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ABSTRACT

This is one of four performance assessment resources booklets for Level III of the Intermediate Science Curriculum Study (ISCS). The four booklets are considered one of four major subdivisions of a set of individualized evaluation materials for Level III developed as a part of the ISCS Individualized Teacher Preparation (ITP) program. Each of these booklets, which accompanies a pair of the student texts, is a teacher's handbook to be used in identifying the appropriate performance checks with which to evaluate each student. Each also indicates how to set up testing situations, correct responses, and give remedial help. This manual covers Winds and Weather (WW) and Crusty Problems (CP) in three units. Each unit begins with a summary table that includes the objectives and performance checks of the unit. Immediately following each table comes the bulk of resource material for each objective introduced in that unit. Suggestions of ways teachers can use the manual are also included. (HM)

INTERMEDIATE SCIENCE CURRICULUM STUDY

ISCS

INDIVIDUALIZED TESTING SYSTEM

Performance Assessment Resources

ISCS LEVEL III

WW-CP

SILVER BURDETT
GENERAL LEARNING CORPORATION
Morristown, New Jersey . Park Ridge, Ill. . Palo Alto . Dallas . Atlanta

INDIVIDUALIZED TESTING SYSTEM

ALL LEVELS	**Individualizing Objective Testing** (an ITP module) **Evaluating and Reporting Progress** (an ITP module)
LEVEL I	**Performance Objectives,** ISCS Level I **Performance Checks,** ISCS Level I, Forms A, B, and C **Performance Assessment Resources,** ISCS Level I, Parts 1 and 2
LEVEL II	**Performance Objectives,** ISCS Level II **Performance Checks,** ISCS Level II, Forms A, B, and C **Performance Assessment Resources,** ISCS Level II, Parts 1 and 2
LEVEL III	**Performance Objectives,** ISCS Level III **Performance Checks,** ISCS Level III, ES-WB, Forms A, B, and C WYY-IV, Forms A, B, and C IQ-WU, Forms A, B, and C WW-CP, Forms A, B, and C **Performance Assessment Resources,** ISCS Level III, ES-WB WYY-IV IO-WU WW-CP

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FOREWORD

To implement an educational approach successfully, one must match the philosophy of evaluation with that of instruction. This is particularly true when individualization is the key element in the educational approach. Yet, as important as it is to achieve this match, the task is by no means simple for the teacher. In fact, without specific resource materials to help him, he is apt to find the task overwhelming. For this reason, ISCS has developed a set of individualized evaluation materials as part of its Individualized Teacher Preparation (ITP) program. These materials are designed to assist teachers in their transition to individualized instruction and to help them tailor their assessment of students' progress to the needs of all their students.

The two modules concerned with evaluation, *Individualizing Objective Testing* and *Evaluating and Reporting Progress*, can be used by small groups of teachers in in-service settings or by individual teachers in a local school environment. Hopefully, they will do more than give each teacher an overview of individualized evaluation. These ITP modules suggest key strategies for achieving both subjective and objective evaluation of each student's progress. And to make it easier for teachers to put such strategies into practice, ISCS has produced the associated booklets entitled *Performance Objectives, Performance Assessment Resources,* and *Performance Checks.* Using these materials, the teacher can objectively assess the student's mastery of the processes, skills, and subject matter of the ISCS program. And the teacher can obtain, at the moment when they are needed, specific suggestions for remedying the student's identified deficiencies.

If you are an ISCS teacher, selective use of these materials will guide you in developing an individualized evaluation program best suited to your own settings and thus further enhance the individualized character of your ISCS program.

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THE ISCS INDIVIDUALIZED TESTING SYSTEM

The ISCS individualized testing system for each level of ISCS is composed of four major subdivisions:

1. The ITP modules *Evaluating and Reporting Progress* and *Individualizing Objective Testing*,
2. *Performance Objectives*,
3. *Performance Checks* in three alternate forms, and
4. *Performance Assessment Resources*.

Evaluating and Reporting Progress presents a comprehensive overview, with many refinements, for individualizing the grading and reporting of students' progress, based on both subjective and objective criteria. The module *Individualizing Objective Testing* describes more specifically those ISCS evaluation materials which have objective criteria – the performance objectives, checks, and resources – and it presents practical suggestions for their use. These two modules should be considered prerequisite to successful use of the other ISCS evaluation materials.

Each of the *Performance Objectives* booklets contains a composite list of selected measurable objectives considered important to a given level of the ISCS program. However, many of the long-range goals and aims that are at the heart of the ISCS program do not lend themselves to being expressed as measurable performance objectives. Thus, these booklets should not be construed as being all-inclusive anthologies of all the possible learning outcomes of ISCS.

Each of three *Performance Checks* booklets contains an equivalent but alternative set of performance checks which were developed to assess the students' achievement of the objectives stated in the *Performance Objectives* booklets.

The *Performance Assessment Resources* booklet is a teacher's handbook to be used in identifying the appropriate performance checks with which to evaluate each student. The booklet also indicates how to set up testing situations, correct responses, and give remedial help.

NOTES TO THE TEACHER

An overview of evaluation, including both objective and subjective criteria, is given in the module *Evaluating and Reporting Progress* and many aspects of this booklet are described in more detail in Chapter 3 of the module *Individualizing Objective Testing*. These notes are meant to augment, not replace, Chapter 3 of that module. As you use this booklet, you will begin to see ways to modify its suggestions to meet your needs better. You are encouraged to enter your modifications at the points at which they apply. Only by altering these materials will you evolve an evaluation system best suited to your own classroom environment. It is important to remember that only principles involved in objective criterion-referenced evaluation are applied in this booklet. Therefore, you will obviously want to incorporate subjective criteria also.

Texts, Units, and Chapters

There are four *Performance Assessment Resources* booklets for Level III of ISCS. Each of these booklets accompanies a pair of the student texts. The pairs of texts and their abbreviated symbols are as follows:

Environmental Science - Well-Being (ES-WB)
Why You're You - Investigating Variation (WYY-IV)
In Orbit - What's Up? (IO-WU)
Winds and Weather - Crusty Problems (WW-CP)

The testing materials for each text are divided into units, thus breaking up each Level III text into easily handled sections of correlative chapters and related excursions or resources. The relationships between the units and the chapters of *Winds and Weather* and *Crusty Problems* are shown in Table 1.

TEXT	UNIT	CHAPTERS
WW	1	1 and 2
WW	2	3 and 4
WW	3	5 thru 7
CP	1	1
CP	2	2
CP	3	3
CP	4	4

Table 1

Most units include the objectives and performance checks for one or two chapters and their related excursions or resources. You will recall that the number before the hyphen in the identification number for an excursion states the chapter to which it is related. The identification number of each resource is a one- or two-digit number which does not identify the chapter to which it is related. The individual objectives and performance checks for each unit are to be selected and used when the student has completed the designated chapters and any excursions or resources he wishes to do. This delay should ensure that there is no premature assessment of the student's achievement of concepts and skills which may be introduced early in a unit, but which require development throughout the unit. Thus, subdividing units for assessment purposes should be done with great care. Keep this in mind if you decide to spot check students as they proceed through units, rather than conducting a formal evaluation at the end of the unit.

Summary Table

Each unit begins with a double-spread "Performance Check Summary Table." The left-hand page of the "Summary Table" serves as a table of contents for the unit. It provides a great deal of information about the objectives pertinent to the unit. Usually about twenty-five objectives for each unit are introduced for the first time in each "Summary Table." A maximum of ten relevant objectives from previous units are reintroduced.

On the left-hand side of the "Summary Table" is a list of code numbers, each of which is unique to one objective within the level. Two examples of code numbers and their meaning are illustrated in Figure 1 below.

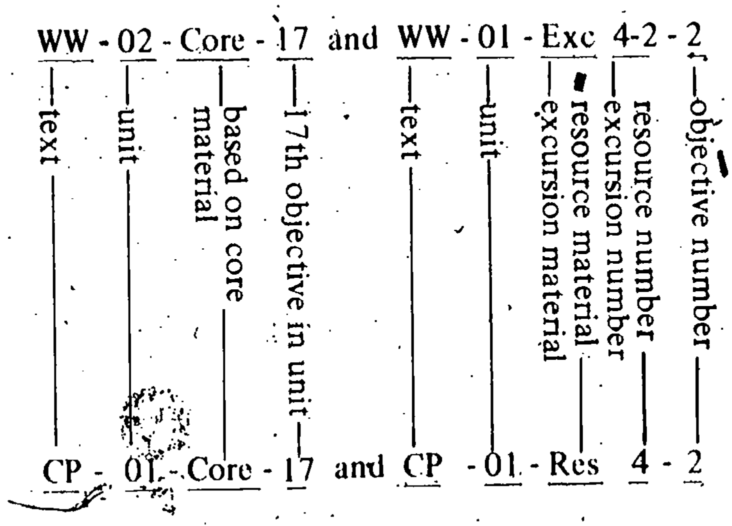


Figure 1

The core objectives appear first in an order that corresponds roughly to the text development. Exceptions to this ordering were made to place objectives based on related processes or content together. Objectives based on remedial excursions are numbered as core objectives because they involve skills essential to success in core activities. Next are listed the general or enrichment excursion objectives or the resource objectives, and these are followed by objectives from prior units which are again considered important to the students' progress. These repeated objectives are easily spotted, as a capital R (for Repeated) appears after their identifying code number, giving a listing such as WW-02-Core-17R. The specific resource aids to be used with repeated objectives are given in the units designated by the code number (unit 2 in the just-cited example), and the information is not repeated each time within the textual material that follows the "Summary Table."

Each objective code number is followed by a short descriptive statement of that objective. These short statements were written, using the students' vocabulary. They should be helpful in communicating the objectives to the students should you desire to do so. Ways to involve your students in selecting the objectives are discussed in the module *Individualizing Objective Testing.*

The right side of the "Summary Table" is made up of eleven columns. Letters are used in the first five to designate the characteristics of the performance check. The letters and their meanings are as follows:

M - Completing the check requires regular ISCS materials.
O - An observer should view the student's performance as he does the check.
P - Completing the check requires the use of specially prepared materials.
Q - The answer to the check is of the quick-scoring variety.
T - The check will require more than three minutes of the student's time.

Check marks in the next four columns help the teacher assign appropriate performance checks to individual students. The first of these columns is entitled "Basal." Achieving the objectives checked in this column is considered essential to the student's progress. These performance checks may be assigned to any student; however, better students will find that many of these offer little or no challenge.

Check marks in the columns headed "Math," "Reading," and "Concept" indicate performance checks which require a higher level of computational skills, a higher reading level, or a greater ability to think abstractly than the performance checks for most other objectives. Performance checks which have no marks in any of these four columns are considered to be more than basal, but the skills which they require are within the capabilities of most students.

A tenth column lists the action verb that identifies the theoretical mental process required of the student to complete the performance check for the objective. A precise definition of each of the verbs used to designate mental processes is given in the module *Individualizing Objective Testing.*

Finally, in the eleventh column, space is provided for notes. Although you will find an occasional comment printed here, this space is mainly for your notes. It's a good place to put any special instructions or preparations you have found helpful.

As mentioned earlier, some objectives are repeated objectives – ones that have appeared in previous units. When such an objective is listed again in the "Summary Table," its classification as basal or as presenting math, reading, or conceptual difficulties is likely to be different. This change most often derives from a change in purpose. The first time a concept or skill is introduced, the intent may be only to introduce students to it. When reintroduced in a later unit, the skill or concept is frequently developed and used extensively. Thus, in the "Summary Table" for the earlier unit, objectives related to a concept are likely to be classified as conceptually difficult for many students, whereas in the later units, the same objective might be reclassified as basal.

Organization of Resources

Immediately following each "Summary Table" comes the bulk of the resource material for each objective introduced in that unit. Once more, each objective is identified by its code number, but this time it appears in bold, black print in the outer margin directly beside the applicable resource. A pair of horizontal lines separates the resources for each objective from those for the previous and following objectives. When no horizontal line appears at the bottom of a page, the resource material for the objective is continued on the next page.

The functions of the various component resources provided for the objectives are listed below. Two of the components (Regular Supplies and Special Preparations) appear only when they are needed for a particular check. When the performance check does not require any supplies, the supply headings are omitted. Observe the functional descriptions carefully – they are the keys to the types of resource materials provided in the *Performance Assessment Resources* booklet.

COMPONENTS	FUNCTION
Descriptive Statement	This statement duplicates the ones that appears in the "Summary Table." If you misread a code number and find yourself looking at material for the wrong objective, this should stop you and send you back to the Table to check. More important, it should briefly indicate to you the basic purpose of the objective.
Objective	The underlined verb in this statement of the objective indicates the theoretical mental process that the student will perform. The phrase following it indicates the content or process skill which the student must perform. A complete description of the verbs and their meanings can be found in the ITP module *Individualizing Objective Testing*.
Regular Supplies	This section lists any ISCS equipment that the student will need – regular equipment that is being used in the unit on which the student is being evaluated or in previous units.
Special Preparations	Don't overlook this section. It lists and describes materials the teacher must collect or prepare in some way. Included are special solutions, special packaging, and labels required for materials for evaluation purposes. The section also specifies particular grids, charts, or maps that the students will need to complete the check.

Student Action	This is a general description of what the student should do in responding to any of the three performance checks based on the objective. If his expected response is to state a general principle, it is listed in this section. If the three performance checks require specific answers, they are provided below the general statement in the student action.
Performance Check A	Performance Check A is fully stated to allow for a quick review of the statement of the tasks as they are presented to the student. Performance Checks B and C generally present slightly different situations or wording but ask students to perform equivalent tasks.
Remediation	This final section outlines suggested action that can be taken if the student fails to achieve the objective. In some of the remediations, the listed steps are sequential; in others the steps represent options from which it is suggested that you select one or two. Some remediations suggest referring the student to review sections of the core, doing an excursion, doing a resource, or reviewing a self-evaluation question and its response.

How To Find It

Locating a particular objective whose number you know is easy. Just thumb through the pages watching for the unit number which appears in large black print above the word *core*, *excursion*, or *resource* in the margins. But suppose you wish to locate an objective pertinent to a given section or chapter of the text and you don't know the number. Here is a procedure to follow:

1. Determine the unit in which the chapter occurs, using Table 1.
2. Thumb through this booklet until you find that unit number as the beginning digits of any code number appearing in large black print in the outer margin.
3. Look for the "Summary Table" at the beginning of that unit.
4. Use the "Summary Table" to determine the number of the objective you seek.

Be Selective

The resource books for each level contain many more objectives and resources than any one teacher can use. If you add objectives and resources, and you probably will, your list will expand further. The most successful user of this catalog will be the teacher who picks and chooses selectively to meet the specific needs of his students. Therefore, once you are familiar with this book, it is imperative that you establish a system of selecting and assigning checks to the student. Suggestions on how to establish this are given in Chapter 3 of *Individualizing Objective Testing*.

Whatever selection and assignment system you develop, it must give due regard to the individual student's differences. For example, if you administer too many recall performance checks to a high-ability student, he will not only be bored but you will also fail to assess his progress adequately. Too many difficult items administered to a low-ability student leads to frustration and reinforcement of the "I knew I couldn't do it" attitude. On the other hand, even the best students need their egos inflated by some questions that they can answer easily. And, the less able student needs to be appropriately challenged. Be careful, too, of placing too much emphasis on objectives. This may lead students to place undue emphasis on tests, thus slowing their progress to the extent that they lose interest in the story line.

Assigning Performance Checks

How many performance checks should be assigned to a student? This question has no fixed answer. The primary concern is that performance checks provide the needed feedback to both you and the student. If, in your judgment, evaluating a student on a particular unit is unnecessary, then don't do it. If you feel a student needs to be evaluated, then assign an appropriate selection of performance checks. *Individualizing Objective Testing* makes suggestions about how to do this. In no case should any student be assigned all the performance checks or even a random sampling of them. Such a practice would subject the student to tasks which would be either unduly difficult and time-consuming or perhaps too simple for him and therefore meaningless, time-wasting activities.

You may wish to specify the equivalent form (A, B, or C) of performance checks that the student should do when assigning the specific performance check numbers. There is, of course, no difference in their difficulty level. In any case, have the student record both the number and the letter of the specific performance check he does. These numbers and letters should appear on his answer sheet, as they will be needed to check his response. Since the numbers are unique within each ISCS level, there is no need to use a student's time copying the performance checks. Listing the number with the response is sufficient. It's a good idea to remind students frequently that their answers must go on separate paper – not in the *Performance Checks* books.

As you assign checks, keep the supply situation in mind. You won't want too much of some equipment tied up in Special Preparations at any one time. To avoid this, keep abreast of the range of your students' progress and prepare only those materials you anticipate needing, referring to the P's appearing in the third column on the right-hand page of the "Summary Table." Batteries, of course, will need replacement or recharging occasionally, and specially boxed supplies should be checked periodically for missing or nonfunctioning parts.

At the back of the *Performance Assessment Resources*, you will find grids, charts, and maps identical to those the students must use in certain performance checks. The grids, charts, and maps at the back are suitable for reproduction. You may make copies directly, using one of the well-known commercial copiers. For large quantities at low cost, make a master by the thermo process and use it to make duplicates. If you make copies in either of these ways, your students will not be wasting time drawing grids, charts, and maps, and you will feel free to assign objectives that need these.

Winds and Weather **WW**

WW 01

Chapters 1 and 2 — Performance Check

Excursions 1-1 thru 2-3 — Summary Table

Objective Number	Objective Description
WW-01-Core-1	Relates water temperature to air-particle distribution
WW-01-Core-2	Recognizes the relationship between spacing of particles and heating
WW-01-Core-3	States the effect of radiant energy on wet and dry surfaces
WW-01-Core-4	Compares the energy absorption of dark- and light-colored surfaces
WW-01-Core-5	Compares graphs of the effect of radiant energy on wet and dry surfaces
WW-01-Core-6	Indicates the sequence of the sun's effect on the earth's surface and air
WW-01-Core-7	Recognizes the effect of different surfaces on air temperature
WW-01-Core-8	Explains the airborne behavior of a floating object
WW-01-Core-9	Describes a plan to determine the order of surface and air heating
WW-01-Core-10	Makes weather-instrument readings
WW-01-Core-11	Selects a controllable variable in weather watching
WW-01-Core-12	Explains the need for time-controlled weather measurements
WW-01-Core-13	Makes readings from a weather-instrument diagram
WW-01-Core-14	Recognizes cloud types from diagrams
WW-01-Core-15	Draws the symbols which represent varying amounts of cloud cover.
WW-01-Core-16	Draws the symbol indicating the fraction of cloud cover
WW-01-Core-17	Explains why scientists use symbols
WW-01-Core-18	Converts inches of snowfall to inches of rainfall

	Materials	Observer	Special Preparations	Quick Score	3 + Minutes	Basal	Math.	Reading	Concept	Action Verbs	Notes
						√				applies	
						√				applies	
				Q						applies	
						√				applies	
										applies	
				Q		√				applies	
				Q						applies	
										generates	
					T					generates	
			P			√				applies	
				Q		√				applies	
										generates	
				Q		√				applies	
				Q						identifies	
				Q						recalls	
				Q						applies	
						√				generates	
				Q						applies	

WW 01

Objective Number	Objective Description
WW-01-Core-19	Cleans up the work area at the close of class
WW-01-Core-20	Cooperates with lab partners
WW-01-Core-21	Returns equipment promptly to storage areas
WW-01-Core-22	Responds to text questions
WW-01-Core-23	Shows care for laboratory materials
WW-01-Exc 1-1-1	Selects a device to stop the descent of a hot-air balloon
WW-01-Exc 1-1-2	Relates temperature to the lifting force of an enclosed gas
WW-01-Exc 1-1-3	Describes how to find the relationship between the lifting force of a gas and its
	temperature
WW-01-Exc 2-1-1	Names wind direction from a diagram
WW-01-Exc 2-1-2	States the wind direction from wind data
WW-01-Exc 2-1-3	Indicates the sequence of observations according to increasing wind speed
WW-01-Exc 2-2-1	Defines the prefix *alto*
WW-01-Exc 2-2-2	Names cloud types in photographs
WW-01-Exc 2-3-1	Uses a table to convert temperatures from one scale to another
WW-01-Exc 2-3-2	Converts miles per hour to kilometers per hour
WW-01-Exc 2-3-3	Converts inches to centimeters

	Materials	Observer	Special Preparations	Quick Score	3 + Minutes	Basal	Math	Reading	Concept	Action Verbs	Notes
		O				√				chooses	
		O				√				chooses	
		O				√				chooses	
		O				√				chooses	
		O				√				chooses	
				Q		√				applies	
									√	applies	
										generates	
				Q		√				applies	
				Q						applies	
				Q		√				applies	
				Q						recalls	
			P							identifies	
				Q		√				applies	
				Q			√			applies	
				Q			√			applies	

WW 01 Core 1

Relates water temperature to air-particle distribution.

The student applies the concepts of the relationship between air and water temperatures and the relationship between air temperature and air-particle distribution.

Student Action: Selecting the diagram which shows the particles closer together above the water when the water is identified as cold or the particles farther apart above the water when the water is identified as hot and stating, in effect, that air above water tends to assume the temperature of the water below it and that air particles over the water are farther apart when the air is warm than when the air is cool.

A: b
B: a
C: c

Performance Check A: Alice placed a tray of ice water in her sealed observation box, as shown below. The dots represent air particles.

Diagram a.

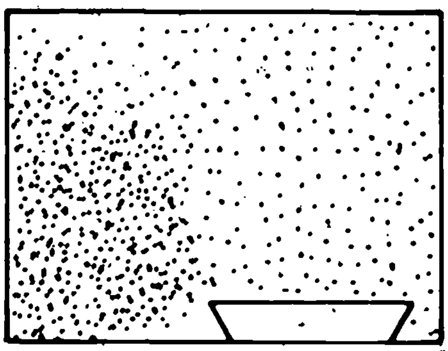


Diagram b.

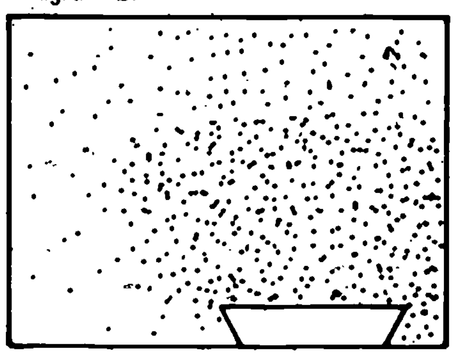
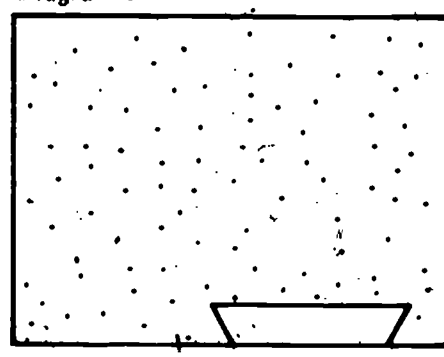


Diagram c.



1. Which of the diagrams best shows how the air particles will be distributed in her observation box?
2. Explain the reason for your choice.

Remediation: (1) Suggest that the student review Activities 1-3, 1-4, and 1-5, questions 1-1, 1-2, and 1-3, and Figure 1-1. (2) Ask him how he can explain the upward movement of air above hot water or the air's downward movement above cold water. (3) If he doesn't know how particles are distributed in warm air or in cold air, see the Remediation for WW-01-Core-2.

WW 01 Core

Recognizes the relationship between spacing of particles and heating.

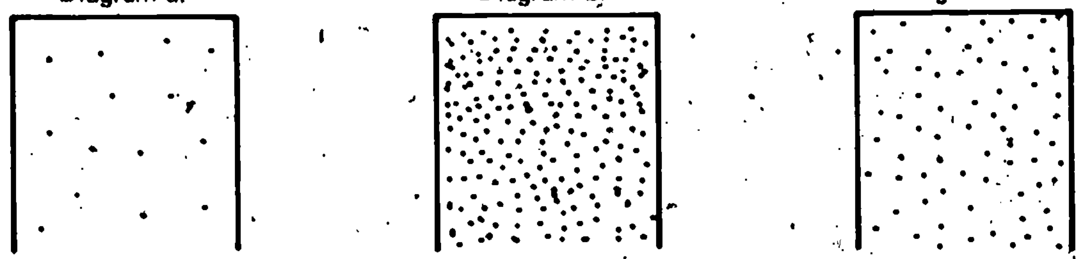
The student applies the concepts that in a heated substance, the particles move faster and that the more frequent collisions which result tend to force the particles farther apart.

2

Student Action: Selecting the container with the greatest particle separation as the one which contains the warmest air and stating the essence of the concept that in a heated substance, particles move faster and that the more frequent collisions which result tend to force the particles farther apart.

A: a
B: c
C: b

Performance Check A: The diagrams below show three paper bags containing air. They are open at the bottom. The small dots represent air particles.



1. Which bag contains the warmest air?
2. Explain your answer in terms of the things the particle model says about heat and matter particles.

Remediation: (1) Have the student review Activity 1-7 and Figure 1-2 on page 6. (2) Review his answers to questions 1-7 and 1-8 on pages 5 and 6 and, if necessary, discuss Activity 1-7 and Figure 1-2 with him. (3) Refer him to Self-Evaluation 1-2 on pages 32 and 33 of the *Record Book*. (4) If a Level I or a Level II text is available, you will find the particle model presented in Chapter 21 of the Level I text and in Part B of Excursion 1-1 in the Level II text. Refer the student to one of them.

WW 01 Core 3

States the effect of radiant energy on wet and dry surfaces.

The student applies the concept that the temperatures of some substances change more than those of other substances when the same amount of radiant energy strikes them.

Student Action: Selecting the item that indicates that the wet surface would have a lower temperature.

A: d
B: b
C: d

Performance Check A: Sometimes a lifeguard will spray water on the tiles around the pool area. A good reason for his action would be that

a. he owns stock in the local water company.
b. he wants to make the tiles slippery so that children will stop running around the pool.
c. he knows the water will absorb energy and make the tiles hotter.
d. he knows that water spread on the tiles will cool the tiles, making them more comfortable for the swimmers.

Remediation: (1) Refer the student to Table 1-1 and to Activity 1-11 on pages 8 and 9, in which he examined temperature changes caused by the same amount of light energy. (2) Review his answers to questions 1-11 and 1-12 on page 10. (3) Review his answer to Self-Evaluation 1-3 on page 1 of the *Record Book*.

WW 01 Core 4

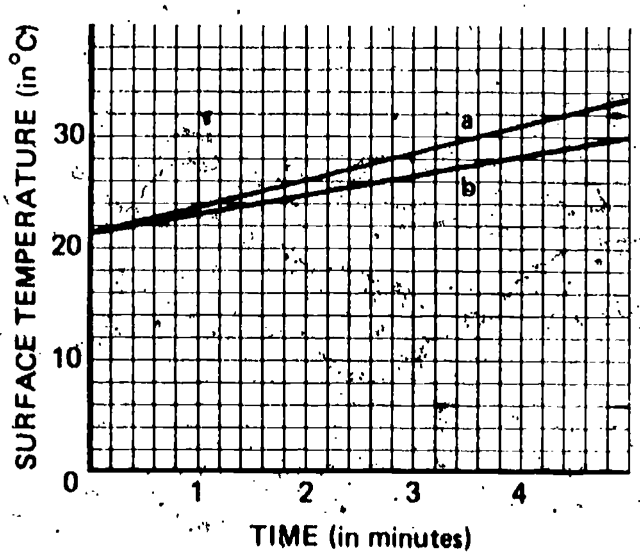
Compares the energy absorption of dark- and light-colored surfaces.

The student applies the concept that surfaces of different colors absorb radiant heat energy at different rates.

Student Action: Selecting the graph (line) which shows the slower rate of increase in temperature as the graph (line) for the light-colored surface and stating the effect of the concept that dark-colored surfaces absorb radiant heat energy more readily than do light-colored surfaces.

A: b
B: a
C: b

Performance Check A: Hank placed two dry substances in sunlight and measured their surface temperatures several times. One substance was white sand and the other black sand. He plotted their surface temperatures on the grid shown below.



1. Which graph (line), a or b, represents the surface temperature of the white sand?
2. Explain your choice.

Remediation: (1) Refer the student to Activity 1-11 on page 8 of the text and to Table 1-1 on page 2 of the *Record Book.* (2) Check his completion of Figure 1-4 and his response to question 1-9. (3) In Figure 1-4, have him compare his plot for dry sand to that for dry charcoal by interpreting those graphic results. (4) If a Level I or Level II text is available, have the student review Excursion 17 of Level I or Excursion 7-1, Part B, of Level II, both of which deal with interpretation of graphs.*

WW 01 Core 5

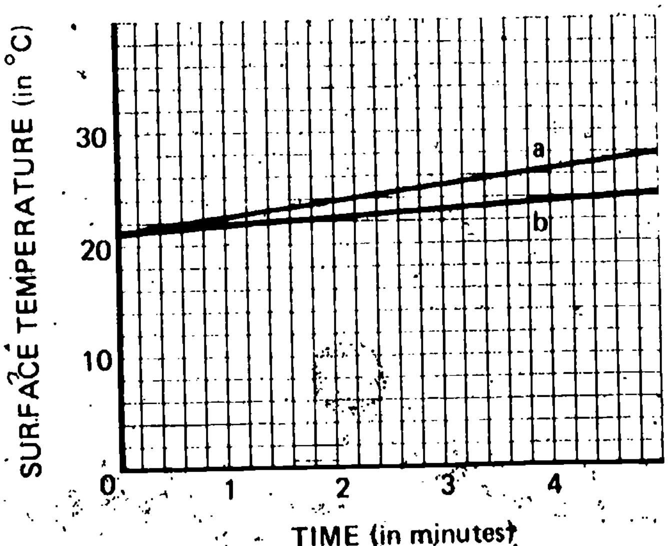
Compares graphs of the effect of radiant energy on wet and dry surfaces.

The student applies the concept that radiant energy heats wet and dry surfaces of the same material at different rates.

Student Action: Selecting the graph (line) which shows the smaller rate of increase in temperature and stating the effect of the concept that radiant energy warms wet surfaces of a material more slowly than dry surfaces of the same material.

A: b
B: b
C: a

Performance Check A: Joanne placed two containers of sand, one wet and one dry, in sunlight. She measured the surface temperatures of the two containers and plotted her data as shown below.



1. Which of the two graphs (lines), a or b, represents the surface temperature of the wet sand?
2. Explain your answer.

Remediation: (1) If the student explains the effect in terms of evaporation acting as a cooling process or states another logical reason, accept it. (2) Refer the student to Activity 1-11 on page 8 of the text and to Table 1-1 on page 2 of his *Record Book*. (3) Check his completion of Figure 1-4 and his response to question 1-11. (4) In Figure 1-4, have him compare his plot for dry sand to that for wet sand by interpreting their graphic results. (5) If a Level I or a Level II text is available, suggest that the student review Excursion 17 of Level I or Excursion 7-1, Part B, of Level II, both of which deal with the interpretation of graphs.

WW 01 Core 6

Indicates the sequence of the sun's effect on the earth's surface and air.

The student applies the concept that solar radiation causes differential heating of the earth's surface which, in turn, causes differential heating of the air above the surface, resulting in up-and-down motion of the air.

Student Action: Arranging the events to reflect the following order: (1) the sun warms the land and water surfaces, (2) the land and water temperatures rise at different rates, (3) the air temperature above the land warms faster than the air temperature above the water, and (4) the air begins to move in an up-and-down motion.

A: 2, 4, 3, 1
* **B:** 4, 1, 2, 3
C: 3, 2, 1, 4

Performance Check A: Arrange the following events in the order in which they occur.

1. An up-and-down motion of the air above the beach and the water
2. The sun heating the beach and the water
3. The air above the beach warming faster than the air above the water
4. The beach and the water warming at different rates

Remediation: (1) Suggest that the student review his results from Problem Break 1-1 and his responses to questions 1-14 and 1-15 on page 3 of the *Record Book*. (2) Also have him review page 12. (3) Have him do an alternate performance check and, if necessary, discuss its sequence of events with him.

WW 01 Core 7

Recognizes the effect of different surfaces on air temperature.

The student applies the concepts that a dark-colored surface warms up more than a light-colored surface, that a dry surface warms up more than a moist or wet surface, and that air above a warm surface is warmer than air above a cool surface.

Student Action: Predicting that the air will be warmest above a dry, dark-colored surface.

A: c
B: a
C: b

Performance Check A: Roger went outside on a sunny, windless day to measure the temperature of the air in various unshaded places around the school. He measured the air temperature above the following surfaces.

a. The light-colored concrete sidewalk
b. The grass-covered football field
c. The black asphalt basketball court
d. The moist, black earth of the school's garden

Above which surface would he record the highest air temperature?

Remediation: (1) Discuss the results of Problem Break 1-1, page 11, with the student. Have him describe the surfaces above which the air temperature was warmest and coldest. (2) If he did not compare the air temperatures above dry and wet surfaces and above light- and dark-colored surfaces in Problem Break 1-1, suggest that he do so now. (3) Review his answer to Self-Evaluation 1-4. (4) Have him do an alternate check.

WW 01 Core 8

Explains the airborne behavior of a floating object.

The student generates an explanation of the behavior of an object in a column of rising air resulting from uneven heating of the earth's surface.

Student Action: Stating an explanation which includes the idea that an object in a column of rising air, the result of uneven heating of the earth's surface, will be supported or lifted by that rising air.

Performance Check A: One day Tina noticed a peculiar thing. A large bird was circling over a field nearby. Although the bird did not flap its wings once during the ten minutes she watched it, it kept rising higher and higher in the sky. How was it possible for the bird to stay up and even to rise without flapping it wings?

Remediation: (1) Refer the student to Figure 1-5 on page 13 and have him describe the motion of the glider shown there. (2) Review his answer to question 1-5 and, if necessary, discuss the effects that up-and-down motion of air has on birds or aircraft.

WW 01 Core 9

Describes a plan to determine the order of surface and air heating.

The student generates a description of a plan to measure the order in which surface and air heat.

Student Action: Describing a plan that includes measuring both the air and surface temperatures to determine which heats first.

Performance Check A: Dick and Janet were having an argument. Janet said that energy from the sun first heats a dark-colored surface and that this warm surface then heats the air above it. Dick argued that the sun's energy heated the air first and this hot air then heated the surface below it. State a plan to find out who is correct.

Remediation: (1) Discuss the check with the student. Have him tell you what the check is asking for and question him as to how he would find out the answer. (2) Have him redo the check.

WW 01 Core 10

Makes weather-instrument readings.

The student applies the procedure for reading the weather instrument, which includes reading the wind speed as shown by the position of the wind-speed indicator, reading the wind direction as shown by the pointer on the wind-direction indicator, reading the temperature on the thermometer, and reading the amount of precipitation as shown by the level of the water in the rain gauge.

Special Preparations: Set up the weather instrument by filling the rain gauge with water to a particular reading and by setting the wind-speed arm at a particular reading and taping it in place. Vary these readings occasionally, but keep the total rain indicator constant at zero.

Student Action: Recording wind speed within ±3 mph, the direction of the wind correct to the nearest lettered compass bearing, the temperature correct to the nearest whole degree, and the amount of rainfall within ±0.2 inch.

Performance Check A: Go to the weather instrument that your teacher has set up in the classroom. Make the readings from the weather instrument, and record them on your answer paper.

Remediation: (1) Suggest that the student review pages 16 and 17, where the directions are given for use of the ISCS weather instrument. (2) If the student has difficulty measuring wind speed or direction, suggest that he do Excursion 2-1. (3) Have him redo the check. If he still has difficulty, help him use the weather instrument properly.

WW 01 Core 11

Selects a controllable variable in weather watching.

The student applies the concept that separate weather measurements are variables which cannot be controlled.

Student Action: Selecting the entry "time of day you take the readings" as the only listed variable which can be controlled.

A: a
B: e
C: d

Performance Check A: The following variables are involved in weather watching. Which of these variables can be controlled?

a. Time of day you take the readings
b. Wind speed
c. Wind direction
d. Temperature
e. Inches of rainfall

Remediation: (1) Have the student review page 15, where this concept is introduced. (2) Discuss together the variables in Table 2-1 which can be controlled and those which cannot be controlled.

WW 01 Core 12

Explains the need for time-controlled weather measurements.

The student generates an explanation for the necessity of making weather-watch measurements at the same time each day.

Student Action: Stating an explanation which includes the ideas that weather measurements change with the time of day as well as with the kind of weather and that unless measurements are made at the same time each day, they are not comparable.

Performance Check A: State why you should make your weather-watch measurements at the same time each day.

Remediation: (1) Discuss with the student the need for reading weather measurements at the same time each day. Include in your discussion those variables listed in Table 2-1 on page 17. Ask him if any of the variables listed would vary systematically for each 24-hour period. (2) If possible, secure a table of readings for different times of day and have them available.

WW 01 Core 13

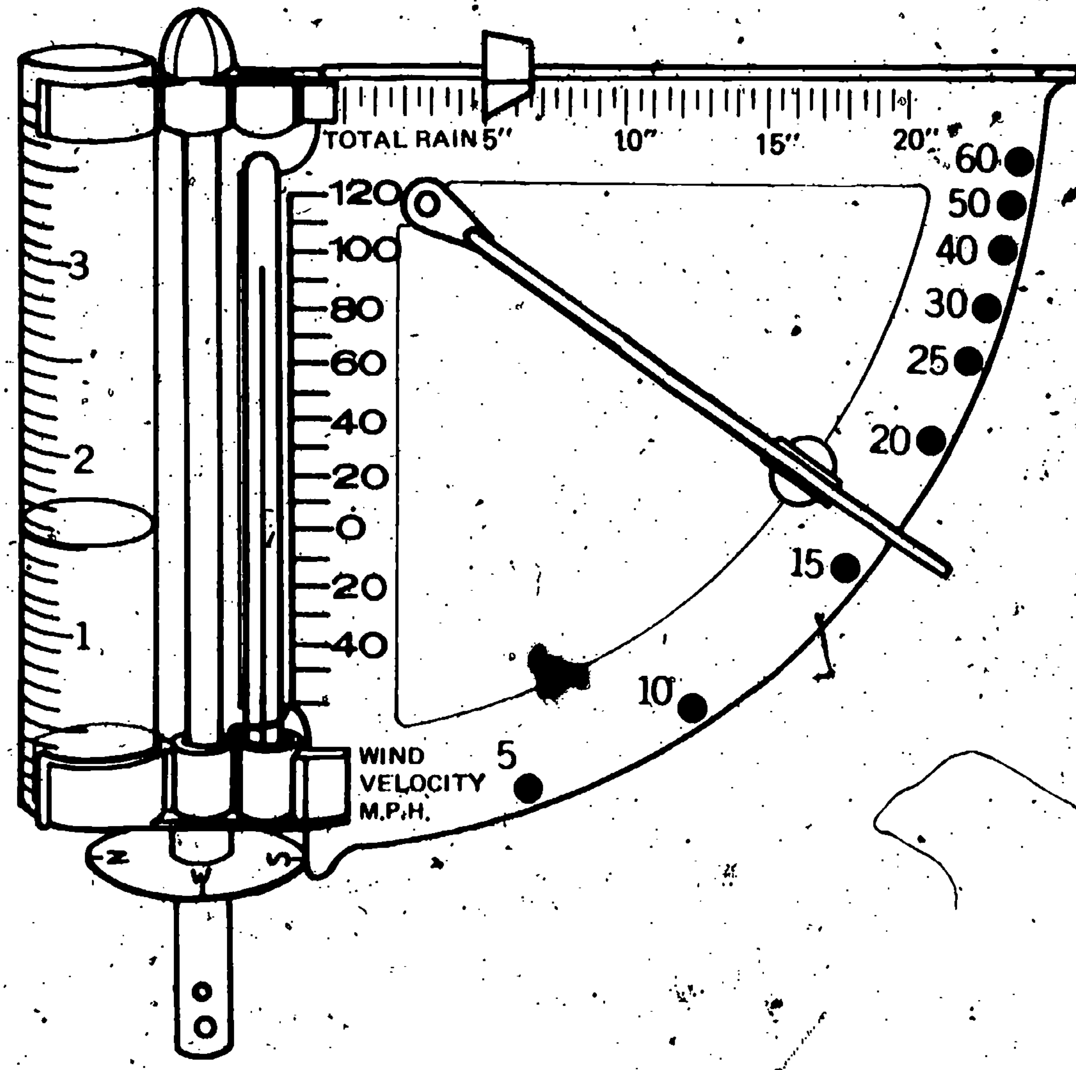
Makes readings from a weather-instrument diagram.

The student applies the procedure for reading the weather instrument, which includes reading the wind speed as shown by the position of the wind-speed indicator, reading the wind direction as shown by the pointer on the wind-direction indicator, and reading the amount of precipitation as shown by the level of the water in the rain gauge.

Student Action: Stating the wind speed within ±3 mph, the wind direction to the nearest lettered compass bearing, and the amount of rainfall within ±0.2 inch.

A: 1. 17 ±3 mph, 2. S, 3. 1.5 ±0.2 inches
B: 1. 28 ±3 mph, 2. N, 3. 3.5 ±0.2 inches
C: 1. 32 ±3 mph, 2. E, 3. 2.5 ±0.2 inches

Performance Check A: Use the diagram of the weather instrument below to answer the three questions that follow.



1. What is the wind speed?
2. What is the wind direction?
3. How much precipitation has there been since the last reading?

Remediation: (1) Have the student do or review Excursion 2-1 on pages 103 through 105. (2) Review his answers to Self-Evaluation 2-1 A, B, and C on pages 35 and 36 of the *Record Book*.

WW 01 Core

Recognizes cloud types from diagrams.

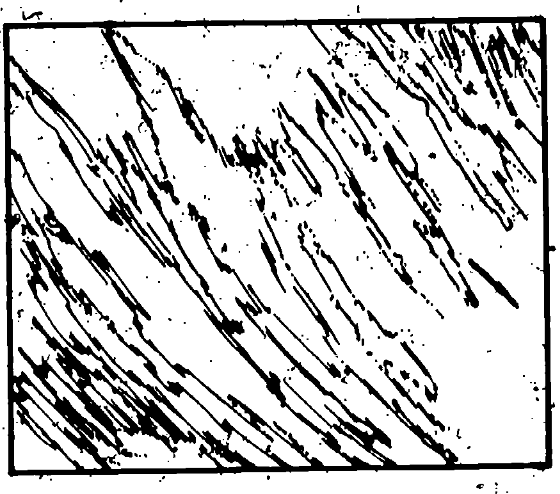
The student identifies different types of clouds.

Student Action: Naming correctly the cloud type shown in each diagram as follows: (1) the fluffy-topped, flat-bottomed clouds as cumulus, (2) the heavy, thick, layered clouds as stratus, and (3) the thin, wispy clouds as cirrus. Consider a student's answer correct even if it contains a prefix or suffix in addition to the correct cloud type.

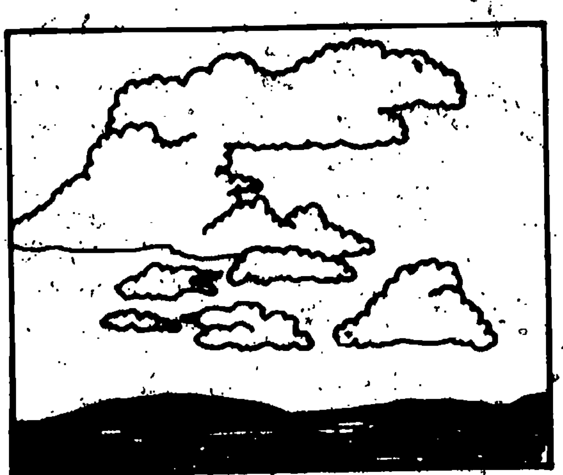
A: 1. cirrus, 2. cumulus, 3. stratus
B: 1. cumulus, 2. stratus, 3. cirrus
C: 1. stratus, 2. cirrus, 3. cumulus

Performance Check A: Identify the type of cloud shown in each diagram below.

Cloud Type 1.



Cloud Type 2.



Cloud Type 3.

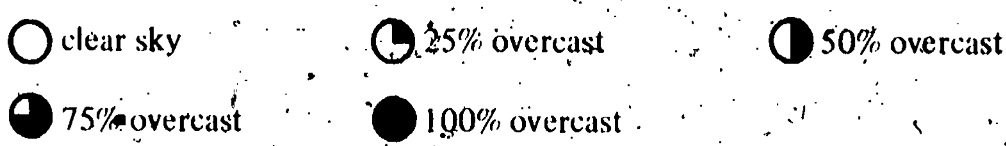
Remediation: (1) Suggest that the student review Figures 2-2a, 2-2b, and 2-2c on pages 18 and 19. (2) Review his answers to Self-Evaluation 2-2, parts A and B on pages 36 and 37 of the *Record Book.*

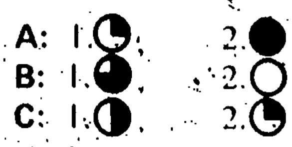
WW 01 Core 15

Draws the symbols which represent varying amounts of cloud cover.

The student recalls the symbols that are used to indicate amounts of cloud cover.

Student Action: Drawing correctly the symbols for the amounts of cloud cover specified in accordance with those below. Consider the student's answer correct regardless of the orientation of the symbol.





Performance Check A: Draw the symbols that are used to indicate the following amounts of cloud cover.

1. 25% overcast
2. 100% overcast

Remediation: Have the student review page 19, where the symbols used to represent the amount of cloud cover are given.

WW 01 Core 16

Draws the symbol indicating the fraction of cloud cover.

The student applies the procedure for indicating the amount of cloud cover present, which includes estimating the fraction of the sky covered by clouds to the nearest 25% and symbolizing the fraction covered.

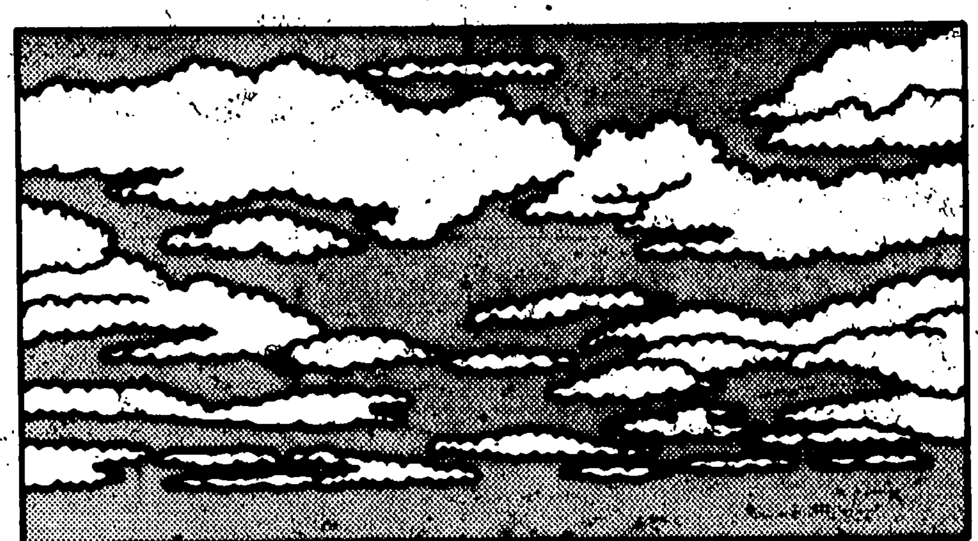
Student Action: Drawing a completely darkened circle if coverage is 100%, a circle three-quarters darkened if coverage is 75%, a circle half darkened if coverage is 50%, a circle one-quarter darkened if coverage is 25%, and an undarkened circle if coverage is 0%. Consider the student's answer correct regardless of the orientation of the symbol.

A: 

B: 

C: 

Performance Check A: Draw the cloud-cover symbol that indicates the amount of cloud cover on the day the following diagram of the sky was drawn.



Remediation: (1) Have the student review the symbols on page 19 for the amount of cloud cover. (2) Review the student's answers to Self-Evaluation 2-2.c and d on pages 36 and 37 of the *Record Book*. (3) Have him do an alternate check.

WW 01 Core 17

Explains why scientists use symbols.

The student generates an explanation for scientists' use of symbols.

Student Action: Stating the essence of the notion that symbols are used as a time-saving device or as a shorthand method of communication.

Performance Check A: You may have noticed that symbols like °C for *degrees Celsius*, Na for the element *sodium*, and % for *percent* are often used in science. Why do scientists use symbols?

Remediation: Ask the student if he would want to write *degrees Celsius* after each temperature he recorded or if he would prefer to write simply the symbol °C. From his answer, lead him to the essence of the objective.

WW 01 Core

Converts inches of snowfall to inches of rainfall.

The student applies the concept that in terms of the amount of precipitation, a particular depth of snow is approximately equivalent to one-tenth that depth of rain.

Student Action: Stating the equivalent amount of rainfall as 0.10 times the number of inches of snowfall.

A: 1.5 inches
B: 3.2 inches
C: 2.8 inches

18

Performance Check A: Scott measured the depth of snowfall to be 15 inches in an area where there had been no drifting. How many inches of rainfall is approximately equivalent to a snowfall 15 inches deep?

Remediation: (1) Refer the student to page 19, where the conversion of inches of snowfall into inches of rainfall is presented. (2) Reassess the objective with an alternate check.

WW 01 Core 19

Cleans up the work area at the close of class.

The student chooses to close the laboratory activity period promptly upon receiving notification of the time to do so.

Student Action: Ceasing the ongoing laboratory activity when notified of the time, returning materials in usable, clean condition to storage, and participating in work area cleanup, on at least three separate occasions when being observed by the teacher or another designated person without his knowledge.

Teacher's Note: The opportunity for assessment of this objective arises almost every day during the course of regularly assigned laboratory activities. Use a few minutes of class time for group instruction early in the school year, and almost every week for reinforcement, to discuss the role of the student in the ISCS learning environment. To encourage personal responsibility in the student, discuss the reasons for his closing his activities promptly (to allow time for himself and others for lab-closing activities), returning materials to storage in clean condition (to facilitate their use by others), and participating in area cleanups (to leave the area as clean as he found it).

Performance Check A: Your teacher will observe you for this check when he can.

Remediation: (1) If a student fails to accept this responsibility, approach him individually and review the reasons for his acceptance of it. Emphasize the social responsibility for cooperation in the learning environment for the good of all students. Point out that he has received the benefit of other students' provisions for others as well as for themselves. (2) Do not, at first, suggest that he may lose his privileges unless he cooperates. But if he doesn't cooperate after you observe his behavior several times, ask him if he can suggest a proper penalty. (3) An alternative remedy may be to request him to assist in the process of overall classroom accounting of the materials for a period of time until he recognizes the importance of the student's role. (4) Do not use extra cleanup as a penalty for not cleaning up properly. In other words, don't use something as a penalty that you want done willingly.

WW 01

Cooperates with lab partners.

The student chooses to cooperate with fellow students in the laboratory.

Student Action: Being polite, waiting his turn, being orderly when moving about, and observing the right of his classmates to work without being unnecessarily disturbed, when observed without his knowledge by the teacher or another designated person on at least three occasions.

Core 20

Teacher's Note: The opportunity for assessment of this objective arises almost every day during the course of regularly assigned laboratory activities. Use a few minutes of class time at the beginning of a session for a whole-group discussion early in the school year and several times later on to discuss the need for cooperation with and consideration of other students. Some particular points for discussion include being polite, waiting patiently, not making others wait longer than necessary, being orderly when moving about, and observing the right of others not to be disturbed. Talk about each student's accepting the personal responsibility for his own behavior in the group situation.

Performance Check A: Your teacher will observe you for this check when he can.

Remediation: (1) If a student fails to accept any of these responsibilities, approach him privately and review the reasons for his lack of cooperation with his fellow students. Suggest that he pay some attention to changing his behavior to more acceptable standards. (2) Find out if the student feels that he is behaving in a less than acceptable way. If so, ask him whether he feels some penalty should be imposed and what he thinks a suitable penalty would be.

WW 01 Core 21

Returns equipment promptly to storage areas.

The student chooses to show personal responsibility for returning laboratory equipment promptly to the proper storage places as soon as it is no longer needed, during the class period, and not just at the end of the period.

Student Action: Returning equipment and materials no longer needed to the proper storage places on at least three occasions when observed by the teacher or another designated observer without his knowledge of being checked.

Teacher's Note: This objective may be assessed at any time the student is responsible for learning activities requiring the use of equipment and supplies. Use a few minutes of class time for group discussion of the reasons for returning equipment to storage areas promptly when it is not being used by the student or by his group. The reasons include (1) the short supply of certain items and the need to cooperate with others, (2) the chances of equipment's being misplaced, (3) the possibility of accidental damage to equipment, and (4) the greater opportunity for pilferage by an irresponsible student when things are disorganized.

Performance Check A: Your teacher will observe you for this check when he can.

Remediation: In a private conference, discuss the reasons for the student's cooperation in this request. Ask for that cooperation. See also Remediations (1), (2), and (3) for WW-01-Core-19.

WW 01 Core 22

Responds to text questions.

The student chooses to write in his *Record Book* the answers to 90% or more of the textbook questions.

Student Action: Exhibiting the written responses when requested to do so. At least nine out of ten questions should have responses, be they correct or incorrect.

Teacher's Note: It is intended that this objective be assessed throughout the year. Such a check provides opportunities to encourage students to work nearer their capacities while remaining independent of the teacher. Use a few minutes of class time for a group discussion of the reasons for writing the answers in the *Record Book*. Writing in the *Record Book* serves (1) to help the student think through what he sees and does, (2) to preserve ideas for future reference, (3) to make a record of the student's progress through the core, (4) to provide the teacher with a source of input for analyzing the student's difficulties and progress, and (5) to help the student learn the background ideas for conceptual understanding. Writing in the *Record Book* is "in"; writing in the text is "out."

Performance Check A: Your teacher will observe you for this check when he can.

Remediation: (1) In a private conference, discuss with the student the ideas enumerated and ask why he chooses not to write the answers. (Perhaps he cannot write!) Evaluate his reasons and counsel him accordingly. Encourage him to follow the pattern of his classmates and set down his ideas as they are doing. (2) Have him read "Notes to the Student," pages viii and ix in his text. (3) Follow up in a few days to determine his actions.

WW 01 Core 23

Shows care for laboratory materials.

The student chooses to show proper care and use of ISCS laboratory materials.

Student Action: Using the materials only for their intended purpose or requesting permission to do other specific experiments with them when being observed without his knowledge by the teacher or another designated person on three or more occasions.

Teacher's Note: This objective may be assessed at any time that the student is responsible for a learning activity in which equipment and supplies are required. Use a few minutes of class time for a whole-group discussion of the reasons for handling laboratory materials properly. Such reasons include: (1) If damaged, they are lost to use by students who need them now. Short supply means waiting in line. (2) They cannot readily be replaced. Replacement usually takes several months at best. (3) If materials are handled properly, they may be used for other than regular activities (with the permission of the teacher and after making a proper request).

Performance Check A: Your teacher will observe you for this check when he can.

Remediation: (1) In a private conference, ask the student why he chooses to mishandle equipment. Help him to evaluate his reasons, and ask for his cooperation in the future. If he agrees, reassess the objective later. (2) If after the conference he still does not agree, ask him if he feels that he should be penalized and what he thinks should be an appropriate penalty. Give him another opportunity for compliance. (3) If he is still uncooperative, apply a penalty for mishandling equipment. This may mean denying him use of the equipment either temporarily or permanently or taking some other suitable action.

WW 01 Exc 1-1 1

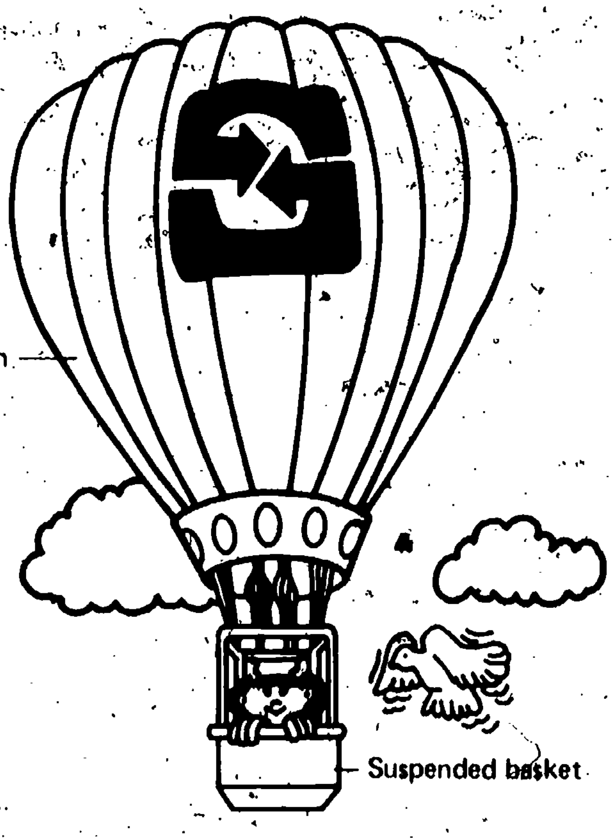
Selects a device to stop the descent of a hot-air balloon.

The student applies the concept that a balloon inflated with heated air will rise through cooler air.

Student Action: Selecting the device which can be used to heat the air in the balloon so as to keep the balloon aloft.

- **A:** b
- **B:** c
- **C:** d

Performance Check A: High-Flying Frances, world famous air balloonist, is suspended in a basket from her balloon, as shown below. The balloon is beginning to descend too soon. She opens her supplies and begins to look for something. What should she be looking for?



a. A device to cool the air in the balloon
b. A butane burner to heat the air in the balloon
c. An air pump to blow up the balloon
d. A valve to release some of the air in the balloon

Remediation: (1) Refer the student to Excursion 1-1 on page 102, especially to questions 1 and 2. (2) Discuss the concept with him if necessary. (3) Have him do an alternate check.

WW 01 Exc 1-1 2

Relates temperature to the lifting force of an enclosed gas.

The student applies the concept that the lifting force of an enclosed gas varies with the surrounding air temperature.

Student Action: Stating, in effect, that the lifting force will be greater when the surrounding air is cold and the notion that it is the difference in mass (density) between the air in the balloon and the surrounding air that supplies the lifting force.

Performance Check A: Suppose you filled a balloon with hot air.

1. Would it have more lifting force if the air surrounding the balloon were warm or if it were cold?
2. Explain your answer.

Remediation: (1) Review the student's answer to question 1-7 on page 5. Then have him reread page 6 and review Figures 1-2 and 1-3. (2) Refer him to Excursion 1-1 and ask why the balloon there rose. What would happen to the lifting force if the temperature inside the balloon were increased? What would happen to the lifting force if the temperature outside the heated balloon were decreased?

WW 01 Exc 1-1 3

Describes how to find the relationship between the lifting force of a gas and its temperature.

The student generates a description of a plan which includes measuring the effect of changes in temperature on a lifting force while holding the other variables constant.

Student Action: Stating a description of a plan which includes the notion of systematically measuring the effect of changes in temperature on the lifting force while holding the other variables constant.

Performance Check A: Describe a plan you could use to measure the relationship between the lifting force of a hot-air balloon and the temperature of the air inside the balloon.

Remediation: (1) Discuss the check with the student. Be sure that he understands what is being asked. Ask him how he would measure the effect of changes in temperature on the lifting force of the balloon. (2) Refer him to Excursion 1-1, pages 99 through 102. Have him describe how he would measure the relationship between lifting force and the air temperature of that balloon.

WW 01

Names wind direction from a diagram.

The student applies the rule that winds are named by the directions from which they are blowing.

Student Action: Selecting the response which best indicates the wind direction.

- **A:** e
- **B:** d
- **C:** b

Performance Check A: In the diagram below, arrows indicate the way the wind is blowing along the coast.

Exc 2-1 1

Which of the following is the best name for the wind direction?

a. W wind
b. N wind
c. SE wind
d. E wind
e. NW wind

Remediation: (1) Refer the student to page 103, where this rule is introduced. (2) Reassess this objective with an alternate check.

States the wind direction from wind data.

WW 01 Exc 2-1 2

The student applies the rule that in reading wind direction, an average (midrange) reading is used.

Student Action: Selecting the direction which is the average (midrange) wind-direction reading.

A: c
B: b
C: d

Performance Check A: Suppose that the pointer on your wind-direction instrument keeps moving from NE through E to SE and back to NE again as you try to take a reading. You should

a. wait until wind direction is steadier before you take a reading.
b. record N.
c. record E.
d. record S.
e. record all three directions NE, E, and SE.

Remediation: (1) Suggest that the student review page 104 of Excursion 2-1, where this rule is introduced. (2) Have him describe to you Figure 3 on page 104. This will determine how well he understands the rule that wind direction is an average reading.

WW 01 Exc 2-1 3

Indicates the sequence of observations according to increasing wind speed.

The student applies the concept that wind speeds can be judged visually by the effects the wind has on common objects.

Student Action: Arranging the observations in order of increasing wind speed.

A: 2, 3, 4, 1
B: 1, 4, 2, 3
C: 3, 4, 2, 1

Performance Check A: Frank made the following observations concerning wind speed on a weekend when he didn't have a wind-measuring instrument available. Arrange his observations in order of increasing wind speed. List the number of the lowest wind speed first.

1. The branches of the old maple tree in front of his house sway.
2. The flag hangs limp on his neighbor's flag pole.
3. A pile of leaves from autumn raking begins to blow around.
4. Bushes and shrubbery begin to move.

Remediation: (1) Suggest that the student review Table 1 on page 106. (2) Have the student do an alternate check.

WW 01 Exc 2-2 1

Defines the prefix *alto*.

The student recalls that the prefix *alto* means "of medium height" when it is added to the name of a type of cloud.

Student Action: Responding that the prefix *alto* means "of medium height."

Performance Check A: What does the prefix *alto* mean when it is added to the name of a type of cloud?

Remediation: Refer the student to page 109 of Excursion 2-2, where the prefix *alto* is defined. (Early editions of *Winds and Weather* incorrectly define *alto* as "high." If the student gives that definition, accept it, but redefine it correctly for him.)

WW 01

Names cloud types in photographs.

The student identifies the type of cloud shown in three photographs of the sky showing cirrus, cirrocumulus, cirrostratus, altocumulus, altostratus, stratus, stratocumulus, nimbostratus, cumulus, or cumulonimbus cloud types.

Special Preparations: Secure six pictures of clouds such as those on pages 107 through 116 of the text. Paste them on a piece of soft cardboard and label them 1, 2, 3, 4, 5, and 6. Then fill in the correct cloud types in the space provided in the Student Action. Place them in a folder and label the folder WW-01-Exc 2-2-2. A cloud chart may be obtained for a nominal fee from Edmund Scientific Co., 401 Edscorp Bldg., Barrington, N.J. 08007.

Exc 2-2-2

Student Action: Naming at least two of the three cloud types from the following list:

a. cirrus if they are high, thin, and wispy,
b. cirrocumulus if they are high, thin, white, and patchy,
c. cirrostratus if they are high, thin sheets of white or bluish clouds with a slight fibrous look,
d. altocumulus if they are middle level rows or waves of fairly large, flattened globules,
e. altostratus if they form a middle layer of thin, gray or bluish uniform veils having a slight striated structure,
f. stratus if they form a uniform, amorphous, gray, low-lying layer resembling fog,
g. stratocumulus if they are relatively low, soft, gray clouds in the form of ridges or large globules,
h. nimbostratus if they are relatively low, amorphous, dark gray clouds with ragged bases,
i. cumulus if they are relatively low, dense, puffy clouds with flat, gray bases and dome-shaped tops, and
j. cumulonimbus if they are very tall, billowing clouds with dark bases and anvil-shaped tops.

A: 1.
2.
3.

B: 2.
4.
6.

C: 1.
3.
5.

Performance Check A: Get pictures 1, 2, and 3 from folder WW-01-Exc 2-2-2. Name the type of cloud shown in each picture.

Remediation: (1) Suggest that the student review Figures 1 through 18, pages 107 through 116, in which photographs of the various cloud types are presented. (2) Reassess the objective with an alternate check.

Uses a table to convert temperatures from one scale to another.

WW

The student applies the procedure for converting temperatures from one scale to another, using a temperature conversion table.

O1 Exc 2-3 1

Student Action: Stating the converted temperatures.

A: 1. 8.6°F, 2. 17 ±0.5°C
B: 1. 23.0°F, 2. 4 ±0.5°C
C: 1. -2.2°F, 2. 9 ±0.5°C

Performance Check A: Use the following table to convert the two temperatures listed below it.

°C	°F	°C	°F	°C	°F	°C	°F
20	68.0	10	50.0	0	32.0	-10	14.0
19	66.2	9	48.2	-1	30.2	-11	12.2
18	64.4	8	46.4	-2	28.4	-12	10.4
17	62.6	7	44.6	-3	26.6	-13	8.6
16	60.8	6	42.8	-4	24.8	-14	6.8
15	59.0	5	41.0	-5	23.0	-15	5.0
14	57.2	4	39.2	-6	21.2	-16	3.2
13	55.4	3	37.4	-7	19.4	-17	1.4
12	53.6	2	35.6	-8	17.6	-18	-0.4
11	51.8	1	33.8	-9	15.8	-19	-2.2

1. How many °F equal -13°C?
2. How many °C equal 62°F?

Remediation: (1) Have the student convert degrees Fahrenheit to degrees Celsius and vice versa using Table 1 on page 119. (2) Review his answers to questions 1 through 4 on page 118. (3) Reassess the objective, using an alternate check.

WW O1 Exc 2-3 2

Converts miles per hour to kilometers per hour.

The student applies the procedure for converting miles per hour to kilometers per hour.

Student Action: Stating the speed in kph correctly within ±5%.

A: 1. 24.0 ±1.2 kph, 2. 108.8 ±5.4 kph
B: 1. 28.8 ±1.4 kph, 2. 89.6 ±4.5 kph
C: 1. 33.6 ±1.7 kph, 2. 99.2 ±5.0 kph

Performance Check A: Convert the following wind speeds from miles per hour to kilometers per hour. (HINT: There are 1.6 kilometers in 1 mile.)

1. 15 mph
2. 68 mph

Remediation: (1) Have the student review page 120 of Excursion 2-3 where the procedure for converting mph to kph is introduced. (2) Review his answers to questions 5, 6, and 7 on page 120. (3) Have him do an alternate check. Discuss the conversion procedure with him if necessary.

Converts inches to centimeters.

The student applies the procedure for converting a measurement in inches to centimeters.

Student Action: Stating the amount of rainfall in centimeters correctly within ±5%.

A: 9.7 ±0.5 cm
B: 6.4 ±0.3 cm
C: 7.9 ±0.4 cm

WW 01 Exc 2-3 3

Performance Check A: When Martha checked the rain gauge, she found that 3.8 inches of rain had fallen last night. She knows that there are 2.54 cm in one inch. How many centimeters of rain fell last night?

Remediation: (1) Refer the student to page 120 where the procedure for converting inches to centimeters is introduced. (2) Review his answer to question 8 on page 120. (3) Review his answer to Self-Evaluation 2-3 on page 37 of the *Record Book*. (4) Reassess the objective with an alternate check.

WW 02

Chapters 3 and 4

Excursions 3-1 thru 4-1

Performance Check

Summary Table

Objective Number	Objective Description
WW-02-Core-1	Relates air temperature to surface temperature
WW-02-Core-2	Relates air temperature to altitude
WW-02-Core-3	States the cause of air pressure
WW-02-Core-4	Explains air pressure
WW-02-Core-5	Relates air pressure and altitude
WW-02-Core-6	Selects reasons for lower air pressure at higher altitudes
WW-02-Core-7	Recognizes the relationship between height and pressure
WW-02-Core-8	Recognizes the barometric evidence of different pressures
WW-02-Core-9	Explains the effect of pressure difference on an object
WW-02-Core-10	Explains the purpose of the straw in a barometer
WW-02-Core-11	Explains identical barometric readings on dissimilar days
WW-02-Core-12	States a plan to show that moisture does not pass through glass
WW-02-Core-13	Defines *dew point*
WW-02-Core-14	Defines *relative humidity*
WW-02-Core-15	Uses a sling psychrometer to measure relative humidity
WW-02-Core-16	Calculates the relative humidity
WW-02-Core-17	Relates temperature to the total amount of water vapor in the air
WW-02-Core-18	Relates relative humidity to temperature change

Materials	Observer	Special Preparations	Quick Score	3 + Minutes	Basal	Math	Reading	Concept	Action Verbs	Notes
			Q		√				applies	
			Q		√				applies	
					√				recalls	
									recalls	
			Q		√				applies	
			Q			√			applies	
					√				applies	
			Q		√				identifies	
									generates	
									generates	
								√	applies	
									generates	
					√				recalls	
					√				recalls	
M	O				√				manipulates	
			Q						applies	
			Q		√				applies	
			Q		√			√	applies	

WW 02

Objective Number	Objective Description
WW-02-Core-19	Relates wet-bulb and dry-bulb difference to relative humidity
WW-02-Core-20	Relates relative humidity to the difference between dry-bulb and wet-bulb readings
WW-02-Core-21	Uses a sling psychrometer to measure the dew point
WW-02-Core-22	States the function of solid particles in cloud formation
WW-02-Exc 3-1-1	Selects units of pressure
WW-02-Exc 3-1-2	Calculates pressure
WW-02-Exc 3-1-3	Selects the greater of two pressures
WW-02-Exc 3-2-1	Relates the heights of columns of mercury to those of glass tubes
WW-02-Exc 3-2-2	Relates the heights of mercury columns to the diameters of tubes
WW-02-Exc 3-2-3	Calculates air pressure by converting millibars into pounds per square inch
WW-02-Exc 3-2-4	Reads an aneroid barometer scale
WW-02-Exc 4-1-1	Compares the cooling potentials of water and alcohol
WW-02-Exc 4-1-2	Indicates the effect of motion on a dry-bulb thermometer reading
WW-02-Exc 4-1-3	Indicates the effect of motion on a wet-bulb reading
WW-01-Core-1R	Relates water temperature to air-particle distribution
WW-01-Core-2R	Recognizes the relationship between spacing of particles and heating
WW-01-Core-17R	Explains why scientists use symbols

	Materials	Observer	Special Preparations	Quick Score	3 + Minutes	Basal	Math	Reading	Concept	Action Verbs	Notes
						√			√	applies	
				Q					√	applies	
	M	O				√				manipulates	
						√				recalls	
				Q		√				applies	
				Q			√			applies	
				Q						applies	
				Q		√				applies	
				Q						applies	
				Q			√			applies	
				Q		√				applies	
						√				applies	
										applies	
										applies	
						√				applies	
						√				applies	
						√				generates	

WW
O2
Core
1

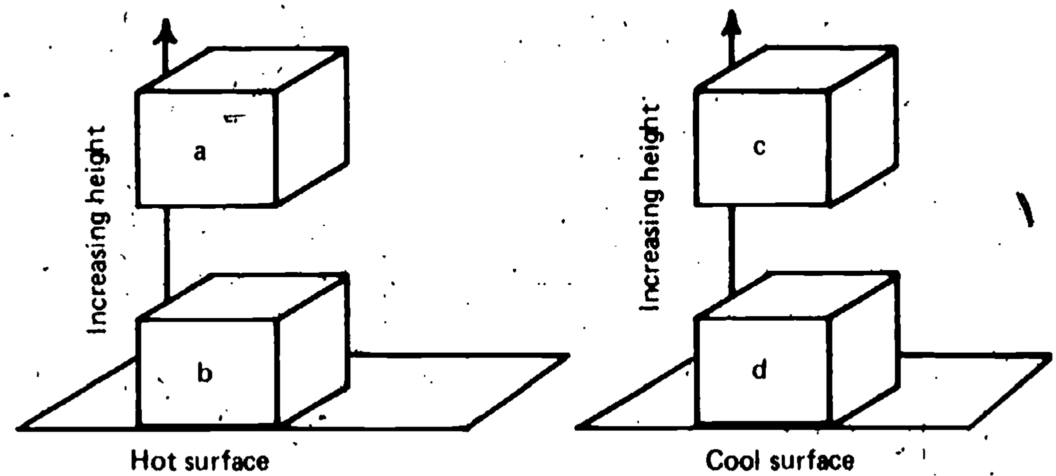
Relates air temperature to surface temperature.

The student applies the concepts that the temperature above the earth's surface varies with the heat absorbed by the surface and that air cools as it rises.

Student Action: Selecting the cube closest to the hot surface as the hottest and the cube farthest from the cool surface as the coolest.

A: 1. b, 2. c
B: 1. c, 2. a
C: 1. c, 2. b

Performance Check A: Look at the diagram below showing cubes of air over two different surfaces.



1. Which cube of air will be the hottest?
2. Which cube of air will be the coolest?

Remediation: (1) Refer the student to Figures 3-1 and 3-2 on pages 22 and 23. (2) Review his answers to questions 3-3 and 3-4 on page 22. (3) Question him about how heat absorbed by a warm surface and a cold surface relates to air temperature. If necessary, discuss it with him.

WW
O2
Core

Relates air temperature to altitude.

The student applies the concept that air temperature usually varies inversely with altitude.

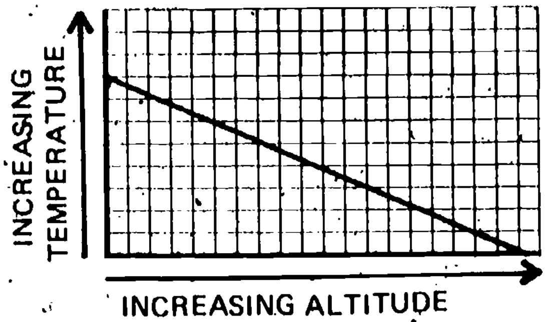
Student Action: Selecting the graph which slopes downward to the right.

A: a
B: b
C: d

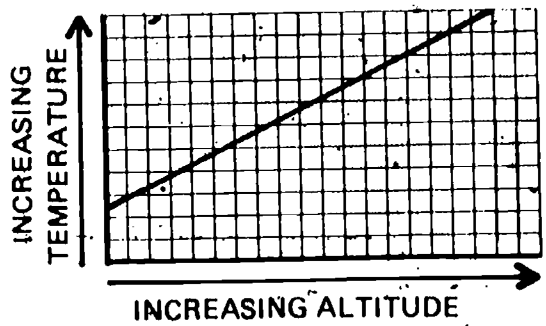
2

Performance Check A: Which of the following graphs best shows how air temperature usually changes with altitude above the earth's surface?

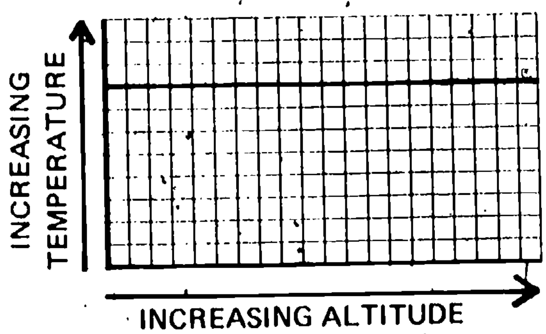
Graph a.



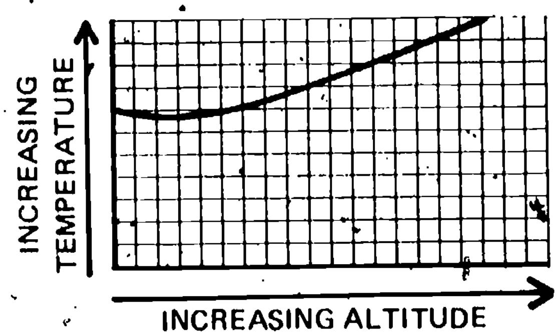
Graph b.



Graph c.



Graph d.



Remediation: (1) Refer the student to Figures 3-1 and 3-2 on pages 22 and 23. (2) Review his answers to questions 3-3 and 3-4 on page 22. (3) Review his answer to Self-Evaluation 3-1 on pages 37 and 38 of the *Record Book*.

WW O2 Core 3

States the cause of air pressure.

The student recalls the cause of pressure on an object at the earth's surface.

Student Action: Stating, in effect, that the air pressure on an object is the result of the total weight of the column of air above that object.

Performance Check A: What causes air pressure on an object at the earth's surface?

Remediation: (1) Suggest that the student review the last paragraph on page 24 and Figure 3-3 on page 25. (2) Have him redo the check. If he still has difficulty, discuss it with him.

WW O2

Explains air pressure.

The student recalls what air pressure is.

Student Action: Responding that air pressure results from the weight of a column of air above the surface of the earth.

Core 4

Performance Check A: People often measure air pressure in terms of the height of a column of mercury. What is air pressure that causes it to support a column of mercury?

Remediation: (1) Suggest that the student review page 33 and Figure 3-11. (2) Check his answer to question 3-12 on page 30.

WW O2 Core 5

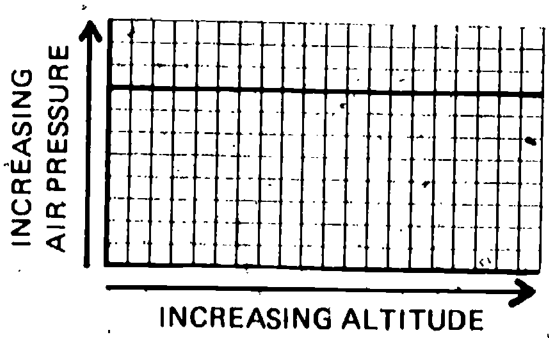
Relates air pressure and altitude.

The student applies the concept that air pressure usually varies inversely with altitude.

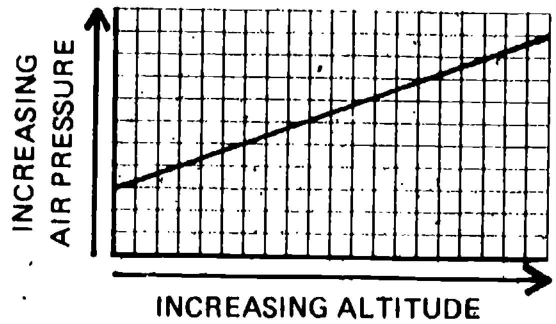
Student Action: Selecting the graph that slopes downward to the right.
- **A:** d
- **B:** c
- **C:** b

Performance Check A: Which of the following graphs best shows how air pressure usually changes with altitude above the earth's surface?

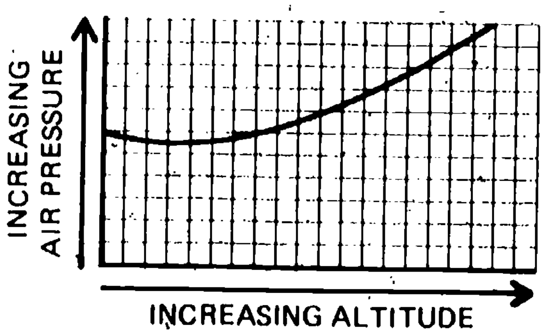
Graph a.



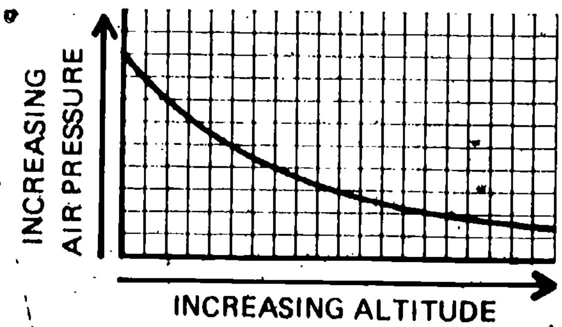
Graph b.



Graph c.



Graph d.



Remediation: (1) Have the student review Figure 3-3 and the paragraphs following on page 25. (2) Review his answer to question 3-19 on page 33. (3) Review his answer to Self-Evaluation 3-2 on page 38 of the *Record Book*. (4) Have the student redo the check. If necessary, discuss the concept with him.

Selects reasons for lower air pressure at higher altitudes.

The student applies the concepts of why air pressure is lower at higher altitudes.

WW 02 Core 6

Student Action: Selecting the statements which reflect the concepts that at higher altitudes there are fewer air particles present and there is less air pushing down from above.

A: c and d
B: b and c
C: a and b

Performance Check A: Air pressure measured by a barometer on the top of a high mountain is less than air pressure measured at sea level because

a. the air is cooler at higher altitudes.
b. air particles are moving more slowly at higher altitudes.
c. there are fewer air particles at higher altitudes.
d. there is less air above the air on top of the mountain than there is above the air at sea level.

Remediation: (1) If the student doesn't realize that there is less air pushing down from above at higher altitudes, suggest that he review Figure 3-3, page 25. (2) If he doesn't know that there are fewer air particles at higher altitudes, see Remediation WW-02-Core-5.

Recognizes the relationship between height and pressure.

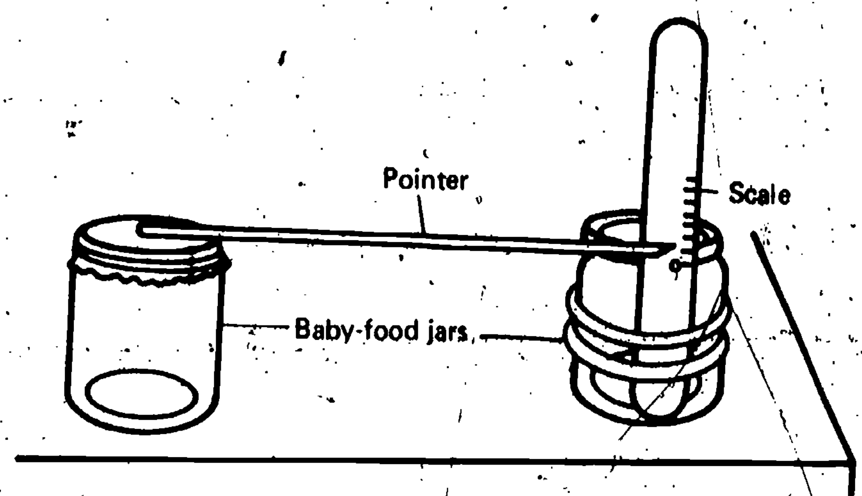
The student applies the concept that air pressure varies inversely with altitude.

WW 02 Core 7

Student Action: Stating the direction of the pointer's movement and either that air pressure decreases as altitude increases or that air pressure increases as altitude decreases.

A: Down
B: Down
C: Up

Performance Check A: Roger built the baby-food jar barometer shown below.



1. Suppose Roger carried his barometer to the top of a tall mountain. Would the pointer move up on the scale or down on the scale as Roger's altitude increased? (Assume the temperature remains constant.)
2. Explain your answer.

Remediation: See the Remediation for WW-02-Core-5.

WW 02 Core 8

Recognizes the barometric evidence of different pressures.

The student identifies the relationship between the pressure inside and outside the baby-food jar barometer.

Student Action: Matching the statement of inside and outside pressures with each diagram as follows: the jar in which the top bulges outward with an inside pressure which is greater than the outside pressure, the jar with the flat top with inside and outside pressures which are equal, and the jar with the top dished in with an inside pressure which is less than the outside pressure.

A: 1. c, 2. b, 3. a
B: 1. b, 2. a, 3. c
C: 1. a, 2. c, 3. b

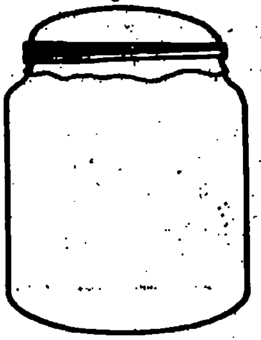
Performance Check A: Each jar shown below is capped with the end of a rubber balloon. Match the best description of the relationship between the pressure inside the jar and the pressure outside the jar with each of the diagrams. Write the number of the diagram and after it the letter of the matching description.

Diagram

Description

a. Pressure inside equal to pressure outside
b. Pressure inside less than pressure outside
c. Pressure outside less than pressure inside
d. None of these

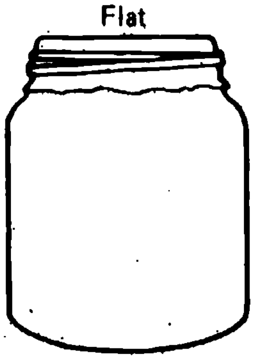
Bulged out

1. 

Dished in

2. 

Flat

3. 

Remediation: (1) Have the student review Figures 3-5, 3-6, and 3-7 on page 27 and Figure 3-8 on page 29. (2) Review the student's answers to questions 3-10, 3-11, and 3-12 on pages 27 and 30. (3) If necessary, have the student do an alternate check.

WW 02 Core 9

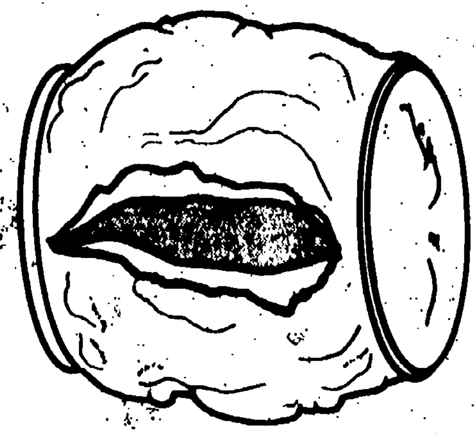
Explains the effect of pressure difference on an object.

The student generates a decision and an explanation based on the appearance of the can in the diagram.

Student Action: Stating the location of the greater pressure correctly and an explanation based on the idea that a greater pressure inside the can would tend to force the can apart, whereas a greater pressure outside would cause the can to collapse.

A: The air pressure inside was greater.
B: The air pressure outside was less.
C: The air pressure inside was less.

Performance Check A: Ruth found a tin can that had been damaged because there was too much pressure difference between the air inside and the air outside the can. She drew the diagram shown below.



1. Was the air pressure inside the can greater or less than the air pressure outside?
2. What evidence do you have to support your decision?

Remediation: (1) Refer the student to Figures 3-5, 3-6, and 3-7 on page 27. (2) In a discussion, ask him what would happen if the inside pressure in the baby-food jar either increased greatly or decreased greatly. (3) If your student cannot understand how a greater pressure can exist inside a can, discuss with him how spoiled foods may give off gases and cause their container to bulge and break. (4) Have him do an alternate check.

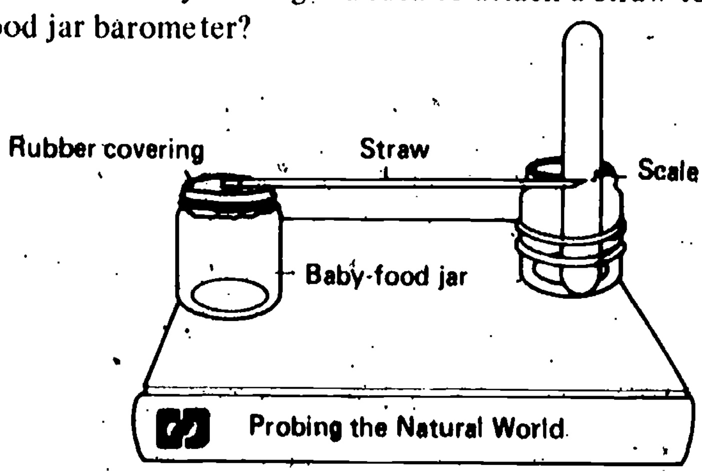
WW 02 Core 10

Explains the purpose of the straw in a barometer.

The student generates an explanation for the straw used in the baby-food jar barometer, which includes the notion of amplifying the motion of the rubber covering.

Student Action: Stating an explanation to the effect that the straw was attached to the rubber covering on the top of the baby-food jar barometer to amplify the motion of the covering.

Performance Check A: The diagram below shows a baby-food jar barometer like the one you used in class. Why is it a good idea to attach a straw to the rubber covering of the baby-food jar barometer?



Remediation: (1) Refer the student to the first two paragraphs on page 28. (2) Have him use the baby-food jar barometer with and without the straw attached to discover the straw's purpose. (3) Ask him why the straw was attached to the rubber covering of the barometer. Discuss its purpose with him.

WW 02 Core 11

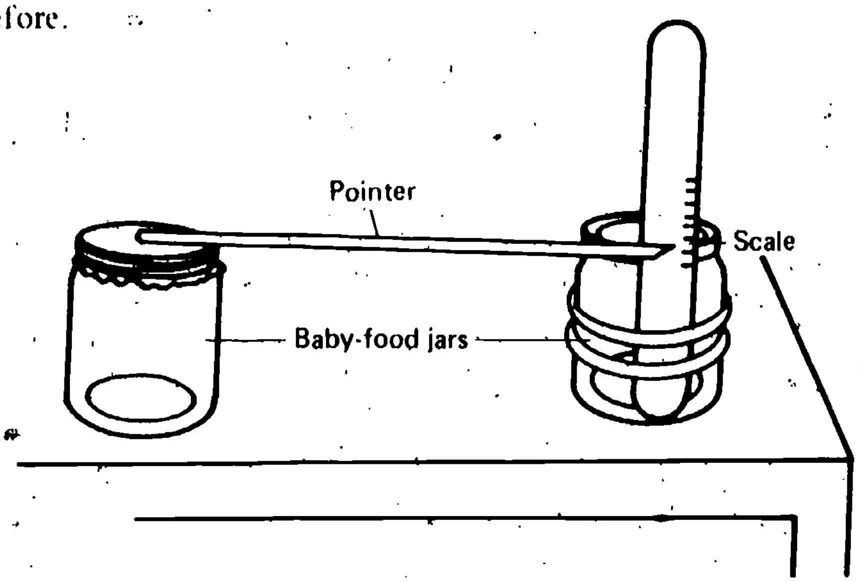
Explains identical barometric readings on dissimilar days.

The student applies the concepts that the volume of a gas varies directly with temperature and inversely with pressure and that a variation in temperature and pressure in the same direction have opposite (cancelling) effects.

Student Action: Stating the direction of change of the outside air pressure and, in effect, that the pressure has increased if the temperature has increased or that the pressure has decreased if the temperature has decreased and so the readings remain the same because of the cancelling effects of temperature and pressure.

A: Decreased
B: Increased
C: Decreased

Performance Check A: Jim built the baby-food jar barometer shown below and set it up outside. He read the barometer on a warm day. He read the barometer again the next morning when it was very cold outside. The reading was the same as it had been the day before.



1. Had the air pressure outside increased, decreased, or stayed the same?
2. Explain the reason for your answer.

Remediation: (1) If the student doesn't understand the relationship between air temperature and air pressure, have him review Activity 3-10 and question 3-17 on page 32. (2) Refer him to Self-Evaluation 3-4 on page 39 of the *Record Book*. If in doing the check he had difficulty in predicting that since the pointer did not move as a result of the temperature change, there must have been a pressure change in the same direction, discuss the check with him.

WW O2 Core 12

States a plan to show that moisture does not pass through glass.

The student generates a description of a plan to show that moisture which appears on the outisde of a glass containing a cold liquid does not seep through the glass.

Student Action: Describing a plan which includes any idea similar to one of the following: (1) using an empty cold glass, (2) using different types of containers holding cold water, (3) using a different cold liquid, such as oil, or (4) carefully weighing the glass before and after water collects on the sides.

Performance Check A: Cindy's little brother has seen moisture collect on the outside of a glass of cold water. He thinks that the water comes out through the sides of the glass. State how Cindy could show him that the water drops do not come from inside the glass.

Remediation: (1) Review the student's answer to Self-Evaluation 4-1 on page 39 of the *Record Book*. Review his answers to questions 4-1 through 4-4 on page 38 of the text. (3) Have the student review Activity 4-1 on page 38, in which he found why water collects on the outside of a cold container. (4) Discuss Activity 4-1 with him. Ask him how he could show that the water on the outside isn't coming through the container.

WW O2 Core 13

Defines *dew point*.

The student recalls the definition of *dew point*.

Student Action: Stating, in effect, either that the dew point is the temperature at which the moisture in the air begins to condense to form tiny droplets or that it is the temperature at which the air is saturated with water vapor; that is, it can no longer hold all its moisture.

Performance Check A: What is meant by the term *dew point*?

Remediation: Refer the student to page 40, where *dew point* is defined.

WW O2 Core 14

Defines *relative humidity*.

The student recalls the definition of the term *relative humidity*.

Student Action: Stating, in effect, the definition of *relative humidity* as the ratio between the amount of water vapor in the air at a particular temperature and the greatest amount of water vapor that the air can hold at that temperature and that it is expressed as a percentage.

Performance Check A: What is meant by the term *relative humidity*?

Remediation: Refer the student to page 41, where *relative humidity* is defined.

Uses a sling psychrometer to measure relative humidity.

WW 02 Core 15

The student manipulates the psychrometer according to the procedure which involves wetting its wick, swinging it around for about 15 seconds, reading the wet- and dry-bulb temperatures, finding the difference between them, and consulting the table to determine the relative humidity.

Regular Supplies: 1 sling psychrometer

Student Action: Stating the relative humidity as determined by using the proper procedure.

Performance Check A: Ask your teacher to watch you do this check. Get the sling psychrometer, and measure the relative humidity in your classroom. You may use Table 4-2 on page 44 of *Winds and Weather.*

Remediation: (1) If the student doesn't know how to use the sling psychrometer to measure relative humidity, have him review Activity 4-4 on page 42. (2) Review his answer to question 4-13 on page 45. (3) Review his answers to Self-Evaluations 4-3 and 4-4A on page 40 of the *Record Book.* (4) If his trouble appears to be difficulty in reading Table 4-2, refer him to the explanation on page 43.

Calculates the relative humidity.

WW 02 Core 16

The student applies the procedure for calculating the relative humidity, which includes dividing the actual water vapor content by the maximum amount of water vapor which the air could hold at that temperature and multiplying the result by 100 to determine the relative humidity.

Student Action: Stating the relative humidity within ±10%.

A: any answer between 55 and 67%
B: any answer between 76 and 94%
C: any answer between 51 and 63%

Performance Check A: Use the following information to calculate the relative humidity.

Temperature = 25°C
Greatest amount of water vapor which can be held in 1000 ml of air at 25°C = 23 milligrams
Actual amount of water vapor in this 1000 ml of air = 14 milligrams

Remediation: (1) Suggest that the student review page 41, where the formula for relative humidity is given. (2) Review his answers to questions 4-9 and 4-10 on page 41. (3) Review his answer to Self-Evaluation 4-2 on page 39 of the *Record Book.* (4) Reassess the objective with an alternate check.

WW 02 Core 17

Relates temperature to the total amount of water vapor in the air.

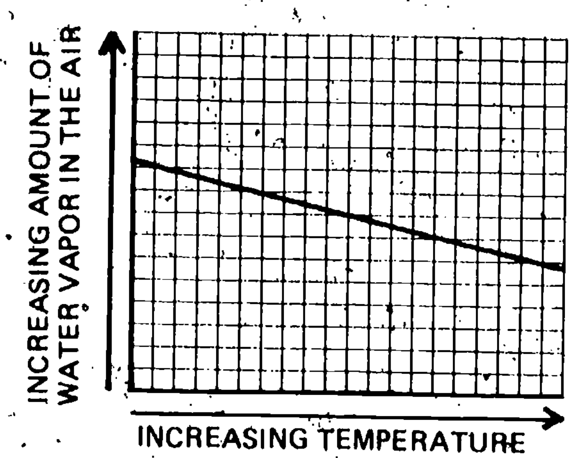
The student applies the concept that warm air can hold more water vapor than colder air.

Student Action: Selecting the graph which indicates an increase in the amount of water vapor that the air can hold as the temperature increases.

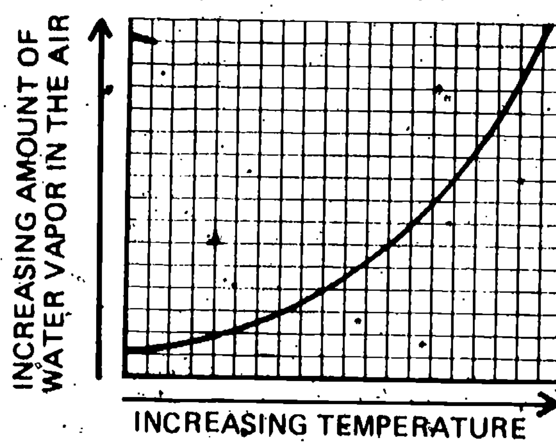
A: b
B: a
C: c

Performance Check A: Select the graph below that best shows how the greatest amount of water vapor that the air can hold varies with temperature.

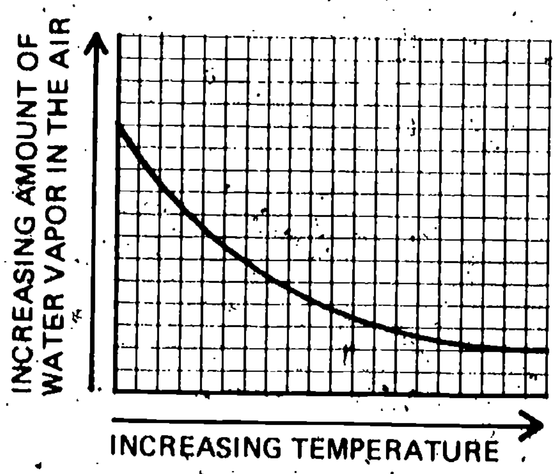
Graph a.



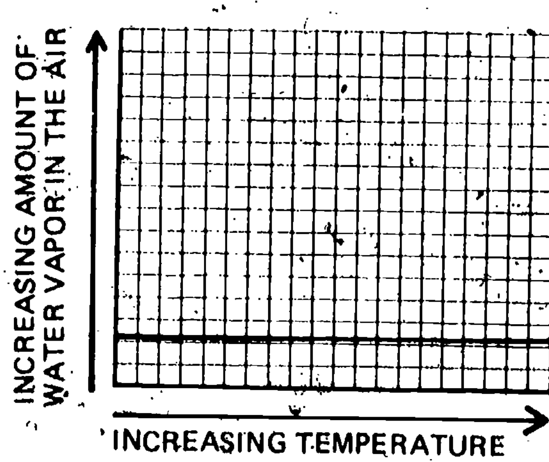
Graph b.



Graph c.



Graph d.



Remediation: (1) Suggest that the student review pages 40 and 41, where this concept is introduced. (2) Review his response to question 4-8 on page 40. (3) Have him do an alternate check. If he still has difficulty selecting the graph, discuss with him this relationship.

WW 02 Core 18

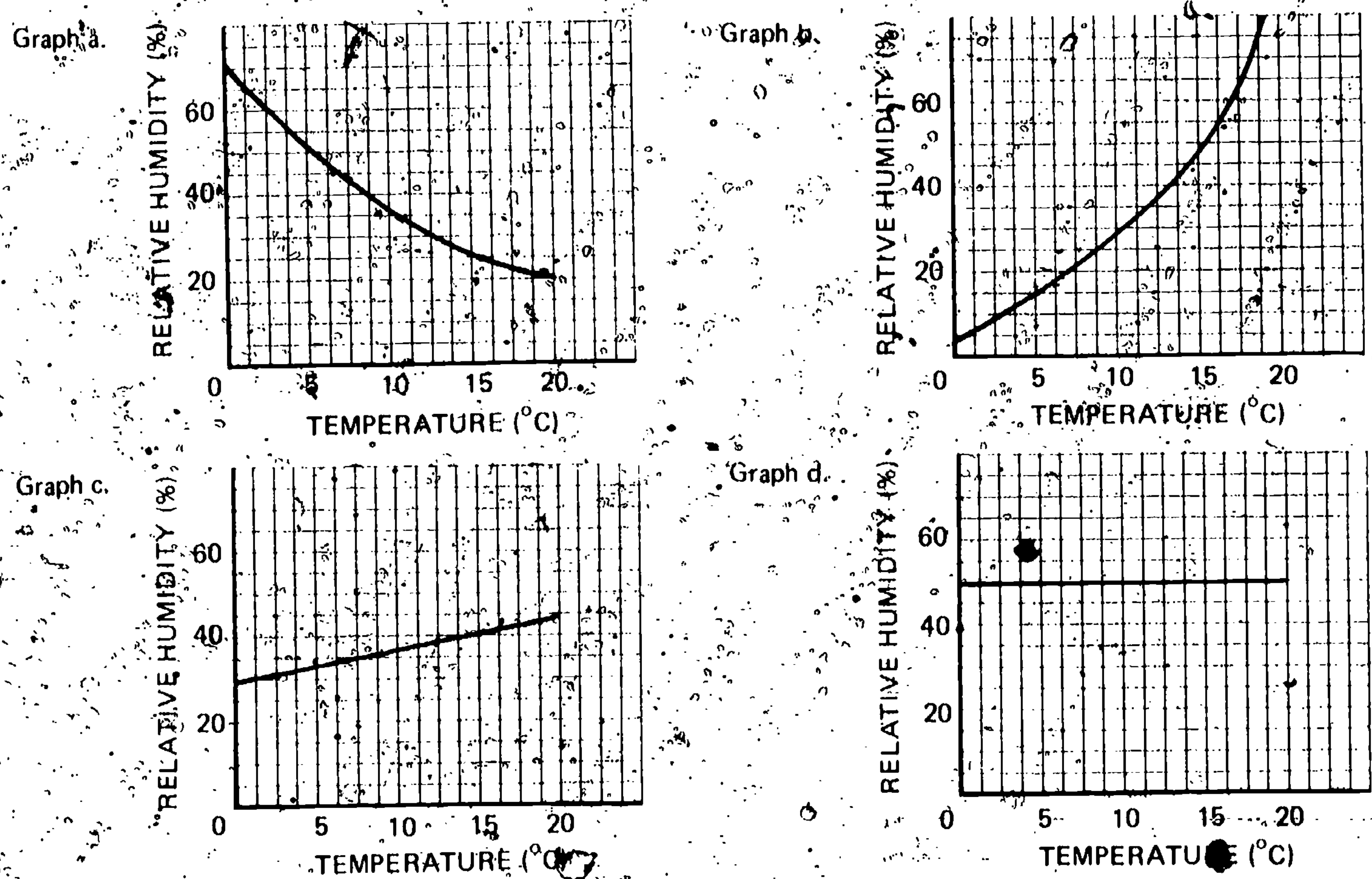
Relates relative humidity to temperature change.

The student applies the concepts that the maximum amount of water vapor that air can hold varies with temperature and that the relative humidity is defined by the percentage ratio of the actual water vapor content of the air to the maximum amount of water vapor the air could hold at that temperature.

Student Action: Selecting the graph which shows decreasing relative humidity with increasing temperature.

- **A:** a
- **B:** d
- **C:** c

Performance Check A: Suppose you heated a sample of air so that the temperature increased but the amount of water vapor in the air stayed constant. Select the letter of the graph below that best shows how the relative humidity would change with temperature.



Remediation: (1) If the student doesn't know either the relationship between temperature and the amount of vapor in the air or the definition for *relative humidity*, have him review page 41. (2) If he has difficulty in interpreting the question, discuss the relative humidity formula with him. Ask him which variable is held constant (the water vapor) and how relative humidity is affected by an increase in temperature.

WW 02 Core 19

Relates wet-bulb and dry-bulb difference to relative humidity.

The student applies the concept that the dry-bulb temperature, the wet-bulb temperature, and their difference are needed to calculate the relative humidity.

Student Action: Stating, in effect, that it is impossible to determine on which day the relative humidity was higher and that both the dry-bulb temperature reading and the difference between the wet- and dry-bulb readings are necessary to determine the relative humidity.

Performance Check A: Roger measured the wet-bulb and dry-bulb temperatures on Monday and found that their difference was 3°.

On Tuesday, Isabel measured them and found that their difference was 5°.

1. On which of the two days was the relative humidity higher?
2. Explain your answer.

Remediation: (1) Suggest that the student review page 43, where he was told how to measure relative humidity. (2) Review his answers to questions 4-13 and 4-14 on page 45. (3) If necessary, discuss the check with him. Can the relative humidity be determined when only the difference in wet-bulb and dry-bulb temperatures is given?

WW 02 Core 20

Relates relative humidity to the difference between dry-bulb and wet-bulb readings.

The student applies the concept that greater temperature differences between wet- and dry-bulb thermometers indicate lower relative humidities.

Student Action: Selecting the graph which curves downward to the right.

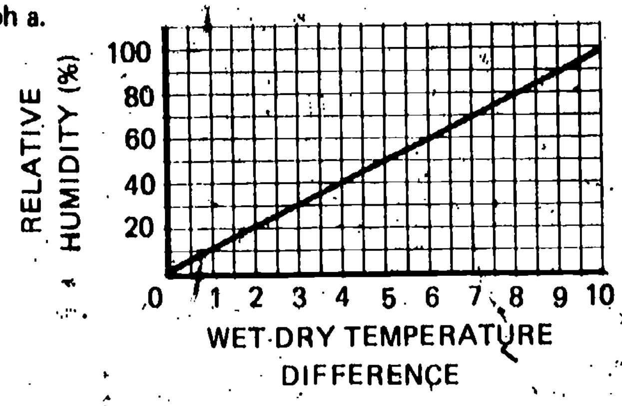
A: d

B: b

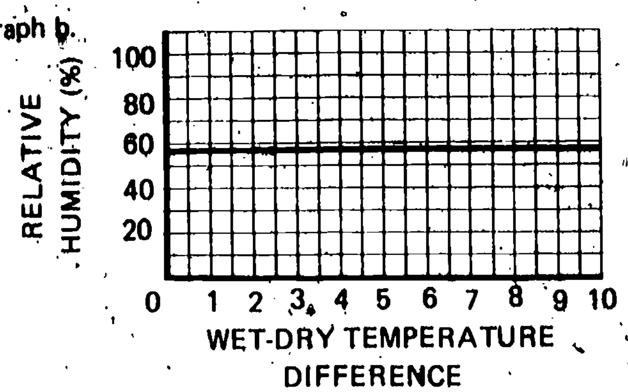
C: a

Performance Check A: For ten days in a row, Hank's dry-bulb reading of his sling psychrometer was unchanged. Yet, each day his wet-bulb reading changed, giving him a greater difference between the two temperatures. He made a graph showing both the daily relative humidity and the difference between his wet-bulb and dry-bulb temperature readings. Select the letter of the graph below that best shows the relationship he found.

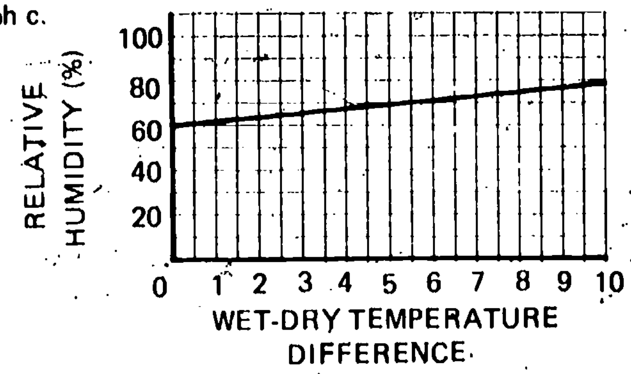
Graph a.



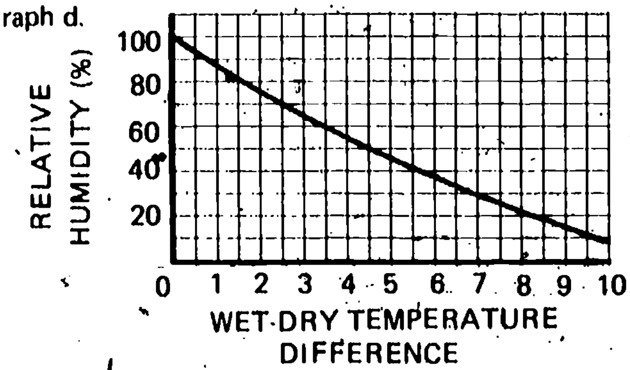
Graph b.



Graph c.



Graph d.



Remediation: (1) Suggest that the student examine Table 4-2 on page 44 to determine the relationship between relative humidity and the difference in thermometer readings. (2) Have him do an alternate check. If necessary, discuss the concept with him. (3) Ask him to plot a graph, using the 10°C dry-bulb line of Table 4-2.

WW O2 Core 21

Uses a sling psychrometer to measure the dew point.

The student manipulates the psychrometer according to the procedure of wetting its wick, swinging it around for about 15 seconds, reading the wet- and dry-bulb temperatures, finding the difference between them, and consulting the table to determine the dew point.

Regular Supplies: 1 sling psychrometer

Student Action: Stating the dew point as determined by using the proper procedure.

Performance Check A: Ask your teacher to watch you do this check. Get a sling psychrometer, and determine the dew point in your classroom. You may use Table 4-3 on page 46 of *Winds and Weather*.

Remediation: (1) If the student doesn't know how to use the sling psychrometer, suggest that he review Activity 4-4 on page 42. (2) Review his answer to question 4-17 on page 4[illegible]. (3) Review his answer to Self-Evaluation 4-4 on page 40 of the *Record Book*.

WW O2 Core 22

States the function of solid particles in cloud formation.

The student recalls why there must be solid particles in the air in order for clouds to form.

Student Action: Responding with the effect of the notions that clouds are collections of water droplets and that, in order to form the droplets, solid particles must be present in the air to provide surfaces for vapor to condense upon.

Performance Check A: Why must there be solid particles in the air in order for clouds to form?

Remediation: Refer the student to page 47, where the function of solid particles in cloud formation is stated.

WW O2 Exc 3-1 1

Selects units of pressure.

The student applies the concept that a pressure is a force per unit of area.

Student Action: Selecting at least two of the three readings and no others, using units that represent a force per unit of area.

- **A:** b, c, f
- **B:** b, d, e
- **C:** a, b, f

Performance Check A: Select all of the following that could be measures of pressure.

- a. 23 newtons
- b. 0.2 newton per square centimeter
- c. 3 newtons per square meter
- d. 16 inches
- e. 0.46 pound
- f. 12 pounds per square foot

Remediation: (1) Refer the student to Checkup I on page 121. (2) Suggest that he review pages 123 and 124 of Excursion 3-1, where the units for pressure are given.

WW O2

Calculates pressure.

The student applies the procedure for calculating pressure by dividing the force applied by the area over which the force is distributed.

Student Action: Stating the pressure correctly within ±10% and the appropriate unit.

- **A:** 31 ±3 newtons per sq cm
- **B:** 27 ±3 newtons per sq cm
- **C:** 24 ±2 newtons per sq cm

Performance Check A: Russ weighs 620 newtons. When he ice skates, his weight is distributed over about 20 square cm of the ice's surface. What pressure does he then exert on the ice? (Be sure to express your answer in the proper units.)

Remediation: (1) Refer the student to Checkup 2 on page 121. (2) Suggest that he review page 124, where a sample calculation of pressure is presented. (3) Review his answer to question 2 on page 123. (4) Reassess the objective with an alternate check.

Exc 3-1 2

Selects the greater of two pressures.

The student applies the concept that pressure is a measure of the concentration of a force.

Student Action: Selecting the weight which exerts the greater force per unit of area.

- **A:** The 100-pound woman
- **B:** The 90-pound ballerina
- **C:** The 150-pound woman

Performance Check A: Which exerts the greater pressure, the weight of a 180-pound man exerted on the 9 square inches of the flat heel on his shoe or the weight of a 100-pound woman exerted on the 2 square inches of the high heel of her shoe?

Remediation: (1) Suggest that the student review page 122, where this concept is presented. (2) Review his answer to question 1 on page 122. (3) If necessary, discuss the concept with the student, using the diagram on page 122.

WW O2 Exc 3-1 3

Relates the heights of columns of mercury to those of glass tubes.

The student applies the concept that the height of the mercury column in a barometer tube is determined only by atmospheric pressure, provided that the tube is longer than the mercury column.

Student Action: Selecting the height that is the same as the height of the mercury column in the first barometer.

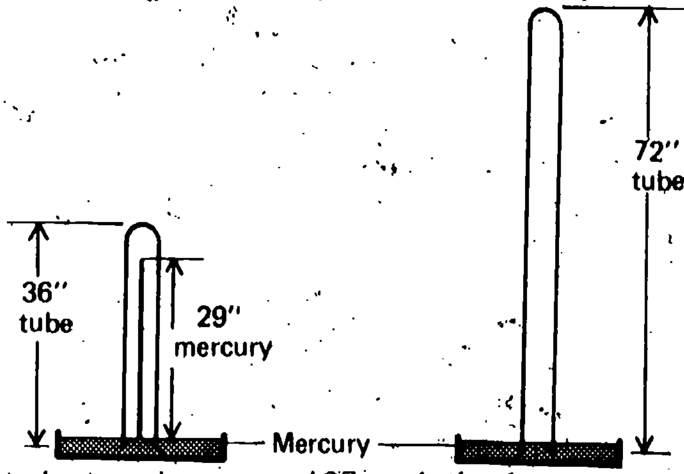
- **A:** c
- **B:** d
- **C:** a

WW O2 Exc 3-2

1

Performance Check A: Sylvia made a mercury barometer from a glass tube 36 inches long. She made another mercury barometer 72 inches long from tubing of the same diameter. Then she measured the height of the mercury column in each tube. She found that the height of the mercury column in the 36-inch tube was 29 inches. Select the answer which best indicates the height of the mercury column in the 72-inch glass tube.

a. 72 inches
b. 36 inches
c. 29 inches
d. 65 inches
e. 14½ inches



Remediation: Have the student review page 127 and the bottom paragraph on page 128. Then point out to him that no factor other than the pressure of the air could account for the height of the column.

WW
O2
Exc
3-2
2

Relates the heights of mercury columns to the diameters of tubes.

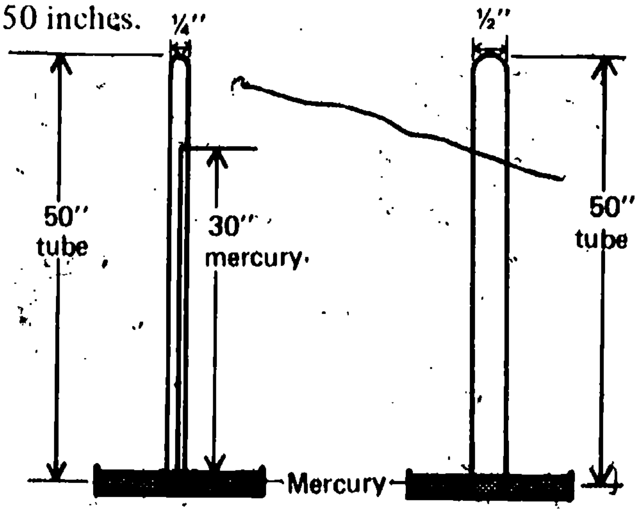
The student applies the concept that the height of a mercury column in a barometer tube is determined only by the atmospheric pressure, provided that the tube is longer than the mercury column.

Student Action: Selecting the height which is the same as the height of the column of mercury in the other barometer.

A: c
B: b
C: e

Performance Check A: Look at the diagram below. Ross used a glass tube with a diameter of ¼ inch and a height of 50 inches to make a mercury barometer. Today the mercury column in Ross's tube is 30 inches high. Select the answer below that best indicates how high the mercury column would be today in a barometer tube with a diameter of ½ inch and height of 50 inches.

a. 70 inches
b. 60 inches
c. 30 inches
d. 15 inches
e. 7.5 inches



Remediation: See the Remediation for WW-02-Exc 3-2-1, and point out that although Torricelli did not mention variations in the diameters of his tubes, he did refer to making "many vessels of glass like those shown," and he did not indicate that the diameter size was controlled in any way.

WW 02 Exc 3-2 3

Calculates air pressure by converting millibars into pounds per square inch.

The student applies the procedure for calculating the air pressure required to support a mercury column of a specified height, which involves multiplying the pressure equivalence of 1 millibar by the number of millibars required to support a column 30 inches high and then multiplying the result by the height of the specified mercury column divided by 30.

Student Action: Stating the air pressure required within ±10%.

- **A:** 11.8 ±1.2 pounds per square inch
- **B:** 10.3 ±1.0 pounds per square inch
- **C:** 8.84 ±0.9 pounds per square inch

Performance Check A: One millibar of pressure is equal to 0.0145 pounds per square inch of pressure. An air pressure of 1016 millibars is required to support a mercury column 30 inches high. What air pressure, in pounds per square inch, is required to support a column of mercury 24 inches high?

Remediation: (1) Refer the student to page 130 of Excursion 3-2, where he is given the procedure for converting millibars to pounds per square inch. (2) Review the student's answers to questions 1 and 2. If necessary, discuss this calculation with him. (3) Reassess the objective with an alternate check.

WW 02 Exc 3-2

Reads an aneroid barometer scale.

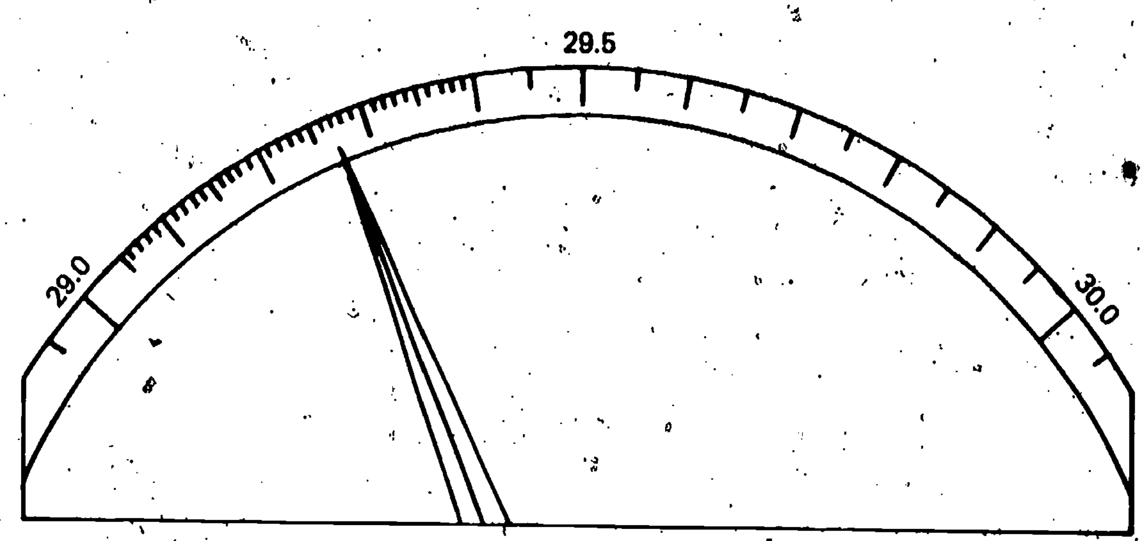
The student applies the procedure for reading an aneroid barometer, which includes reading the scale value opposite the pointer.

Student Action: Stating the barometric pressure within ±0.01 units.

- **A:** 29.27 ±0.01 inches
- **B:** 29.16 ±0.01 inches
- **C:** 29.33 ±0.01 inches

4

Performance Check A: What is the barometric pressure shown below?



Remediation: (1) Refer the student to the Checkup on page 132 of Excursion 3-2. (2) If they are needed, the directions for reading the barometer scale are on page 130. (3) Reassess this objective with an alternate check.

WW O2 Exc 4-1 1

Compares the cooling potentials of water and alcohol.

The student applies the concept that evaporation is a cooling process and the fact that alcohol evaporates more rapidly than water.

Student Action: Stating that the thermometer moistened with alcohol will register the lower temperature and, in effect, that evaporation is a cooling process and that alcohol evaporates more rapidly than water.

Performance Check A: Janice has two wet-bulb thermometers. She wet the wick of one with water and the wick of the other with alcohol. She then waved both thermometers around for 15 seconds.

1. Which thermometer will register the lower temperature after being waved?
2. Explain your answer.

Remediation: (1) Have the student review Activity 5 on page 135. (2) Review his answers to questions 6 and 7. If necessary, discuss the concept with him.

WW O2 Exc

Indicates the effect of motion on a dry-bulb thermometer reading.

The student applies the concept that waving a thermometer affects its temperature reading only if there is liquid evaporating from around the bulb.

Student Action: Responding that there will be no difference in the temperature readings of the two thermometers and with the essence of the notion that waving a thermometer only affects its temperature reading if there is liquid evaporating from around the bulb.

Performance Check A: Danny has two identical dry-bulb thermometers. He keeps one stationary and waves the other around rapidly for about 15 seconds.

1. Which thermometer will register the lower temperature?
2. Explain your answer.

Remediation: (1) If the student doesn't understand the purpose of waving the thermometer, have him review Activities 6 and 7 and Table 2 on pages 136 and 137. (2) Then have him redo the check. If he still has difficulty, discuss the concept with him. What is the purpose of waving a wet-bulb thermometer?

4-1 2

WW O2 Exc 4-1 3

Indicates the effect of motion on a wet-bulb reading.

The student applies the concepts that evaporation is a cooling process and that the rate of evaporation increases if air moves across the wet surface.

Student Action: Stating that the thermometer which was waved around would give the lower temperature reading and, as his reason, the notion that the rate of evaporation increases when air moves over the wet surface.

Performance Check A: Ralph moistened the wicks of two wet-bulb thermometers with water. He held one still and waved the other one in the air for 15 seconds.

1. Which thermometer gave the lower temperature reading?
2. Explain your answer.

Remediation: Suggest that the student review Activities 6 and 7 and Table 2 on pages 136 and 137. Have him compare the temperatures recorded in Table 2 for the stationary thermometer and the one waved around.

WW 03

Chapters 5 thru 7

Excursions 5-1 thru 7-3

Performance Check

Summary Table

Objective Number	Objective Description
WW-03-Core-1	Explains the uncertainty of cloud formation when pressure and temperature are
	reduced
WW-03-Core-2	Compares the air temperature above dirt and water
WW-03-Core-3	Describes air movement around a cold surface
WW-03-Core-4	Indicates the wind direction at a land-water boundary
WW-03-Core-5	Selects the reason for a breeze blowing from over water toward land
WW-03-Core-6	Interprets weather map symbols
WW-03-Core-7	Selects the highest and lowest pressure stations on a weather map
WW-03-Core-8	Selects from a weather map the stations reporting the highest and lowest wind speeds
WW-03-Core-9	Selects the stations on a weather map with the highest and lowest temperatures
WW-03-Core-10	Defines *isobars*
WW-03-Core-11	Draws isobars on a weather map
WW-03-Core-12	Indicates the wind direction in a low pressure area
WW-03-Core-13	Determines cloudy areas on a weather map
WW-03-Core-14	Explains rainfall on two sides of a mountain range
WW-03-Core-15	Lists causes of the uplifting of air
WW-03-Core-16	Recognizes the symbols for fronts
WW-03-Core-17	Selects the direction of movement of a low pressure area

	Materials	Observer	Special Preparations	Quick Score	3 + Minutes	Basal	Math	Reading	Concept	Action Verbs	Notes
								√	√	applies	
						√				applies	
			P			√				applies	
				Q		√				applies	
				Q		√				applies	
				Q						identifies	
				Q		√				applies	
				Q		√				applies	
				Q		√				applies	
										recalls	
			P			√				applies	
										applies	
			P			√				applies	
						√				applies	
										recalls	
				Q						classifies	
				Q		√				applies	

WW 03

Objective Number	Objective Description
WW-03-Core-18	Selects the weather characteristics of a low pressure area
WW-03-Core-19	Selects the weather characteristics of a cold front
WW-03-Core-20	Selects the weather characteristics of a warm front
WW-03-Core-21	Recognizes diagrams of warm and cold fronts
WW-03-Exc 5-1-1	Calculates air temperature at a specified altitude
WW-03-Exc 5-1-2	Calculates the dew point at a specified altitude
WW-03-Exc 5-1-3	Calculates the height of cloud bottoms
WW-03-Exc 5-2-1	Selects variables used to measure cloud speed
WW-03-Exc 5-2-2	Calculates cloud speed
WW-03-Exc 7-1-1	Selects the effect of electric charges on particles
WW-03-Exc 7-1-2	Explains how dry ice can help produce rain
WW-03-Exc 7-2-1	States why cumulus clouds often disappear quickly
WW-03-Exc 7-2-2	Explains hailstone structure
WW-03-Exc 7-3-1	Forecasts weather conditions
WW-01-Core-4R	Compares the energy absorption of dark- and light-colored surfaces
WW-02-Core-18R	Relates relative humidity to temperature change

	Materials	Observer	Special Preparations	Quick Score	3 + Minutes	Basal	Math	Reading	Concept	Action Verbs	Notes
				Q		√				applies	
				Q		√				applies	
				Q		√				applies	
				Q						identifies	
				Q			√			applies	
				Q			√			applies	
				Q			√			applies	
				Q						recalls	
				Q			√			applies	
				Q						recalls	
										generates	
										recalls	
						√				recalls	
									√	generates	
						√				applies	
				Q		√				applies	

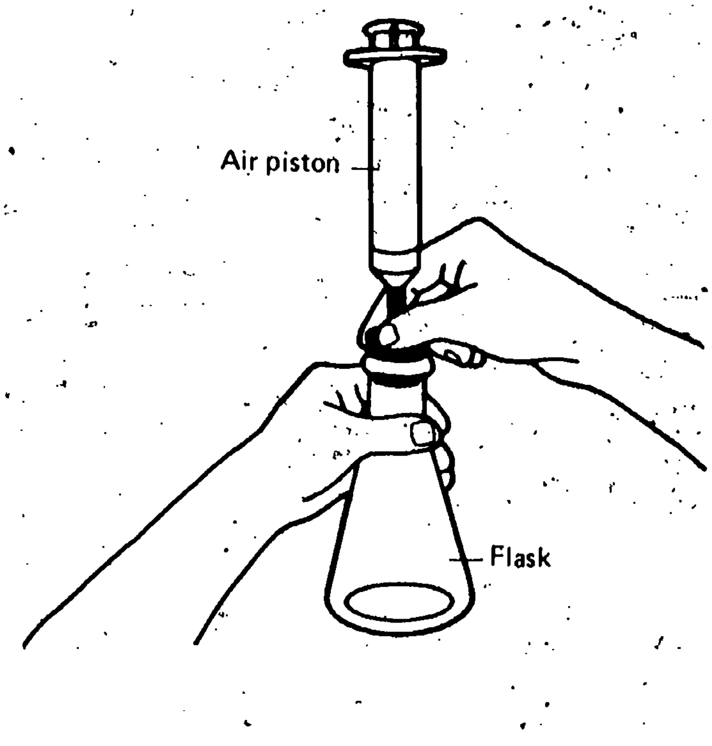
WW
03
Core
1

Explains the uncertainty of cloud formation when pressure and temperature are reduced.

The student applies the concepts that relative humidity affects cloud formation and that relative humidity varies inversely with temperature provided that there is the same amount of water vapor in the air.

Student Action: Stating, in effect, that the relative humidity may have been different and that cooling the flask increases the relative humidity which in turn increases the chance of a mist forming in the flask.

Performance Check A: Barb, using the apparatus shown in the diagram, had no trouble forming a mist in the flask. A week later Lou tried the same activity. He had a great deal of trouble. He had to cool the flask with cold water before he could get any mist at all to form. Why might Lou have had trouble forming a mist when Barb did not?



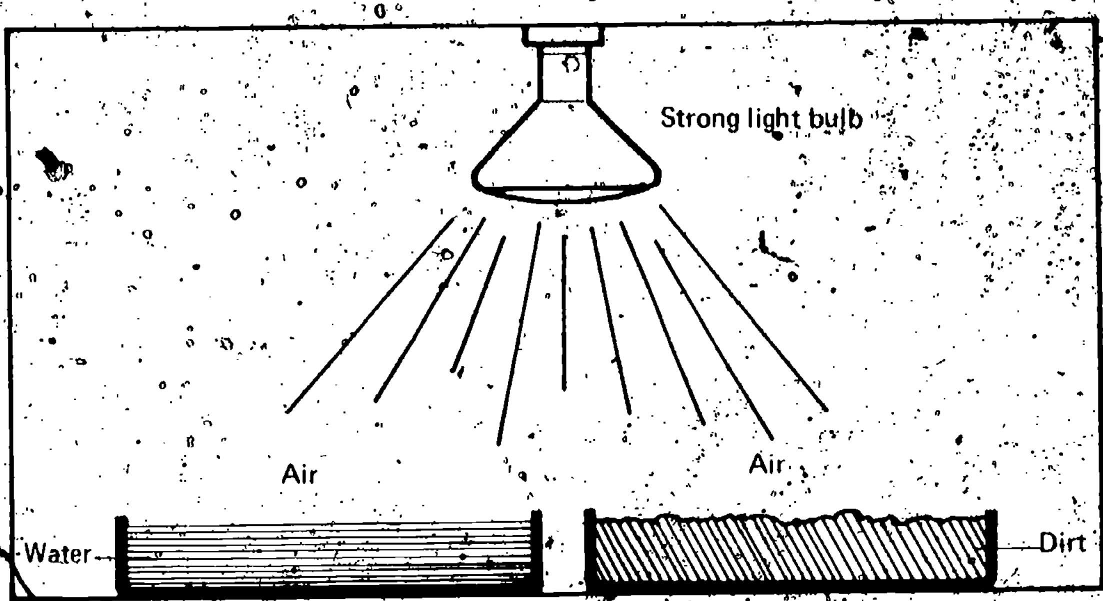
Remediation: (1) Question the student about how clouds form. If he has difficulty with this question, refer him to page 51. (2) Question him about the effect relative humidity has on cloud formation and how relative humidity varies with temperature. (3) Ask him why the second student had trouble forming a mist. What effect did cooling the flask have on mist formation?

Compares the air temperature above dirt and water.

The student applies the concept that solid earthen surfaces radiate more energy than water when both receive the same amount of energy and that therefore the surface of the solid warms the air above it more than does the surface of the water.

Student Action: Responding to the effect that the air will be warmer above the dirt and with the essence of the concept that when exposed to equal amounts of sunlight, dirt reradiates radiant energy more rapidly than does water and, as a result, warms the air above it more.

Performance Check A: Eric set up the apparatus shown below. After having the light on for 5 minutes, he measured the temperature of the air 3 cm above the surface of the dirt and of the air 3 cm above the surface of the water.



1. Is the air warmer above the water or above the dirt?
2. Explain your answer.

Remediation: (1) Refer the student to Figure 5-2 and the paragraph that precedes it on page 55. (2) Have him compare the radiant energy absorption of land and water in Figure 5-A and in the figure that accompanies Self-Evaluation 5-1.

WW 03 Core 2

Describes air movement around a cold surface.

The student applies the concepts that the air tends to take on the temperature of its surroundings and that cooler air is heavier (denser) than warmer air and tends to push warmer air upward to its original position.

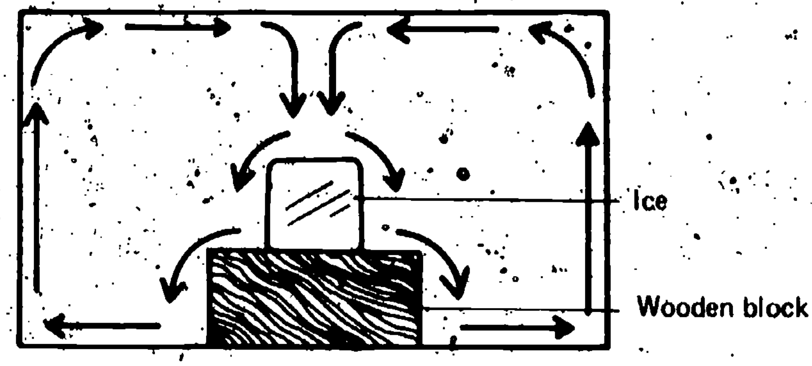
Special Preparations: Duplicate diagram WW-03-Core-3 that appears in the special section at the back of this book.

WW 03

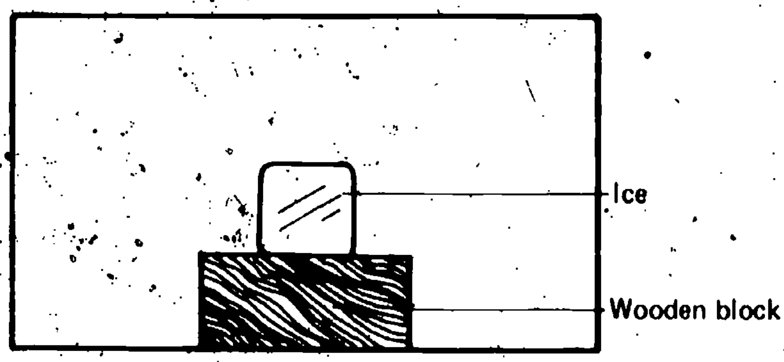
Core 3

Student Action: Drawing arrows to show that the air above the piece of ice moves downward, spreads outward over the floor of the box, and then moves upward near the outer walls.

A, B, and C:



Performance Check A: Danny put a piece of ice on a wooden block in his observation box as shown in the diagram below. Copy the diagram onto your answer sheet, or get a copy of it from your teacher. Draw arrows on your copy to indicate the direction of motion of the air throughout the entire box.



Remediation: (1) If the student doesn't know how air moves over warm and cold surfaces, refer him to Figure 1-1 on page 4 and Figure 5-3 on page 56. (2) Have him redo the check. If necessary, discuss with him the concepts involved.

WW 03 Core

Indicates the wind direction at a land-water boundary.

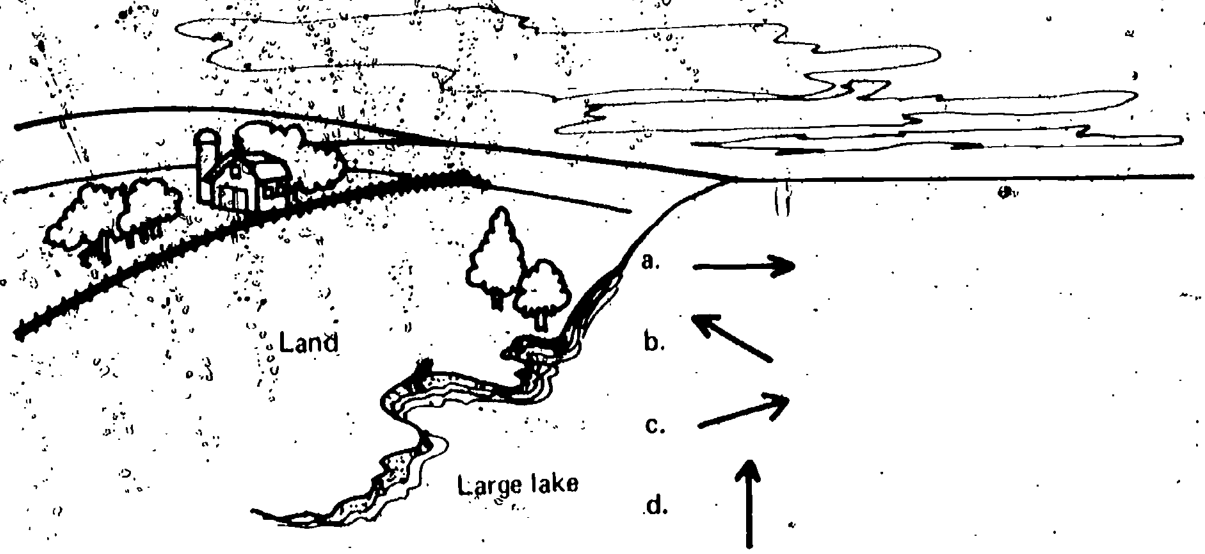
The student applies the facts that air above a land surface warms up more rapidly than air above a water surface and that the warmer air above the land is pushed upward by the cooler air moving in from above the water surface.

Student Action: Selecting the arrow indicating a wind moving from the direction of the water surface towards the land surface.

A: b
B: c
C: a

4

Performance Check A: The diagram below shows a farm located near a very large lake. Select the arrow which best indicates the wind direction on a hot, sunny day.



Remediation: Refer the student to page 62, and have him describe to you the air flow and the reason that it flows in that direction.

WW 03 Core 5

Selects the reason for a breeze blowing from over water toward land.

The student applies the concepts that the sun causes a differential heating of bodies of water and land surfaces and that denser cool air flows under the less dense warm air, causing the warm air to rise.

Student Action: Selecting the statement to the effect that the cooler air above the water moves in over the land, causing the warmer air over the land to rise.

A: c
B: d
C: a

Performance Check A: Heather is staying at a summer cottage near a very large lake. Every day she notices that there is a cool breeze blowing in from the lake. Which statement below explains the reason for this cool breeze?

a. The air over the lake is warmer than the air over the land.
b. The air over the land contains more water vapor than the air over the lake.
c. The cooler air above the lake moves in over the land, causing the warmer air over the land to rise.
d. There is less air over the lake than over the land.
e. The waves on the lake cause the air to be blown over the land.

Remediation: (1) Refer the student to Problem Break 5-2 and Figure 5-8 on page 62. (2) Review his answers to question 5-15 and Figure 5-8 in his *Record Book.* (3) If necessary, discuss the concept with him.

WW 03 Core 6

Interprets weather map symbols.

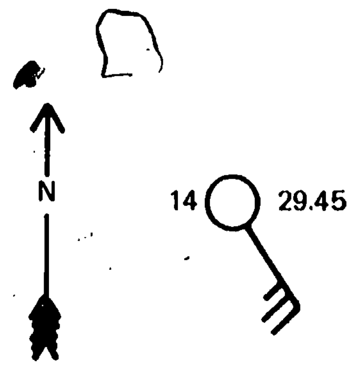
The student identifies the wind direction as from the tail to the head of the symbol, the wind speed as within the range of that symbol on the chart whose tail is the same, the temperature as the whole number, and the barometric pressure as the number having two decimal places.

Student Action: Stating the wind direction to the nearest 45° compass reading (N, NW, W, etc.) and the wind speed, temperature, and barometer pressure correctly.

A: 1. SE, 2. 19-24 mph, 3. 14°, 4. 29.45
B: 1. NW, 2. 13-18 mph, 3. 19°, 4. 29.60
C: 1. 4°, 2. 29.91, 3. S, 4. 4-7 mph

Performance Check A:

WIND SPEED (in mph)	WIND SPEED SYMBOL
Less than 1	
1-3	
4-7	
8-12	
13-18	
19-24	
25-31	



Use the information above to help you interpret the weather map symbol shown next to the arrow. Then answer the four questions about the symbol.

1. What is the wind direction?
2. What is the wind speed?
3. What is the temperature?
4. What is the air pressure?

Remediation: (1) Suggest that the student review Figure 6-5 on page 69. (2) Reassess the objective with an alternate check.

WW 03 Core

Selects the highest and lowest pressure stations on a weather map.

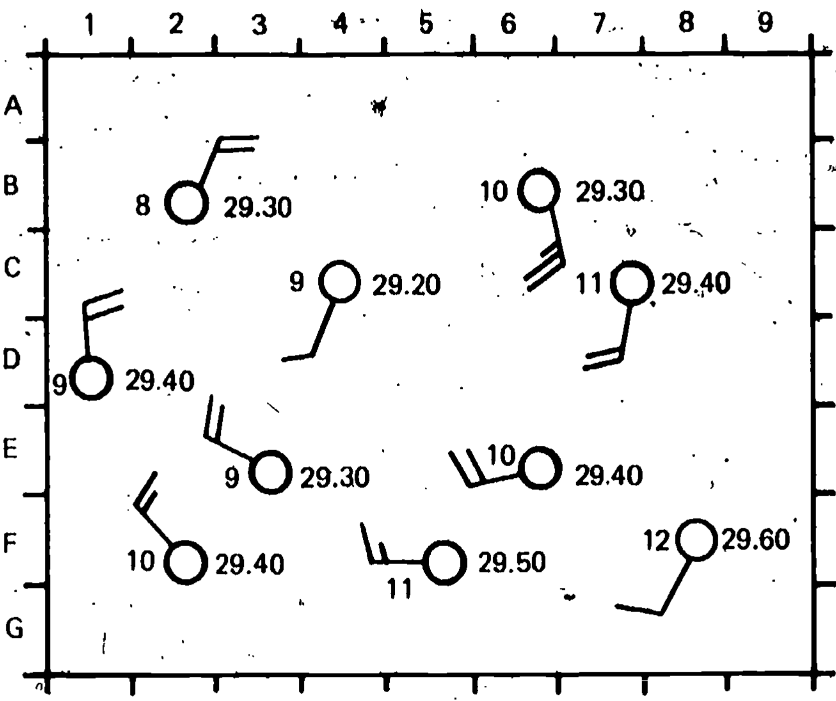
The student applies the convention that on a weather map the numbers with two decimal places represent air pressure readings.

Student Action: Stating the coordinates of the stations with the highest and the lowest numbers having two decimal places as the locations at which the air pressure is the highest and lowest respectively.

A: 1. F-8, 2. C-4
B: 1. C-6, 2. E-2
C: 1. B-4, 2. D-8

Performance Check A: Use the horizontal and vertical scales on the weather map shown below to answer the two questions.

1. Which weather station reported the highest air pressure?
2. Which weather station reported the lowest air pressure?



Remediation: (1) Suggest that the student review pages 68 and 69. (2) Review the student's answer to question 6-1. (3) Review his answer to Self-Evaluation 6-1 A. (4) If a student has trouble using the coordinate system to identify areas on the map, have him bring in a road map. Select small cities from the list of cities and have him use the coordinates to find them. (5) Ask the student what part of the symbol indicates the location of the station. (6) Reassess the objective with an alternate check.

7

Selects from a weather map the stations reporting the highest and lowest wind speeds.

The student applies the convention that on a weather map the wind speed at each location is indicated by the number and length of the angular barbs in the weather symbol.

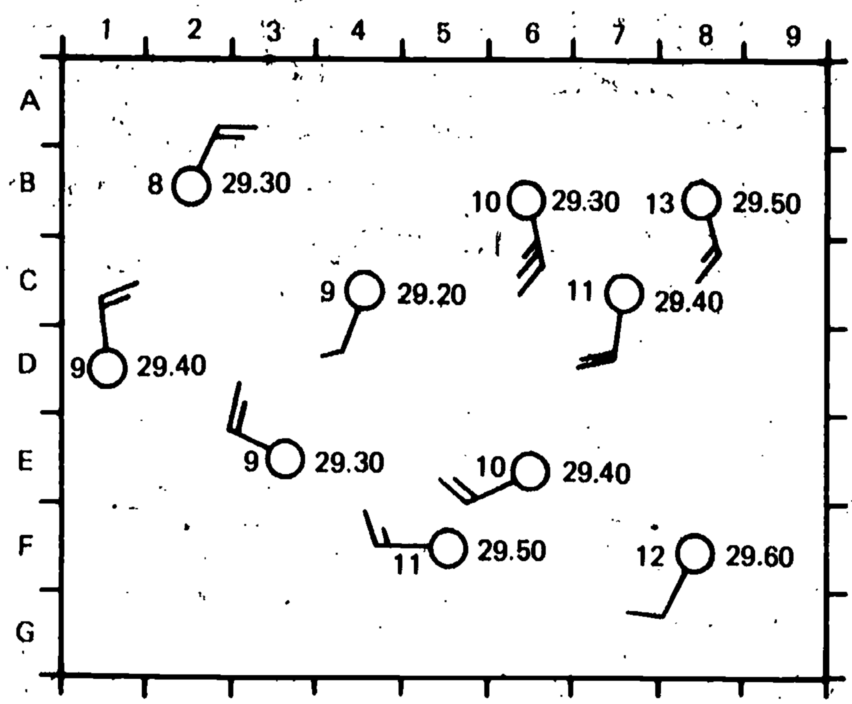
Student Action: Stating the coordinates of the symbol with the most numerous and longest barbs as the location at which the wind speed is highest and the coordinates of the symbol with the fewest and shortest barbs as the location at which the wind speed is lowest.

A: 1. B-6, 2. C-4
B: 1. D-2, 2. B-7
C: 1. E-4, 2. A-9

WW 03 Core 8

Performance Check A: Use the horizontal and vertical scales on the weather map shown below to answer the two questions.

1. Which weather station reported the highest wind speed?
2. Which weather station reported the lowest wind speed?



Remediation: See the Remediation for WW-03-Core-7.

WW 03 Core 9

Selects the stations on a weather map with the highest and lowest temperatures.

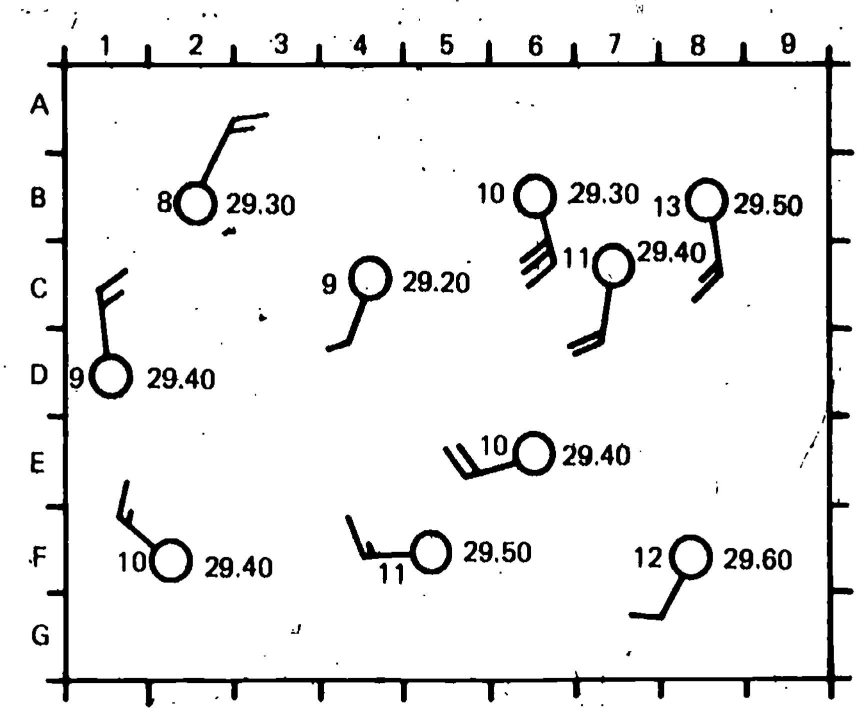
The student applies the convention that the integers (whole numbers) on the weather map represent the temperatures reported.

Student Action: Stating the coordinates of the stations beside which the highest and lowest integers appear as the stations at which the temperature is highest and lowest, respectively.

A: 1. B-8, 2. B-2
B: 1. C-7, 2. D-3
C: 1. D-2, 2. F-8

Performance Check A: Use the horizontal and vertical scales on the weather map shown below to answer the two questions.

1. Which weather station reported the highest temperature?
2. Which weather station reported the lowest temperature?



Remediation: See Remediation WW-03-Core-7.

WW 03 Core 10

Defines *isobar.*

The student recalls the definition of *isobar.*

Student Action: Responding to the effect that an isobar is a line drawn on a weather map to connect areas of equal pressure.

Performance Check A: Weather forecasters often use isobars in predicting the weather. What is meant by the term *isobar?*

Remediation: Refer the student to page 72, where *isobar* is defined.

WW 03

Draws isobars on a weather map.

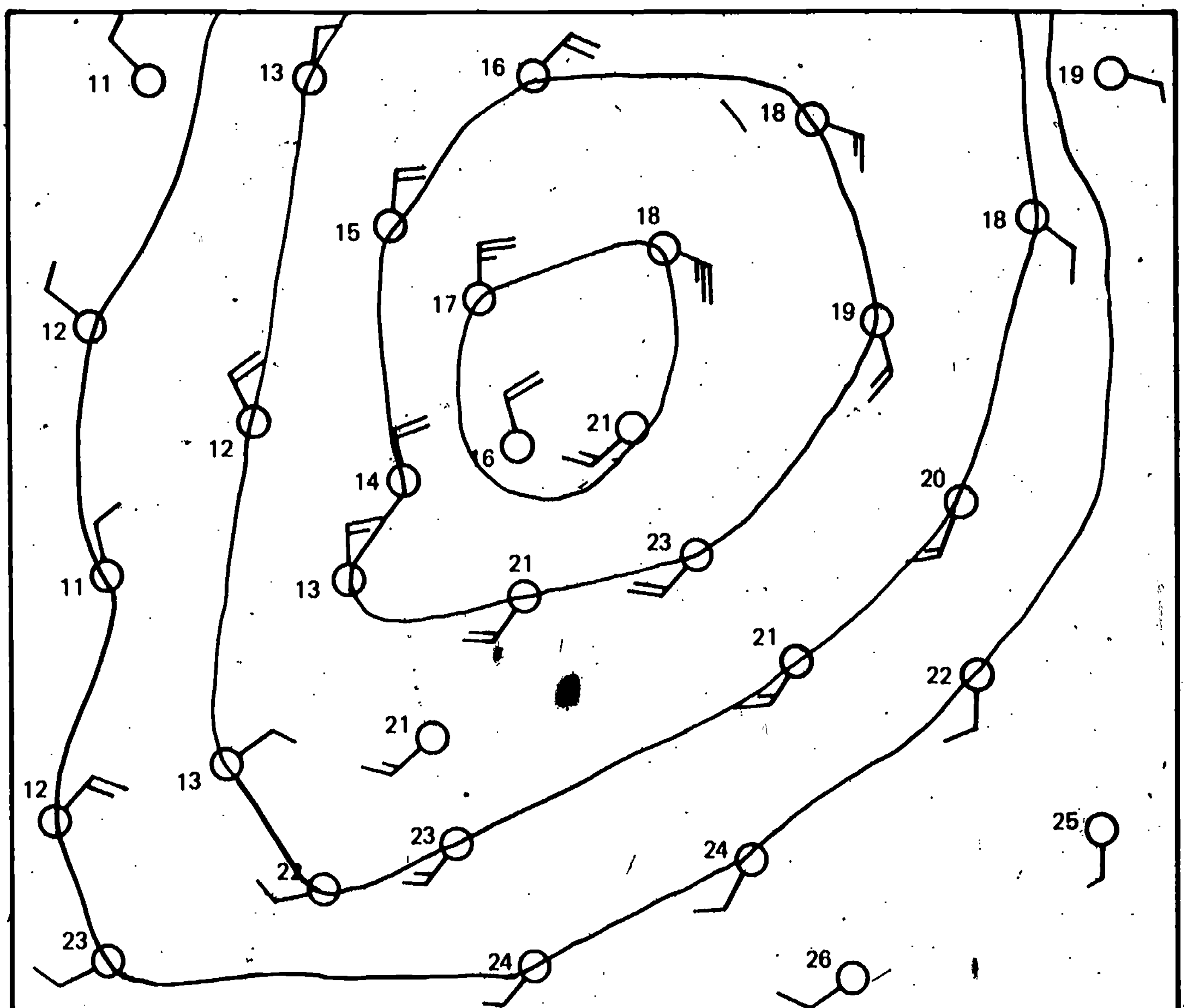
The student applies the procedure for drawing isobars on a weather map.

Special Preparations: Duplicate the appropriate maps labeled WW-03-Core-11 A, B, and C that appear in the special section at the back of this book.

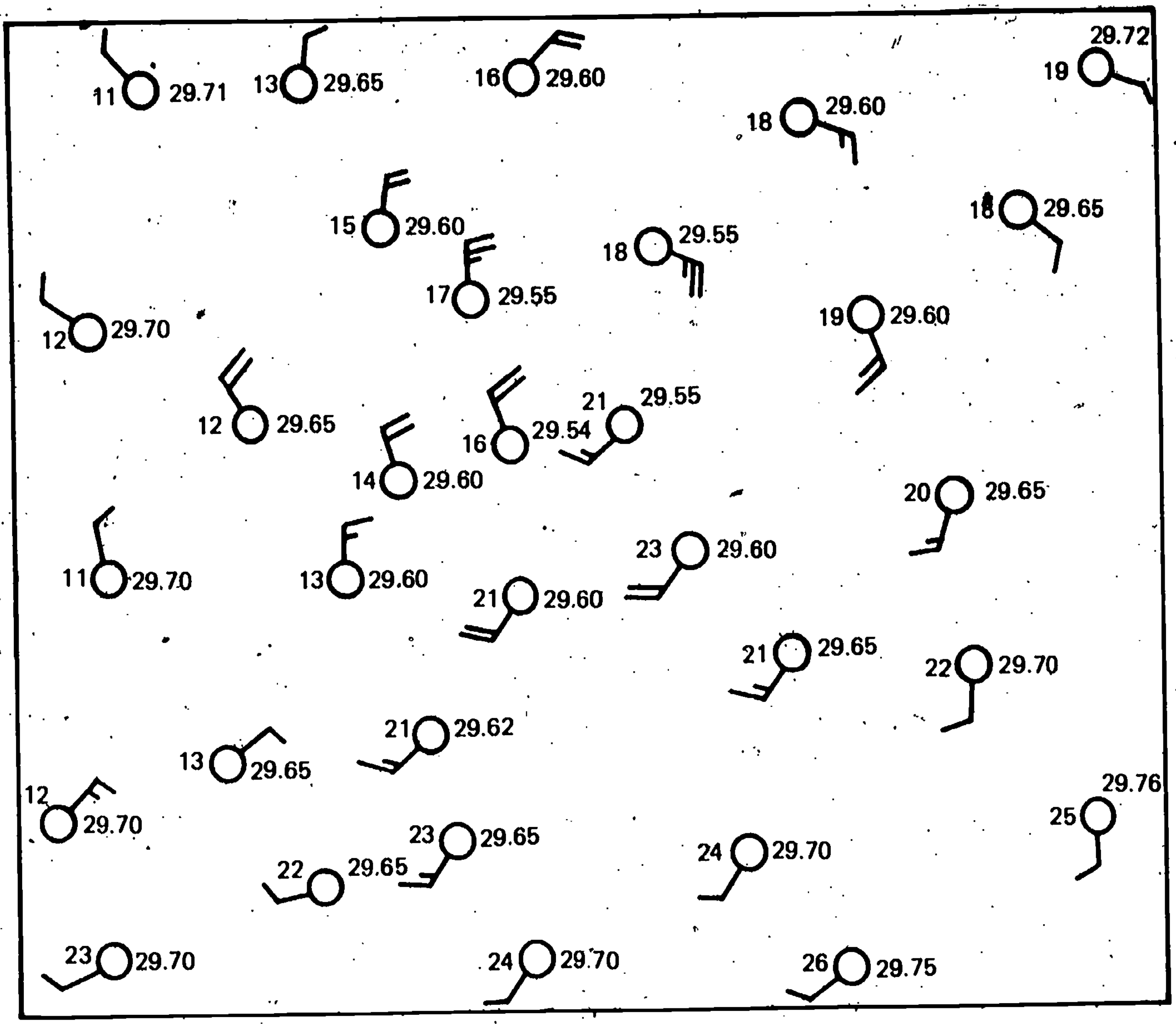
Core 11

Student Action: Drawing in two isobars as smoothly curved lines that pass through weather stations reporting the same barometric readings and between stations reporting higher or lower pressure readings.

A, B, and **C:** The student's two isobars should resemble the appropriate two curved lines shown below.



Performance Check A: Get a copy of the weather map shown below from your teacher. Draw in two isobars on your copy of the weather map.



Remediation: (1) Have the student review Figure 6-4, page 15 of the *Record Book*, on which he drew isobars. (2) Review the student's answer to Self-Evaluation 6-1 B. (3) Reassess this objective with an alternate check.

WW 03 Core

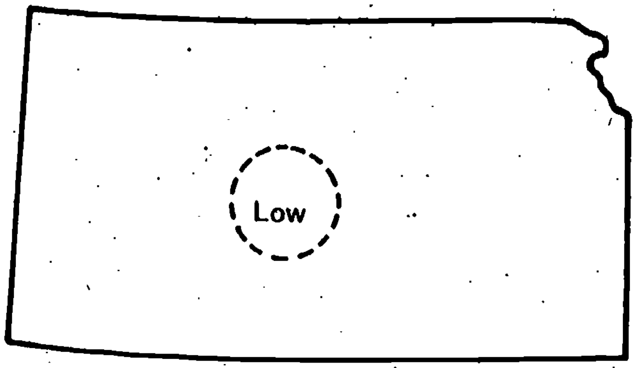
Indicates the wind direction in a low pressure area.

The student applies the concept that in the Northern Hemisphere air moves in a counterclockwise direction around a low pressure area.

Student Action: Drawing arrows on his map indicating a counterclockwise flow of air around the low pressure area.

12

Performance Check A: Copy the map of the state of Kansas shown below. The map shows a low pressure area near the middle of the state. Use arrows to indicate the directions of the wind over the state when the low pressure area is present.



Remediation: (1) Suggest that the student review the last three paragraphs on page 73. (2) Review his answers to questions 6-9 and 6-11 on pages 73 and 75. (3) Review his answer to Self-Evaluation 6-2. (4) Have him do an alternate check. Discuss the concept with him if necessary.

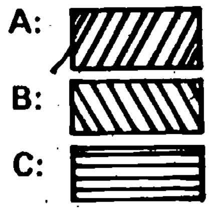
WW 03 Core 13

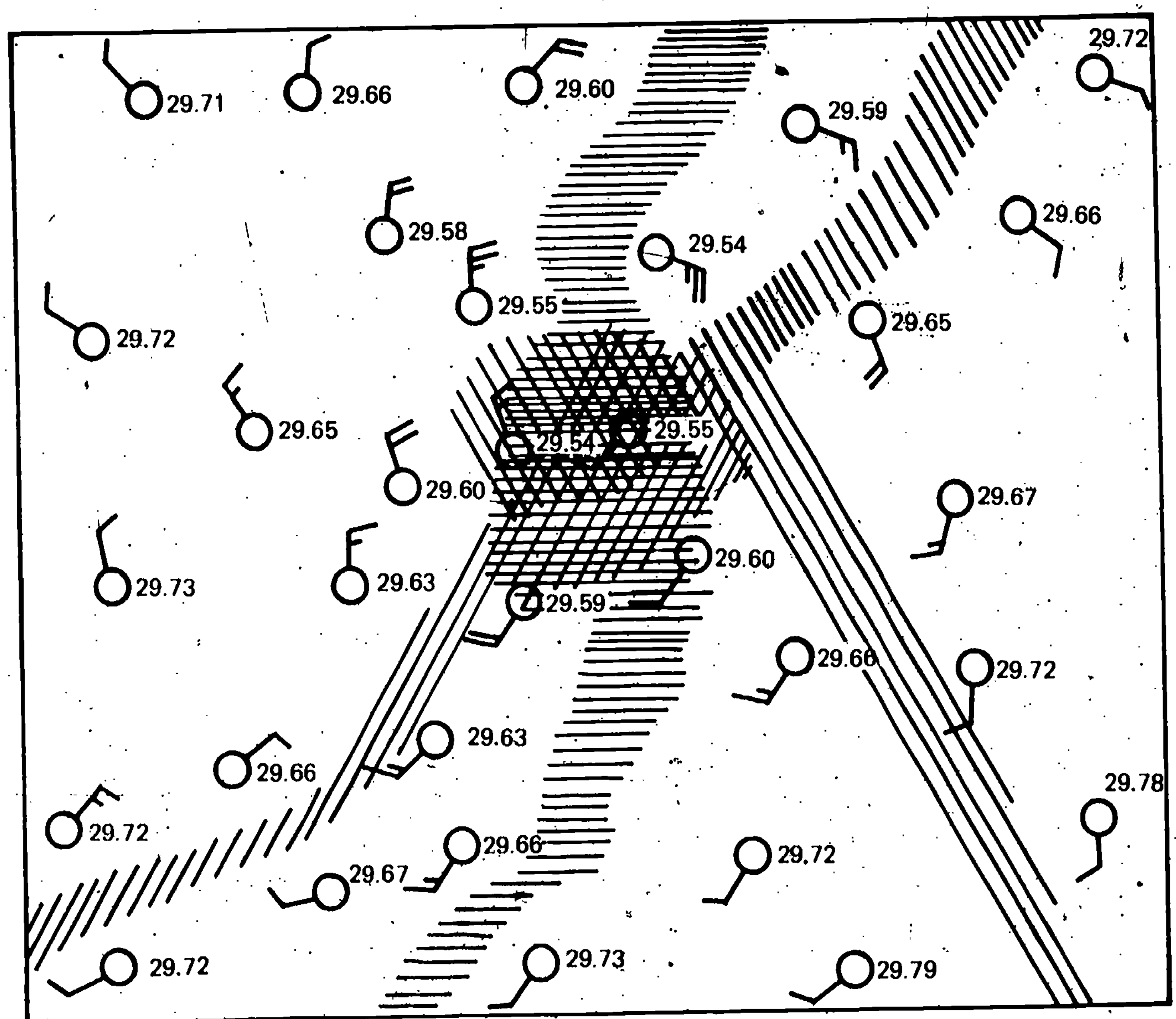
Determines cloudy areas on a weather map.

The student applies the concept that heavy cloud cover is usually located near the boundaries between cold and warm air masses and near the center of low pressure areas.

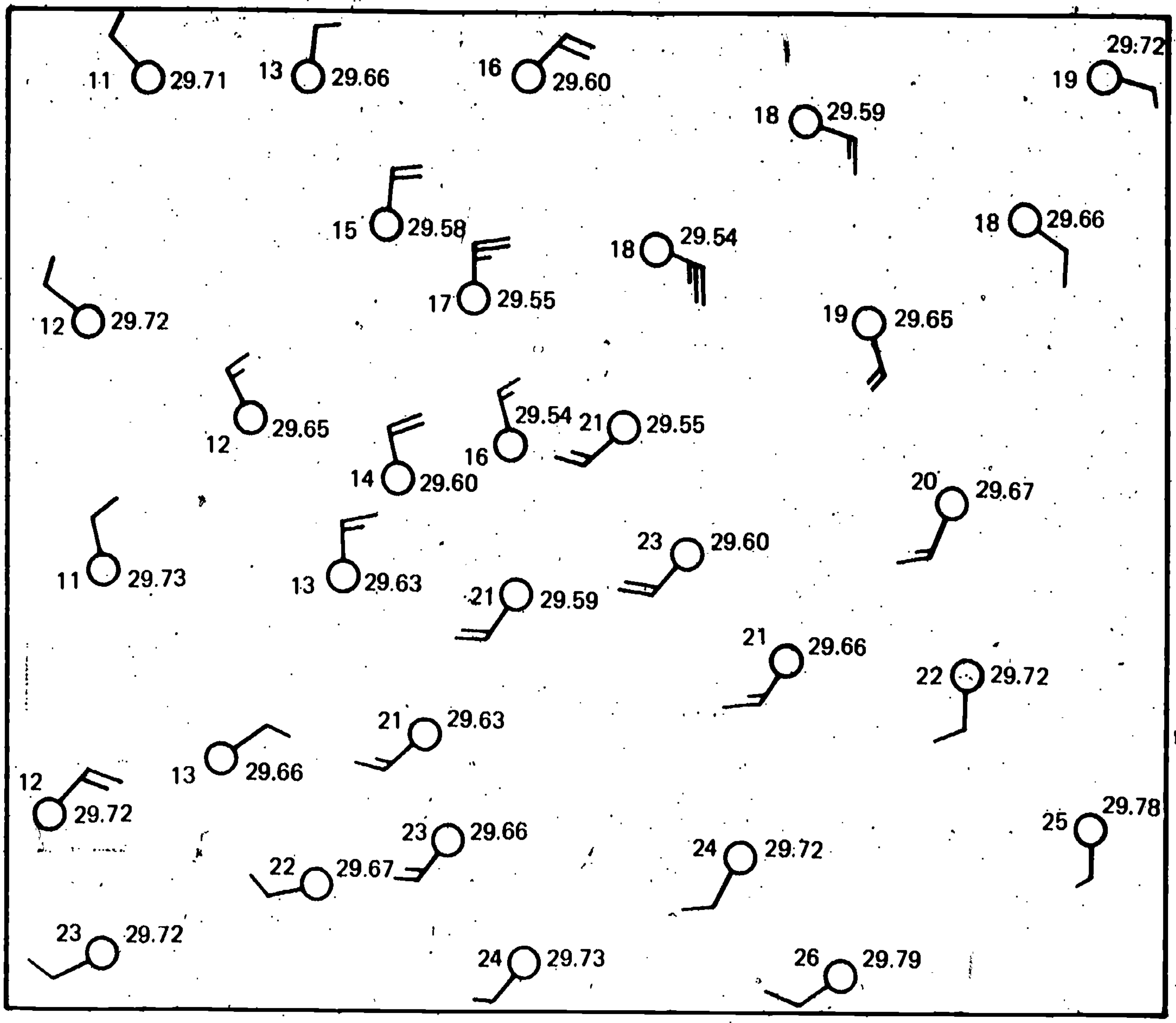
Special Preparations: Duplicate the appropriate maps labeled WW-03-Core-13 A, B, and C that appear in the special section at the back of this book.

Student Action: Shading on the weather map the areas which correspond both to boundaries between cold and warm air masses and to the center of the low pressure region.





Performance Check A: Ask your teacher for a copy of the weather map shown below. Use the information on the map to determine the areas where you would expect to find overcast skies. Shade in those overcast areas on your copy of the weather map.



Remediation: (1) Suggest that the student review Problem Break 6-1 on page 76. (2) Check Figure 6-9, page 16, in his *Record Book*. (3) Review his answers to Self-Evaluation 6-1 C and D. (4) Reassess the objective with an alternate check.

WW 03

Explains rainfall on two sides of a mountain range.

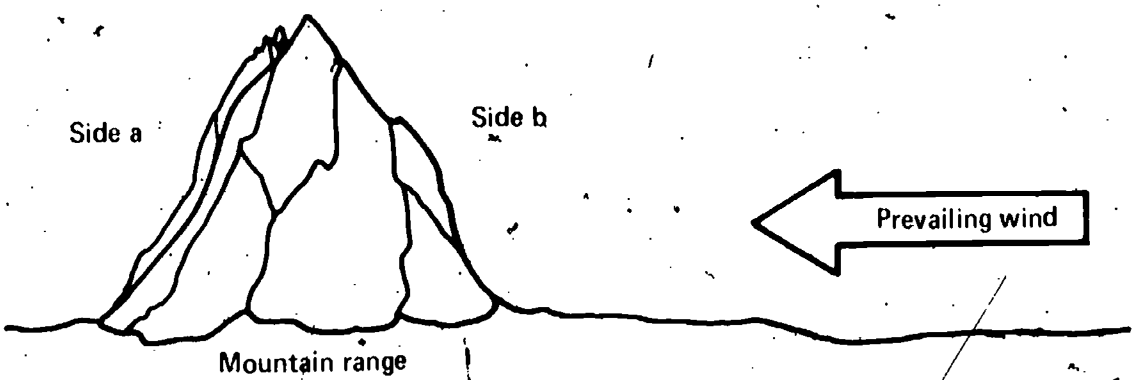
The student applies the concept that air cools as it rises, which often results in condensation and precipitation.

Student Action: Selecting the windward side as having more rainfall and stating, in effect, that when air is forced upward by a mountain range, it cools, which often results in the condensation of some of the moisture, which then forms clouds and falls as rain on the windward side of the mountain.

A: b
B: b
C: a

Core 14

Performance Check A: Examine the diagram of the mountain range shown below.



1. Which side of the mountain range, a or b, will receive more rainfall?
2. Explain your answer.

Remediation: (1) Suggest that the student review page 78, especially Figure 6-11. (2) Review his answer to Self-Evaluation 6-3. (3) Have him do an alternate check. If necessary, discuss the concept with him.

WW 03 Core 15

Lists causes of the uplifting of air.

The student recalls the major causes of the uplifting of air.

Student Action: Stating the effect of three of the following: (1) warmed surfaces which heat air, (2) sharp differences in air temperature (fronts), (3) low barometric pressure, and (4) the influence of geographic features such as mountains or seacoasts.

Performance Check A: List three major causes of the uplifting of air.

Remediation: Refer the student to pages 81 and 82, where the four major areas in which air is uplifted are listed.

WW

Recognizes the symbols for fronts.

The student classifies the symbols used for a cold front, a warm front, and a stationary front.

O3 Core 16

Student Action: Naming the line having only pointed bumps as the symbol for a cold front, the line having only rounded bumps as the symbol for a warm front, and the line having both rounded and pointed bumps as the symbol for a stationary front.

- **A:** 1. cold front, 2. warm front, 3. stationary front
- **B:** 1. stationary front, 2. warm front, 3. cold front
- **C:** 1. warm front, 2. stationary front, 3. cold front

Performance Check A: Name each of the following weather map symbols.

Remediation: (1) Suggest that the student review page 82, where the symbol for each front is introduced. (2) Review his answer to Self-Evaluation 7-3.

WW O3 Core 17

Selects the direction of movement of a low pressure area.

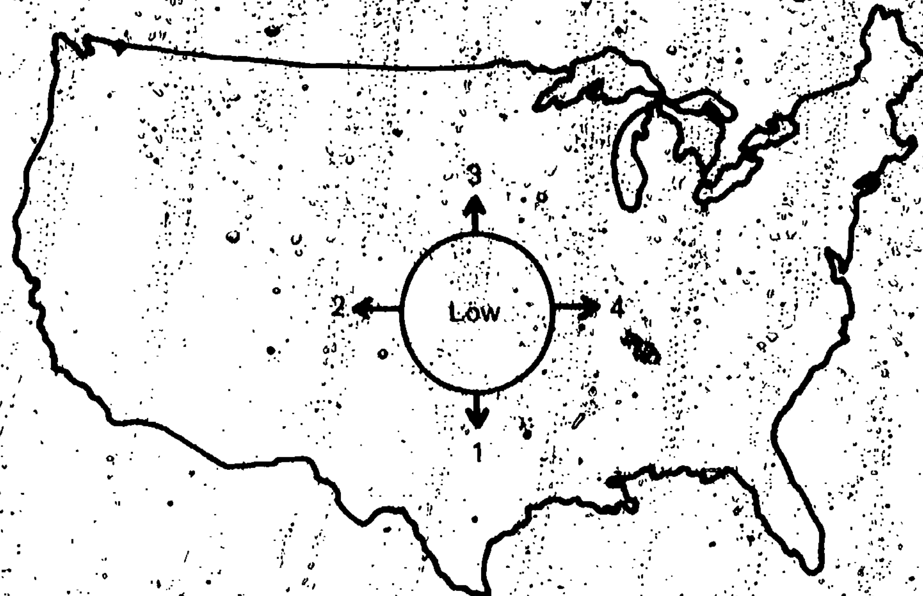
The student applies the concept that over the United States, weather phenomena have a general motion from west to east.

Student Action: Selecting the arrow that points eastward.

- **A:** d
- **B:** a
- **C:** e

Performance Check A: From the list below, select the option that shows the direction in which the low pressure area shown on the map is most likely to move.

a. Arrow 1
b. Arrow 2
c. Arrow 3
d. Arrow 4
e. All of the directions indicated are equally likely.



Remediation: (1) Refer the student to pages 83 through 87 and to question 7-1 on page 87. (2) Have him review Figures 7-1a through 7-4a and then tell you the direction of motion of the low pressure area in the check. (3) Review his answer to Self-Evaluation 7-1.

Selects the weather characteristics of a low pressure area.

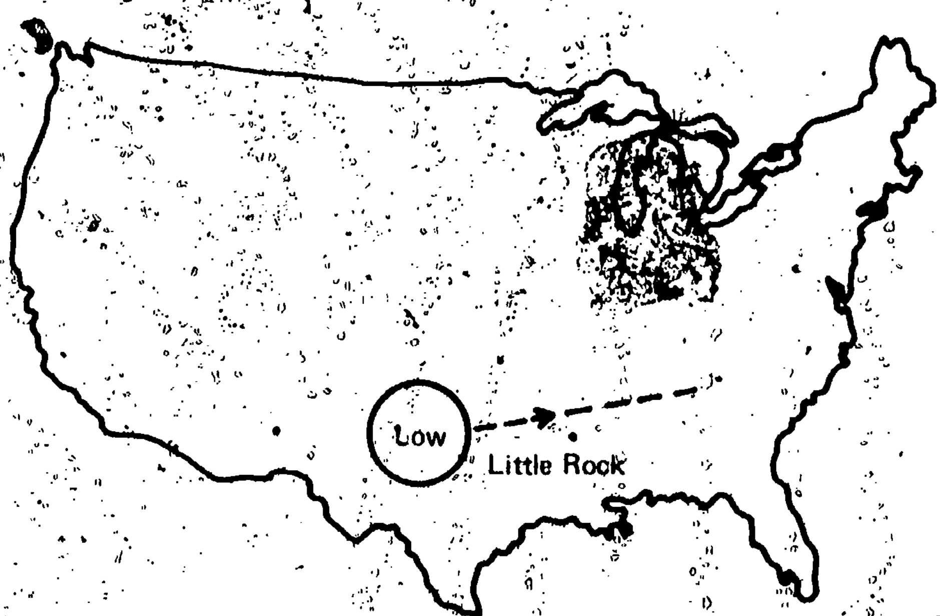
WW 03 Core 18

The student applies the concepts that as a low pressure area approaches, certain specific weather conditions may usually be observed.

Student Action: Selecting at least two of the three changes which are included in the check and are in agreement with the following: as the low pressure area approaches (1) the barometric pressure will drop, (2) the sky will tend to cloud over, (3) the wind will tend to be from either the southeast or the southwest, and (4) the temperature will remain constant or rise.

- **A:** b, c, e
- **B:** b, c, d
- **C:** a, b, c

Performance Check A: The weather map below shows a low pressure area approaching Little Rock, Arkansas.



List the letters of all the changes in the weather you would expect as the low pressure area approaches.

a. There will be a sudden drop in temperature.
b. The wind will shift until it is blowing from the southwest.
c. The barometric pressure will drop.
d. There will be a sudden shift in wind direction so that it blows from the north.
e. The sky will cloud over.

Remediation: (1) Suggest that the student review page 87, where the characteristics of a low pressure system are investigated. (2) Review his answers to questions 7-3 through 7-6. (3) Have him tell you the characteristics of an approaching low pressure area. If necessary, discuss them with him. (4) Review his answer to Self-Evaluation 7-2. (5) In relation to the effect on temperature, ask the student what happens in Figures 7-1b, 7-2b, and 7-3b as the low pressure area approaches Syracuse.

WW O3 Core

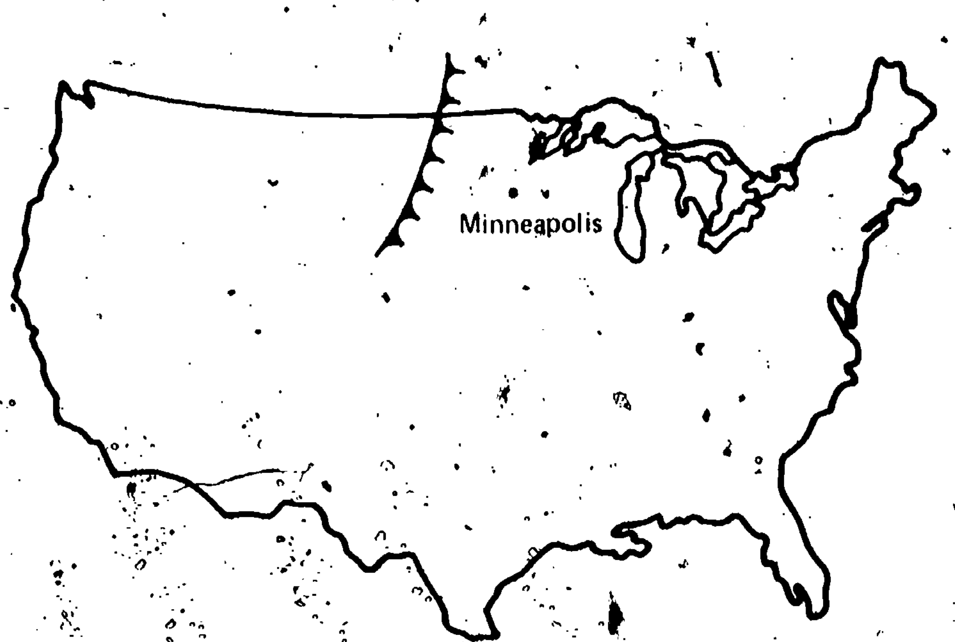
Selects the weather characteristics of a cold front.

The student applies the concept that as a cold front approaches and passes through, certain specific weather conditions are usually observable.

Student Action: Selecting at least two of the three changes which appear in the check and are in agreement with the following: (1) as a cold front approaches, primarily the sky will cloud over with cumulus and the cumulonimbus clouds, (2) as the cold front passes through, the temperature will drop, (3) as the cold front passes through, the wind will shift until it is blowing from the north, and (4) the barometric pressure will drop as the front approaches and then rise as the front passes through.

A: b, d, e
B: a, c, d
C: a, b, d

Performance Check A: The weather map below shows a cold front approaching Minneapolis, Minnesota.



Indicate which of the weather changes below you would expect to occur as the cold front approaches and passes through.

a. Cirrus clouds in the sky will provide advance warning of the approaching cold front.
b. As the cold front passes through, the wind will shift so that it blows from the north.
c. The barometric pressure will rise steadily as the cold front approaches and then will drop.
d. As the cold front approaches, the sky will cloud over, primarily with cumulus and cumulonimbus clouds.
e. The temperature will drop as the cold front passes through.

Remediation: (1) Suggest that the student review page 88, where he investigated the characteristics of a cold front approaching Selma, Alabama. (2) Review his answers to questions 7-13 through 7-17. If necessary, discuss the characteristics with him.

WW
O3
Core
20

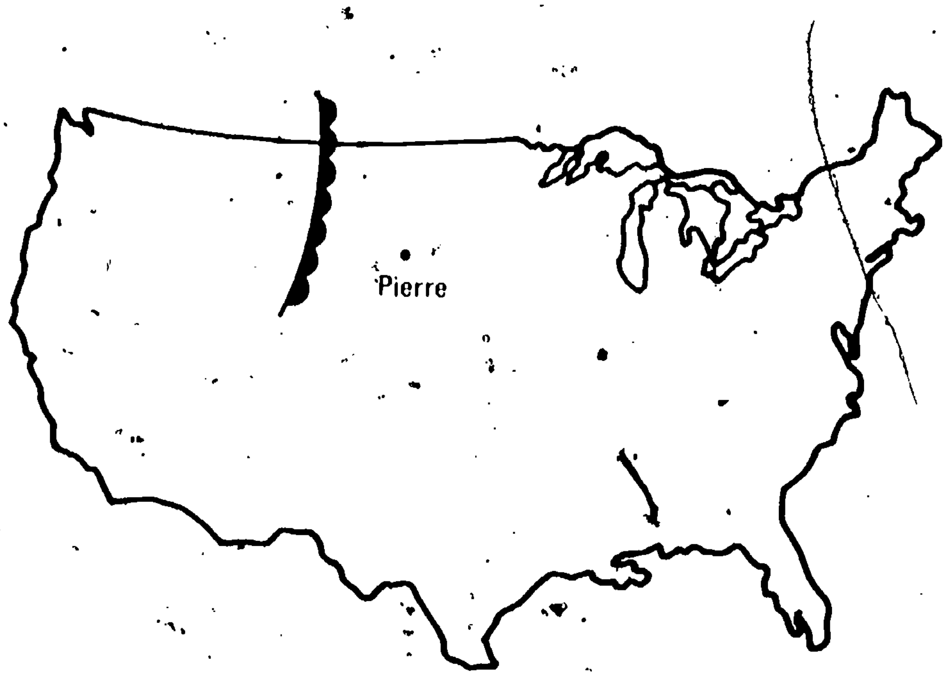
Selects the weather characteristics of a warm front.

The student applies the concept that as a warm front approaches and passes through an area, certain specific weather conditions are usually observable.

Student Action: Selecting at least two of the three changes which are included in the check and are in agreement with the following: (1) the sky will cloud over with cirrus, then cumulus, then stratus clouds as the warm front approaches, (2) the barometric pressure will tend to fall as the warm front approaches and passes through, (3) the temperature will increase as the warm front moves through, and (4) the wind before the approaching warm front will generally be from the south.

A: a, d, e
B: b, c, d
C: a, b, c

Performance Check A: The weather map below shows a warm front approaching Pierre, South Dakota.



List the letters of all the weather changes you would expect to occur as the warm front approaches and passes through.

a. There will be a south wind as the warm front approaches.
b. The barometric pressure will rise steadily as the warm front approaches and passes through.
c. As the warm front approaches, the sky will cloud over, primarily with cumulus and cumulonimbus clouds.
d. The temperature will increase as the warm front passes through.
e. Cirrus clouds will appear in the sky first, followed by cumulus, and then by stratus clouds as the warm front gets closer.

Remediation: (1) Suggest that the student review page 88, where he investigated the characteristics of a warm front approaching Fargo, North Dakota. (2) Review his answers to questions 7-7 through 7-11. If necessary, discuss the characteristics with him. (3) Review his answer to Self-Evaluation 7-5.

Recognizes diagrams of warm and cold fronts.

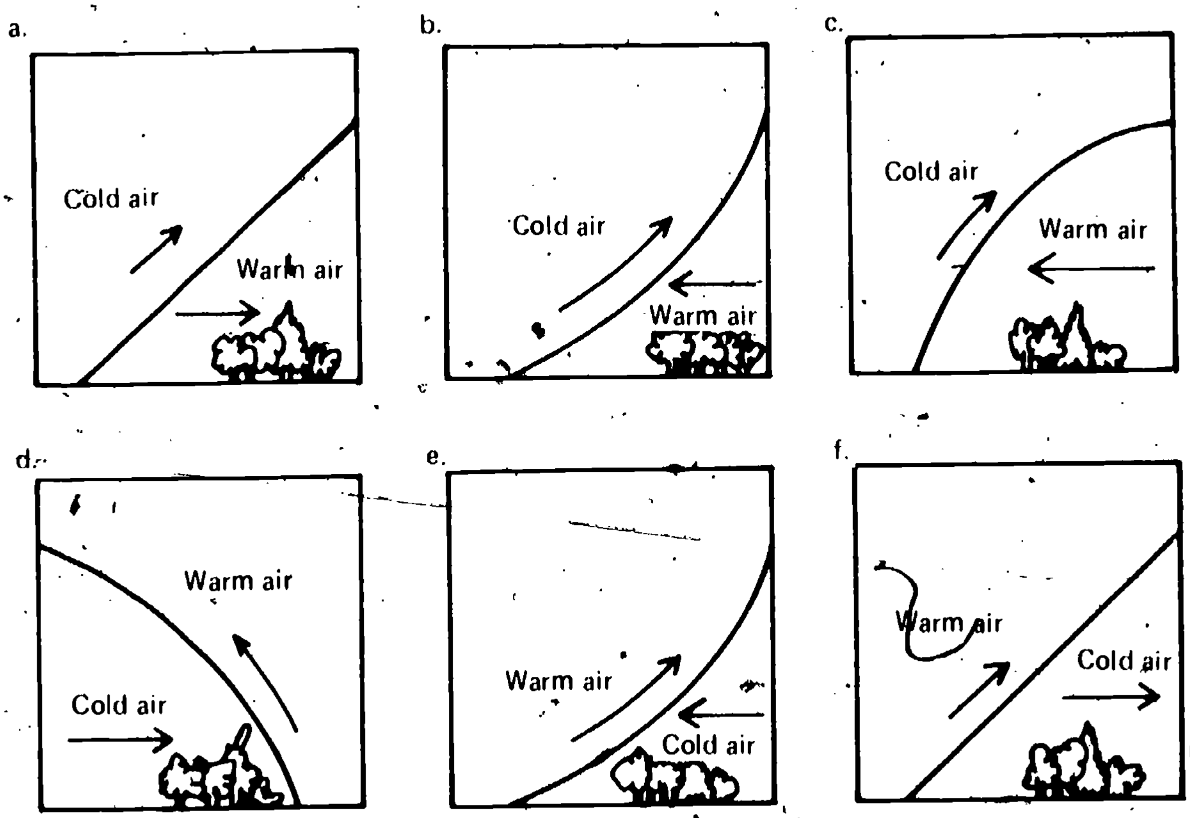
The student identifies the diagram with a straight demarkation line between the cold and warm air masses and in which the warm air is above the cold as representing a warm front and the front with a curved interface which bulges upward between the cold and warm air masses and in which the warm air is above the cold as representing a cold front.

Student Action: Selecting the diagrams which represent cold and warm fronts.

A: 1. f, 2. d
B: 1. c, 2. e
C: 1. d, 2. a

Performance Check A: The arrows in the diagrams below represent the directions of air movement.

1. Which diagram best represents a warm front?
2. Which diagram best represents a cold front?



Remediation: (1) Suggest that the student review Figures 7-5 and 7-6 on page 89. Review his answer to Self-Evaluation 7-6 on page 46 of the *Record Book*.

WW
O3
Exc
5-1
1

Calculates air temperature at a specified altitude.

The student applies the procedure for calculating the air temperature at a specified altitude, which involves dividing the altitude expressed in meters by 100 m and subtracting this result from the air temperature at the earth's surface.

Student Action: Stating the air temperature within ±0.2°C.

A: 13.1 ±0.2°C
B: 16.6 ±0.2°C
C: 20.3 ±0.2°C.

Performance Check A: Philip measured the air temperature at the earth's surface. It was 22.5°C. He knows that the air temperature decreases at an average rate of about 1.0°C per 100 m. Calculate the air temperature at an altitude of 940 meters above the earth's surface at the time Phil made his measurement.

Remediation: (1) Refer the student to Figure 2 on page 142. (2) Review his answer to question 4 on page 142. If necessary, discuss the calculation with him. (3) Reassess this objective with an alternate check.

WW
O3
Exc
5-1
2

Calculates the dew point at a specified altitude.

The student applies the procedure for calculating the dew point at a specified altitude, which involves dividing the altitude by 550 and subtracting the result from the dew point at the earth's surface.

Student Action: Stating the dew point within ±0.2°C.

A: 9.8 ±0.2°C
B: 9.7 ±0.2°C
C: 12.2 ±0.2°C

Performance Check A: Bill wants to calculate the dew point at an altitude of 1540 meters above the earth's surface. He has measured the dew point at the earth's surface. It is 12.6°C. He knows that the dew point of air decreases at an average rate of 1.0°C per 550 m. What is the dew point at an altitude of 1540 m at the time Bill took his measurement?

Remediation: (1) Refer the student to page 142, especially to Figure 3. (2) Check his response to question 5. If necessary, discuss the calculation with him. (3) Reassess this objective with an alternate check.

WW
O3

Calculates the height of cloud bottoms.

The student applies the procedure for calculating the height of the cloud bottoms, which involves subtracting the dew point from the air temperature as recorded by the dry-bulb thermometer and multiplying the difference by 122.

Student Action: Stating the height of the cloud bottoms in proper units within ±1%.

A: 1,098 ±11 meters

B: 244 ±2 meters

C: 1708 ±17 meters

Exc 5-1 3

Performance Check A: Kathy made the following measurements on May 8.

Temperature, using dry-bulb thermometer = 20°C

Temperature, using wet-bulb thermometer = 10°C

She used these measurements to find that the relative humidity was 24% and the dew point was 11°C. The height of the cloud bottoms can be obtained using the following formula:

$$\text{Height of cloud bottom in meters} = 122\,(T_{air} - T_{dew\ point})$$

Use Kathy's information to calculate the height of the cloud bottoms on May 8.

Remediation: (1) Refer the student to page 144, where the formula for measuring the height at which clouds form is explained. (2) Review his answers to questions 7 and 8 on page 144. (3) Reassess this objective with an alternate check.

WW O3 Exc 5-2 1

Selects variables used to measure cloud speed.

The student recalls the measurements necessary to measure cloud speed, using a nephoscope.

Student Action: Selecting the statement that includes all of the following measurements: (1) the height of a cloud, (2) the radius of the nephoscope circle, (3) the height of the viewer's eye above the nephoscope, and (4) the time necessary for the cloud to travel from the center to the edge of the nephoscope circle.

A: e

B: f

C: e

Performance Check A: Ralph wants to use his nephoscope to measure the speed of the clouds. Which of the following measurements must he make?

a. The height of a cloud

b. The radius of the nephoscope circle

c. The height of his eye above the nephoscope

d. The time required for the cloud to travel from the center to the edge of the nephoscope circle

e. All of the measurements listed in a, b, c, and d

f. Only the measurements listed in a, b, and c

Remediation: Refer the student to page 149, where the variables used to calculate cloud speed are stated.

WW
O3
Exc
5-2
2

Calculates cloud speed.

The student applies the formulas D = H X d/h and S = D/t to determine the speed of clouds.

Student Action: Stating the speed of the clouds in the proper units within ±5%.

- **A:** 41.7 ±2.1 m/sec
- **B:** 25.1 ±1.3 m/sec
- **C:** 13.1 ±0.7 m/sec

Performance Check A: Tim wants to use the following formulas to calculate the speed of the clouds.

$$D = \frac{H \times d}{h} \qquad S = \frac{D}{t}$$

He has made the following measurements.

d (radius of nephoscope circle) = 0.05 meters
h (height of eye above nephoscope) = 0.3 meters
H (estimated height of cloud) = 1500 meters
t (time for cloud to move from center to edge of the nephoscope circle) = 6 seconds

Use Tim's measurements to calculate the speed (S) of the clouds.

Remediation: (1) Refer the student to pages 149 and 150, where the formula used to measure cloud speed is explained. (2) Review his answers to questions 1, 2, and 3 on page 150. Discuss the calculations with him if necessary. (3) Reassess the objective with an alternate check.

WW
O3
Exc
7-1
1

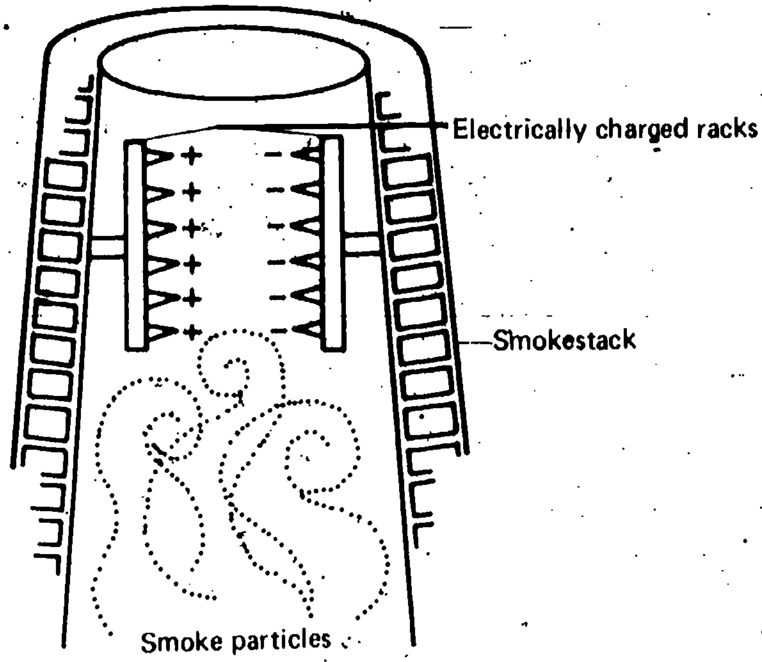
Selects the effect of electric charges on particles.

The student recalls that an electric charge causes small particles to clump together.

Student Action: Selecting the option that the presence of an electrostatic field tends to make small particles clump together.

- **A:** c
- **B:** a
- **C:** e

Performance Check A: A factory has just installed in its smokestacks the new device shown below. What effect will these large, electrically charged racks have on the smoke particles? Select the letter of the best possible answer from the list below.



a. Remove the color from the smoke
b. Get the smoke out of the stack faster
c. Cause small particles to clump together
d. Stop all gases from going up the stack
e. Keep rain from entering the stack

Remediation: (1) Refer the student to Activity 4 on page 154 and to questions 1 through 4 on page 155. (2) In a discussion, have him tell you what happens to small particles (droplets) when they pass through an electric field.

WW 03 Exc 7-1

Explains how dry ice can help produce rain.

The student generates an explanation for the production of rain when clouds are seeded with dry ice.

Student Action: Stating an explanation based on the notion that because dry ice is very cold, it would cause the formation of ice crystals in the cloud, and other water droplets would freeze onto these crystals and cause them to grow so that they would eventually fall as rain.

Performance Check A: Some scientists are very interested in learning how to make rain when they want it. One technique that has been used is to drop millions of tiny crystals of dry ice into clouds from an airplane. Dry ice crystals are very cold, about -73°C. Explain how dropping dry ice crystals into a cloud can cause rain.

2

Remediation: (1) Suggest that the student review the last paragraph of page 155 and all of page 156, where the presence of ice crystals in clouds is discussed. (2) Have him describe Figure 4, page 155, to you and tell you how supercooled droplets may stimulate precipitation. (3) Have him redo the check.

WW O3 Exc 7-2 1

States why cumulus clouds often disappear quickly.

The student recalls the reason that cumulus clouds tend to fade away quickly.

Student Action: Responding to the effect that cumulus clouds often don't last very long because the dry air surrounding such clouds causes the cloud droplets to evaporate and become invisible water vapor.

Performance Check A: When you watch a single cumulus cloud, you can see that it often does not last very long. Explain why these clouds tend to fade away rather quickly.

Remediation: Suggest that the student review page 158, where this concept is discussed.

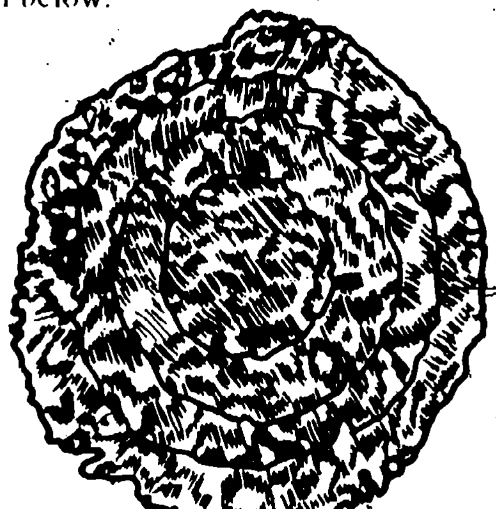
WW O3 Exc 7-2 2

Explains hailstone structure.

The student recalls how hailstones are formed in concentric shells in the atmosphere.

Student Action: Responding to the effect that ice is added rapidly only when the hailstone is moving up or down in the cloud and each layer of ice represents one upware or downward motion.

Performance Check A: Explain why hailstones usually consist of layers of ice in concentric shells as shown below.



Remediation: Suggest that the student review pages 161 and 162 and Figure 6, page 161, where the structure of hailstones is discussed.

WW 03 Exc 7-3 1

Forecasts weather conditions.

The student generates a weather forecast based on supplied data and the relationships presented in Table 2.

Student Action: Stating correctly at least four of the six changes in the weather which are in agreement with the patterns evident in the supplied data and the relationships in Table 2.

A: 1. increase, 2. decrease, 3. clearer, 4. no, 5. no, 6. a light breeze

B: 1. increase, 2. increase, 3. stay the same, 4. yes, cumulus, 5. no, 6. a light breeze

C: 1. decrease, 2. increase, 3. stay the same, 4. no, 5. no, 6. a light breeze

Performance Check A: The table below shows measurements that Bruce has made during the last four days. Open *Winds and Weather* to page 165.

DATE	TIME	TEMP (in °C)	WIND DIR.	WIND SPEED (in mph)	CLOUD TYPE	CLOUD COVER	PRECIPITATION (in inches)	BAR. PRESS. (in inches)	REL. HUM. (in %)	DEW POINT (in °C)
6	12:15	12	SW	3-5	clear	○	--	29.90	40	6
7	1:00	11	S	8-12	cirrus	◔	--	29.92	45	6
8	11:45	13	S	8-12	cumulus	◑	--	29.86	60	9
9	12:00	14	W	25-31	stratus	●	0.8	29.81	90	14

Based on Bruce's data and on Table 2 on page 165, answer the following questions to tell what changes will probably occur during the next 24 hours.

1. Will the temperature increase, decrease, or stay constant?
2. Will the relative humidity increase, decrease, or stay constant?
3. Will the sky become cloudier, clearer, or stay the same?
4. Will there be any clouds? If so, name the type.
5. Will there be no, some, or heavy precipitation?
6. Will there be no wind, a light breeze, or a strong wind?

Remediation: (1) Review the student's answer to question 2 on page 164. (2) Refer him to his results in Activity 1 on page 164. (3) If necessary, discuss each element of the forecast which he had difficulty predicting. (4) Reassess the objective with an alternate check.

CP

Crusty Problems

CP 01

Chapter 1

Resources 1 thru 4

Performance Check

Summary Table

Objective Number	Objective Description
CP-01-Core-1	States the Wegener theory about the continents
CP-01-Core-2	States supporting evidence for continental drift
CP-01-Core-3	Locates earthquakes, using longitude and latitude
CP-01-Core-4	Selects characteristics of colliding and separating plates
CP-01-Core-5	Recognizes whether changes have occurred in a landscape
CP-01-Core-6	States two inquiry-oriented questions
CP-01-Core-7	Cleans up the work area at the close of class
CP-01-Core-8	Coöperates with lab partners
CP-01-Core-9	Returns equipment promptly to storage areas
CP-01-Core-10	Responds to text questions
CP-01-Core-11	Shows care for laboratory materials
CP-01-Res 1-1	States Ice Age evidence supporting the theory of continental drift
CP-01-Res 2-1	Selects rock sequences from continents that were joined at one time
CP-01-Res 3-1	States why a baked apple is useful as a model for the earth
CP-01-Res 4-1	Selects statements which are not observations

Materials	Observer	Special Preparations	Quick Score	3 + Minutes	Basal	Math	Reading	Concept	Action Verbs	Notes
									recalls	
					√				recalls	
			O						applies	
			O						applies	
									generates	
								√	generates	
	O				√				chooses	
	O				√				chooses	
	O				√				chooses	
	O				√				chooses	
	O				√				chooses	
					√				recalls	
					√				applies	
					√				recalls	
			O						classifies	

CP 01 Core 1

States the Wegener theory about the continents.

The student recalls the Wegener theory about the continents.

Student Action: Responding to the effect that all continents were once joined together in a super landmass which broke apart into separate continents.

Performance Check A: What did Alfred Wegener state about the origin of the continents on the earth?

Remediation: Refer the student to the section entitled "Drifting Continents" on page 3, in which Wegener's theory is stated.

CP 01 Core 2

States supporting evidence for continental drift.

The student recalls evidence to support the theory of continental drift.

Student Action: Responding with the effect of at least two of the following:

1. the jigsaw puzzle fit of the continents,
2. the location of glacial drift and grooves of the same age in Southern Hemisphere continents and India,
3. the location of similar fossils of the same age in continents separated by oceans,
4. the magnetic lines (anomalies) that form long, ridge-like mirror images parallel to the midocean ridges, and
5. the identical rock sequences on different continents.

Performance Check A: Many geologists now accept the idea that the continents were once joined together and later drifted apart. What evidence can be cited that would support this idea?

Remediation: (1) Refer the student to the marginal diagram and the first paragraph on page 4. (2) Resources 1 and 2 provide data which he can apply to the check. Have him review these resources. (3) Review his answers to questions 1 and 2 on page 14. (4) Review his answer to question 3 on page 17. (5) Review his answer to Self-Evaluation 1-2.

CP 01 Core

Locates earthquakes, using longitude and latitude.

The student applies the procedure of locating positions on the earth, using latitude and longitude.

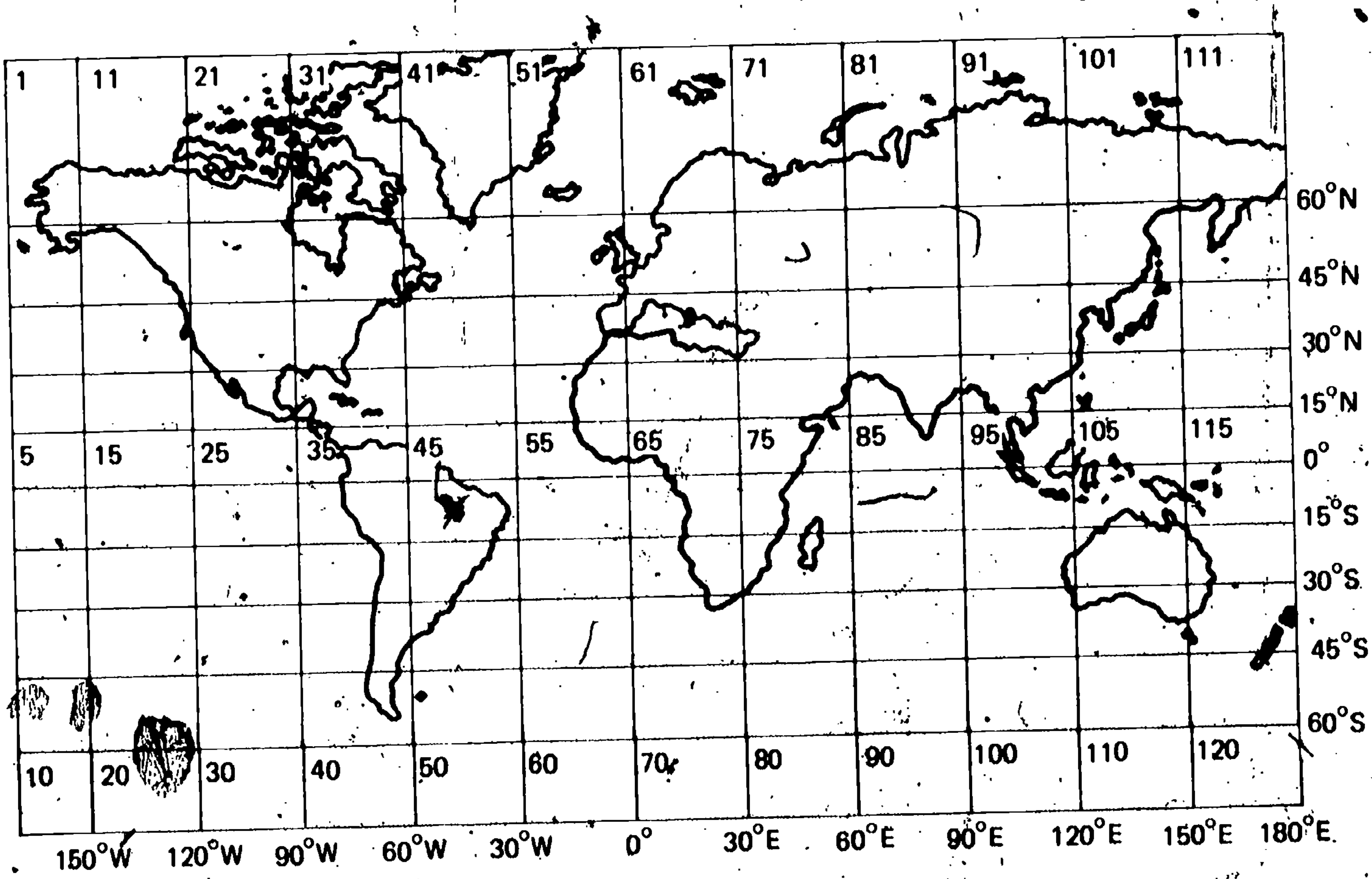
Student Action: Indicating the correct box number for the positions of at least three of the four earthquakes.

A: 1. 116, 2. 13, 3. 7, 4. 83
B: 1. 106, 2. 12, 3. 117, 4. 97
C: 1. 116, 2. 12, 3. 117, 4. 88

3

Performance Check A: The data below are from the "Preliminary Determination of Epicenters" table. For each of the four earthquakes, use the map below to determine its location. Write the number of the earthquake and after it the number of the box in which the earthquake is located. Note that the boxes on the map are numbered in order from top to bottom. (For example, box 86, though unnumbered, is the box directly below box 85.)

EARTHQUAKE	ORIGIN TIME (GMT)			GEOGRAPHIC COORDINATES		DEPTH (in km)
	Hr	Min	Sec	Lat	Long	
1	05	16	56.2	4.3 S	152.9 E	45
2	05	40	12.7	40.5 N	127.3 W	10
3	16	10	55.4	19.9 S	177.9 W	590
4	16	27	47.7	38.6 N	69.8 E	36



Remediation: (1) Review the student's answer to question 1-8 on page 7. (2) Review his plot of earthquakes on page 7 of the *Record Book*.

CP 01 Core 4

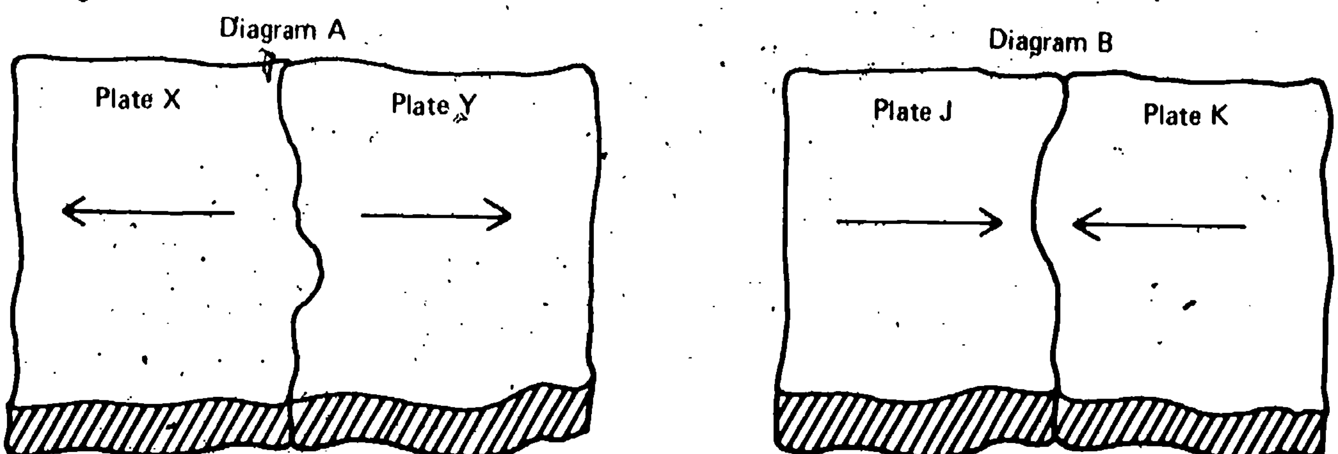
Selects characteristics of colliding and separating plates.

The student applies the concept that the boundaries of colliding and separating plates have different characteristics.

Student Action: Selecting the statements that indicate that the boundaries of plates moving away from each other tend to occur in midocean basins and they produce shallow earthquakes, whereas the boundaries of colliding plates tend to occur near the edge of a continent and produce deep earthquakes.

A: 1. b, e, g, 2. a, d, f
B: 1. b, d, f, 2. a, c, g
C: 1. a, e, f, 2. b, d, g

Performance Check A: The diagrams below show the motions of four plates.



1. Which of the following describe the line between the plates in Diagram A?
   a. It is probably near the edge of a continent.
   b. It is probably in the middle of an ocean.
   c. It is the source of no earthquakes.
   d. It is the source of deep earthquakes.
   e. It is the source of shallow earthquakes.
   f. The line is between colliding plates.
   g. The line is between separating plates.
2. Which of the following describe the line between the plates in Diagram B?
   a. It is probably near the edge of a continent.
   b. It is probably in the middle of an ocean.
   c. It is the source of no earthquakes.
   d. It is the source of deep earthquakes.
   e. It is the source of shallow earthquakes.
   f. The line is between colliding plates.
   g. The line is between separating plates.

Remediation: (1) Have the student review pages 6 through 8. (2) Review with him his answers to questions 1-12 and 1-13. (3) Have him review the correct response to Self-Evaluation 1-4.

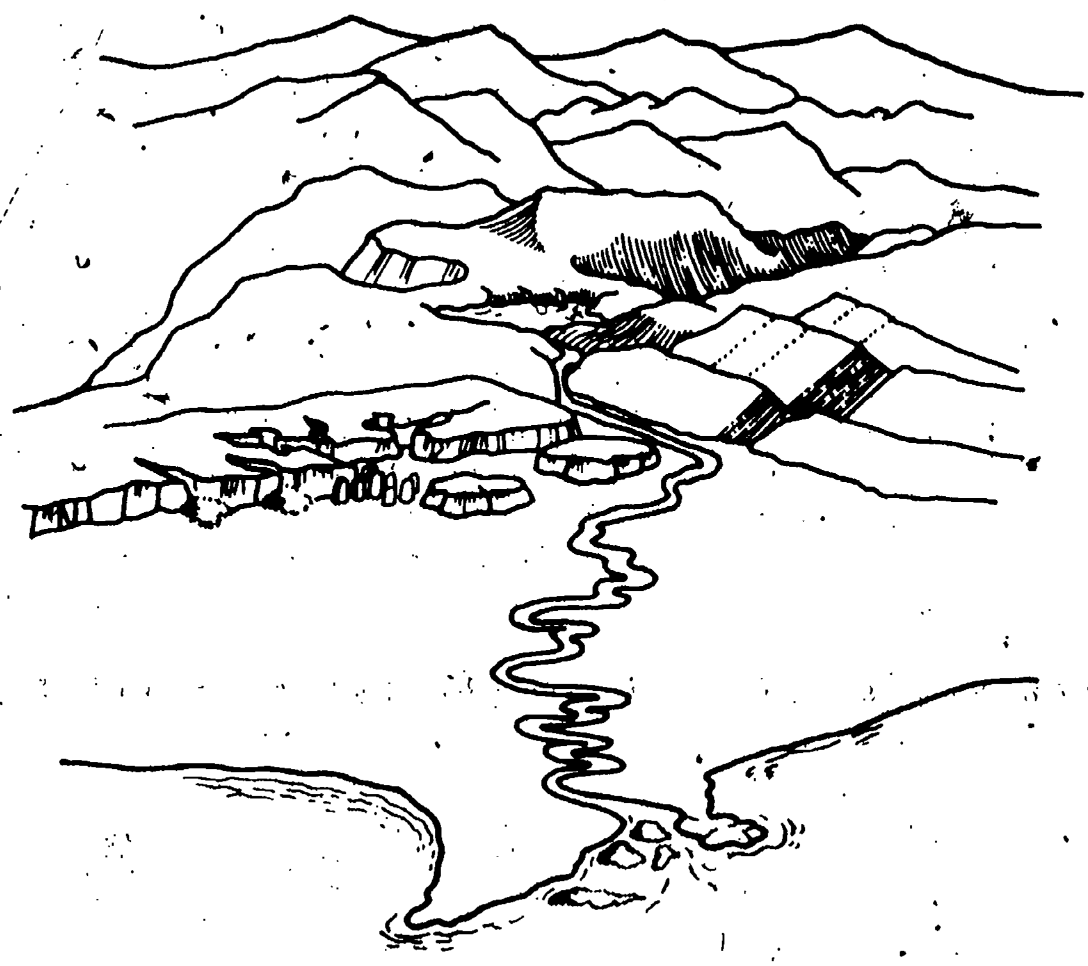
Recognizes whether changes have occurred in a landscape.

CP 01 Core 5

The student generates inferences based on observation of a diagram.

Student Action: Inferring that change has occurred and naming any of the following processes: (1) erosion, (2) uplift, (3) faulting, and (4) deposition.

Performance Check A: Examine the diagram below.



1. Is there any evidence in the diagram that geologic change has occurred?
2. If there is, name the processes that caused the change.

Remediation: (1) Refer the student to Figure 1-4 on page 9, which shows types of change in a landscape. (2) Discuss some of the evidence for the changes as they are depicted in the diagram.

CP
01
Core
6

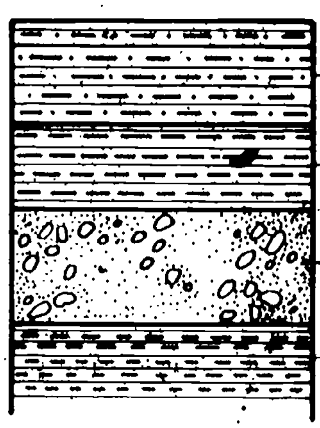
States two inquiry-oriented questions.

The student generates two questions which are inquiry oriented and which indicate a systematic investigation.

Student Action: Listing two questions similar to the following examples.

1. Were the separate landmasses once connected?
2. Are there other similarities in the rock record of the separate areas to indicate that they were once connected?
3. Is it possible that the landmasses in question were once under water?
4. Were the separate landmasses under water at the same time or at different times?

Performance Check A: In the late 19th century, a geologist in the Southern Hemisphere found on at least three different continents deposits of rock whose layers were in the sequence shown in the diagram below. Each rock deposit included a layer which contained the same kind of fossil plant. Assume you are a geologist living at that time, and you want to find an explanation for this. List two questions whose answers would help you get more information.



Remediation: Review the student's responses with him. Help him recognize that the questions he listed do not lend themselves to investigation, and help him develop some inquiry-oriented questions.

CP
01

Cleans up the work area at the close of class.

The student chooses to close the laboratory activity period promptly upon receiving notification of the time to do so.

Student Action: Ceasing the ongoing laboratory activity when notified of the time, returning materials in usable, clean condition to storage, and participating in work area cleanup, on at least three separate occasions when being observed by the teacher or another designated person without his knowledge

Teacher's Note: The opportunity for assessment of this objective arises almost every day during the course of regularly assigned laboratory activities. Use a few minutes of class time for group instruction early in the school year, and almost every week for reinforcement, to discuss the role of the student in the ISCS learning environment. To encourage personal responsibility in the student, discuss the reasons for his closing his activities promptly (to allow time for himself and others for lab-closing activities), returning materials to storage in clean condition (to facilitate their use by others), and participating in area cleanups (to leave the area as clean as he found it).

Core 7

Performance Check A: Your teacher will observe you for this check when he can.

Remediation: (1) If a student fails to accept this responsibility, approach him individually and review the reasons for his acceptance of it. Emphasize the social responsibility for cooperation in the learning environment for the good of all students. Point out that he has received the benefit of other students' provisions for others, as well as for themselves. (2) Do not, at first, suggest that he may lose his privileges unless he cooperates. But if he doesn't cooperate after you observe his behavior several times, ask him if he can suggest a proper penalty. (3) An alternative remedy may be to request him to assist in the process of overall classroom accounting of the materials for a period of time until he recognizes the importance of the student's role. (4) Do not use extra cleanup as a penalty for not cleaning up properly. In other words, don't use something as a penalty that you want done willingly.

CP 01 Core 8

Cooperates with lab partners.

The student chooses to cooperate with fellow students in the laboratory.

Student Action: Being polite, waiting his turn, being orderly when moving about, and observing the right of his classmates to work without being unnecessarily disturbed, when observed without his knowledge by the teacher or another designated person on at least three occasions.

Teacher's Note: The opportunity for assessment of this objective arises almost every day during the course of regularly assigned laboratory activities. Use a few minutes of class time at the beginning of a session for a whole-group discussion early in the school year and several times later on to discuss the need for cooperation with and consideration of other students. Some particular points for discussion include being polite, waiting patiently, not making others wait longer than necessary, being orderly when moving about, and observing the right of others not to be disturbed. Talk about each student's accepting the personal responsibility for his own behavior in the group situation.

Performance Check A: Your teacher will observe you for this check when he can.

Remediation: (1) If a student fails to accept any of these responsibilities, approach him privately and review the reasons for his lack of cooperation with his fellow students. Suggest that he pay some attention to changing his behavior to more acceptable standards. (2) Find out if the student feels that he is behaving in a less than acceptable way. If so, ask him whether he feels some penalty should be imposed and what he thinks a suitable penalty would be.

CP 01 Core 9

Returns equipment promptly to storage areas.

The student chooses to show personal responsibility for returning laboratory equipment promptly to the proper storage places as soon as it is no longer needed, during the class period, and not just at the end of the period.

Student Action: Returning equipment and materials no longer needed to the proper storage places on at least three occasions when observed by the teacher or another designated observer without his knowledge of being checked.

Teacher's Note: This objective may be assessed at any time the student is responsible for learning activities requiring the use of equipment and supplies. Use a few minutes of class time for group discussion of the reasons for returning equipment to storage areas promptly when it is not being used by the student or by his group. The reasons include (1) the short supply of certain items and the need to cooperate with others, (2) the chances of equipment's being misplaced, (3) the possibility of accidental damage to equipment, and (4) the greater opportunity for pilferage by an irresponsible student when things are disorganized.

Performance Check A: Your teacher will observe you for this check when he can.

Remediation: In a private conference, discuss the reasons for the student's cooperation in this request. Ask for that cooperation. See also Remediations (1), (2), and (3) for CP-01-Core-7.

CP 01 Core 10

Responds to text questions.

The student chooses to write in his *Record Book* the answers to 90% or more of the textbook questions.

Student Action: Exhibiting the written responses when requested to do so. At least nine out of ten questions should have responses, be they correct or incorrect.

Teacher's Note: It is intended that this objective be assessed throughout the year. Such a check provides opportunities to encourage students to work nearer their capacities while remaining independent of the teacher. Use a few minutes of class time for a group discussion of the reasons for writing the answers in the *Record Book*. Writing in the *Record Book* serves (1) to help the student think through what he sees and does, (2) to preserve ideas for future reference, (3) to make a record of the student's progress through the core, (4) to provide the teacher with a source of input for analyzing the student's difficulties and progress, and (5) to help the student learn the background ideas for conceptual understanding. Writing in the *Record Book* is "in"; writing in the text is "out."

Performance Check A: Your teacher will observe you for this check when he can.

Remediation: (1) In a private conference, discuss with the student the ideas enumerated and ask why he chooses not to write the answers. (Perhaps he cannot write!) Evaluate his reasons and counsel him accordingly. Encourage him to follow the pattern of his classmates and set down his ideas as they are doing. (2) Have him read "Notes to the Student," pages viii and ix in his text. (3) Follow up in a few days to determine his actions.

CP 01 Core 11

Shows care for laboratory materials.

The student chooses to show proper care and use of ISCS laboratory materials.

Student Action: Using the materials only for their intended purpose or requesting permission to do other specific experiments with them when being observed without his knowledge by the teacher or another designated person on three or more occasions.

Teacher's Note: This objective may be assessed at any time that the student is responsible for a learning activity in which equipment and supplies are required. Use a few minutes of class time for a whole-group discussion of the reasons for handling laboratory materials properly. Such reasons include: (1) If damaged, they are lost to use by students who need them now. Short supply means waiting in line. (2) They cannot readily be replaced. Replacement usually takes several months at best. (3) If materials are handled properly, they may be used for other than regular activities (with the permission of the teacher and after making a proper request).

Performance Check A: Your teacher will observe you for this check when he can.

Remediation: (1) In a private conference, ask the student why he chooses to mishandle equipment. Help him to evaluate his reasons, and ask for his cooperation in the future. If he agrees, reassess the objective later. (2) If after the conference he still does not agree, ask him if he feels that he should be penalized and what he thinks should be an appropriate penalty. Give him another opportunity for compliance. (3) If he is still uncooperative, apply a penalty for mishandling equipment. This may mean denying him use of the equipment either temporarily or permanently or taking some other suitable action.

CP 01 RES 1 1

States Ice Age evidence supporting the theory of continental drift.

The student <u>recalls</u> the evidence from the Ice Age which supports the theory of continental drift.

Student Action: <u>Responding</u> to the effect that as the evidence of continental drift left in rock by the glacier, geologists suggest glacial grooves and glacial drift of about the same age found on continents that are widely separated today but could have formed one super continent millions of years ago.

Performance Check A: Geologists often use evidence from the Ice Age to support their theory of continental drift. State this evidence.

Remediation: (1) Have the student review Resource 1. (2) Review with him his answer to question 1 on page 14. (3) Review his answer to Self-Evaluation 1-2.

CP 01 RES 2 1

Selects rock sequences from continents that were joined at one time.

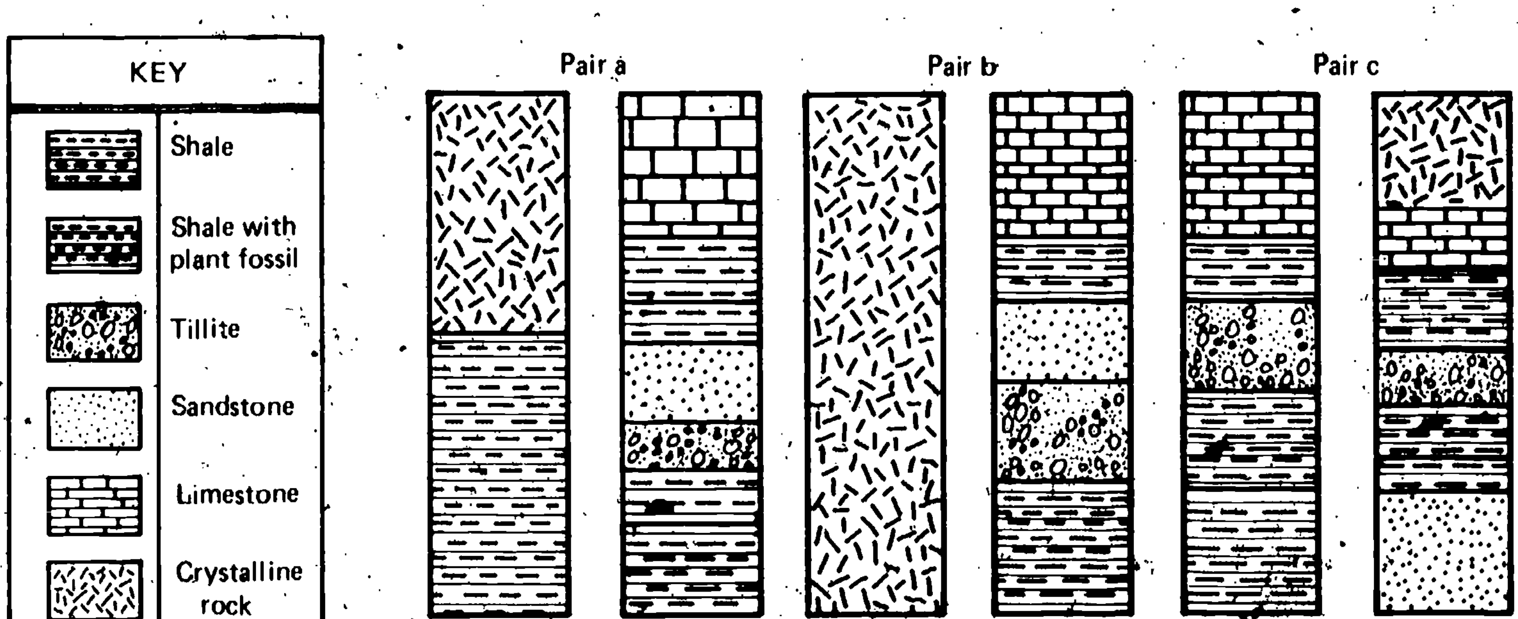
The student <u>applies</u> the concept that rock layers can be correlated.

Student Action: <u>Selecting</u> the correct pair and <u>responding</u> with the essence of the concept that rock layers can be correlated using location of key fossils and similarities of rocks.

A: c
B: c
C: a

Performance Check A: Three pairs of rock sequences are shown below. The two rock sequences making up each pair were found on different continents.

1. Which pair of rock sequences, a, b, or c, represents rock sequences that may have been formed at the same time on the same original continent?
2. What evidence supports your answer?



Remediation: (1) Check the student's answer to question 2 on page 16. (2) Direct the student to Figure 1 on page 14 to illustrate the idea of matching layers of rock separated by distance. (3) Have him reexamine the check, and ask him to match the layers in the two sequences for each of the pairs. Drawing lines from a layer in the first sequence to a layer in the second sequence may help. (4) Reassess the objective, using an alternate check.

CP 01 RES 3 1

States why a baked apple is useful as a model for the earth.

The student recalls the usefulness of the baked-apple model for explaining mountain building on the earth.

Student Action: Responding to the effect that a baked apple is like the earth in that it has a tough skin around a core which was once very hot but is now cooling, causing the skin to shrink and buckle.

Performance Check A: In what ways is a baked apple similar to the earth so that it serves as a model to explain mountain building?

Remediation: Have the student review Resource 3 with emphasis on the paragraph at the top of page 19.

CP 01 RES 4 1

Selects statements which are not observations.

The student classifies as observations statements which are consistent with the data and are directly perceivable by the senses.

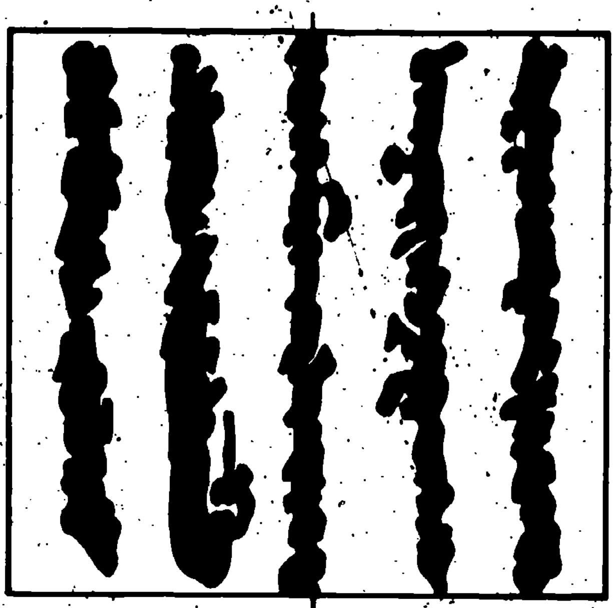
Student Action: Selecting statements of inferences which are not directly perceivable by the senses.

- **A:** b, c
- **B:** a, d
- **C:** a, c

(Continued)

Performance Check A: The diagram below shows the magnetic field recorded in the rocks in an ocean basin. The shaded areas represent rocks on the sea floor that record the earth's magnetic field as it is today. The white areas indicate rocks with a reversed magnetic field. The ridge axis is shown at the center of the diagram.

Below are four statements. Some of them are observations, and some are not. List the letter of each statement which is not directly observable in the diagram.



a. Four reversals are recorded in the rocks shown in the diagram.
b. The rocks farther from the ridge are older than those near it.
c. The sea floor is spreading away from the ridge.
d. The ridge axis appears to bisect the magnetic lines.

Remediation: (1) This is similar to objective CP-01-Core-5 in that the student is to differentiate between observations and inferences. If he missed CP-01-Core-5, he probably was not able to do this one. Review the difference between an observation and an inference. (2) If he is confused about spreading, he should be directed to Resource 4. (3) Reassess the objective with an alternate check.

CP 02

Chapter 2

Resources 5 thru 23

Performance Check

Summary Table

Objective Number	Objective Description
CP-02-Core-1	Uses a clinometer to measure a dip angle
CP-02-Core-2	Distinguishes between observations and interpretations
CP-02-Core-3	Recognizes rock texture
CP-02-Core-4	Recognizes rock texture
CP-02-Core-5	States the rock type of a rock sample
CP-02-Core-6	Selects the factors which determine a rock's texture
CP-02-Core-7	States the conditions under which igneous rocks are formed
CP-02-Core-8	Selects characteristics of faulted mountains
CP-02-Core-9	Matches rocks to the environments in which they were formed
CP-02-Core-10	States the probable movement which formed Death Valley
CP-02-Core-11	Selects a description of an erosional mountain
CP-02-Core-12	States how dome-shaped mountains were formed
CP-02-Core-13	Selects a description of a folded mountain
CP-02-Core-14	Selects a description of an old volcanic crater
CP-02-Core-15	Recognizes erosional features that are glacial in origin
CP-02-Core-16	Labels features in a glacial valley as either depositional or erosional
CP-02-Core-17	Recognizes the cause of deformation in sedimentary rocks
CP-02-Res 5-1	Recognizes igneous, sedimentary, and metamorphic rocks

Materials	Observer	Special Preparations	Quick Score	3 + Minutes	Basal	Math	Reading	Concept	Action Verbs	Notes
M		P	Q						manipulates	Save a clinometer for this check.
		P							classifies	
M		P			√				classifies	
M		P			√				classifies	
M		P			√				classifies	
			Q						classifies	
		P			√				applies	
			Q		√				classifies	
		P	Q		√				applies	
									classifies	
			Q						classifies	
		P							applies	
			Q						classifies	
			Q		√				classifies	
			Q						classifies	
			Q						classifies	
		P			√				applies	
M		P	Q		√				classifies	

CP 02

Objective Number	Objective Description
CP-02-Res 6-1	Relates rates of cooling and crystal sizes
CP-02-Res 6-2	Arranges igneous rocks in order of cooling rate
CP-02-Res 7-1	Explains how sedimentary layers are formed
CP-02-Res 7-2	States the kind of rock that bubbles when dilute HCl is added
CP-02-Res 8-1	Explains the bubbling reaction of a noncarbonate sedimentary rock with an acid
CP-02-Res 8-2	Explains how sand grains are held together in some samples
CP-02-Res 9-1	Recognizes limestone, sandstone, and shale
CP-02-Res 10-1	Recognizes metamorphic grade in rock samples
CP-02-Res 11-1	Defines *relative hardness* of minerals
CP-02-Res 11-2	Recognizes metallic and nonmetallic luster in minerals
CP-02-Res 11-3	Selects mineral samples possessing cleavage
CP-02-Res 11-4	Uses the "Mineral Classification Chart" to name minerals
CP-02-Res 12-1	Recognizes alternate paths in rock cycles.
CP-02-Res 13-1	States the origin of a mountain from a diagram
CP-02-Res 14-1	Distinguishes between intrusion and flow of molten igneous rock
CP-02-Res 15-1	Distinguishes between a sill and a dike
CP-02-Res 16-1	Names cracks in the earth through which lava flows
CP-02-Res 17-1	Indicates a fault and its direction of motion

	Materials	Observer	Special Preparations	Quick Score	3 + Minutes	Basal	Math	Reading	Concept	Action Verbs	Notes
				Q		√				applies	
	M		P			√				applies	
			P			√				applies	
				Q		√				applies	
										applies	
			P			√				applies	
	M		P							applies	
			P							applies	
						√				applies	
			P	Q		√				identifies	
			P			√				classifies	
	M		P	Q		√				classifies	
										applies	
						√				classifies	
						√				classifies	
						√				classifies	
				Q						recalls	
						√				classifies	

CP 02

Objective Number	Objective Description
CP-02-Res 18-1	Indicates the direction of force that produces folds
CP-02-Res 19-1	Selects the older mountain
CP-02-Res 20-1	Describes the process by which snow turns into glacial ice
CP-02-Res 21-1	Selects the conditions necessary for changes in glacial size

	Materials	Observer	Special Preparations	Quick Score	3 + Minutes	Basal	Math	Reading	Concept	Action Verbs	Notes
				Q		√				applies	
						√				classifies	
										recalls	
				Q						classifies	

CP
O2
Core
1

Uses a clinometer to measure a dip angle.

The student manipulates a clinometer.

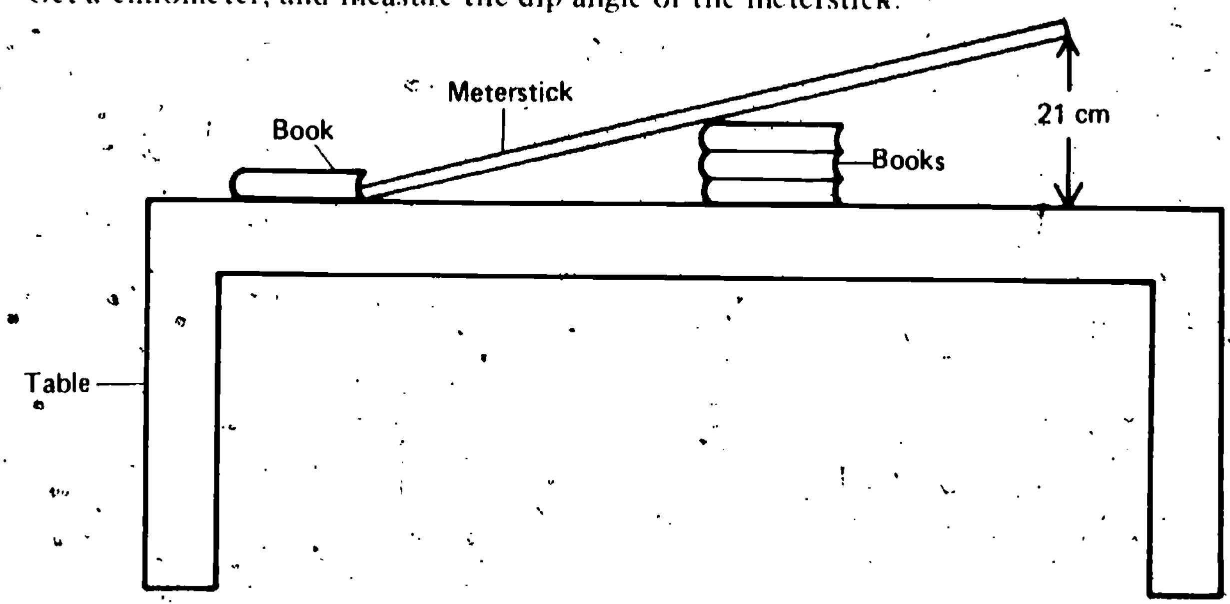
Regular Supplies: 1 clinometer
1 meterstick
several books

Special Preparations: Save a clinometer from Activity 1-3.

Student Action: Reporting the size of the dip angle within ±2°.

A: 12 ±2°
B: 8 ±2°
C: 15 ±2°

Performance Check A: Get a meterstick, and put several books under one end of it to make the distance between the table and the stick 21 cm at the high end. Keep the other end of the meterstick steady with a book, as shown in the diagram below. Get a clinometer, and measure the dip angle of the meterstick.



Remediation: (1) Review the student's answer to question 2-2 on page 30. (2) Have the student redo the check with the assistance of the textbook (page 30) and another student who can use the clinometer. (3) Reassess the objective with an alternate check.

CP
O2
Core

Distinguishes between observations and interpretations.

The student classifies statements about tilted rocks as observations or interpretations.

Special Preparations: Duplicate diagram CP-02-Core-2 found at the back of this book. Prepare the cutout block by cutting out the diagram along the solid line and pasting it on soft cardboard. Trim the cardboard to the same dimensions as the cut-out. Then fold the diagram along the dotted lines and tape the corners to form the appropriate block.

2

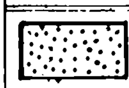
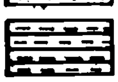
Student Action: Labeling the statements that are verifiable precepts as observations and the statements that are inferences of cause, condition, or relation based on an observation as interpretations and stating, in effect, the observation upon which each interpretation is based.

A:
1. Observation
2. Interpretation. The sandstone layer is on top.
3. Interpretation. There are separate layers of conglomerate.
4. Observation
5. Interpretation. The rocks are sedimentary and were formed horizontally.

B:
1. Inference. The rocks are sedimentary and were formed horizontally.
2. Observation
3. Inference. There are separate layers of conglomerate.
4. Inference. The sandstone layer is on top.
5. Observation

C:
1. Interpretation. There are separate layers of conglomerate.
2. Observation
3. Interpretation. The sandstone layer is on top.
4. Interpretation. The rocks are sedimentary and were formed horizontally.

Performance Check A: The five statements listed below refer to cutout block CP-02-Core-2. Get the block from your teacher. The key for the block is given below.

KEY	
Symbol	Rock
	sandstone
	shale
	conglomerate
	shale-sandstone

On your answer sheet, write the number of each statement, and after it indicate whether it is an observation or an interpretation. Then, after each statement you labeled as an interpretation, state the observation on which that interpretation is based.

1. There are four rock layers in the section.
2. The sandstone layer is the youngest.
3. The conglomerate layers were formed during a time when conditions changed.
4. The rocks are tilted approximately 30°.
5. The rocks were uplifted and tilted after formation.

Remediation: See the Remediation for CP-01-Res 4-1.

CP 02 Core 3

Recognizes rock texture.

The student classifies the texture of an interlocking rock.

Regular Supplies: 1 hand lens

Special Preparations: Relabel one of the numbered sets of rock samples with capital letters, as follows.

ORIGINAL NUMBER	NEW LETTER	ORIGINAL NUMBER	NEW LETTER
5	E	13	I
6	C	14	R
7	H	15	D
8	G	16	O
9	A	17	K
10	M	18	N
11	L	19	J
12	P	20	F

This may be done by whiting over the existing number and then relabeling the rock sample with the appropriate capital letter. Place this set of samples in a box labeled CP Rock Check Kit.

Student Action: Stating, in effect, that the texture is interlocking because the grains are interwoven rather than cemented together.

Performance Check A: Get rock F from the CP Rock Check Kit and a hand lens.

1. Does this rock have interlocking or noninterlocking texture?
2. Give your reason for your answer.

Remediation: (1) Review the student's results in Activities 2-6 through 2-9. (2) Check his completion of Table 2-1. (3) Refer him to Resource 5. Have him focus on the texture of various rock types used in Resource 5.

CP 02 Core 4

Recognizes rock texture.

The student classifies the texture of a noninterlocking rock.

Regular Supplies: 1 hand lens

Special Preparations: If you have not prepared the CP Rock Check Kit, see the Special Preparations for CP-02-Core-3.

Student Action: Responding to the effect that the texture is noninterlocking, since the grains are cemented, not interwoven.

Performance Check A: Get rock I from the CP Rock Check Kit and a hand lens.

1. Does the rock have interlocking or noninterlocking texture?
2. What evidence led to your decision?

Remediation: See the Remediation for CP-02-Core-3

CP 02 Core 5

States the rock type of a rock sample.

The student classifies a rock as igneous.

Regular Supplies: 1 hand lens
1 steel nail

Special Preparations: If you have not prepared the CP Rock Check Kit, see the Special Preparations for CP-02-Core-3.

Student Action: Responding to the effect that the rock is igneous, since the grains are interlocking and randomly oriented.

Performance Check A: Get rock H from the CP Rock Check Kit and a hand lens and a steel nail. Open your textbook to Table 1 on page 47.

1. Is the rock sample igneous, sedimentary, or metamorphic?
2. Explain the reason for your answer.

Remediation: (1) Review the student's answer to question 2-3 a on page 33 and his completion of Table 2-1. (2) Have him review pages 31 through 33. (3) If necessary, have him do or redo Resource 5.

CP 02 Core 6

Selects the factors which determine a rock's texture.

The student classifies the presence of cementing agents, the orientation of grains, the interlocking or noninterlocking of grains, and grain size as the factors which determine the texture of a rock.

Student Action: Selecting the option "all of these."

A: e
B: e
C: f

Performance Check A: Which of the characteristics below are important in describing a rock's texture?

a. Cement visible
b. Interlocking grains
c. Grain size
d. Random grains
e. All of these
f. None of these

Remediation: (1) Have the student review Resource 5, pages 45 through 48. (2) Have him select the characteristics which determine a rock's texture from Table 1 on page 47. (3) Have him get two rocks from the kit and describe the texture of each.

CP 02 Core 7

States the conditions under which igneous rocks are formed.

The student applies the concept of how igneous rocks are formed.

Special Preparations: If you have not prepared the CP Rock Check Kit, see the Special Preparations for CP-02-Core-3.

Student Action: Responding to the effect that igneous rocks with fine-grained texture are formed under conditions of high temperature and relatively low pressure which allowed rapid cooling and that such conditions exist at or near the surface of the earth's crust.

Performance Check A: Get rock A from the CP Rock Check Kit. It's a sample of igneous rock. Observe its texture and appearance.

1. Under what conditions was the rock formed?
2. Where in or on the earth's crust might this occur?

Remediation: (1) Have the student do or review Resource 6. (2) Review with him his answer to question 2-3 b on page 33.

CP 02 Core 8

Selects the characteristics of faulted mountains.

The student classifies block-faulted mountains according to their characteristics.

Student Action: Selecting as a block-fault mountain the one (1) composed of sedimentary and metamorphic marine rocks, (2) existing in scarp and basin regions, and (3) having long, asymmetrical (wedge-shaped) slopes.

A: a
B: c
C: d

Performance Check A: Select the letter of the mountain type which has the characteristics of a faulted mountain.

MOUNTAIN TYPE	LOCATION	CHIEF ROCK TYPE	SHAPE
a.	scarp and basin regions	marine sediments, may be metamorphic	long and wedge-shaped
b.	earthquake and geyser zones	surface-cooled igneous	round, cone-shaped
c.	isolated on plains	deep-cooled igneous or metamorphic	round, dome-shaped
d.	valley and ridge regions	(marine sediments, may be metamorphic	groups of long, symmetrical, parallel slopes

Remediation: (1) Have the student review the section entitled "Death Valley, California," on pages 35 and 36. (2) Have him review Resource 17 on pages 79 through 82. (3) Refer him to Table 2-3 on page 42.

CP 02 Core 9

Matches rocks to the environments in which they were formed.

The student applies the concept that different environments of rock formation result in rocks with different characteristics.

Special Preparations: If you have not prepared the CP Rock Check Kit, see the Special Preparations for CP-02-Core-3.

Student Action: Matching the rocks with the environments as follows: (1) gray granite forms deep within the crust, (2) gneiss forms at or near the surface of the earth and under pressure, (3) sandstone forms in an ocean basin, and (4) obsidian comes from the flow of volcanic material.

A: 1. H, 2. E, 3. J, 4. L
B: 1. L, 2. H, 3. J, 4. E
C: 1. J, 2. H, 3. E, 4. L

Performance Check A: Get rock samples E, H, J, and L from the CP Rock Check Kit. Below is a list of environments in which the samples may have formed. Write the letter of the rock sample after the number of the environment in which you think it was formed.

Environments
1. In a pool of molten rock deep within the crust
2. In solid rock of the crust, under pressure
3. In an ocean basin
4. From the flow of volcanic material

Remediation: (1) Review the student's answers to question 2-3 a and b on page 33, (2) If the student had difficulty with (1), refer him to the activities in Resources 6, 7, and 8 on pages 48 through 59.

CP 02 Core 10

States the probable movement which formed Death Valley.

The student classifies Death Valley as formed by normal faulting.

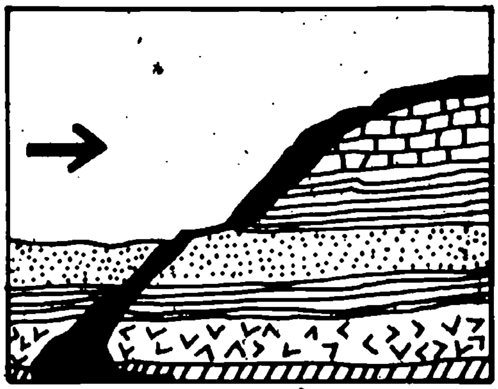
Student Action: Selecting the diagram which shows a down-dropped block as the most probable formation for Death Valley and stating at least one piece of evidence from the following: (1) the down-dropped block (normal faulting), (2) the lowering of the strata from the surrounding walls, and (3) the wedge-shaped mountain ridge.

A: c
B: d
C: a

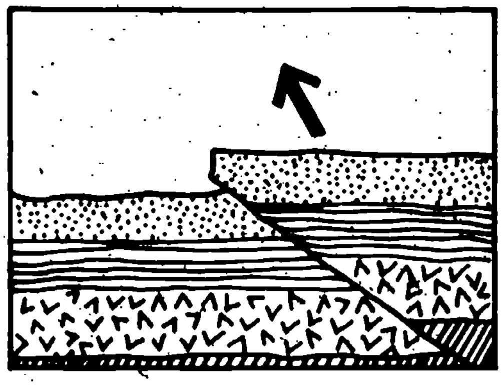
Performance Check A: Recall what you know about Death Valley and look at Figure 2-7 on page 36.

1. Which diagram below shows the probable way Death Valley was formed?
2. Give two pieces of evidence for your choice.

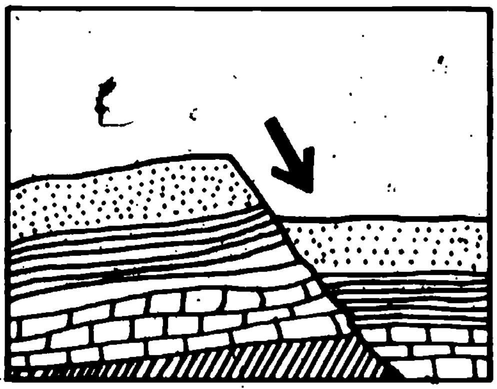
a.



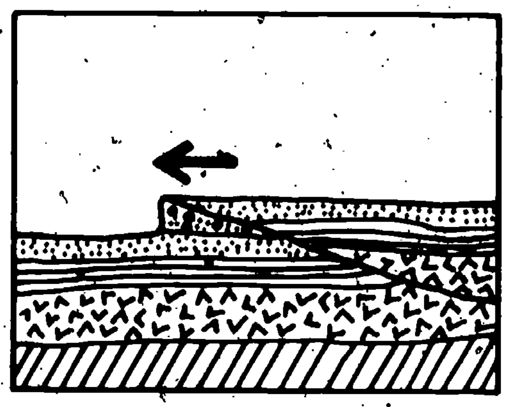
b.



c.



d.



Remediation: (1) Have the student review the section entitled "Death Valley, California," on pages 35 and 36: (2) Review his answer to question 2-11 on page 36, (3) Have him look at Figure 3 on page 82.

CP O2 Core 11

Selects a description of an erosional mountain.

The student classifies erosional mountains according to their characteristics.

Student Action: Selecting as an erosional mountain the one (1) composed of deep-cooled igneous rocks, (2) having a round or a dome-shape, and (3) existing singly on a plain.

A: d
B: a
C: b

Performance Check A: Write the letter of the mountain type which has the characteristics of an erosional mountain. Erosional mountains form when softer surrounding materials erode away.

MOUNTAIN TYPE	LOCATION	CHIEF ROCK TYPE	SHAPE
a.	valley and ridge regions	marine sediments, may be metamorphic	groups of long, symmetric, parallel slopes
b.	scarp and basin regions	marine sediments, may be metamorphic	long and wedge-shaped
c.	earthquake and geyser zones	surface-cooled igneous	round, cone-shaped
d.	isolated on plains	deep-cooled igneous or metamorphic	round, dome-shaped

Remediation: (1) Refer the student to Figure 2-12 on page 39. (2) Have him read the section entitled "Stone Mountain, Georgia," on page 39. (3) Have him review Resource 15 on pages 74 through 78 for a description of how these mountains are formed.

CP O2 Core 12

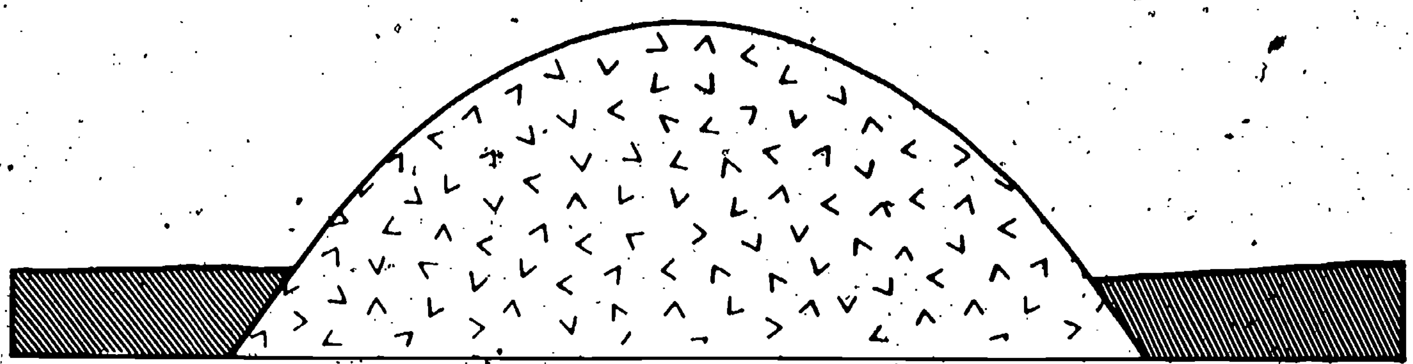
States how dome-shaped mountains were formed.

The student applies the concept of dome-shaped mountain formation.

Special Preparations: If you have not prepared the CP Rock Check Kit, see the Special Preparations for CP-02-Core-3.

Student Action: Responding to the effect that dome-shaped mountains composed of coarse-grained igneous rocks were formed deep in the crust and put in place by the uplift of the igneous rock and erosion of the softer rock in which it was formed.

Performance Check A: Get rock G from the CP Rock Check Kit. Below is a cross section of a mountain. Rock sample G is like the rock found in the mountain. Explain what the rock sample and the shape of the mountain tell about how the mountain was formed.



Remediation: (1) Have the student review Resource 15. (2) Review his answer to question 2-19 on page 42 as it applies to dome-shaped mountains like Stone Mountain. (3) Review his answer to question 2-16 on page 39.

CP O2 Core 13

Selects a description of a folded mountain.

The student <u>classifies</u> folded mountains according to their characteristics.

Student Action: <u>Selecting</u> as a folded mountain the one (1) composed of sedimentary and metamorphic rocks of marine origin, (2) existing in valley and ridge regions, and (3) having groups of long, parallel slopes.

- **A:** b
- **B:** c
- **C:** d

Performance Check A: In the table below, four types of mountains are described. Write the letter of the mountain type which has the characteristics of folded mountains.

MOUNTAIN TYPE	LOCATION	CHIEF ROCK TYPE	SHAPE
a.	scarp and basin regions	marine sediments, may be metamorphic	long and wedge-shaped
b.	valley and ridge regions	marine sediments, may be metamorphic	groups of long, symmetric, parallel slopes
c.	earthquake and geyser zones	surface-cooled igneous	round, cone-shaped
d.	isolated on plains	deep-cooled igneous or metamorphic	round, dome-shaped

Remediation: (1) Refer the student to Table 2-3 on page 42. (2) Have him do or review Resource 18 for a description of how these mountains were formed.

Selects a description of an old volcanic crater.

CP 02 Core 14

The student classifies old volcanic craters according to their characteristics.

Student Action: Selecting as an old volcanic crater the mountain (1) composed of surface-cooled igneous rocks, (2) having a cone shape, and (3) existing in earthquake or geyser regions.

A: b
B: a
C: d

Performance Check A: Write the letter of the mountain type which has the characteristics of an old volcanic crater.

MOUNTAIN TYPE	LOCATION	CHIEF ROCK TYPE	SHAPE
a.	scarp and basin regions	marine sediments, may be metamorphic	long and wedge-shaped
b.	earthquake and geyser zones	surface-cooled igneous	round, cone-shaped
c.	isolated on plains	deep-cooled igneous or metamorphic	round, dome-shaped
d.	valley and ridge regions	marine sediments, may be metamorphic	groups of long, symmetric, parallel slopes

Remediation: (1) Have the student review the section entitled "Mono craters in California" on pages 37 through 39. (2) Refer him to Table 2-3 on page 42. (3) Refer him to Resource 16 for a discussion of the formation of old volcanic craters. (4) Review his answer to Self-Evaluation 2-3 to see if he can apply data about existing cones to predict the cause of their formation.

Recognizes erosional features that are glacial in origin.

CP 02 Core

The student classifies those erosional features that are produced by glaciers.

Student Action: Selecting the three glacial erosional features from the following list: cirques, rock grooves, horns, hanging valleys, and U-shaped valleys.

A: a, c, d
B: b, d, e
C: a, d, e

15

Performance Check A: Write the letters of any erosional features listed below which were formed by glacial action.

a. Cirque
b. Sill
c. Horn
d. Rock groove
e. Gully

Remediation: (1) Review the student's answer to question 2-20 on page 43. (2) Refer him to Cluster D, emphasizing especially Resources 22 and 23 on pages 90 through 99.

CP O2 Core 16

Labels features in a glacial valley as either depositional or erosional.

The student classifies the features in a glacial valley as either depositional or erosional.

Student Action: Labeling the moraines as depositional and the cirques, horns, and hanging valleys as erosional correctly for at least three of the four features.

A: 1. depositional, 2. erosional, 3. erosional, 4. erosional
B: 1. erosional, 2. depositional, 3. erosional, 4. erosional
C: 1. erosional, 2. erosional, 3. depositional, 4. erosional

Performance Check A: Examine the diagram below. Four features have been indicated by numbers. Which of these features do you think are depositional and which erosional?

Remediation: (1) Refer the student to Figure 1 on page 91. (2) Refer him to Figure 3 on page 92 and suggest that he reread pages 90 and 91. (3) Refer him to Figure 5 on page 97.

CP 02 Core 17

Recognizes the cause of deformation in sedimentary rocks.

The student applies the concept that great pressures cause folding in sedimentary rock formation.

Special Preparations: Duplicate diagram CP-02-Core-17, which appears at the back of this book. Prepare the cutout block by cutting out the diagram along the solid lines and pasting it on soft cardboard. Trim the cardboard to the same dimensions as the cutout. Then fold the diagram along the dotted lines and tape the corners to form the appropriate block.

Student Action: Responding to the effect that sedimentary rocks compressed under high pressures yield to the pressures by forming folds.

Performance Check A: Examine cutout block CP-02-Core-17, showing several layers of sedimentary rock. Explain a process that would cause the rocks to become deformed as they are in the cutout block.

Remediation: (1) Review the student's answers to questions 2-3 b on page 33 and 2-18 on page 42. (2) Check his answer to Self-Evaluation 2-4.

CP 02 CORES 5 1

Recognizes igneous, sedimentary, and metamorphic rocks.

The student classifies rocks on the basis of their origin.

Regular Supplies: 1 hand lens
1 steel nail
1 dropper bottle of HCl (0.5 m)

Special Preparations: If you have not prepared the CP Rock Check Kit, see the Special Preparations for CP-02-Core-3.

Student Action: Naming each rock correctly as igneous, metamorphic, or sedimentary.

A: C. igneous, E. metamorphic, I. sedimentary
B: H. igneous, O. sedimentary, P. metamorphic
C: D. metamorphic, L. sedimentary, M. igneous

Performance Check A: Get rock samples C, E, and I from the CP Rock Check Kit. Also get a hand lens, a steel nail, and dilute HCl. Open your textbook to the rock test key on pages 45 through 47. Write the letter of each sample, and state if it is igneous, sedimentary, or metamorphic.

Remediation: (1) Refer the student to Resource 5. Several things could cause him difficulty in using the sequence of tests to classify rocks. It is probably best to go over the tests that he performs on the rocks as described on pages 45 through 48. Give the student a rock and observe him using the sequence of questions. (2) Reassess the objective, using an alternate check.

CP O2 RES 6 1

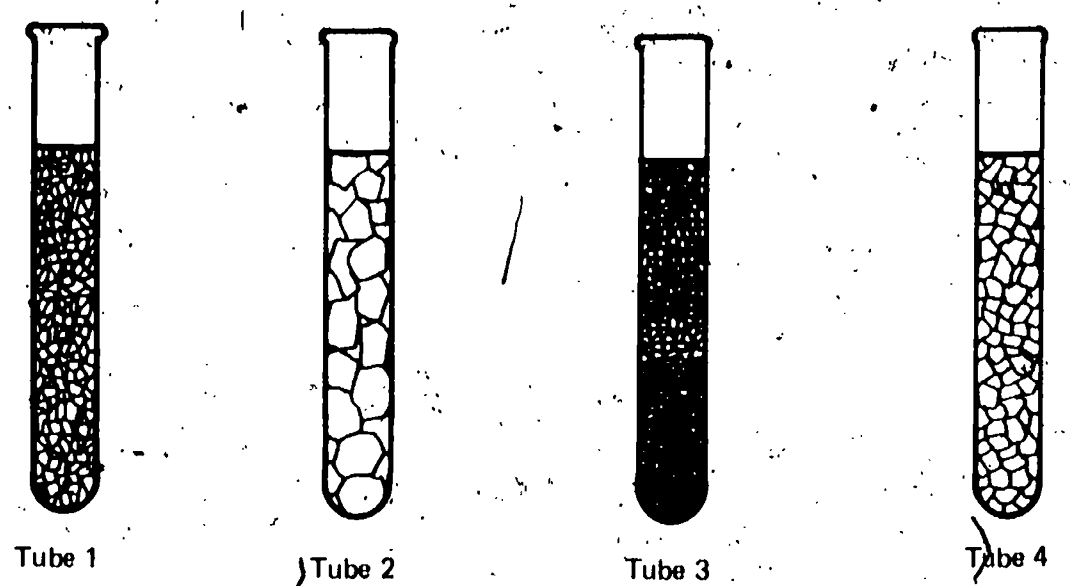
Relates rates of cooling and crystal sizes.

The student applies the concept that different cooling rates produce crystals of different sizes.

Student Action: Listing the materials from the largest to the smallest crystal size to represent the order in which the materials cooled from the slowest to the fastest rate.

A: 2, 4, 1, 3
B: 3, 1, 4, 2
C: 1, 2, 4, 3

Performance Check A: The four test tubes shown below contain the same substance which was cooled from a liquid to a solid at different rates. On your answer sheet, list the numbers of the test tubes in the order of the rate from slowest to fastest at which the substance in each was cooled.



Remediation: (1) Refer the student to Resource 6. It would be helpful to have available samples of the results from Activities 5, 6, and 8 on pages 50 and 51 rather than having the student repeat Resource 6. He can then use the samples and reread the resource. (2) Reassess the objective, using an alternate check.

Arranges igneous rocks in order of cooling rate.

CP 02 RES 6 2

The student applies the concept that different cooling rates produce different size crystals.

Regular Supplies: 1 hand lens

Special Preparations: If you have not prepared the CP Rock Check Kit, see the Special Preparations for CP-02-Core-3.

Student Action: Responding with the correct order of rocks arranged from those containing the smallest crystals to those with the largest crystals and the essence of the concept that rapid cooling causes small crystals to form, whereas slow cooling causes larger crystals to form.

- **A:** L, A, and C
- **B:** L, M, and H
- **C:** L, A, and G

Performance Check A: Get a hand lens and, from the CP Rock Check Kit, samples A, C, and L. These are three igneous rocks. Each one cooled and solidified from a molten material. Observe each rock carefully with the hand lens.

1. Using the letter on each, list the rocks in the order that you think they cooled, from fastest cooling to slowest cooling.
2. How did you decide the order?

Remediation: (1) This objective requires the student to make an inference based on the series of activities in Resource 6. Refer him to Resource 6, especially the discussion on page 51, the observation of the cut rock, and Activity 8. (2) Reassess the objective, using an alternate check.

Explains how sedimentary layers are formed.

CP 02 RES 7 1

The student applies the concept of how sedimentary layers are formed.

Special Preparations: Use three pictures from *Crusty Problems* (Figures 1, 2, and 3 on page 53) or other suitable pictures. Prepare the pictures by cutting them out and mounting them on cardboard. Then draw an arrow to one of the layers in each picture. Label the pictures CP-02-Res 7-1A, CP-02-Res 7-1B, and CP-02-Res 7-1C.

Student Action: Responding to the effect that sedimentary rocks are made of layers of sediment from deposits or precipitates settling from a liquid, the air, or a glacier.

Performance Check A: Examine the photograph that your teacher has labeled CP-02-Res.7-1A. How was the layer that the arrow points to formed?

Remediation: (1) If the student had difficulty, refer him to Activities 1 through 4 on pages 54 and 55. Have available a test tube containing layers of calcium chloride, sand, crushed colored chalk, crushed white chalk, and silt. Have the student read through the activities, making reference to the layers in the test tube. (2) Reassess the objective with an alternate check.

CP O2 RES 7 2

States the kind of rock that bubbles when dilute HCl is added.

The student applies the operational definition that a limestone is composed of calcium carbonate and reacts with dilute HCl to release bubbles of CO_2 gas.

Student Action: Responding that the rock is limestone and is composed of calcium carbonate.

A, B, and C: 1. limestone, 2. calcium carbonate

Performance Check A: Jake poured a small amount of dilute HCl onto a rock sample. Bubbles immediately appeared.

1. Name the rock that reacts with HCl in this way.
2. What substance is the rock made of?

Remediation: (1) Refer the student to Activities 5 through 8 on pages 56 and 57. (2) Find out if the student can operationally define *limestone* as those sedimentary rocks that bubble when acid is dropped onto them. If not, have him read the first paragraph below Activity 8 on page 57. (3) Reassess the objective with an alternate check.

CP O2 RES 8 1

Explains the bubbling reaction of a noncarbonate sedimentary rock with an acid.

The student applies the concept that certain dissolved minerals such as compounds of iron and carbonates react with HCl and serve as cementing agents to hold sedimentary grains together.

Student Action: Responding to the effect that the reaction was due to the presence of certain cementing substances in the rock which reacted with acid.

Performance Check A: Ed found a rock near his home. He observed that it was composed of one kind of material, and the grains were noninterlocking. He concluded it was sedimentary. Using his "Mineral Classification Chart," he determined that the single visible component was quartz. He then applied HCl to the rock, and it began to bubble. Since quartz does not react with HCl, what would cause the HCl to bubble?

Remediation: (1) If the student has not done Resource 8, suggest that he do it now. (2) Refer the student to Activity 8 in Resource 7 if he does not understand why HCl causes the rock to bubble. (3) Reassess the objective with an alternate check.

CP O2 RES 8 2

Explains how sand grains are held together in some samples.

The student applies the concept that dissolved minerals can act as cementing agents which hold grains of sediment together.

Special Preparations: A cemented sample of sand can be prepared by dissolving a small amount of ferrous sulfate ($FeSO_4$) in a ½ inch deep cup of sand. Label this cup CP-02-Res 8-2a and let it harden for 24 hours. Place loose sand in a cup of the same size and label it CP-02-Res 8-2b.

Student Action: Responding to the effect that one sample has loose grains of sand and the other one has grains of sand which have been cemented together by dissolved minerals.

Performance Check A: Get cups CP-02-Res 8-2a and CP-02-Res 8-2b. Examine the sand in both cups.

1. What difference do you notice in these two samples?
2. Explain how this difference could occur in nature.

Remediation: (1) Refer the student to Resource 8. The samples used in the test item should be available. The student can use these when he rereads the resource. (2) Re-assess the objective with an alternate check.

CP O2 RES 9 1

Recognizes limestone, sandstone, and shale.

The student applies the concept of how to differentiate among limestone, sandstone, and shale.

Regular Supplies: 1 hand lens
1 dropper bottle of HCl (0.5m)

Special Preparations: If you have not prepared the CP Rock Check Kit, see the Special Preparations for CP-02-Core-3.

Student Action: Naming (1) as limestone the rock that reacts to acid, (2) as sandstone the rock that is composed principally of visible and rounded grains which show no acid reaction, or (3) as shale the rock that smells like mud when breathed on and is composed principally of very small grains and shows little reaction to acid and stating the reasons for his choices.

A: K is limestone; O is shale.
B: K is limestone; J is sandstone.
C: K is limestone; J is sandstone.

Performance Check A: From the CP Rock Check Kit take samples K and O. Also get a hand lens and some dilute HCl.

1. Determine whether each is a sandstone, a shale, or a limestone.
2. Explain how you know.

Remediation: (1) Resource 9 should be reviewed if the student had difficulty with the check. (2) Point out to the student that the nonlimestone sedimentary rocks are classified by grain size and thus can be identified using that as the criterion. Any rock that reacts to acid except for some sandstones that have a limestone cement is a limestone. (3) Reassess the objective with an alternate check.

CP 02 RES 10 1

Recognizes metamorphic grade in rock samples.

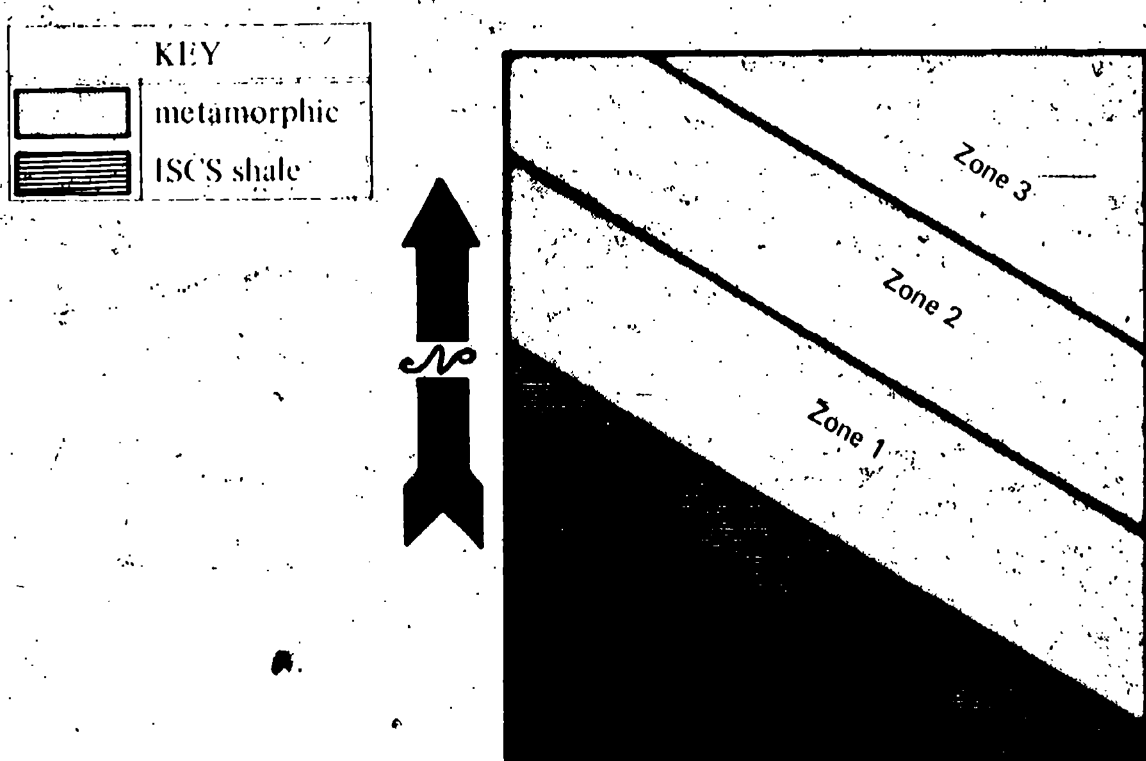
The student applies the concept that the grade of metamorphism increases as the intensity of heat and pressure increases.

Special Preparations: If you have not prepared the CP Rock Check Kit, see the Special Preparations for CP-02-Core-3.

Student Action: Stating that slate will be found in the zone nearest the sedimentary rock, schist would be found in the middle zone, and gneiss would be found in the zone farthest from the sedimentary rock, since the degree of banding or foliation and the size of the minerals increase from slate through schist to gneiss.

A, B, and C: Zone 1 contains N, Zone 2 contains F, and Zone 3 contains E.

Performance Check A: Get rock samples E, F, and N from the CP Rock Check Kit. The map below shows where ISCS shale and metamorphic rocks are found. Assume that the intensity of metamorphism is greatest in the northeast part of the map.



1. In which zones would you most likely find each of the three rock samples you have been given?
2. Explain your answer.

Remediation: (1) The idea of metamorphic grade is developed in Resource 10. Review the student's response to question 1 on page 62. (2) Refer him to the discussion at the bottom of page 64 and the top of page 65. (3) Reassess the objective, using an alternate check.

CP O2 RES 11 1

Defines *relative hardness* of minerals.

The student applies the concept that relative hardness can be determined by scratching one object with another.

Student Action: Responding to the effect that the harder object will scratch the softer one when they are rubbed together.

Performance Check A: If you had two minerals to compare, how could you determine (define) their relative hardness?

Remediation: (1) Refer the student to Activity 4 and question 1 on page 67 if he has difficulty with the concept of hardness. (2) Have him determine whether a penny or a nickel is harder. (3) Reassess the objective, using an alternate check.

CP O2 RES 11 2

Recognizes metallic and nonmetallic luster in minerals.

The student identifies minerals having metallic luster as those which shine like a metal and those having nonmetallic luster as those which are glassy or vitreous.

Special Preparations: Relabel one of the numbered sets of mineral samples with lowercase letters, as follows.

ORIGINAL NUMBER	NEW LETTER	ORIGINAL NUMBER	NEW LETTER
21	b	27	n
22	e	28	d
23	h	29	i
24	a	30	l
25	j	31	m
26	g	32	f

This may be done by whiting over the existing number and then relabeling the mineral sample with the appropriate lowercase letter. Place this set of samples in a box labeled CP Mineral Check Kit.

Student Action: Assigning augite, quartz, muscovite mica, biotite mica, hornblende, and olivine as having a nonmetallic luster and galena and hematite as having a metallic luster.

A: b. nonmetallic, f. nonmetallic, j. metallic
B: d. nonmetallic, l. nonmetallic, n. metallic
C: i. nonmetallic, m. nonmetallic, n. metallic

Performance Check A: Get minerals b, f, and j from the CP Mineral Check Kit. Write the letter of each mineral, and after it state the kind of luster – metallic or nonmetallic – that it has.

Remediation: (1) Refer the student to the discussion and question 2 at the bottom of page 67 and Figure 2 on page 68. (2) Reassess the objective, using an alternate check.

CP O2 RES 11 3

Selects mineral samples possessing cleavage.

The student classifies minerals as to whether they have cleavage.

Special Preparations: If you have not prepared the CP Mineral Check Kit, see the Special Preparations for CP-02-Res 11-2.

Student Action: Selecting as the mineral having cleavage the sample which has one or more surfaces that flash when rotated in light and responding with the essence of the cleavage test.

- **A:** e
- **B:** l
- **C:** h

Performance Check A: Get mineral samples m, g, and e from the CP Mineral Check Kit. Study them carefully.

1. Write the letter of each mineral sample that shows cleavage.
2. Explain how you know.

Remediation: (1) Refer the student to Activities 1, 2, and 3 on pages 66 and 67. (2) If you have a large specimen of feldspar or calcite (both of which show cleavage), you might use it to demonstrate the idea of how to identify cleavage. (3) Reassess the objective with an alternate check.

CP O2 RES 11 4

Uses the "Mineral Classification Chart" to name minerals.

The student classifies minerals, using a classification system based on the properties of luster, hardness, and cleavage.

Regular Supplies: 1 glass plate
1 knife

Special Preparations: If you have not prepared the CP Mineral Check Kit see the Special Preparations for CP-02-Res 11-2.

Student Action: Stating the names of the three minerals.

- **A:** e. calcite, l. muscovite mica, g. garnet
- **B:** b. augite, e. calcite, m. olivine
- **C:** j. galena, i. biotite mica, e. calcite

Performance Check A: Get minerals e, l, and g from the CP Mineral-Check Kit and a glass plate and a knife. Open your textbook to the "Mineral Classification Chart" on pages 68 and 69. Identify each mineral by writing its letter and name on your answer sheet.

Remediation: (1) The student should be referred to pages 68 and 69 for instructions on how to use the "Mineral Classification Chart." (2) If his problem is observing luster, hardness, or cleavage, you should provide the following remediation. For luster, refer to the last paragraph and question 2 on page 67 and Figure 2 on page 68. For hardness, refer to Activity 4 on page 67. For cleavage, refer to Activities 1, 2, and 3 on pages 66 and 67. (3) Reassess the objective, using an alternate check.

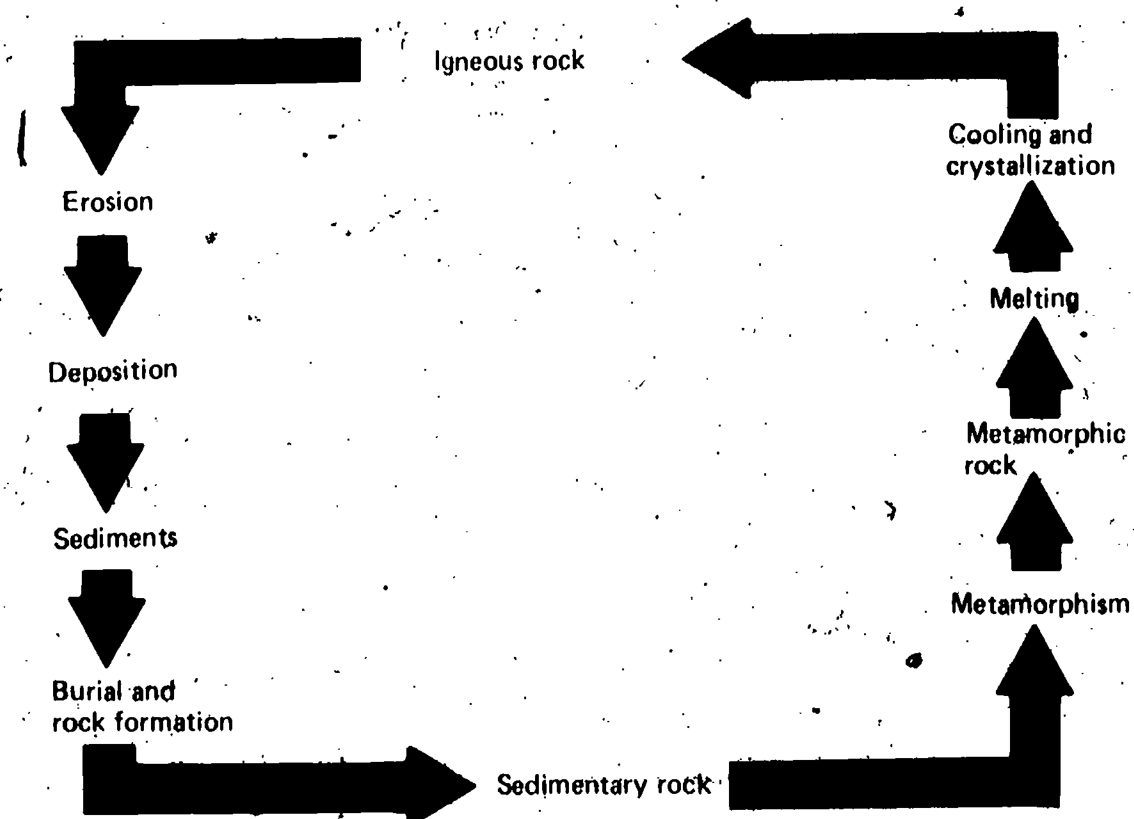
CP O2 RES 12 1

Recognizes alternate paths in rock cycles.

The student applies the concept that a rock can follow many geologic paths.

Student Action: Drawing an arrow to show that sedimentary rocks may be immediately melted or eroded.

Performance Check A: The diagram below shows a rock cycle. In this case, the sedimentary rock after burial and rock formation is metamorphosed. Using arrows and the labels from the diagram, draw on your answer sheet another path for a sedimentary rock in the cycle.



Remediation: (1) Have the student read Resource 12, pages 69 and 70. (2) Reassess the objective, using an alternate check.

CP O2 RES 13 1

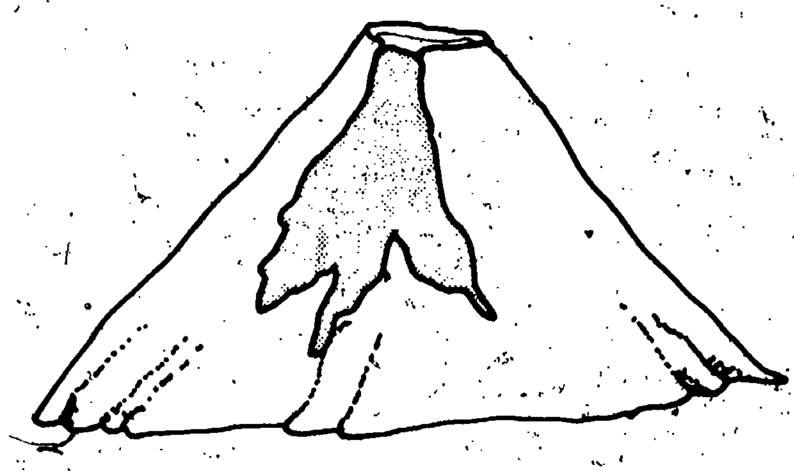
States the origin of a mountain from a diagram.

The student classifies a mountain as volcanic in origin because of its characteristics.

Student Action: Stating that it is a volcanic mountain and citing at least one of the following as the reason: (1) the cone shape, (2) the presence of lava flow, and (3) the crater, or depression, in the center of the cone.

Performance Check A:

1. How was the mountain shown in the diagram below formed?
2. What evidence supports your answer?



Remediation: (1) The student should check his sketch of the volcano in question 1 in his *Record Book*. (2) Have him examine the volcanic mountains shown in Figures 2-9, 2-10, and 2-11 on pages 37 and 38 of the text.

CP O2 RES 14

Distinguishes between intrusion and flow of molten igneous rock.

The student classifies a feature as an intrusion.

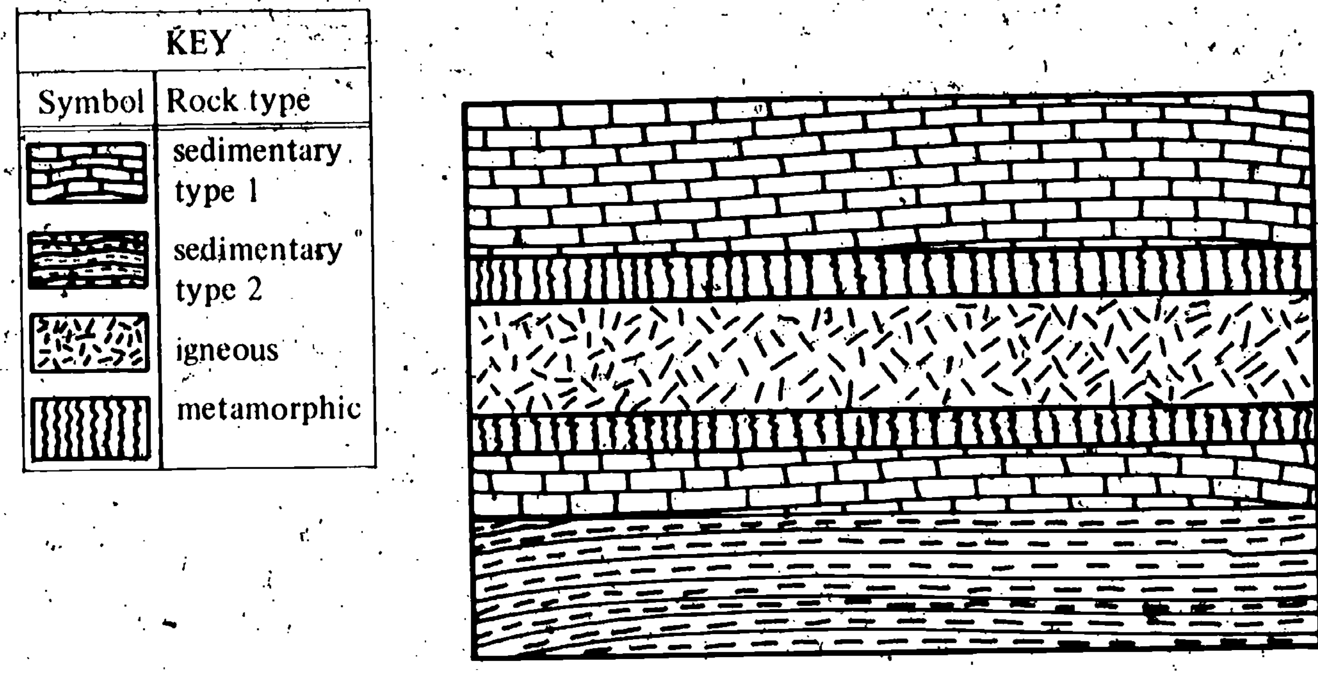
Student Action: Stating that the feature is an intrusion and the notion that the occurrence of metamorphosed rocks above and below the igneous rocks indicates an intrusion, whereas a flow would not have the metamorphosed rock layer above it.

A, B, and C: an intrusion

Performance Check A: Examine the diagram below carefully.

1. Is the igneous rock an intrusion (intruded rock) or a flow?
2. How do you know?

1



Remediation: (1) The student should reread Resource 14 on pages 72 through 74. (2) Reassess the objective.

Distinguishes between a sill and a dike.

The student classifies a sill and a dike.

Student Action: Naming the igneous intrusion concordant (parallel) to the intruded rock layers as the sill and the igneous intrusion discordant to (cutting across) the intruded rock layers as the dike and stating the essence of the description.

A: 1. A, 2. B
B: 1. A, 2. B
C: 1. B, 2. A

CP
O2
RES
15
1

Performance Check A: Both of the igneous rocks shown in the diagrams below are intrusions.

1. Which is a sill?
2. Which is a dike?
3. Explain your answers.

KEY	
Symbol	Rock
	igneous
	shale

Diagram A.

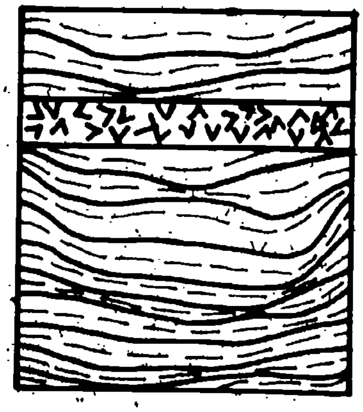
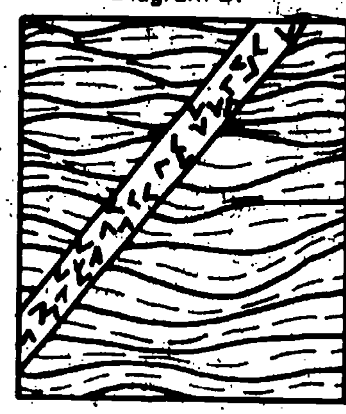


Diagram B.



Remediation: (1) Refer the student to Resource 14 for a definition of *sill.* (2) Refer him to Resource 15, Activity 5, and the paragraph following for a definition of *dike.* (3) Have him redo the check.

CP O2 RES 16 1

Names cracks in the earth through which lava flows.

The student recalls the name of a crack in the earth through which lava flows.

Student Action: Stating that a fissure is such a source.

Performance Check A: Not all lava flows from volcanoes. Much of the lava found in the northwestern United States flowed through long cracks in the earth's surface. What is the name given to these cracks?

Remediation: Have the student reread Resource 16 on pages 78 and 79.

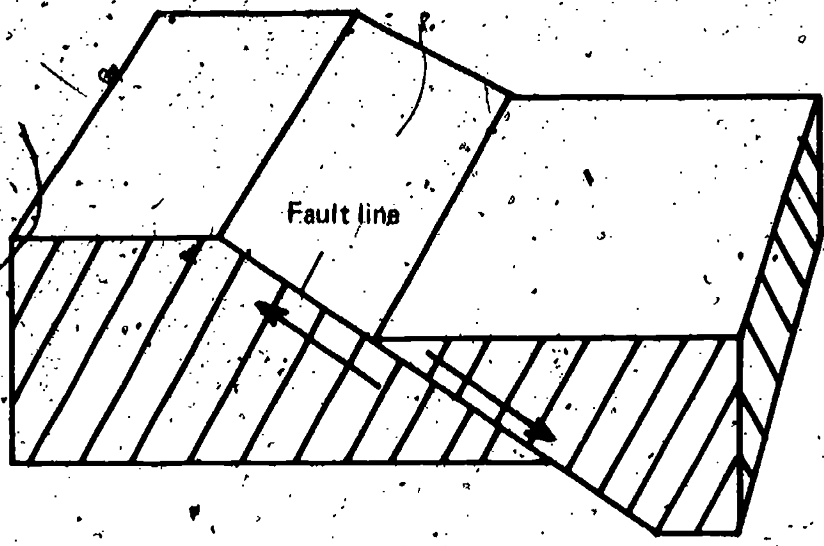
CP O2

Indicates a fault and its direction of motion.

The student classifies a fault line as the line along which motion has occurred.

Student Action: Labeling a fault line and showing on each side of it arrows parallel to the fault line but pointing in opposite directions.

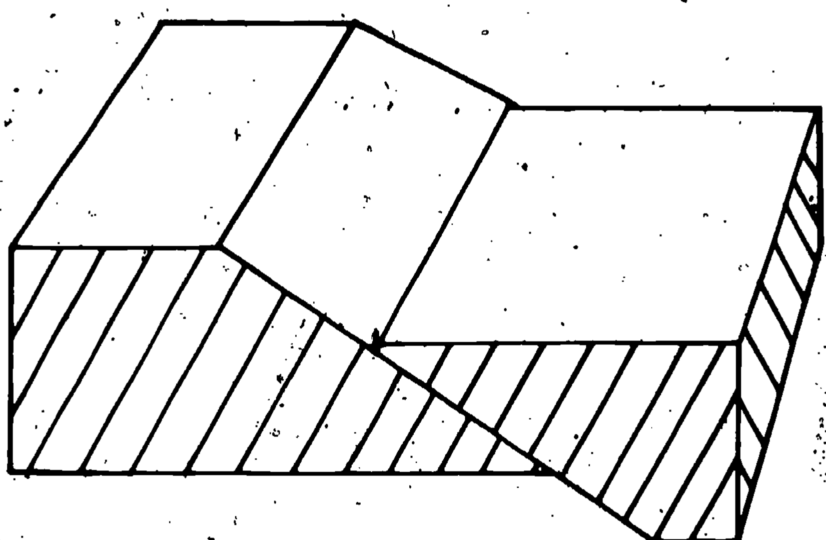
A, B, and C:



RES 17 1

Performance Check A: Copy the block diagram below onto your answer sheet.

1. Label the fault line.
2. Using arrows, show the possible directions the rocks could have moved along the fault.



Remediation: Refer the student to Activity 4 and Figure 1 on page 81 and to Figure 30 on page 82.

CP O2 RES

Indicates the direction of force that produces folds.

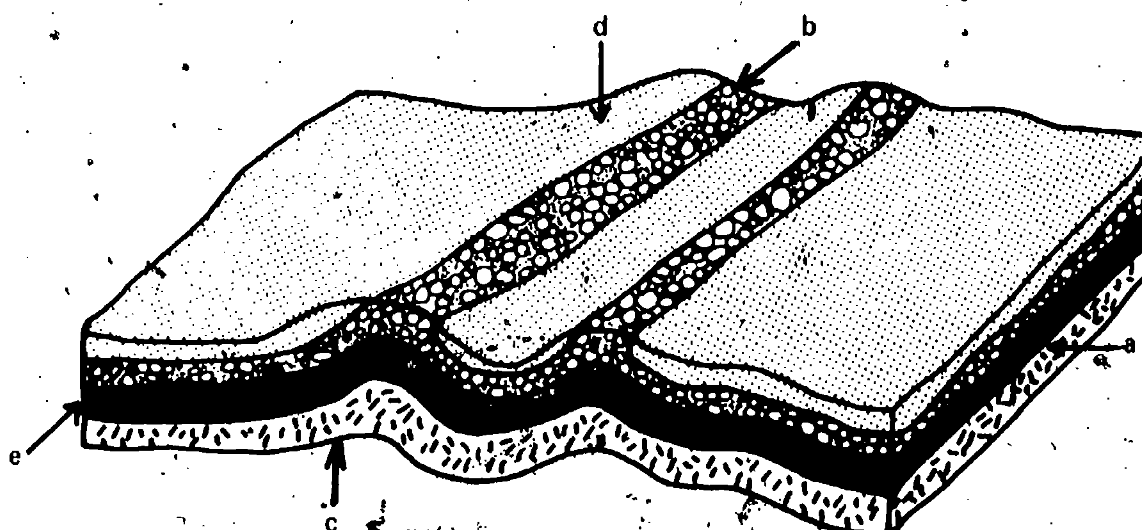
The student applies the concept that the force required to compress sediments into folds is lateral and from the direction of maximum folds.

Student Action: Selecting a horizontal arrow toward the area of the greatest bending and perpendicular to the axis of the fold.

A: a
B: e
C: c

18
1

Performance Check A: The block diagram below illustrates rock strata that have been compressed into folds. Select the letter of the arrow which indicates the direction of the applied force that caused the rocks to fold.



Remediation: (1) Provide samples of the folded clay from Resource 15 if you still have some. Then refer the student to Activities 3 and 4, on pages 83 and 84, in which the folds were generated and analyzed. (2) Provide clay, and let the student repeat those activities. (3) Check his answer to Self-Evaluation 2-4. (4) Reassess the objective, using an alternate check.

CP
O2
RES

Selects the older mountain.

The student classifies old mountains on the basis of their characteristics.

Student Action: Selecting the older mountain and stating, in effect, that it has gentle slopes and broad valleys as compared to the high peaks, steep mountain sides, and narrow valleys of the younger, less-eroded mountains.

- **A:** Mount Hope
- **B:** Mount Lowe
- **C:** Mount Spiral

19
1

Performance Check A: The data below concern two different mountains from different mountain chains.

1. Which one do you think is older?
2. Explain your answer.

CHARACTERISTICS	MOUNT JOY	MOUNT HOPE
Height of peaks	12,000 feet	8,000 feet
Steepness of mountain sides	very steep	gentle slopes
Nature of valley	narrow	broad

Remediation: (1) Refer the student to the discussion in Resource 19 on pages 86 and 87. (2) Have him examine the photographs in Figures 1 and 2 on page 87. (3) Review his answer to Self-Evaluation 2-6 and discuss with him the notion that mountains wear down in time because of erosional forces.

CP
O2
RES
20
1

Describes the process by which snow turns into glacial ice.

The student recalls the process of snow's being turned into glacial ice.

Student Action: Responding with the notions of at least two of the following three steps: (1) the process begins when more snow falls than melts, (2) then snow on the already accumulated snow produces pressure on the snowflakes at the bottom, turning them into ice grains, and (3) further packing and the addition of water from melting snow recrystallizes the ice grains into solid ice.

Performance Check A: Describe the process by which snow turns into glacial ice.

Remediation: (1) Have the student reread Resource 20 on pages 87 and 88. (2) Reassess the objective, with an alternate check.

CP
O2
RES

Selects the conditions necessary for changes in glacial size.

The student classifies the conditions for glacial advance and retreat.

Student Action: Selecting as conditions which cause a change in glacial size snowfall in winter which exceeds melting and evaporation in the summer and snowfall in the winter which is exceeded by melting and evaporation in the summer.

A: a and b
B: c and d
C: a and c

21

1

Performance Check A: Kathy suggested that each of the following climate conditions would always result in changing the size of a glacier.

a. Snowfall in the winter which exceeds the loss from melting and evaporation in the summer.
b. Snowfall in the winter which is exceeded by the loss from melting and evaporation in the summer.
c. Snowfall in the winter which is equalled by the loss from melting and evaporation in the summer.
d. Eighty inches of snowfall per year
e. One hundred inches of snowfall per year

Larry disagreed, saying that only some of those conditions would result in changes in a glacier's size. Which options would cause a glacier's size to change?

Remediation: (1) Refer the student to Resource 21 on pages 88 through 90. (2) Reassess the objective, using an alternate check.

CP 03

Chapter 3

Resources 24 thru 37

Performance Check

Summary Table

Objective Number	Objective Description
CP-03-Core-1	Recognizes sources for river systems
CP-03-Core-2	Indicates conditions necessary for river system formation
CP-03-Core-3	Selects the stream whose profile indicates the greatest potential energy
CP-03-Core-4	Adjusts the rate of water flow in a stream table
CP-03-Core-5	States a possible relationship between two variables in a data table
CP-03-Core-6	Recognizes places of gravel deposition in a stream
CP-03-Core-7	Selects events that increase a river's kinetic energy
CP-03-Core-8	Names the variable which causes changes in erosion rate
CP-03-Core-9	Recognizes the effects of varying stream conditions
CP-03-Core-10	Selects features which are formed because of a decrease in a stream's kinetic energy
CP-03-Core-11	Names the prime erosional force acting at different geographical sites
CP-03-Core-12	States the factors affecting the rate of flow of a river
CP-03-Res 27-1	Interprets graphs to locate the position of fastest stream flow
CP-03-Res 29-1	Recognizes the variable limiting stream channel depth
CP-03-Res 32-1	Recognizes the relationship between the direction of water flow and the size of deposited particles
CP-03-Res 33-1	Selects stream and rock conditions which produce waterfalls
CP-03-Res 34-1	Indicates the directions of stream flow and gully growth

	Materials	Observer	Special Preparations	Quick Score	3 + Minutes	Basal	Math	Reading	Concept	Action Verbs	Notes
						√				applies	
			P							applies	
						√				applies	
	M	O				√				manipulates	
										generates	
						√				applies	
				Q		√				classifies	
										applies	
			P					√	√	applies	
				Q						classifies	
										classifies	
				Q		√				applies	
				Q			√			applies	
				Q						applies	
										applies	
										applies	
			P							applies	

CP 03

Objective Number	Objective Description
CP-03-Res 36-1	Indicates areas of erosion and deposition on a meandering stream
CP-03-Res 36-2	Recognizes conditions that alter a meandering stream
CP-03-Res 37-1	Selects wind direction from dune shapes
CP-02-Core-2R	Distinguishes between observations and interpretations

	Materials	Observer	Special Preparations	Quick Score	3 + Minutes	Basal	Math	Reading	Concept	Action Verbs	Notes
										applies	
						√				applies	
										applies	
			P			√				classifies	

CP
O3
Core
1

Recognizes sources for river systems.

The student applies the concept that river systems tend to originate in highland areas and in high precipitation areas.

Student Action: Selecting three locations and responding to the effect that river systems tend to originate in highlands and high precipitation areas.

A: a, b, d
B: b, c, d
C: a, b, c

Performance Check A: Study the list of locations below very carefully.

a. The southern Appalachian Mountains
b. The coastal plains of the eastern United States
c. The Mojave Desert
d. The Gulf coast area of the U.S.

1. Which of them are likely source areas of river systems? Choose all the correct answers.
2. What are the reasons for your choices?

Remediation: (1) Check the student's response to question 3-3 in his *Record Book*. In order to answer that question, he had to examine the three maps in Resources 24, 25, and 26 and draw conclusions concerning where rivers begin. (2) If he had difficulty with the check, you should have him reexamine the maps. Have him select two or three major rivers and trace each to its source. (3) Reassess the objective with an alternate check.

CP
O3
Core
2

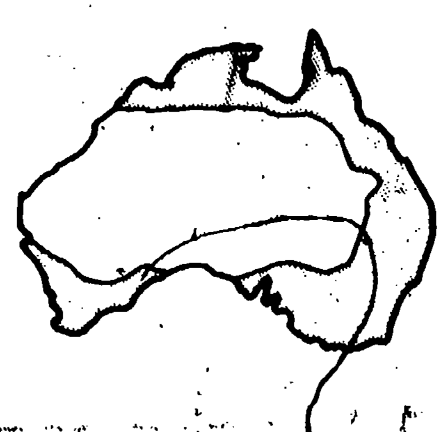
Indicates conditions necessary for river system formation.

The student applies the concept that most river systems originate in highlands or high precipitation areas.

Special Preparations: Prepare a blank outline map of Australia or duplicate the map which appears at the back of this book.

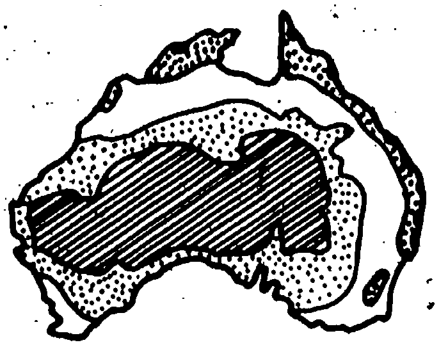
Student Action: Marking on a blank map of Australia a high altitude area and a high precipitation area. At least 75% of the correct area should be marked.

A, B, and C:



Performance Check A: Get a blank map of Australia from your teacher. Study both the average precipitation map and the elevation map shown below. On the basis of these two maps, where do you think river systems originate in Australia? Indicate your selections by shading those large general areas for each location on your blank map.

Average precipitation in Australia



KEY	
Symbol	Precipitation (in cm)
	0-25
	26-50
	51-100
	101-150
	151-200

Elevation map of Australia

KEY	
Symbol	Elevation (in m)
	1526-2440
	611-1525
	306-610
	0-305

Remediation: (1) This check is an application of question 3-3 on page 103. Essentially the student was asked to determine the source areas of rivers in the U.S. Check with him his response to question 3-3. (2) Have him compare the maps in Resources 24 and 26 with the river origins noted on the map in Resource 25. (3) Reassess the objective by having the student redo the check.

CP 03 Core 3

Selects the stream whose profile indicates the greatest potential energy.

The student applies the concept that the potential energy of a river increases as the average slope increases.

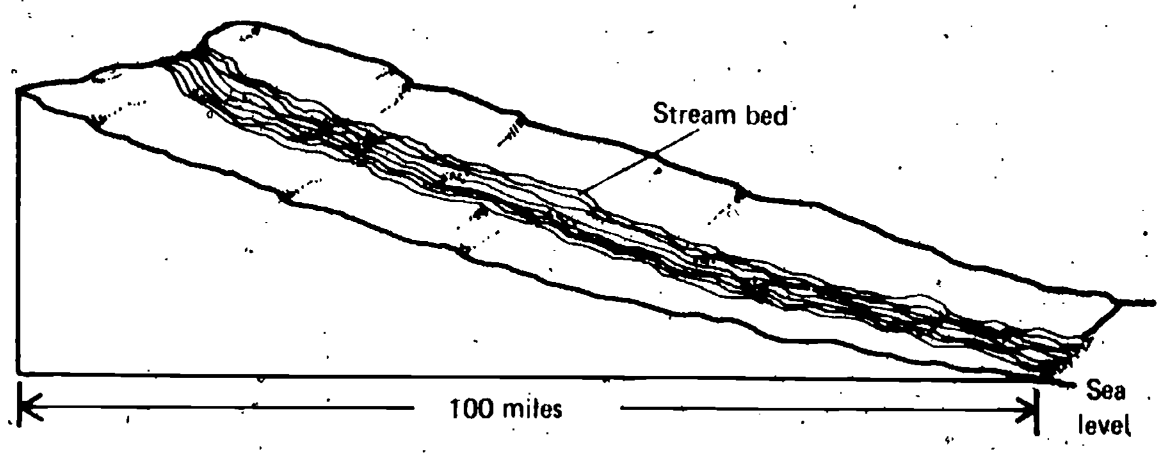
Student Action: Selecting the river with the greatest average slope angle and responding to the effect that the slope is the steepest.

A: b
B: c
C: a

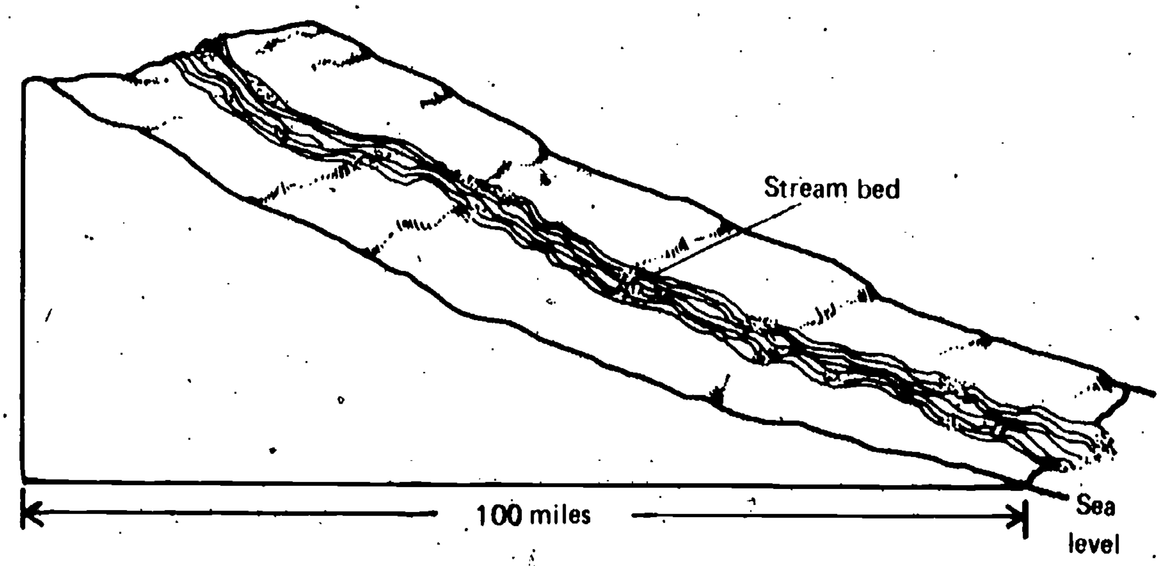
Performance Check A: The diagrams below show the profiles of three different streams.

1. Which stream do you think has the greatest potential energy?
2. What is the basis for your selection?

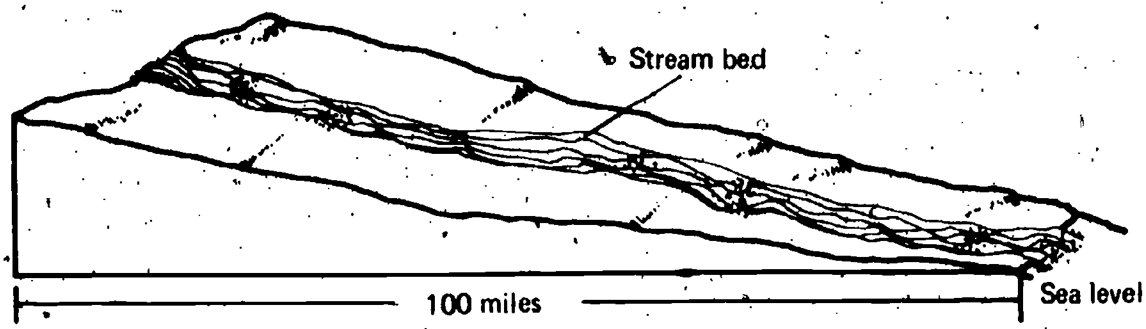
Profile a.



Profile b.



Profile c.



Remediation: (1) Refer the student to question 3-2 and the discussion immediately following on page 103. (2) Check his answer to Self-Evaluation 3-3. (3) If the student has completed Resource 27, he should check his results to Activity 3. Encourage the student to do Resource 27 if he did not do it. (4) Reassess the objective with an alternate check.

Adjusts the rate of water flow in a stream table.

CP 03 Core 4

The student manipulates the water flow of a stream table kept at a constant slope.

Regular Supplies: 1 stream table, complete
1 supply bucket
2 catch buckets
1 100-ml beaker

Student Action: Adjusting the screw clamps so that it takes 10 ±2 seconds to fill a 100-ml beaker.

Performance Check A: Get a supply and two catch buckets and a 100-ml beaker from the supply area. Using these materials and a stream table, adjust the rate of flow in the stream table to 10 ml/sec without changing the slope of the table. When you think you have the correct flow, ask your teacher to check it.

Remediation: (1) Since the student will be doing many activities with the stream table, refer him to page 107. The student should review the procedure described there for determining the rate of flow. (2) Activity 3-1 on page 107 illustrates and describes the adjustments needed to regulate the flow of water. Reviewing these steps with the student will help. (3) Check the student again to see that he can manipulate the equipment.

States a possible relationship between two variables in a data table.

CP 03

The student generates a hypothesis relating stream-table-slope data to erosion data.

Student Action: Responding to the effect that the rate of erosion increases as the stream gradient increases.

Core 5

Performance Check A: A stream table was used to determine how long it would take for 50 grams of a sand-gravel mixture to be eroded. The slope of the table was varied, but the amount of water used was the same for each trial. Study the data table below carefully. State how you think the slope of the stream table and the rate of erosion of the stream trough are related.

HEIGHT OF STREAM TABLE'S UPPER END ABOVE ITS LOWER END (in cm)	TIME TO REMOVE 50 g OF A SAND-GRAVEL MIXTURE (in sec)	
	Trial 1	Trial 2
4	26	28
8	15	18
12	7	6

Remediation: (1) This is a slight variation from Resource 27, in which the student calculated speed and from that made inferences concerning the effect of slope. In the check, the relationship is between erosion (mass of material removed) and changing slope. Although subtle, it may help to point out the difference. After the student understands this, refer him to Table 1 on page 122. (2) The discussion on pages 122 and 123 may also help. (3) Reassess the objective with an alternate check.

CP 03 Core 6

Recognizes places of gravel deposition in a stream.

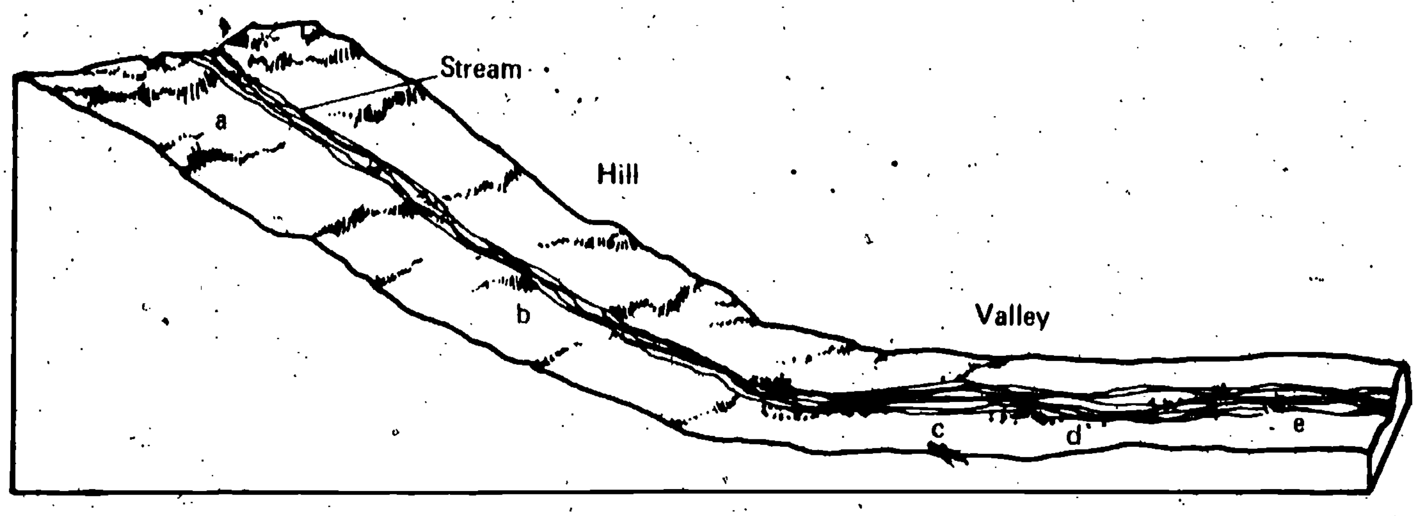
The student applies the concept that deposits of gravel are the result of the reduction of a stream's kinetic energy.

Student Action: Selecting the letter at the point of energy reduction and responding to the effect that deposits of gravel are found there because of a reduction in the kinetic energy of the stream.

A: c
B: c
C: b

Performance Check A: A stream profile is shown in the diagram below.

1. Select the letter at the location you would expect to find a deposit of gravel.
2. How do you explain the gravel at that spot?



Remediation: (1) Check the student's response to question 3-5 on page 111. (2) Refer him to Resource 31 on pages 129 through 131. (3) Reassess the objective with an alternate check.

Selects events that increase a river's kinetic energy.

CP 03 Core 7

The student classifies changes that increase a river's kinetic energy.

Student Action: Selecting changes that will increase the kinetic energy of the river by increasing its discharge or increasing the smoothness of its bed.

A: a, b, d
B: a, c, d
C: a, b, c

Performance Check A: Examine the following list of statements. Each describes a change or an event that could occur in some region of the United States. Write the letter of any of the changes listed below that would almost immediately increase a river's kinetic energy.

a. A severe thunderstorm
b. Increased temperatures in mountainous regions in springtime
c. Ten days of clear weather with very low temperatures
d. Removal of rocks from the river bed

Remediation: (1) This objective integrates several activities and resources connected with Chapter 3. Check the student's responses to questions 3-4 and 3-5 on pages 110 and 111. (2) Discuss with the student the concept of kinetic energy and that in terms of a river system, kinetic energy is the rate of flow. Ask him to list the ways in which the rate of flow of a river could be increased, or have him explain how several variables that you suggest would affect the rate of flow. (3) Reassess the objective with an alternate check.

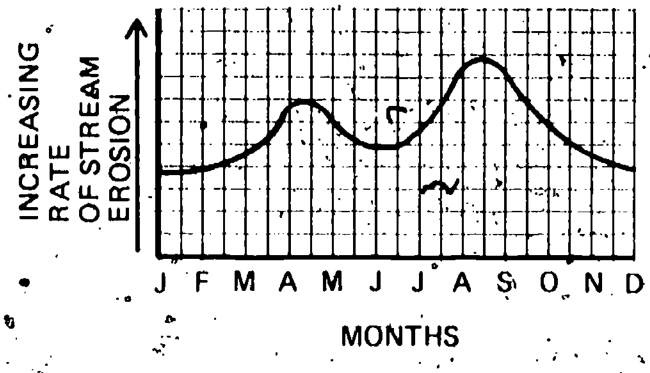
CP 03 Core 8

Names the variable which causes changes in erosion rate.

The student applies the concept that any variable which causes an increase in the kinetic energy of the stream will increase erosion.

Student Action: Responding to the effect that an increase in the volume of stream flow will increase erosion.

Performance Check A: The graph below shows the erosion rate for one year at a bridge over the St. John's River. What variable would be the major cause for the rate of erosion to increase or decrease as shown on the graph?



Remediation: (1) The basic concept that increasing discharge will increase the rate of erosion is developed on pages 122 and 123, especially in Activity 3. (2) Reassess the objective with an alternate check.

CP 03 Core 9

Recognizes the effects of varying stream conditions.

The student applies the concept that the rate of erosion of a stream bed, an application of the kinetic energy, varies directly with the potential energy and the friction of the bed.

Special Preparations: Duplicate the appropriate table (CP-03-Core-9A, B, or C) found at the back of this book.

Student Action: Completing correctly at least ten of the fifteen possible changes in the table to show that (1) potential energy varies directly with source height or water volume, (2) kinetic energy varies directly with potential energy or slope and with increasing smoothness of the river bed, and (3) erosion, ease of bed removal, varies directly with kinetic energy.

A:

CHANGE OR DIFFERENCE	POTENTIAL ENERGY	KINETIC ENERGY	EROSION RATE
Starts at greater height	+	+	+
Smoother bed	0	+	+
More water	+	+	+
Less bed slope		–	–
Harder bed	0	0	–

B:

CHANGE OR DIFFERENCE	POTENTIAL ENERGY	KINETIC ENERGY	EROSION RATE
Lower the starting height	–	–	–
Rocks in the bed	0	–	–
Less water	–		
Steeper slope	+	+	+
Harder bed	0	0	–

C:

CHANGE OR DIFFERENCE	POTENTIAL ENERGY	KINETIC ENERGY	EROSION RATE
Smoother bed	0	+	+
Less water		–	–
Lower the starting height	–	–	–
Harder bed	0	0	–
Steeper slope	+	+	+

Performance Check A: If you could vary the conditions of a stream as you can a stream table in the laboratory, it would change the effect of the water flow. Get a copy of the following table (CP-03-Core-9A) from your teacher. Complete each box of the table by writing + to show that the change increases the effect, – to show that it decreases the effect, and 0 to show that it has no effect.

CHANGE OR DIFFERENCE	POTENTIAL ENERGY	KINETIC ENERGY	EROSION RATE
Starts at greater height			
Smoother bed			
More water			
Less bed slope			
Harder bed			

Remediation: (1) Refer the student to Table 1 on page 122. Inspection of the table should reveal that increasing the slope and the rate of flow and decreasing the roughness of the bed will tend to increase the speed of the water. (2) You may have to review with him the relationship between speed and kinetic energy. (3) Review his answers to Self-Evaluations 3-2 and 3-3. (4) Reassess the objective with an alternate check.

CP 03 Core 10

Selects features which are formed because of a decrease in a stream's kinetic energy.

The student classifies depositional features as resulting from a reduction in a stream's kinetic energy.

Student Action: Selecting the two depositional features found in the following list: (1) alluvial fans, (2) sandbars, (3) deltas, (4) mud bars, and (5) spits.

A: b, d
B: a, d
C: b, c

Performance Check A: Which of the following features are formed when a river's kinetic energy has been reduced? Choose all the correct answers.

a. Stream channels
b. Alluvial fans
c. Gullies
d. Sandbars
e. Potholes

Remediation: (1) Refer the student to Resources 31, 32, and 37. (2) You might also find it useful to define *kinetic energy* and discuss the effects of a change in kinetic energy on stream channel features. (3) Reassess the objective with an alternate check.

CP 03 Core 11

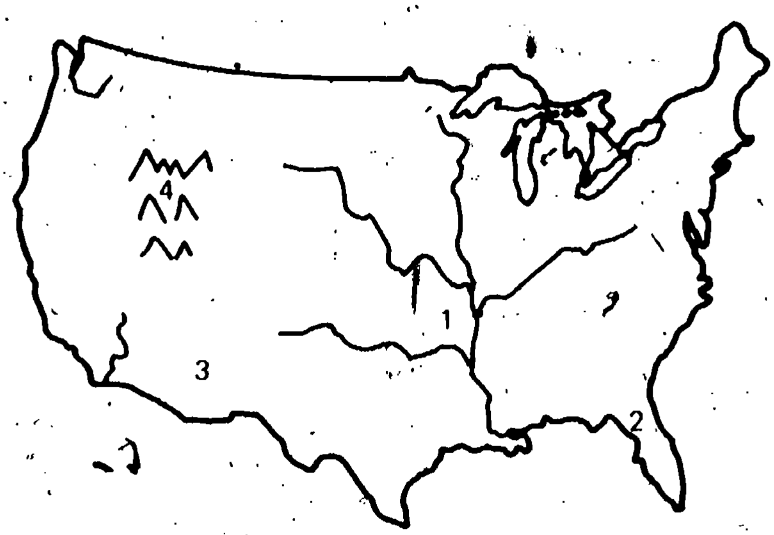
Names the prime erosional force acting at different geographical sites.

The student classifies sites by the chief agent of erosion at that site.

Student Action: Selecting the correct agent for at least three of the four sites from among the following agents: (1) wind erosion in deserts, (2) water erosion in humid areas and mountain valleys, and (3) wave erosion at beaches.

- **A:** 1. flowing water, 2. wave action, 3. wind, 4. flowing water
- **B:** 1. flowing water, 2. wind, 3. wave action, 4. flowing water
- **C:** 1. wind, 2. flowing water, 3. flowing water, 4. wave action

Performance Check A: Rock and soil are eroded in different ways according to climate and geography. Erosion is often caused by flowing water, wave action, wind, and glaciers. What causes erosion at each of the four areas numbered below on the map of the United States?



Remediation: (1) For a discussion of wave erosion, have the student read "The Force of Waves" on pages 154 and 155. (2) For flowing water erosion, have him read "Special Erosional Features of Rivers" on page 111. (3) For wind erosion, have him review Activity 1 on page 149.

CP 03

States the factors effecting the rate of flow of a river.

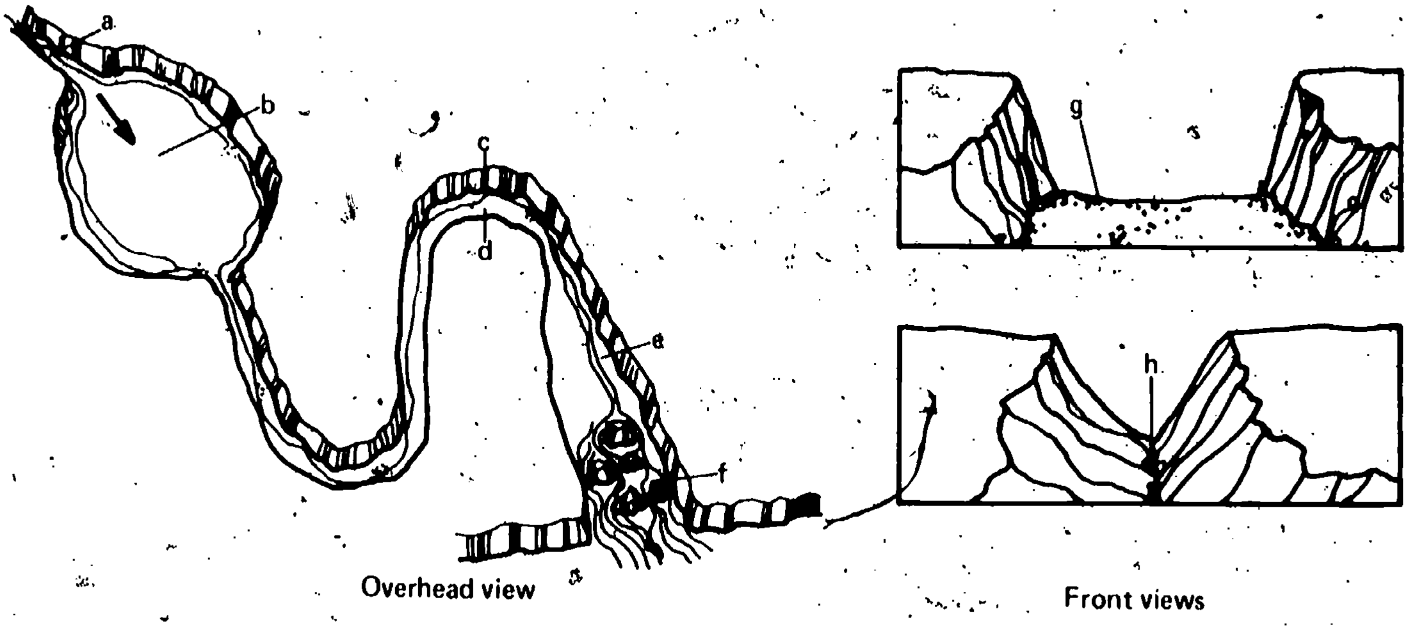
The student applies the concept that the rate of flow in a river is greater (1) when the width of the river narrows, (2) when there are no obstacles in the river, (3) at the outside of a bend, and (4) where the river bed is V-shaped.

Core 12

Student Action: Selecting at least three of the four points of faster flow.

A: 1. a, 2. c, 3. e, 4. h
B: 1. a, 2. c, 3. e, 4. g
C: 1. b, 2. c, 3. e, 4. g

Performance Check A: Look at the diagrams below of a river.



For each of the pairs of letters, select the location where the river will flow faster. Assume that all parts of the river have the same slope.

1. Location a or b
2. Location c or d
3. Location e or f
4. Location g or h

Remediation: (1) For a discussion of the effect on the rate of flow at bends in a river, refer the student to the paragraph and Figures 1 and 2 on page 145. (2) For a discussion of the effect of width, appeal to common sense. If the same amount of water per day moves through a wide and a narrow spot in the stream, it has to go faster through the narrow spot. (3) That fast-moving water is common in steep-walled canyons is discussed on pages 141 and 142. (4) For a discussion of the effect of obstacles, have him reread page 128. (5) For a discussion of the effect of channel shape, have him reread the last paragraph on page 123.

CP O3 RES

Interprets graphs to locate the position of fastest stream flow.

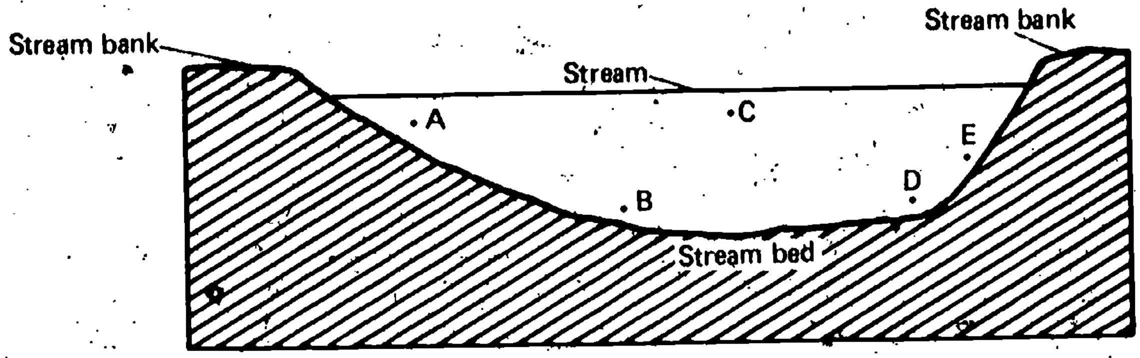
The student applies the concept that the velocity of water in a stream is greatest at the center point farthest from the stream's banks and bed.

Student Action: Selecting the graph which shows that the water flow is fastest at the center point where the water is farthest from the stream's banks and bed.

A: b
B: a
C: c

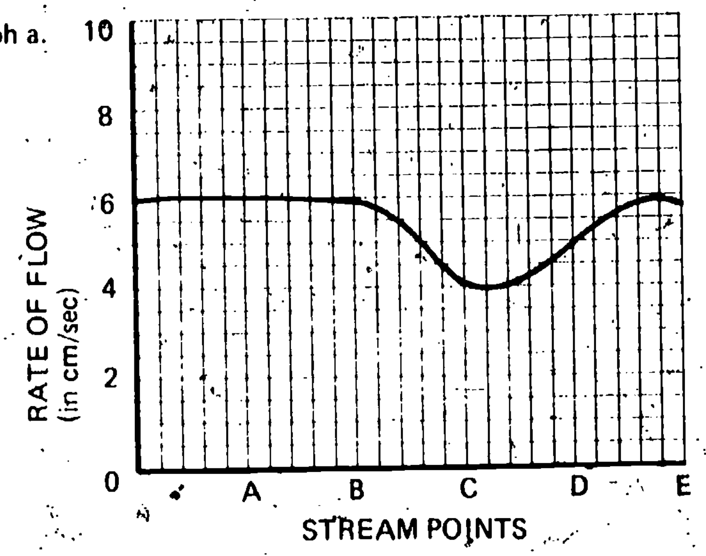
27
1

Performance Check A:

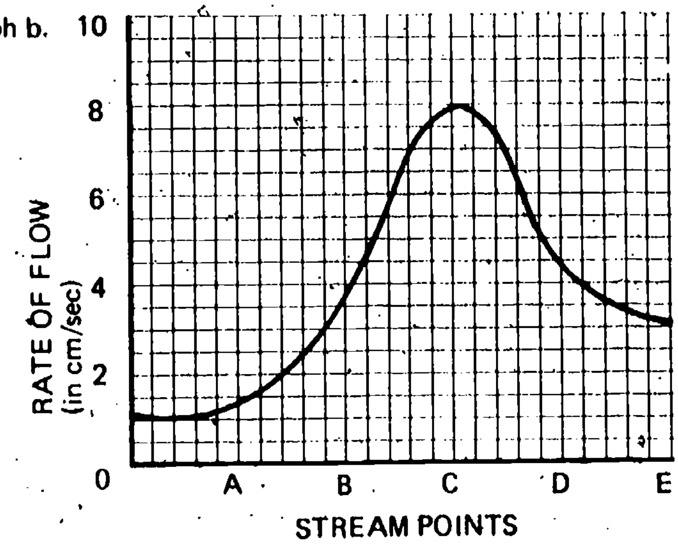


Above is a diagram of a cross section of a stream channel. Which graph below best shows the rates at which water flows at the lettered points?

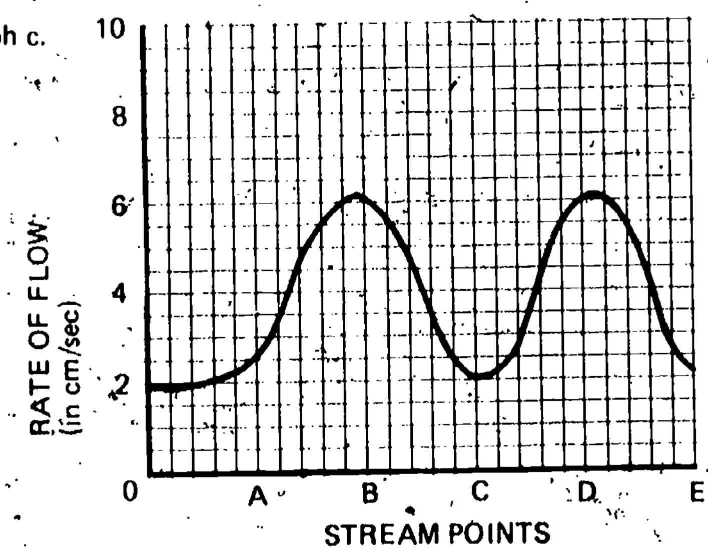
Graph a.



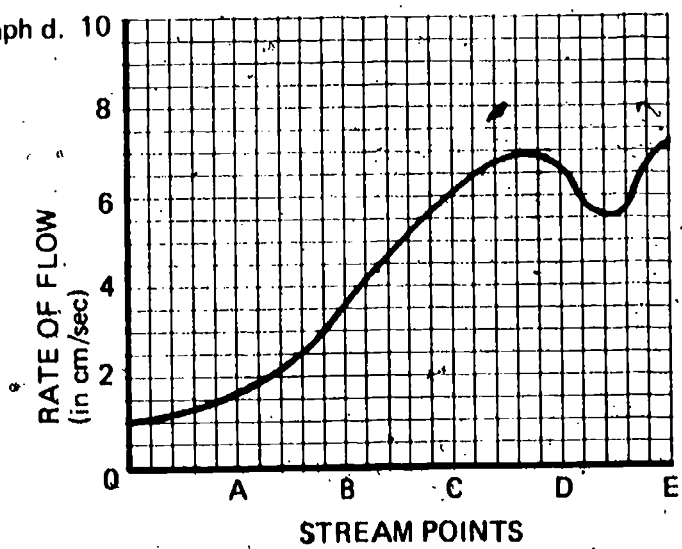
Graph b.



Graph c.



Graph d.



Remediation: (1) Have the student review Resource 27 on pages 121 through 123. (2) If necessary, have the student put food coloring into water flowing downhill and determine which part of the stream is moving fastest. (3) Reassess the objective, using an alternate check.

CP
03
RES
29
1

Recognizes the variable limiting stream channel depth.

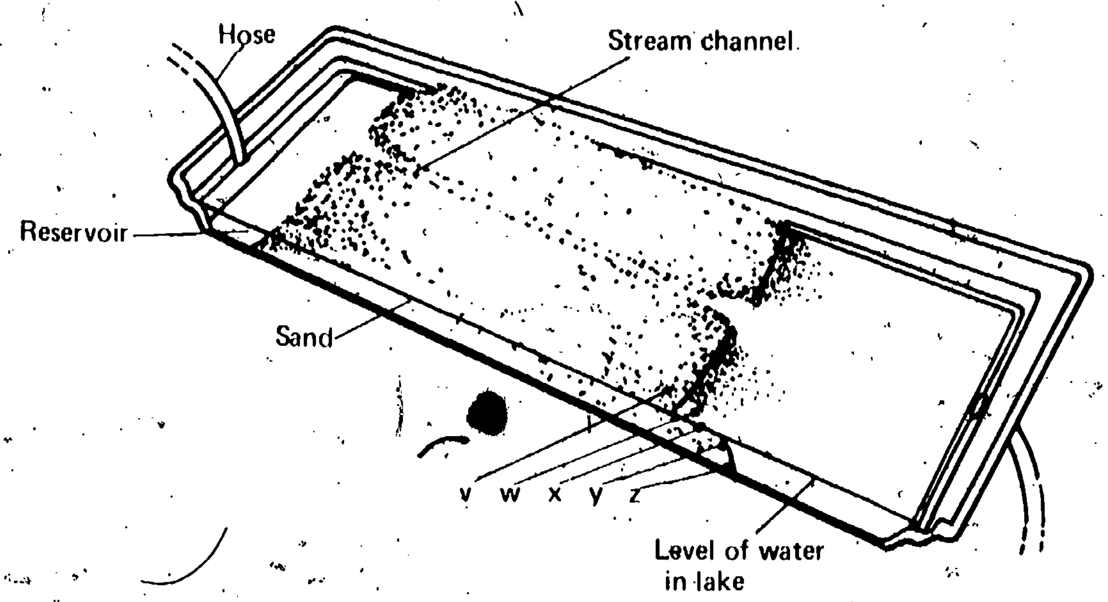
The student applies the concept that stream channel depth cannot be lower than the lake or ocean into which it flows.

Student Action: Selecting a depth which is equal to the level of the lake and the statement that channel depth is controlled by the level of the lake.

A: 1. x, 2. c
B: 1. n, 2. b
C: 1. s, 2. a

Performance Check A: The diagram below shows a stream table setup. Water will be allowed to flow at 5 ml/sec from the reservoir into the stream channel. The level of water in the lake will be kept constant.

1. Select the maximum depth (v, w, x, y, or z) to which the channel will be cut.
2. Select the letter of the statement below which explains why you chose that depth.
   a. Channel depth is controlled by the bottom of the stream table.
   b. Channel depth is controlled by the rate of flow.
   c. Channel depth is controlled by the level of the lake.
   d. Channel depth is controlled by time.



Remediation: (1) Refer the student to Resource 29 on pages 126 and 127. (2) Discuss with him the principle that a stream cuts to the level of the body of water into which it flows. (3) Reassess the objective, using an alternate check.

CP
O3
RES
32
1

Recognizes the relationship between the direction of water flow and the size of deposited particles.

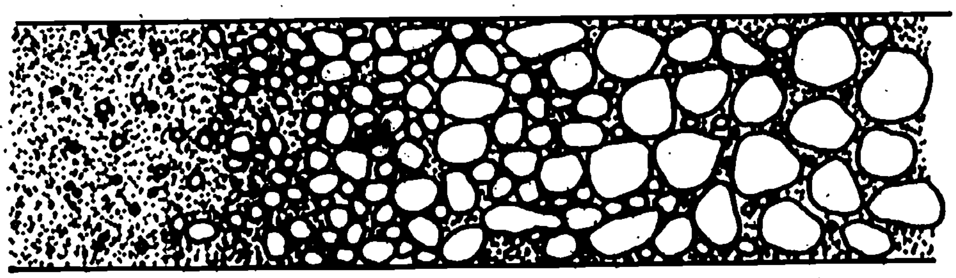
The student applies the concept that streams deposit particles of various degrees of coarseness in a regular pattern.

Student Action: Responding negatively and with the essence of the concept that coarse particles in a stream bed are deposited close to shore and fine particles farther out.

A, B, and C: no

Performance Check A: The diagram below shows a lengthwise section of the river bottom in a delta.

1. Did the river flow from A to B to C at the time of deposition?
2. Explain your answer.



Remediation: (1) Have the student do or review Resources 28 and 32. (2) If you have a stream table set up, have the student produce a delta. Remove the water from the stream table and carefully slice the delta in half along the lengthwise axis. Point out to the student the variation in grain size. (3) Reassess the objective with an alternate check.

CP
O3
RES
33

Selects stream and rock conditions which produce waterfalls.

The student applies the concept that waterfalls form along a stream where the water flows across an interface from a relatively hard to a softer rock layer.

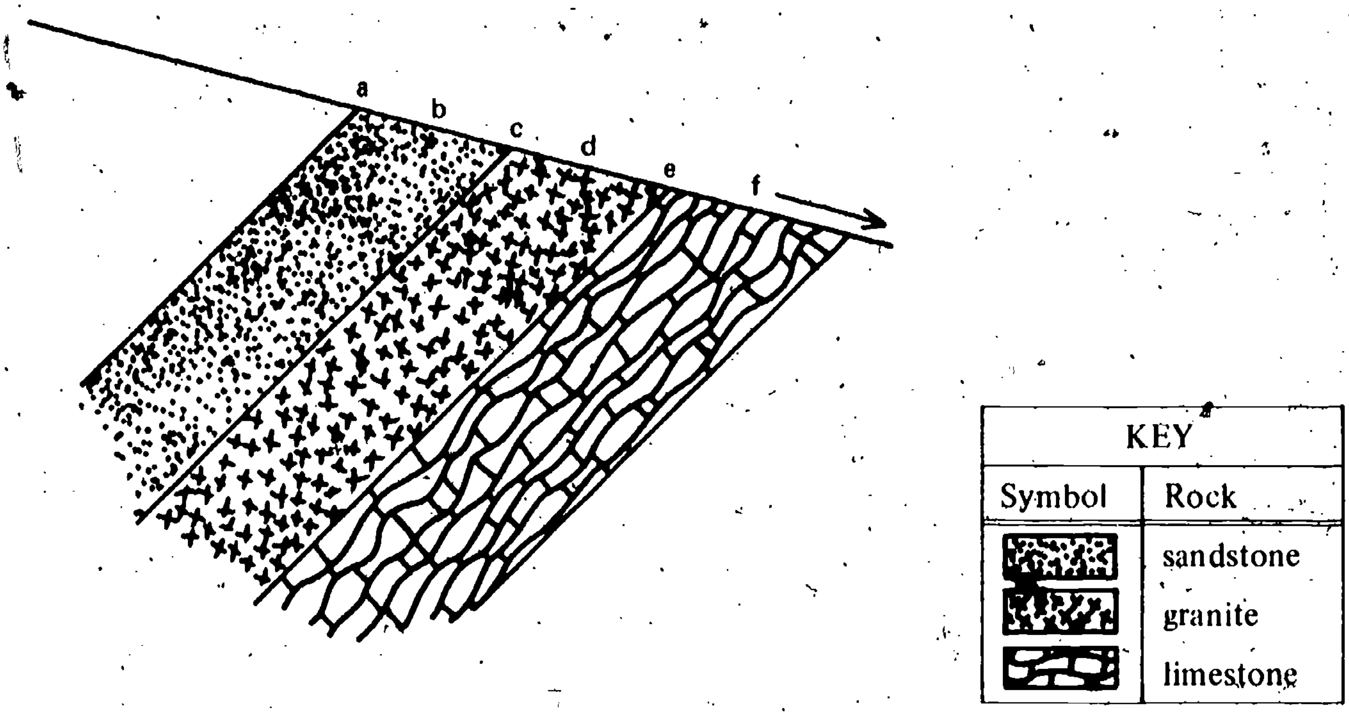
Student Action: Selecting a site where the water flows across an interface from a relatively hard to a softer rock layer and responding to the effect that the less resistant rock will erode much faster than the harder rock to form the waterfall.

A: e
B: e
C: c

1

Performance Check A: Study the diagram of the stream bed and its key below. The arrow shows the direction the water flows.

1. Write the letter of any place where a waterfall could form.
2. State the reason for your choice.



Remediation: (1) The student was given the option of doing Prediction 1 on page 114, which is related to this check. If he chose not to do it, do not give him any remediation. (2) Refer him to Resource 33, especially to Activities 1 through 3 on pages 136 and 137. (3) If he has difficulty with the relative hardness of rocks, have him test samples of marble, quartzite, sandstone, granite, and shale. (4) Reassess the objective with an alternate check.

CP O3 RES 34

Indicates the directions of stream flow and gully growth.

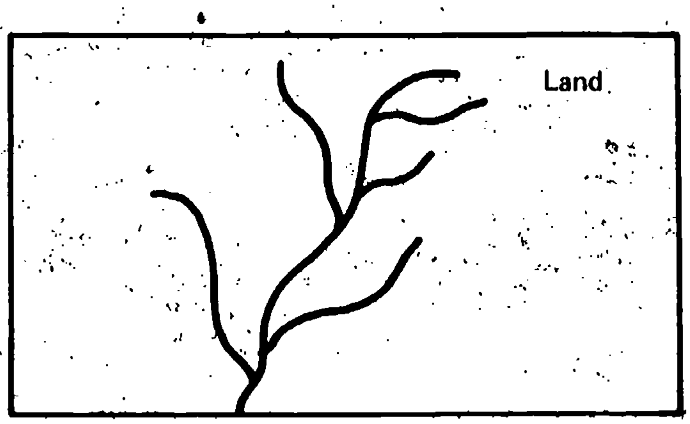
The student applies the concept that water flows from branch channels into a central channel and that gullies develop and get longer by headward erosion.

Special Preparations: Duplicate the appropriate map CP-03-Res 34-1 at the back of this book.

Student Action: Drawing and labeling an arrow showing water flow from tributaries to the main channel and an arrow showing that erosion occurs headward, that is, up the tributaries.

Performance Check A: The map below shows the paths of several gullies. Copy this map onto your answer sheet or use the one provided by your teacher.

1. Use an arrow labeled *flow* to show the direction that water flows in one of the gullies.
2. Use an arrow labeled *growth* to show the direction in which one of the gullies will tend to grow.



Remediation: (1) Have the student review Resource 34 on pages 139 through 141. (2) Have him repeat Activities 1 and 2 on pages 139 and 140 if necessary. (3) Reassess the objective, using the same check.

Indicates areas of erosion and deposition on a meandering stream.

The student applies the concept that stream velocity determines whether deposition or erosion occurs.

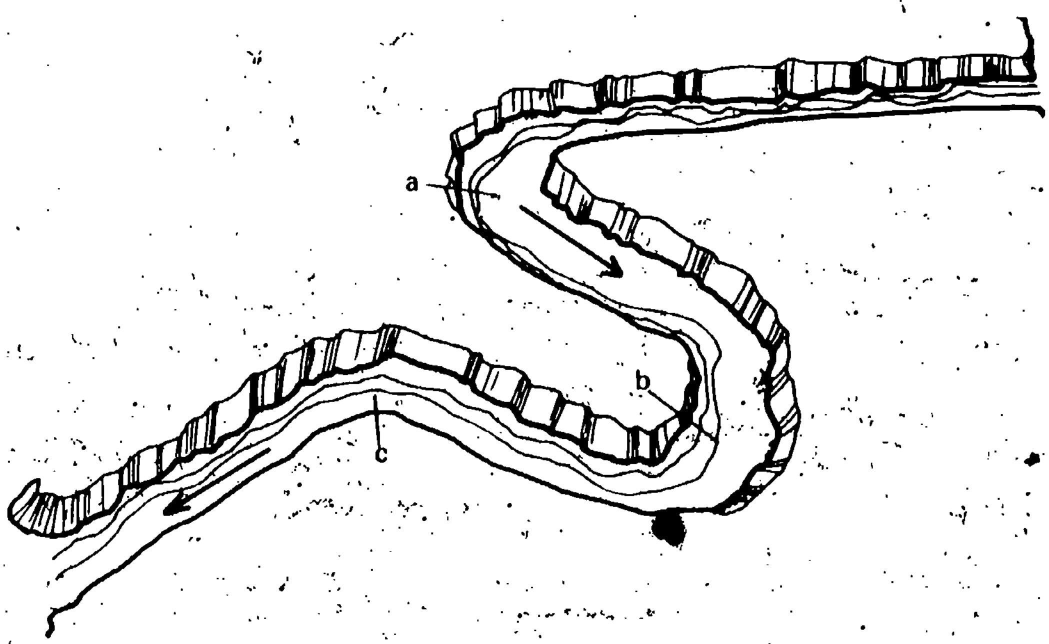
Student Action: Selecting high velocity sites as places of erosion and low velocity sites as places of deposition and responding with the notion that erosion occurs on the outside of bends of streams where velocity is high, whereas deposition occurs on the inside of bends where the water velocity is low.

A: 1. a, 2. b and c
B: 1. c, 2. a and b
C: 1. b, 2. a and c

CP O3 RES 36 1

Performance Check A: The diagram below shows the path of a river and three lettered points along its course. Arrows mark the direction the water flows.

1. At which points is erosion likely to occur?
2. At which points is deposition likely to occur?
3. State the reason for your choices.



Remediation: (1) Refer the student to Resource 36. Figure 1 on page 145 shows very clearly where deposition occurs. He could compare this diagram to the diagram in the check. (2) Have him do Activity 4 on page 145. (3) Reassess the objective with an alternate check.

CP
O3
RES
36
2

Recognizes conditions that alter a meandering stream.

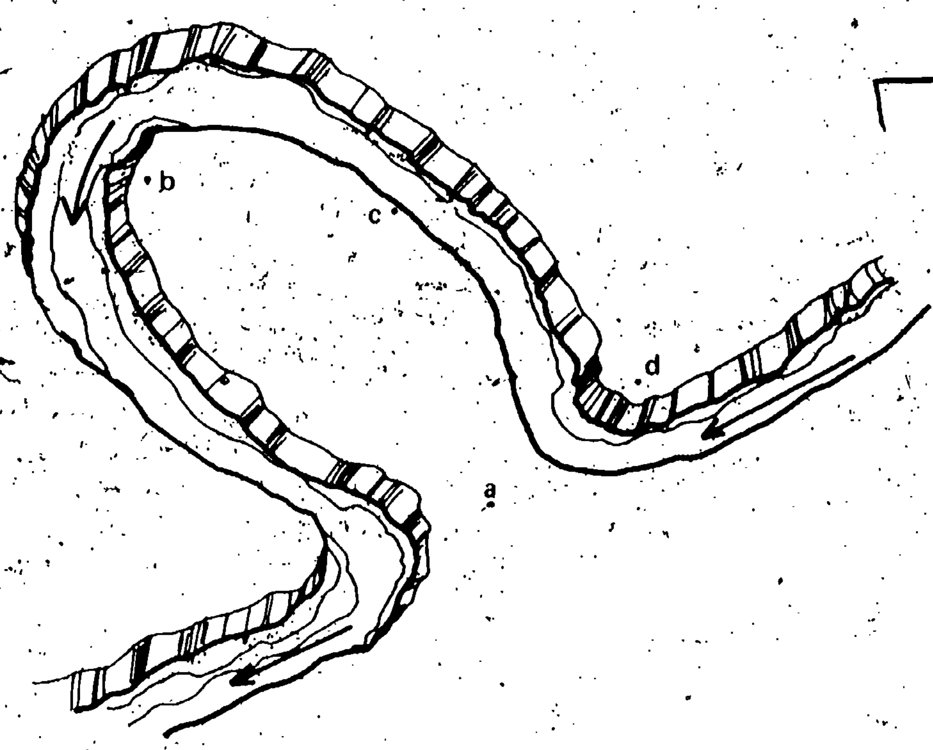
The student applies the concept that bed and stream wall erosion are greatest at the outside of a bend in a stream.

Student Action: Selecting the point of land at the neck of the meander and stating, in effect, that it would probably erode first because erosion takes place most rapidly on the outside of a bend in a stream.

A: a
B: b
C: d

Performance Check A: A section of a meandering stream is shown below.

1. As the stream erodes the land surface, which of the four areas indicated by letters would be eroded first?
2. Explain the reason for your answer.



Remediation: (1) Refer the student to Figure 4 on page 147. The diagrams illustrate the effect of erosion on a meandering stream. (2) The student could set up the stream table replicating the stream channel shown in the check. (3) Review the student's answer to Self-Evaluation 3-5. (4) Reassess the objective with an alternate check.

Selects wind direction from dune shapes.

The student applies the concept that steep slopes and pointed horns of crescent-shaped dunes point downwind.

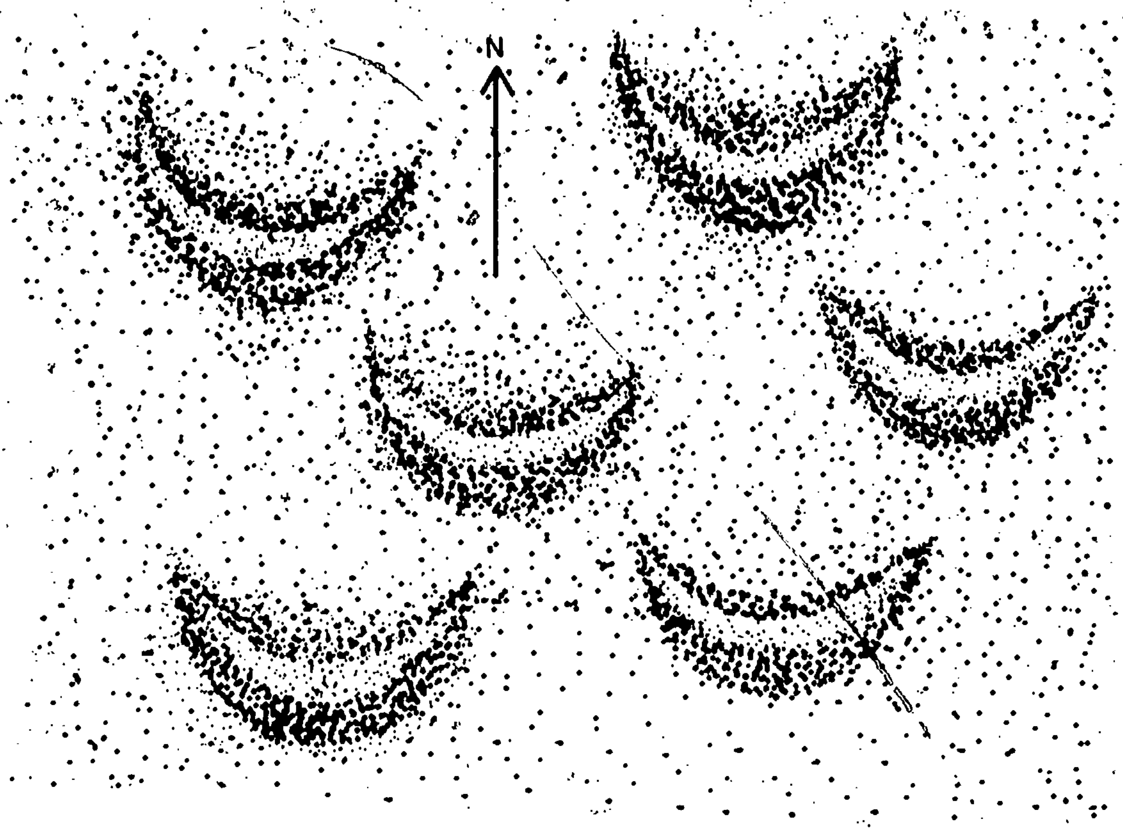
Student Action: Stating the wind direction and, in effect, either that steep slopes point downwind or that pointed horns point downwind.

- **A:** south
- **B:** west
- **C:** north

CP
O3
RES
37
1

Performance Check A: The features on the map below are sand dunes.

1. What is the direction of the prevailing winds in this area?
2. How can you tell from the map?



Remediation: (1) Have the student review Resource 37 on pages 148 through 151. (2) Review his answer to question 1 on page 149. (3) Have him review Figure 3-19 and the related textual material on pages 116 and 117. (4) Reassess the objective with an alternate check.

CP 04

Chapter 4 — **Performance Check**

Resources 38 thru 47 — **Summary Table**

Objective Number	**Objective Description**
CP-04-Core-1	Relates beach profiles and the energy of incoming waves
CP-04-Core-2	Predicts the effect of a hurricane on a beach
CP-04-Core-3	Relates the type of shoreline change to the energy condition
CP-04-Core-4	States the type of waves which help form sand beaches
CP-04-Core-5	Produces a sand bench in a stream table
CP-04-Core-6	Indicates sand deposition and direction along a spit
CP-04-Core-7	States the difference between a fiord and an estuary
CP-04-Res 38-1	Indicates the part of a wave which will cause the most erosion
CP-04-Res 38-2	Selects features associated with rocky or steeply inclined shorelines
CP-04-Res 39-1	[illegible]tes the direction of motion and wave shape
CP-04-Res 40-1	Selects shoreline conditions for the refraction and diffraction of waves
CP-04-Res 40-2	Diagrams the effects of headlands and bays on wave fronts
CP-04-Res 40-3	Diagrams the effects of barriers on wave fronts
CP-04-Res 42-1	Estimates the mean sea level from a tidal change record
CP-04-Res 43-1	Selects the position of the earth, the sun, and the moon that produce the highest tides
CP-04-Res 44-1	Explains how benches form
CP-04-Res 46-1	States the direction of sand movement along a shoreline

	Materials	Observer	Special Preparations	Quick Score	3 + Minutes	Basal	Math	Reading	Concept	Action Verbs	Notes
						√				identifies	
										applies	
				Q						classifies	
						√				recalls	
	M	O			T	√				manipulates	
			P			√				applies	
										recalls	
						√				applies	
				Q						classifies	
						√				applies	
										applies	
			P			√				applies	
			P			√				applies	
							√			applies	
				Q		√				applies	
										applies	
				Q		√				applies	

CP 04

Objective Number	Objective Description
CP-02-Res 7-1R	Explains how sedimentary layers are formed
CP-03-Core-11	Names the prime erosional force acting at different geographical sites

	Materials	Observer	Special Preparations	Quick Score	3 + Minutes	Basal	Math	Reading	Concept	Action Verbs	Notes
			P			√				applies	
						√				classifies	

CP 04 Core 1

Relates beach profiles and the energy of incoming waves.

The student identifies a shoreline produced by high-energy waves.

Student Action: Selecting the diagram of a beach produced by high-energy waves and citing as evidence the offshore deposits (the benches).

A: a
B: b
C: b

Performance Check A: Study the two diagrams below.

1. Which diagram represents a shoreline which is the result of high-energy waves attacking the beach?
2. What evidence supports your answer?

Diagram a.

Diagram b.

Remediation: (1) Review with the student his answer to question 4-3 on page 159. (2) Review Activities 4-1 through 4-3 on pages 157 through 159. (3) Reassess the objective with an alternate check.

CP 04 Core

Predicts the effect of a hurricane on a beach.

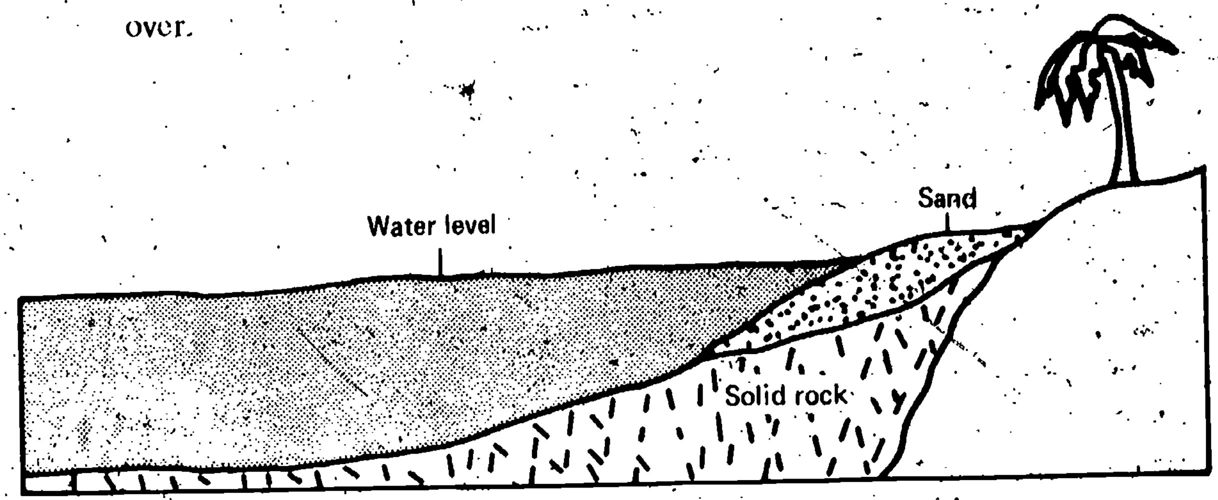
The student applies the concept that high-energy waves will carry sand to deeper water to form a bench.

Student Action: Stating, in effect, that sand will be moved out to deeper water, forming a wide bench and drawing a diagram of his answer.

2

Performance Check A: The diagram below shows a shoreline with a sand beach and the water level at low tide. Suppose a severe hurricane with high winds and waves pounded against the beach for four hours.

1. What do you think would happen to this beach and its sand?
2. Include a diagram on your answer sheet of the area after the hurricane is over.



Remediation: (1) Refer the student to Activities 4-1 and 4-2 on pages 157 and 158 and also to Figure 4-7 on page 158. (2) He may have to repeat Activities 4-1 and 4-2 although Figure 4-7 illustrates the idea. (3) Reassess the objective with an alternate check.

CP 04 Core 3

Relates the type of shoreline change to the energy condition.

The student classifies changes for a beach produced by low-energy waves and for a beach produced by high-energy waves.

Student Action: Stating for at least two of the three changes that the removal of sand to expose gravel and the formation of a bench are evidences of high-energy wave action and that the buildup of a beach is evidence of low-energy wave action.

A: 1. high, 2. high, 3. low
B: 1. low, 2. high, 3. high
C: 1. high, 2. low, 3. high

Performance Check A: Study the three changes along a shoreline listed below. For each change, state whether it is evidence of high-energy wave action or low-energy wave action.

1. Gravel and solid rock exposed where sand was once located
2. Accumulation of sand offshore, a bench
3. Gravel and solid rock covered by sand

Remediation: (1) Refer the student to his answer to question 4-3 on page 19 in the *Record Book*. (2) Review with him Activities 4-1 through 4-3 on pages 157 through 159. (3) Reassess the objective with an alternate check.

CP
04
Core
4

States the type of waves which help form sand beaches.

The student recalls how low-energy waves are produced and that they are critical to the formation of a sand beach.

Student Action: Responding to the effect that a wooden block is moved gently in the water to create the waves and that low-energy waves are needed for the formation of sand beaches.

Performance Check A: Diagram A below shows a stream table set up to produce waves. Diagram B shows the stream table after the waves ceased.

1. How were these waves produced in the stream table?
2. What is an important variable in the formation of the beach?

Diagram A.

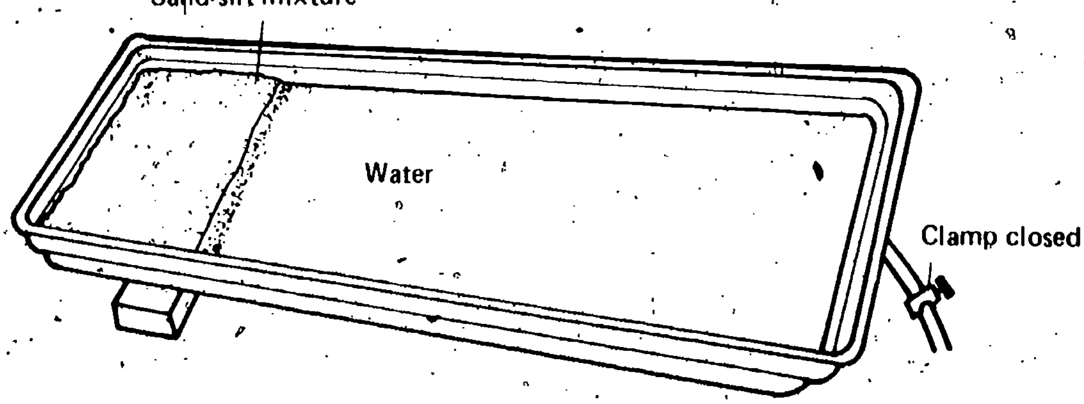
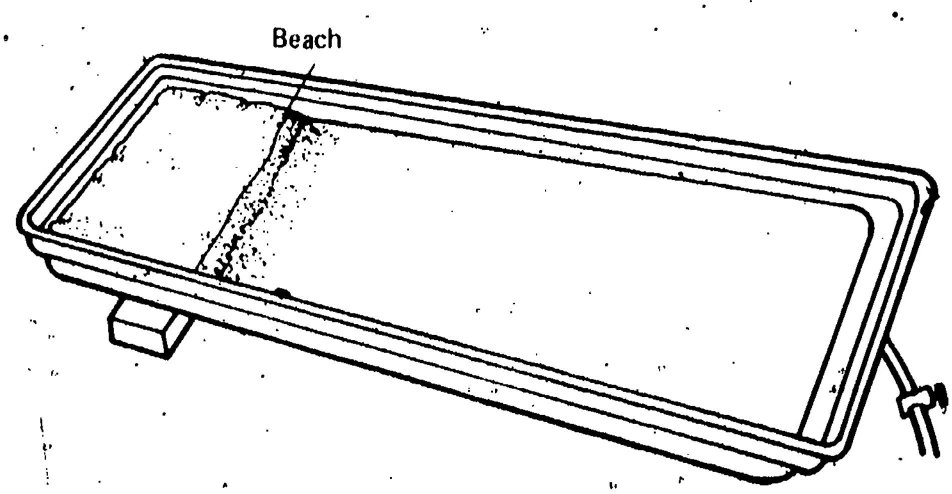


Diagram B.



Remediation: (1) Review with the student his answer to question 4-3 on page 19 of the *Record Book*. (2) Suggest that the student review Activities 4-1 through 4-3 on pages 157 through 159 and compare the results of producing high-energy storm waves with low-energy waves.

Produces a sand bench in a stream table.

The student manipulates a stream table which is set up to produce high-energy waves.

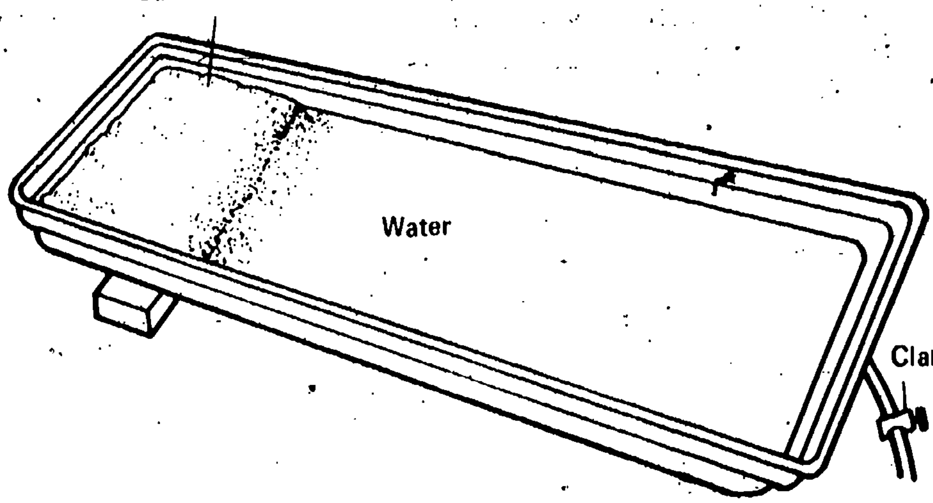
CP 04 Core 5

Regular Supplies: 1 stream table
1 wooden block
sand
water

Student Action: Pressing on the wooden block to produce relatively high-energy waves and responding to the effect that strong waves are needed to produce the sand bench.

Performance Check A: Set up a stream table as shown below. Secure any additional equipment you may need.

1. Produce waves that will result in the production of a sand bench. Show your teacher how you do this.
2. What important variable is needed to produce the sand bench?



Remediation: (1) Review the student's answer to question 4-3 on page 19 of the *Record Book*. (2) Have the student repeat Activities 4-1 and 4-2 on pages 157 and 158 to see the effect of storm waves on a beach. Then suggest that he do Activity 4-3 on page 159 to compare the storm waves with the low-energy waves.

Indicates sand deposition and direction along a spit.

CP 04

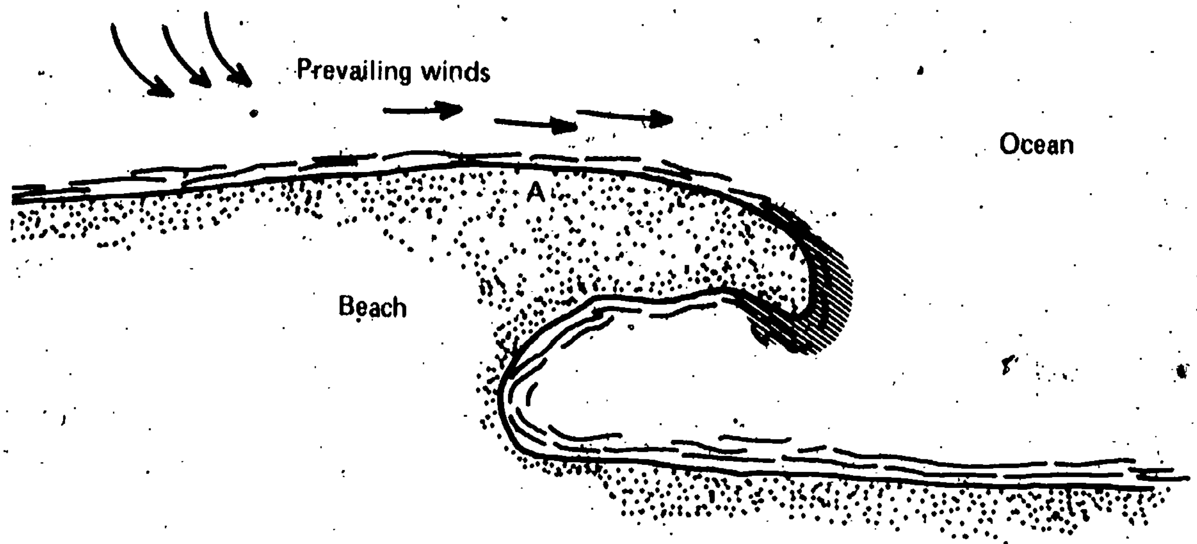
The student applies the concepts that sand is deposited in the area at the tip of the spit and that waves cause longshore transport in the direction of the prevailing winds.

Special Preparations: Duplicate diagram CP-04-Core-6 at the back of this book.

Core 6

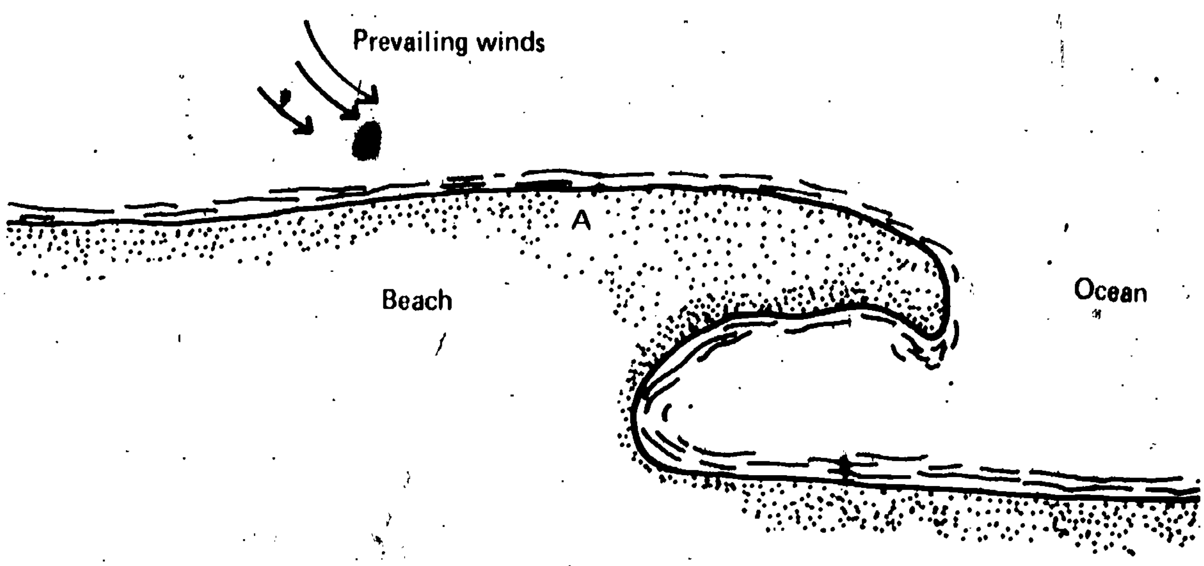
Student Action: Indicating deposition in the area along the tip of the spit and sketching arrows in a path along the spit in the direction of the prevailing winds.

A, B, and C:



Performance Check A: Copy the diagram below, or get a copy of it from your teacher. Suppose waves erode sand at point A.

1. Shade in the place most of the sand is likely to be deposited.
2. Show the path of the sand with arrows.



Remediation: (1) Refer the student to the discussion on pages 167 and 168 and also to Figure 4-19 on page 167. (2) Have him do or review Resource 46 on pages 191 through 193. (3) Reassess the objective with an alternate check.

CP 04 Core 7

States the difference between a fiord and an estuary.

The student recalls the difference between a fiord and an estuary.

Student Action: Responding that a fiord is a flooded, ice-carved valley, whereas an estuary is a flooded, river-carved valley.

Performance Check A: Tracy Arm, a fiord in Alaska, looks like a lake between two mountains. The Hudson River on the East Coast of the United States is an estuary. What is the difference between a fiord and an estuary?

Remediation: (1) Check the student's answer to question 4-12 on page 169. (2) Refer him to Resource 47 on pages 193 through 195.

CP 04 RES 38 1

Indicates the part of a wave which will cause the most erosion.

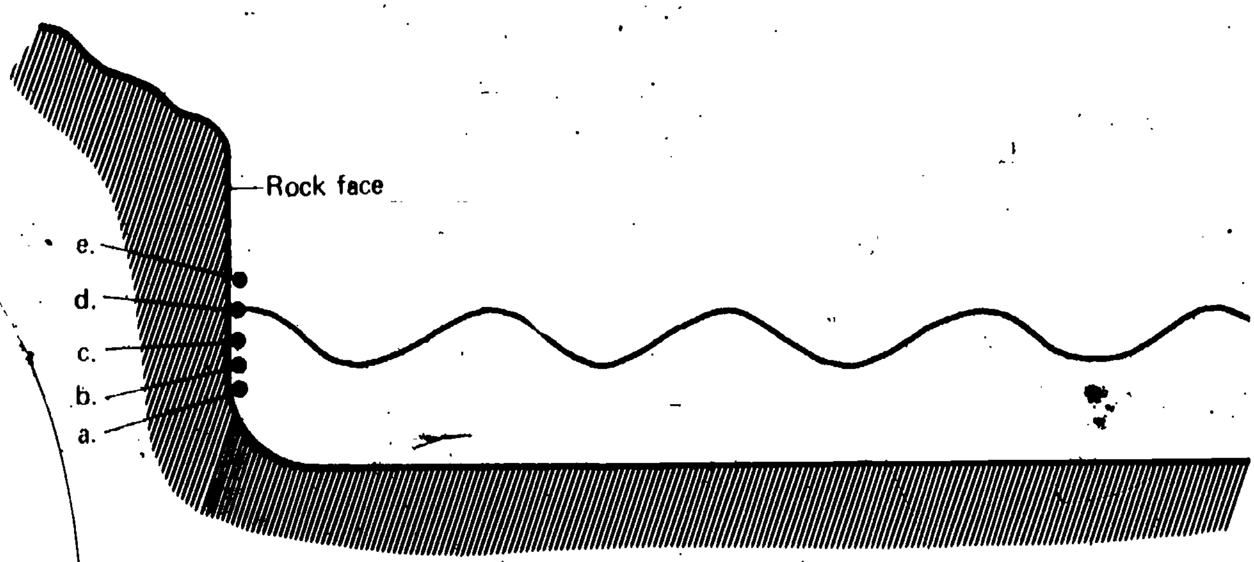
The student applies the concept that the kinetic energy of a wave is greatest at its crest.

Student Action: Selecting the point along the rock face where the crest of the wave hits the face and responding to the effect that the work done at that point will be greatest because the kinetic energy of a wave is greatest at its crest.

A: d
B: e
C: c

Performance Check A: The diagram below shows waves hitting a rocky coastline.

1. Where will erosion of the rock face by these waves be greatest?
2. Explain your answer.



Remediation: (1) Refer the student to Activity 1 on page 171 and the discussion on page 172. (2) Reassess the objective with an alternate check.

CP
04
RES
38
2

Selects features associated with rocky or steeply inclined shorelines.

The student classifies features associated with rocky or steeply inclined shorelines.

Student Action: Selecting at least two of the three features from the following: caves, arches, pinnacles, and benches.

A: b, d, e
B: a, c, d
C: b, c, d

Performance Check A: The following are features that are formed along shorelines. Select any of the features which are commonly associated with rocky or steeply inclined shorelines.

a. Spits
b. Arches
c. Deltas
d. Caves
e. Benches

Remediation: (1) Have the student review Resource 38 on pages 171 through 173, especially Activity 1 on page 171 and Figures 2 and 3 on page 172. A discussion of page 173 would be helpful. (2) If he associates spits with rocky or steeply inclined shorelines, have him review Resource 46 on pages 191 through 193. (3) Have him review his answer to Self-Evaluation 4-5 on page 19 of the *Record Book*. (4) Reassess the objective with an alternate check.

CP
04
RES
39
1

Relates the direction of motion and wave shape.

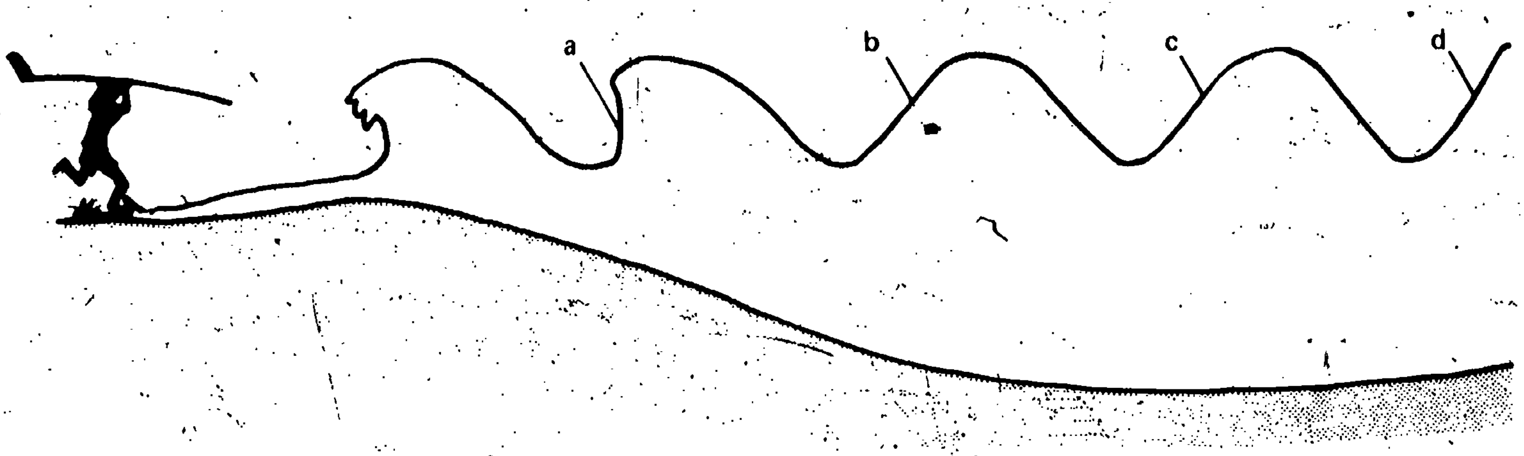
The student applies the concept that wave motion is circular in deep water and as a wave approaches the sloping beach, the motion is changed to forward motion.

Student Action: Selecting the labeled wave farthest from the shore which is becoming angular and stating that this wave would carry him to shore, whereas on the other waves, his motion would be mostly up and down.

A: a
B: d
C: c

Performance Check A: Suppose you were the surfer in the diagram below.

1. At which of the four lettered spots should you begin to ride the waves to get the best ride?
2. Explain your choice, and indicate why you did not select the other waves.



Remediation: (1) Have the student examine the sequence in Figures 2, 3, and 4 in Resource 39 on pages 175 and 176. (2) Suggest to him that he reread all of Resource 39 on pages 174 through 177. (3) Reassess the objective with an alternate check.

Selects shoreline conditions for the refraction and diffraction of waves.

CP 04 RES 40 .1

The student applies the concepts that diffraction and refraction of waves are produced by different coastal conditions.

Student Action: Selecting the diagrams which correctly indicate the refraction and diffraction conditions and responding to the effect that the bending of waves by refraction is due to shallow water slowing part of the crests and the bending of waves by diffraction is due to the interruption of the wave train by a barrier.

A: 1. a and c, 2. b
B: 1. b and c, 2. a
C: 1. a and b, 2. c

Performance Check A: Study three diagrams below of ocean waves approaching different shorelines.

1. Write the letter of any diagram which shows conditions for the bending of waves by refraction.
2. Write the letter of any diagram which shows conditions for the bending of waves by diffraction.
3. Explain your answers to parts 1 and 2.

Diagram a.

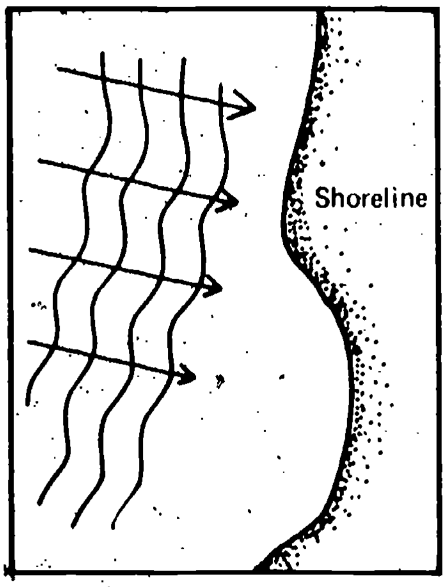


Diagram b.

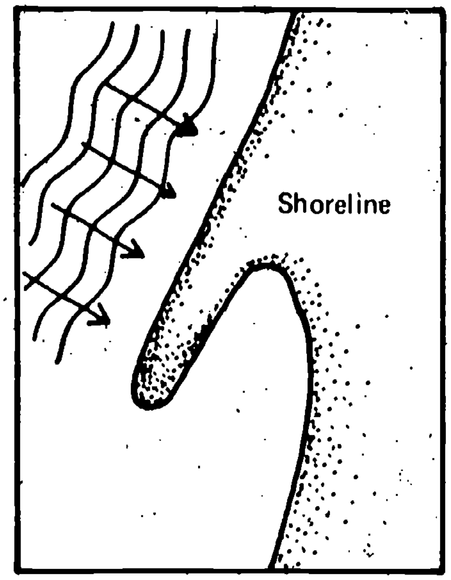
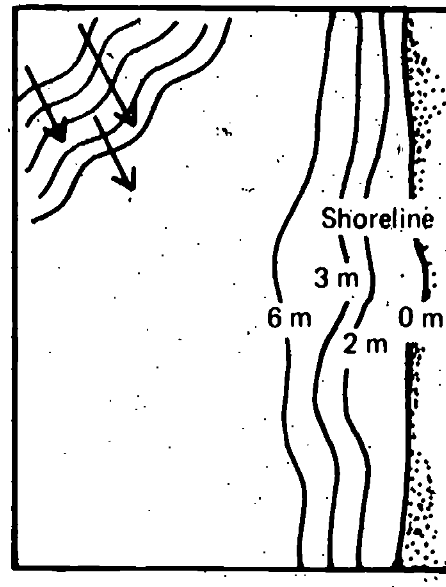


Diagram c.



Remediation: (1) Refer the student to Activities 2 and 3 on pages 178 and 180 and to the discussion on page 179. (2) Reassess the objective with an alternate check.

CP 04 RES 40

Diagrams the effects of headlands and bays on wave fronts.

The student applies the concept that wave fronts are refracted by headlands and bays.

Special Preparations: Duplicate the two diagrams for CP-04-Res 40-2 found at the back of this book.

2

Student Action: Drawing wave fronts which are bent around the headland and at bays are bowed so that they tend to parallel the banks of the bay.

A, B, and C:

Diagram 1.

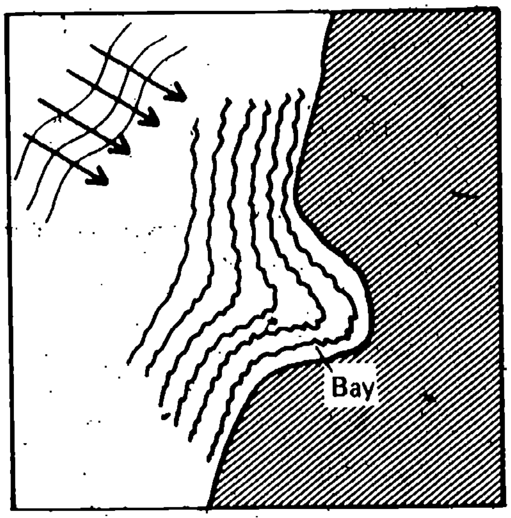
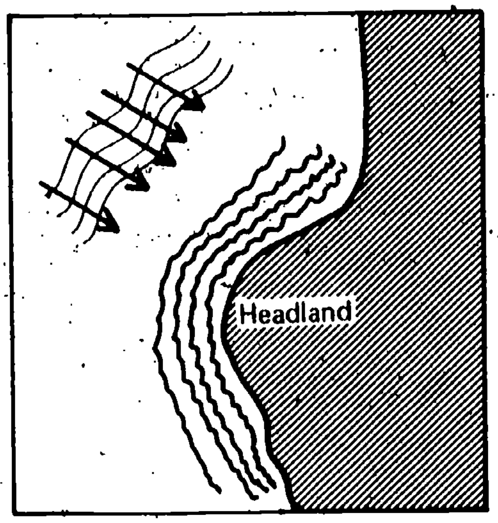


Diagram 2.



Performance Check A: Copy the diagrams below, or get copies of them from your teacher. Diagram 1 shows wave fronts approaching a bay. Diagram 2 shows wave fronts approaching a headland. Draw more wave fronts on each diagram to show any probable changes in the shape of the fronts as they move shoreward.

Diagram 1.

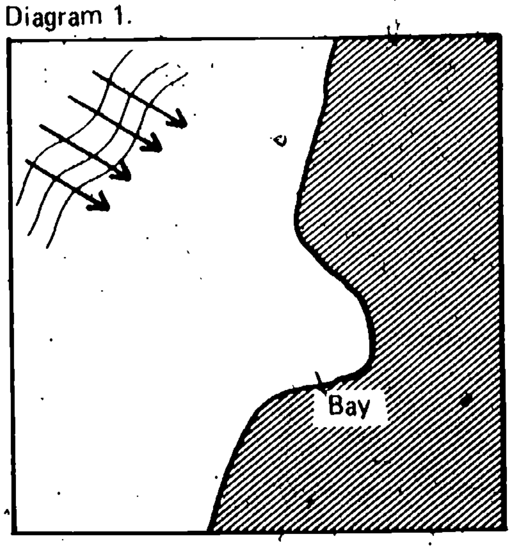
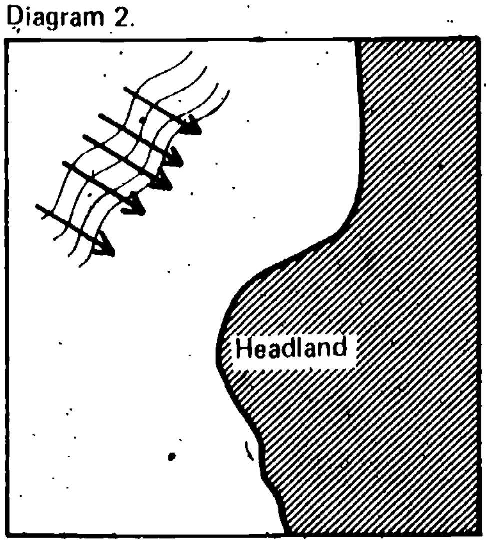


Diagram 2.



Remediation: (1) Refraction of waves is illustrated in Activity 3 on page 180. If the student had trouble, it is probably best to set up the stream table and let him study the wave patterns generated in Activities 2 and 3 on pages 178 and 180. (2) Refer him also to the discussion on page 179. (3) Review his answer to Self-Evaluation 4-2. (4) Reassess the objective.

CP 04 RES 40 3

Diagrams the effects of barriers on wave fronts.

The student applies the concept that wave fronts are diffracted by barriers.

Special Preparations: Duplicate the two diagrams for CP-04-Res 40-3 found at the back of this book.

Student Action: Drawing wave fronts which are bent around the ends of the barriers.

A, B, and C:

Diagram 1.

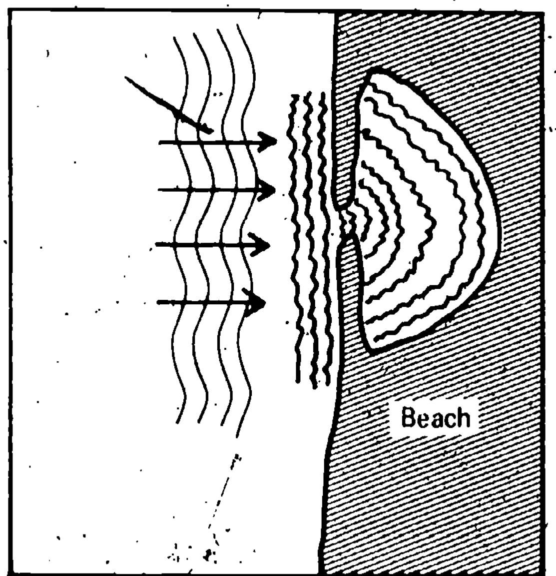
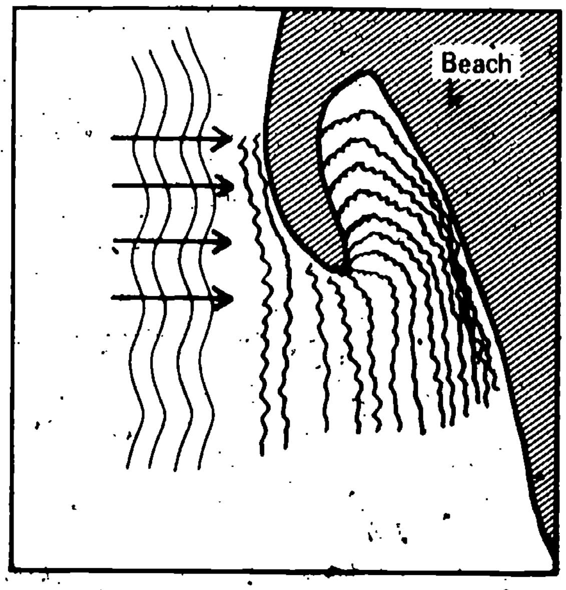


Diagram 2.



Performance Check A: Copy the diagrams below, or get copies of them from your teacher. Diagram 1 shows wave fronts approaching an opening between two barriers. Diagram 2 shows wave fronts approaching a single barrier. Draw more wave fronts toward the land to show any probable changes in their direction as they move shoreward past the barriers.

Diagram 1.

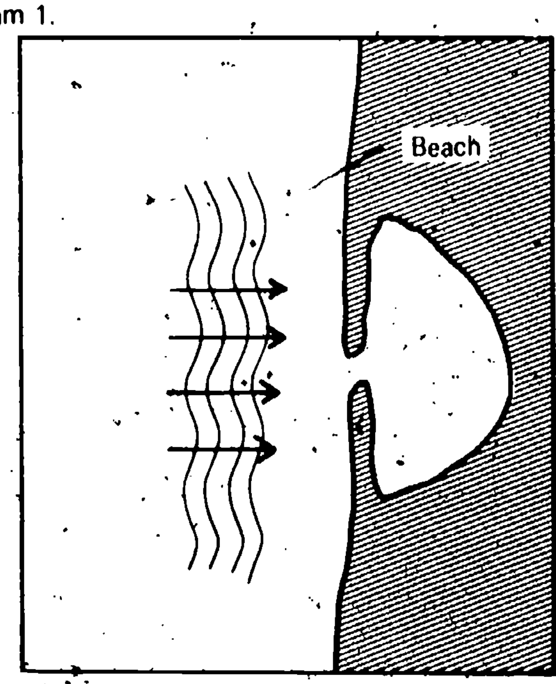
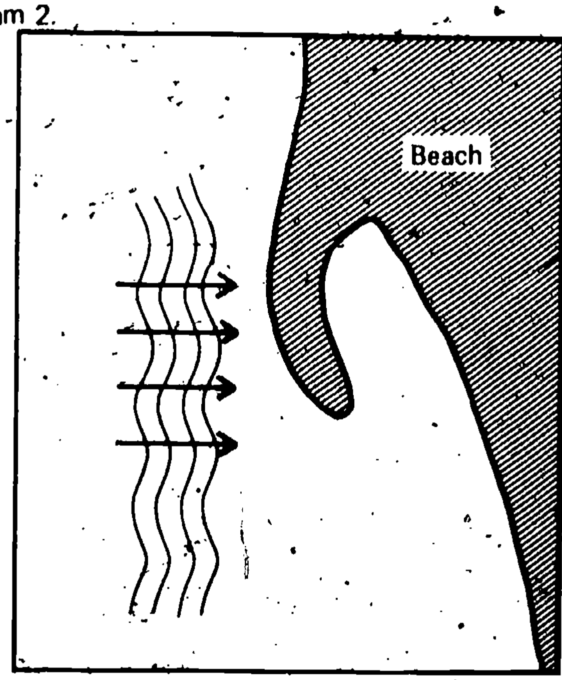


Diagram 2.



Remediation: (1) Refer the student to Resource 40 on pages 177 through 180. Activity 2 on page 178 illustrates the diffraction of wave fronts. Suggest that he compare this pattern to that in Activity 3 on page 180. The discussion on page 179 will also help. (2) Review the student's answer to Self-Evaluation 4-2 on page 19 of the *Record Book*. (4) Reassess the objective with an alternate check.

CP 04 RES 42 1

• Estimates the mean sea level from a tidal change record.

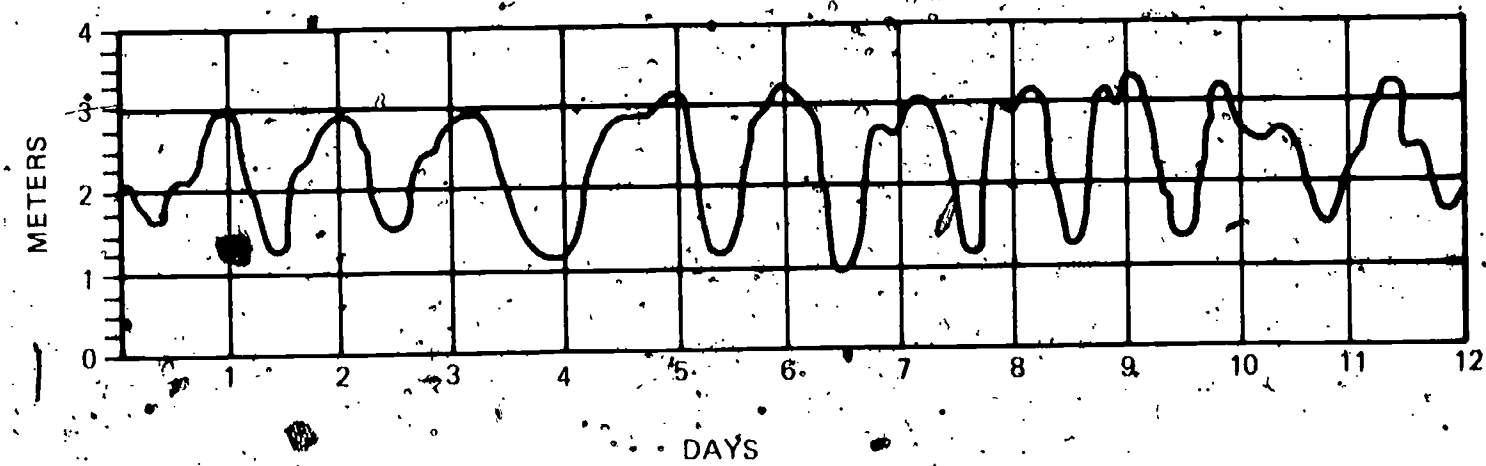
The student applies the concept that the mean sea level is the average of the daily high- and low-water level readings.

Student Action: Estimating the mean sea level within ±0.25 m and stating, in effect, that he arrived at this value by estimating the average of the high-water level and low-water level readings.

- **A:** 2.25 ±0.25 m
- **B:** 3.00 ±0.25 m
- **C:** 2.25 ±0.25 m

Performance Check A: The graph below shows the tidal record for 12 days at a tide-gauging station.

1. What would you estimate the mean sea level to be at this station? (Estimate it: do not calculate it.)
2. Which group of readings did you consider to estimate the mean sea level?



Remediation: (1) Have the student examine very carefully Figure 2 on page 184 and the discussion that follows on page 185. (2) Reassess the objective, using an alternate check.

CP
O4
RES
43
1

Selects the position of the earth, the sun, and the moon that produces the highest tides.

The student applies the concept that gravitational force is greatest when the bodies are in a straight line.

Student Action: Selecting the diagram showing the earth, the moon, and the sun pulling in a straight line.

A: b
B: c
C: a

Performance Check A: Which diagram below shows the relationship among the earth, the moon, and the sun which would cause the highest tides on the earth?

Diagram a.

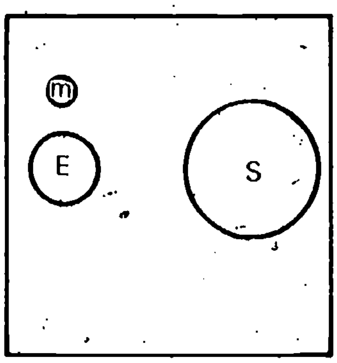


Diagram b.

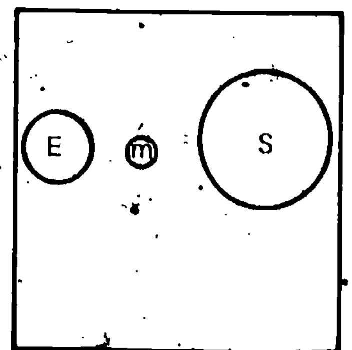
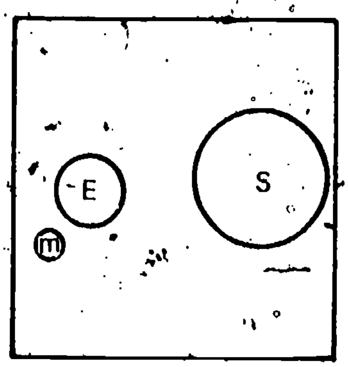


Diagram c.



Remediation: (1) Refer the student to the discussion on page 186, which should provide him with the appropriate information. (2) Reassess the objective with an alternate check.

CP
O4
RES

Explains how benches form.

The student applies the concepts that a bench is caused by wave action and the presence of several benches indicates a series of relative motions of the sea level.

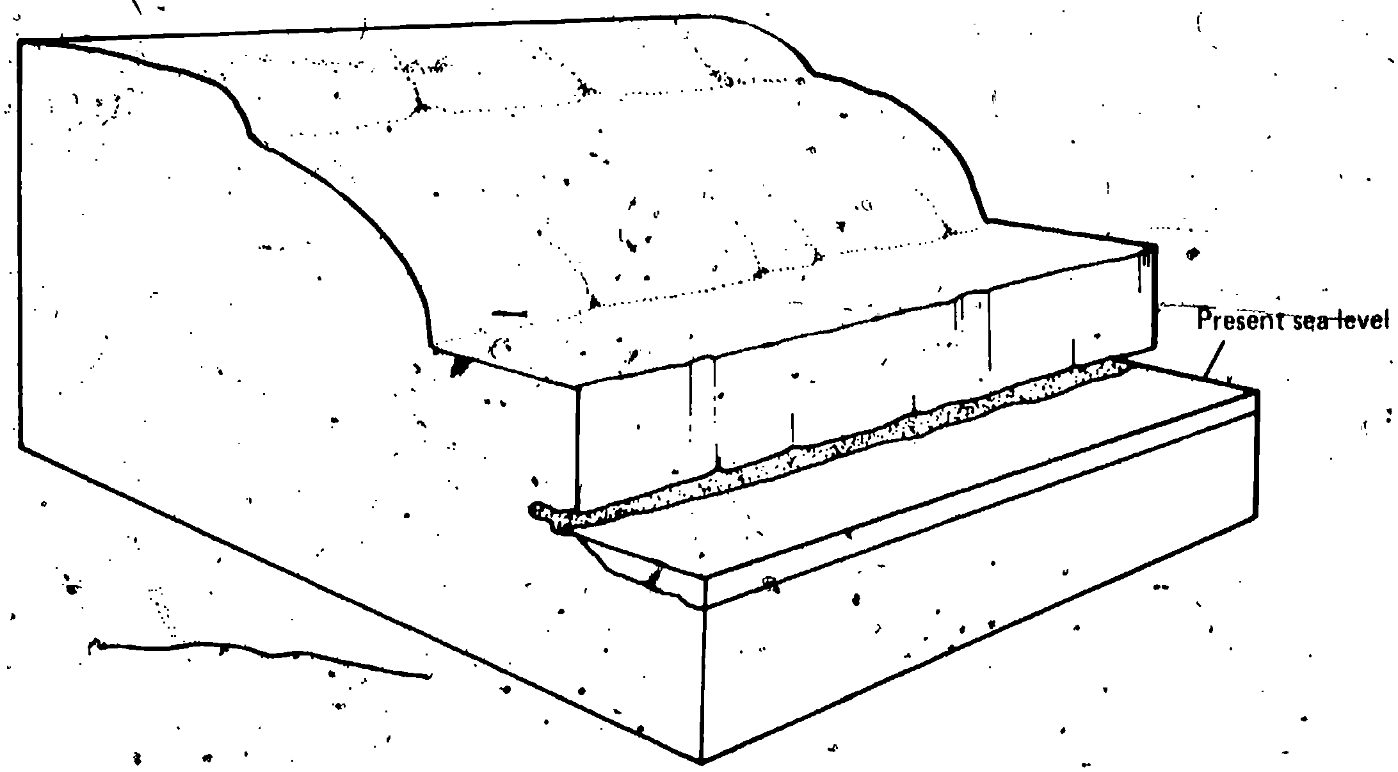
Student Action: Responding to the effect that a bench is caused by wave erosion and that the presence of several benches indicates a series of relative motions of the sea level (either the land was uplifted or the sea level dropped).

Performance Check A: Examine the coastline and the series of benches (steps) shown in the diagram below.

1. How were these benches formed?
2. How can you explain the fact that there are several benches?

44

1



Remediation: (1) Refer the student to Resource 44, pages 188 and 189, especially Activity 2 on page 188. Point out that lowering the sea level caused erosion of a bench at a lower level. (2) Have the student study Figure 1 on page 189, which illustrates the process.

States the direction of sand movement along a shoreline.

The student applies the concepts that sand will be transported in the direction of the current and will be deposited as a spit.

Student Action: Selecting the arrow that points in the same direction as the ocean current and stating that the eroded material will form a spit.

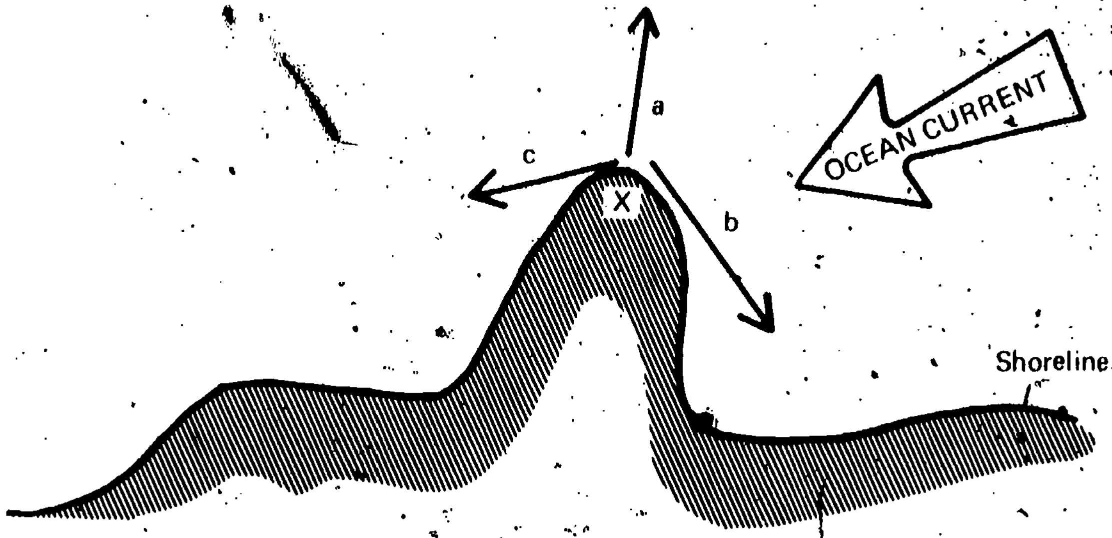
A: 1. c, 2. spit
B: 1. a, 2. spit
C: 1. b, 2. spit

CP
04
RES
46

1

Performance Check A: The diagram below shows a coastline of sedimentary sandstone with the direction of an ocean current marked. The material at X will be eroded.

1. Write the letter of the arrow showing the path of the eroded material.
2. What feature will the deposited sand form?

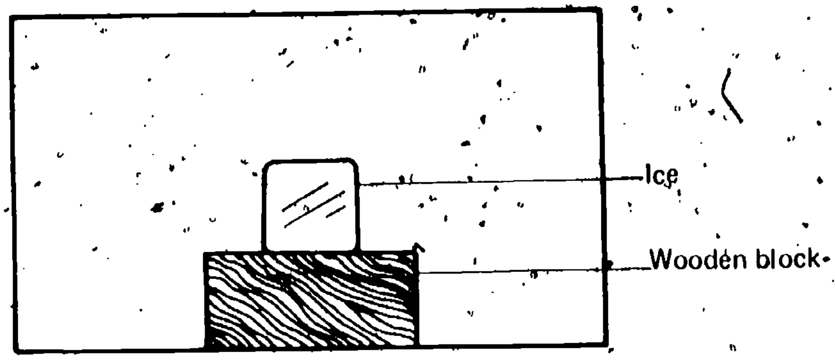


Remediation: (1) Refer the student to Resource 46 on pages 191 through 193. (2) It might help to have the student redo Activity 1 on page 192, in which a spit is generated. (3) Studying Figure 1 on page 192 will show the relationship between an ocean current and the spit. (4) Reassess the objective, using an alternate check.

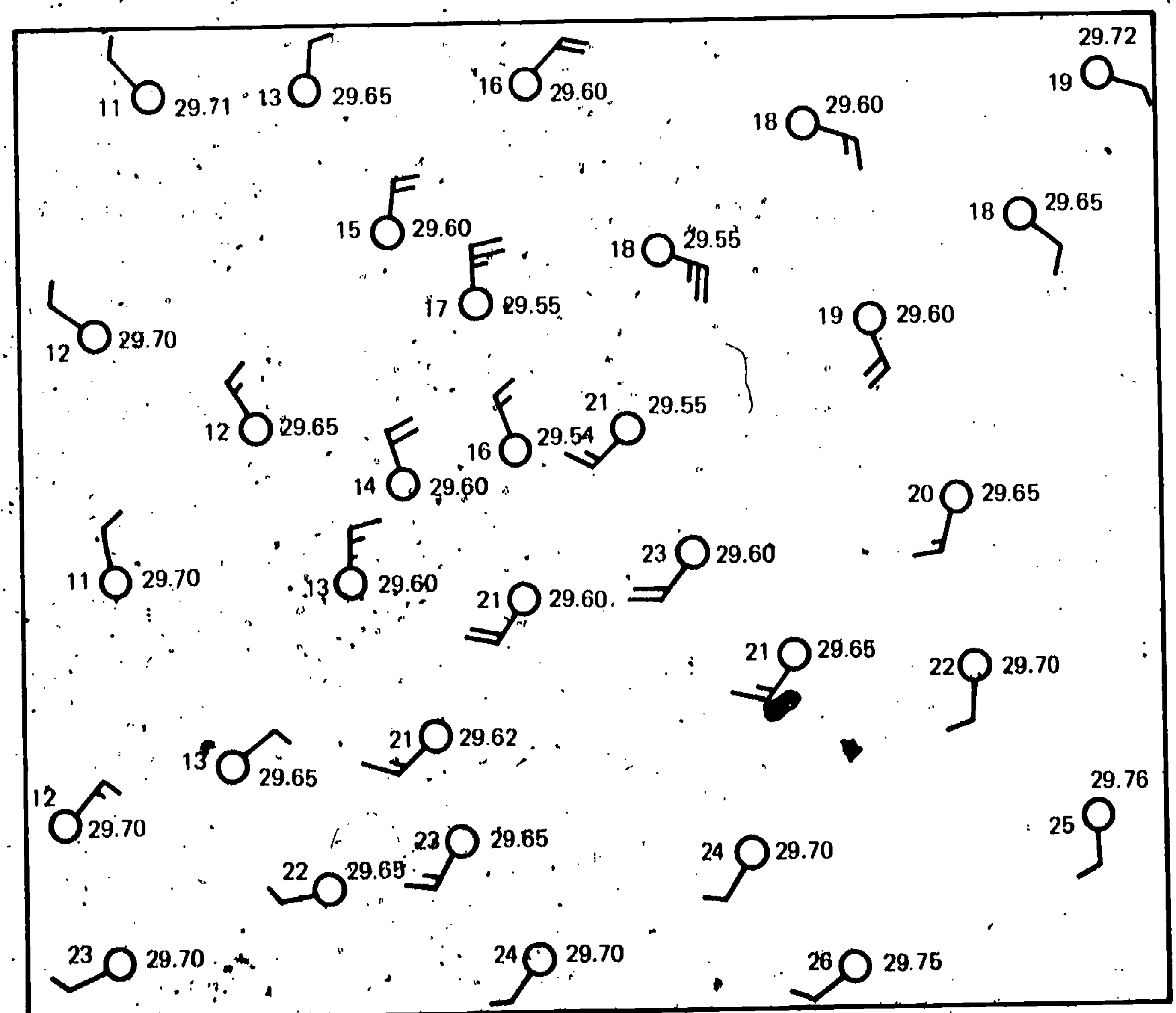
Diagrams, Maps, and Tables

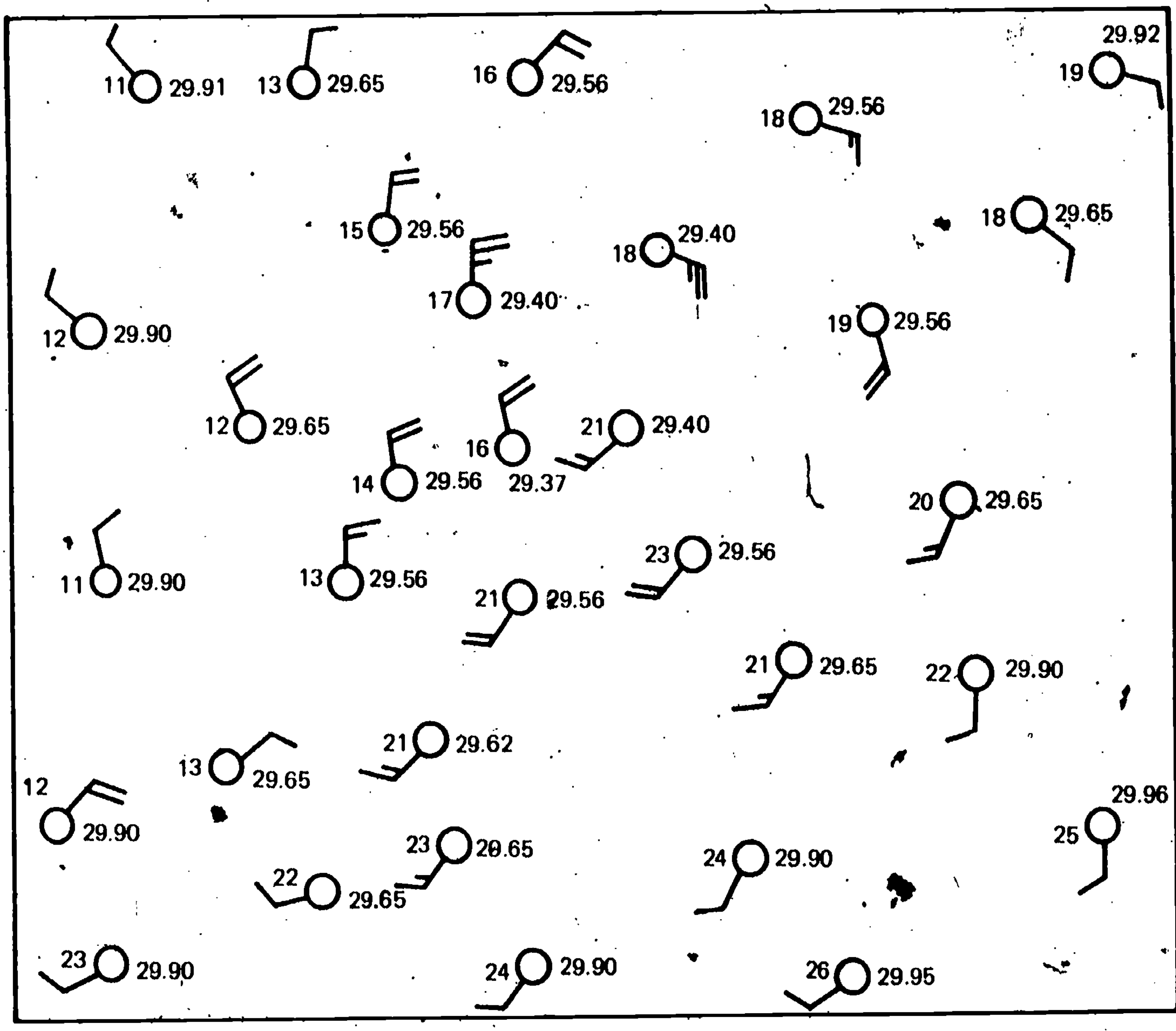
WW
CP

WW
03-Core-3A, B, C



WW
03-Core-11A

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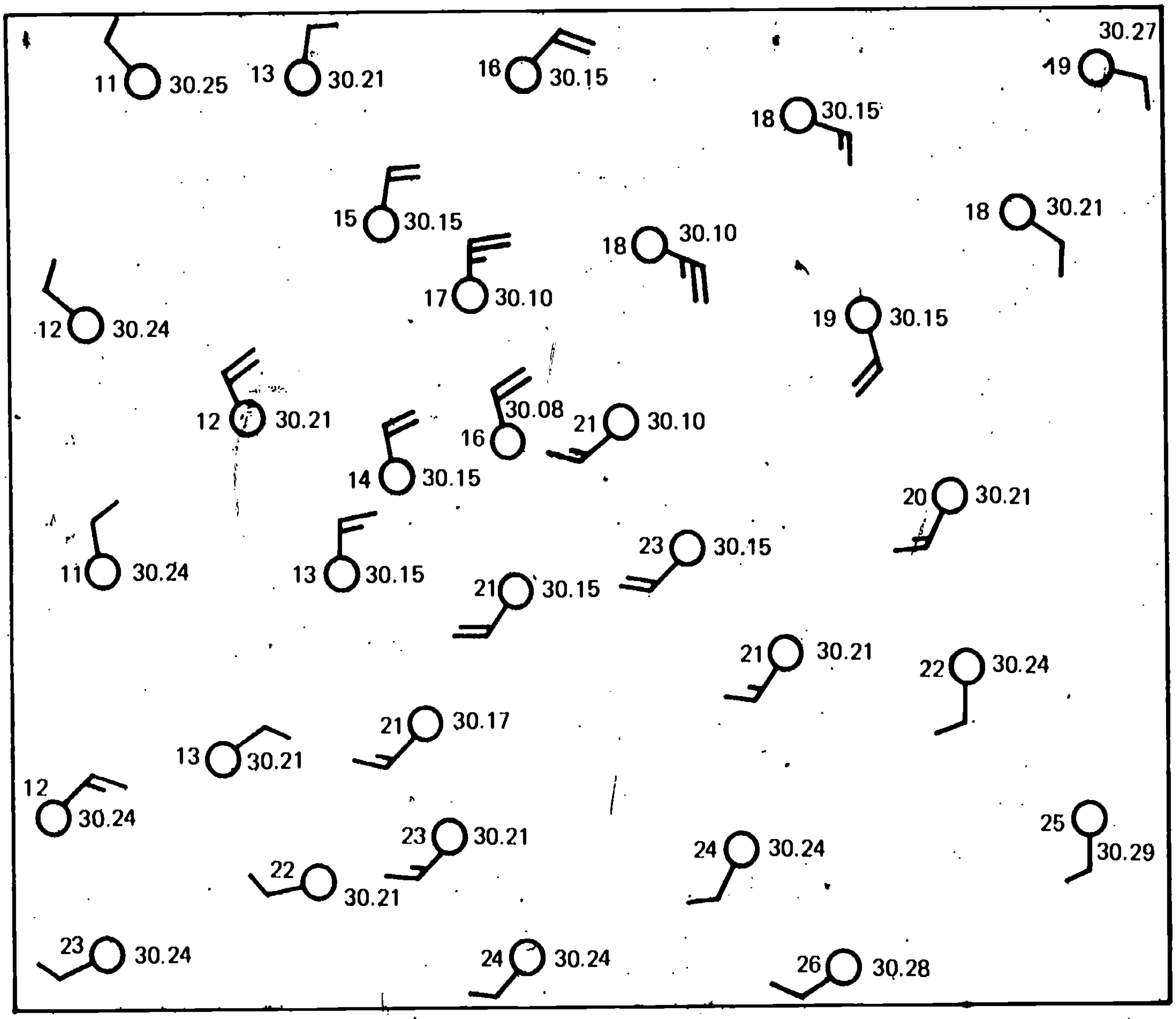
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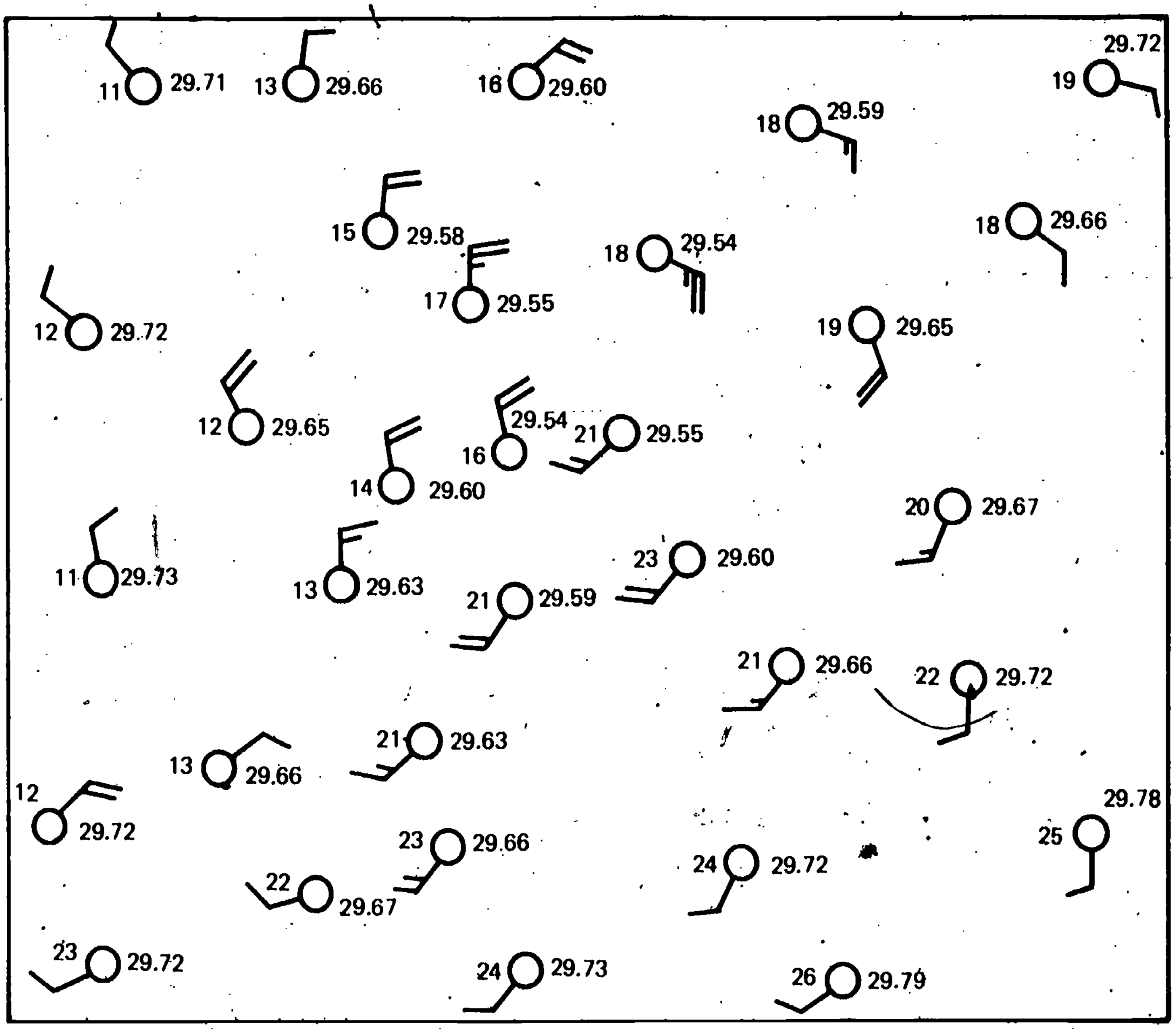
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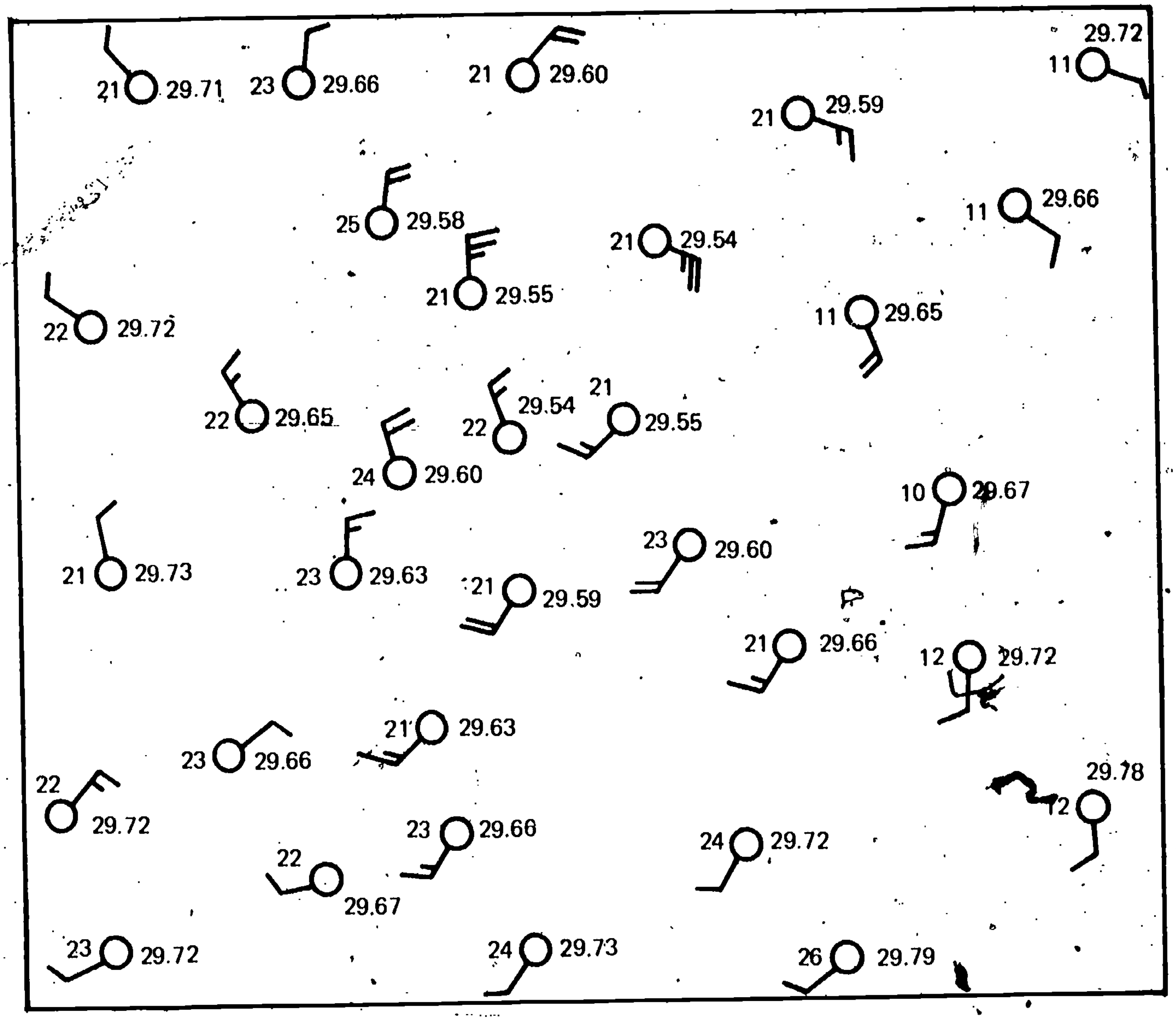
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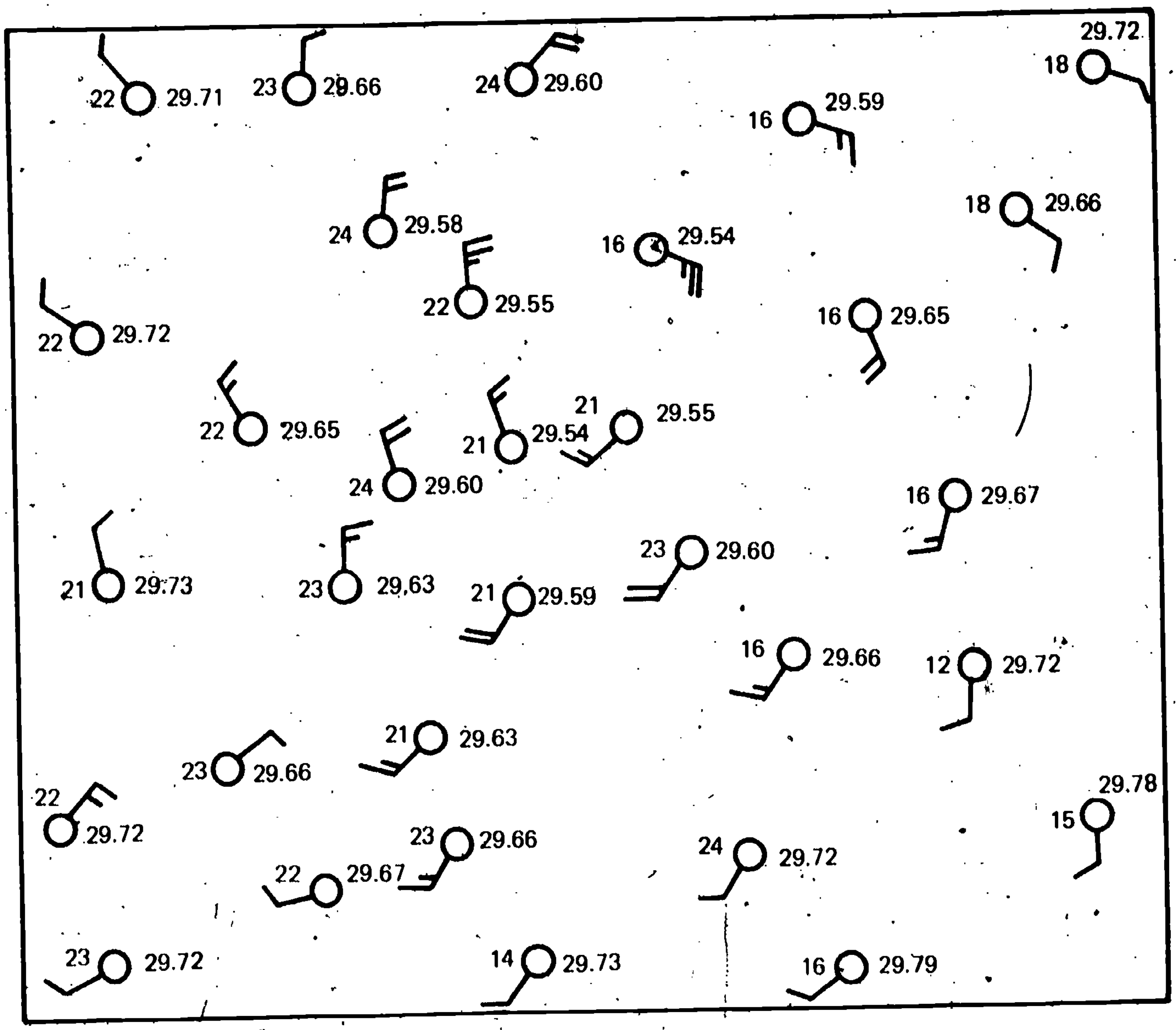
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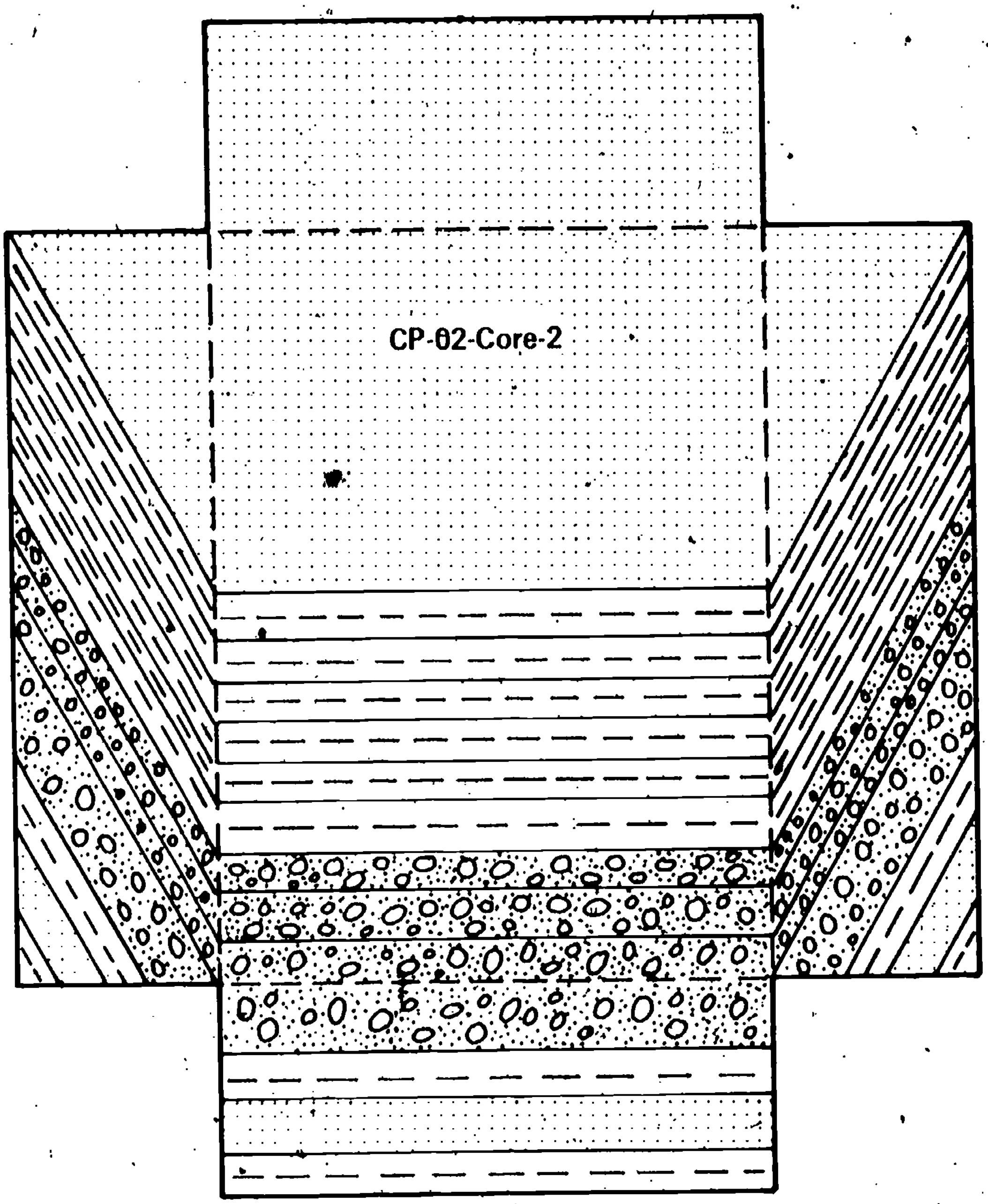
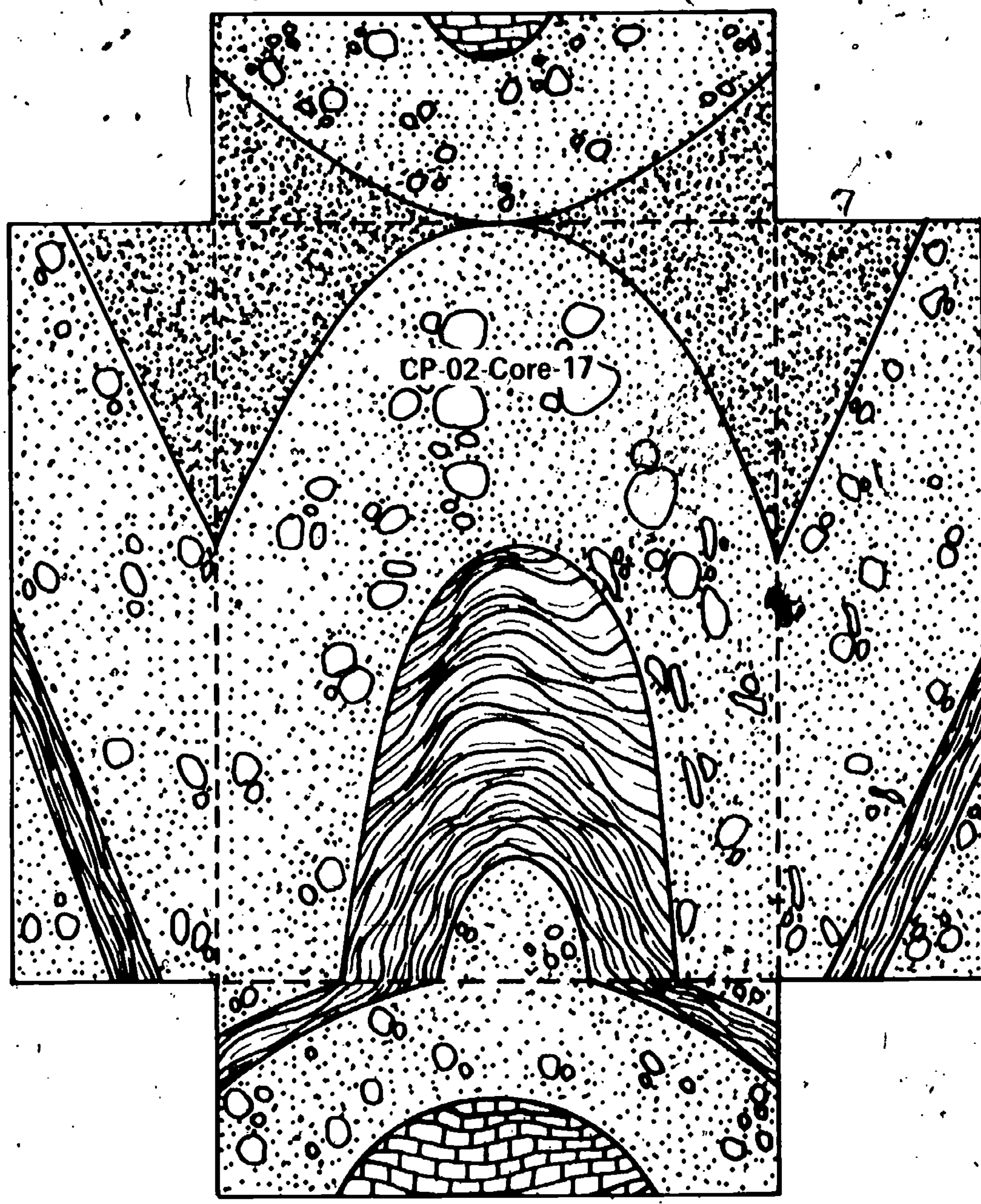

CP-02-Core-2


CP-02-Core-17

CP
03-Core-2A, B, C

CP
03-Core-9A

CHANGE OR DIFFERENCE	POTENTIAL ENERGY	KINETIC ENERGY	EROSION RATE
Starts at greater height			
Smoother bed			
More water			
Less bed slope			
Harder bed			

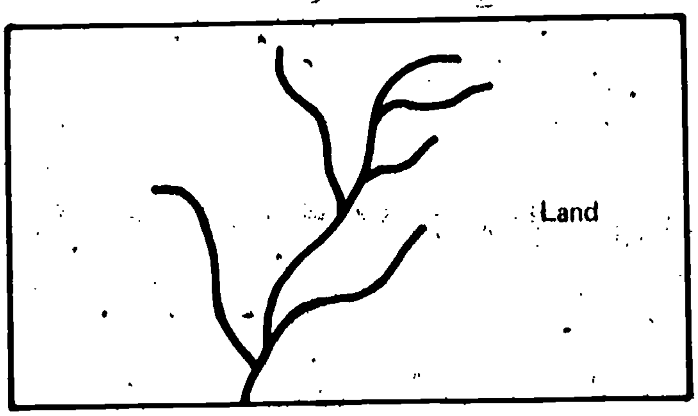
CP
03-Core-9B

CHANGE OR DIFFERENCE	POTENTIAL ENERGY	KINETIC ENERGY	EROSION RATE
Lower the starting height			
Rocks in the bed			
Less water			
Steeper slope			
Harder bed			

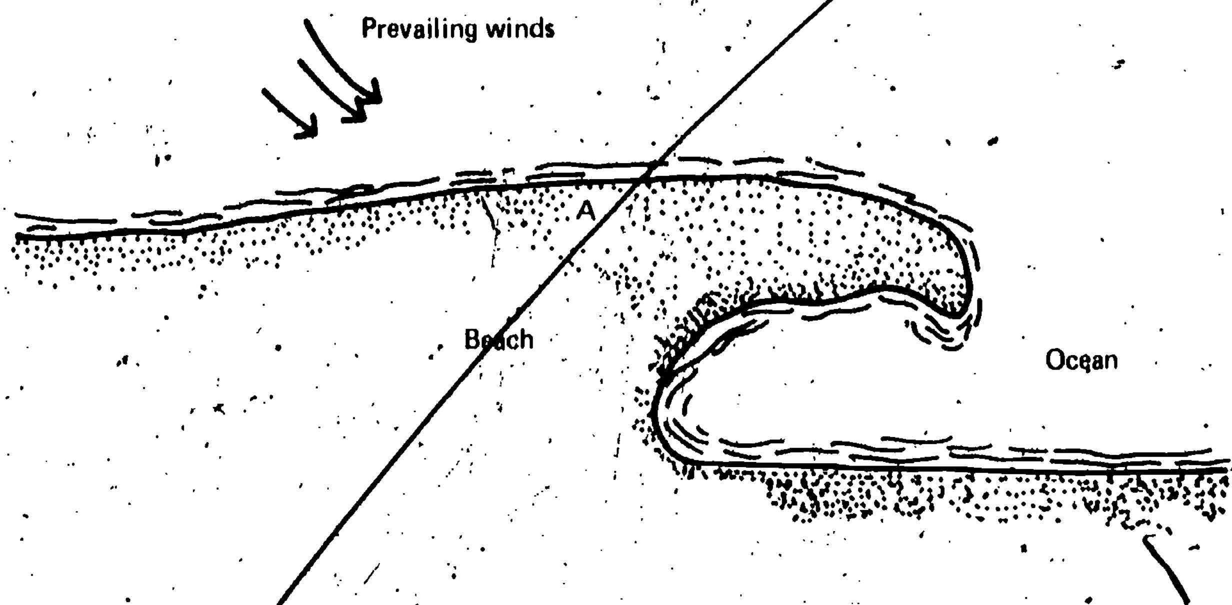
CP
03-Core-9C

CHANGE OR DIFFERENCE	POTENTIAL ENERGY	KINETIC ENERGY	EROSION RATE
Smoother bed			
Less water			
Lower the starting height			
Harder bed			
Steeper slope			

CP
03-Res 34-1A, B, C



CP
04-Core-6A, B, C



CP
04-Res 40-2A, B, C

Diagram 1.

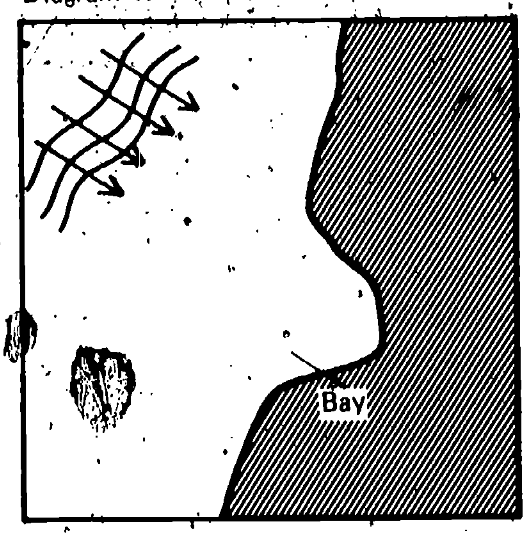


Diagram 2.

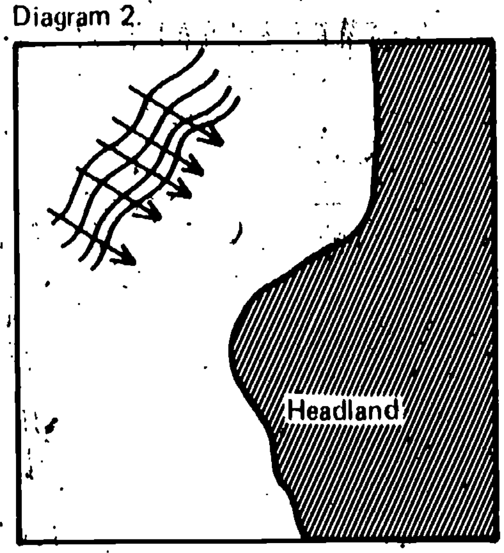


Diagram 1.

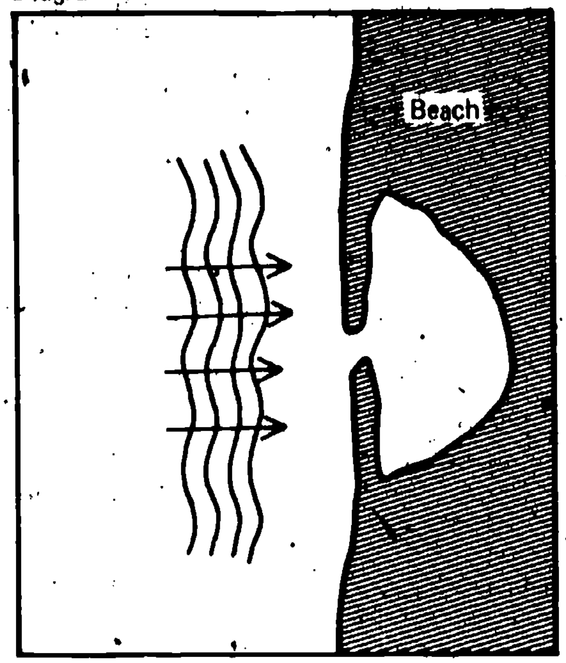


Diagram 2.