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IDENTIFICATION AND DEFINITION OF SUBJECT-MATTER CONTENT VARIABLES RELATED TO HUMAN APTITUDES, VOLUME II, APPENDICES.

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THE SETS OF INSTRUCTIONAL MATERIALS PRESENTED IN THIS VOLUME WERE DESIGNED TO CALL INTO THE LEARNING SITUATION THE MOST HIGHLY DEVELOPED COGNITIVE APTITUDES OF INDIVIDUAL STUDENTS. THE ASSUMPTION BEHIND THEIR DESIGN WAS THAT LEARNING DIFFICULTIES IN VARIOUS SUBJECT-MATTER AREAS COULD BE MINIMIZED BY ALTERING THE CONTENT OF TEXTUAL MATERIAL TO FIT THE INDIVIDUAL'S APTITUDE PATTERN. FOUR SETS OF DATA ARE INCLUDED--(1) MATERIALS FOR REDUNDANCY STUDIES (REDUNDANCY IN TEXTUAL MATERIAL), (2) LEARNING MATERIALS AND TESTS FOR STUDIES OF ELEMENTARY SET CONCEPTS, (3) MATERIALS AND TESTS FOR VOCABULARY LEARNING STUDIES, AND (4) LEARNING MATERIALS FOR MATHEMATICAL OPERATIONS STUDIES. RELATED INFORMATION MAY BE FOUND IN ED 010 627. (JH)

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IDENTIFICATION AND DEFINITION OF SUBJECT-MATTER CONTENT VARIABLES RELATED TO HUMAN APTITUDES

Volume II

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THE FINAL MOLECULES

_____ the previous sections we _____ previewed two types of _____ action by which energy _____ released: 1, the taking _____ of the molecule's carbon _____, and 2, the removal _____ passing of hydrogens. Wher: _____ this process end? What _____ the final molecules?

The _____ products of energy release _____ mainly on the enzymes _____ in the cells. And _____, you will recall, depend _____ heredity. Organisms tend to _____ in habitats where their _____ have the right, kinds _____ substrate molecules to work _____. Streptococcus lactis, for example, _____ a bacterium with enzymes _____ convert the sugar lactose _____ lactic acid. Lactose is _____ sugar of milk. When _____ microbe grows in milk, _____ lactic acid causes the _____ of curds, and the _____ becomes sour. Man cultivates _____ bacterium and others whose _____ products are responsible for _____ flavors of various cheeses. _____ closely related microbe works _____ the glucose molecule, degrading _____ to lactic acid. It _____ this glucose, along with _____ essentials for living, in _____ rumen of the cow. _____ we call it Streptococcus _____. When the enzymes of _____ cells attack glucose, the _____ depends on whether or _____ oxygen is available. Without _____, the end products are _____ dioxide and ethyl alcohol. _____ yield of energy from _____ fermentation process is extremely _____. It takes less than _____ percent of the sugar's _____ of energy. Also, because _____ damages plasma membranes, dehydrates _____, and has other disorganizing _____, yeast cells are sometimes

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APPENDIX A

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Name _____ Teacher _____

_____ _____ Date _____

School Attended County

INSTRUCTIONS

This is a reading comprehension test of a new kind. It may be unfamiliar to you, so be sure that you understand this explanation.

In general, you are to read the attached materials as well as you can; try to make sense out of what you see despite the missing words. Every time you come to a blank, try to put back the word you think has been left out. It may be helpful to scan the passage quickly before attempting to fill in the blanks.

If you received:

"_____ Bond's number is 007." You might guess "James." You should then write that word in the blank.

Here is a more difficult example.

"_____ cerebrum is the large _____ portion of the brain _____ makes up about _____ of the brain's total _____."

The sentence makes sense if you insert: "The," "upper," "and," "four-fifths," and "weight."

Notice that only one word goes in each blank, and that all blanks are of the same length. The length of a blank then, is no indication at all of the size of the missing word.

Every fifth word has been deleted from the attached materials. The deleted words may have been abbreviations, hyphenated words, numbers, or any other kind of word.

Some blanks will be easy to fill in. Others will be difficult, and still others may seem impossible. But don't be afraid to guess. You are urged to guess, and it will be to your advantage to do so. Leaving a blank unfilled counts off just as much as guessing the wrong word for it.

Try to finish each test in about ten minutes. If you make any changes, be sure to erase or scratch out your first guess.

Before you begin, fill in the blanks at the top of this sheet.

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WATER IS AN ESSENTIAL FOR LIFE

_____ you weigh 120 pounds _____ could be thoroughly "dried _____' or dehydrated, your weight _____ shrink to about 40 _____. About 2/3 of the _____ of the human body _____ due to its water _____. Oranges, tomatoes, melons and _____ like may contain 90 _____ or more water by _____. Milk contains around 88 _____ water and meat about _____ percent. These and other _____ are sometimes prepared for _____ and shipment by dehydrating _____. When 100 lb. of _____ are shredded and dried _____ the dehydrated product is _____ compressed in a hydraulic _____, the resulting potato "cakes" _____ about one-eighth the original _____ and occupy less than _____ the original volume. Milk, _____ course, must be dried _____ such a manner as _____ to scald the liquid _____ scorch the solid content. _____ calls for evaporating away _____ water in a partial _____. This scheme works because _____ liquids evaporate faster or _____ at a lower temperature _____ the opposing atmospheric pressure _____ reduced. For example, the _____ point of water can _____ reduced from 212°F. _____ 122°F. by decreasing _____ opposing pressure from 760 _____. to 92 mm.

The _____ that dehydrated foods can _____ preserved for long periods _____ time without spoiling shows _____ bacteria and molds also _____ water. These organisms can _____ drying for indefinite lengths _____ time, but they need _____ in order to thrive _____ multiply. The preservation of _____ and meats by drying _____ been practiced throughout the

WHEN WILL YOUR CASE BE TRIED?

_____ us assume that on _____ afternoon you are driving _____ car on a "through" _____ with your mother as _____ passenger. You are driving _____ a safe speed and _____ pavement is dry. At _____ intersection a car driven _____ fast fails to stop _____ as you reach there. _____ efforts to avoid a _____ are useless; the recklessly _____ car smashes into you. _____ addition to other injuries, _____ mother's hip is broken _____ your car is wrecked. _____ weeks later your father _____ that the accident will _____ him about $6,000 in _____ surgical and hospital treatment _____ your mother, buying a _____ car, and hiring help _____ home while your mother _____ convalescing. He has to _____ money to meet the _____. The reckless driver and _____ insurance company either refuse _____ pay anything to your _____ or offer a settlement _____ small that he does _____ want to take it. _____, he secures a lawyer _____ files suit for the _____.

When will the case _____ tried? When will your _____ be able to repay _____ money he has borrowed? _____ it be one month? _____ months? or when?

In _____ parts of the country _____ will be two to _____ years before the case _____ be tried!

This delay _____ a glaring defect in _____ administration of justice. Delay _____ justice often leads to _____. Yet large backlogs of _____ jam the dockets in _____ all courts.

In 1959 _____ parents of some children

THE ROLE OF THE LEAGUE OF NATIONS

_____ the insistence of President _____, the Covenant, or constitution, _____ the League of Nations _____ made part of the _____ peace settlement. The new _____ was entrusted with carrying _____ various provisions of the _____ treaties and could even _____ changes in the treaties _____. It was also supposed _____ lead the way in _____ armaments and in ending _____ diplomacy. However, the most _____ task assigned to the _____ was the peaceful settlement _____ international disputes.

Any war, _____ or war, or other _____ distrubing to international peace _____ be brought before the _____ of Nations. The League _____ then hold hearings and _____ some peaceful method for _____ the dispute. If one _____ the parties to the _____ resorted to war in _____ of the League's decision, _____ might be voted. The _____ could be formally condemned _____ an aggressor, in the _____ that unfavorable world opinion _____ compel it to behave _____. If necessary, the League _____ ask its members to _____ off all trade with _____ offending country. As a _____ resort, it could request _____ members to use armed _____ to stop the illegal _____.

Machinery of the League _____ carry out its functions, _____ League of Nations had _____ main organs--the Assembly, _____ Council, and the Secretariat. _____ Assembly was composed of _____ from all of the _____ nations. (At the League's _____, these totaled fifty-eight.) Each _____, large or small, was _____ as equal and cast _____ single vote. The Assembly

PROTOPLASM

_____ plant cell or animal _____ is almost entirely composed _____ a substance called protoplasm (_____). You can perhaps learn _____ little about protoplasm by _____ the protozoans on your _____. You may observe that _____ protoplasm is almost transparent. _____ may also observe that _____ is slightly gray or _____. Scientists have found that _____ is somewhat like watery _____ or the white of _____ egg. You are not _____, however, to be able _____ discover this fact from _____ observations.

Protoplasm is living _____. In fact, so far _____ we know, it is _____ only living material that _____. When a plant _____ an animal dies, that _____ was protoplasm before its _____ is no longer so. _____ has changed in some _____ not yet understood. The _____ that fills the cells _____ looks for a time _____ as it did before _____ organism died. Also, as _____ as scientists have yet _____ able to discover, it _____ the same chemical composition _____ the same weight before _____ immediately after death. Yet _____ is different, because it _____ longer has whatever it _____ that made it alive.

_____ protoplasm of one living _____ looks like the protoplasm _____ every other living thing. _____ samples of protoplasm from _____ organisms, or even from _____ parts of the same _____, are never exactly alike. _____ of a dog is _____ from that of a _____. That in your hand _____ not quite like that _____ your foot. Moreover, the

THE PHYSICAL PROPERTIES OF WATER

_____ ordinary temperatures, water is _____ colorless, transparent liquid. In _____ pure state it is _____. Any taste noticed is _____ to minerals and other _____. Since these very from _____ location to another, the _____ of water varies also. _____ water freezes at 0° _____and, at sea level, _____ at 100° C. The _____ point, however, will change _____ the pressure changes. In _____ higher altitudes, the boiling _____ of water is somewhat _____ than 100°C.

Water _____ an excellent solvent. Water _____ dissolve more substances than _____ any other liquid on _____. This property is a _____ important factor in the _____ erosion of the earth's -_____. Some substances in the _____ crust dissolve in rain, _____ streams, or in marsh _____. The resulting solutions are _____ washed into lakes or _____ ocean. Finely ground fragments _____ sandstone rock are carried _____ by the water and _____ sand.

The minerals dissolved _____ water are taken in _____ plants and are used _____ take new tissue for _____. Food dissolved in water _____ carried throughout all protions _____ the plant. In the _____ body the blood stream, _____ is largely water, transports _____ to every cell in _____ human body.

Water is _____ important solvent used in _____ laboratories and industrial plants. _____ is used in larger _____ than any other chemical _____.

Water expands when it _____. Water is one of _____ few substances that expand _____ they freeze; most substances _____ or shrink. When water

THE EARLY JAPANESE PEOPLE

_____ factors have played a _____ role in Japan's long _____. The basic factor influencing _____ history and development in _____ times was her isolation _____ the mainland of Asia, _____, as you know, she _____ a country of islands. _____ factor helped to keep _____ from being annexed to _____ empire, but the two _____ were so close geographically _____ Chinese culture was able _____ span the East China _____ and the Japan Sea _____ influence the civilization of _____.

The Japanese are a _____ race. The available evidence _____ the belief that in _____ times immigrants came from _____ mainland and from Borneo, _____, and the Philippines. During _____ Chou Dynasty (c.1123-256 _____.C.) many groups of _____ migrated to Japan. During _____ Han Dynasty (202 B._____.-220 A.D.), Korea _____ under Chinese Rule. After _____, Chinese and Korean weavers, _____, and farmers brought their _____ and culture to the _____. Thus began the raising _____ silkworms. Chinese medicine and _____ Chinese calendar were introduced.

_____ scribes brought to Japan _____ language, the writing, and _____ literature of China. The _____ adapted the Chinese language _____ their own way of _____ images and ideas and _____ much of the Chinese _____. Much later they developed _____ system of phonetic writing _____ simplified the Chinese characters _____ made it easier to _____ them in writing Japanese. _____ step stimulated the growth _____ a native Japanese literature.

_____ classify the Japanese people _____ Mongoloid, but some scholars

MR. SMITH RUNS FOR CONGRESS

_____ we think about elections _____ usually picture exciting national _____, fighting speeches watched by _____ of televiewers, political caravans _____ the nation in a _____ of publicity. But not _____ campaigns for national office _____ like this. A candidate _____ Congress often finds that _____ campaign means a lot _____ dull legwork and exhausting _____ of speeches to small _____. "When you get away _____ the national arena," Pearson _____ Allen have written, "political _____ gets right back to _____ old horse-and-buggy days... What _____ counts is the all-important _____ of personal contract." How _____ member of Congress wins _____ is important; watching him _____ a campaigner helps us _____ him as a congressman. _____ us look at the _____--but rather typical--case _____ John Smith, aspirant to _____?

Why does Mr. Smith _____ to run for Congress _____ the first place? Obviously _____ wants to be a _____--but so do many _____ people. In Mr. Smith's _____, his decision is not _____. The incumbent, he knows, _____ be hard to beat. _____ not sure that this _____ be a good year _____ his party. A campaign _____ mean practically deserting his _____ practice for three or _____ months. It will cost _____. On the other hand, _____ thinks he can win. _____ has served as district _____ and state senator, and _____ feels ready for bigger _____. And, he reflects, a _____ campaigning might help advertise _____ law practice even if _____ shouldn't win. So Mr.

WHAT WAS THE PLACE OF THE CHURCH IN THE MIDDLE AGES?

_____ Bernard trudged along the _____ forest road, his long _____ of coarse brown cloth _____ in the brisk autumn _____. Sandal-shod, he unconsciously avoided _____ deep puddles as his _____ body, toughened by years _____ tramping in all sorts _____ weather, pressed onward. Father _____ was a friar, a _____ priest whose life was _____ to the service of _____ and man.

Father Bernard's _____ were as accustomed to _____ for a sick person _____ holding a plow in _____ furrow as they were _____ turning the pages of _____ prayer book and to _____ the sign of the _____. For this man was _____ only a priest; he _____ a doctor, teacher, bringer _____ news, and good friend _____ to shut-away people in _____ villages and to poor _____ in the towns. In _____ for his services, Father _____ asked nothing but plain _____ and a place in _____ to sleep.

St. Francis _____ St. Dominic founded organizations _____ friars. Father Bernard's brown _____ marked him as a _____ (fran-sis'k'n) friar, a follower _____ St. Francis of Assisi (_____). St. Francis is one _____ the noblest and most _____ characters, not only of _____ Middle Ages but of _____ time. Born into a _____ family, as a young _____ he turned from a _____ of aimless pleasure to _____ of poverty, self-denial, and _____. Soon Francis gathered about _____ a small band of _____ followers who adopted his _____ and way of life. _____ went about preaching and

THE JUDICIARY AND THE LAW

_____ speaking, the judiciary branch _____ out its functions of _____ in two different ways. _____, it determines the guilt _____ innocence of persons accused _____ government of violating ordinances _____ braaking laws; that is, _____ courts make decisions regarding _____ and crimes. Petty violations, _____ as illegal parking, are _____ as offenses and carry _____ light penalties--small fines, _____ of license, some hours _____ days in jail for _____ violations. There are two _____ of criminal lawbreaking: Misdemeanors _____ felonies. Misdemeanors are petty _____ (larceny), disorderly conduct, or _____. They are punished by _____ fines or brief jail _____. Felonies are more serious _____ such as robbery (grand _____), arson, and homicide in _____ first, second, and third _____. The punishments for these _____ heavier--long prison sentences _____ even death.

The second _____ function is to judge _____ between citizens, groups of _____, or citizens and their _____. These cases are called _____. Civil actions in court _____ claims for wrongful injury _____ person or property, or _____ restitution of money or _____ lost by reason of _____, or for harm caused _____ failure to perform a _____. If a person claims _____ has been damaged (he _____ the plaintiff), the court _____ either agree, and require _____ (the person accused of _____ the damage) to pay _____ certain sum, or decide _____ defendant's favor, requiring plaintiff _____ pay court costs. In _____ where a person anticipates _____-- to his property, for _____--by somebody else's intended

THE MASS OF AN ATOM AND ITS PARTS

_____ are in the nucleus _____ electrons surround it. Most _____ the mass of the _____ is in the nucleus. _____ two statements imply that _____ electron weighs far less _____ a proton; this is _____ case. Experiments have been _____ in which individual electrons _____ protons have been weighed. _____ experiments show that the _____ of the electron is _____ than that of a _____ by a factor of _____.

This means that most _____ the mass of the _____ must be furnished by _____ nucleus. However, the mass _____ the nucleus is not _____ by the number of _____ alone. For example, a _____ nucleus has two protons _____ a hydrogen nucleus has _____ proton. Yet a helium _____ is measured to be _____ times heavier than a _____ atom. What can be _____ composition of the helium _____? A partial answer to _____ problem was obtained when _____ third particle, the neutron, _____ discovered. The neutron carries _____ charge; it is a _____ particle. Its mass is _____ identical to the mass _____ the proton. Thus the _____ of the helium atom _____ consist of two neutrons _____ two protons. Then its _____ will be 2+ but _____ mass will be four _____ the mass of the _____ atom.

Now our nuclear _____ suffices. We can build _____ the atoms for all _____. Each atom has a _____ consisting of protons and _____. The protons are responsible _____ all of the nuclear _____ and part of the

AGRICULTURE AND THE RISE OF CIVILIZATION

_____ communities, with houses, public _____, governments, laws, and written _____, could not arise until _____ had solved the problem _____ staying in one place. _____, agriculture was, and is, _____ for civilization. A second _____ for civilization is organization _____ division of labor. According _____ all of our records, _____ first organizations of this _____ began under the direction of _____ a powerful leader. One _____ of gaining power over _____ men was by owning _____. Hence, when land became _____ source of food through _____, the head of a _____ family could marry his _____ and daughters into other _____ families, so that his _____ or most agressive son _____ control more property, and _____ on. Fathers or leaders _____ large families thus became _____ "kings." About these rulers _____ grouped soldiers, priests, tradesmen, _____, and others. By conquering _____ people, they acquired large _____ of slaves who built _____, palaces, temples, and pyramids. _____ this way were born _____ first great civilizations, in _____, Mesopotamia, and the Indus _____ of western India.

You _____ see from this brief _____ of man's rise that _____ change from the savage, _____ Age type of existence _____ modern civilization took only _____ tiny fraction of the _____ of time needed for _____ to evolve from his _____ ancestors. Furthermore, if we _____ in order the various _____ that gave man his _____ control over nature, we _____ they have been made

TAKING RESPONSIBILITY FOR GOVERNING

The party in office _____ held responsible by the _____ for running the government _____ for the achievement of _____ party's program. If a _____ President and Congress have _____ elected, they are considered _____ for laws passed and _____ taken, even though many _____ these laws and actions _____ have been supported by _____ Republicans. Thus, the Democrats _____ the praise and blame (_____ on the point of _____) for the New and _____ Deal programs. The Republican _____ Congress and President Eisenhower _____ held responsible for legislation, _____ though much of President _____ program was supported by _____ Democrats.

Not infrequently, however, _____ legislative and executive branches _____ government are controlled by _____ parties. This was the _____ during two years of _____ Truman administration and during _____ of Eisenhower's eight years _____ the White House. Divided _____ is found even more _____ the state level.

For _____ person who prefers things _____ remain pretty much as _____ are, believing that governmental _____ is generally better than _____ new programs, the matter _____ divided responsibility may be _____ virtue. At least one's _____ party can veto the _____ action which the opposing _____ might take. Many political _____, however, decry divided responsibility. _____ contend that voters elect _____ to carry out programs _____ will meet society's needs. _____ required action is costly _____ frustrating. Part of the _____ to the problem of _____ responsibility lies in educating _____ to the folly of _____ an executive of one _____

BUILDING PROTEIN MOLECULES

The DNA and RNA _____ a cell are closely _____. We have already seen _____ the structure of RNA _____ similar to that of _____. What else do biologists _____ about RNA? All cells _____ have been examined contain _____, but some cells contain _____ more than others. Those _____ with much RNA carry _____ much protein synthesis. The _____ in higher animals that _____ digestive enzymes, for instance, _____ large quantities of protein. _____ amounts of RNA are _____ in the cells of _____ organs. Certain glands of _____ silkworm also contain striking _____ of RNA, and these _____ the glands that produce _____ protein, silk. For these _____ it is thought that _____ plays an important role _____ protein synthesis.

The preceding _____ of this chapter described _____ biochemists were able to _____ the biological code contained _____ RNA. How are the _____ abilities of RNA related _____ the DNA of the _____?

Biologists believe that the _____ instructions to the cell _____ coded in the DNA _____ the nucleus. Although DNA _____ the library of instructions, _____ cannot act directly in _____ many chemical reactions of _____ cell. There is a _____ simple reason for thinking _____ this is so. In _____ cells the DNA is _____ in the nucleus, whereas _____ cell activities occur in _____ cytoplasm. DNA must therefore _____ indirectly in most cells.

_____ the instructions coded in _____ must be carried into _____ cytoplasm where the work _____ the cell actually goes _____.

THE STRUCTURE OF THE ATOM

For almost three quarters _____ a century scientists have _____ accumulating evidence about the _____ of atoms. Some of _____ evidence has come from _____ study of radioactive elements _____ radium and uranium. The _____, the X-ray tube, and _____ modern electric devices for _____ the structure of atoms _____ given additional information. At _____ present time scientists recognize _____ atoms are not simple _____ particles. Instead, they are _____ to be composed of _____ different kinds of still _____ particles arranged in a _____ complex way.

An atom _____ of two main parts. _____ positively charged central part _____ called the nucleus. It _____ very small and very s_____. Its diameter is about _____ cm, or 102 A. _____ is about one one-hundred-thousandth _____ the diameter of the _____ itself, since atoms range _____ 1A to 5 _____ in diameter.

Negatively charged _____, called electrons, move about _____ nucleus in more or _____ definite regions called shells _____ energy levels. About 1913 _____ Danish scientist Niels Bohr (_____) pictured the movement of _____ about the nucleus of _____ atom as similar to _____ rotation of the planets _____ the sun. However, the _____ of the electrons are _____ known to be much _____ definite than the orbits _____ the planets. Electrons move _____ the nucleus of an _____ much as bees move _____ in the area near _____ hive. Sometimes the electrons _____ near the nucleus, sometimes _____ are farther away. By _____ seemingly haphazard motion the _____

PETER'S REFORMS

The reforms that Peter _____ Great believed in and _____ to introduce changed the _____ of Russian history. To _____ for himself what Europe _____ like he journeyed there _____ person, and hired shipbuilders, _____, weavers, and other skilled _____ to come to Russia. _____ he was away some _____ his regiments at Moscow _____, and on his return _____ punished the rebels mercilessly, _____ and killing hundreds of _____. Throughout his reign he _____ to fight resistance and _____. The clergy of the _____ Orthodox Church opposed the _____ he made and denounced _____ for employing "heretics" from _____ Protestant countries. Reports _____ among the Russian people _____ he was the great "_____," the Antichrist, foretold in _____ Book of Revelation. When _____ learned that his own _____ Alexius had plotted against _____ he had Alexius flogged _____ death. Nothing could turn _____ from his relentless purpose.

_____ plans to expand the _____ frontiers to the Baltic _____ the Black Sea involved _____ in wars with the _____ and the Turks. The _____ were famous soldiers with _____ weapons, and at first, _____ their daring young king, _____ XII, they defeated the _____ easily. Peter was not _____. "I know well that _____ Swedes will beat us _____ a long time," he _____, "but, at last, they _____ teach us how to _____." He was right. His _____ with Sweden, the Great _____ War, dragged on for _____ years. In 1708 Charles _____ Russia with his Swedish _____

THE UNITED STATES MOVES TOWARD WAR

_____ the outbreak of the _____ in Europe most Americans _____ with Great Britain and _____. They believed that Germany _____ be defeated and that _____ United States should stay _____ of the struggle. Isolationist _____ was still strong. As _____ won victory after victory, _____ changed their attitude. In _____, 1939, Congress amended the _____ Act to permit belligerent _____ to buy munitions on _____ cash-and-carry basis. The change _____ Britain and France, since _____ needed our munitions. The _____ of France made Americans _____ the importance of Great _____ to the defense of _____ Western Hemisphere. Hence the _____ States decided to give _____ all aid "short of _____." In September, 1940, our _____ transferred fifty over-age destroyers _____ Great Britain in return _____ the use of naval _____ air base sites in _____, British Guiana, and the _____ Indies. When England no _____ had money to pay _____ imports, Congress passed the _____ Act (March, 1941), which _____ for "lending" war supplies _____ Britain and other countries _____ were fighting the Axis. _____ American Navy began to _____ British ships part way _____ the Atlantic. The United _____ took control of Greenland _____ Iceland with the approval _____ the Danish government-in-exile. By _____ summer, the United States _____ was convoying British merchant _____ as far as Iceland. _____ November, 1941, Congress said _____ the lend-lease supplies could _____ delivered in American ships.

_____ acting as the "arsenal _____ democracy," the United States _____ to its own defenses.

THE ENERGY OF THE CELL

_____, as we have said, _____ its work by chemical _____. We have also said _____ the power to carry _____ this work comes from _____ energy. The most important _____ which supplies this chemical _____ to cells is glucose. _____ is broken down in _____ process of respiration.

If _____ is simply burned up, _____ will give off heat, _____ this heat could not _____ used to do the _____ work. Instead, the cell _____ apart the glucose molecule _____ step at a time. _____ glucose molecule has six atoms in it. During _____ it is changed to _____ kind of molecule after _____ until it ends up _____ molecules with only one _____ atom in them. These _____ carbon dioxide molecules (CO_2).

_____ time one of these _____ is changed into another, _____ is released. This energy _____ now allowed to escape _____ heat. Instead the energy _____ used to build up _____ special phosphorus compound called _____ its initials ATP. Later _____ energy stored in the _____ can be used whenever _____ is needed to do _____ work of the cell. _____ of ATP as the _____ carrier of the cell. _____ carbon and hydrogen in _____ glucose are gotten rid _____ by combining them with _____. This means that the _____ products of glucose respiration _____ carbon dioxide and water. _____ is needed in the _____, but carbon dioxide is _____ waste and must be _____. Some cells do not _____ oxygen at all. They

THE SECOND WORLD WAR BEGINS

_____ Second World War begin _____ September, 1939, with the _____ invasion of Poland. At _____ time Germany was ruled _____ a dictator, Adolf Hitler. _____ man had risen to _____ in 1933. The German _____ established after the First _____ War had not succeeded _____ well in giving Germany _____ prosperity the people hoped _____. The depression which had _____ in 1929 had brought _____, confusion, and hardship. Hitler, _____ the head of his _____, or National Socialist, party, _____ promised to bring prosperity. _____ had also promised to _____ the evils which he _____ had been perpetrated upon _____ by the Treaty of _____. Hitler had remilitarized the _____, overrun Austria, and occupied _____. Poland was next on _____ timetable.

In Italy was _____ dictator, Benito Mussolini. He _____ risen to power in _____. Just as Hitler had _____ own political party, so _____ had his, the Fascist _____. The two dictators in _____ made an alliance which _____ called the Rome-Berlin Axis. _____ was formed the same _____ in which Italy conquered _____. The methods of the _____ dictators were much the _____. Both built up their _____ forces and threatened their _____. Both took away the _____ of their people. They _____ the organization of labor _____ and of rival political _____. They built up propaganda _____ to control the ideas _____ their people. And they _____ of conquest and of _____ building. Italy joined Germany _____ the war at the _____ France was retreating before

PROTEINS IN VEGETABLES

_____ proteins in vegetables are _____ important to some people, _____ vegetarians, and so we _____ know of any changes _____ occur in the protein _____ vegetables when they are _____. You have already learned _____ protein compounds differ widely _____ properties. Because of this _____, they are affected differently _____ heating. Some of the _____ are soluble in water _____ therefore dissolve in the _____ in which the vegetables _____ cooked. Some proteins are _____ heat, either in _____ cells of the vegetable _____ in the water in _____ they are dissolved. This _____ of the coagulation of _____ by heat is important _____ remember, for most kinds _____ proteins are affected in _____ manner. The cooking of _____ is complicated because they _____ generally mixed with other _____ nutrients that require different _____ to make them ready _____ digestion. For example, the _____ foods which contain protein, _____ as wheat flour, corn, _____, and peas, also contain _____ large proportion of starch. _____ we have learned that _____ are made soluble by _____, and thus are more _____ digested. Then how are _____ vegetable foods to be _____? The guiding principle should _____ that vegetables containing both _____ nutrients should not be _____ long. Also, it is _____ to cook them in _____ that is relatively soft, _____ hard water contains calcium _____ magnesium salts which unite _____ the protein called legumin _____ form insoluble compounds that _____ very difficult to digest. _____ these principles are adhered

STOCK EXCHANGES

It was easy to _____ purchasers for the shares _____ joint-stock companies after they _____ paid handsome profits, but _____ was always a risk _____ be taken with new _____. Many joint-stock companies did _____ make the great profits _____ of them. Many companies _____ in bankruptcy. The value _____ shares in joint-stock companies, _____, varied a good deal.

_____ people with money made _____ business of trying to _____ shares when they were _____ and sell them when _____ went up in price. _____ of shares was done _____ certain places called stock _____. The man who wished _____ sell could almost always _____ someone at the exchange _____ was willing to buy. _____ were split into small _____ so that even landlords _____ small shopkeepers who knew _____ of foreign trade were _____ to invest their savings _____ shares of stock. The _____ with which shares in _____ joint-stock companies could be _____ or sold on the _____ exchange helped merchants obtain _____ capital needed for oceanic _____.

Indeed, it became too _____ to sell stock. Because _____ the large profits paid _____ a few concerns such _____ the British East India _____, the price of their _____ rose rapidly in London _____ before 1720. People began _____ buy all kinds of _____ in hope of selling _____ at a higher price. _____ company was started to _____ people against death from _____ drinking, and one "for _____ undertaking which shall in _____ course be revealed," the _____

DRUGS AGAINST DISEASE

For thousands of years, _____ has used drugs in _____ attempt to cure infectious _____. Most of these drugs _____ mixtures of wild plants _____ few were of any _____. It is difficult to _____ a drug that will _____ microbes in the living _____. If it can kill _____, the drug is usually _____ strong that it will _____ kill the cells of _____ body.

Scientists struggled with _____ difficult problem of finding _____ drugs for many years, _____ at first they had _____ little success. One chemist, _____ 606 attempts, discovered a _____ that would act against _____ germs of syphilis in _____ body. A number of _____ drugs were developed to _____ the one-celled animals that _____ human diseases. These drugs _____ very valuable, although sometimes _____ had harmful effects on _____ body cells.

It was _____ until 1932 that a _____ useful drug for destroying _____ inside the body was _____. A German chemist developed _____ red dye that would _____ germs in the bodies _____ animals without harming the _____ themselves. He had not _____ his experiments when he _____ told that his own _____ was seriously ill. Bacteria _____ entered her blood stream _____ the doctors could do _____ to save her. The _____ gave her a large _____ of the red dye _____ in a short time _____ was on the road _____ recovery.

Chemists working with _____ red dye found that _____ active substance in it _____ a white powder called

PRICE CONTROL: CONSTITUTIONAL HISTORY

When, during World War _____, American agriculture was called _____ to provide for the _____ of allied countries whose _____ were overrun by armies, _____ boomed. So did income. _____ overextended themselves buying new _____, new stock, new equipment _____ blown-up prices.

The collapse _____ the foreign market when _____ war ended knocked the _____ out of prices and _____ debt-ridden farmers could not _____ their obligations. There was _____ hardship. An accepted definition _____ a farm came to _____ "a portion of land _____ covered by a mortgage." _____ depressed condition continued throughout _____ _____ 1920's even while the _____ of the economy was _____ so-called prosperity.

After the _____ Depression set in the _____ had more company in _____ economic misery, but was _____ better off. The New _____ introduced a series of _____ to lift farm prices _____, although mended, remain effective _____ today.

First, an Agricultural _____ Act (AAA) was passed _____ 1933. The plan was _____ raise a fund by use of a "processing _____" on farm products, the _____ to go to those _____ who cooperated in reducing _____. By raising less food, _____ would go up. No _____ ever invited such hostility _____ ridicule. To many people _____ seemed wrong to kill _____ third of the young _____ and plow under every _____ row of cotton while _____ were still people in _____. But the Supreme Court _____ short the experiment. In _____ it pronounced it unconstitutional - _____ because it levied a _____

PROPERTIES OF SULFUR

Lumps of sulfur are _____ and brittle. They can _____ melted and cast into _____, or roll, form. Another _____ form of sulfur is _____ flowers of sulfur. This _____ soft yellow powder.

_____ is about twice as _____ as water, insoluble in _____, soluble in carbon disulfide ($\_\_\_\_\__2$), a non-conductor of electricity, _____ has no marked odor.

_____ some sulfur into a _____ tube and heat it _____. When the sulfur reaches _____ C, it forms a _____, straw-colored liquid. When the _____ is raised, the liquid _____ darkens to amber color _____ thickens. At about 160° _____, the test tube can _____ inverted, and the sulfur _____ not run out. The _____ is now like thick, _____ tar. At a higher _____ it is liquid again. _____ it boils at 444.6° _____.

When the sulfur is _____, some of the vapor _____ in the form of _____ yellow powder (flowers of _____) on the cooler walls _____ the test tube. Hot _____ burns with a blue _____ when it reaches the _____. Sulfur dioxide (SO_2), a _____ gas that has a _____, choking odor, is formed.

_____ melted sulfur is quickly _____ by pouring it into _____ water, a dark, sticky _____ of plastic sulfur forms _____ resembles smoked rubber. Plastic _____ can be molded into _____ desired shape while it _____ warm. It hardens into _____, dark mass, which _____ becomes yellow again long _____ it has colled.

These _____ changes in physical proper ·s _____

CAUSES OF INEQUITABLE REPRESENTATION

_____ representation has grown through _____ failures of government. First, _____ those legislatures where one _____ both houses are elected _____ a basis roughly of _____ member per county, such _____ in California, a distortion _____ representation is bound to _____. More people live in _____ counties than rural, and _____ a result the city _____ counts for less.

_____, many states have failed _____ redistrict as their population _____ shifted, leaving rotten boroughs _____ through the state. For _____, Mississippi has not changed _____ districts since 1890, Delaware _____ 1897, Tennessee since 1900, _____ Illinois since 1901.

Third, _____ many states the redistricting _____ has been corrupted by _____.

In most states, the _____ to redistrict or the _____ to gerrymandering has been _____ responsibility of the state _____ themselves. In these states, _____ legislators, who years ago _____ did represent the majority _____ the population, have been _____ reluctant to change the _____ of the legislature in _____ of growing urban population, _____ only because they did _____ relish the prospect of _____ themselves out of their _____. Not only the individual _____ the political party is _____; rural legislators (in two-party _____) are frequently Republican, urban _____ are frequently Democratic; and _____ has been too much _____ expect one party to _____ itself into a minority.

_____ some areas, rural Republicans _____ been supported by conservative _____ interests in the cities, _____ prefer a Republican legislature, _____ of origin, over a _____ legislature more responsive to

THE PARTS OF THE BRAIN

_____ large upper portion of _____ brain is called the _____ (sĕr'ĕ-brŭm). It is divided _____ two hemispheres, which are _____ by a mass of _____ fibers. The other surface _____ the cerebrum, which is _____ called the cortex (kôr'tĕks), _____ composed of gray matter, _____ up of the cell _____ of neurons. The interior _____ the brain is formed _____ of nerve fibers and _____ white because of the _____ sheaths of these fibers. _____ activity, such as voluntary _____, memory, and reasoning, is _____ to be controlled by _____ cortex. Thus "gray matter" _____ commonly referred to as _____ equivalent of intelligence. Since _____ activity seems to take _____ largely in the cortex, _____ area of the cortex _____ more important than the _____ of the brain as _____ whole. Its area is _____ by many deep folds, _____ convolutions, in the surface _____ the brain. The more _____ deeper the convolutions, the _____ will be the area _____ the cortex. In general, _____, the intelligence of an _____ is closely related to _____ convolutions in its brain. _____ has a more complex _____ of convolutions than any _____ animal.

The cerebellum (sĕr'ê-bĕll'ŭm), _____ the "hind brain," lies _____ the cerebrum. It is _____ divided into two hemispheres _____ is covered with gray _____ under which are white _____. This part of the _____ is the center of _____ coördination. Damage to the _____ results in muscle movements _____ are jerky and ineffective. _____ cerebellum also controls muscular

FARADAY AND SOLUTIONS

_____ former times, just as _____ present, people have attempted _____ understand matter. By the _____ of the 18th century _____ had a good idea _____ gases and how they _____, but liquids troubled them _____ much. One of the _____ problems facing early chemists _____ the strange behavior of _____ when in solution. Why, _____ example, does a sodium _____ solution conduct electricity, while _____ sugar solution does not? _____ does hydrochloric acid permit _____ flow of electricity better _____ does acetic acid? Why _____ distilled water not conduct _____ while tap water does? _____ do the boiling and _____ points of a solution _____ when its concentration changes?

_____ the beginning of the century Michael Faraday of _____ became interested in these _____. Through numerous experiments he _____ up a systematic knowledge _____ solutions, part of which _____ now called Faraday's Law _____ Electrolysis. He found that _____ he passed the same _____ of electrical charge through _____ of different compounds, the _____ of the different elements _____ at the terminals were _____ to their atomic weights.

_____ 1833 Faraday published a _____ on his researches into _____ conductivity of solutions. This _____ included the law just _____, and it also introduced _____ terminology of electrolysis which _____ today. Thus it was _____ who gave us the _____ electrode to represent the _____ terminal entering a solution. _____ first used the word _____ to describe a solution _____ permits a current of _____ to pass through it.

GOVERNMENT OF INDIA ACT OF 1935

_____ conferences to find a _____ solution to the problem _____ held in London in _____ early 1930's. Gandhi himself _____ present at one of _____. These meetings revealed one _____ the chief difficulties of _____ Indian question to be _____ fear of the Moslem _____ that it would not _____ equal rights with the _____.

In 1935 Parliament enacted _____ new constitution for India. _____ was put into operation _____ 1937. This Government of _____ Act declared India to _____ a federation of Indian _____ (ruled by their princes) _____ governors' provinces. At the _____ of the federal government _____ the governor, or viceroy, _____ by the crown. The _____ was to be assisted _____ a council of ministers, _____ of the various departments _____ the government.

The federal _____ was composed of two _____, a Council of State _____ a Federal Assembly. Each _____ representatives of the provinces _____ of the princely states. _____ local affairs of the _____ states were left to _____ rulers. The governors' provinces _____ legislatures, part of whose _____ were elected by the _____.

The extreme nationalists still _____ absolute independence, although the _____ were willing to accept _____ status. The Indians insisted _____ they had a right _____ govern their own country. _____ British held that by _____ of the differences in _____, religion, language and cast, _____ the general illiteracy of _____ people, India was not _____ able to manage its _____ affairs. India, if left _____ herself, they said, would

THE ANCIENTS BELIEVED THE WORLD MADE OF "FOUR ELEMENTS"

But to return to _____ original question: What is _____ world made of? Guesses _____ speculations would be useless _____ attempting to answer this _____. Because the ancients depended _____ upon these procedures and _____ upon inaccurate and uncontrolled _____ and observation, they made _____ progress in answering the _____.

After Thales had suggested _____, another man proposed that _____ might be another of _____ basic substances from which _____ matter was made. Fire, _____, was suggested and later _____. Pythagoras (pī-thăg'ō-răs), an ancient _____ thinker and mathematician who _____ about 600 B.C., _____ thought to have been _____ first European to express _____ idea that all matter _____ composed of these "four _____."

These conclusions seemed to _____ proved by the observations _____ the early investigators. When _____ stick of green wood _____ burned, they saw that _____ was produced, water was _____ out and boiled off _____ the ends of the _____, a smoky vapor (air) _____ given off, and an _____ (earth) was left behind. _____ concluded, therefore, that all _____ was made up of _____ amounts of two or _____ of these four basic, _____ elementary, substances.

The Greek _____, however, made a sericus _____. They failed to make _____ observations of different substances. _____ did not make enough _____. Consequently, their conclusions were _____. Strangely enough, the idea _____ all matter is composed _____ "four elements" (earth, air, _____, and water) persisted until _____ eighteenth century and was _____ correct by many otherwise _____

FOREIGN AGGRESSION FURTHERED JAPANESE AMBITIONS

In becoming a modern _____ nation, Japan also became _____. A rapid rise in _____ had resulted from improved _____ and better medical services. _____ the Meiji Era alone, _____ expanded from less than _____ to over 50 million. _____ nation could not produce _____ food for its people. _____ also lacked raw materials _____ needed markets for its _____. Japan looked to the _____ mainland as a solution _____ its difficulties. As early _____ 1876 the Japanese obtained _____ privileges in Korea. It _____ such transactions that irritated _____ Chinese and precipitated the _____ War of 1894-1895. By _____ China, Japan made its _____ significant acquisition of territory _____ its own borders.

The _____ of Shimonoseki granted Japan _____ only Formosa and the _____ but also the Liaotung _____ of Manchuria, which jutted _____ into the Yellow Sea. _____ Russians, pursuing their own _____ policy of imperialist expansion _____ Manchuria, had long desired _____ because at its southern _____ lay Port Arthur, one _____ the finest year-round harbors _____ the Far East. Backed _____ France and Germany, Russia _____ Japan to return Liaotung _____ China, and shortly afterward _____ the peninsula and harbor _____ itself through a treaty _____ China. This move angered _____ Japanese, as did Russian _____ in Korea.

Negotiations between _____ and Russia over Korea _____ Manchuria broke down in _____. Fighting began when Japan, _____ a formal declaration of _____, attacked the Russian fleet _____ Port Arthur. Much to _____ surprise of the West, _____

WATER AND MINERALS FROM ROOT TO LEAF

In the daytime, in _____, sunny weather, a wet _____ suit dries quickly. The _____ in it evaporates. Water _____ from plant leaves, too, _____ such weather. Evaporation from _____ is called transpiration. In _____ living plant the water _____ are filled with water _____ all times, from the _____ of the roots to _____ veins in the leaves. _____ takes water out of _____ leaf cells, lowering the _____ of water in the _____. Water then diffuses into _____ cells from xylem in _____ veins. The veins are _____ full by diffusion of _____ from the soil into _____ roots. While transpiration takes _____ in the leaves there _____ a continuous stream of _____ upward through the roots _____ stem with its branches. _____ goodsized birch tree may _____ as much as 350 _____ of water on a _____, dry day. A single _____ plant may lose three _____ four quarts of water _____. If the plant is _____ live, all that is _____ must come in through _____ roots.

You can now _____ why plants must be _____ carefully when they are _____. Parts of the roots, _____ the root hairs, are _____ in digging the plant. _____ all the leaves are, transpiration continues at the _____ rate as before, but _____ can't get into an _____ root system at that _____. Do you see why _____ usually "cut back" the _____ of a plant when _____ transplant it? This slows _____ transpiration.

Biologists have long _____

SALES TAXES

Thirty-two out of forty-eight _____ in this country collect _____ general sales tax. This _____ is the major source _____ revenue for most of _____ states. Some cities also _____ a sales tax. At _____ times it has been _____ that the federal government _____ also enact a sales _____ as a means of _____ more money. However, up _____ now, Congress has never _____ such a tax law _____ the federal government.

A _____ tax is easy to _____. At the time of _____ a purchase in a _____ store, the consumer pays _____ regular price charged by _____ merchant. Then, he also _____ a small percentage of _____ regular price as an _____ tax payment. The merchant _____ as a tax collector. _____ keeps a record of _____ amount of taxes he _____, and he turns this _____ over to the treasury _____ the state or city _____ has enacted the sales _____ law.

Some people object _____ the sales tax as _____ regressive tax. They believe _____ burden of taxation falls _____ heavily on poor families _____ it does on wealthy _____. This is true because _____ families spend almost all _____ income on food, furniture, _____ clothing. Wealthy families on _____ other hand do not _____ all their income on _____ immediate necessities of life. _____ save part of their _____ and invest it or _____ it on things not _____ in retail stores. Therefore, _____ pay a smaller total _____ of their incomes as _____.

PROGRAMS TO EXCHANGE PERSONS

_____ need to exchange people _____ other countries. This is _____ than just exchanging tourists _____ are sightseeing, having fun, _____ simply loafing in strange _____. We need a serious _____ of students, teachers, doctors, _____, authors, musicians, farmers, labor _____, athletes, dancers, engineers, and _____ people who study and _____, perform and observe. "Breaking _____ the barriers that divide _____ people from those of _____ nations and building in _____ stead avenues for cooperation _____ the free interchange of _____ and skills are the _____ purposes of international educational _____ activities."

Since World War _____, Congress has authorized several _____ programs to promote educational _____. Probably the best known _____ the ones provided by _____ Fulbright Act (1946) and _____ Smith-Mundt Act (1948). The _____ Act is primarily for _____ purpose of aiding American _____ and scholars to teach _____ study in certain approved _____. Russia, Poland, and the "_____ curtain" countries are excluded. _____ Smith-Mundt Act created the _____ States Information Agency (USIA), _____ maintains offices in foreign _____ to dispense information about _____ country.

The International Educational _____ Program, also created by _____ Smith-Mundt Act, in a _____ year brought 4,146 people _____ more than seventy-five foreign _____ to visit, teach, and _____ in our country. More _____ 1,700 of these visitors _____ students. The Program provided _____ for young people of _____ countries to study in _____ schools abroad. We sent _____ Americans abroad under this _____. Among them were some _____ students, who studied in

COTTON

_____ is the soft, white _____ obtained from the cotton _____. The fibers are long, _____ cells attached to the _____ seeds. The seeds and _____ are formed in a _____ called a boll, which _____ open when the cotton _____ ripe.

The cotton and _____ are picked from the _____ by hand or by _____ and taken to a _____ gin, where seeds and _____ are separated. The cotton _____ go to a mill _____ cleaning, carding, and spinning _____ thread. The seeds are _____ to produce cottonseed oil, _____ is used to make _____ fats and margarine. The _____ meal which remains is _____ as food for cattle.

_____ is produced in large _____ in the United States, _____, Egypt, and Brazil. In _____ and other countries, cotton _____ spun into thread and _____ into cloth. Some varieties _____ cloth made from cotton _____ lawn, muslin, denim, broadcloth, _____ calico, and cambric.

Under _____ microscope, cotton fibers appear _____ be a flattened, twisted _____. Chemically, cotton is almost _____ cellulose, $(C_6H_{10}O_5)$. The subscript "_____" tells us that the _____ unit is repeated an _____ number of times. When _____ comes from the plant, _____ is creamy-white. It is _____ with chlorine or hydrogen _____ to make it pure _____.

If cotton is soaked _____ strong, cold sodium hydroxide _____ a few minutes and _____ washed and dried, it _____ mercerized cotton. Mercerized cotton _____ a better luster than _____. It is also stronger _____ dyes better than untreated

AN EVALUATION OF BRITISH AND AMERICAN STRENGTH

_____ as its words were, _____ Declaration of Independence along _____ not guarantee independence. If _____ United States (the thirteen _____ colonies) were to be _____, the Revolutionary War would _____ to be won. The _____ of patriots would be _____ to give life to _____ new country.

Fortunately for _____ Americans, there were men _____ to make sacrifices. Men _____ Tom Paine, whose pamphlets _____ to fan the sparks _____ revolution; Benjamin Franklin, who _____ with distinction as American _____ to France; the Frenchman _____ de Lafayette, the German _____ von Steuben, the Pole _____ Pulaski, who came to _____ from Europe to fight _____ liberty; and George Washington, _____ led the ragged and _____ American troops through what _____ Paine called "times that _____ men's souls."

The odds _____ victory seemed to favor _____ British. They had the _____ advantages: (1) Their army _____ better trained than the _____ troops. (2) Their navy _____ far more powerful than _____ ships available to the _____. (3) They had the _____ necessary to hire mercenary _____(paid professional soldiers, such _____ the Hessians) to fight _____ them. (4) They retained _____ loyalty of many colonists.

_____ the other hand, the _____ had these advantages: (1) _____ war was being fought _____ their home grounds, while _____ British were many miles _____ England. (2) They had _____ effective leadership of Washington _____ other men whose tactics _____ proved superior to those _____ British generals. (3) They _____ the eventual support of

CONVERGENT EVOLUTION

_____ have noted that species (_____.g. bird and bat, _____ and fish, woodchuck and _____) are sometimes found which _____ each other superficially but _____ to reveal the homologies _____ would indicate close kinship. _____ as a result of _____ two species of different _____ come to resemble one _____ closely is termed convergent _____. It can be explained _____ the basis of the _____ forces of natural selection _____ in a similar way _____ two originally different phenotypes. _____ are certain structural and _____ requirements that must be _____ before any organism, no _____ what its ancestry, can _____ or swim.

Convergent evolution _____ in no sense the _____ of speciation. While two _____ species may come to _____ one another closely as _____ selective forces work on _____, each species is, at _____ same time, diverging from _____ own ancestral stock. The _____ Australian marsupials which resemble _____ mammals in both appearance _____ habits illustrate convergent evolution _____ respect to the placental _____. With respect to the _____ marsupials, however, they represent _____ most dramatic example of _____ radiation, in other words, _____ multiplication of species.

The _____ of evolution is the _____ important generalization about living _____ that has been made. _____ the last chapter we _____ some of the kinds _____ evidence that can best _____ explained by a theory _____ evolution. In this chapter _____ have examined the mechanism _____ which evolutionary change is _____ to occur. Now let _____ round out the story

PARTY AND CONSTITUENCY IN THE UNITED STATES

Writing in Parliamentary Affairs _____ decade ago, Professor Charles _____ Merriam said that the _____ States had 49 party _____. Since that time, only _____ number has changed. Now, _____ are 51 party systems--_____ federal and 50 state, _____ to mention the countless _____ in cities and counties. _____ is no national party _____ with authority to issue _____ to state and local _____, to discipline them, to _____ the formulation of their _____, or to the direct _____ of their members who _____ public office. A major _____ the in the United can best be defined _____ a quadrennial federation of _____ state parties. This is _____, of course, to the _____ system, which not only _____ governmental power between the _____ and the Nation but _____ makes the 50 states _____ 50 separate constituencies. Governors _____ Senators are elected in _____ state. Each member of _____ national House of Representatives _____ elected in a constituency, _____ boundaries have been determined _____ the legislature of his _____ state. Even the President _____ Vice-President are chosen by _____ electors who are elected _____ each state. Consequently, in _____ to win elections, a _____ party organization must be _____ to its own state _____ to the various social _____ that dominate or hold _____ balance of power in _____ particular state.

Both federalism _____ the party systems are _____ products of the American _____. The United States is _____ by geography, by memories _____ the Civil War, by _____

BRONZE TOOLS

The Bronze Age dawned _____, about four thousand years _____. People did not throw _____ their old stone tools _____ and begin to use _____ ones. Moreover, the Bronze _____ did not spread rapidly _____ all parts of the _____. Many people were still _____ the Stone Age when _____ discovered America, and in _____ parts of the world _____ tribes were still in _____ Stone Age at the _____ of the twentieth century. _____ bronze came to _____ used widely in any section of the world, _____ say that those people _____ living in the Bronze _____.

The use of metal _____ an important step forward _____ a higher level of _____. The new tools opened _____ many possibilities for him. _____ metal weapons with stone _____ and you will realize _____ much more efficient man _____ be with his bronze _____. They helped bring him _____ the doorway of civilization.

_____ the dawn of civilization, _____ had learned much. Lacking _____ means of protection that _____ animals had, he had _____ his superior wits and _____ become in a real _____ the master of his _____. He had learned speech, _____ use of fire, the _____ of bronze weapons. He _____ learned to _____ and reap, to cook _____ food, to sew, to _____, to build houses for _____, and to dig out _____ log and use it _____ a boat.

Among these _____

THE CHANCES OF FOSSIL FORMATION

The number of organisms _____ are fossilized after death _____ a very small percentage _____ all the organisms that _____ ever lived. You have _____ noticed that the conditions _____ which fossils are formed _____ very rigid. After death _____ organisms do not encounter _____ conditions.

Most land animals _____ eaten by scavengers or _____ decay too rapidly to _____ fossils. There are probably _____ fossil remains of the _____ of millions of bison _____ ranged the Great Plains _____ hundreds of years. The _____ land plants or animals _____ have formed fossils are _____ that have been in _____ conditions after death, such _____ freezing in glaciers, falling _____ bogs or swamps where _____ proceeded slowly to produce _____ or petrifaction, or being _____ in tar pits or _____.

Water plants and animals _____ more apt to form _____, since after death they _____ to the bottom of _____ body of water in _____ they live. Here in _____ sediments they encounter slow _____ and sedimentation, conditions favorable _____ fossil formation.

Ocean sediments _____ the shore have provided _____ greatest number of fossils. _____ is abundant in shallow _____ waters, and the sediments _____ the shore are constantly _____ so that the bodies _____ dead organisms are quickly _____.

You can see that _____ chances that any particular _____ will become a fossil _____ death are very slight. _____ chances that we will _____ a fossil after it _____ formed are equally slight.

_____ a very small amount _____

SYNTHETIC RUBBER, SILICONES

Perhaps you have seen _____ dry their hands with _____, or violinists rub their _____ over the same kind _____ substance.

For generations mankind _____ found many ways for _____ the different substances known _____ resins. These are hard, _____, noncrystalline solids which are _____ in water but soluble _____ many organic solvents. They _____ either softened or melted _____ heat. The resins include _____ materials as resin from _____ turpentine pine trees; amber, _____ fossil resin from cone-bearing _____; copal and kauri, resins _____ are useful in making _____; and lac, the secretion _____ an insect, from which _____ is made.

As uses _____ natural resins increased, the _____ became inadequate and chemists _____ interested in the production _____ synthetic resins, now commonly _____ plastics. These materials resemble _____ resins in appearance and _____. The names "resin" and "_____" at one time were _____ interchangeably. Strictly speaking, however, _____ are brittle while plastics, _____ the name implies, may _____ molded or pressed into _____ forms under heat, or _____, or both. A plastic _____ has a larger molecular _____ than a resin; many _____ the plastics soften when _____, but they do not _____ liquid. Heated resins form _____ with relatively low viscosities.

_____ plastics are continually being _____. A careful control of _____ makes it possible to _____ a plastic which will _____ perfectly adapted to the _____ use. An almost limitless _____ of plastics can be _____, and it is now _____ to make an astounding _____

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Textbooks Sampled

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Cloze Tests for Redundancy Study III

THE SHINING METAL

Charles Hall had a _____ laboratory in his father's _____. He had made most _____ the laboratory equipment himself. _____ young man had remade _____ batteries. Now he could _____ electric current. He was _____ to do some experimenting.

_____ liked to study metals. _____ had read chemistry books. _____ had learned many facts. _____ wanted to do some _____ experiments. That was why _____ had remade the old _____. It was the reason _____ had made other laboratory _____.

Charles Hall knew that _____ metal could be changed _____ a solid. This change _____ be made by adding _____ certain chemicals to the metal. _____ mixture had to be _____. The heat would melt _____ chemicals. Then the chemicals _____ run together.

Next, this _____ mixture would be cooled. _____ would become solid.

Charles _____ read facts about alumina _____ his chemistry books. The _____ had stated that alumina _____ found in an ore. _____ ore was called bauxite. _____ believed alumina was a _____.

Some scientists discovered a _____ to make powdered alumina _____ a usable metal. The _____ metal was named aluminum. _____ the new metal took _____ and work. That made _____ more expensive than older _____ had been. Men knew _____ to make aluminum twenty _____ before Charles Hall tried _____. Not twenty-five tons of _____ had been made.

Charles _____ there was a large _____ of alumina in the _____. He decided to find _____ quick way to make _____. If the metal could _____ made quickly, it would _____be very expensive.

He _____ to find a way _____ dissolve alumina. He experimented _____ several chemicals. He decided _____ use cryolite. When cryolite _____ heated it became a _____. Charles Hall felt certain _____ liquid cryolite and heat _____ dissolve alumina.

Charles measured _____

THE SHINING METAL

Charles Hall had set _____ a chemistry laboratory in _____ father's woodshed. He had _____ most of the laboratory _____ himself. Now the young _____ had completed the remaking, _____ restoration, of old batteries _____ that electric current might _____ used. He felt that _____ last he was prepared _____ do some experimenting.

For _____ time the study of _____ and minerals appealed _____ Charles. When quite young, _____ had read books on _____. From books he had _____ many facts that had _____ his desire to carry _____ some laboratory experiments. It _____ then that he set _____ work on the restoration _____ old batteries and other _____ he needed.

One bit _____ information Charles Hall had _____ from a chemistry book _____ that a powdered metal _____ be changed into a _____. This change could be _____ by adding certain chemicals _____ the metal, then heating _____ mixture until both the _____ and the chemicals melted ran together. After this _____ mixture had cooled, it _____ be solid in form.

_____ the chemistry book, Charles _____ learned of a substance _____ alumina. The book stated _____alumina was found in _____ ore called bauxite and _____ scientists believed it was _____ metal.

After that chemistry _____ had been published, scientists _____ a method by which _____ alumina could be made _____ a usable metal. The _____ substance was named aluminum. _____ process used to make _____ required so much time _____ effort that this new _____ was more expensive than _____ older metals had been. _____ the twenty-year period previous _____ Charles Hall's interest in _____ with alumina, not twenty-five _____ of aluminum had been _____.

Charles knew that there _____ a large amount of _____ in the earth. He _____ determined to find a _____

THE PONY EXPRESS RIDER

"It's a pity you're _____ a little older, Billy," _____ George Chrisman. "I would _____ you a job as _____ Express rider. There's good _____ in it."

George Chrisman _____ the Western agent for _____ express company. That company _____ on the point of _____ a plan which many _____ thought was ridiculous. But _____ the other hand, everybody _____ the Mississippi River and _____ West Coast thought the _____ was fine. The Express _____ planned to maintain a _____ of fast riders for _____ regular carrying of the _____. The distance to be _____ was about two thousand _____. The route extended from _____ Missouri River to California.

_____ had been joking when _____ had spoken to Billy. _____ young William Cody, however, _____ a Pony Express rider _____ no joke.

"Oh, I _____, Mr. Chrisman, give me _____ chance at it!" was _____ plea. "I can ride _____ _____ well as any man--_____ know I can!"

"Sure, _____ can ride," replied his _____, good-naturedly. "But it takes _____ riding, Billy-- it _____ sand!"

On the table _____ a St. Louis newspaper _____ contained the notice that _____ set the whole West _____. Chrisman handed it to _____ Cody so the boy _____ read it. This is _____ he read:

"To San _____ in 8 days by _____ Overland, California and Pike's _____ Express Company. The first _____ of the Pony Express _____ leave the Missouri River _____, April 3rd, at 5 _____ P.M., and it _____ run regularly weekly thereafter, _____ letter mail only. A _____ of departure on the _____ River will be in _____ contact with the East, _____ will be annouueed in _____ time."

The boy's eyes _____ as he said, "Oh, _____ me a chance at _____. Where is it to _____?"

THE PONY EXPRESS RIDER

"It's too bad you're _____ older, Billy," said George _____. "I'd give you a _____ as a rider. There's _____ pay in it."

Chrisman _____ the Western agent for _____ express company. The company _____ ready to carry out _____ plan. People living between _____ Mississippi River and the _____ Coast liked the plan. _____ said it was foolish.

_____ plan was for a _____ of fast riders to _____ mail. The distance to _____ covered was about two _____ miles. The route reached _____ the Missouri River to _____.

Chrisman had been joking _____ Billy. But being a _____ Express rider was no _____ to young William Cody.

"_____ me a chance at _____!" said Billy. "I ride _____ well as any man."

"_____ takes more than riding," _____ Chrisman. "It takes sand."

_____ St. Louis newspaper lay _____ the table. A notice _____ it had set the _____ buzzing. Chrisman handed it _____ William Cody. This is _____ the boy read:

"To _____ Francisco in 8 days _____ Central Overland, California, and _____ Peak Express Company. The _____ courier of the Pony _____ will leave the Missouri _____, Tuesday, April 3rd, at _____ o'clock in the afternoon. _____ run weekly. It _____ carry letters only. It _____ start from a town _____ the Missouri River. That _____ will be in touch _____ the East by telegraph. _____ town will be named _____."

"Give me a chance," _____ Billy. "Where is it _____ start?"

"From St. Joseph, _____," replied the agent. "Do _____ want to watch them _____?"

"Sure," replied Billy. "But _____ want to carry the _____ muself!"

"We'll think about _____." said Chrisman.

Before 1860, _____ United States reached only _____ far west as the _____ River. There were hundreds _____ miles of forests and _____.

ADVENTURES OF THE WHALEPS

"Thar she blows!" That _____ the cry heard on _____ ships. They are exciting _____. They were the words _____ told that a quarry _____ been seen. That cry _____ the signal for the _____ of the whale, the _____ creature of the seas.

_____ days of the clipper _____ and pirates and of _____ American whalers are gone. _____ story of whaling is _____ of the roaring seafaring _____. It is an exciting _____, even today.

A whaling _____ carried several boats. These _____ were lowered from the _____ ship after whales were _____.

The whaleboats were very _____. Everything was where the _____could find it at _____ time of the chase. _____ harpoons were where the _____ could reach them quickly. _____ were in racks at _____ bow. Three hundred fathoms _____ rope were coiled in _____ tubs. There was a _____. The boat might not _____ near the mother ship.

_____ were four oarsmen and _____ mate in each boat. _____ man knew what his _____ was to be during _____ chase.

The mate was _____ of the crew. He _____ orders to the oarsmen. _____ was at the tiller. _____ steered the boat.

Each _____ had his job, too. _____ bow oarsmen was the _____. He stood up with _____ harpoon in his hands, _____ soon as the boat _____ near the whale. The _____ oarsman pulled the sweeping _____.

The tub oarsman threw _____ on the rope as _____ ran through the chocks. _____ water kept the rope _____ burning. The stroke oarsman _____ the stroke for the _____ men. He also helped _____ keep the line clear, _____ pull in the rope, _____ to coil it.

The _____ important weapon was the _____.

ADVENTURES OF THE WHALERS

"Thar she blows!" That _____ the traditional cry on _____ ships. No more exciting _____ than these have echoed _____ the seas. They were _____ words that broke monotony _____ whalers; they told that _____ quarry had been sighted. _____ cry was the signal _____ the chase of the _____, the mightiest creatures of _____ seas. Like the age _____ the clipper ships, or _____ days of pirates, the _____ when the American whalers __ _____ to the far corners _____ globe is gone. _____ story of whaling is _____ of the roaring seafaring _____, but it is an _____ story even today.

When _____ whaling vessel started out, _____ carried several boats which _____ lowered from the mother _____ after whales were sighted. _____ whaleboats were the picture _____ neatness. The whalers knew _____ everything must be where _____ could find it in _____ exciting moment of the _____. The boats were fully _____. The harpoons, ready to _____ seized by the mate, _____ in gleaming racks at _____ bow. Three hundred fathoms _____ rope were neatly coiled _____ wooden tubs. Other equipment _____ a compass, lanterns, candles, _____ food, for there was _____ certainty that the boat _____ stay within sight of _____ mother ship.

The crew _____ each boat consisted of _____ mate and four oarsmen. _____ man aboard knew exactly _____ his chore was to _____ during the chase.

The _____ was boss of the _____ and gave orders to _____ oarsmen. At the beginning _____ the chase he stood _____ the tiller, which was _____ the stern of the _____. With both his hands _____ the tiller, the mate _____ the craft.

Each of _____ four oarsmen had special _____, too. The bow oarsmen _____ as harpooner. When the _____ was approached, he stood _____

2

INDEPENDENCE DAY

Residents of a Midwestern _____ where a great celebration _____ to take place were _____ early on the morning _____ July Fourth. Everyone was _____ a hurry to finish _____ minute preparations. Boys and _____ called to their comrades, "_____ going to be a _____ day. We'll have a _____ crowd."

From the appearance _____ this town anyone might _____ that it was about _____ for an Independence Day _____. Flags were flying from _____ and public buildings. Gayly _____ automobiles, trucks, and wagons _____ nearly ready for the _____ parade which would be _____ important event of the _____. Much work had been _____ on these "floats." On _____ historical scenes were represented _____ as Betsy Ross making _____ first American flag and _____ Jefferson writing the stirring _____ of the Declaration of _____. Other floats showed the _____ between articles used in _____ days and those used _____. Candle molds, spinning wheels, _____ other cherished antiques of _____ times were shown on _____ floats.

Preparations had been _____ for several kinds of _____. Races would be held _____ those who wished to _____ them. In the afternoon _____ would be a baseball _____.

Picnic tables were ready _____ the big public park. _____ and other visitors to _____ little town had brought _____ lunches to share with _____ they hoped to see _____ the celebration.

A platform _____ had been built for _____ occasion was draped with _____, white, and blue cloth. _____ this platform a speaker _____ remind the people of _____ reason for having a _____.

The speaker for this _____ celebration was to be _____ Hood. He probably had _____ more about the Declaration _____ Independence and more about _____ days than anyone else _____ the community. He could _____ depended on for a _____

INDEPENDENCE DAY

People of a Midwestern _____ were to have a _____. They were up early _____ the morning of July _____. Everyone was in a _____ to finish last minute _____. Boys and girls called _____ to their friends, "It's _____ to be a clear _____. We'll have a good _____."

This was Independence Day. _____ flew from homes and _____ buildings. Cars, trucks, and _____ were nearly ready for _____ big parade.

The "floats" _____ ready. Scenes from history _____ represented. There was Betsy _____ making the first American _____. There was Thomas Jefferson _____ the Declaration of Independence. _____ floats showed things used _____ Colonial days and those _____ now. There were spinning _____ and many other things. _____ were floats which showed _____ of today.

There would _____ races, too. In the _____ there would be a _____ game.

Picnic tables were _____ in the public park. _____ and other visitors had _____ picnic lunches to share _____ friends.

A platform had _____ built. It was decorated _____ red, white, and blue _____. A speaker would remind _____ people why they were _____ a celebration.

The speaker _____ this year's celebration was _____ be Judge Hood. He _____ a great deal about _____ Declaration of Independence. He _____ more about Colonial days _____ anyone else in the _____. He would make a _____ speech.

Tom Fleming was _____ represent Thomas Jefferson in _____ parade. His mother had _____ his costume.

One day _____ the celebration Tom and _____ friends went to visit _____ Hood. They learned a _____ deal about the Declaration _____ Independence. They learned about _____ men who had written _____ signed it. They also _____ why it was written.

_____ costume was heavy. He _____ of how warm Jefferson _____ have felt. The long _____

Achievement Test for Redundancy Study IV

THE SHINING METAL

Directions

This is a test of your ability to answer questions about the story you have just read.

1. Your answer must be marked, in pencil, on the separate answer sheet which has been provided.

   The following is a sample questions to show how your answers are to be marked. Study the sample carefully and if you have any questions, raise your hand.

****

SAMPLE QUESTION

1. In what year did Columbus discover America?

   (1) 1092 (2) 1492 (3) 1892 (4) 1490

ANSWER TO BE MARKED ON SEPARATE ANSWER SHEET

1. (1) (2) (3) (4)

The correct answer to the sample question is answer Number 2. On the separate answer sheet we have blackened the space beside the Number 2 to show the correct answer.

****

2. Read each question carefully and then look at the four choices shown underneath the question. Decide which of the four choices is the correct answer. Then turn to the separate answer sheet and blacken the space beside the number that matches the answer you have selected. Blacken the space between the lines completely but make sure you blacken only one space for each question.

3. You should try to answer as many questions as you can. Do not spend a great amount of time on any one question; if you cannot think of the answer quickly, move on to the next question.

4. If you wish to change any answer, erase your first answer completely. Do not make any stray marks on the answer sheet.

PLEASE DO NOT MAKE ANY MARKS ON THE TEST BOOKLET
MARK YOUR ANSWERS WITH PENCIL ONLY

22. Which of the following was <u>not</u> a result of Charles's work?

(1) Many new industries were developed.
(2) Thousands of new jobs were created.
(3) Aluminum was made more durable.
(4) Aluminum was processed more inexpensively.

23. Where would an aluminum miner work most of the time?

(1) in the open air
(2) in a mine tunnel
(3) in a laboratory
(4) in a factory

24. What is the main reason that railway tracks are laid to the place where the bauxite is to be mined?

(1) to carry the miners to work
(2) to carry in mining equipment
(3) to carry ore to the crushing mills
(4) to carry away the top crust of earth from the mine area

25. Which of the following is true about the supply of bauxite?

(1) There was once a large supply but it is now almost used up.
(2) There has been a large supply until now, but it could become scarce in the future.
(3) There has never been a large supply.
(4) There is an almost endless supply.

26. What color is bauxite?

(1) It is always white.
(2) It is always red.
(3) It is always the same color as aluminum.
(4) It can be white, yellow, red or almost any color.

8. Why was aluminum so expensive before Charles's new way of refining it?

(1) It was very rare.
(2) Mining it was very difficult.
(3) Refining it took much time and work.
(4) People thought it was the same as silver.

9. Before Charles developed his new method, how much aluminum had been made?

(1) none
(2) about 100 pounds
(3) less than 25 tons
(4) over 1000 tons

10. Alumina is found in an ore called

(1) aluminum
(2) bauxite
(3) cryolite
(4) silicate

11. What material did Charles use to help dissolve the alumina?

(1) cryolite
(2) chlorate
(3) bauxite
(4) potassium

12. In the production of aluminum, which of these processes comes next after mining?

(1) refining
(2) crushing
(3) mixing with water
(4) molding

13. Compared with most other metals, aluminum weighs

(1) 1/10 as much
(2) 1/3 as much
(3) 2 times as much
(4) 10 times as much

14. Which of these is an ore?

(1) aluminum
(2) silver
(3) barium
(4) bauxite

15. Which of these is a metal?

(1) cryolite
(2) bauxite
(3) aluminum
(4) ore

16. What is used to loosen the ore in the mines?

(1) picks
(2) dynamite
(3) heat
(4) drills

17. How is ore carried from the mines to the crushing mills?

(1) by carts
(2) by trucks
(3) by railway
(4) by barges

18. Solid pieces of aluminum are called

(1) "bricks"
(2) "blocks"
(3) "pigs"
(4) "bars"

19. About how long ago did Charles discover his process?

(1) 10 years
(2) 25 years
(3) 75 years
(4) 200 years

20. When cryolite is heated, it becomes

(1) a powder
(2) a gas
(3) a solid
(4) a liquid

21. Which of the following statements is not true of aluminum?

(1) It will rust.
(2) It can be shaped into many forms.
(3) It is used to make more than 3000 different things.
(4) It can be polished like silver.

22. Which of the following was <u>not</u> a result of Charles's work?

(1) Many new industries were developed.
(2) Thousands of new jobs were created.
(3) Aluminum was made more durable.
(4) Aluminum was processed more inexpensively.

23. Where would an aluminum miner work most of the time?

(1) in the open air
(2) in a mine tunnel
(3) in a laboratory
(4) in a factory

24. What is the main reason that railway tracks are laid to the place where the bauxite is to be mined?

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26. What color is bauxite?

(1) It is always white.
(2) It is always red.
(3) It is always the same color as aluminum.
(4) It can be white, yellow, red or almost any color.

27. How is water used in making aluminum?

(1) to loosen the ore at the mine
(2) to dissolve the cryolite
(3) to dissolve the minerals in the powdered ore
(4) to wash the finished product

28. Why is aluminum a valuable metal today?

(1) It is very expensive
(2) It is often mistaken for silver.
(3) It is not very expensive and has many uses.
(4) It is as hard as diamond.

29. Why is aluminum produced in different forms?

(1) Different forms are needed for different purposes.
(2) Different refineries learned to make it in different ways.
(3) The different methods of refining it cause the different forms.
(4) The different forms depend on the color of the ore.

30. What source of electricity did Charles use in his laboratory?

(1) a wire from his father's house
(2) a portable electric generator
(3) batteries
(4) lightening

APPENDIX B

Table of Contents

Sets (VI)

You have known about sets of objects for a long time. You probably have a set of dishes in your home. Maybe your father has a set of garden tools or a set of golf clubs.

The word set is used in the study of mathematics. You can think of a set as a number of objects that are grouped together for some reason. The objects are called elements of the set. The dishes are the elements of a set of dishes. Each golf club is an element of the set of golf clubs.

The reason why objects are elements of a certain set may not be clear. We could have a set with three elements -- a horse, a book, and a dish -- if we chose to list these as the elements of the set.

If there are so many elements in a set that they all cannot be listed, we may just describe the set. Examples of this are:

the set with the elements all eleventh graders
the set which includes all horses
the set with all even numbers as its elements

Disjoint Sets

We are now going to learn about some things about pairs of sets. This first section is about pairs of sets that are called disjoint sets. You will be given examples of disjoint sets. See if you can tell what makes two sets disjoint sets.

The set with the elements 1,2,3 and the set with the elements 4,5,6 are examples of disjoint sets. However, the set with elements 1,2,3 and the set with the elements 3,4,5 are not disjoint sets.

The set with all men as its elements and the set with all women as its elements are disjoint sets. But, the set with all men as its elements and the set with all people as its elements are not disjoint sets.

The set with the elements a,b,c and the set with the elements x,y,z are disjoint sets. But, the set with the elements a,b and the set with the elements a,e,i,o,u are not disjoint sets.

Here are some more pairs of sets that are disjoint sets.

1. The set which has all dogs in it and the set which has all cats in it.

2. The set with 1,3,5,9 as its elements and the set with 4,2,8 as its elements.

3. The set with elements t,g,r and the set with the elements s,f.

4. The set which has all even numbers in it and the set which has all odd numbers in it.

Here are some more pairs of sets that are not disjoint sets.

1. The set which has all cars in it and the set which has all black Fords in it.

2. The set with 1,5,6 as its elements and the set with 5,8,2 as its elements.

3. The set with the elements s,t,u and the set with the elements s,a,t.

4. The set which has all odd numbers in it and the set which has all numbers greater than ten in it.

Can you make up other examples of disjoint sets?

Union of Two Sets

This section is about the union of two sets. The union of the set with top, ball, cat as its elements and the set with dog, car as its elements is the set with top, ball, cat, dog, car as its elements.

Some more examples of the union of two sets will be given. See if you can tell how to make the union of two sets.

1. The union of the set with the element Tom and the set with the element Joe is the set with the elements Tom, Joe.

2. The union of the set with the element Tom and the same set (that is, the set with the element Tom), is the set with the element Tom.

3. The union of the set with the elements Tom, Joe and the set with the element Bill is the set with the elements Tom, Joe, Bill.

4. The union of the set with the elements Tom, Joe and the set with the element Joe is the set with the elements Tom, Joe.

5. The union of the set with 0,1,2 as its elements and the set with 7,8,9 as its elements is the set with 0,1,2,7,8,9 as its elements.

6. The union of the set with elements a,b,c and the set with the elements b,c,d is the set with elements a,b,c,d.

7. The union of the set which has all men over six feet tall in it and the set which has all women over six feet tall in it is the set which has adults over six feet tall in it.

8. The union of the set which has all numbers greater than ten in it and the set which has all numbers greater than twenty in it is the set which has all numbers greater than ten in it.

Can you tell how to make the union of two sets?

Intersection of Two Sets

This section is about the intersection of two sets. The intersection of the set with a,b,c as its elements and the set with c,d,e as its elements is the set with c as its elements.

Some more examples of the intersection of two sets will be given. See if you can tell how to make the intersection of two sets.

1. The intersection of the set with Tom as its element and the same set (that is, the set with Tom as its element) is the set with Tom as its element.

2. The intersection of the set with Tom, Joe as its elements and the set with Joe as its element is the set with Joe as its element.

3. The intersection of the set with Tom as its element and the set with Joe as its element is the set without any elements.

4. The intersection of the set with 8,6,4,2 as its elements and the set with 1,2,3,4,5 as its elements is the set with 2,4 as its elements.

5. The intersection of the set which has all animals in it and the set with barn, cow, house, dog as its elements is the set with cow, dog as its elements.

6. The intersection of the set with a,e,i,o,u as its elements and the set with d,a,e,r,b as its elements is the set with a,e as its elements.

7. The intersection of the set with the elements 7,8,9,10 and the set with the elements 4,9,6,7 is the set with the elements 9,7.

8. The intersection of the set which has all whole numbers less than ten in it and the set which has all whole numbers greater than four in it is the set with 5,6,7,8,9 as its elements.

9. The intersection of the set with Joe, Mary, Dick, Bob as its elements and the set with Bill, Jan, Mary as its elements is the set with Mary as its element.

Can you tell how to make the intersection of two sets?

Sets (VD)

You have known about sets of objects for a long time. You probably have a set of dishes in your home. Maybe your father has a set of garden tools or a set of golf clubs.

The word set is used in the study of mathematics. You can think of a set as a number of objects that are grouped together for some reason. The objects are called the elements of the set. The dishes are the elements of a set of dishes. Each golf club is an element of the set of golf clubs.

The reason why objects are elements of a certain set may not be clear. We could have a set with three elements -- a horse, a book, and a dish -- if we chose to list these as the elements of the set.

If there are so many elements in a set that they all cannot be listed, we may just describe the set. Examples of this are:

the set with the elements all eleventh graders
the set which includes all horses
the set with all even numbers as its elements

Disjoint Sets

In this section we will learn about disjoint sets. Two sets are said to be disjoint if no element belongs to both sets.

The set which is made up of all boys and the set which is made up of all girls are disjoint sets because no one is a boy and a girl at the same time. Everyone is either a member of the set of all boys or a member of the set of all girls.

The set of all eleventh graders and the set of all football players are not disjoint because some eleventh graders are also football players.

Another example of disjoint sets is the set with a,b,c,d as its elements and the set with e,f,g as its

elements. These sets are disjoint because none of the elements of either set are also elements of the other set.

An example of sets that are not disjoint is the set with elements a,e,i,o,u and the set with elements a,b,c,d. These two sets are not disjoint because the letter a is an element in both sets.

Union of Two Sets

This section is about the union of two sets. The union of two sets is a set that contains all of the elements in either the first set or in the second set.

For example, the union of the set which has all eleventh grade boys in it and the set which has all eleventh grade girls in it is the set which has all eleventh graders in it.

The union of the set with A,B,C,D as its elements and the set with D,E,F as its elements is the set with A,B,C,D,E,F as its elements. You will see that each element of the set with A,B,C,D as its elements is in the union and that each element of the set with D,E,F as its elements is in the union. You will also see that the letter D is put in only once in the union although it appears in both sets.

An element is in the union of two sets because it is an element of one set or the other. For example, the letter d is in the union of the set with b,d as its elements and the set with b,f,g as its elements because the letter d is an element of the set with b,d as its elements. The letter b is also in the union because it is an element of the set whichhas b,d in it and the set which has b,f,g in it as well. The whole union of the set with elements b,d and the set with elements b,f,g is the set with elements b,d,f,g. Each of the letters in the set with b,d,f,g as its elements are in either the set with b,d as its elements or the set with b,g,f as its elements.

Intersection of Two Sets

This section is about the intersection of two sets. The intersection of two sets is a set that has all the elements that are in teh first set and that are in the second set.

For example, the intersection of the set of eleventh graders and the set of football players is the set of eleventh graders who are football players.

The intersection of the set with elements A,B,C,D and the set with the elements A,C,E,F is the set with elements A,C. The letters A and C are the only letters that are in both the set with A,B,C,D as elements and the set with A,C,E,F as elements. An element is not in the intersection unless it is in both of the sets.

Here is another example. The intersection of the set with house, barn, shed as its elements and the set with house, barn, school as its elements is the set with house, barn as its elements. The intersection is the set with house, barn as its elements because "house" and "barn" are elements of both the set with house, barn, shed as its elements and the set with house, barn, school as its elements.

Sets (FI)

There are many ways to talk about "any group of things." We might say: a <u>set</u> of dishes,
or a set of garden tools,
or a _____ of golf clubs.

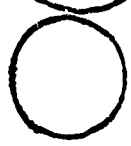
Can you see one way we may talk about a group of things? Any group of things may be called a _____.

We can show a set in several ways. Think about what is said below:

A <u>set</u> of dishes may be shown by 

A set of garden tools may be shown by 

means a _____ of golf clubs.

A  may be used to show a _____. Now you can see that one way to show a set is by a _____.

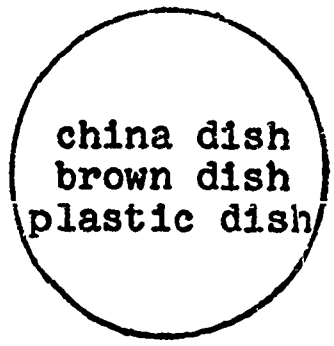
Sometimes we want to refer to things in a set. The <u>elements</u> of a set of golf clubs are each of the golf clubs.

The elements of a 

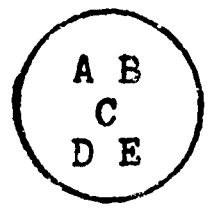
are each of the garden tools. You can see that a china dish, a brown dish and a plastic dish are _____ of 

. One way to show the elements of 

is like this



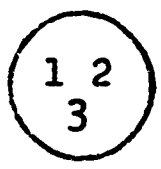
The 

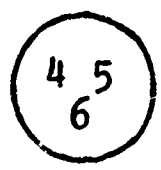
might be shown by 

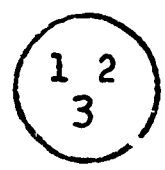
where the elements are A,B,C,D and E.

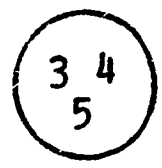
Disjoint Sets

Let's think about two sets that are called disjoint sets. See if you can tell from the examples what makes two sets disjoint sets.



and 

are <u>disjoint</u>, 

and 

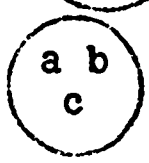
are <u>not</u> disjoint.

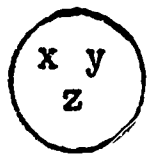
and 

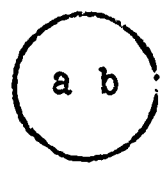
are <u>disjoint</u>, 

and 

are <u>not</u> disjoint.



and 

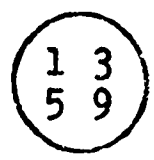
are <u>disjoint</u>, 

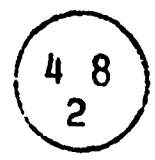
and 

are <u>not</u> disjoint.

Below you will find pairs of sets that are disjoint sets.

and 

, 

and 

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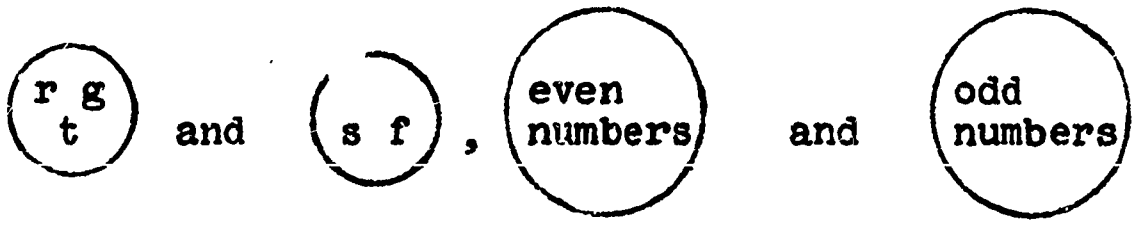
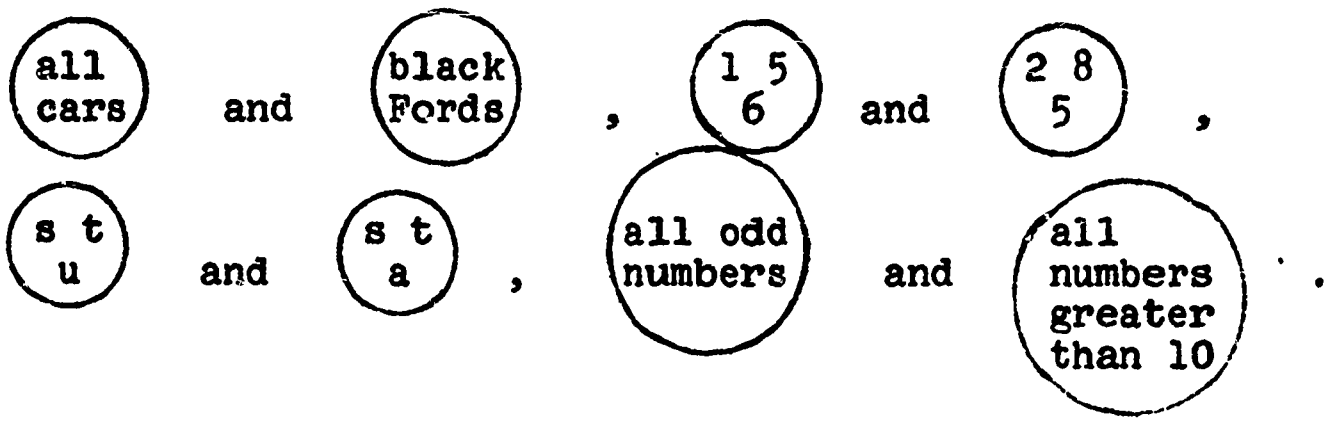


.

Here are some pairs of sets that are <u>not</u> disjoint sets.

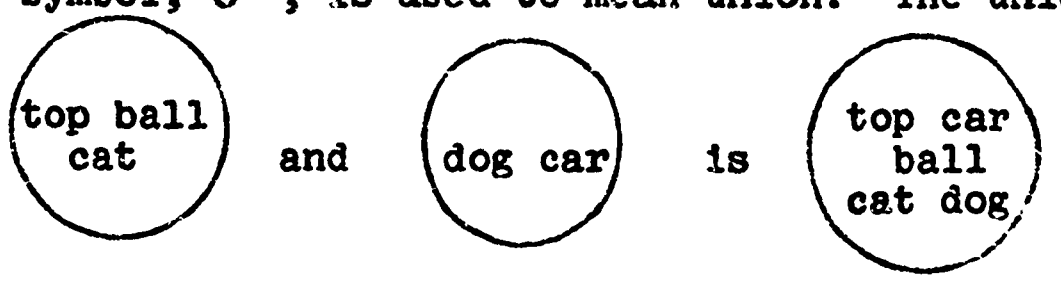


.

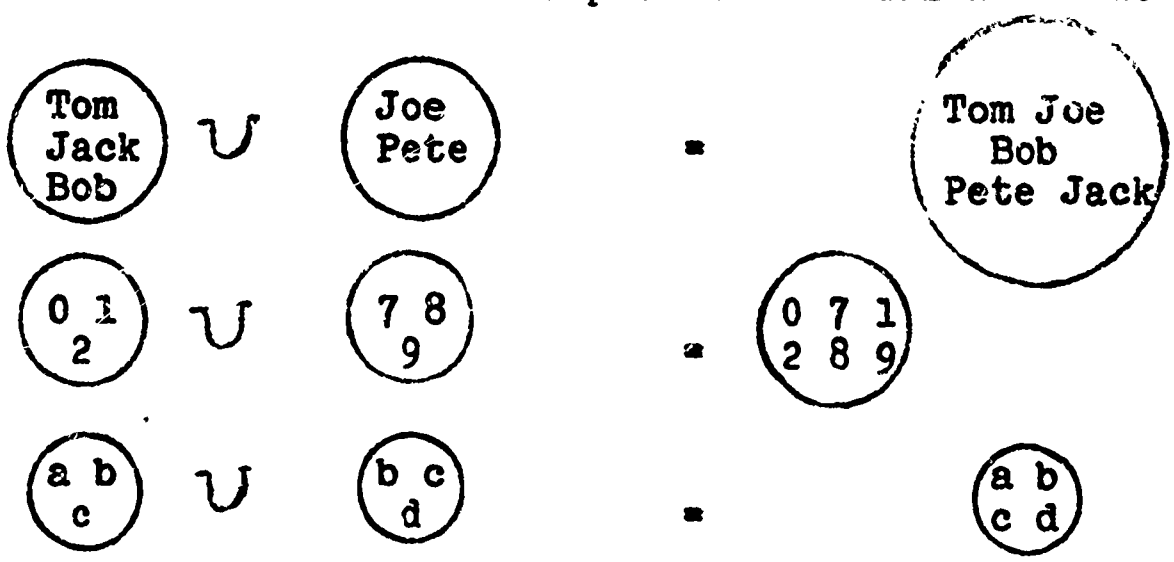
Can you make up other examples of disjoint sets?

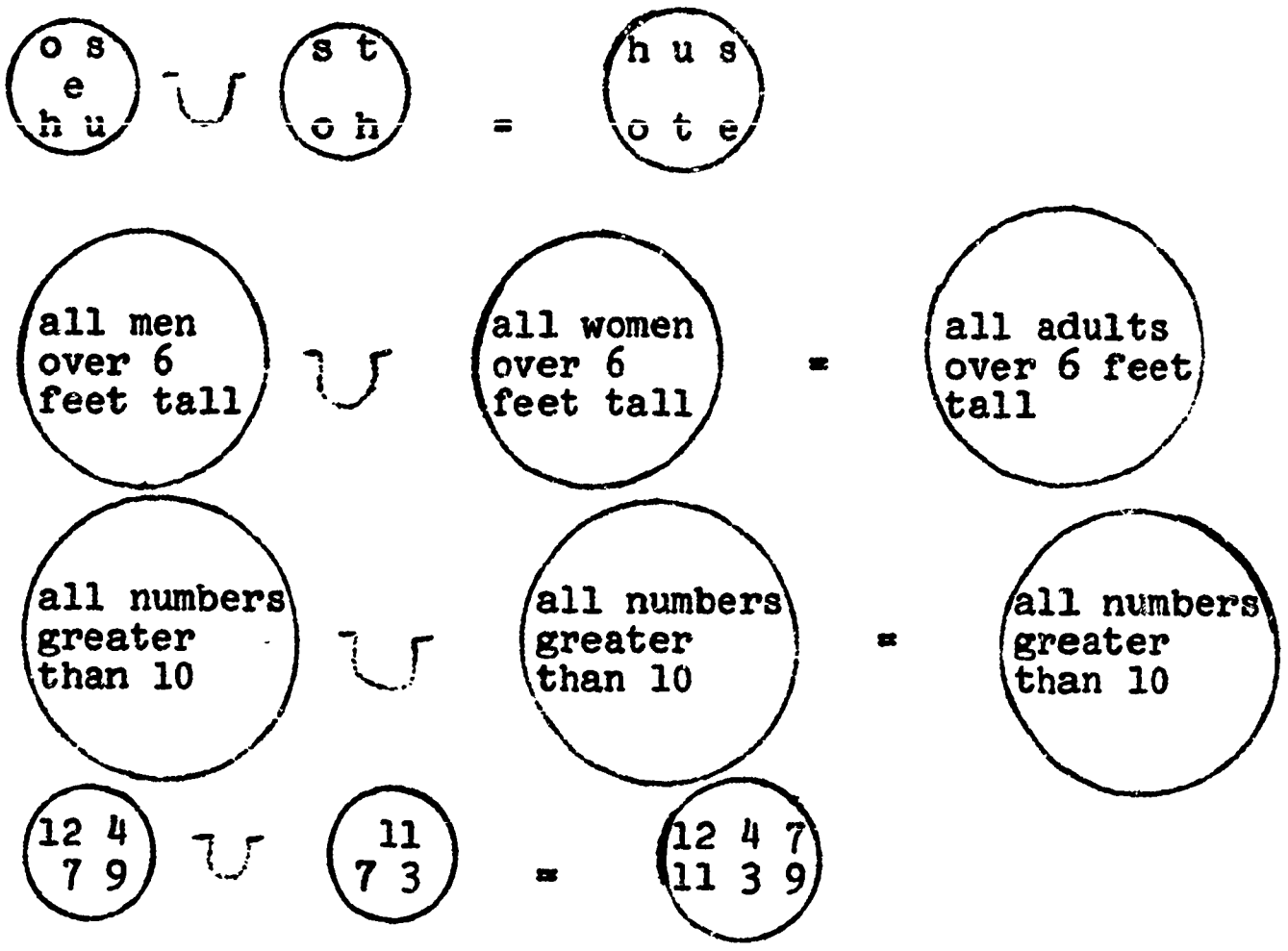
Union of Two Sets

Now we will look at the <u>union</u> of two sets. The symbol, $\cup$, is used to mean union. The union of



Here are some more examples of the union of two sets.



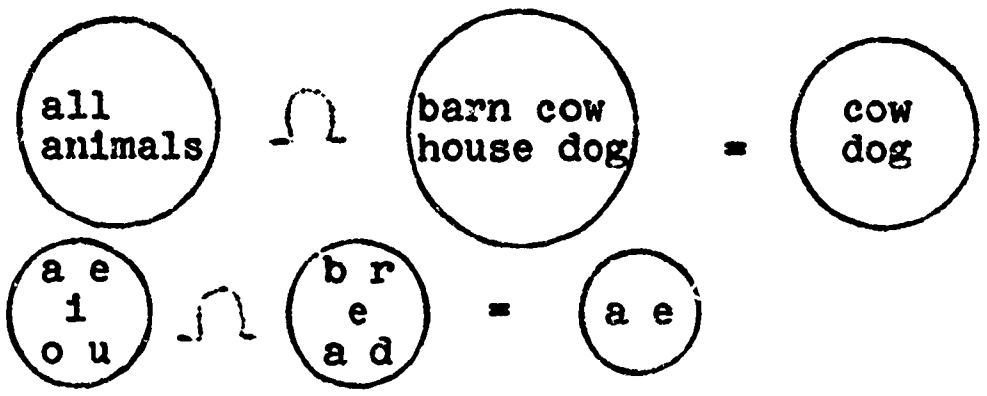


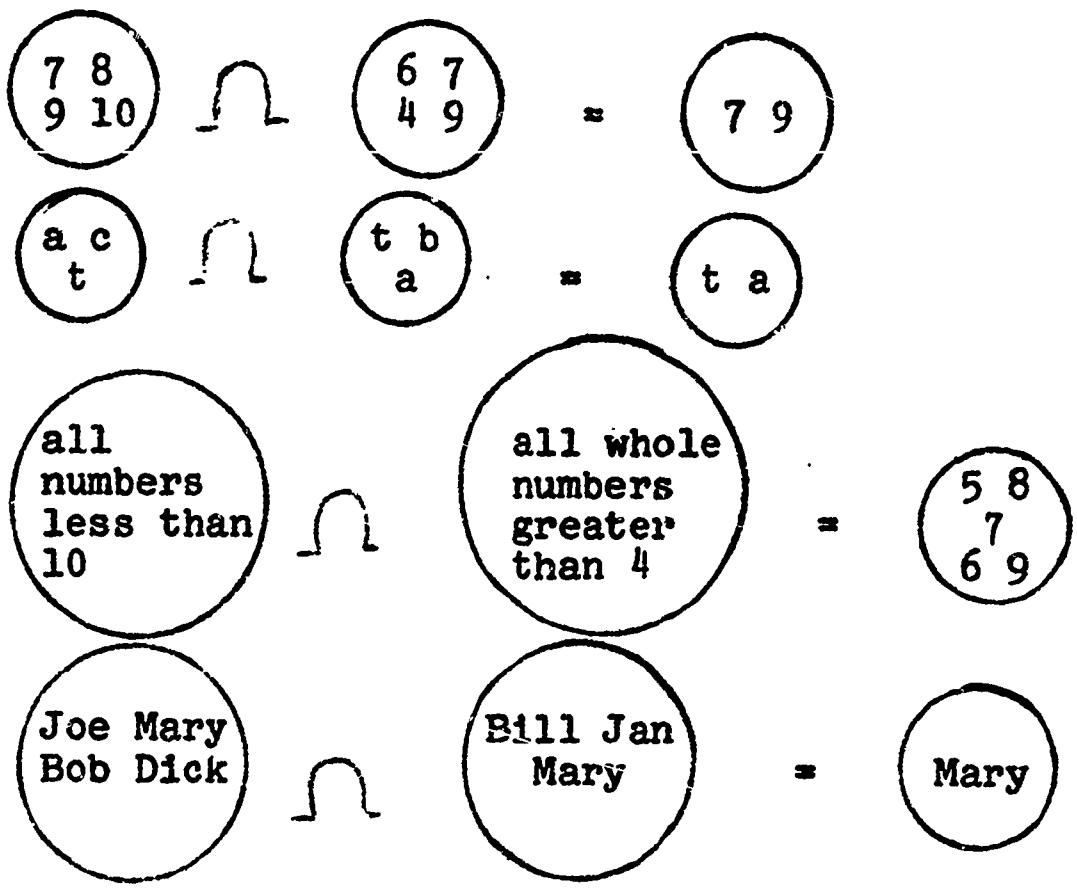
Can you tell how to make the union of two sets?

Intersection of Two Sets

The symbol, ∩ , is used to mean the intersection of two sets. The intersection of 8 6 / 4 2 and 1 2 3 / 4 5 is 2 4 .

Here are some more examples of the intersection of two sets.





Can you tell how to make the intersection of two sets?

Sets (FD)

There are many ways to talk about "any group of things." We might say: a <u>set</u> of dishes,
or a set of garden tools,
or a _____ of golf clubs.

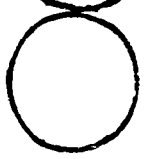
Can you see one way we may talk about a group of things? Any group of things may be called a _____.

We can show a set in several ways. Think about what is said below:

A <u>set</u> of dishes may be shown by 

A set of garden tools may be shown by 

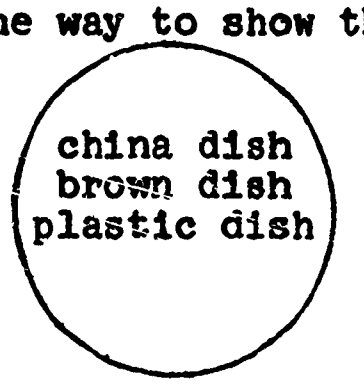
means a _____ of golf clubs.

A  may be used to show a _____. Now you can see that one way to show a set is by a _____.

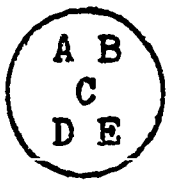
Sometimes we want to refer to things in a set. The <u>elements</u> of a set of golf clubs are each of the golf clubs. The elements of a 

are each of the garden tools. You can see that a china dish, a brown dish and a plastic dish are _____ of 

. One way to show the elements of 

is like this 

. The 

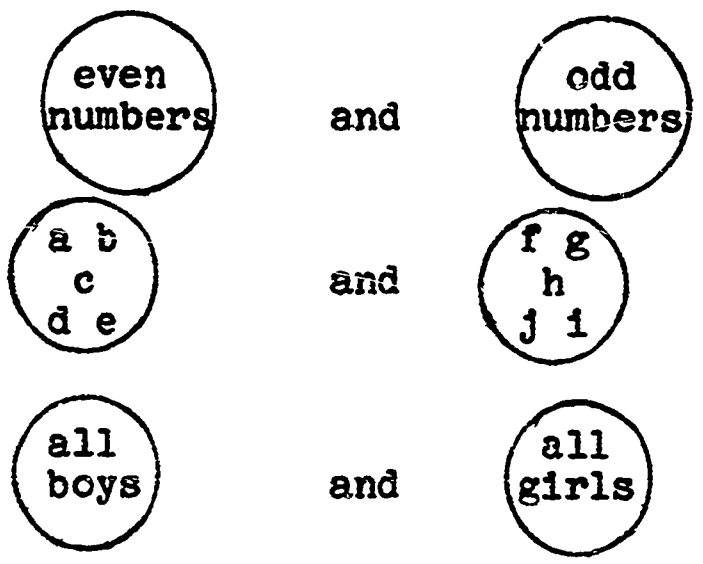
might be shown by 

where the elements are

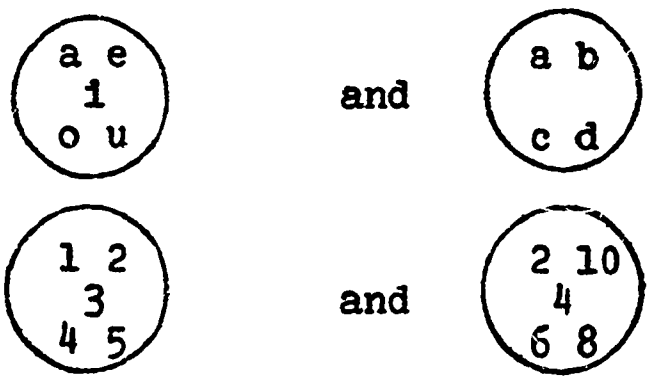
A,B,C,D and E.

Disjoint Sets

Two sets are said to be <u>disjoint</u> sets if <u>no</u> element belongs to <u>both</u> sets.

Examples: 

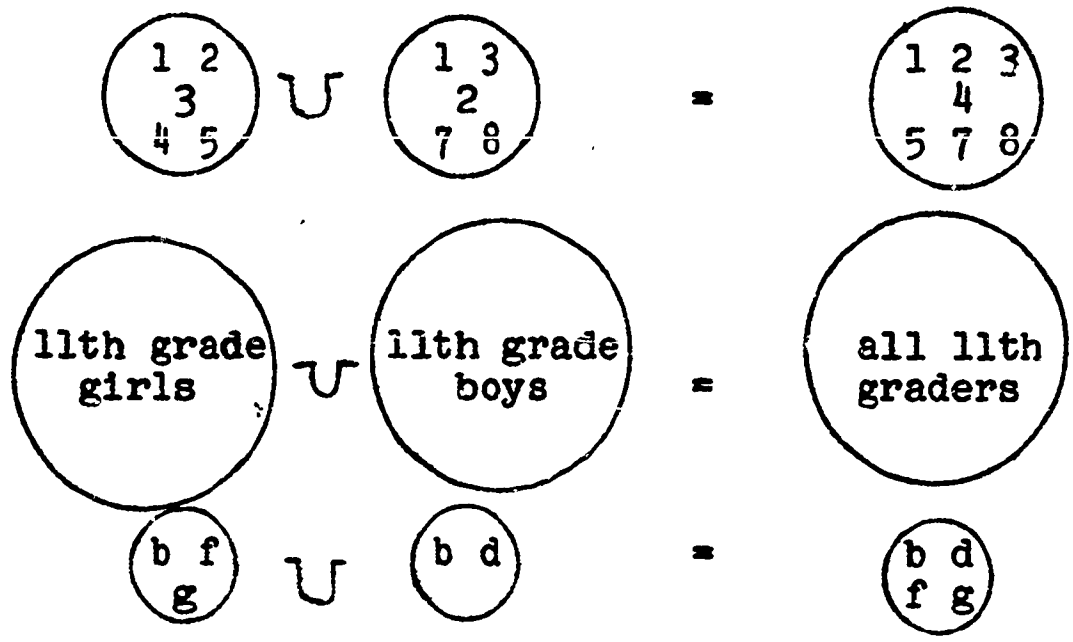
The sets below are <u>not</u> disjoint.



Union of Two Sets

The <u>union</u> ($\cup$) of two sets is a set that has in it all of the different elements in both sets.

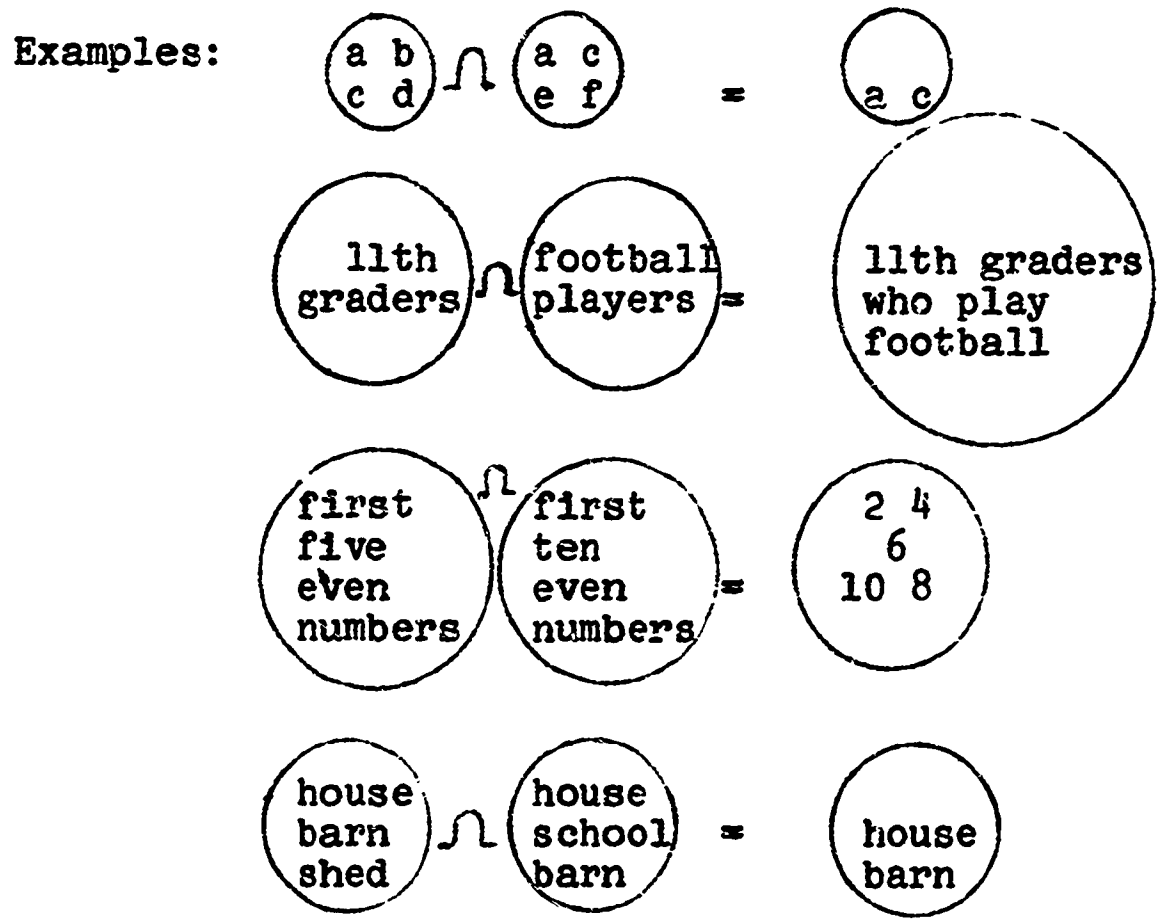
Examples: 



Intersection of Two Sets

The <u>intersection</u> (∩) of two sets is a set that has in it all of the elements that are the <u>same</u> in both sets.

Examples:



Posttest

Name _____

On this test, $\cup$ means union.
On this test, $\cap$ means intersection.

Answer questions 1-12 either YES or NO.

1. Is 8 an element of the set of all whole numbers between 1 and 10? _____

2. Are {table, chair, barn} and {house, knife, string} disjoint sets? _____

3. Could horse be an element of {all animals} ? _____

4. Think about the set with the elements small, long, short and the set with the elements tall, high, big. Are these sets disjoint sets? _____

5. Could table be an element of the set of all members of a family? _____

6. Is the intersection of the set with the elements 1,2,3,4 and the set with the elements 2,3,4,5,6 a new set with the elements 2,3,4? _____

7. Is 22 an element of {even numbers between 1 and 20} ? _____

8. Are {pen, pencil, paper} and {paper, pen, pencil} disjoint sets? _____

9. Think about (15, 16, 17) and (17, 20).

Is 16 an element of the ∩ of these sets?

_____

10. Are the set with the elements a,b,c,d,e and the set with the elements a,e,i,o,u disjoint sets?

_____

11. Think about the sets with the elements 8, 9, 10 and the set with the elements 13, 9. Is 13 an element of the union of two sets? _____

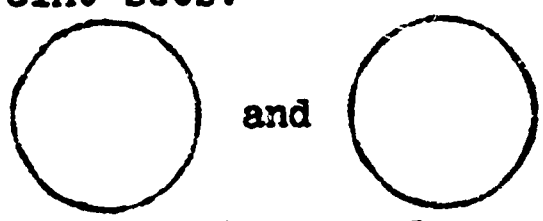
12. Are {2,4,6,8,10} and {1,2,3,4,5} disjoint sets? _____

---

13. What is one element of { letters in the alphabet } ? _____

14. Write down an example of something that is <u>not</u> an element of the set with 2,4,6,8 as its elements. _____

15. Make two disjoint sets.



16. Think about the set with the elements wood, lead iron, steel and the set with the elements iron, wood, steel, lead. Write the intersection of these two sets. _____

17. If (a, c, l, m, o, q, r) is the ∪ of 2 sets, what could the 2 original sets be? _____ and _____

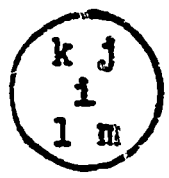
18. Write down one element of the set of the days of the week. _____

19. List two sets that are disjoint.

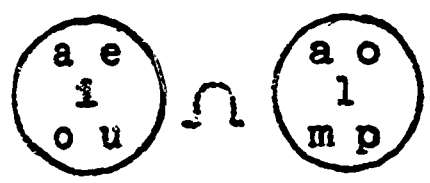
{_____} and {_____}

20. Think about the set with the elements a,o,u and the set with the elements l,m,n,o. What is the union of these two sets? _____

21. Write down something that does not belong to



. _____

22. 

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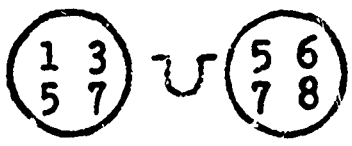
23. If you know that the intersection of two sets is the set with big, fat as its elements what could the two original sets be? _____

_____

24. Give one element of 

. _____

25. 

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26. If you know that the union of two sets is the set with house, barn, cat, dog, boy as its elements, what might be the two original sets?

_____ and _____

Name _____

Write as many words as you can that have meanings which are the same as or similar to the four words below.

Antipodal	Duress	Altercation	Nascent

APPENDIX C

Table of Contents

Synonym Production Test Used in Vocabulary Study III

Production Test

Name ______________________________

Write as many words as you can that have meanings which are the same as or similar to the four words below.

Alacrity	Lissome	Succinct	Paroxysm
________	________	________	________
________	________	________	________
________	________	________	________
________	________	________	________
________	________	________	________
________	________	________	________
________	________	________	________
________	________	________	________
________	________	________	________
________	________	________	________
________	________	________	________
________	________	________	________

Name _____

Write as many words as you can that have meanings which are the same as or similar to the four words below.

Antipodal	Duress	Altercation	Nascent

Name _____

Write as many words as you can that have meanings which are the same as or similar to the four words below.

Limpid	Stripling	Salubrious	Ignominious

Synonym Matching Test Used in Vocabulary Study III

Matching Test

Name _____

This is a test to see how well you have learned the correct meanings of the words you just studied. Lists 1 and 2 represent synonyms for the words in Groups 1 and 2. For each word in List 1, write the number in the blank that corresponds to the word that means the same or most nearly the same from Group 1. After you have finished List 1 then continue on to List 2 using the words in Group 2. Only Group 1 words are to be used with the synonyms in List 1 and Group 2 words used with List 2 synonyms.

Group 1

1. Succinct
2. Paroxysm
3. Lissome
4. Duress
5. Altercation
6. Stripling

List 1

___ willowy
___ cub
___ squabble
___ minor
___ brief
___ control
___ quarrel
___ argument
___ spasm
___ youth
___ convulsion
___ dispute
___ flexible
___ outburst
___ restraint
___ confinement
___ curt
___ captivity
___ limber
___ lad
___ seizure
___ condensed
___ supple
___ short

Group 2

1. Limpid
2. Nascent
3. Salubrious
4. Ignominious
5. Alacrity
6. Antipodal

List 2

___ treacherous
___ immature
___ promptness
___ emerging
___ converse
___ serene
___ eagerness
___ punctuality
___ wholesome
___ beginning
___ invigorating
___ quickness
___ dishonorable
___ bracing
___ transparent
___ clear
___ contrasting
___ crystalline
___ fraudulent
___ new
___ healthful
___ opposite
___ vile
___ reverse

Definition Material Used in Vocabulary Study III

Time: _____

Definitions

Directions: Read the definition of each word carefully and then write in the space provided below it a definition in your own words.

A person undergoing a visible and violent reaction from either physical or emotional causes can be said to be having a paroxysm. Thus a paroxysm is any unusually explosive excitation.

When all the elements of the environment work together to produce a feeling of general well being, it can be considered a salubrious environment. Thus salubrious describes any condition that is good for one.

When two or more people express different opinions, get excited, and contradict each other, the event is called an altercation. Thus an altercation is a social interaction characterized by heated exchange of opposing arguments.

A person who performs a task as soon as he perceives it and as though he really wants to do it is acting with alacrity. Thus alacrity implies both immediacy and cheerfulness in the carrying out of some activity.

Synonym Material Used in Vocabulary Study III

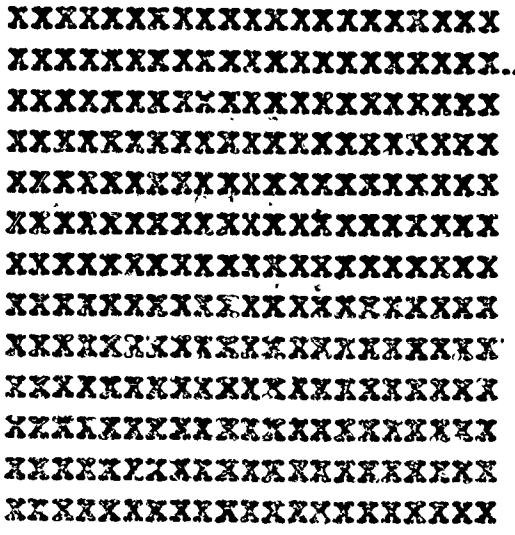
Synonyms

Directions: On each of the following pages are two lists of words. The first list is made up of the words whose meanings you are to learn. In the second list, there is a synonym for each word in the first plus one word which is not a synonym for any of the words in the first list. Write the word from List 1 in the space beside its synonym in List 2. Write "none" by the word which is not a synonym. When you have finished all five blanks, fold the page back along the dotted line and check your answers as they are given on the other side of the page. Then follow the same procedure for the other pages in this booklet.

List 1: Antipodal Ignominious Stripling Succinct

List 2:

1. _____lad
2. _____dishonorable
3. _____short
4. _____heal
5. _____opposite

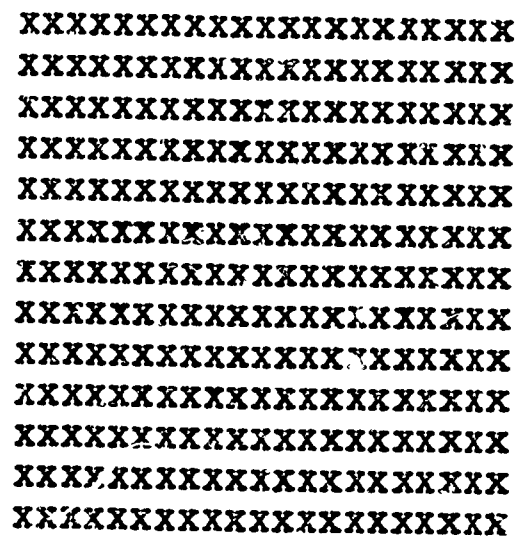


1. stripling
2. ignominious
3. succinct
4. none
5. antipodal

List 1: antipodal ignominious stripling succinct

List 2:

1. _____brief
2. _____reverse
3. _____fraudulent
4. _____invite
5. _____cub

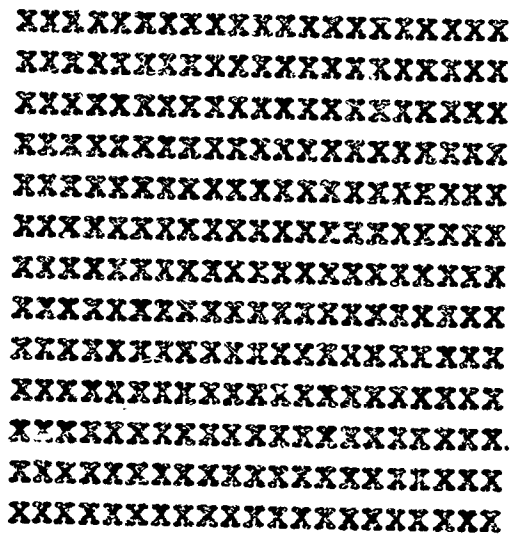


1. succinct
2. antipodal
3. ignominious
4. none
5. stripling

List 1: antipodal ignominious stripling succinct

List 2:

1. _____treacherous
2. _____converse
3. _____curt
4. _____lad
5. _____incur



1. ignominious
2. antipodal
3. succinct
4. stripling
5. none

List 1: antipodal ignominious stripling succinct

List 2:

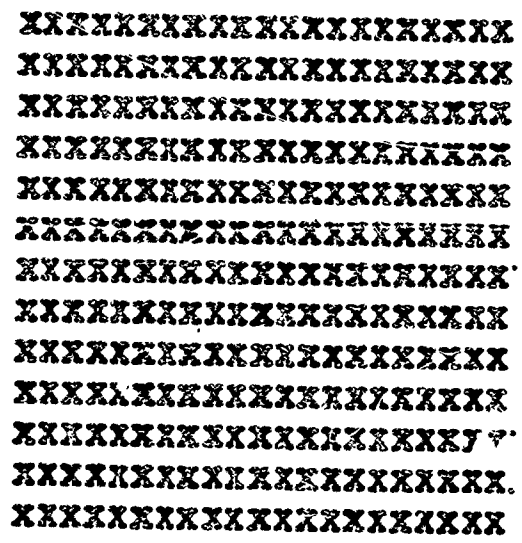
1. _____material

2. _____counter

3. _____minor

4. _____vile

5. _____compressed



1. none
2. antipodal
3. stripling
4. ignominious
5. succinct

List 1: antipodal ignominious stripling succinct

List 2:

1. _____current
2. _____compact
3. _____sprig
4. _____contemptible
5. _____antagonistic

xxxxxxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxxxxxx
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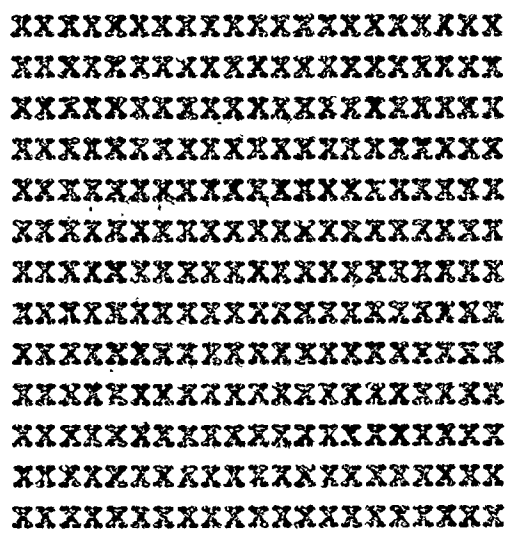
1. none
2. succinct
3. stripling
4. ignominious
5. antipodal

List 1: antipodal ignominious stripling succinct

List 2:

1. _____contrasting
2. _____foul
3. _____hurried
4. _____youth
5. _____condensed



1. antipodal
2. ignominious
3. none
4. stripling
5. succinct

Sentence Material Used in Vocabulary Study III

Time: _____

Sentences

Directions; On the next page are given four words whose meanings you are to learn followed by five short sentences. In the blank to the left of each sentence write the word non by the sentence not related to any of the words. When you have classified each sentence fold the page along the dotted line and check your answers. For each word there is only one sentence and there is one sentence which does not have a related word. Then continue the same procedure for the remainder of the pages in the booklet.

List 1: duress limpid lissome nascent

List 2:

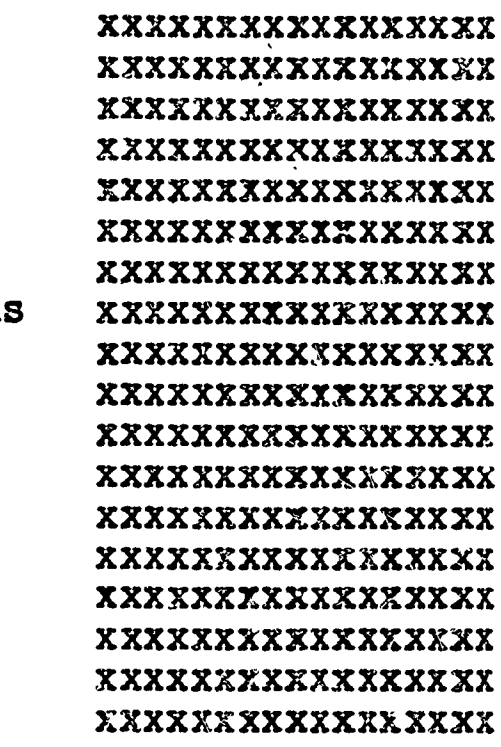
1. _____ A tulip bulb shows just a tip of green above the earth.

2. _____ A tall tale told by a fisherman.

3. _____ A hula dancer performs with grace and skill.

4. _____ Direct rays from the sun light up a tiny glade encircled by deep forest.

5. _____ A wild bird trys to escape through the bars of his cage.



1. Nascent
2. none
3. lissome
4. limpid
5. duress

List 1: duress limpid lissome nascent

List 2:

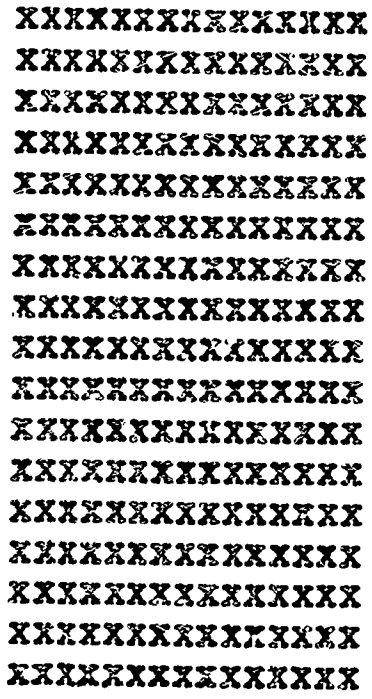
1. _____ Sounds of a flute coming from a distance through still air.

2. _____ The first fading of darkness each morning.

3. _____ A dog's faith in his master.

4. _____ A dictator refuses to allow the newspapers "Freedom of expression."

5. _____ A weeping willow moving in a breeze.



1. limpid
2. nascent
3. none
4. duress
5. lissome

List 1: duress limpid lissome nascent

List 2:

1. _____ A dangerous criminal is handcuffed to two policemen.

2. _____ Three young greyhounds frolicking on a lawn.

3. _____ A rock crystal free of impurities.

4. _____ A magician casts his spell.

5. _____ A sketch containing the necessary notes for a large ambitious sculpture.

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1. duress
2. lissome
3. limpid
4. none
5. nascent

List 1: duress limpid lissome nascent

List 2:

1. _____ A man weakened by fatigue.

2. _____ An engineer realizing which line of attack will eventually produce the solution to a construction problem.

3. _____ A beautiful princess held captive by a wicked knight.

4. _____ The fingers of a concert pianist as they run across a keyboard.

5. _____ An argument presented briefly but well.

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1. none
2. nascent
3. duress
4. lissome
5. limpid

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List 1: duress limpid lissome nascent

List 2:

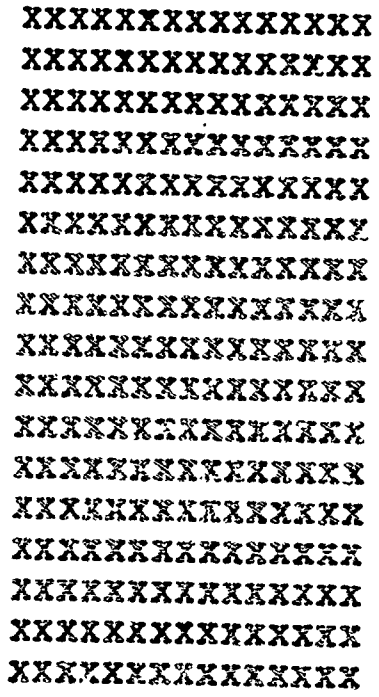
1. _____ An acrobat performs a difficult feat with ease.

2. _____ An author's style characterized by being very understandable and smooth.

3. _____ An amusing story told to an audience.

4. _____ A newborn baby lying in a cradle.

5. _____ A child is made to "clean up his plate" before he gets dessert.



1. lissome
2. limpid
3. none
4. nascent
5. duress

List 1: duress limpid lissome nascent

List 2:

1. _____ A butterfly coming out of its cocoon.

2. _____ An over active mental patient is put in a strait jacket.

3. _____ The large, beautiful eyes of a doe.

4. _____ An ice skater bends and sways gracefully while figure skating.

5. _____ A word whose meaning is unknown.

1. nascent
2. duress
3. limpid
4. lissome
5. none

Sample Synonym Production Test Used in
Vocabulary Study IV

SAMPLE SYNONYM PRODUCTION TEST

Name _____

Write as many synonyms for the following words as possible.

tractive

gauche

lissome

surreptitious

Synonym Materials Used in Vocabulary St: Ly IV

NAME _____

DIRECTIONS: On each of the following pages are two lists of words. The first list is made up of the words whose meanings you are to learn. In the second list, there is a synonym for each word in the first plus one word which is not a synonym for any of the words in the first list. Write the word from List 1 in the space beside its synonym in List 2. Write "none" by the word which is not a synonym. When you have finished all five blanks, fold the page back and check your answers as they are given on the other side of the page. Then follow the same procedure for the other pages in this booklet.*

START TIME _____

*These same directions appeared on the front of every booklet.

Booklet 1

Booklet 2

List 1: tractive, gauche, lissome, surreptitious

List 2:

1. _____ drawing
2. _____ clumsy
3. _____ pliable
4. _____ secretive
5. _____ customer

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List 1: juxtapose, acumen, inveigh, celerity

List 2:

1. _____ wisdom
2. _____ cypress
3. _____ join
4. _____ censure
5. _____ velocity

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1. tractive
2. gauche
3. lissome
4. surreptitious
5. none

1. acumen
2. none
3. juxtapose
4. inveigh
5. celerity

List 1: tractive, gauche, lissome, surreptitious

List 2:

1.	_____	awkward
2.	_____	intimate
3.	_____	pulling
4.	_____	flexible
5.	_____	shady

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List 1: juxtapose, acumen, inveigh, celerity

List 2:

1.	_____	speed
2.	_____	inspire
3.	_____	prudence
4.	_____	blame
5.	_____	neighbor

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1. gauche
2. none
3. tractive
4. lissome
5. surreptitious

1. celerity
2. none
3. acumen
4. inveigh
5. juxtapose

List 1: tractive, gauche, lissome, surreptitious

List 2:

1. _____ ungraceful
2. _____ plastic
3. _____ sneaky
4. _____ hauling
5. _____ scholar

List 1: juxtapose, acumen, inveigh, celerity

List 2:

1. _____ sanitary
2. _____ adjoin
3. _____ reproach
4. _____ swiftness
5. _____ keenness

1. gauche
2. lissome
3. surreptitious
4. tractive
5. none

1. none
2. juxtapose
3. inveigh
4. celerity
5. acumen

List 1: tractive, gauche, lissome, surreptitious

List 2:

1.	_____	wedlock	XXXXXXXXXXXXXXXXX
2.	_____	underhandedness	XXXXXXXXXXXXXXXXX
3.	_____	gawky	XXXXXXXXXXXXXXXXX
4.	_____	elastic	XXXXXXXXXXXXXXXXX
5.	_____	tugging	XXXXXXXXXXXXXXXXX

List 1: juxtapose, acumen, inveigh, celerity

List 2:

1.	_____	border	XXXXXXXXXXXXXXXXX
2.	_____	rapidity	XXXXXXXXXXXXXXXXX
3.	_____	condemn	XXXXXXXXXXXXXXXXX
4.	_____	waterfall	XXXXXXXXXXXXXXXXX
5.	_____	brightness	XXXXXXXXXXXXXXXXX

1. none
2. surreptitious
3. gauche
4. lissome
5. tractive

1. juxtapose
2. celerity
3. inveigh
4. none
5. acumen

List 1: tractive, gauche, lissome, surreptitious

List 2:

1. _____ towing
2. _____ graceful
3. _____ granulate
4. _____ cumbersone
5. _____ shifty

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List 1: juxtapose, acumen, inveigh, celerity

List 2:

1. _____ gaseous
2. _____ haste
3. _____ connect
4. _____ shrewdness
5. _____ denounce

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1. tractive
2. lisscme
3. none
4. gauche
5. surreptitious

1. none
2. celerity
3. juxtapose
4. acumen
5. inveigh

List 1: tractive, gauche, lissome, surreptitious

List 2:

1. _____ bendable
2. _____ stealthy
3. _____ unwieldy
4. _____ merrily
5. _____ dragging

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List 1: juxtapose, acumen, inveigh, celerity

List 2:

1. _____ meet
2. _____ cleverness
3. _____ abuse
4. _____ melodious
5. _____ acceleration

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1. lissome
2. surreptitious
3. gauche
4. none
5. tractive

1. juxtapose
2. acumen
3. inveigh
4. none
5. celerity

Booklet 3

Booklet 4

List 1: taxonomy, parturition, alacrity, chivalrous

List 2:

1. _____ eagerness
2. _____ classification
3. _____ unselfish
4. _____ scratchy
5. _____ childbirth

List 1: rancid, antipodal, explication, limpid

List 2:

1. _____ odorous
2. _____ elaboration
3. _____ woody
4. _____ transparent
5. _____ opposite

1. alacrity
2. taxonomy
3. chivalrous
4. none
5. parturition

1. rancid
2. explication
3. none
4. limpid
5. antipodal

List 1: taxonomy, parturition, alacrity, chivalrous

List 2:

1. _____ birth
2. _____ tacky
3. _____ generous
4. _____ readiness
5. _____ categorization

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List 1: rancid, antipodal, explication, turnpid

List 2:

1. _____ translucent
2. _____ stale
3. _____ contrary
4. _____ development
5. _____ mischief

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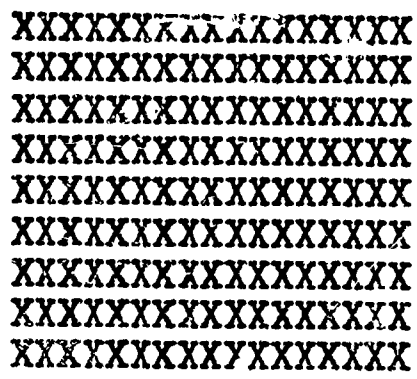
1. parturition
2. none
3. chivalrous
4. alacrity
5. taxonomy

1. limpid
2. rancid
3. antipodal
4. explication
5. none

List 1: taxonomy, parturition, alacrity, chivalrous

List 2:

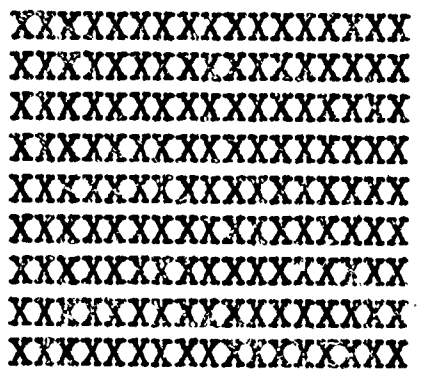
1. _____ soapy
2. _____ benevolent
3. _____ grouping
4. _____ nativity
5. _____ zest



List 1: rancid, antipodal, explication, limpid

List 2:

1. _____ lucid
2. _____ running
3. _____ expansion
4. _____ smelly
5. _____ contrasted



1. none
2. chivalrous
3. taxonomy
4. parturition
5. alacrity

1. limpid
2. none
3. explication
4. rancid
5. antipodal

List 1: taxonomy, parturition, alacrity, chivalrous

List 2:

1. _____ subdivision
2. _____ considerate
3. _____ hearty
4. _____ hatching
5. _____ cheerful readiness

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List 1: rancid, antipodal, explication, limpid

List 2:

1. _____ opposing
2. _____ clear
3. _____ old
4. _____ warmth
5. _____ amplification

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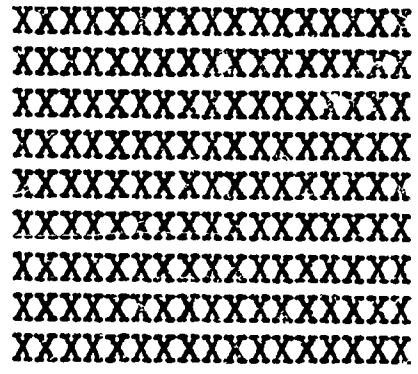
1. taxonomy
2. chivalrous
3. none
4. parturition
5. alacrity

1. antipodal
2. limpid
3. rancid
4. none
5. explication

List 1: taxonomy, parturition, alacrity, chivalrous

List 2:

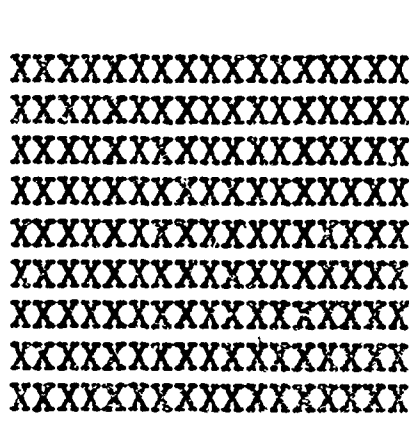
1. _____ spirit
2. _____ organization
3. _____ delivery
4. _____ gallant
5. _____ lighted



List 1: rancid, antipodal, explication, limpid

List 2:

1. _____ enlargement
2. _____ crystal
3. _____ musty
4. _____ antithesis
5. _____ beneath



1. alacrity
2. taxonomy
3. parturition
4. chivalrous
5. none

1. explication
2. limpid
3. rancid
4. antipodal
5. none

List 1: taxonomy, parturition, alacrity, chivalrous

List 2:

1. _____ courteous
2. _____ do-able
3. _____ keenness
4. _____ genesis
5. _____ pigeonholing

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List 1: rancid, antipodal, explication, limpid

List 2:

1. _____ repulsive
2. _____ contradictory
3. _____ wishful
4. _____ interpretation
5. _____ crystalline

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1. chivalrous
2. none
3. alacrity
4. parturition
5. taxonomy

1. rancid
2. antipodal
3. none
4. explication
5. limpid

Booklet 5

Booklet 6

List 1: paroxysm, sinuous, reciprocation, aberration

List 2:

1. _____ sailing
2. _____ frenzy
3. _____ exchange
4. _____ unconformity
5. _____ circuitous

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List 1: boorish, mediate, delineate, endemic

List 2:

1. _____ vulgar
2. _____ describe
3. _____ intercede
4. _____ nippy
5. _____ native

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1. none
2. paroxysm
3. reciprocation
4. aberration
5. sinuous

1. boorish
2. delineate
3. mediate
4. none
5. endemic

List 1: paroxysm, sinuous, reciprocation, aberration

List 2:

1. _____ exception
2. _____ roundabout
3. _____ give and take
4. _____ watery
5. _____ rage

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List 1: boorish, mediate, delineate, endemic

List 2:

1. _____ recorder
2. _____ indigenous
3. _____ portray
4. _____ coarse
5. _____ intervene

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1. aberration
2. sinuous
3. reciprocation
4. none
5. paroxysm

1. none
2. endemic
3. delineate
4. boorish
5. mediate

List 1: paroxysm, sinuous, reciprocation, aberration

List 2:

1. _____ oddity
2. _____ furor
3. _____ devious
4. _____ swapping
5. _____ chilly

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List 1: boorish, mediate, delineate, endemic

List 2:

1. _____ negotiate
2. _____ original
3. _____ numerous
4. _____ picture
5. _____ unrefined

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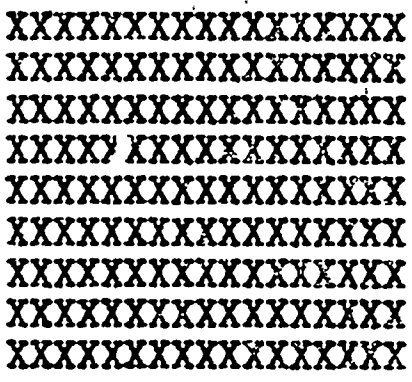
1. aberration
2. paroxysm
3. sinuous
4. reciprocation
5. none

1. mediate
2. endemic
3. none
4. delineate
5. boorish

List 1: paroxysm, sinuous, reciprocation, aberration

List 2:

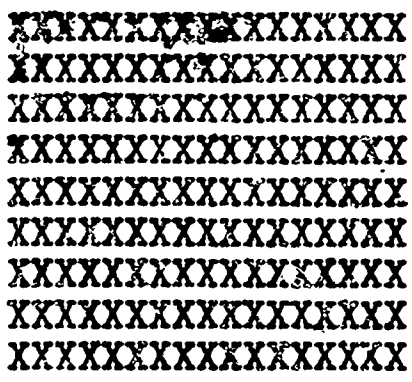
1. _____ trading
2. _____ rectify
3. _____ rarity
4. _____ indirect
5. _____ seizure



List 1: boorish, [illegible], delineate, endemic

List 2:

1. _____ scenic
2. _____ shocking
3. _____ depict
4. _____ pre-existing
5. _____ interpose



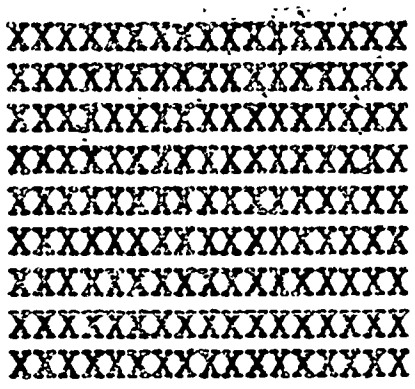
1. reciprocation
2. none
3. aberration
4. sinuous
5. paroxysm

1. none
2. boorish
3. delineate
4. endemic
5. mediate

List 1: paroxysm, sinuous, reciprocation, aberration

List 2:

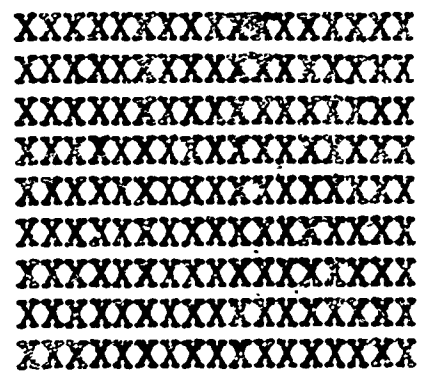
1. _____ sprightly
2. _____ peculiarity
3. _____ fit
4. _____ switch
5. _____ winding



List 1: boorish, mediate, delineate, endemic

List 2:

1. _____ referee
2. _____ represent
3. _____ monstrous
4. _____ inherent
5. _____ snobbish



1. none
2. aberration
3. paroxysm
4. reciprocation
5. sinuous

1. mediate
2. delineate
3. boorish
4. endemic
5. none

List 1: paroxysm, sinuous, reciprocation, aberration

List 2:

1. _____ interchange
2. _____ twisting
3. _____ rescue
4. _____ fever
5. _____ eccentricity

List 1: boorish, mediate, delineate, endemic

List 2:

1. _____ interfere
2. _____ characterize
3. _____ gross
4. _____ laborious
5. _____ innate

1. reciprocation
2. sinuous
3. none
4. paroxysm
5. aberration

1. mediate
2. delineate
3. boorish
4. none
5. endemic

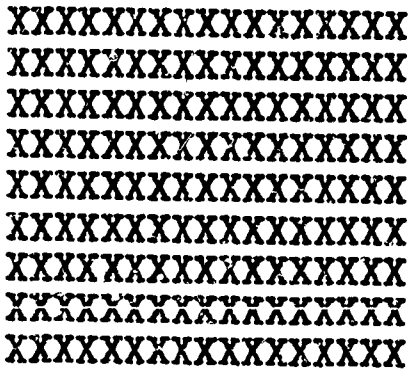
Booklet 7

Booklet 8

List 1: asseverate, perspicacity, tenuous, redaction

List 2:

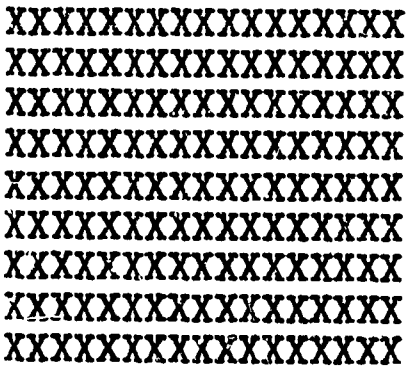
1. _____ sagacity
2. _____ revision
3. _____ behave
4. _____ affirm
5. _____ slender



List 1: vapid, ignominious, tensity, paradigm

List 2:

1. _____ birthplace
2. _____ dull
3. _____ model
4. _____ disreputable
5. _____ rigidity



1. perspicacity
2. redaction
3. none
4. asseverate
5. tenuous

1. none
2. vapid
3. paradigm
4. ignominious
5. tensity

List 1: asseverate, perspicacity, tenuous, redaction

List 2:

1. _____ exceed
2. _____ rare
3. _____ amendment
4. _____ foresight
5. _____ assert

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List 1: vapid, ignominious, tensity, paradigm

List 2:

1. _____ dry
2. _____ dishonorable
3. _____ pattern
4. _____ excess
5. _____ rigor

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1. none
2. tenuous
3. redaction
4. perspicacity
5. asseverate

1. vapid
2. ignominious
3. paradigm
4. none
5. tensity

List 1: asseverate, perspicacity, tenuous, redaction

List 2:

1. _____ dreamlike
2. _____ insight
3. _____ declare
4. _____ correction
5. _____ manhood

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List 1: vapid, ignominious, tensity, paradigm

List 2:

1. _____ manicure
2. _____ standard
3. _____ unrespectful
4. _____ firmness
5. _____ flat

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1. tenuous
2. perspicacity
3. asseverate
4. redaction
5. none

1. none
2. paradigm
3. ignominious
4. tensity
5. vapid

List 1: asseverate, perspicacity, tenuous, redaction

List 2:

1. _____ state
2. _____ perception
3. _____ illusory
4. _____ sickness
5. _____ edition

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List 1: vapid, ignominious, tensity, paradigm

List 2:

1. _____ infamous
2. _____ tasteless
3. _____ lullaby
4. _____ stiffness
5. _____ rule

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1. asseverate
2. perspicacity
3. tenuous
4. none
5. redaction

1. ignominious
2. vapid
3. none
4. tensity
5. paradigm

List 1: asseverate, perspicacity, tenuous, redaction

List 2:

1. _____ discernment
2. _____ rewrite
3. _____ unreal
4. _____ pronounce
5. _____ absorb

List 1: vapid, ignominious, tensity, paradigm

List 2:

1. _____ tedious
2. _____ abide
3. _____ original
4. _____ discreditable
5. _____ tenseness

1. perspicacity
2. redaction
3. tenuous
4. asseverate
5. none

1. vapid
2. none
3. paradigm
4. ignominious
5. tensity

List 1: asseverate, perspicacity, tenuous, redaction

List 2:

1. _____ penetration
2. _____ feeble
3. _____ contend
4. _____ wintry
5. _____ rearrangement

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XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX

List 1: vapid, ignominious, tensity, paradigm

List 2:

1. _____ notorious
2. _____ example
3. _____ tightness
4. _____ unlively
5. _____ wrinkle

XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX

1. perspicacity
2. tenuous
3. asseverate
4. none
5. redaction

1. ignominious
2. paradigm
3. tensity
4. vapid
5. none

Booklet 9

Booklet 10

List 1: nascent, mordant, abrogate, confabulate

List 2:

1. _____	abolish	XXXXXXXXXXXXXXXXX
		XXXXXXXXXXXXXXXXX
2. _____	converse	XXXXXXXXXXXXXXXXX
		XXXXXXXXXXXXXXXXX
3. _____	new	XXXXXXXXXXXXXXXXX
		XXXXXXXXXXXXXXXXX
4. _____	leopard	XXXXXXXXXXXXXXXXX
		XXXXXXXXXXXXXXXXX
5. _____	bitter	XXXXXXXXXXXXXXXXX

List 1: duress, salubrious, callow, inane

List 2:

1. _____	lavatory	XXXXXXXXXXXXXXXXX
		XXXXXXXXXXXXXXXXX
2. _____	immature	XXXXXXXXXXXXXXXXX
		XXXXXXXXXXXXXXXXX
3. _____	restraint	XXXXXXXXXXXXXXXXX
		XXXXXXXXXXXXXXXXX
4. _____	wholesome	XXXXXXXXXXXXXXXXX
		XXXXXXXXXXXXXXXXX
5. _____	trivial	XXXXXXXXXXXXXXXXX

1. abrogate
2. confabulate
3. nascent
4. none
5. mordant

1. none
2. callow
3. duress
4. salubrious
5. inane

List 1: nascent, mordant, abrogate, confabulate

List 2:

1. _____ immature
2. _____ annul
3. _____ harsh
4. _____ talk
5. _____ decency

XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX

List 1: duress, salubrious, callow, inane

List 2:

1. _____ confinement
2. _____ healthful
3. _____ youthful
4. _____ shallow
5. _____ decorate

XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
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XXXXXXXXXXXXXXXXX

1. nascent
2. abrogate
3. mordant
4. confabulate
5. none

1. duress
2. salubrious
3. callow
4. inane
5. none

List 1: nascent, mordant, abrogate, confabulate

List 2:

1. _____ urgency
2. _____ speak with
3. _____ repeal
4. _____ severe
5. _____ emerging

XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX

List 1: duress, salubrious, callow, inane

List 2:

1. _____ juvenile
2. _____ utility
3. _____ beneficial
4. _____ captivity
5. _____ silly

XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX

1. none
2. confabulate
3. abrogate
4. mordant
5. nascent

1. callow
2. none
3. salubrious
4. duress
5. inane

List 1: nascent, mordant, abrogate, confabulate

List 2:

1. _____ segment
2. _____ cancel
3. _____ consult with
4. _____ beginning
5. _____ rough

XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX

List 1: duress, salubrious, callow, inane

List 2:

1. _____ raw
2. _____ foolish
3. _____ healthy
4. _____ sedentary
5. _____ control

XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX

1. none
2. abrogate
3. confabulate
4. nascent
5. mordant

1. callow
2. inane
3. salubrious
4. none
5. duress

List 1: nascent, mordant, abrogate, confabulate

List 2:

1. _____ at the start
2. _____ sharp
3. _____ chat
4. _____ learn
5. _____ erase

List 1: duress, salubrious, callow, inane

List 2:

1. _____ benign
2. _____ legible
3. _____ compel
4. _____ idle
5. _____ crude

XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXX
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XXXXXXXXXXXXXXXXX

1. nascent
2. mordant
3. confabulate
4. none
5. abrogate

1. salubrious
2. none
3. duress
4. inane
5. callow

List 1: nascent, mordant, abrogate, confabulate

List 2:

1. _____ confer
2. _____ remove
3. _____ initially
4. _____ sarcastic
5. _____ tunnel

XXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXX
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XXXXXXXXXXXXXXXXXX
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List 1: duress, salubrious, callow, inane

List 2:

1. _____ frivolous
2. _____ inexperienced
3. _____ good
4. _____ oblige
5. _____ tropic

XXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXX
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XXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXX

1. confabulate
2. abrogate
3. nascent
4. mordant
5. none

1. inane
2. callow
3. salubrious
4. duress
5. none

RECORD THE FINISH TIME _____ *

*This instruction appeared on the last page of every booklet.

Definition Material Used in Vocabulary Study IV

NAME _____

DIRECTIONS: On the following pages, the meanings of four words are given. Read the definition of each word carefully and then write in the space provided below it a definition in your own words. Remember--try to <u>learn</u> the meaning of each word.

PLEASE RECORD THE TIME

START _____

FINISH _____

TRACTIVE

Heavy weights are often moved by using some kind of tractive device which makes it easier for people to accomplish their task. Thus tractive refers to a pulling or hauling capability of something.

LISSOME

Dance instructors would commonly call a ballerina lissome. Hence, lissome means to be lithe or limber or graceful in motion.

GAUCHE

A person who is generally awkward and lacking in social graces is a gauche individual. Thus, gauche means tactless and clumsy in behavior.

SURREPTITIOUS

A burglar has to make a surreptitious approach to the place he plans to rob if he wants to avoid being caught. Thus surreptitious refers to the secretiveness and deceit in carrying out some plan of action.

RECORD THE FINISH TIME.

JUXTAPOSE

When an architect begins a design of a house, he probably wants to be careful to juxtapose the kitchen and the dining room for the convenience of the homemaker. Juxtapose, therefore, refers to placing things very near to each other or side by side.

ACUMEN

A person who shows he can comprehend a difficult problem quickly and easily can be said to possess acumen. Thus acumen refers to a keenness and quickness of mind.

INVEIGH

An angry man might inveigh bitterly against the cause of his annoyance. Thus to inveigh means to condemn or to blame and implies the making of strong verbal attacks or denunciations of an existing condition.

CELERITY

A man who is in a position of authority often has to act with celerity when immediate difficulties force him to make a decision. Hence, celerity means speed or swiftness.

RECORD THE FINISH TIME.

TAXONOMY

It is often easier to understand a multitude of unrelated events by making a taxonomy for them. Hence, taxonomy pertains to a classification or organization of many things and implies meaningful relationships between all these things.

PARTURITION

When a mother gives birth to her children, she has performed an act of parturition. Thus parturition is concerned with the bringing forth of young.

ALACRITY

A person who performs a task as soon as he perceives it and as though he really wants to do it is acting with alacrity. Thus alacrity implies both immediacy and cheerfulness in the carrying out of some activity.

CHIVALROUS

A person who possesses qualities of generosity, honor and courteousness is said to be chivalrous. Thus chivalrous means unselfish and kind, and usually refers to one who is self-sacrificing and has good character.

RECORD THE FINISH TIME.

RANCID

Only in a second-rate restaurant is one likely to be served a salad dressing made from rancid olive oil. Thus, rancid means in bad condition because of age or lack of proper care.

ANTIPODAL

When a geography teacher speaks of the north and south pole, he is explaining the antipodal regions of the earth. Thus antipodal refers to anything which is exactly opposite or contrary.

EXPLICATION

If a person wishes to make his argument free of obscurities and unlikely to be misinterpreted, he may make an explication. Thus, explication refers to an interpretation or clearing up of a doctrine or other statement.

LIMPID

A pool of water unruffled by waves and uncontaminated by any sort of trash or mud could be called limpid. Thus limpid means free of disrupting or clouding elements.

RECORD THE FINISH TIME.

ABERRATION

Patients in mental hospitals almost always exhibit some behavioral aberrations. Thus an aberration is a departure from what is typical or normal.

PAROXYSM

A paroxysm of rage can be fatal to a person who suffers from high blood pressure. Thus, a paroxysm is an extreme response, either emotional or physical, to a given condition.

SINUOUS

Politicians are well-known for their sinuous remarks to reporters who wish to have direct answers to their questions. Therefore, sinuous pertains to the roundabout and deviating manner which people often use to avoid making clearer statements.

RECIPROCATION

When two people exchange or borrow items of clothing back and forth as girls often do, this is called an act of reciprocation. Thus reciprocation refers to mutual giving and taking.

RECORD THE FINISH TIME.

BOORISH

If a guest at a formal dinner party interrupts the activities and insults his hostess, his fellow guests will likely consider him boorish. Thus, boorish usually describes an unrefined, uncultured manner or habit.

MEDIATE

Many industrial strikes are averted when expert advisors mediate the dispute among the groups concerned. Thus mediate refers to the act of intervention or interfering and implies a condition of negotiation to resolve current problems.

DELINEATE

The teacher asked one of his students to delineate carefully one of the characters in the play so that the rest of the class would understand the role of this individual. Thus, delineate means to describe or portray, usually in a careful or detailed manner.

ENDEMIC

Revolt against the established order seems to be endemic among adolescents of most countries. Hence, endemic pertains to any condition which exists among a particular group or a specific locality.

RECORD THE FINISH TIME.

ASSERVATE

A person having a strong commitment to a personal ideal is likely to asservate his position with conviction. Thus, to asservate means to state or assert positively and earnestly.

PERSPICACITY

When a person has an unusual ability to understand the nature of things in depth, he can be said to possess a great deal of perspicacity. Thus, perspicacity refers to the insight and penetration of matters which are complex and hard to comprehend.

TENUOUS

A mental patient usually has only a tenuous hold on reality. Thus, tenuous refers to something that is unstable or weak.

REDACTION

Members of the United States Congress often make redactions to much of the legislation because of faulty wording of ideas. Thus redaction refers to making revisions or corrections to written material.

RECORD THE FINISH TIME.

VAPID

A poor teacher is often criticized for his vapid presentation of what ordinarily is extremely interesting material. Hence, vapid describes a dull and dry event.

IGNOMINIOUS

A commander in battle who deserts a position before he is forced to can be criticized for his ignominious retreat. Therefore an ignominious act is one which cannot be respected or honored.

TENSITY

When a student is told he must do well on the next exam in order to pass the course, a state of tensity will develop as the exam day and hour approach. Tensity, then, refers to the state of being tense or anxious.

PARADIGM

A teacher is sometimes referred to as a paradigm of a good citizen. Hence paradigm usually pertains to a model or an example.

RECORD THE FINISH TIME.

NASCENT

When any thing or idea is in the very first stages of its development, it is said to be nascent. Therefore nascent means just coming into existence.

MORDANT

When a person criticizes other people with mordant remarks, he may learn later on that he is not very well liked. Thus mordant means harsh or severe and implies bitter and cutting statements to other persons.

ABROGATE

When students wish to remove the present way of grading through an act of the Student Government, their intention is to abrogate this system of evaluation. To abrogate means, then, to abolish or annul by an authoritative act an unacceptable or unsatisfactory condition.

CONFABULATE

People often get together casually and confabulate about the events of the day. Thus, confabulate means to converse or talk informally.

RECORD THE FINISH TIME.

Please record the time written on the board.

Time _____

Please record the time written on the board.

Time _____

APPENDIX D

Table of Contents

You are asked to participate in an experiment the purpose of which is to determine which of several ways is most efficient in teaching students certain operations.

Name: _____

Sex: Male ____ Female ____

Class: _____

Previous mathematics courses: _____

_____

_____

You are asked to participate in an experiment the purpose of which is to determine which of several ways is most efficient in teaching students certain operations.

Name: _____

Sex: Male ___ Female ____

Class: _____

Previous mathematics courses: _____

_____

_____

Please record the time written on the board.

Time _____

Please record the time written on the board.

Time _____

You are going to be presented with certain concepts. After being given an opportunity to study these concepts you will be tested on some combinations of these concepts. Please read the material carefully, respond in the blanks provided and then check your answers on the following page.

You are going to be presented with certain concepts. After being given an opportunity to study these concepts you will be tested on some combinations of these concepts. Please read the material carefully, respond in the blanks provided and then check your answers on the following page.

Definition:

$\begin{Vmatrix} x_1 \\ x_2 \end{Vmatrix}$ is a symbol for a vector. x_1 and x_2 are symbols that stand for certain real numbers. x_1 is in the first position and x_2 is in the second position.

Definition:

A vector is an ordered pair of real numbers. A vector is said to be ordered because one member of the pair is said to be in a first position while the other member of the pair is said to be in a second position.

$\left\|\begin{matrix} x_1 \\ x_2 \end{matrix}\right\|$ is a symbol for a _____.

x_1 is in the _____ position.

x_2 is in the _____ position.

x_1 and x_2 are symbols for dertain real _____.

An ordered pair of real numbers is a _____.
It is said to be ordered because one number is in the _____ position while the other number is in the _____ position. The numbers that make up the vector are certain real _____.

vector

first

second

numbers

vector

first

second

numbers

$\begin{Vmatrix} y_1 \\ y_2 \end{Vmatrix}$ is a symbol for a _____.

y_1 is in the _____ position.

y_2 is in the _____ position.

y_1 and y_2 are symbols for certain _____ numbers.

Any ordered pair of real numbers is a _____.

Any pair of numbers that form a vector is said to be ordered because one number is in the _____ position while the other number is in the _____ position.

The numbers that make up the vectors are certain _____ numbers.

```
vector

first

second

real
```


```
vector

first

second

real
```

$\left\|\begin{matrix}3\\4\end{matrix}\right\|$ is a symbol for a _____.

3 is in the _____ position.

4 is in the _____ position.

3 and 4 are symbols for certain _____ numbers.

An ordered pair of numbers with a three in the first position and a four in the second position is a _____.

The three is in the _____ position.

The four is in the _____ position.

The three and the four are certain _____ numbers.

```
vector

first

second

real
```


```
vector

first

second

real
```

Definition:

The product of two vectors $\begin{Vmatrix} x_1 \\ x_2 \end{Vmatrix}$ and $\begin{Vmatrix} y_1 \\ y_2 \end{Vmatrix}$, written

$$\begin{Vmatrix} x_1 \\ x_2 \end{Vmatrix} * \begin{Vmatrix} y_1 \\ y_2 \end{Vmatrix},$$

is defined by:

$$\begin{Vmatrix} x_1 \\ x_2 \end{Vmatrix} * \begin{Vmatrix} y_1 \\ y_2 \end{Vmatrix} = (x_1) \cdot (y_1) + (x_2) \cdot (y_2)$$

Definition:

The product of two vectors, when the two vectors are expressed as orders pairs of real numbers, is defined by the following three steps:

1. multiply the first number in one of the vectors by the first number in the other vector.
2. multiply the second number in one of the vectors by the second number in the other vector.
3. add together the results of steps number 1 and 2.

Examples:

1. $\begin{vmatrix} 3 \\ 4 \end{vmatrix} * \begin{vmatrix} 5 \\ 6 \end{vmatrix} = 3.5 + 4.6 = 15 + 24 = 39$

2. $\begin{vmatrix} 2 \\ 3 \end{vmatrix} * \begin{vmatrix} 4 \\ 7 \end{vmatrix} = 2.4 + 3.7 = 8 + 21 = 29$

Examples:

1. The product of a vector which has a three in the first position and a four in the second position, with a vector which has a five in the first position and a six in the second position equals 39, which is the sum of three times five and four times six.
2. The product of a vector which has a two in the first position and a three in the second position, with a victor which has a four in the first position and a seven in the second position equal 29, which is the sum of two times four and three times seven.

$$\begin{vmatrix} 6 \\ 2 \end{vmatrix} * \begin{vmatrix} 3 \\ 4 \end{vmatrix} = \_\_\_\_\_ \times \_\_\_\_\_ + \_\_\_\_\_ \times \_\_\_\_\_ = \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_$$

The product of a vector which has a six in the first position and a two in the second position, with a vector which has a three in the first position and a four in the second position equals

_____times_____plus_____times_____which equals

_____plus_____which equals_____.

$$\underline{6} \times \underline{3} + \underline{2} \times \underline{4} = \underline{18} + \underline{8} = \underline{26}$$

$\underline{6}$ times $\underline{3}$ plus $\underline{2}$ times $\underline{4}$ which equals $\underline{18}$ plus $\underline{8}$ which equals $\underline{26}$.

$$\begin{vmatrix} 5 \\ 3 \end{vmatrix} * \begin{vmatrix} 9 \\ 7 \end{vmatrix} = \_\_\_\_ x \_\_\_\_ + \_\_\_\_ x \_\_\_\_ = \_\_\_\_ + \_\_\_\_ = \_\_\_\_$$

The product of a vector which has a five in the first position and a three in the second position, with a vector which has a nine in the first position and a seven in the second position equals_____times _____plus_____times_____which equals _____plus_____which equals_____.

$6x^4y^3$ is an _____ expression,

where a = _____, m = _____ and n = _____.

$6x^4y^3$ is an _____ expression,

where a = _____, m = _____ and n = _____.

Please record the time written on the board.

Time _____

Please record the time written on the board.

Time _____

You are going to be presented with certain additional concepts. After being given an opportunity to study these concepts you will be tested on some combinations of these concepts. Please read the material carefully, respond in the blanks provided and then check your answers on the following page.

You are going to be presented with certain additional concepts. After being given an opportunity to study these concepts you will be tested on some combinations of these concepts. Please read the material carefully, respond in the blanks provided and then check your answers on the following page.

Definition:

ax^my^n is an algebraic expression.

a, m and n are symbols for certain real numbers.

x and y are variables. Note that m and n are exponents.

Examples:

$3x^4y^8$ where a = 3, m = 4, and n = 8.

$5x^2y^4$ where a = 5, m = 2, and n = 4.

$2x^9y5$ where a = 2, m = 9, and n = 5.

$19x^7y^{42}$ where a = 19, m = 7, and n = 42.

Definition:

An algebraic expression is composed of letters of the alphabet which stand for certain real numbers. It is written in the form ax^my^n. Note that m and n are exponents.

Examples:

$3x^4y^8$ where a = 3, m = 4, and n = 8.

$5x^2y^4$ where a = 5, m = 2, and n = 4.

$2x^9y^5$ where a = 2, m = 9, and n = 5.

$19x^7y^{42}$ where a = 19, m = 7, and n = 42.

$6x^4y^3$ is an _____ expression,

where a = _____, m = _____ and n = _____.

$6x^4y^3$ is an _____ expression,

where a = _____, m = _____ and n = _____.

algebraic

6, 4, 3

algebraic

6, 4, 3

$5x^9y^3$ is an algebraic _____,

where a = _____, m = _____ and n = _____.

$5x^9y^3$ is an algebraic _____,

where a = _____, m = _____ and n = _____.

expression

5, 9, 3

expression

5, 9, 3

Definition:

$D_x(\quad)$, read as the derivative with respect to x, is a symbol that stands for a certain operation on whatever algebraic expression appears in the parentheses. That is, $D_x(ax^my^n)$ is read as the derivative of ax^my^n with respect to x.

$D_x(ax^my^n)$ transforms the given algebraic expression, ax^my^n, into another algebraic expression by use of the rule

$$D_x(ax^my^n) = m \cdot ax^{m-1}y^n.$$

Definition:

The derivative of an algebraic expression, with respect to x, transforms the given algebraic expression, ax^my^n, into another algebraic expression. This transformation is accomplished by complying with the following two steps

1. Multiply the given algebraic expression by the exponent of x;

2. Reduce the exponent of x in the algebraic expression resulting from step 1 by one.

Examples:

(1) $D_x(3x^4y^6) = 4 \cdot 3x^{4-1}y^6 = 12x^3y^6$

(2) $D_x(4x^5y^3) = 5 \cdot 4x^{5-1}y^3 = 20x^4y^3$

Examples:

(1) The derivative of $3x^4y^6$ with respect to x gives $4 \cdot 3x^4y^6 = 12x^4y^6$ by the first step and $12x^{4-1}y^6 = 12x^3y^6$ by the second step.

(2) The derivative of $4x^5y^3$ with respect to x gives $5 \cdot 4x^5y^3 = 20x^5y^3$ by the first step and $20x^{5-1}y^3 = 20x^4y^3$ by the second step.

$D_x(6x^5y^4)$ = _____ = _____.

The derivative of $6x^5y^4$ with respect to x equals

_____.

$$5.6x^{5-1}y^4 = 30x^4y^4$$

$$30x^4y^4$$

$D_x(5x^3y^2)$ = _____ = _____.

The derivative of $5x^3y^2$ with respect to x equals

_____.

$$3 \cdot 5x^{3-1}y^2 = 15x^2y^2$$

$15x^2y^2$

$$6 \cdot 5x^2y^{6-1} = 30x^2y^5$$

$30x^2y^5$

Examples:

(1) $D_y(3x^4y^6) = 6 \cdot 3x^4y^{6-1} = 18x^4y^5$

(2) $D_y(4x^5y^3) = 3 \cdot 4x^5y^{3-1} = 12x^5y^2$

Examples:

(1) The derivative of $3x^4y^6$ with respect to y gives $6 \cdot 3x^4y^6 = 18x^4y^6$ by the first step and $18x^4y^{6-1} = 18x^4y^5$ by the second step.

(2) The derivative of $4x^5y^3$ with respect to y gives $3 \cdot 4x^5y^3 = 12x^5y^3$ by the first step and $12x^5y^{3-1} = 12x^5y^2$ by the second step.

$D_y(5x^2y^6)$ = _____ = _____.

The derivative of $5x^2y^6$ with respect to y equals

_____.

$6 \cdot 5x^2y^{6-1} = 30x^2y^5$

$30x^2y^5$

$D_y(2x^3y^5 =$ _____ • _____.

The derivative of $2x^3y^5$ with respect to y equals

_____.

$$5 \cdot 2x^3y^{5-1} = 10x^3y^4$$

$10x^3y^4$

Note that $D_x(6x^3y^5) = 18x^2y^5$ while $D_y(6x^3y^5) = 30x^3y^4$.
$D_x(6x^3y^5)$ requires a certain operation with the exponent of x.
$D_y(6x^3y^5)$ requires a certain operation with the exponent of y.

Note that the derivative of $6x^3y^5$ with respect to x equals $18x^2y^5$ while the derivative of $6x^3y^5$ with respect to y equals $30x^3y^4$.
The derivative of $6x^3y^5$ with respect to x requires a certain operation with the exponent of x.
The derivative of $6x^3y^5$ with respect to y requires a certain operation with the exponent of y.

Please record the time written on the board.

Time _____

Please record the time written on the board.

Time _____

You are now ready to take a test on the preceding material. You may refer back to the preceding material if necessary.

You are now ready to take a test on the preceding material. You may refer back to the preceding material if necessary.

TEST

1. $\left\|\begin{matrix}8\\7\end{matrix}\right\| * \left\|\begin{matrix}3\\5\end{matrix}\right\|$ = _____?

2. $\left\|\begin{matrix}6\\4\end{matrix}\right\| * \left\|\begin{matrix}5\\2\end{matrix}\right\|$ = _____?

TEST

1. Multiply the vector which has an eight in the first position and a seven in the second position by a vector which has a three in the first position and a five in the second position.

_____ Answer

2. Multiply the vector which has a six in the first position and a four in the second position by the vector which has a five in the first position and a two in the second position.

_____ Answer

3. $\left\|\begin{matrix}5\\8\end{matrix}\right\| * \left\|\begin{matrix}6\\3\end{matrix}\right\| + 4 =$ _____?

3. Multiply the vector which has a five in the first position and an eight in the second position by a vector which has a six in the first position and a three in the second position and then, to this result, add four.

_____Answer

4. $\begin{Vmatrix}12\\5\end{Vmatrix} * \begin{Vmatrix}2\\1\end{Vmatrix} - 6 =$ _____?

4. Multiply the vector which has a twelve in the first position and a five in the second position by a vector which has a two in the first position and a one in the second position and then, from this result, subtract six.

_____ Answer

5. $3\left(\begin{vmatrix}7\\3\end{vmatrix} * \begin{vmatrix}4\\5\end{vmatrix}\right) =$ _____?

5. Multiply the vector which has a seven in the first position and a three in the second position by a vector which has a four in the first position and a five in the second position and then multiply this result by three.

_____ Answer

6. $5\left(\begin{Vmatrix}6\\9\end{Vmatrix} * \begin{Vmatrix}3\\8\end{Vmatrix}\right) =$ _____?

6. Multiply the vector which has a six in the first position and a nine in the second position by a vector which has a three in the first position and an eight in the second position and then multiply this result by five.

_____Answer

7. $\left|\begin{matrix}4 \\ 6\end{matrix}\right| * \left|\begin{matrix}9 \\ 3\end{matrix}\right| + \left|\begin{matrix}6 \\ 7\end{matrix}\right| * \left|\begin{matrix}3 \\ 8\end{matrix}\right| =$ _____?

7. Multiply the vector which has a four in the first position and a six in the second position by a vector which has a nine in the first position and a three in the second position, and add the result to the number obtained by multiplying a vector which has a six in the first position and a seven in the second position by a vector which has a two in the first position and an eight in the second position.

_____Answer

8. $\begin{Vmatrix} 3 \\ 7 \end{Vmatrix} * \begin{Vmatrix} 5 \\ 9 \end{Vmatrix} + \begin{Vmatrix} 11 \\ 10 \end{Vmatrix} * \begin{Vmatrix} 7 \\ 12 \end{Vmatrix} =$ _____?

8. Multiply the vector which has a three in the first position and a seven in the second position by a vector which has a five in the first position and a nine in the second position, and add the result to the number obtained by multiplying a vector which has an eleven in the first position and a ten in the second position by a vector which has a seven in the first position and a twelve in the second position.

_____Answer

9. Find x so that $\left\|\begin{matrix}3\\4\end{matrix}\right\| * \left\|\begin{matrix}6\\x\end{matrix}\right\| = 30$.

_____ Answer

9. The product of two vectors is thirty. If one of the vectors has a three in the first position and a four in the second position while the other vector has a six in the first position then what is in the second position of the latter vector?

_____ Answer

10. Find x so that $\begin{vmatrix} 3 \\ 8 \end{vmatrix} * \begin{vmatrix} 5 \\ x \end{vmatrix} = 47$.

_____ Answer

10. The product of two vectors is forty seven. If one of the vectors has a three in the first position and an eight in the second position while the other has a five in the first position then what is in the second position of the latter vector?

_____ Answer

11. $\left\|\begin{matrix}3\\4\end{matrix}\right\| * \left\|\begin{matrix}7\\2\end{matrix}\right\| * \left\|\begin{matrix}2\\9\end{matrix}\right\| * \left\|\begin{matrix}6\\3\end{matrix}\right\| =$ _____?

11. Multiply a vector with a three in the first position and a four in the second position by a vector which has a seven in the first position and a two in the second position; then divide this result by a number obtained from multiplying a vector with a two in the first position and a nine in the second position by a vector which has a six in the first position and a three in the second position.

_____ Answer

12. $\left\| \begin{matrix} \left\| \begin{matrix} 6 \\ 4 \end{matrix} \right\| * \left\| \begin{matrix} 7 \\ 1 \end{matrix} \right\| \\ \left\| \begin{matrix} 2 \\ 3 \end{matrix} \right\| * \left\| \begin{matrix} 6 \\ 9 \end{matrix} \right\| \end{matrix} \right\| =$?

12. Form a vector such that the number in the first position is the product of a vector which has a six in the first position and a four in the second position with a vector which has a seven in the first position and a one in the second position; and such that the number in the second position is the product of a vector which has a two in the first position and a three in the second position with a vector which has a six in the first position and a nine in the second position.

_____ Answer

Please record the time written on the board.

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Time _____

TEST

1. $D_x(3x^4y^6)$ = _____?

2. $D_y(5x^3y^4)$ = _____?

3. $D_x(7x^5y^3)$ = _____?

4. $D_y(9x^6y^7)$ = _____?

TEST

1. The derivative of $3x^4y^6$ in respect to x equals _____.

2. The derivative of $5x^3y^4$ in respect to y equals _____.

3. The derivative of $7x^5y^3$ in respect to x equals _____.

4. The derivative of $9x^6y^7$ in respect to y equals _____.

5. $D_y(D_x(2x^8y^6)) =$ _____?

6. $D_x(D_y(5x^3y^7)) =$ _____?

5. The derivative with respect to y of the derivative with respect to x of $2x^8y^6$ equals _____.

6. The derivative with respect to x of the derivative with respect to y of $5x^3y^7$ equals _____.

7. Find $ax^m y^n$ so that $D_x(ax^m y^n) = 16x^3y^5$.

_____ Answer

8. Find $ax^m y^n$ so that $D_y(ax^m y^n) = 32x^5y^7$.

_____ Answer

7. For what algebraic expression, $ax^m y^n$, does the derivative in respect to x equal $16x^3y^5$?

_____ Answer

8. For what algebraic expression, $ax^m y^n$, does the derivative with respect to y equal $32x^5y^7$?

_____ Answer

9. Find $ax^m y^n$, so that $D_x(ax^m y^n) = 15x^4y^3$.

_____ Answer

10. Find $ax^m y^n$ so that $D_y(ax^m y^n) = 18x^9y^8$.

_____ Answer

9. For what algebraic expression, $ax^m y^n$, does the derivative with respect to x equal $15x^4y^3$?

_____ Answer

10. For what algebraic expression, $ax^m y^n$, does the derivative with respect to y equal $18x^9y^8$?

_____ Answer

11. Find the value of $D_x (7x^3y^8)$ when $x = 5$ and $y = 3$.

_____ Answer

11. Find the value of the derivative of $7x^3y^8$, with respect to x, when x equals five and y equals three.

_____ Answer

12. Find the value of $D_y (6x^9y^3)$ when $x = 3$ and $y = 2$.

_____ Answer

12. Find the value of the derivative of $6x^9y^3$, with respect to x, when x equals three and y equals two.

_____ Answer

13. $D_x(8x^3y^5) + D_y(4x^7y^4) =$ _____?

13. The derivative of $8x^3y^9$ with respect to x plus the derivative of $4x^7y^4$ with respect to y equals _____.

14. Find the value of $D_x(6x^3y^3) + D_y(8x^5y^3)$ when $x = 2$ and $y = 3$.

Answer _____

14. Find the value of the derivative of $6x^3y^3$ with respect to x plus the derivative of $8x^5y^3$ with respect to y when x equals two and y equals three.

Answer _____

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Time _____

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Time _____

1. $D_x(3x^m y^n)$ = _____ when m = $\begin{Vmatrix} 3 \\ 4 \end{Vmatrix} * \begin{Vmatrix} 2 \\ 1 \end{Vmatrix}$

and n = $\begin{Vmatrix} 4 \\ 1 \end{Vmatrix} * \begin{Vmatrix} 2 \\ 3 \end{Vmatrix}$.

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1. The derivative of $3x^m y^n$ with respect to x equals _____ when m is the product of a vector which has a three in the first position and a four in the second position with a vector which has a two in the first position and a one in the second position, and n equals the product of a vector which has a four in the first position and a one in the second position with a vector which has a two in the first position and a three in the second position.

2. $\begin{Vmatrix}3\\4\end{Vmatrix} * \begin{Vmatrix}2\\5\end{Vmatrix}$ $(D_x(5x^6y^4)) =$ _____?

2. Multiply the derivative of $5x^6y^4$ with respect to x by the product of a vector which has a three in the first position and a four in the second position with a vector which has a two in the first position and a five in the second position.

_____ Answer

3. Find the value of $D_y(D_x(6x^2y^3))$ when

$x = \begin{Vmatrix} 1 \\ 2 \end{Vmatrix} * \begin{Vmatrix} 3 \\ 2 \end{Vmatrix}$ and $y = 3$.

_____ Answer

3. Find the value of the derivative with respect to y of the derivative with respect to x of $6x^2y^3$ when y equals three and x equals the product of a vector which has a one in the first position and a two in the second position with a vector which has a three in the first position and a two in the second position.

_____ Answer

4. Find the value of $ax^m y^n$ when $D_x(ax^m y^n) = 8x^3y^4$, $x = \begin{Vmatrix}3\\4\end{Vmatrix} * \begin{Vmatrix}5\\2\end{Vmatrix}$, and $y = \begin{Vmatrix}2\\1\end{Vmatrix} * \begin{Vmatrix}3\\6\end{Vmatrix}$.

_____ Answer

4. Find the value of $ax^m y^n$ when the derivative of $ax^m y^n$ equals $8x^3y^4$, x equals the product of a vector which has a three in the first position and a four in the second position with a vector which has a five in the first position and a two in the second position, and y equals the product of a vector which has a two in the first position and a one in the second position with a vector which has a three in the first position and a six in the second position.

_____ Answer

5. $ax^m y^n$ = _____ when $D_x(ax^m y^n) = 6x^r y^3$

and $r = \begin{Vmatrix} 2 \\ 3 \end{Vmatrix} * \begin{Vmatrix} 4 \\ 1 \end{Vmatrix}$.

5. Find the algebraic expression $ax^m y^n$ such that the derivative of $ax^m y^n$ with respect to x equals $6x^r y^3$ when r equals the product of a vector which has a two in the first position and a three in the second position with a vector which has a four in the first position and a one in the second position.

_____ Answer

6. $ax^m y^n$ = _____ when $D_x(ax^m y^n) = 5x^3 y^r$

and $r = \begin{Vmatrix} 3 \\ 2 \end{Vmatrix} * \begin{Vmatrix} 6 \\ n \end{Vmatrix}$.

6. Find the algebraic expression $ax^m y^n$ such that the derivative of $ax^m y^n$ with respect to x equals $5x^3 y^r$ when r equals the product of a vector which has a three in the first position and a two in the second position with a vector which has a six in the first position and a one in the second position.

_____Answer

You have completed a portion of the experiment. Please record the time written on the board.

Time _____

You have completed a portion of the experiment. Please record the time written on the board.

Time _____