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ABSTRACT

This booklet on the metric system and its presentation in the foreign language class has three main sections: (1) background material, including a brief history of the metric system and a rationale for teaching it in the foreign language class; (2) information for the teacher; and (3) learning activities. The second section includes terminology, an explanation of the decimal nature of the metric system, a metric style guide, suggested equipment, and classmade learning aids. The third section presents some techniques for beginning to teach the metric system and a metric awareness quiz. In addition to these items, there are: learning activities for length, mass, temperature, and volume/capacity; metric games; and a post-test self-quiz. The class activities are in French, German, and Spanish. The appendices include a list by state of metric-conversion educators and a list of some metric conversions. A bibliography completes the volume. (AMH)

LANGUAGE IN EDUCATION: THEORY AND PRACTICE

32

Teaching the Metric System in the Foreign Language Classroom

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CONTENTS

BACKGROUND

> GAS PUMPS MAY TURN METRIC--Washington (UPI, April, 1979)
> If gasoline prices hit $1 a gallon, the nation's service stations will have a good chance to go metric, changing their pumps to liters instead of gallons, the chairman of the U.S. Metric Board, Louis Polk, said. The change could be made during redesigning "at little or no extra cost. However, unless this change is adequately explained, consumers will assume that metrics caused the price hike, not the market economy."[1]

Given the phenomenal increase in the price of gasoline since the appearance of this newspaper article, the above quotation may seem antiquated. Nevertheless, the concern stated by Polk about the negative reaction of the American consumer if faced by a changeover to the metric system seems justified. Unable to obtain any consistency in pricing procedures as gasoline prices soared over $1.00 per gallon, a few oil companies switched over to pricing in cents per liter. Some companies redesigned pumps to measure gallons per dollar, but most firms recalibrated their pumps to measure one-half the total price pumped. (The price registered on the gasoline pump is then doubled to obtain the correct amount to be paid.) Such inconsistency and avoidance of using a new system of measurement represents the anti-metric attitude that has traditionally been expressed, sometimes quietly, sometimes forcefully, whenever a changeover to the metric system (or SI, Le Système International d'Unités) is discussed. Since 1790 when Thomas Jefferson proposed a decimal system based on units of 10, the United States has approached conversion but has always backed off from full adoption. The result is that while 95 percent of the world's inhabitants use the metric system, only in the U.S., Brunei, Burma, Liberia, and Yemen is it not yet generally in use. This situation, however, is rapidly changing. Conversion has already begun and will continue because of the growing interdependence between the U.S. and countries that use the metric system. Many businesses are already changing over, motivated by a decision of the nine common-market countries that after April, 1978, they would no longer accept imports unless labeled in metric dimensions. But why has the metric system been adopted by most of the countries in the world, and the U.S. remained the last major industrial country where the metric system is not the principal system of measurement? Historical development of the metric system provides a partial answer.

In 1670, an abbé from Lyon, Gabriel Mouton, generally regarded as the founder of the metric system, proposed a decimal system of weights and measures. By the end of the French Revolution in 1795, France had officially adopted a decimal system of measurement when the "metre" (from the Greek metron, meaning "a measure") was approved by the

French National Convention. From the meter, a unit of length, a unit of volume was obtained by cubing a tenth of a meter to produce a liter. A liter of water produced the basic unit of mass, the kilogram. In later developments of the system, multiples on the basis of 10 were provided using Greek prefixes (deka-, hecto-, ega-, etc.) For subdivisions, Latin prefixes were used (deci-, centi-, milli-, micro-).

The new system contained three important principles: (1) the standard unit of length was based on some unchanging, absolute standard found in the physical universe; (2) the basic units of length, volume, and weight were directly related to each other; and (3) the multiples and subdivisions of the standard units were decimally related. For the first time a consistent, unified measurement system was available for worldwide use.

The French tried to interest the U.S. in their new system, but no action was taken by Congress. In 1821, John Quincy Adams issued a document listing the advantages and disadvantages of both the English and metric systems, but he concluded that "the time was not right."[2] His recommendation succeeded in stopping for 40 years any further consideration by the U.S. of an international system of measurement.

In 1875 the International Bureau of Weights and Measures was established in Paris and the "Treaty of the Meter" was signed by 17 nations, including the U.S. It established well-defined metric standards for length and mass, and by 1880 most of Europe and South America had adopted the metric system. The U.S. "officially" became a metric nation in 1893 by adopting the metric prototypes that had been set by the International Bureau three years before.

Between 1918 and 1929, bitter opposition from both labor and business blocked every attempt by Congress to pass a metric bill. As recently as 1920, pamphlets were published with such titles as "What Real He-Men Think of the Compulsory Metric System." By 1959, however, much anti-metric discussion had died away. Customary units (foot, pound, etc.) were now officially defined in terms of metric units, and in 1960, as a further indication of the atomic age, the "meter bar" was abandoned as the international standard of length, and a wavelength of light was substituted. One meter is now officially defined as 1 650 763.73 wavelengths of the orange-red line produced by krypton 86.[3]

Great Britain began to convert to the metric system in 1965. Australia and Canada soon followed, and by 1971 the U.S. was essentially alone in remaining with the customary English System. In that same year, however, the National Bureau of Standards published a report recommending that the U.S. should have a coordinated national program that would encourage conversion over a period of ten years. The study was summarized in A Metric America: A Decision Whose Time Has Come. In 1972 the U.S. Senate passed legislation establishing voluntary conversion to predominantly metric measurements within the next ten years. Many American businesses--especially those with foreign branches--that found themselves having to use both systems began voluntarily to convert.

In December of 1975, President Ford signed the Metric Conversion Act of 1975, providing for the creation of a United States Metric Board, which would have the responsibility for coordinating a "volun-

tary conversion." The Act did not specify the period of time in which conversion would take place, nor did the Act make metric conversion mandatory.[4]

How have American educational institutions prepared for the changeover? Several grants funded under the Department of Education are financing the development of a variety of programs, including plans to explain and promote the metric system in the community. These programs emphasize the teaching of adults and children to actually use the metric system. There have been two interstate consortiums on metric education that have developed recommendations for including studies--one at Western Michigan University and one at The Ohio State University. In California there is a regional metric center established by the Department of Education of San Diego County, and a series of instructional TV and radio spots has been prepared to introduce the American public to SI. All of these, in one way or another, have been supported by the U.S. Department of Education. Nearly all the states have taken some steps toward the eventual adoption of the metric system. Some states have the authority to set deadlines for metric conversion in the classroom and have already done so. Other states that have little authority over their schools' curricula and texts have made recommendations and are providing technical assistance to school districts in teacher training and program development.

Rationale for Metrication in the Foreign Language Classroom

That foreign language teachers should be involved in the teaching of the metric system seems quite natural. After all, the countries whose languages are studied in the U.S. all use the metric system. Since one of the goals of language study is communicative competence, situations involving aspects of buying, selling, measuring, travelling, etc., would, as a matter of course, involve using the metric system. Many foreign language teachers have had personal experiences in learning and using the metric system as a result of living or travelling in another country. They are in a unique position to help their students understand and use the metric system. Their own first-hand experiences will help them to anticipate and provide for their students' needs as well as to show students that the metric system is not an abstract, isolated system of measurement, suitable only for the classroom and having no relevance in the real world.

Many educators are concerned about a growing "ignorance explosion"[5]--the gap between new knowledge and our ability to assimilate it--a fundamental characteristic of modern technical societies. As traditional walls that have surrounded many disciplines break down and professionals rethink and reorder the world's knowledge, more and more references to interdisciplinary learning are appearing in the literature of education. The salient features of proposals for interdisciplinary studies emphasize that we are all learners and can learn from each other. In fact, our very survival may depend on our ability to do so. In addition, interdisciplinary learning may help to alleviate that sense of alienation and fragmentation that is felt in many aspects of modern society.

Foreign language teachers, with their experiences of living in a metric society, may be able to help math and science teachers motivate their students to use the new metric system being presented in the classroom. In exchange, mathematics teachers, with their background in mathematics pedagogy, may help foreign language teachers develop and refine activities for use in the foreign language classroom. By working together, each discipline may be enhanced.

According to Strevens (1969), scientific concepts can be learned in the second language if certain student abilities are developed in the learning environment. Among these abilities are (1) acquisition of a minimum basic competence in the foreign language; (2) acquisition of control in the second language of certain "grammatico-logical operators," which are groups of words or expressions that express abstract, complex ideas (e.g., because; although, if, if... then, in order to, unless, whenever, etc.); (3) ability to carry out a certain amount of mental arithmetic and a willingness to describe by quantifying; (4) ability to generalize from observation; and (5) ability to learn scientific vocabulary as needed.

When vocabulary, grammatical structures, and new cultural material are presented in a meaningful context and must be used by the student in communicating information that she or he considers important to others, then this information may be processed more meaningfully and at a deeper level. The "hands-on" activities advocated by metric educators provide such meaningful contexts. Many of these activities involve the use of props and/or some discovery learning methods. Teachers will have to decide individually how best to utilize them.

BEFORE YOU BEGIN

The material in this section consists of some information that teachers should have regarding the metric system before they begin to develop activities for classroom use.

Terminology

Metrication -- the word used by the British to describe the process of converting or changing over to the metric system.

Hard conversion -- the size of the commodity has been changed based on a convenient number of metric units. For example, the new liter bottles of soft drinks are gradually replacing the old quart bottles. Both specifications may appear on the label, but eventually only the metric measurement will appear.

Soft conversion -- the size of a commodity is not changed, but its size is stated in metric units rather than English units. For example, a can of frozen orange juice marketed in a 12 oz. size is changed to indicate 354 mL. Both specifications may appear on the label.

Basic Units

Meter: A little longer than a yard (about 1.1 yards)
Liter: A little larger than a quart (about 1.06 quarts)
Gram: About the weight of a paper clip

Common Prefixes

Milli: One-thousandth (0.001)
Centi: One-hundredth (0.01)
Kilo: One thousand times (1000)

For example, 1000 millimeters = 1 meter
100 centimeters = 1 meter
1000 meters = 1 kilometer

Other Commonly Used Units

Millimeter:	0.001 meter	Diameter of paper clip wire
Centimeter:	0.01 meter	Width of a paper clip (about 0.4 inch)
Kilometer:	1000 meters	Somewhat further than half a mile (about 0.6 mile)
Kilogram	1000 grams	A little more than 2 pounds (about 2.2 pounds)
Milliliter:	0.001 liter	Five of them make a teaspoon

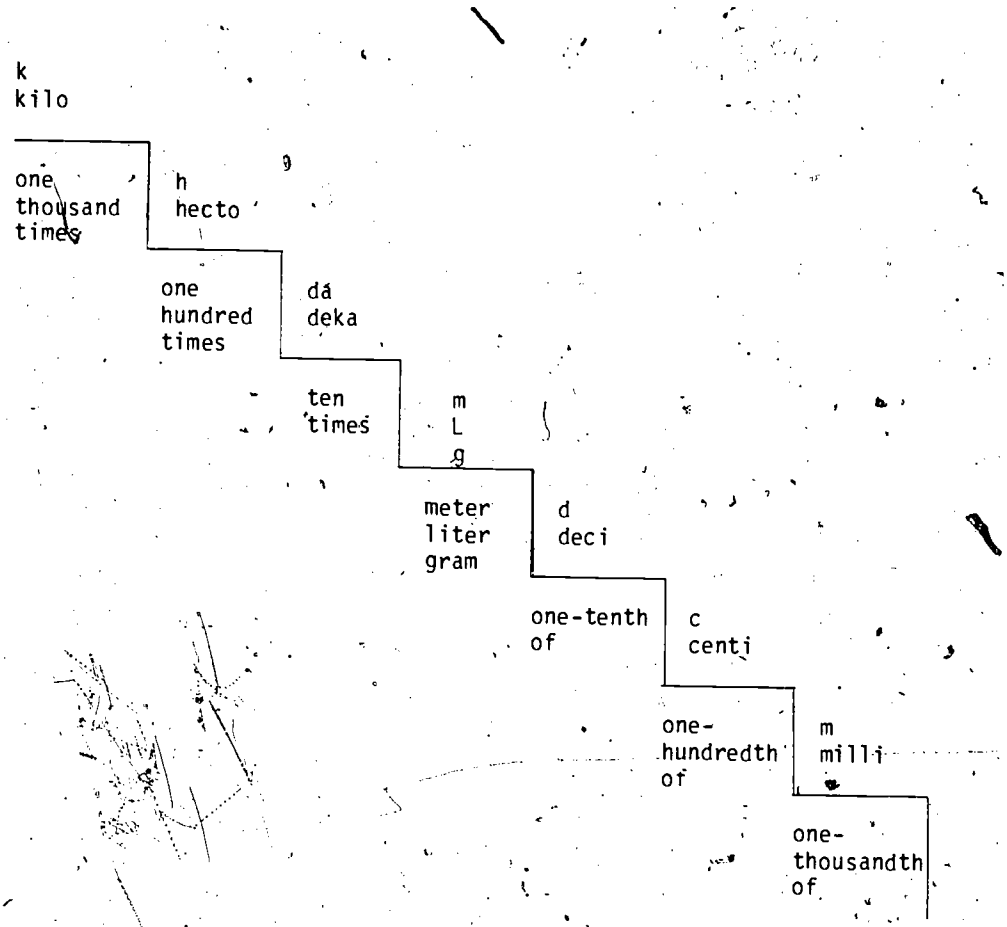
Hectare: About 2½ acres
Tonne: About 1 ton

The Decimal Nature of the Metric System

Both the decimal and the metric system have the following characteristics: (1) grouping is by tens; (2) each place is 10 times greater than the immediate place to the right, 10 times smaller than the immediate place to the left; (3) zero is used as a place holder; (4) the decimal marker separates the whole number from the fractional part.

The Prefix Staircase

The prefix staircase shows increases or decreases by powers of 10. Going down the staircase, the decimal marker is moved one place to the right for each "step" (e.g., 4 g equals 40 dg and 400 cg). Going up the staircase, the decimal marker is moved one place to the left for each step (e.g., 4 g equals 0.4 dag).



Metric Style Guide[6]

Units and Symbols

• Metric symbols are not capitalized except for L (liter) or if they are derived from a proper name. EXAMPLE: This carton holds 1 L of water. The race is 1500 m long.

• The capital "L" for liter was chosen since lower case "l" may be confused with the numeral "1." This avoids confusion when material is typewritten and there is no separate key for "1" or a separate key for the italic "ℓ." In many foreign publications, however, the lower case "l" or the "ℓ" may be found.

• A period is not used after a symbol, except when the symbol is at the end of a sentence. EXAMPLE: The recipe calls for 15 g of salt. The length of the field is 350 m.

• Spelling. There is, as yet, no consensus on which spelling of

"meter" (metre) and "liter" (litre) to use. The Educational Materials Sector Committee of the American National Metric Council recommends "-er." This monograph follows their recommendation.

Numerals

· Leave a space between a numeral and the unit name or symbol to which it refers. EXAMPLE: 455 m, 2.5 L, 350 km

· But the symbol for degrees Celsius is °C. (Although "Centigrade" is used in some countries, the preferred SI terminology is Celsius. Foreign language teachers may be more familiar with "Centigrade" in everyday language. Teachers may well want their students to become familiar with "Centigrade" also.) Do not leave a space between the two parts of the symbol, and do not leave a space between the numeral and the unit symbol, 37°C. EXAMPLE: The temperature of boiling water is 100°C.

· There is no international agreement on the decimal marker. In the United States, a dot on the line is used as the decimal marker. In many countries, however, such as Spain and France, a comma is used as a decimal marker. Some countries use a raised dot. I feel that since foreign language teachers will be using realia from the countries studied, they should adopt whatever notation is used by the country of the language being studied. EXAMPLE: 2.5 L of milk; 2,5 L de lait; 2,5 L de leche

· Decimal notation is preferred with metric measurements, although common fractions are acceptable. EXAMPLE: 0.5 g, 1.75 kg are preferred; 1/2 g, 1 3/4 kg are acceptable.

· In numbers between 1 and -1 (but not 0), a zero should be placed before the decimal point (to prevent the possibility that a faint decimal point will be overlooked). EXAMPLE: 0.75, not .75.

· Since commas are used as decimal markers in many countries, commas should not be used to separate groups of digits. Instead, separate the digits into groups of three, counting both to the left and to the right from the decimal marker, and use a space to separate the groups of three digits. The space should be of fixed width, equal to that formerly occupied by the comma. EXAMPLE: 4 549 523; 0.528 75 .

If there are only four digits to the left or right of the decimal point, the space is optional. Exercises in this monograph use both forms so that students will become familiar with both. EXAMPLE: 6875 or 6 875; 0.1234 or 0.234 5 .

But in a column with other numbers that show the space and are aligned on the decimal point, the space is necessary.

EXAMPLE:
```
    14.8
 3 870
+119 100
```

There still exists an inconsistent application of this guideline in some publications in French and Spanish and in traditional usage. For example, 11 872 would be 11.872. As more and more companies, editorial boards, etc. adopt SI guidelines, these inconsistencies will gradually disappear. Many technical publications in German, French, and Spanish do use the SI guidelines and separate groups of digits by the blank space. Language teachers, however, may want to show students examples from publications in the language that they are teaching in order to show the differences that still occur in what seems to be a period of transition. The exercises in this monograph follow SI guidelines and use a blank space to separate groups of digits.

Weight, Mass, and Force

Since the word "weight" is used to mean both mass and force, its use should be avoided in technical and scientific publications. In commercial and everyday use, however, the word "weight" nearly always means mass. Although in everyday speech in many countries the shortened form "kilo" is used, metrication specialists feel that the full name (kilogram, kilometer, etc.) should be used in order to avoid confusion.

Most Frequently Used Metric Units

Quantity	Unit	Symbol
length	kilometer	km
	meter	m
	centimeter	cm
	millimeter	mm
volume or capacity	cubic meter	m3
	cubic decimeter	dm3
	liter*	L*
	deciliter	dL*
	cubic centimeter	cm3
	milliliter*	mL*

*To be used for fluids (both gases and liquids) and for dry ingredients in recipes. Liter is used for the space within objects such as refrigerators, automobile trunks, etc. Although it is possible to use the standard prefixes with liter, the two most commonly used measurements are liter and milliliter.

mass (weight)	metric ton (1000 kg)	t
	kilogram	kg
	gram	g
	centigram	cg
	milligram	mg
temperature	degrees Celsius	°C
speed or velocity	meter per second	m/s
	kilometer per hour	km/h

Time

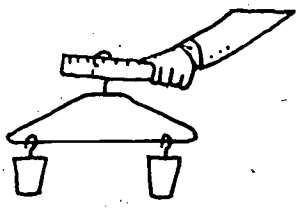
The SI base unit for time is the second. This is one system of measurement that will not change, although there probably will be an increasing tendency to use the 24-hour clock when telling time. This will not be a problem for foreign language teachers, since many countries already use the 24-hour clock for transportation timetables, theatrical performances, etc.

Suggested Equipment[7]

Some equipment may be made by students. Some equipment, such as balances and sets of metric masses, may be borrowed from the school's science or math departments. Other equipment may need to be purchased. Select only those materials that use proper SI notations and symbols: meter sticks; rulers; trundle wheel (for measuring distance); measuring tapes (100 cm or 150 cm); longer tapes (5 m or 10 m) --the physical education department may have some; volume set of containers, in mL, L gradations; balance (double pan); set of metric masses (metal and/or plastic, accurate to within 2 g of their stated mass); bathroom scales graduated in kilograms (an old scale may be converted if necessary); spring scale made of metal with a capacity of at least 6 kg and 100 g gradations; Celsius thermometers for student use (indoor--immersible and metal-backed, with a range of at least -10°C; outdoor--range of at least -30°C to +50°C); metric measuring cups and spoons.

Classmade Learning Aids[8]

Balance scale--Bent coat hanger with paper clips holding styrofoam or paper cups.



Foot measurer--Paste a picture of a large cardboard paper foot on the floor with a centimeter scale next to it. Cover with contact paper. Students can measure their feet against the model.

Handspan measurer--Paste a large cardboard hand on the wall with a centimeter scale. Cover with contact paper. Students can measure their handspan against the model.

Long distance measurer--A trundle wheel can be made using a piece of wood with a diameter of slightly less than 32 cm (31.86 cm) that will give a circumference of one meter. Drill a hole through the end of a broom handle or other stick. Join the two with a nut, bolt, and washers to permit easy rotation. Divide the wheel circumference with dm, cm and one-meter marks. A metal tab can be attached at the one-meter mark so that a click is made as each meter is measured.

Liter containers--use 7-Up or Coke liter bottles. One-pound coffee cans are approximately one liter. Also, a half-gallon milk carton cut 11 cm from base will hold one liter. Cut 12 cm from base to allow for spillage.

Height measurer--Tape or paste a two-meter cardboard strip to wall. Mark in centimeter scale. Cover with contact paper. Have a straightedge to place on top of head at correct height.

Mass measurers--Fill heavy-duty plastic bags or containers (e.g., margarine tubs) with sand or rocks corresponding to various masses--gram to kilogram.

Linear measurers--Have students make decimeter and 10 centimeter strips that can be joined to make a meter measurer. Adding machine tape, manila folder strips, or any paper covered with clear contact paper can be used.

ACTIVITIES

How to Begin

Leffin (1975) and others suggest that the overall teaching strategy should be THINK METRIC--DO METRIC! They advocate the use of activities that stress estimating and then checking the estimate by using the appropriate measuring instrument. Leffin encourages teachers to integrate learning the metric system into their classroom activities in a natural way. It need not be a crash program. He feels that teachers should take time to learn the system themselves first in order to feel comfortable in presenting activities to their students. Most states have developed materials and/or inservice workshops to help non-mathematics and non-science teachers learn the metric system, as there is a concerted effort by metrication specialists to include all areas of the curriculum in the changeover. I found much encouragement and support from this sector, and other foreign language teachers will, no doubt, find the same interest and help. (See Appendix A for metrication specialists in each state. These people have indicated an interest in helping foreign language teachers develop metrication activities for the classroom.)

In a study on metric attitudes and achievement, Devies (1977) found that students' achievement and retention after the teaching of a metric unit was significantly greater if they perceived the teacher's attitude toward the metric system as positive. As in so many areas of instruction, it seems that if the teacher has positive attitudes toward the material to be learned, so will the student.

One way to help develop such attitudes is through awareness activities. Some of these activities stress the ways in which the metric system is already being used in this country. Through these activities foreign language teachers can relate the new system of measurement to the students' everyday world. As students report their experiences with these activities to the class, they are communicating relevant information to others in the foreign language. Activities of this type may be included before actual study of the system or concurrent with it.

By dividing instructional activities into three levels--proceeding from general ideas to more specific measuring tasks--teachers will be able to organize classroom metric activities around the vocabulary and grammatical structures being learned in the foreign language.

Level I activities use terms like "higher than, lower than, same height as, shorter than, smaller than, bigger than, heavier than, lighter than." They stress general concepts of measurement. As soon as comparatives are introduced, the foreign language teacher can begin to include level I activities.

Level II activities include teaching the primary units and symbols of the metric system. These activities stress estimation first, then measurement. Personal reference measures are often used. For example: "How long is your pace?" "A meter?" The student estimates, makes a choice, then measures to see how accurate his or her measurement is. An appropriate time to begin estimation activities is with the introduction of the parts of the body and after numbers up to 100 have been learned. Good checks for whether the vocabulary has been learned meaningfully are short multiple-choice questions such as "From the knee to the floor is approximately (a) 45 cm; (b) 45 m; (c) 4.5 m." Since students will already be familiar with the English system of measurement, teachers may wish to include gross comparisons between the two systems. These should be eliminated, however, as soon as possible in favor of exclusive use of the metric system, once students have a general idea of the length of a meter, the mass of a kilogram, the capacity of a liter, etc.

Again, it must be stressed that mathematical conversions from the English to the metric system should be avoided. Although some comparison will be inevitable as this country adapts to the metric system, learning to think and do in metric will be much simpler, less time consuming and less forbidding to most people if they do not feel that every time they have to measure something, mathematical calculations will have to be performed. Reserve conversions for the "math buffs" in the class.

Level III activities include accurate and precise measurements of the physical world. An activity of this nature might be a class softball or frisbee throw. Each student's throw would be measured with a meter tape. Another activity might be preparing a recipe using metric measures. Conversions within the metric system would also be appropriate at this level. Some mathematics educators, however, prefer not to use conversions within the system itself except for a few of the most common (e.g., 1.5 m = 150 cm).

Which Measurement Should Be Taught First

Generally, the meter and its multiples and submultiples are taught first. The meter is the base SI unit for length and, in addition, submultiples and multiples of the meter are used for derived measures for area (hectare), volume (1 cubic decimeter = 1 liter) and mass (1 liter of pure water at 4 degrees Celsius has approximately the mass of 1 kilogram). The order of teaching the other measures and temperatures is a matter of choice. In the following activities the order is length, mass, temperature, and volume. These activities are not intended to provide a complete curriculum for teaching the metric system in the foreign language. It is hoped, rather, that they will provide a basic understanding of how the system operates, that students of varying abilities will be able to find activities with which they will be successful, and that teachers will be stimulated by the activities presented here to create other activities and games for their classrooms.

Implementation of awareness and measuring activities may be

handled in several different ways. The activities may be pursued by small groups, by a whole class, or by individuals in a learning center. They may be presented orally for practice in listening and speaking, or in written form for practice in reading and writing. Teachers may need to adapt the activities in this chapter to their own students' level of language development. For example, writing activities may be simplified so that students fill in blanks on teacher-prepared charts, or they may answer yes/no or multiple response questions. (See Allen and Valette [1977] for other techniques to structure exercises according to language levels.)

Devising a simple poll of student interests in the foreign language will help teachers find out what specialized SI units students may be interested in learning after they learn the basic structure of the metric system. The poll would also help to identify students whose interests would be appropriate for group work.

Measurement Awareness

(Self-Quiz)[9]

The following quiz may be given before actual study begins in order to assess students' knowledge of the metric system. It should not be graded but should serve as a stimulus to discussion about the system and to raise the level of students' awareness. It may be given again at the end of the activities to assess their effectiveness.

Circle the response that you think is correct.

1. A gram is about the weight of (a) an apple; (b) a dime; (c) a pineapple; (d) a large dictionary.

2. A meter is about the height of (a) a door; (b) a refrigerator; (c) the seat of a sofa; (d) a table.

3. Normal body temperature is about (a) 25°C; (b) 37°C; (c) 45°C; (d) 90°C.

4. A basketball player has a height of approximately (a) 2 centimeters; (b) 20 centimeters; (c) 200 centimeters; (d) 2 000 centimeters.

5. A cup of coffee contains approximately (a) 20 milliliters of liquid; (b) 200 milliliters of liquid; (c) 2 liters of liquid; (d) 20 liters of liquid.

6. A new-born baby weighs about (a) 3 kilograms; (b) 30 kilograms; (c) 300 kilograms.

7. A professional football player weighs about (a) 4.5 kilograms; (b) 45 kilograms; (c) 100 kilograms; (d) 225 kilograms.

8. A dollar bill measures approximately (a) 15 centimetens by 7 centimeters; (b) 20 centimeters by 10 centimeters; (c) 30 centimeters by 20 centimeters; (d) 85 centimeters by 60 centimeters.

Answers: 1(b), 2(d), 3(b), 4(c), 5(b), 6(a), 7(c), 8(a).

French

Encerolez la réponse que vous trouvez correcte.

1. Un gramme a à peu près le poids (a) d'une pomme; (b) d'une pièce de 1 franc; (c) d'un ananas; (d) d'un grand dictionnaire.

2. Un mètre a à peu près la hauteur (a) d'une porte; (b) d'un réfrigérateur; (c) des coussins du sofa; (d) d'une table.

3. La température normale du corps est (a) 25°C; (b) 37°C; (c) 45°C; (d) 90°C.

4. Un joueur de basketball mesure à peu près (a) 2 centimètres; (b) 20 centimètres; (c) 200 centimètres; (d) 2 000 centimètres.

5. Une tasse de café contient à peu près (a) 20 millilitres de liquide; (b) 200 millilitres de liquide; (c) 2 litres de liquide. (d) 20 litres de liquide.

6. Un nouveau-né pèse à peu près (a) 3 kilogrammes; (b) 30 kilogrammes; (c) 300 kilogrammes.

7. Un joueur professionnel de football pèse à peu près (a) 4,5 kilogrammes; (b) 45 kilogrammes; (c) 100 kilogrammes; (d) 225 kilogrammes.

8. Un billet d'un dollar mesure à peu près (a) 15 centimètres sur 7 centimètres; (b) 20 centimètres sur 10 centimètres; (c) 30 centimètres sur 20 centimètres; (d) 85 centimètres sur 60 centimètres.

Réponses: 1(b); 2(d); 3(b); 4(c); 5(b); 6(a); 7(c); 8(a).

German

Machen Sie einen Kreis um die richtige Antwort.

1. Ein Gramm wiegt soviel wie (a) ein Apfel; (b) ein Zehnpfennigstück; (c) eine Ananas; (d) ein dickes Wörterbuch.

2. Ein Meter ist ungefähr die Höhe (a) einer Tür; (b) eines Kühlschranks; (c) eines Sofas; (d) eines Tisches.

3. Die normale Körpertemperatur ist (a) 25°C; (b) 37°C; (c) 45°C; (d) 90°C.

4. Ein Korbballspieler ist (a) 2 cm gross; (b) 20 cm gross; (c) 200 cm gross; (d) 2 000 cm gross.

5. Eine Tasse Kaffee enthält ungefähr (a) 20 ml Flüssigkeit; (b) 200 ml Flüssigkeit; (c) 2 L Flüssigkeit; (d) 20 L Flüssigkeit.

6. Ein neugeborenes Kind wiegt ungefähr (a) 3 kg; (b) 30 kg; (c) 300 kg.

7. Ein professioneller, amerikanischer Fußballspieler wiegt ungefähr (a) 4,5 kg; (b) 45 kg; (c) 180 kg; (d) 225 kg.

8. Ein Dollarschein hat die Größe von ungefähr (a) 15 cm mal 7 cm; (b) 20 cm mal 10 cm; (c) 30 cm mal 20 cm; (d) 85 cm mal 60 cm.

Antworten: 1(b), 2(d), 3(b), 4(c), 5(b), 6(a), 7(c), 8(a).

Spanish

Ponga usted un círculo alrededor de la respuesta que usted piensa que es correcto.

1. Un gramo tiene un peso aproximadamente igual al peso de (a) una manzana; (b) una moneda de diez centavos; (c) una piña; (d) un diccionario grande.

2. Un metro tiene una altura aproximadamente igual a la altura de (a) una puerta; (b) un refrigerador; (c) el asiento de un sofá; (d) una mesa.

3. La temperatura constante normal del cuerpo es (a) 25°C; (b) 37°C; (c) 45°C; (d) 90°C.

4. Un jugador de baloncesto tiene una altura aproximada de (a) 2 centímetros; (b) 20 centímetros; (c) 200 centímetros; (d) 2 000 centímetros.

5. Una taza de café contiene aproximadamente (a) 20 mililitros de líquido; (b) 200 mililitros de líquido; (c) 2 litros de líquido; (d) 20 litros de líquido.

6. Un nene recién nacido puede tener un peso de (a) 3 kilogramos; (b) 30 kilogramos; (c) 300 kilogramos.

7. Un jugador de futbol profesional puede tener un peso de (a) 45 kilogramos; (b) 100 kilogramos; (c) 180 kilogramos; (d) 225 kilogramos.

8. Un billete con el valor de un dólar americano mide unos (a) 15 centímetros por 7 centímetros; (b) 20 centímetros por 10 centímetros; (c) 30 centímetros por 20 centímetros; (d) 85 centímetros por 60 centímetros.

Respuestas: 1(b), 2(d), 3(b), 4(c), 5(b), 6(a), 7(b), 8(a).

Measurement Activities: Length

1. Awareness[10]

Fill in the blank with the correct unit. Use either kilometers, meters, centimeters, or millimeters. (Pictures to illustrate the phrase will help to eliminate the need for translation.)

1. The highway speed is about 90 _____ per hour.
2. A stick of gum is 7.5 _____ long.
3. The classroom is about 15 _____ long.
4. My mother bought 2 _____ of material to make a skirt.
5. The Mississippi River is about 3 900 _____ long.
6. A paper clip is about 30 _____ long.
7. A basketball net is about 3 _____ high.
8. A banana is about 20 _____ long.
9. A mosquito is about 14 _____ long.
10. Mt. Everest is about 8 845 _____ high.

French

Choisissez l'unité convenable pour chacune des phrases suivantes. Remplacez le tiret par le mot correct. Employez kilomètres, mètres, centimètres ou millimètres.

1. La vitesse sur les autoroutes est environ de 90 _____ heure.
2. Un paquet de chewing-gum a à peu près 7,5 _____ de long.
3. La salle de classe a à peu près 15 _____ de long.
4. Ma mère m'a acheté 2 _____ d'étoffe pour faire une jupe.
5. Le Mississippi a environ 3 900 _____ de long.
6. Un trombone a environ 30 _____ de long.
7. Le panier de basketball est suspendu à environ 3 _____ du sol.
8. Une banane a environ 20 _____ de long.
9. Un moustique a environ 14 _____ de long.
10. Le Mont Everest a environ 8 845 _____ d'altitude.

German

Ergänzen Sie die fehlende Maßeinheit: Gebrauchen Sie Kilometer, Meter, Zentimeter oder Millimeter. (Bilder, die den Sinn erklären, erübrigen die Übersetzung.)

1. Die Höchstgeschwindigkeit ist ungefähr 90 _____ die Stunde.
2. Ein Stück Kaugummi ist 7,5 _____ lang.
3. Das Klassenzimmer ist ungefähr 15 _____ lang.
4. Meine Mutter kauft 2 _____ Stoff für einen Rock.
5. Der Mississippi ist ungefähr 3 900 _____ lang.
6. Eine Büroklammer ist ungefähr 30 _____ lang.
7. Ein Korbballnetz ist ungefähr 3 _____ hoch.
8. Eine Banane ist ungefähr 20 _____ lang.
9. Eine Mücke ist ungefähr 14 _____ lang.
10. Mt. Everest ist ungefähr 8 845 _____ hoch.

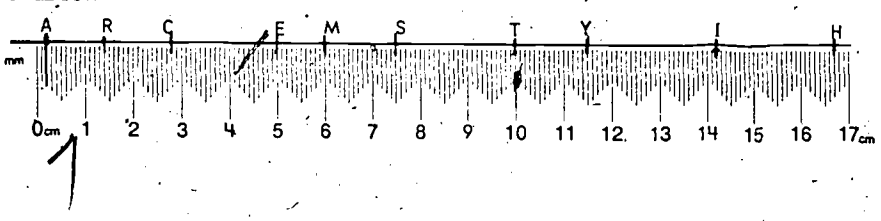
Spanish

Ponga la unidad correcta (o kilómetros, metros, centímetros o milímetros) en el espacio.

1. La velocidad máxima en la carreterra es aproximadamente 90 _____.
2. Un chicle mide 7,5 _____ de longitud.
3. El aula de español mide aproximadamente 15 _____ de longitud.
4. Mi madre compró 2 _____ de tela para coser una falda.
5. El río Misisipí es aproximadamente 3.900 _____ de longitud.
6. Un dedal mide aproximadamente 30 _____ de longitud.
7. Una red para jugar al baloncesto está a unos 3 _____ de altura.
8. Un plátano mide 20 _____ de longitud.
9. Un mosquito mide 14 _____ de longitud.
10. El monte Everest está a unos 8 845 _____ de altura.

2. Using a Metric Ruler

ENGLISH



Find each of these points on the ruler. Take the letter from the ruler and write it in the blank.

1. 10 cm = _____
2. 167 mm = _____
3. .5 dm = _____
4. 60 mm = _____
5. 50 mm = _____
6. 1 dm = _____
7. 14 mm = _____
8. 14.2 cm = _____
9. .28 dm = _____
10. .075 m = _____
11. 1.16 dm = _____
12. 7.5 cm = _____
13. 100 mm = _____
14. .5 dm = _____
15. 6 cm = _____
16. 142 mm = _____
17. 75 mm = _____
18. 5 cm = _____
19. 2 mm = _____
20. .75 dm = _____
21. 11.6 cm = _____

French: Pour chacune des mesures de longueur ci-dessous, trouvez la lettre correspondante. Remplacez le tiret par la réponse correcte.

German: Finden Sie die verschiedenen Punkte auf dem Lineal. Setzen Sie den richtigen Buchstaben für die Zentimeterzahl ein.

Spanish: Encuentre cada medida en la regla y ponga la letra en el espacio en blanco.

Measurement Activities: Mass/Weight

1. Awareness

Choose the correct unit (kilogram, gram, milligram) to complete the following sentences.

1. My tennis shoe has a mass of 300 _____. (g)
2. One strand of hair has a mass of 2 _____. (mg)
3. A banana weighs about 150 _____. (g)
4. My car has a mass of 1 456 _____. (kg)
5. I bought 4 _____ of potatoes at the store. (kg)
6. One aspirin tablet weighs about 325 _____. (mg)
7. The soup needs more salt, add 4 _____. (g)
8. My little sister is three weeks old. She weighs 4 _____. (kg)
9. I want to prepare hamburgers for 4 people; I need to buy 500 _____ of meat. (g)
10. A dime has a mass of 2.2 _____. (g)

French

Choisissez l'unité convenable (kilogramme, gramme, milligramme) pour compléter les phrases suivantes.

1. Une de mes chaussures de tennis pèse 300 _____. (g)
2. Un cheveu pèse 2 _____. (mg)
3. Une banane pèse à peu près 150 _____. (g)
4. Le poids de ma voiture est 1 456 _____. (kg)
5. J'ai acheté 4 _____ de pommes de terre au marché. (kg)
6. Un cachet d'aspirine pèse à peu près 325 _____. (mg)
7. La soupe n'a pas assez de sel. Ajoutez-en 4 _____. (g)
8. Ma petite soeur de trois semaines pèse 4 _____. (kg)
9. Je voudrais préparer des hamburgers pour 4 personnes. J'ai besoin d'acheter 500 _____ de viande. (g)
10. Une pièce d'un centime pèse 2.2 _____. (g)

German

Ergänzen Sie die richtige Maßeinheit (kilogramm, gramm, milligramm):

1. Mein Tennisschuh wiegt 300 _____. (g)
2. Ein Haar wiegt 2 _____. (mg)
3. Eine Banane wiegt 150 _____. (g)
4. Mein Auto wiegt 1 456 _____. (kg)
5. Ich kaufe 4 _____ Kartoffeln ein. (kg)
6. Eine Aspirin Tablette wiegt 325 _____. (mg)
7. Die Suppe braucht Salz; füge noch 4 _____ hinzu. (g)
8. Meine kleine Schwester ist drei Wochen alt. Sie wiegt 4 _____. (kg)
9. Ich mache Hamburger für vier Leute; ich kaufe dafür 500 _____ Fleisch. (g)
10. Ein Zehnpfennig-stück wiegt 2,2 _____. (g)

Spanish

Escoge la unidad correcta (kilogramo, gramo o miligramo) para terminar la frase.

1. Un zapato de tenis tiene un peso de 300 _____. (g)
2. Un pelo tiene un peso de 2 _____. (mg)
3. Un plátano tiene un peso de 150 _____. (g)
4. Mi carro tiene un peso de 1 456 _____. (kg)
5. Compré 4 _____ de patatas en el supermercado. (kg)
6. Una tableta de aspirina tiene un peso de 325 _____. (mg)
7. Hace falta sal en la sopa. Agregue 4 _____. (g)
8. Mi hermanita menor solamente tiene tres semanas de edad. Ella tiene un peso de 4 _____. (kg)
9. Quiero preparar hamburguesas para cuatro personas, necesito comprar 500 _____ de carne molida. (g)
10. Una moneda de diez centavos tiene una masa de 2,2 _____. (g)

2. Estimating[12]

You will need a balance or spring scale, the objects listed in the chart below, and a cake pan.

- Pour into the pan your estimate of the mass that is indicated on the chart.
- Put the pan on the scale to measure your estimate.
- Record your estimate in the space provided.
- Make the mass correct by adding or deleting from the amount you estimated.

Objects	Mass	Estimate
Dried beans	250 g	
pennies	4 g	
nails	12 g	
oranges	2 kg	
sugar	100 g	
paper clip	10 g	
books	5 kg	
chalk	50 g	

French

Vous avez besoin d'une balance, d'un moule à gâteau, et des objets suivants:

- Pour chaque objet sur la liste estimez une quantité correspondante au poids dans la deuxième colonne.

- Notez votre estimation dans la troisième colonne.
- Pesez, puis corrigez la quantité selon le poids indiqué sur la balance.

Objets	Poids	Estimation
haricots secs	250 g	
centimes	4 g	
clous	12 g	
oranges	2 kg	
sucre	100 g	
trombones	10 g	
livres	5 kg	
craie	50 g	

German

Sie benötigen eine Waage, die angeführten Sachen und eine Kuchenform.

- Tun Sie in die Waagschale das geschätzte Gewicht der angegebenen Sachen.
- Wiegen Sie die Sachen.
  Schreiben Sie das Gewicht in die Tabelle.
- Korrigieren Sie das Gewicht, indem Sie entweder etwas aus der Waagschale herausnehmen oder hinzufügen.

Sachen	Gewicht	Voranschlag
getrocknete Bohnen	250 g	
Pfennige	4 g	
Nägel	12 g	
Apfelsinen	2 kg	
Zucker	100 g	
Büroklammer	10 g	
Bücher	5 kg	
Kreide	50 g	

Spanish

Usted va a necesitar una balanza, los objetos que aparecen abajo y un molde redondo.

- Eche al molde su cálculo del peso que está indicado abajo.
- Entonces ponga el molde en la balanza para medir su cálculo.
- Escriba su cálculo en el espacio.
- Añada o quite los objetos para corregir su cálculo.

Objetos	Peso	Cálculo
frijoles secos	250 g	
monedas de un centavo	4 g	
clavos	12 g	
naranjas	2 kg	
azúcar	100 g	
sujetapapeles	10 g	
libros	5 kg	
tiza	50 g	

3. Recipes

French: Soupe Minestrone[13]

125 g haricots verts
125 g poireaux
125 g carottes
125 g céleri
2 tomates fraîches
1 gousse ail
50 g spaghetti
1 grosse noix beurre ou margarine
50 g parmesan ou gruyère râpé
2 pincées de basilic déshydraté (facultatif)
Sel, poivre

Faites bouillir 2 L d'eau salée et poivrée. Epluchez et coupez tous les légumes en petits morceaux. Jetez-les dans l'eau bouillante. Couvrez. Laissez mijoter 50 minutes.

Cassez les spaghetti en tronçons. Ajoutez-les au potage. Faites bouillir encore 20 minutes. Avant de servir incorporez-y le basilic, une noix de beurre ou de margarine et parsemez de fromage râpé. (Pour 4 personnes.)

German: Streuselkuchen

TEIG

500 g Mehl
75 g Zucker
5 El. Öl
25 g Hefe
1 Tl. Salz
1/4 L Milch

STREUSEL

250 g Mehl
175 g Butter
100 g Zucker
1 Tl. Vanille

Mehl in eine Schüssel sieben. Hefe und die Hälfte der Milch in eine Vertiefung ins Mehl geben. In der Vertiefung einen Vorteig bereiten aus etwas Mehl, Hefe und Milch. Diesen Vorteig aufgehen lassen und dann alle Zutaten vermengen und verkneten. Teig ausrollen und mit Streusel bestreuen. Bei 175 Grad eine halbe Stunde backen. Den Streusel aus Mehl, Zucker, Vanille und zerlassener Butter bereiten.

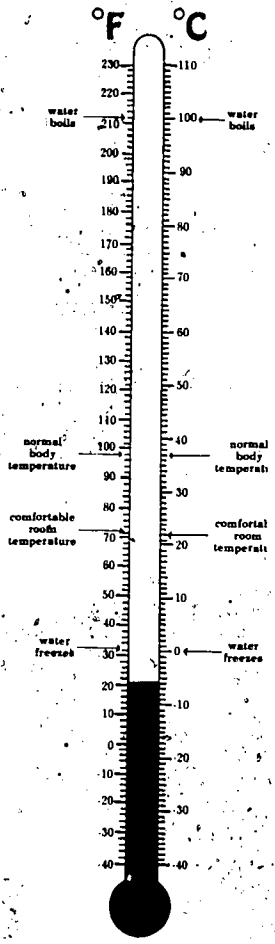
Spanish: Polvorones[14]

Se trabaja mucho, con la espátula, 150 g de manteca con 150 g de azúcar. Cuando esté muy fino y unido, mézclese con 300 g de harina tamizada, uniéndolo todo perfectamente. Fórmense unas bolas como nueces, aplastándolas un poco y cociéndolas a horno moderado (175°C).

Measurement Activity: Temperature

1. Awareness[15]

125°C = 257°F
150°C = 302°F
175°C = 347°F
190°C = 375°F
200°C = 392°F
225°C = 437°F



This thermometer shows temperatures in degrees Fahrenheit (°F) and in degrees Celsius (°C). Use the thermometer to answer these questions.

0°C = _____°F. Normal body temperature is _____°C. Comfortable room temperature is _____°F. A nice summer day is 80°F. That is about _____°C. You might wear a sweater at 50°F. That is about _____°C. 22°C is comfortable ____. At 100°C water _____. Water freezes at _____°C. 0°F is about _____°C. -40°F = _____°C. 32°F = _____°C. You might go swimming outside when it is 85°F. That is about _____°C. 37°C is normal _____. At 0°C water _____. 22°C is about _____°F. You could go ice skating at 10°F. That is about _____°C. 212°F = _____°C.

French

Ce thermomètre marque la température en degrés Fahrenheit (°F) et en degrés Celsius (°C). Utilisez le thermomètre pour trouver la réponse correcte:

0°C = _____°F. La température normale du corps est de _____°C. La température ambiante des maisons est de _____°C. Une belle journée d'été est de 80°F. C'est à peu près _____°C. 37°C = _____°F. L'eau bout à _____°C. 100°F est à peu près _____°C. On porte un sweater à 50°F ou à _____°C. A 100°C l'eau _____. L'eau gèle à _____°C. 0°F est à peu près _____°C. -40°F = _____°C. 32°F = _____°C. On peut nager dehors quand il fait 85°F ou _____°C. A 0°C l'eau _____. 22°C est à peu près _____°F. On peut faire du patinage sur glace quand il fait 10°F ou à peu près _____°C. 212°F = _____°C.

German

Dieses Thermometer registriert Temperaturen in Fahrenheit und in Celsius. Gebrauchen Sie das Thermometer, um diese Fragen zu beantworten.

0°C = _____°F. Normale Körpertemperatur ist _____°C. Sommertemperatur ist 80°F. Das ist etwa _____°C. 37°C = _____°F. Wasser kocht bei _____°C. 100°F ist etwa _____°C. Wir ziehen eine Jacke an bei 50°F. Das ist etwa _____°C. 22°C ist gerade die richtige _____. Bei 100°C _____ Wasser. Wasser friert bei _____°C. 0°F ist ungefähr _____°C. -40°F = _____°C. Die richtige Zimmertemperatur ist _____°C. 32°F = _____°C. Sie gehen schwimmen bei 85°F. Das ist etwa _____°C. 37°C ist normale _____. Bei 0°C _____ Wasser. 22°C ist ungefähr _____°F. Sie laufen Schlittschuh bei 10°F. Das ist etwa _____°C. 212°F = _____°C.

Spanish

Este termómetro tiene temperaturas en grados Fahrenheit (°F) y grados Celsio (°C). Usando el termómetro, encuentre la respuesta correcta y escríbala en el espacio en blanco.

0°C = _____°F. La temperatura constante del cuerpo es _____°C. La temperatura cómoda dentro de una casa es _____°F. Un día muy bonito tiene una temperatura de 80°F o aproximadamente _____°C. 37°C = _____°F. El agua hierve a los _____°C. 100°F es aproximadamente _____°C. Se puede llevar un suéter a los 50°F o a los _____°C. A los 100°C el agua _____. El agua hiela a los _____°C. 0°F es aproximadamente _____°C. -40°F = _____°C. 32°F = _____°C. Se puede nadar afuera cuando hace 85°F o aproximadamente _____°C. 37°C es _____. A 0°C el agua _____. 22°C es aproximadamente _____°F. Se puede patinar a los 10°F o aproximadamente _____°C. 212°F = _____°C.

2. Reading/Writing Exercise[16]

Answer the following questions with "yes" or "no." If the answer is "no," rewrite the sentence and change the temperature so that the correct answer is "yes."

1. The thermometer reads 22°C. Do you need a winter coat? (no)
2. The thermometer reads 15°C. Are you going swimming at the pool today? (no)
3. The doctor has taken your temperature and it reads 37°C. Do you have a fever? (no)
4. If the temperature of your body is 40°C, are you sick? (yes)
5. The temperature outside is 35°C. Are you going skiing today? (no)
6. It's 15°C below zero outside today. Is it too cold to play a game of tennis? (yes)
7. Your mother brings you a cup of hot chocolate. It's 45°C. Will you burn your tongue if you drink it? (no)
8. Your mother forgot that the thermostat of her new oven now measures in degrees Celsius. She put a cake in the oven at 375°C. Did the cake burn? (yes)
9. You want to take a bath but the water is 15°C. Is the water hot? (no)
10. If you want to conserve energy in the winter, you should put your thermostat at 20°C. (yes)

French

La température

Répondez "oui" ou "non" aux questions suivantes. Si la réponse est "non", récrivez la phrase et changez la température pour pouvoir répondre par l'affirmative.

1. Le thermomètre marque 22°C. Avez-vous besoin d'un manteau? (non)
2. Le thermomètre marque 15°C. Allez-vous nager à la piscine aujourd'hui? (non)
3. Le médecin vient de prendre votre température et le thermomètre montre 37°C. Avez-vous de la fièvre? (non)
4. La température de votre corps est de 40°C. Etes-vous malade? (oui)
5. La température dehors est de -15°C. Fait-il trop froid pour jouer au tennis? (oui)
6. La température dehors est de 35°C. Allez-vous faire du ski? (non)
7. Votre mère vous apporte une tasse de chocolat chaud. Sa température est de 45°C. Est-ce que vous vous brûlerez la langue si vous la buvez? (non)
8. Votre mère a oublié que le thermostat de son nouveau four mesure la température en degrés Celsius. Elle a mis un gâteau dans le four à 375°C. Est-ce que le gâteau a brûlé? (oui).
9. Vous voulez prendre un bain. L'eau a la température de 15°C. Est-ce que l'eau est chaude? (non)
10. Si vous voulez conserver l'énergie pendant l'hiver vous devez mettre le thermostat à 20°C. (oui)

German

Beantworten Sie die folgenden Fragen mit "ja" oder "nein". Sollte die Antwort "nein" sein, dann ändern Sie den Satz und die Temperatur so, daß danach die richtige Antwort "ja" ist.

1. Die Temperatur ist 22°C. Ziehen Sie einen Wintermantel an? (nein)
2. Die Temperatur ist 15°C. Gehen Sie baden im Freibad? (nein)
3. Der Arzt misst Ihr Fieber, welches 37°C ist. Haben Sie Fieber? (nein)
4. Sind Sie krank, wenn Ihre Temperatur 40°C ist? (ja)
5. Draußen ist es 35°C. Gehen Sie heute skilaufen? (nein)
6. Es ist heute -15°C. Ist es zu kalt für Tennis? (ja)
7. Ihre Mutter bringt Ihnen eine Tasse Kakao. Er ist 45°C. Verbrennen Sie sich die Zunge, wenn Sie sie trinken? (nein)
8. Ihre Mutter hat vergessen, dass ihr neuer Herd jetzt die Temperatur in Celsius mißt. Sie backt den Kuchen bei 375°C. Hat Sie den Kuchen verbrannt? (ja)
9. Sie möchten baden, aber das Wasser ist 15°C. Ist das Wasser heiss? (nein)
10. Wenn Sie im Winter Energie sparen möchten, dann stellen Sie den Thermostat auf 20°C. (ja)

Spanish

Conteste las siguientes preguntas con "sí" o "no". Si la respuesta es "no", escriba de nuevo la frase y cambie la temperatura para poder contestar la frase con "sí".

1. El termómetro marca 22°C. ¿Necesita usted un abrigo? (no)
2. El termómetro marca 15°C. ¿Va a ir hoy a nadar a la piscina? (no)
3. El médico le toma la temperatura a usted. El termómetro marca 30°C. ¿Tiene usted fiebre? (no)
4. Si la temperatura del cuerpo está a 40°C, ¿Está usted enfermo(a)? (sí)
5. La temperatura afuera está a 35°C, ¿Va a esquiar hoy? (no)
6. Hace 15°C bajo cero hoy. ¿Hace demasiado frío para jugar un partido de tenis? (sí)
7. Su mamá le sirve a usted una taza de chocolate caliente. Está a 45°C. ¿Le quema la lengua si la toma? (no)
8. A su mamá se le olvidó que el termóstato de su horno ya mide en grados Celsio. Puso un pastel en el horno a 375°C. ¿Se le quemó el pastel? (sí)
9. Usted quiere bañarse. El agua está a 15°C. ¿Está caliente el agua? (no)
10. Si quiere conservar la energía en el invierno, ¿debe poner el termóstato a 20°C? (sí)

3. Estimating

Each day for a week estimate in °C both the inside temperature of the classroom and the outside temperature. Mark the chart in column

"E" in red pencil with your estimates. Then record the actual temperature and mark your answer in column "A" another color. At the end of the week, circle the statement that best describes your ability to estimate temperature in °C.

Week of:																				
°C	Room Temperature										Outside Temperature									
	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A
50																				
40																				
30																				
20																				
10																				
0																				
-10																				
-20																				
Day	M		T		W		Th		F		M		T		W		Th		F	

I can estimate temperatures in °C very well.
I can estimate temperatures in °C pretty well.
I need more practice in estimating temperatures in °C.

French

Chaque jour pendant une semaine estimez en degrés Celsius la température dans la salle de classe et la température dehors. Ecrivez-la en rouge dans la colonne "E". Puis, vérifiez la température avec un thermomètre et écrivez-la avec un crayon d'une autre couleur dans la colonne "R" (réel). A la fin de la semaine, encerclez la phrase qui décrit le mieux votre habileté à juger la température en degrés Celsius.

Je peux très bien estimer la température en °C.
Je peux estimer assez bien la température en °C.
J'ai besoin de pratiquer un peu plus les estimations des températures en °C.

German

Schätzen Sie eine Woche lang jeden Tag in Grad Celsius die Innen- und Außentemperaturen. Kennzeichnen Sie die geschätzten Temperaturen in der E-Rubrik mit einem roten Stift. Dann schreiben Sie die wirkliche Temperatur mit einem anderen Stift in die A-Rubrik. Am Ende der Woche kennzeichnen Sie die beste geschätzte Temperatur in Grad Celsius.

Ich kann Temperaturen in Celsius sehr gut abschätzen.
Ich kann Temperaturen in Celsius ziemlich gut abschätzen.
Ich muß das Schätzen von Temperaturen in Celsius mehr üben.

Spanish

Durante una semana haga un estimado diario en °C de la temperatura del aula y también de afuera. Marque los estimados en lápiz rojo y póngalos bajo la columna "E". Entonces, tome la temperatura verdadera con un termómetro y márquela en otro color bajo la columna "V". Cuando termine la semana, haga un círculo alrededor de la frase que mejor describa su habilidad en estimar en grados Celsio.

. . .

Puedo hacer buenos estimados de las temperaturas en °C.

Más o menos puedo hacer buenos estimados de las temperaturas en °C.

Necesito más práctica para hacer buenos estimados de las temperaturas en °C.

Measurement Activities: Volume/Capacity

1. Awareness

Fill in the blank with the correct measure, either liter or milliliter.

1. When I buy gasoline for my car and I want to fill the tank, I ask for about 60 ___ of gas. (L)
2. A small can of frozen orange juice has about 200 ___ of liquid. (ml)
3. A bottle of contact lens solution has about 25 ___ of solution. (ml)
4. To paint a small table and two chairs, use 1 ___ of paint. (L)
5. My little sister's plastic swimming pool holds about 80 ___ of water. (L)
6. Everyone should drink 2 ___ of water every day. (L)
7. After playing outside in the cold, I prepare hot chocolate for my friend and me. I need about 500 ___ of milk. (mL)
8. If I want to prepare lemonade for a group of 10 people I need to prepare at least 2 ___. (L)
9. When you wash your hair, it's only necessary to use 3 ___ of shampoo. (mL)

French: Le volume/La capacité

Choisissez le mot convenable, "litre" ou "millilitre". Remplacez le tiret par le mot convenable.

1. Quand j'ai besoin d'essence pour ma voiture, je fais le plein et je demande à peu près 60 ___ d'essence. (L)
2. Une petite boîte de jus d'orange congelé à environ 200 ___ de liquide. (ml)
3. La bouteille de solution pour nettoyer les verres de contact contient à peu près 25 ___ de liquide. (ml)

4. Pour peindre une petite table et deux chaises on a besoin d'un ___ de peinture. (L)
5. La piscine en plastique de ma petite soeur contient à peu près 80 ___ d'eau. (L)
6. Pour rester en bonne santé on doit boire à peu près 2 ___ d'eau chaque jour. (L)
7. Après avoir joué dans la neige mon ami et moi, nous préparons du chocolat bien chaud. Nous avons besoin de 500 ___ de lait. (ml)
8. Pour faire une citronnade pour un groupe de 10 personnes, je dois en avoir au moins 2 ___. (L)
9. Quand on veut se laver les cheveux, on a besoin de 3 ___ de shampooing. (ml)

German: Volumen/Inhalt

Ergänzen Sie das richtige Maß in Liter oder Milliliter.

1. Wenn ich Benzin für mein Auto kaufe und den Tank vollmachen will, dann kaufe ich 60 ___ Benzin. (L)
2. Eine kleine Dose gefrorenen Apfelsinensaft enthält ungefähr 200 ___. (ml)
3. Eine Flasche mit Kontaktlinsenlösung enthält ungefähr 25 ___. (ml)
4. Um einen kleinen Tisch und zwei Stühle zu streichen, brauche ich 1 ___ Farbe. (L)
5. Das kleine Kunststoffschwimmbecken meiner Schwester hält etwa 80 ___ Wasser. (L)
6. Jeder sollte täglich 2 ___ Wasser trinken. (L)
7. Nach dem Spaziergang in der Kälte koche ich heißen Kakao für meine Freundin und für mich. Ich brauche dafür 500 ___ Milch. (ml)
8. Wenn ich Limonade für 10 Leute serviere, dann brauche ich mindestens 2 ___. (L)
9. Wenn man sein Haar wäscht, dann braucht man nur 3 ___ Schampun. (ml)

Spanish: Volumen/capacidad

Ponga la medida correcta, litro o mililitro, en el espacio en blanco.

1. Cuando compro gasolina para mi coche y quiero llenar el tanque, pido más o menos 50 ___ de gasolina. (L)
2. Una lata pequeña de jugo de naranja congelado contiene alrededor de 200 ___ de líquido. (ml)
3. Un envase de solución para lentes de contacto contiene más o menos 25 ___ de solución. (ml)
4. Para pintar una mesa pequeña y dos sillas, use un ___ de pintura. (L)
5. La piscina de plástico de mi hermanita contiene alrededor de 80 ___ de agua. (L)
6. Todo el mundo debe beber 2 ___ de agua todos los días. (L)
7. Después de jugar afuera en el invierno, preparo chocolate caliente para mi amiga y para mí. Necesito alrededor de 500 ___ de leche. (ml)

8. Si quiero preparar limonada para un grupo de 10 personas, tengo que preparar por lo menos 2 ___. (L)
9. Cuando usted se lava la cabeza, necesita usar solamente 3 ___ de champú. (ml)

2. Estimating

Have students estimate the number of liters in a bucket, a kitchen sink, a bathtub, and any other containers that they might choose. Have them write down their estimate, then let them measure by using a liter container to fill the article. They should then calculate the difference between their estimate and the actual measurement so that they can see how close their estimate is.

French

Estimez la capacité des objets suivants: un seau, un évier, une baignoire. Puis, remplissez l'objet pour trouver la capacité réelle. Calculez ensuite la différence entre vos estimations et les capacités réelles.

German

Man schätze den Literinhalt eines Eimers, eines Waschbeckens, einer Badewanne und anderer Behälter. Lassen Sie die Studenten diese Voranschläge aufschreiben; danach messen die Studenten mit einem Litermaß den Inhalt des Gegenstandes. Die Studenten sollen dann den Unterschied zwischen ihren Voranschlägen und dem richtig gemessenen Inhalt ausrechnen.

Spanish

Calcule la capacidad de los objetos siguientes: un cubo, el fregador de la cocina, tina de baño. Entonces llene el objeto usando un recipiente de un litro para averiguar la capacidad exacta. Entonces saque la diferencia entre su cálculo y la capacidad exacta del objeto.

3. Reading Exercise[17]

The human body has a refined system of self-regulation. Normal body temperature is 37°C. When a person sweats, the heat that is created by the body is released. For example, when a person has a fever, she or he begins to sweat. The human body can release between 600 and 800 g of water in an hour. But if the body releases too much water, there can be grave consequences. The loss of 5.6 L of water can produce mental confusion or hallucinations, because the person has lost too much salt. In order to replace the water lost daily, a per-

son should drink about 2 L of water each day, more if the person exercises a lot.

Questions: Read the following questions and write T if the statement is true and F if the statement is false.

1. If a person has a temperature of 40°C there's nothing to worry about. (F)
2. There is no problem if a person loses 1/2 kg of water in an hour, if she or he replaces it. (T)
3. Dehydration or loss of water can be dangerous. (T)
4. According to the article, if a person drinks four glasses of water daily, that is sufficient to replace the water that has been lost. (F)

French

Le corps humain a un système raffiné d'autorégulation. La température normale du corps est de 37°C. Quand une personne transpire, la chaleur du corps se dégage. Par exemple, une personne fiévreuse commence à transpirer. Le corps humain peut dégager entre 600 et 800 g de sueur par heure. Mais si le corps dégage trop de sueur, les conséquences peuvent être graves. Une perte de 5,6 L d'eau peut produire des troubles mentaux ou des hallucinations à cause du manque de sel. Pour remplacer l'eau qu'on perd quotidiennement, on doit boire tous les jours à peu près deux litres d'eau et davantage si on s'exerce physiquement.

Questions: Lisez les questions suivantes et écrivez "V" si la phrase est vraie et "F" si la phrase est fausse.

1. Si la température de quelqu'un est de 40°C, ce n'est pas grave. (F)
2. Si quelqu'un perd 1/2 kg d'eau en une heure, il n'y a pas de problème à condition qu'il le remplace. (V)
3. Si le corps perd trop d'eau, cela peut être dangereux. (V)
4. Selon l'article, si quelqu'un boit 4 verres d'eau chaque jour, cela suffit pour remplacer l'eau consommée. (F)

German

Der menschliche Körper hat ein raffiniertes System zur Selbstregulierung. Die normale Körpertemperatur ist 37°C. Wenn man schwitzt, gibt der Körper selbsterzeugte Wärme ab. (Z.B., wenn man ein Fieber hat, beginnt man zu schwitzen.) Der Körper ist imstande, innerhalb einer Stunde zwischen 600 und 800 g auszuscheiden. Aber wenn der Körper zuviel Wasser verliert, dann kann es schwere Folgen auf sich haben. Ein Wasserverlust von 5,6 L verursacht geistige Verwirrungen, weil der Körper zuviel Salz verliert. Um den täglichen Wasserverlust ins Gleichgewicht zu bringen, sollte man ungefähr 2 L Wasser täglich trinken, oder mehr, wenn man dem Körper grössere körperliche Anstrengungen zumutet.

Fragen: Lesen Sie die folgenden Fragen und schreiben Sie „R", wenn der Satz richtig, und „F", wenn der Satz falsch ist.

1. Wenn jemand eine Temperatur von 40°C hat, dann braucht man sich nicht zu beängstigen. (F)
2. Es gibt kein Problem, wenn jemand 1/2 kg Wasser in einer Stunde verliert, falls er es gleich wieder ersetzt. (R)
3. Hoher Wasserverlust kann sehr gefährlich sein. (R)
4. Der Artikel sagt aus, dass man genug Wasser trinkt, um das Verlorene zu ersetzen, wenn man 4 Gläser Wasser täglich trinkt. (F)

Spanish

El cuerpo humano tiene un refinado sistema de autorregulación que lo mantiene equilibrado a pesar de los diferentes procesos interiores y exteriores. La temperatura constante normal del cuerpo es de 37°C. El calor se manifiesta, por su parte, a través del sudor, que expulsa el calor. Por ejemplo, cuando una persona tiene una fiebre empieza a sudar. El cuerpo humano puede expulsar entre 600 y 800 g de sudor por hora. Pero si el cuerpo expulsa demasiado sudor hay consecuencias muy graves. La pérdida de 5,6 L de agua pudiera producir el mareo porque la persona ha perdido demasiada sal. Para reponer el agua perdida, una persona debe tomar unos 2 L de agua cada día, más si la persona hace mucho ejercicio.

Preguntas: Lea las siguientes frases. Escriba "V" si la frase es verdad, "F" si la frase es falsa.

1. Si una persona tiene una temperatura de 40°C no hay que preocuparse mucho. (F)
2. No hay problema si una persona pierde 1/2 kg de agua si la repone. (F)
3. La deshidratación, o pérdida de agua es peligrosa. (V)
4. Según el artículo, si una persona toma cuatro vasos de agua diariamente, es suficiente para reemplazar el agua que ha expulsado. (F)

Additional Awareness and Measuring Activities

- Establish a metric environment within the classroom.

- Arrange for students to give (in SI) the weather announcements, including temperature and precipitation.

- Make a chart of important days during the school year. Have students make predictions of the weather, temperature, and precipitation for those days, then record the actual conditions as they occurred. Students can then compare their predictions with what actually happened. (Adapted from Metric Education Guide, Texas.)

- "Teaser" items on a bulletin board (e.g., a full-length poster of Superman with approximate measurements in SI) or in a reading selec-

tion will help to focus awareness on and stimulate interest in the metric system before actual study begins.

· Have a language department-sponsored "Volksmarsch" (a non-competitive walk or jogging event over a predetermined course, usually 5-7 km in length). Students plan and lay out the course using a trundle wheel. Have distances marked in 0.5 km and 1.0 km increments so that people will know how far they have walked. At the starting point, provide a booth to collect a nominal fee for participating or to sell buttons or T-shirts with a slogan commemorating the event. (E.g., Do it in Metric! ¡Hágalo en métrico! Faites-la en métrique! or a student-designed motif telling distance and date of the event.) At the finish line, sell refreshments.

Metric Games

Trueblood and Szabo (1975) suggest eight criteria for designing metric games:

1. Establish specific guidelines. What do you want your students to learn from playing the game? For example: "Given a set of common objects, students estimate the objects' weight."

2. Write simple rules and procedures. The game should be self-instructional and student directed. Include how the game begins, how it is scored, and how a student will obtain feedback concerning his answers or decisions. For example, questions may be written on one side of a card, answers and points received on the other side.

3. Use simple materials (e.g., a cardboard playing surface, buttons for tokens, decision devices such as dice or spinners, task determiners such as card decks or written instructions on the playing surface).

4. Provide immediate feedback. Write answers on the back of the task cards, create an answer deck, or use student leaders whose performance level would permit them to judge the accuracy of the other students' performances. Feedback is a key feature of an instructional game because it instructs and motivates at the same time.

5. Have students record diagnostic information. For example, student record cards provide the players with a record of their scores and motivate them to improve. They also help the teacher judge when the difficulty of the task card should be altered, which students should play together, or which students may be designated as leaders for the game. Use first-round student record sheets as a pre-test. Keep succeeding record sheets in order to observe a particular student's progress.

6. Build in some suspense. Students enjoy games that contain some element of risk or chance. Use dice, or areas on the game board where students may skip forward or back, lose a turn, etc.

7. Create the material to allow for variation. If one set of cards deals with weights, make another set of cards with volume, and another set of cards with linear measurements. This allows a new game to be created without a large time investment on the part of the teacher, and it keeps the game from becoming stale.

8. Evaluate the game. Give students a self-report form that they can use to evaluate the game. The following statements might be included: (a) Would you recommend the game to someone else in the class? (b) How did you feel when you were playing the game? (c) What part of the game did you like best? (d) How would you improve the game? Student suggestions are one of the best ways to find out how successful the game is and how it might be improved.

The Animal Game (3-4 players)

Materials: 3 x 5 cards, pictures or drawings of common animals, felt-tip pens. This game may be made by more advanced students for the other students to play.

Play: The game is played like "Old Maid." Players match one set of picture cards to another set of cards containing a short description of an animal, with metric measurements for weight, length, temperature of environment where the animal is most comfortable; color, etc. The joker or "Old Maid" card should contain the word "Metric" (Métrique, Metern, Métrico). The student who is able to match the most pairs wins. Five points are given for each pair matched. The player who finishes the game with the "Old Maid" deducts 10 points from his or her score.

The Habitat Game (3-4 players)

Materials: Picture cards similar to the ones in the Animal Game, a fact board divided into squares (each square contains one fact about each animal included in the picture card deck plus the number 1, 2, 3, 4, or 5), a spinner card containing the numbers 1-5

Play: Cards are dealt to each player until all are distributed. Players spin the spinner and try to match their picture with any of the matching numbered squares on the gameboard. For example, if a player has a card with a whale on it and his spin indicates a square containing the fact "15 000 kg," he has made a match. Each match is worth two points. As a match is made, the players put their cards face down in front of them. Scores are added at the end of the game. For each card remaining in a player's hand, one point is subtracted from the score. Provide an answer sheet so that any disputes may be settled.

The Grocery Game (3-4 players)

Materials: (1) Deck of ten menu cards, each including a menu typical

of the country being studied, ingredients necessary to prepare the meal, and a space for players to check off the ingredients when they have purchased them (several dittoed copies of each menu should be provided, since the menu card becomes, in effect, the player's score card); (2) a gameboard containing squares with pictures of ingredients and prices (e.g., 2 kg hamburger at $2.50 p/kg; 2 L milk at $1.00 p/L) and with spaces for players to lose a turn, buy any product they wish from another student, find extra money, lose money, etc.; (3) predetermined amount of money in the country's currency.

Play: One player is designated "grocery clerk" and acts as banker for the game. Players roll dice in order to move tokens (buttons) around the board. Each player is dealt a different menu card. The player who is first to buy the products necessary for a complete meal wins. (First place scores 50 points; second place, 25 points; third place, 15 points.)

Metric Card Game (3-4 players)

Materials: A deck of 42 cards. Each of the 21 units of the metric system measuring length, mass, and capacity is printed on two cards. Before each game, the cards should be shuffled. The initial dealer can be selected arbitrarily, and in subsequent games the deal passes to the left.

Play: The dealer deals six cards to each of the players. The rest of the deck is placed face down between the players, and the top card is turned over to start the "discard" pile. The player to the left of the dealer has the option of taking the top card from the discard pile or the top card from the deck. After drawing, the player must discard one card, face up.

The object of the game is to build up a "run" or "runs" in the hand. A "run" consists of three or more cards, all naming the same quantity--length, mass, or capacity--and being adjacent measurements in the quantity. For example, a run could be the following three cards: (dm, cm, mm) or (dag, g, dg) or (kl, hl, dal), etc. A run can also be four, five, or six cards. All the cards in a run must be in order, with no measurement being included in that run more than once. When a player has a hand with all cards being a part of a run or runs, he discards the extra card, declares "Metric," and shows the hand to the rest of the players. If it is a proper "Metric," the hand is completed and the scores are marked down before the next hand is dealt out. If the other players determine that the player who declared "Metric" is incorrect, that player picks up his cards and the play continues.

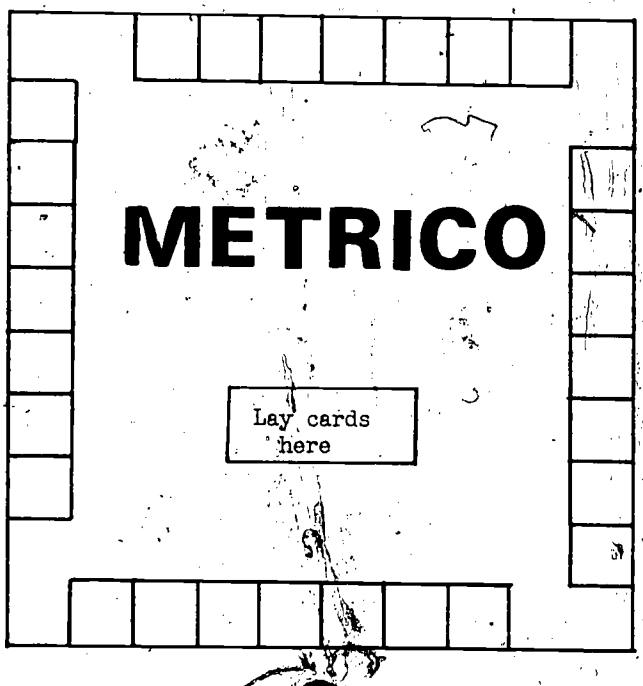
Scoring: The player who declares "Metric" gets five points for going out, and all players, including the declarer, get one point for every card in their hand that is part of a "run." For a run of six cards, two points are scored for each card in addition to the five points for going out--in this case 17 points altogether. Play continues until one of the players has 25 points.

Metric "21"[18]

Make a deck of cards for playing "21." Each card should have a line segment on its face. The segments are one, two, three, four, or five centimeters in length. The three-cm length should be included more than the others, and the one-cm and five-cm lengths should occur least frequently. Use rules as in the card game "21." Have each player decide lengths through estimating rather than measuring. Players win when they get a sum closer to 21 cm than the dealer does, without going over. An actual measurement will verify winners.

Metrico Game and Gameboard[19]

Materials: Colored poster board, 3" x 5" index cards, felt-tipped pen. Make gameboard as shown below from colored posterboard. To facilitate handling and storage, board may be cut in half and taped with masking tape down the middle. Make five cards for each of the letters in the word Metrico (Métrique, Metern, Métrico). Activity cards should contain a variety of pictures of items that can be measured in meters, liters, or grams, e.g, car, motorcycle, dime, flea, coke, dinosaur, football, house, pencil, fingernail, shoe, dog, milk.



Play: Lay activity cards face up on the gameboard. The player whose turn it is answers the question on the card, then checks his response by turning the card over to see the answer. If he is correct, he is allowed to draw one Metrico letter card. He then places his letter on

the proper space (on his side of the board), working toward the spelling of METRICO, one letter at a time. If he already has that letter, he returns it to the bottom of the letter stack. If he responds incorrectly, he forfeits his turn to draw a letter. The game is over when one player has spelled the word METRICO.

Metric Post-test Self-Quiz[20]

Read the following sentences and circle the completion that is most appropriate:

1. A bathing suit made out of 1 dm^2 of material would be (a) decent; (b) indecent.
2. A person who is 220 cm tall and has a mass of 110 kg would be better suited to be (a) a member of a professional basketball team; (b) the fat man in a circus.
3. 40 000 km would be the equator of (a) the earth; (b) the moon; (c) Jupiter.
4. A distance of 1 km would be (a) a marathon race; (b) a stroll in a park; (c) the length of a diving board.
5. A sphere with a diameter of 4 cm would be (a) the head of a snow man; (b) Arnold Palmer's golfball; (c) a grapefruit.
6. The month is Ja[illegible], the temperature is 32 °C. The place is (a) Boston; (b) [illegible]; (c) Atlanta.
7. The temperature is 5 °C and you are swimming. You are probably a (a) penguin; (b) goldfish; (c) fish in the Amazon.
8. A rug of 200 m^2 would best cover (a) a living room floor; (b) a baseball field; (c) a tennis court.
9. In a 100 L aquarium, you would most likely put (a) a whale; (b) a shark in Jaws; (c) a piranha.
10. If you drive 90 km in 1 hour, you would be (a) racing at the Indianapolis Speedway; (b) caught in rush-hour traffic; (c) driving to your grandmother's house.

Answers: 1(b); 2(a); 3(a); 4(b); 5(b); 6(b); 7(a); 8(c); 9(c); 10(c).

French

Complétez les phrases suivantes en encerclant la lettre qui correspond à la meilleure réponse.

1. Un maillot de bain fait avec 1 dm^2 d'étoffe est (a) décent; (b) indécent.
2. Une personne qui mesure 220 cm et qui pèse 110 kg est probablement (a) un joueur professionnel de basketball; (b) un homme très gros dans un cirque.
3. 40 000 km serait l'équateur de (a) la terre; (b) la lune; (c) Jupiter.
4. La distance de 1 km est probablement la longueur (a) d'un marathon; (b) d'une allée; (c) d'un plongeoir.
5. Une sphère de 4 cm de diamètre a à peu près la grandeur de (a) la tête d'un homme; (b) une balle de golf; (c) un pamplemousse.

6. C'est le mois de janvier; il fait 32°C. Le lieu est (a) Québec; (b) Tahiti; (c) Paris.
7. La température est de 5°C et vous nagez. Vous êtes probablement un (a) pingouin; (b) poisson rouge; (c) poisson de l'Amazone.
8. Un tapis de 200 m^2 peut couvrir le mieux (a) le plancher du salon; (b) un terrain de base-ball; (c) un terrain de tennis.
9. Dans un aquarium de 100 L on met probablement (a) une baleine; (b) un requin; (c) un piranha.
10. Si vous conduisez à 90 km/heure vous êtes (a) à la course automobile; (b) dans un embouteillage; (c) en route pour aller chez votre grand'mère.

Réponses: 1(b); 2(a); 3(a); 4(b); 5(b); 6(b); 7(a); 8(c); 9(c); 10(c).

German

Lesen Sie die folgenden Sätze und kennzeichnen Sie die richtige Antwort.

1. Ein Badeanzug aus 1 dm^2 Stoff würde (a) anständig sein; (b) unanständig sein.
2. Ein Mensch, 220 cm gross, mit einem Gewicht von 110 kg sollte lieber (a) ein Korbballspieler sein; (b) ein dicker Mann im Zirkus sein.
3. 40 000 km ist der Umfang (a) der Erde; (b) des Mondes; (c) Jupiters.
4. Eine Entfernung von 1 km wäre (a) ein Marathon-Rennen; (b) ein Spaziergang im Park; (c) die Länge eines Sprungbrettes.
5. Eine Kugel mit einem Umfang von 4 cm wäre (a) der Kopf eines Schneemanns; (b) Arnold Palmer's Golfball; (c) eine Pampelmuse.
6. Der Monat ist Januar; die Temperatur ist 32°C. Der Platz ist (a) Boston; (b) Tahiti; (c) Atlanta.
7. Die Temperatur ist 5°C und Sie schwimmen. Sie sind vielleicht ein (a) Pinguin; (b) Goldfisch; (c) Fisch im Amazonas.
8. Ein Teppich von 200 m^2 bedeckt (a) einen Wohnzimmerboden; (b) ein Baseballfeld; (c) einen Tennisplatz.
9. In einem 100-L-Aquarium kann man (a) einen Walfisch finden; (b) einen Hai sehen; (c) einen Piranha finden.
10. Wenn Sie 90 km per Stunde fahren, würden Sie (a) im Indianapolis-Autorennen sein; (b) im schlimmen Verkehr sein; (c) zu Ihrer Großmutter fahren.

Antworten: 1(b); 2(a); 3(a); 4(b); 5(b); 6(b); 7(a); 8(c); 9(c); 10(c).

Spanish

Lea las frases siguientes y escoja la respuesta más apropiada. Ponga un círculo alrededor de su respuesta.

1. Un traje de baño hecho de 1 dm^2 de tela sería (a) decente; (b) indecente.

2. Una persona que mide 220 cm de altura y tiene un peso de 110 kg debe ser (a) un miembro de un equipo profesional de baloncesto; (b) El hombre más gordo del mundo.
3. 40,000 km es aproximadamente el ecuador de (a) la tierra; (b) la luna; (c) el planeta Júpiter.
4. Una distancia de 1 km es (a) la carrera del maratón; (b) un paseo por el parque; (c) la longitud del trampolín de una piscina.
5. Una esfera con un diámetro de 4 cm es (a) la cabeza de un muñeco de nieve; (b) una pelota de golf; (c) una toronja.
6. El mes es enero y la temperatura es de 32°C. Usted está en (a) Madrid; (b) la ciudad de Panamá; (c) la ciudad de México.
7. La temperatura es de 5°C y usted está nadando. Usted es (a) un pingüino en el Antártico; (b) un pescacito dorado en un acuario; (c) una piraña en el río Amazonas.
8. Una alfombra de 200 m^2 cubre mejor (a) el piso de una sala; (b) un campo de beisbol; (c) una cancha de tenis.
9. En un acuario de 100 L, usted puede poner (a) una ballena, como "Moby Dick"; (b) un tiburón, como "Jaws"; (c) una piraña.
10. Si usted recorre 90 km en una hora, usted (a) participa en la carrera automovilística de Indianápolis; (b) está en una congestión de tráfico; (c) viaja a la casa de su abuelita.

Respuestas: 1(b); 2(a); 3(a); 4(b); 5(b); 6(b); 7(a); 8(c); 9(c); 10(c).

NOTES

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2. Charles Watson et al., Metrication aids for teachers (Little Rock: Arkansas Department of Education), 64.
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16. Ibid., 26.
17. Adapted from Sergio del Monte, Los límites del cuerpo humano, Revista de Geografía Universal 5 (1, 1979), 68-91.
18. Adapted from Measurement...with metric, a resource handbook (Salem, OR: State Department of Education).
19. Adapted from Watson, Metrication aids.
20. Adapted from Georgia metric education, op. cit.
21. Adapted from Richard J. Shumway et al., Think metric--live metric, in Metric handbook for teachers (Reston, VA: Teachers of Mathematics, 1974), 43.

14

APPENDIX A

For further information regarding metrication in the foreign language classroom, teachers may contact the following people in their state. (An asterisk indicates that the state has developed a curriculum guide for the teaching of the metric system.)

*ALABAMA: Dr. Zac Perry, 607 State Office Building, Montgomery, AL 36130.

ALASKA: State Dept of Ed, Louis Coatney, Chair, DOE Metrication Task Force, Documents Librarian, Alaska State Library, Pouch G, Juneau, AK 99811.

*ARKANSAS: Charles D. Watson, Specialist, Mathematics and Science, State Dept of Ed, Capital Mall, Little Rock, AR 72201.

*CALIFORNIA: Joseph R. Hoffmann, Math Consultant, State Dept of Ed, 721 Capitol Mall, Sacramento, CA 95814.

CANAL ZONE: R. Annis, Director of Curriculum, Canal Zone Schools, Box M CASC, Balboa Heights, Canal Zone.

COLORADO: State Facilitator of Metric Ed; or William Dean, Assistant Commissioner; State Dept of Ed, 201 E. Colfax, Denver, CO 80203.

*DELAWARE: Dr. William Geppert, State Metric Coordinator, Townsend Building, Dover, DE 19901.

*GEORGIA: Mrs. Caro Feagin, Foreign Language Consultant, or Mrs. Clare F. Nesmith, Mathematics Ed Coordinator; State Dept of Ed, State Office Building, Atlanta, GA 30334.

GUAM: Dr. Gail S. Mullen, Mathematics Consultant, Dept of Ed, Curriculum and Instruction, Box DE, Agana, Guam 96910.

HAWAII: Miles Muraoka, Educational Specialist, Science Ed, 1270 Queen Emma St, Room 1102, Honolulu, HI 96813.

*IDAHO: Dr. Richard Kay, Consultant, Science, State Dept of Ed, Len B. Jordan Office Building, Boise, ID 87320.

ILLINOIS: Wendell Meeks, Educational Consultant--Mathematics/Metrics, Illinois Office of Ed, 100 North First St, Springfield, IL 62777.

INDIANA: Thomas E. Clark, State Mathematics Consultant, Division of Curriculum, Indiana Dept of Public Instruction, Room 229 State House, Indianapolis, IN 46219.

IOWA: Dr. Barbara Wickless, Curriculum Division, State Dept of Public Instruction, Des Moines, IA 50319.

KANSAS: Dr. Ramona Anshutz, Program Specialist, Science and Mathematics, or Charles E. Nicholson, Coordinator, Educational Assistance Section; State Dept of Ed, 120 E. 10th, Topeka, KS 66612.

KENTUCKY: Lydia Wells Sledge, 1827 Capital Plaza Tower, Frankfort, KY 40601.

LOUISIANA: Mrs. Clytie J. Wayne, Metric Supervisor, State Dept of Ed, P.O. Box 44064, Baton Rouge, LA 70804.

MARYLAND: Clarence Miller, Specialist in Mathematics, State Dept of Ed, 200 W. Baltimore St, Baltimore, MD 21201.
*MASSACHUSETTS: Ernest Mazzone, Director Bilingual Ed, State Oept of Ed, Room 31, St. James Ave, Boston, MA 02116; or Richard A. Carbone, Educational Specialist III, Greater Boston Regional Educational Center, 54 Rindge Ave, EXT., Cambridge, MA 02140.
MICHIGAN: Dr. Wayne R. Scott, MDE/ISP, Box 30008, Lansing, MI 48909.
MINNESOTA: Suzanne Jebe, Program Specialist, Modern and Classical Languages, State Dept of Ed, 649 Capitol Square, 550 Cedar St, Saint Paul, MN 55101; or David Dye, Mathematics Specialist, State Oept of Ed, 643 Capitol Square, 550 Cedar St, Saint Paul, MN 55101.
*MISSISSIPPI: Ms. Oollie S. Mosley, Mathematics Consultant, P.O. Box 771, State Oept of Ed, Jackson, MS 39205.
MISSOURI: Jack Roy, Director, Curriculum Implementation, Dept of Elementary and Secondary Ed, P.O. Box 480, Jefferson City, MO 65102.
MONTANA: Duane Jackson, Foreign Language Consultant, Office of Public Instruction, State Capitol, Helena, MT 59601.
NEBRASKA: Dr. Don Niemann, Math Consultant, or Dr. Mel Neilson, Foreign Language Consultant; State Oept of Ed, 301 Centennial Mall S., Lincoln, NE 68509.
*NEVADA: Ron Gutzman, Ed Consultant, Dept of Ed, Capitol Complex, 400 W. King St, Carson City, NV 89710.
NEW HAMPSHIRE: Fernand J. Prevost, Consultant, Mathematics Ed, State Dept of Ed, 64 N. Main St, Concord, NH 03301.
NEW JERSEY: June I. Coultas, Director Bureau of Basic Skills, State Dept of Ed, 225 W. State St, Trenton, NJ 08625.
NEW MEXICO: Bill Trujillo, Math Specialist, State Oept of Ed, State Education Building, Santa Fe, NM 87503.
*NEW YORK: Alain Blanchet, Bureau of Foreign Language Ed, State Ed Dept, Albany, NY 12234.
NORTH OAKOTA: George Fors, Science and Mathematics Consultant, Dept of Public Instruction, Bismarck, ND 58505.
OKLAHOMA: Or. Joe Bob Weaver, Math Specialist, State Dept of Ed, 2500 N. Lincoln, Oklahoma City, OK 73100.
*OREGON: Oon Fineran, Specialist, Mathematics Ed, Basic Ed; State Dept of Ed, Instruction Division, 942 Lancaster Dr NE, Salem OR 97310.
*PENNSYLVANIA: Carl E. Heilman, Mathematics Education Adviser, Room 500, Ed Building, Harrisburg, PA 17126.
PUERTO RICO: Awilda M. Ramirez, Assistant Secretary for Curriculum and Educational Technology, Dept of Ed, Hato Rey, PR 00919.
RHOOE ISLAND: Oonald R. Gardner, Jr. Coordinator, Program Development, State Dept of Ed, Providence, RI 02908.
SOUTH CAROLINA: Dr. Beverly Enwall, Supervisor, Curriculum Oevelopment, State Superintendent's Office, Columbia, SC 29601.
*SOUTH DAKOTA: Ms. Marilyn Hala, Mathematics Oirector, Kneip Building, Pierre, SD 57501.
TENNESSEE: William G. Crockett, Specialist/Mathematics, Dept of Ed, 124 Gooch Hall, UT Martin, Martin, TN 38238.
*TEXAS: Dr. Robert Montgomery, Assistant Deputy Commissioner, or Dr. Alice R. Kidd, Program Director, Mathematics, Oivision of Curriculum Development; Texas Education Agency, 201 East 11th, Austin, TX 78701.
*UTAH: Or. J. Lloyd Eldredge, Chair, Metric Task Force Committee, State Board of Ed, 250 East 500 S., Salt Lake City, UT 84111.

*VERMONT: Mr. Kenney, Mathematics Consultant, Division of Elementary and Secondary Ed, State Dept of Ed, Montpelier, VT 05602.
*VIRGINIA: Dr. Helen Warriner, Associate Director, Foreign Languages, or Edgar L. Edwards, Jr., Associate Director, Mathematics; Dept of Ed, P.O. Box 6-Q, Richmond, VA 23216.
VIRGIN ISLANDS: Foreign Language Supervisor, Dept of Ed, St. Thomas, VI 00801; or Mario E. Golden, Mathematics Supervisor, Dept of Ed, P.O. Box I, Christiansted, St. Croix, VI 00820.
WASHINGTON: Elden B. Egbers, Supervisor of Mathematics and Metrics, Old Capital Building, Mail Stop FG 11, Olympia, WA 98504.
*WISCONSIN: Dr. Frank Grittner, Foreign Language Supervisor, or Donald L. Chambers, Mathematics Supervisor; State Dept of Public Instruction, 126 Langdon St, Madison, WI 53702.
WYOMING: William M. Futrell, Science/Math Coordinator, State Dept of Ed, Cheyenne, WY 82002.

APPENDIX B

SOME METRIC CONVERSIONS[21]

Distances to Places You Travel

5 km	3 mi
10 km	6 mi
15 km	9 mi
20 km	12 mi
25 km	16 mi
30 km	19 mi
35 km	22 mi
40 km	25 mi
45 km	28 mi
50 km	31 mi
100 km	62 mi
150 km	93 mi
200 km	124 mi
250 km	155 mi
300 km	186 mi
350 km	217 mi
400 km	249 mi
450 km	280 mi
500 km	311 mi
1000 km	621 mi
1500 km	932 mi
2000 km	1243 mi
2500 km	1553 mi
3000 km	1864 mi
3500 km	2175 mi
4000 km	2485 mi

Speedometer

20 km/hr	12 mi/hr
40 km/hr	25 mi/hr
60 km/hr	37 mi/hr
80 km/hr	50 mi/hr
100 km/hr	62 mi/hr
120 km/hr	75 mi/hr
140 km/hr	87 mi/hr

Oven Temperature

100°C	212°F
125°C	257°F
150°C	302°F
175°C	347°F
200°C	392°F
225°C	437°F
250°C	482°F

Kitchen Scale

100 gm	3.5 oz	0.22 lb
200 gm	7.1 oz	0.44 lb
300 gm	10.6 oz	0.66 lb
400 gm	14.1 oz	0.88 lb
500 gm	17.6 oz	1.10 lb
600 gm	21.2 oz	1.32 lb
700 gm	24.7 oz	1.54 lb
800 gm	28.2 oz	1.76 lb
900 gm	31.7 oz	1.98 lb
1000 gm	35.3 oz	2.20 lb
1100 gm	38.8 oz	2.43 lb
1200 gm	42.3 oz	2.65 lb
1300 gm	45.9 oz	2.87 lb
1400 gm	49.4 oz	3.09 lb
1500 gm	52.9 oz	3.31 lb
1600 gm	56.4 oz	3.53 lb
1700 gm	60.0 oz	3.75 lb
1800 gm	63.5 oz	3.97 lb
1900 gm	67.0 oz	4.19 lb
2000 gm	70.5 oz	4.41 lb

Kitchen Capacities

2.5 mL	1/2 teaspoon
5 mL	1 teaspoon
15 mL	1 tablespoon
60 mL	1/4 cup
80 mL	1/3 cup
120 mL	1/2 cup
160 mL	2/3 cup
180 mL	3/4 cup
240 mL	1 cup

Drinking Glass and Pitcher

100 mL	3.4 fl oz
200 mL	6.8 fl oz
300 mL	10.1 fl oz
400 mL	13.5 fl oz
500 mL	16.9 fl oz
600 mL	20.3 fl oz
700 mL	23.7 fl oz
800 mL	27.1 fl oz
900 mL	30.4 fl oz
1000 mL	33.8 fl oz

Room Dimensions

1.0 m	3.3 ft
1.5 m	4.9 ft
2.0 m	6.6 ft
2.5 m	8.2 ft
3.0 m	9.8 ft
3.5 m	11.5 ft
4.0 m	13.1 ft
4.5 m	14.8 ft
5.0 m	16.4 ft
5.5 m	18.0 ft
6.0 m	19.7 ft
6.5 m	21.3 ft
7.0 m	23.0 ft
7.5 m	24.6 ft
8.0 m	26.2 ft
8.5 m	27.9 ft
9.0 m	29.5 ft
9.5 m	31.2 ft
10.0 m	32.8 ft
10.5 m	34.4 ft
11.0 m	36.1 ft

Scrub Pail

1 L	1.1 qts
2 L	2.1 qts
3 L	3.2 qts
4 L	4.2 qts
5 L	5.3 qts
6 L	6.3 qts
7 L	7.4 qts
8 L	8.5 qts
9 L	9.5 qts
10 L	10.6 qts

Gas Tank

10 L	2.6 gal
20 L	5.3 gal
30 L	7.9 gal
40 L	10.6 gal
50 L	13.2 gal
60 L	15.9 gal
70 L	18.5 gal
80 L	21.1 gal
90 L	23.8 gal
100 L	26.4 gal

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