March 2007

Information Booklet

MATHEMATICS
Grade 6

Revised Based on TEKS Refinements

Texas Education Agency • Student Assessment Division

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INTRODUCTION

The Texas Assessment of Knowledge and Skills (TAKS) is a completely reconceived testing program. It assesses more of the Texas Essential Knowledge and Skills (TEKS) than the Texas Assessment of Academic Skills (TAAS) did and asks questions in more authentic ways. TAKS has been developed to better reflect good instructional practice and more accurately measure student learning. We hope that every teacher will see the connection between what we test on this state assessment and what our students should know and be able to do to be academically successful. To provide you with a better understanding of TAKS and its connection to the TEKS and to classroom teaching, the Texas Education Agency (TEA) has developed this newly revised version of the TAKS information booklet based on the TEKS refinements. The information booklets were originally published in January 2002, before the first TAKS field test. After several years of field tests and live administrations, the information booklets were revised in August 2004 to provide an even more comprehensive picture of the testing program. Since that time the TEKS for secondary mathematics have been refined. These TEKS refinements were approved by the State Board of Education in February 2005. In December 2005, the Student Assessment Division produced an online survey to obtain input as to whether the new TEKS content should be eligible for assessment on TAKS mathematics tests at grades 6–10 and exit level. The results of the survey from 1,487 groups composed of 17,221 individuals were compiled and analyzed. Then the TEA math team from the Curriculum and Student Assessment Divisions, with input from educational service center math specialists, used the survey data to guide decisions on what new content should be assessed on the secondary TAKS math tests. This new content, as well as the original content, can be found in this newly revised information booklet. We hope this revised version of the TAKS information booklet will serve as a user-friendly resource to help you understand that the best preparation for TAKS is a coherent, TEKS-based instructional program that provides the level of support necessary for all students to reach their academic potential.

BACKGROUND INFORMATION

The development of the TAKS program included extensive public scrutiny and input from Texas teachers, administrators, parents, members of the business community, professional education organizations, faculty and staff at Texas colleges and universities, and national content-area experts. The agency involved as many stakeholders as possible because we believed that the development of TAKS was a responsibility that had to be shared if this assessment was to be an equitable and accurate measure of learning for all Texas public school students.

The three-year test-development process, which began in summer 1999, included a series of carefully conceived activities. First, committees of Texas educators identified those TEKS student expectations for each grade and subject area assessed that should be tested on a statewide assessment. Then a committee of TEA Student Assessment and Curriculum staff incorporated these selected TEKS student expectations, along with draft objectives for each subject area, into exit level surveys. These surveys were sent to Texas educators at the middle school and secondary levels for their review. Based on input we received from more than 27,000 survey responses, we developed a second draft of the objectives and TEKS student expectations. In addition, we used this input during the development of draft objectives and student expectations for grades 3 through 10 to ensure that the TAKS program, like the TEKS curriculum, would be vertically aligned. This vertical alignment was a critical step in ensuring that the TAKS tests would become more rigorous as students moved from grade to grade.

For example, the fifth grade tests would be more rigorous than the fourth grade tests, which would be more rigorous than the third grade tests. Texas educators felt that this increase in rigor from grade to grade was both appropriate and logical since each subject-area test was closely aligned to the TEKS curriculum at that grade level.

In fall 2000 TEA distributed the second draft of the objectives and TEKS student expectations for eleventh grade exit level and the first draft of the objectives and student expectations for grades 3 through 10 for review at the campus level. These documents were also posted on the Student Assessment Division's website to encourage input from the public. Each draft document focused on two central issues: first, whether the objectives included in the draft were essential to measure on a statewide assessment; and, second, whether students would have received enough instruction on the TEKS student expectations included under each objective to be adequately prepared to demonstrate mastery of that objective in the spring of the school year. We received more than 57,000 campus-consensus survey responses. We used these responses, along with feedback from national experts, to finalize the TAKS objectives and student expectations. Because the state assessment was necessarily limited to a "snapshot" of student performance, broad-based input was important to ensure that TAKS assessed the parts of the TEKS curriculum most critical to students' academic learning and progress.

In the thorough test-development process that we use for the TAKS program, we rely on educator input to develop items that are appropriate and valid measures of the objectives and TEKS student expectations the items are designed to assess. This input includes an annual educator review and revision of all proposed test items before field-testing and a second annual educator review of data and items after field-testing. In addition, each year panels of recognized experts in the fields of English language arts (ELA), mathematics, science, and social studies meet in Austin to critically review the content of each of the high school level TAKS assessments to be administered that year. This critical review is referred to as a content validation review and is one of the final activities in a series of quality-control steps designed to ensure that each high school test is of the highest quality possible. A content validation review is considered necessary at the high school grades (9, 10, and exit level) because of the advanced level of content being assessed.

ORGANIZATION OF THE TAKS TESTS

TAKS is divided into test objectives. It is important to remember that the objective statements are not found in the TEKS curriculum. Rather, the objectives are "umbrella statements" that serve as headings under which student expectations from the TEKS can be meaningfully grouped. Objectives are broad statements that "break up" knowledge and skills to be tested into meaningful subsets around which a test can be organized into reporting units. These reporting units help campuses, districts, parents, and the general public understand the performance of our students and schools. Test objectives are not intended to be "translations" or "rewordings" of the TEKS. Instead, the objectives are designed to be identical across grade levels rather than grade specific. Generally, the objectives are the same for third grade through eighth grade (an elementary/middle school system) and for ninth grade through exit level (a high school system). In addition, certain TEKS student expectations may logically be grouped under more than one test objective; however, it is important for you to understand that this is not meaningless repetition—sometimes the organization of the objectives requires such groupings. For example, on the TAKS writing tests for fourth and seventh grades, some of the same student expectations addressing the conventions of standard English usage are listed

under both Objective 2 and Objective 6. In this case, the expectations listed under Objective 2 are assessed through the overall strength of a student's use of language conventions on the written composition portion of the test; these same expectations under Objective 6 are assessed through multiple-choice items attached to a series of revising and editing passages.

ORGANIZATION OF THE INFORMATION BOOKLETS

The purpose of the information booklets is to help Texas educators, students, parents, and other stakeholders understand more about the TAKS tests. These booklets are not intended to replace the teaching of the TEKS curriculum, provide the basis for the isolated teaching of skills in the form of narrow test preparation, or serve as the single information source about every aspect of the TAKS program. However, we believe that the booklets provide helpful explanations as well as show enough sample items, reading and writing selections, and prompts to give educators a good sense of the assessment.

Each grade within a subject area is presented as a separate booklet. However, it is still important that teachers review the information booklets for the grades both above and below the grade they teach. For example, eighth grade mathematics teachers who review the seventh grade information booklet as well as the ninth grade information booklet are able to develop a broader perspective of the mathematics assessment than if they study only the eighth grade information booklet.

The information booklets for each subject area contain some information unique to that subject. For example, the mathematics chart that students use on TAKS is included for each grade at which mathematics is assessed. However, all booklets include the following information, which we consider critical for every subject-area TAKS test:

- an overview of the subject within the context of TAKS
- a blueprint of the test—the number of items under each objective and the number of items on the test as a whole
- information that clarifies how to read the TEKS
- the reasons each objective and its TEKS student expectations are critical to student learning and success
- the objectives and TEKS student expectations that are included on TAKS
- additional information about each objective that helps educators understand how it is assessed on TAKS
- sample items that show some of the ways objectives are assessed

TAKS MATHEMATICS
INFORMATION BOOKLET
GENERAL INTRODUCTION

Learning mathematics is essential in finding answers to real-life questions. The study of mathematics helps students to think logically, solve problems, and understand spatial relationships. The concepts learned in mathematics courses help students communicate clearly and use logical reasoning to make sense of their world. TEKS instruction in mathematics throughout elementary, middle, and high school will build the foundation necessary for students to succeed in advanced math and science courses and later in their careers.

The six strands identified in the mathematics curriculum for kindergarten through eighth grade are the foundation skills necessary for high school-level mathematics courses. The TAKS assessment objectives are closely aligned with the six strands identified in the TEKS curriculum. For example, in TAKS Objective 1 students are to "demonstrate an understanding of numbers, operations, and quantitative reasoning"; in the TEKS curriculum the first strand identified is "number, operation, and quantitative reasoning." This close alignment reflects the important link between TAKS and the TEKS curriculum. In fact, the TAKS mathematics tests are based on those TEKS student expectations Texas educators have identified as the most critical to student achievement and progress in mathematics.

The TEKS were developed to provide educators with instructional goals at each grade level. Although some student expectations are not tested, they are nonetheless critical for student understanding and must be included in classroom instruction. For each strand of learning, the mathematics TEKS provide more rigorous expectations as students master skills and progress through the curriculum. It is important for educators to vertically align their instructional programs to reinforce the unifying strands of learning each year through grade-level-appropriate instruction. To understand how student learning progresses, educators are encouraged to become familiar with the curriculum at all grade levels. Educators may find it helpful to examine sample items at each grade level to gain a greater understanding of what students need to know and be able to do in mathematics as they move from grade to grade.

A system of support has been designed to ensure that all students master the TEKS. The Student Success Initiative (SSI) requires that students meet the standard on TAKS to be eligible for promotion to the next grade level as specified below:

- the reading test at grade 3, beginning in the 2002–2003 school year;
- the reading and mathematics tests at grade 5, beginning in the 2004–2005 school year; and
- the reading and mathematics tests at grade 8, beginning in the 2007–2008 school year.

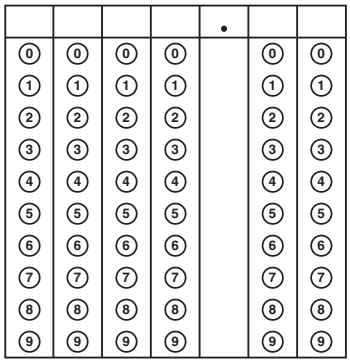
To prepare students for the SSI requirements and to promote vertical alignment, it is essential that teachers collaborate and coordinate across grade levels.

TAKS MATHEMATICS
INFORMATION BOOKLET
GRADE 6

The sixth grade mathematics TEKS describe what students should know and be able to do in sixth grade. However, teachers need to be aware of the "big picture"—an understanding of the TEKS curriculum for both the lower and the higher grades. This awareness of what comes before and after sixth grade will enable teachers to more effectively help their students develop mathematics knowledge and skills.

TEST FORMAT

- The sixth grade test includes a test booklet and a separate machine-scorable answer document. Enough room is left around each item in the booklet for students to work each problem. However, student responses must be recorded on the separate answer document.
- Any item may include application context and extraneous information.
- Most items will be in a multiple-choice format with four answer choices.
- *Not here* or a variation of this phrase may be used as the fourth answer choice when appropriate.
- There will be a limited number of open-ended griddable items. For these items a seven-column grid (with one column designated as a fixed decimal point) will be provided on the answer document for students to record and bubble in their answers. Digits must be in the correct column(s) with respect to the fixed decimal point. This griddable format is intended to allow students to work a problem and determine the correct answer without being influenced by answer choices. An example of a blank grid is shown below.



MATHEMATICS CHART

- For sixth grade the Mathematics Chart (found on pages 7 and 8) will have measurement conversions and formulas.
- A metric ruler and a customary ruler will be provided on the separate Mathematics Chart.
- Items that require students to measure with a ruler from the Mathematics Chart may be found in any objective as appropriate.

TEXAS ASSESSMENT OF KNOWLEDGE AND SKILLS (TAKS)
BLUEPRINT FOR GRADE 6 MATHEMATICS

TAKS Objectives	Number of Items
Objective 1: Numbers, Operations, and Quantitive Reasoning	10
Objective 2: Patterns, Relationships, and Algebraic Reasoning	9
Objective 3: Geometry and Spatial Reasoning	7
Objective 4: Measurement	5
Objective 5: Probability and Statistics	6
Objective 6: Mathematical Processes and Tools	9
Total number of items	**46**

Grade 6
Mathematics Chart

LENGTH

Metric	Customary
1 kilometer = 1000 meters	1 mile = 1760 yards
1 meter = 100 centimeters	1 mile = 5280 feet
1 centimeter = 10 millimeters	1 yard = 3 feet
	1 foot = 12 inches

CAPACITY AND VOLUME

Metric	Customary
1 liter = 1000 milliliters	1 gallon = 4 quarts
	1 gallon = 128 fluid ounces
	1 quart = 2 pints
	1 pint = 2 cups
	1 cup = 8 fluid ounces

MASS AND WEIGHT

Metric	Customary
1 kilogram = 1000 grams	1 ton = 2000 pounds
1 gram = 1000 milligrams	1 pound = 16 ounces

TIME

1 year = 365 days

1 year = 12 months

1 year = 52 weeks

1 week = 7 days

1 day = 24 hours

1 hour = 60 minutes

1 minute = 60 seconds

Grade 6 Mathematics Chart

Perimeter	square	$P = 4s$
	rectangle	$P = 2l + 2w$ or $P = 2(l + w)$
Circumference	circle	$C = 2\pi r$ or $C = \pi d$
Area	square	$A = s^2$
	rectangle	$A = lw$ or $A = bh$
	triangle	$A = \frac{1}{2}bh$ or $A = \frac{bh}{2}$
	trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$ or $A = \frac{(b_1 + b_2)h}{2}$
	circle	$A = \pi r^2$
Volume	cube	$V = s^3$
	rectangular prism	$V = lwh$
Pi	π	$\pi \approx 3.14$ or $\pi \approx \frac{22}{7}$

A Key to Understanding the TEKS Included on TAKS

Example from Objective 1

A

(6.2) **Number, operation, and quantitative reasoning**. The student adds, subtracts, multiplies, and divides to solve problems and justify solutions. The student is expected to

C

B → (A) model addition and subtraction situations involving fractions with [objects,] pictures, words, and numbers.

KEY

A. Knowledge and Skills Statement

This broad statement describes what students should know and be able to do for sixth grade mathematics. The number preceding the statement identifies the instructional level and the number of the knowledge and skills statement.

B. Student Expectation

This specific statement describes what students should be able to do to demonstrate proficiency in what is described in the knowledge and skills statement. Students will be tested on skills outlined in the student expectation statement.

C. [bracketed text]

Although the entire student expectation has been provided for reference, text in brackets indicates that this portion of the student expectation will not specifically be tested on TAKS.

NOTE: The full TEKS curriculum can be found at http://www.tea.state.tx.us/teks/.

TEKS STUDENT EXPECTATIONS—IMPORTANT VOCABULARY

For every subject area and grade level, two terms—*such as* and *including*—are used to help make the TEKS student expectations more concrete for teachers. However, these terms function in different ways. To help you understand the effect each of the terms has on specific student expectations, we are providing the following:

- a short definition of each term;
- an example from a specific student expectation for this subject area; and
- a short explanation of how this term affects this student expectation.

Such as

The term *such as* is used when the specific examples that follow it function only as representative illustrations that help define the expectation for teachers. These examples are just that—examples. Teachers may choose to use them when teaching the student expectation, but there is no requirement to use them. Other examples can be used in addition to those listed or as replacements for those listed.

Example from Objective 2

(6.4) (A) use tables and symbols to represent and describe proportional and other relationships such as those involving conversions, arithmetic sequences (with a constant rate of change), perimeter and area.

This student expectation lists *relationships such as those involving conversions, arithmetic sequences, perimeter and area*. Many other relationships exist that are represented and described by using tables and symbols.

Including

The term *including* is used when the specific examples that follow it must be taught. However, other examples may also be used in conjunction with those listed.

Example from Objective 1

(6.1) (B) generate equivalent forms of rational numbers including whole numbers, fractions, and decimals.

This student expectation lists several forms of rational numbers. Other forms of rational numbers may be taught in addition to those listed.

Remember

- Any example preceded by the term *such as* in a particular student expectation may or may not provide the basis for an item assessing that expectation. Because these examples do not necessarily have to be used to teach the student expectation, it is equally likely that other examples may be used in assessment items. The rule here is that an example will be used only if it is central to the knowledge, concept, or skill the item assesses.
- It is more likely that some of the examples preceded by the term *including* in a particular student expectation will provide the basis for items assessing that expectation, since these examples must be taught. However, it is important to remember that the examples that follow the term *including* do not represent all the examples possible, so other examples may also provide the basis for an assessment item. Again, the rule here is that an example will be used only if it is central to the knowledge, concept, or skill the item assesses.

Grade 6 TAKS Mathematics—Objective 1

Knowledge of **numbers, operations, and quantitative reasoning** is critical for the development of mathematical skills. Students need to understand the value of digits based on their positions in numbers, including rational numbers, in order to read and work with numbers. Students should know how to use both negative and positive integers in real-life problems. Students should understand prime factorization of numbers and the exponential representation of numbers as used in science and mathematics. The understanding of common factors and multiples becomes important as students learn to simplify more complicated fractions and algebraic expressions. More abstract and complicated numbers will be used as students work with and distinguish among the four basic operations of addition, subtraction, multiplication, and division. Students should also be developing a sense of the reasonableness of an expected answer. Quantitative reasoning is knowing when an answer makes sense and is one purpose for rounding numbers to estimate. Students should be prepared to apply the basic concepts included in Objective 1 to other topics in sixth grade mathematics. In addition, the knowledge and skills in Objective 1 at sixth grade provide the foundation for mastering the knowledge and skills in Objective 1 at seventh grade.

Objective 1 groups together the basic building blocks within the TEKS—**numbers, operations, and quantitative reasoning**—from which all mathematical understanding stems.

TAKS Objectives and TEKS Student Expectations

Objective 1

The student will demonstrate an understanding of numbers, operations, and quantitative reasoning.

(6.1) **Number, operation, and quantitative reasoning.** The student represents and uses rational numbers in a variety of equivalent forms. The student is expected to

(A) compare and order non-negative rational numbers;

(B) generate equivalent forms of rational numbers including whole numbers, fractions, and decimals;

(C) use integers to represent real-life situations;

(D) write prime factorizations using exponents;

(E) identify factors of a positive integer, common factors, and the greatest common factor of a set of positive integers; and

(F) identify multiples of a positive integer and common multiples and the least common multiple of a set of positive integers.

(6.2) **Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, and divides to solve problems and justify solutions. The student is expected to

(A) model addition and subtraction situations involving fractions with [objects,] pictures, words, and numbers;

(B) use addition and subtraction to solve problems involving fractions and decimals;

(C) use multiplication and division of whole numbers to solve problems including situations involving equivalent ratios and rates;

(D) estimate and round to approximate reasonable results and to solve problems where exact answers are not required; and

(E) use order of operations to simplify whole number expressions (without exponents) in problem solving situations.

Objective 1—For Your Information

The following list provides additional information for some of the student expectations tested in Objective 1. At sixth grade, students should be able to

- sequence numbers or the words associated with numbers;
- work with problems that include information expressed as numbers or ranges of numbers; and
- round numbers before performing any computations when estimating. The use of compatible numbers (numbers that are easy to compute mentally) may be helpful.

Objective 1 Sample Items

1 On Monday a computer store gave away a free computer game with each purchase over $50. There were 36 purchases over $50 that day. Which integer represents the change in the number of free games the store had in stock at the end of the day on Monday?

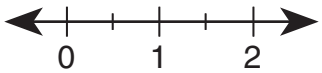
A –50

B* –36

C 36

D 50

2 If Janet correctly marked 0.13, $\frac{3}{2}$, 0.032, and $\frac{1}{3}$ on a number line, which number was closest to zero?



A* 0.032

B 0.13

C $\frac{3}{2}$

D $\frac{1}{3}$

Note: Students should be able to work with numbers given in various forms within the same problem.

3 At a bake sale, each pie was cut into 12 equal-sized slices. Mrs. Tumey sold 8 slices, Mr. Ito sold 6 slices, and Ms. D'Angelou sold 10 slices. Which expression can be used to find the total number of pies sold by these 3 people?

A $12 + 8 + 6 + 10$

B $12(8 + 6 + 10)$

C* $\frac{8}{12} + \frac{6}{12} + \frac{10}{12}$

D $\frac{8}{12} \times \frac{6}{12} \times \frac{10}{12}$

4 Simplify the expression below.

$$2 + 3(6 - 1)$$

A 25

B 21

C 19

D* 17

Grade 6 TAKS Mathematics—Objective 2

Understanding **patterns, relationships, and algebraic thinking** is an integral component of the foundation of algebra. In sixth grade, students should understand how to relate data in a problem situation to a proportion, set up the proportion, and then manipulate the data to find the missing information. These skills are applicable in geometry and in other academic areas, including science, social studies, and art. These skills are also useful in relating quantities in everyday situations such as cooking, carpentry, etc. Students should use variables to generate expressions and equations needed to solve problems. The concepts in Objective 2 should prepare students to continue their learning of more-advanced algebraic ideas. In addition, mastering the knowledge and skills in Objective 2 at sixth grade will help students master the knowledge and skills in Objective 2 at seventh grade.

Objective 2 combines the basic algebra concepts within the TEKS—**patterns, relationships, and algebraic thinking**.

TAKS Objectives and TEKS Student Expectations

Objective 2

The student will demonstrate an understanding of patterns, relationships, and algebraic reasoning.

(6.3) **Patterns, relationships, and algebraic thinking.** The student solves problems involving direct proportional relationships. The student is expected to

(A) use ratios to describe proportional situations;

(B) represent ratios and percents with [concrete] models, fractions, and decimals; and

(C) use ratios to make predictions in proportional situations.

(6.4) **Patterns, relationships, and algebraic thinking.** The student uses letters as variables in mathematical expressions to describe how one quantity changes when a related quantity changes. The student is expected to

(A) use tables and symbols to represent and describe proportional and other relationships such as those involving conversions, arithmetic sequences (with a constant rate of change), perimeter and area; and

(B) use tables of data to generate formulas representing relationships involving perimeter, area, volume of a rectangular prism, etc.

(6.5) **Patterns, relationships, and algebraic thinking.** The student uses letters to represent an unknown in an equation. The student is expected to

(A) formulate equations from problem situations described by linear relationships.

Objective 2—For Your Information

The following list provides additional information for some of the student expectations tested in Objective 2. At sixth grade, students should be able to

- match a description of a proportional situation with a ratio, which may or may not be expressed in lowest terms;
- identify the method for finding any term of an arithmetic sequence; and
- match an equation with a given context.

Objective 2 Sample Items

1 At Clarkswood Elementary School 7 out of every 12 students take the bus to school. Which ratio compares the number of students who take the bus to school to the number of students who do not take the bus to school?

A* 7:5

B 5:12

C 7:12

D 5:7

2 When Mr. Jamison ordered a pair of binoculars, the shipping cost was 12% of the price of the binoculars. Which number could also represent 12%?

A 1.2

B 0.012

C $\frac{1}{8}$

D* $\frac{3}{25}$

3 Which expression best represents the y values in terms of the x values?

x	1	2	3	4	5	6
y	2	5	8	11	14	17

A $1 - 3x$

B $x + 3$

C* $3x - 1$

D $2x + 3$

Note: Students should be able to express the values of a data set using either an expression ($3x - 1$) or an equation ($y = 3x - 1$).

4 If 1 ounce of a certain liquid is equivalent to 30 milliliters, which equation can be used to find x, the number of milliliters in 8 ounces of the liquid?

A $x = 30 + 8$

B* $x = 30 \cdot 8$

C $x = 30 \div 8$

D $x = 30 - 8$

Grade 6 TAKS Mathematics—Objective 3

Knowledge of **geometry and spatial reasoning** is important because the structure of the world is based on geometric properties. With this knowledge, students should be able to classify angles, identify angle relationships in basic polygons, and describe the relationship between basic terms of a circle. Students must learn to plot points on a coordinate grid using ordered pairs of non-negative rational numbers. These concepts build spatial reasoning skills that help develop an understanding of distance and location. The knowledge and skills contained in Objective 3 will allow students to understand the basic concepts of geometry as related to the real world. In addition, the knowledge and skills in Objective 3 at sixth grade are closely aligned with the knowledge and skills in Objective 3 at seventh grade.

Objective 3 combines the fundamental concepts of size and shape found within the TEKS—**geometry and spatial reasoning**—from which all geometric understanding is built.

TAKS Objectives and TEKS Student Expectations

Objective 3

The student will demonstrate an understanding of geometry and spatial reasoning.

(6.6) **Geometry and spatial reasoning.** The student uses geometric vocabulary to describe angles, polygons, and circles. The student is expected to

(A) use angle measurements to classify angles as acute, obtuse, or right;

(B) identify relationships involving angles in triangles and quadrilaterals; and

(C) describe the relationship between radius, diameter, and circumference of a circle.

(6.7) **Geometry and spatial reasoning.** The student uses coordinate geometry to identify location in two dimensions. The student is expected to

(A) locate and name points on a coordinate plane using ordered pairs of non-negative rational numbers.

Objective 3—For Your Information

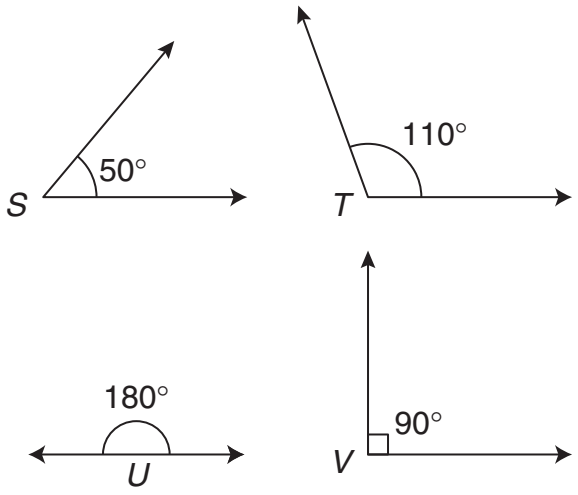
The following list provides additional information for some of the student expectations tested in Objective 3. At sixth grade, students should be able to

- use geometric models shown individually or as part of a more complex figure (for example, an obtuse angle may be shown as part of a trapezoid);

- identify a method for finding the radius, diameter, or circumference of a circle. The method can be written in words or as a mathematical equation or expression; and
- graph points in the first quadrant, including fractions and decimals, on coordinate grids.

Objective 3 Sample Items

1 Look at the 4 angles shown below.



Which angle is obtuse?

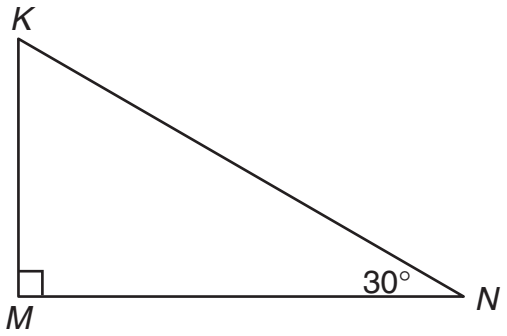
A $\angle S$

B* $\angle T$

C $\angle U$

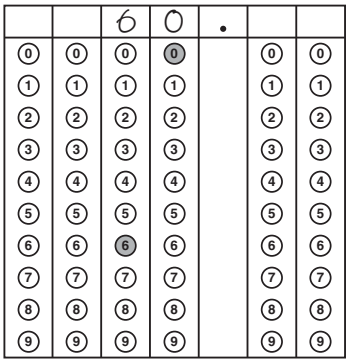
D $\angle V$

2 Mr. Johnson drew a triangle on the board in his classroom. The triangle is shown below.



What is the measure of $\angle MKN$ in degrees?

Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

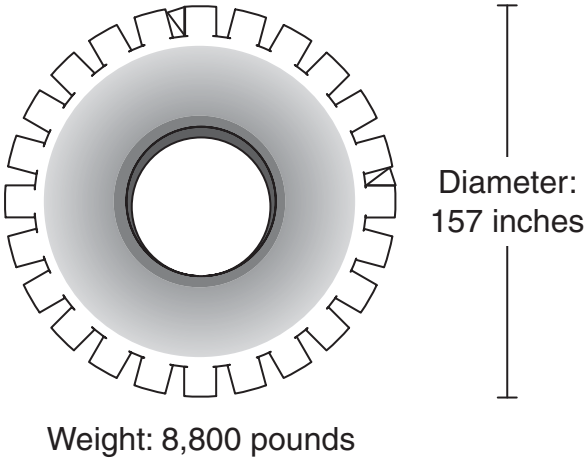


Note: The correct answer to this item is 60. It is acceptable, although not necessary, to grid the zeros before the six and/or after the decimal. These zeros will not affect the value of the correct answer.

This item specifically asks for the measure in *degrees.* On griddable items, students do not grid the units, such as *degrees.*

Objective 3 Sample Items

3 The drawing below shows one of the largest tires in the world.



Which expression can be used to find the circumference of the tire?

A $(157 \div 2) \cdot \pi$

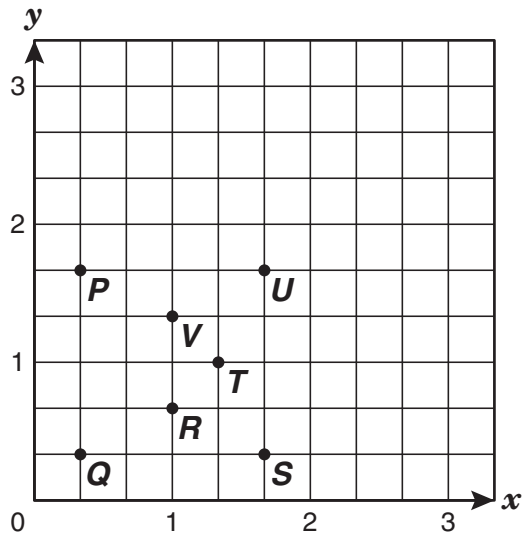
B* $(157 \cdot \pi)$

C $(157 \div \pi)$

D $(157 \cdot 2) \cdot \pi$

Note: Students need to be able to recognize and use the symbol π in equations and expressions.

4 Which coordinate pair best represents point S on the coordinate grid below?



A (5, 1)

B $(1\frac{1}{2}, \frac{1}{2})$

C $(1, \frac{2}{3})$

D* $(1\frac{2}{3}, \frac{1}{3})$

Note: Students should be able to recognize that each line on the graph represents an interval of $\frac{1}{3}$ unit.

Grade 6 TAKS Mathematics—Objective 4

Understanding the concepts and uses of **measurement** has many real-world applications and provides a basis for developing skills in geometry. Students will continue to develop measurement skills, including angle measurement, in order to solve application problems. These problems will require students to correctly use formulas and appropriate units of measure. The understanding and application of measurement concepts provide students with the skills necessary to solve problems in geometry and develop spatial perception. These skills are important in real-world applications and in other academic disciplines. Understanding the basic concepts included in Objective 4 will prepare students to apply measurement skills in various situations. In addition, the knowledge and skills found in Objective 4 at sixth grade are closely aligned with the knowledge and skills found in Objective 4 at seventh grade.

Objective 4 includes the concepts within the TEKS from which an understanding of **measurement** is developed.

TAKS Objectives and TEKS Student Expectations

Objective 4

The student will demonstrate an understanding of the concepts and uses of measurement.

(6.8) **Measurement.** The student solves application problems involving estimation and measurement of length, area, time, temperature, volume, weight, and angles. The student is expected to

(A) estimate measurements (including circumference) and evaluate reasonableness of results;

(B) select and use appropriate units, tools, or formulas to measure and to solve problems involving length (including perimeter), area, time, temperature, volume, and weight;

(C) measure angles; and

(D) convert measures within the same measurement system (customary and metric) based on relationships between units.

Objective 4—For Your Information

The following list provides additional information for some of the student expectations tested in Objective 4. At sixth grade, students should be able to

- utilize the conversions and formulas on the Mathematics Chart to solve problems;

- measure with the ruler on the Mathematics Chart ***only if*** the item specifically instructs students to use the ruler;
- use the given dimensions of a figure to solve problems;
- recognize abbreviations of measurement units; and
- use a pictorial representation of a protractor to measure angles.

Objective 4 Sample Items

1 Dan is 69 inches tall. When he walks into the classroom, the vertical distance between the top of his head and the top of the door frame is about 1 foot. Which is closest to the distance in feet between the floor and the top of the door frame?

A 8 ft

B* 7 ft

C 6 ft

D 5 ft

2 The circumference of a circle is 25 centimeters. Find the approximate length of the circle's radius.

A* 4 cm

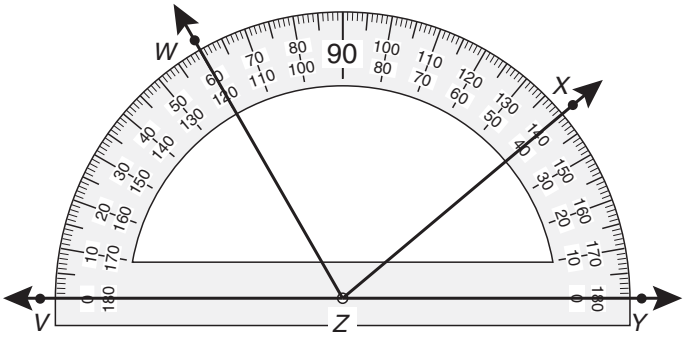
B 5 cm

C 8 cm

D 10 cm

Note: For this item students may choose to use compatible numbers. Pi is close to 3 and the circumference, 25 cm, is close to 24 cm. Dividing 24 by 3 gives an approximate diameter of 8 cm and therefore, an approximate radius of 4 cm. In sixth grade, it is developmentally appropriate for students to approximate the value of pi as 3 in order to solve a problem.

3 Find the measure of $\angle WZX$ to the nearest degree.



A 20°

B 40°

C 60°

D* 80°

Grade 6 TAKS Mathematics—Objective 5

Understanding **probability and statistics** will help students become informed consumers of data and information. As students become more skilled in describing and predicting the results of a probability experiment, they should begin to recognize and account for all the possibilities of a given situation. Students should be able to compare different graphical representations of the same data and solve problems by analyzing the data presented. Students must be able to recognize appropriate and accurate representations of data in everyday situations and in information related to science and social studies (for example, in polls and election results). The knowledge and skills contained in Objective 5 are essential for processing everyday information. In addition, the knowledge and skills in Objective 5 at sixth grade provide the foundation for mastering the knowledge and skills in Objective 5 at seventh grade.

Objective 5 includes the concepts within the TEKS that form the groundwork for an understanding of **probability and statistics**.

TAKS Objectives and TEKS Student Expectations

Objective 5

The student will demonstrate an understanding of probability and statistics.

(6.9) **Probability and statistics.** The student uses experimental and theoretical probability to make predictions. The student is expected to

(A) construct sample spaces using lists and tree diagrams; and

(B) find the probabilities of a simple event and its complement and describe the relationship between the two.

(6.10) **Probability and statistics.** The student uses statistical representations to analyze data. The student is expected to

(A) select and use an appropriate representation for presenting and displaying different graphical representations of the same data including line plot, line graph, bar graph[, and stem and leaf plot];

(B) identify mean (using [concrete objects and] pictorial models), median, mode, and range of a set of data;

(C) sketch circle graphs to display data; and

(D) solve problems by collecting, organizing, displaying, and interpreting data.

Objective 5—For Your Information

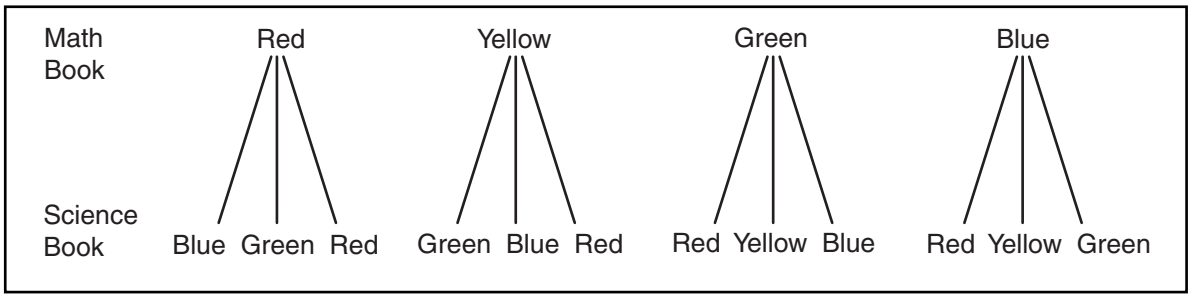
The following list provides additional information for some of the student expectations tested in Objective 5. At sixth grade, students should be able to

- match a situation with a sample space that lists all possible combinations or select the missing portion of a given sample space;
- match the mean, median, mode, and/or range with a given data set, which may be listed in the text of the item or presented in a graphical representation; and
- match a circle graph with a data set listed in table, chart, graph, or sentence form.

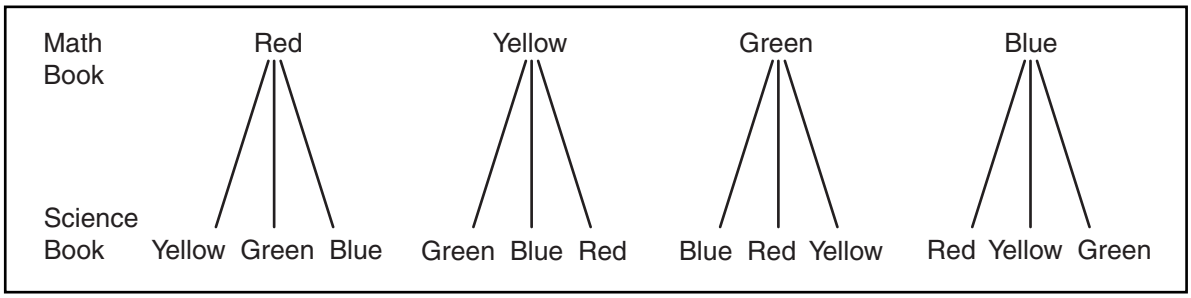
Objective 5 Sample Items

1 Teresa needed to cover her math book and her science book. She had 1 red book cover, 1 yellow book cover, 1 green book cover, and 1 blue book cover. Which diagram shows all the possible outcomes of 1 book and 1 color of book cover?

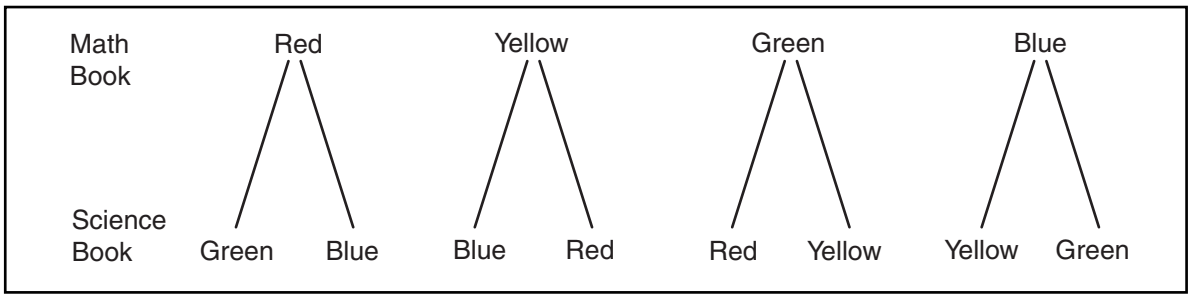
A



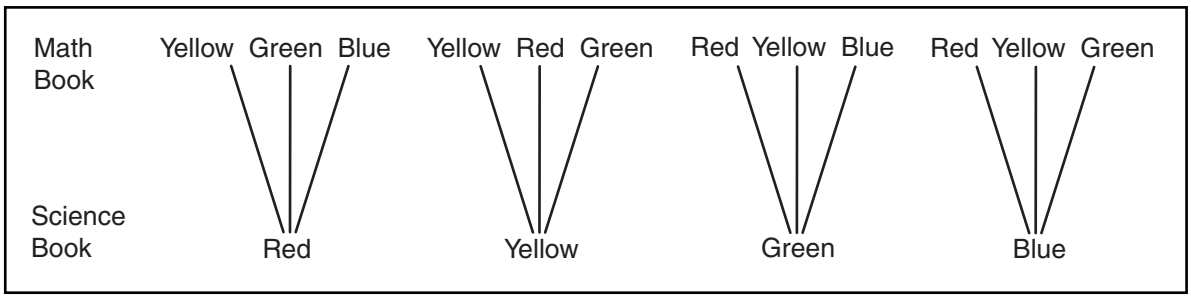
B*



C



D



Note: Students should recognize there are many ways to list the outcomes in a sample space.

Objective 5 Sample Items

2 A tub at a school carnival contains 1 blue, 2 green, 3 red, and 4 yellow footballs. All the footballs are the same size. If Yvonne takes a football from the tub without looking, what is the probability that she will NOT choose a green football?

A $\frac{1}{10}$

B $\frac{1}{5}$

C $\frac{3}{10}$

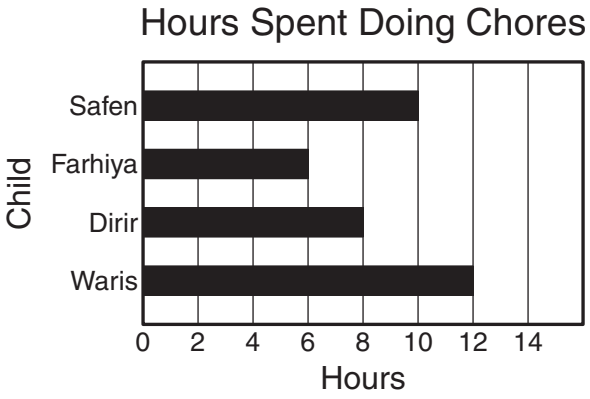
D* $\frac{4}{5}$

Note: One way to approach finding the solution to this problem is for the student to first find the probability of choosing a green football. Then the student can find the complement of that event.

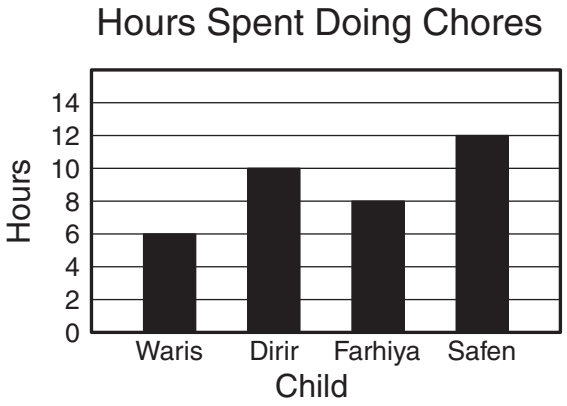
Objective 5 Sample Items

3 Mr. and Mrs. Abdi's children help with household chores each week. During one week, Waris spent 12 hours doing chores, Dirir spent 6 hours, Farhiya spent 8 hours, and Safen spent 10 hours. Which graph most accurately represents the time the children spent doing chores?

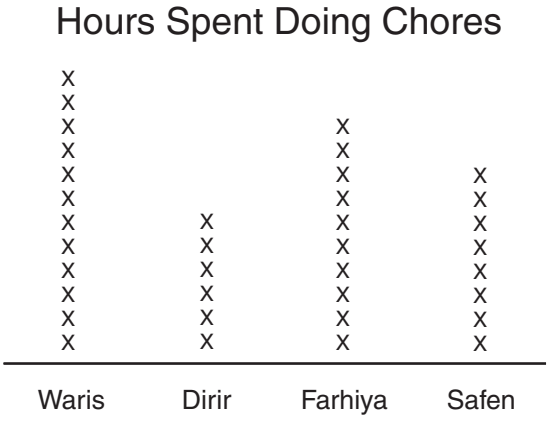
A



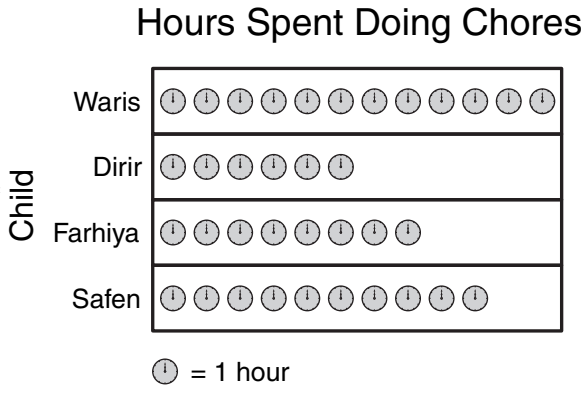
C



B



D*



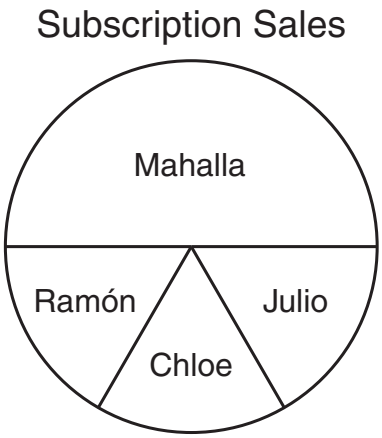
Objective 5 Sample Items

4 Which circle graph best displays the data shown in the table?

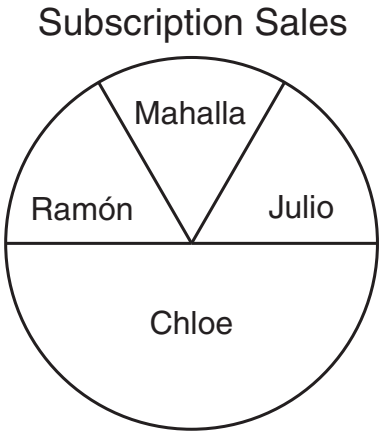
Subscription Sales

Name	Number of Subscriptions
Ramón	150
Mahalla	450
Chloe	150
Julio	150

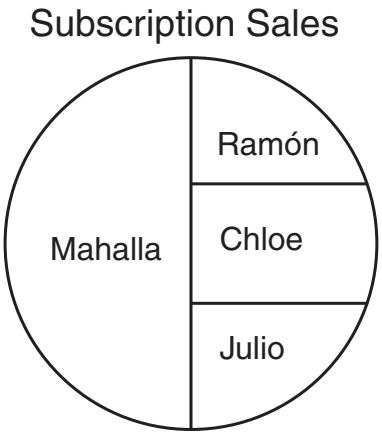
A*



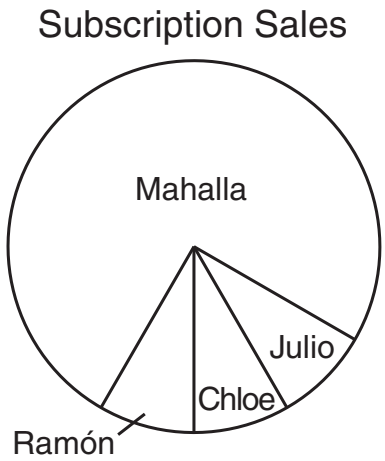
C



B



D



Grade 6 TAKS Mathematics—Objective 6

Knowledge and understanding of **underlying processes and mathematical tools** are critical for students to be able to apply mathematics in their everyday lives. Problems that occur in the real world often require the use of multiple concepts and skills. Students should be able to recognize mathematics as it occurs in real-life problem situations, generalize from mathematical patterns and sets of examples, select an appropriate approach to solving a problem, solve the problem, and then determine whether the answer is reasonable. Expressing problem situations in mathematical language and symbols is essential to finding solutions to real-life questions. These concepts allow students to communicate clearly and use logical reasoning to make sense of their world. Students can then connect the concepts they have learned in mathematics to other disciplines and to higher mathematics. Through an understanding of the basic ideas found in Objective 6, students will be able to analyze and solve real-world problems. In addition, the knowledge and skills in Objective 6 at sixth grade are closely aligned with the knowledge and skills in Objective 6 at seventh grade.

Objective 6 incorporates the **underlying processes and mathematical tools** within the TEKS that are used in finding mathematical solutions to real-world problems.

TAKS Objectives and TEKS Student Expectations

Objective 6

The student will demonstrate an understanding of the mathematical processes and tools used in problem solving.

(6.11) **Underlying processes and mathematical tools.** The student applies Grade 6 mathematics to solve problems connected to everyday experiences, investigations in other disciplines, and activities in and outside of school. The student is expected to

(A) identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and with other mathematical topics;

(B) use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness; and

(C) select or develop an appropriate problem-solving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem.

(6.12) **Underlying processes and mathematical tools.** The student communicates about Grade 6 mathematics through informal and mathematical language, representations, and models. The student is expected to

(A) communicate mathematical ideas using language, efficient tools, appropriate units, and graphical, numerical, physical, or algebraic mathematical models.

(6.13) **Underlying processes and mathematical tools.** The student uses logical reasoning to make conjectures and verify conclusions. The student is expected to

(A) make conjectures from patterns or sets of examples and nonexamples; and

(B) validate his/her conclusions using mathematical properties and relationships.

Objective 6—For Your Information

The following list provides additional information for some of the student expectations tested in Objective 6. At sixth grade, students should be able to

- select the description of a mathematical situation when provided with a written or pictorial prompt;
- identify the information that is needed to solve a problem;
- select or describe the next step or a missing step in a problem-solving situation;
- match informal language to mathematical language or symbols;
- identify the question that is being asked or answered;
- draw a conclusion by investigating patterns and/or sets of examples and nonexamples. A nonexample, or counterexample, proves a general statement to be false;
- understand that nonsensical words may be used to label sets of examples and/or nonexamples; and
- choose the correct supporting information for a given conclusion.

Objective 6 Sample Items

1 Mindy wants to find the total value of the coins she has.

Look at the problem-solving steps shown below. Arrange the steps in the correct order for Mindy to find the total value of her coins.

Step P: Find the sum of the products for each type of coin.

Step Q: Count and record the number of each type of coin.

Step R: For each type of coin, find the product of the number of coins and the value of that type of coin.

Step S: Separate the coins into groups of the same type of coin.

Which list shows the steps in the correct order?

A R, S, Q, P

B* S, Q, R, P

C S, R, Q, P

D P, Q, R, S

Note: Students should recognize that there are multiple strategies to solve problems. Students should be able to select the most appropriate strategy given for a particular situation.

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2 Anita found the measures of the angles of a triangle. One angle measured 50°, and the other 2 angles were congruent. Which method can be used to find the measure of each of the congruent angles?

A Multiply 50 by 2 and then add 180

B Divide 50 by 2 and then subtract from 180

C Add 50 to 180 and then divide by 3

D* Subtract 50 from 180 and then divide by 2

3 A spinner is divided into equal sections. There are 4 red sections and 3 blue sections. Rose spins the spinner 35 times. Which proportion can be used to find r, the number of times that the spinner can be expected to land on a red section?

A $\frac{r}{35} = \frac{3}{7}$

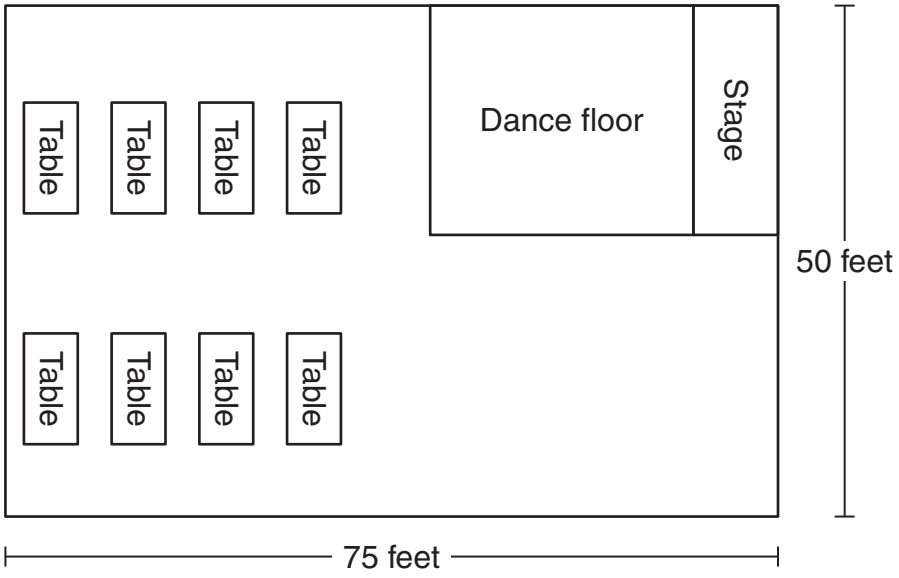
B $\frac{r}{35} = \frac{3}{4}$

C* $\frac{r}{35} = \frac{4}{7}$

D $\frac{r}{35} = \frac{4}{3}$

Objective 6 Sample Items

4 To decorate for an upcoming dance, Tracy is hanging streamers around the entire perimeter of the gym. The picture below shows the layout of the gym.



Each streamer roll is 20 yards long. Tracy estimated that she would need 5 streamer rolls. Will Tracy have enough streamers?

A* Yes, because the perimeter of the room is 250 feet, which is less than 100 yards

B Yes, because the perimeter of the room is 125 feet, which is less than 100 yards

C No, because the perimeter of the room is 250 feet, which is more than 100 yards

D No, because the perimeter of the room is 125 feet, which is more than 100 yards

Note: Students should recognize that this problem may involve more than one step. For example, this problem uses knowledge of perimeter of a rectangle, unit conversion, and division.