Introduction - Grade 7 Mathematics

The following released test questions are taken from the Grade 7 Mathematics Standards Test. This test is one of the California Standards Tests administered as part of the Standardized Testing and Reporting (STAR) Program under policies set by the State Board of Education.

All questions on the California Standards Tests are evaluated by committees of content experts, including teachers and administrators, to ensure their appropriateness for measuring the California academic content standards in Grade 7 Mathematics. In addition to content, all items are reviewed and approved to ensure their adherence to the principles of fairness and to ensure no bias exists with respect to characteristics such as gender, ethnicity, and language.

This document contains released test questions from the California Standards Test forms in 2003, 2004, and 2005. First on the pages that follow are lists of the standards assessed on the Grade 7 Mathematics Test. Next are released test questions. Following the questions is a table that gives the correct answer for each question, the content standard that each question is measuring, and the year each question last appeared on the test.

The following table lists each strand/reporting cluster, the number of items that appear on the exam, and the number of released test questions that appear in this document.

STRAND/REPORTING CLUSTER	NUMBER OF QUESTIONS ON EXAM	NUMBER OF RELEASED TEST QUESTIONS
Number Sense – Rational Numbers	14	11
Number Sense – Exponents, Powers, and Roots	8	7
Algebra and Functions – Quantitative Relationships and Evaluating Expressions	10	8
Algebra and Functions – Multi-step Problems, Graphing, and Functions	15	13
Measurement and Geometry	13	6
Statistics, Data Analysis, and Probability	5	3
TOTAL	65	48

In selecting test questions for release, three criteria are used: (1) the questions adequately cover a selection of the academic content standards assessed on the Grade 7 Mathematics Test; (2) the questions demonstrate a range of difficulty; and (3) the questions present a variety of ways standards can be assessed. These released test questions do not reflect all of the ways the standards may be assessed. Released test questions will not appear on future tests.

For more information about the California Standards Tests, visit the California Department of Education's Web site at http://www.cde.ca.gov/ta/tg/sr/resources.asp.

THE NUMBER SENSE STRAND

In Grade 7, there are two reporting clusters within the Number Sense strand: 1) Rational Numbers and 2) Exponents, Powers, and Roots. This booklet contains released test questions for each of these clusters.

The following seven California content standards are included in the Rational Numbers reporting cluster of the Number Sense strand and are represented in this booklet by 11 test questions. These questions represent only some ways in which these standards may be assessed on the Grade 7 California Mathematics Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Number Sense	
Standard Set 1.0	**Students know the properties of, and compute with, rational numbers expressed in a variety of forms:**
7NS1.1	Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation.
7NS1.2*	Add, subtract, multiply, and divide rational numbers (integers, fractions, and terminating decimals) and take positive rational numbers to whole-number powers.
7NS1.3	Convert fractions to decimals and percents and use these representations in estimations, computations, and applications.
7NS1.4*	Differentiate between rational and irrational numbers.
7NS1.5*	Know that every rational number is either a terminating or repeating decimal and be able to convert terminating decimals into reduced fractions.
7NS1.6	Calculate the percentage of increases and decreases of a quantity.
7NS1.7*	Solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest.

* Denotes key standards (*Mathematics Framework for California Public Schools*)

The following five California content standards are included in the Exponents, Powers, and Roots reporting cluster of the Number Sense strand and are represented in this booklet by seven test questions. These questions represent only some ways in which these standards may be assessed on the Grade 7 California Mathematics Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Number Sense	
Standard Set 2.0	**Students use exponents, powers, and roots and use exponents in working with fractions:**
7NS2.1	Understand negative whole-number exponents. Multiply and divide expressions involving exponents with a common base.
7NS2.2*	Add and subtract fractions by using factoring to find common denominators.
7NS2.3*	Multiply, divide, and simplify rational numbers by using exponent rules.
7NS2.4	Use the inverse relationship between raising to a power and extracting the root of a perfect square integer; for an integer that is not square, determine without a calculator the two integers between which its square root lies and explain why.
7NS2.5*	Understand the meaning of the absolute value of a number; interpret the absolute value as the distance of the number from zero on a number line; and determine the absolute value of real numbers.

* Denotes key standards (*Mathematics Framework for California Public Schools*)

THE ALGEBRA AND FUNCTIONS STRAND

In Grade 7, there are two reporting clusters within the Algebra and Functions strand: 1) Quantitative Relationships and Evaluating Expressions and 2) Multi-step Problems, Graphing, and Functions. This booklet contains released test questions for each of these clusters.

The following seven California content standards are included in the Quantitative Relationships and Evaluating Expressions reporting cluster of the Algebra and Functions strand and are represented in this booklet by eight test questions. These questions represent only some ways in which these standards may be assessed on the Grade 7 California Mathematics Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Algebra and Functions

Standard Set 1.0	**Students express quantitative relationships by using algebraic terminology, expressions, equations, inequalities, and graphs:**
7AF1.1	Use variables and appropriate operations to write an expression, an equation, an inequality, or a system of equations or inequalities that represents a verbal description (e.g., three less than a number, half as large as area A).
7AF1.2	Use the correct order of operations to evaluate algebraic expressions such as $3(2x + 5)^2$.
7AF1.3*	Simplify numerical expressions by applying properties of rational numbers (e.g., identity, inverse, distributive, associative, commutative) and justify the process used.
7AF1.4	Use algebraic terminology (e.g., variable, equation, term, coefficient, inequality, expression, constant) correctly.
7AF1.5	Represent quantitative relationships graphically and interpret the meaning of a specific part of a graph in the situation represented by the graph.
Standard Set 2.0	**Students interpret and evaluate expressions involving integer powers and simple roots:**
7AF2.1	Interpret positive whole-number powers as repeated multiplication and negative whole-number powers as repeated division or multiplication by the multiplicative inverse. Simplify and evaluate expressions that include exponents.
7AF2.2	Multiply and divide monomials; extend the process of taking powers and extracting roots to monomials when the latter results in a monomial with an integer exponent.

* Denotes key standards (*Mathematics Framework for California Public Schools*)

The following six California content standards are included in the Multi-step Problems, Graphing, and Functions reporting cluster of the Algebra and Functions strand and are represented in this booklet by 13 test questions. These questions represent only some ways in which these standards may be assessed on the Grade 7 California Mathematics Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Algebra and Functions	
Standard Set 3.0	**Students graph and interpret linear and some nonlinear functions:**
7AF3.1	Graph functions of the form $y = nx^2$ and $y = nx^3$ and use in solving problems.
7AF3.2	Plot the values from the volumes of three-dimensional shapes for various values of the edge lengths (e.g., cubes with varying edge lengths or a triangle prism with a fixed height and an equilateral triangle base of varying lengths).
7AF3.3*	Graph linear functions, noting that the vertical change (change in y-value) per unit of horizontal change (change in x-value) is always the same and know that the ratio ("rise over run") is called the slope of a graph.
7AF3.4*	Plot the values of quantities whose ratios are always the same (e.g., cost to the number of an item, feet to inches, circumference to diameter of a circle). Fit a line to the plot and understand that the slope of the line equals the ratio of the quantities.
Standard Set 4.0*	**Students solve simple linear equations and inequalities over the rational numbers:**
7AF4.1*	Solve two-step linear equations and inequalities in one variable over the rational numbers, interpret the solution or solutions in the context from which they arose, and verify the reasonableness of the results.
7AF4.2*	Solve multistep problems involving rate, average speed, distance, and time or a direct variation.

* Denotes key standards (*Mathematics Framework for California Public Schools*)

THE MEASUREMENT AND GEOMETRY STRAND/REPORTING CLUSTER

The following 12 California content standards are included in the Measurement and Geometry strand/reporting cluster and are represented in this booklet by six test questions. These questions represent only some ways in which these standards may be assessed on the Grade 7 California Mathematics Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS STRAND/CLUSTER

Measurement and Geometry

Standard Set 1.0	**Students choose appropriate units of measure and use ratios to convert within and between measurement systems to solve problems:**
7MG1.1	Compare weights, capacities, geometric measures, times, and temperatures within and between measurement systems (e.g., miles per hour and feet per second, cubic inches to cubic centimeters).
7MG1.2	Construct and read drawings and models made to scale.
7MG1.3*	Use measures expressed as rates (e.g., speed, density) and measures expressed as products (e.g., person-days) to solve problems; check the units of the solutions; and use dimensional analysis to check the reasonableness of the answer.
Standard Set 2.0	**Students compute the perimeter, area, and volume of common geometric objects and use the results to find measures of less common objects. They know how perimeter, area, and volume are affected by changes of scale:**
7MG2.1	Use formulas routinely for finding the perimeter and area of basic two-dimensional figures and the surface area and volume of basic three-dimensional figures, including rectangles, parallelograms, trapezoids, squares, triangles, circles, prisms, and cylinders.
7MG2.2	Estimate and compute the area of more complex or irregular two- and three-dimensional figures by breaking the figures down into more basic geometric objects.
7MG2.3	Compute the length of the perimeter, the surface area of the faces, and the volume of a three-dimensional object built from rectangular solids. Understand that when the lengths of all dimensions are multiplied by a scale factor, the surface area is multiplied by the square of the scale factor and the volume is multiplied by the cube of the scale factor.
7MG2.4	Relate the changes in measurement with a change of scale to the units used (e.g., square inches, cubic feet) and to conversions between units (1 square foot = 144 square inches or [1 ft^2] = [144 in^2], 1 cubic inch is approximately 16.38 cubic centimeters or [1 in^3] = [16.38 cm^3]).

— 6 —

Standard Set 3.0	Students know the Pythagorean theorem and deepen their understanding of plane and solid geometric shapes by constructing figures that meet given conditions and by identifying attributes of figures:
7MG3.1	Identify and construct basic elements of geometric figures (e.g., altitudes, midpoints, diagonals, angle bisectors, and perpendicular bisectors; central angles, radii, diameters, and chords of circles) by using a compass and straightedge.
7MG3.2	Understand and use coordinate graphs to plot simple figures, determine lengths and areas related to them, and determine their image under translations and reflections.
7MG3.3*	Know and understand the Pythagorean theorem and its converse and use it to find the length of the missing side of a right triangle and the lengths of other line segments and, in some situations, empirically verify the Pythagorean theorem by direct measurement.
7MG3.4*	Demonstrate an understanding of conditions that indicate two geometrical figures are congruent and what congruence means about the relationships between the sides and angles of the two figures.
7MG3.6*	Identify elements of three-dimensional geometric objects (e.g., diagonals of rectangular solids) and describe how two or more objects are related in space (e.g., skew lines, the possible ways three planes might intersect).

* Denotes key standards (*Mathematics Framework for California Public Schools*)

THE STATISTICS, DATA ANALYSIS, AND PROBABILITY STRAND/REPORTING CLUSTER

The following three California content standards are included in the Statistics, Data Analysis, and Probability strand/reporting cluster and are represented in this booklet by three test questions. These questions represent only some ways in which these standards may be assessed on the Grade 7 California Mathematics Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS STRAND/CLUSTER

Statistics, Data Analysis, and Probability	
Standard Set 1.0	**Students collect, organize, and represent data sets that have one or more variables and identify relationships among variables within a data set by hand and through the use of an electronic spreadsheet software program:**
7PS1.1	Know various forms of display for data sets, including a stem-and-leaf plot or box-and-whisker plot; use the forms to display a single set of data or to compare two sets of data.
7PS1.2	Represent two numerical variables on a scatterplot and informally describe how the data points are distributed and any apparent relationship that exists between the two variables (e.g., between time spent on homework and grade level).
7PS1.3*	Understand the meaning of, and be able to compute, the minimum, the lower quartile, the median, the upper quartile, and the maximum of a data set.

* Denotes key standards (*Mathematics Framework for California Public Schools*)

1 Which shows 833,000 written in scientific notation?

A 8.33×10^3

B 8.33×10^4

C 8.33×10^5

D 8.33×10^6

2
$$\left(\frac{2}{3}\right)^4 =$$

A $\dfrac{8}{81}$

B $\dfrac{16}{81}$

C $\dfrac{8}{3}$

D $\dfrac{16}{3}$

3 Roberto paid $43.08 for 3 CDs. All 3 CDs were the same price. How much did each CD cost?

A $11.36

B $14.36

C $40.08

D $46.08

4 Which of the following is equivalent to $\dfrac{5}{2}$?

A   2.25

B   2.5

C   5.2

D   5.25

5 Tasha is buying a CD that is regularly $12.99 and is on sale for $\dfrac{1}{4}$ off. Which expression can she use to estimate the discount on the CD?

A $0.0025 \times \$13$

B $0.04 \times \$13$

C $0.25 \times \$13$

D $0.40 \times \$13$

6 Which is an irrational number?

A $\sqrt{5}$

B $\sqrt{9}$

C -1

D $-\dfrac{2}{3}$

7 Which fraction is the same as 3.08?

A $\dfrac{56}{25}$

B $\dfrac{77}{25}$

C $\dfrac{19}{5}$

D $\dfrac{32}{5}$

8 A sweater originally cost $37.50. Last week, Moesha bought it at 20% off.

How much was deducted from the original price?

A $7.50

B $17.50

C $20.00

D $30.00

9 Jason bought a jacket on sale for 50% off the original price and another 25% off the discounted price. If the jacket originally cost $88, what was the final sale price that Jason paid for the jacket?

A $22

B $33

C $44

D $66

10 Marl borrowed $200 at 12% simple interest for one year. If he makes no payments that year, how much interest will he owe at the end of the year?

A $6.00

B $12.00

C $22.40

D $24.00

11 Tamika works in a shoe store and is paid a 12% commission on her sales. In January her sales total was $3740. To the nearest dollar, how much did Tamika earn in commission for January?

A $312

B $449

C $3291

D $4189

— 10 —

12 Which of the following has the same value as $5^6 \times 5^{-2}$?

A $\quad 5^{-12}$

B $\quad 5^{-3}$

C $\quad 5^4$

D $\quad 5^8$

13 Which of the following shows the next step using the least common denominator to simplify $\dfrac{7}{8} - \dfrac{5}{6}$?

A $\quad \left(\dfrac{7}{8} \times \dfrac{3}{3}\right) - \left(\dfrac{5}{6} \times \dfrac{4}{4}\right)$

B $\quad \left(\dfrac{7}{8} \times \dfrac{4}{4}\right) - \left(\dfrac{5}{6} \times \dfrac{3}{3}\right)$

C $\quad \left(\dfrac{7}{8} \times \dfrac{5}{5}\right) - \left(\dfrac{5}{6} \times \dfrac{7}{7}\right)$

D $\quad \left(\dfrac{7}{8} \times \dfrac{7}{7}\right) - \left(\dfrac{5}{6} \times \dfrac{5}{5}\right)$

14 $\qquad \dfrac{4^2 \cdot 3^5 \cdot 2^4}{4^3 \cdot 3^5 \cdot 2^2} =$

A $\quad \dfrac{4}{2}$

B $\quad \dfrac{3}{2}$

C $\quad 1$

D $\quad \dfrac{1}{2}$

15 Which expression is equivalent to $7^5 \times 7^{10}$?

A $\quad 7^{15}$

B $\quad 7^{50}$

C $\quad 49^{15}$

D $\quad 49^{50}$

16 $\qquad \sqrt{225} =$

A $\quad 15$

B $\quad 25$

C $\quad 35$

D $\quad 45$

17 $\qquad |9-5| - |6-8| =$

A $\quad -6$

B $\quad -2$

C $\quad 2$

D $\quad 6$

18 **Which expression has the *smallest* value?**

A $\left|-19\right|$

B $\left|-34\right|$

C $\left|11\right|$

D $\left|47\right|$

19 **The sum of a number (*n*) and 14 is 72. Which equation shows this relationship?**

A $14+n=72$

B $72n=14$

C $14-n=72$

D $72+n=14$

20 **If *x* = 4 and *y* = 3, then *xy* − 2*x* =**

A 4

B 6

C 19

D 40

21 **Which operation will change the value of any nonzero number?**

A adding zero

B multiplying by zero

C multiplying by one

D dividing by one

22 **Which property is used in the equation below?**

$$12(x+4)=12x+48$$

A Associative Property of Addition

B Commutative Property of Addition

C Distributive Property

D Reflexive Property

23 **Which expression is equivalent to $3x-3y$?**

A $3xy$

B $3(x-y)$

C $3x-y$

D $x-3y$

Released Test Questions

24   The table below shows the charges for renting and racing a go-cart.

Grand Prix Go-Carts

Number of Laps	0	1	2	3	4	5
Price (dollars)	5	8	11	14	17	20

Which graph *best* represents these prices?
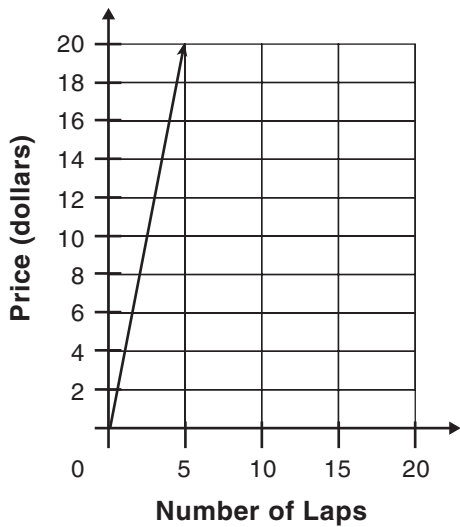
A
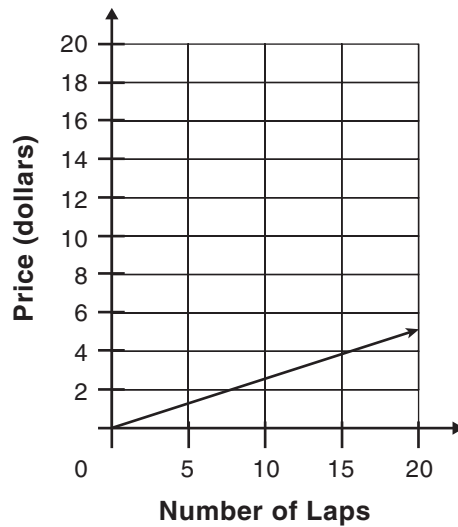
C
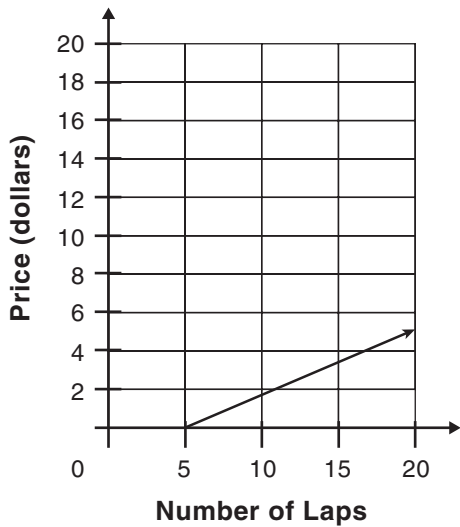
B
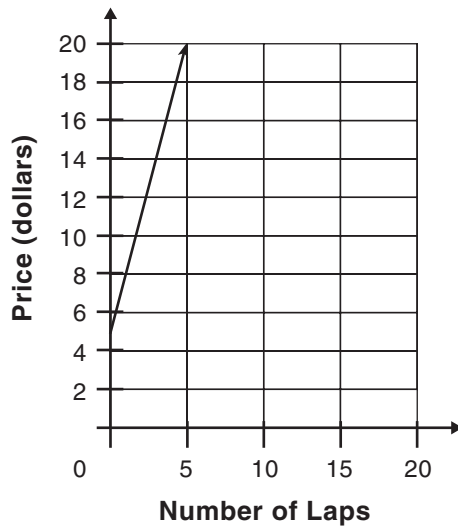
D

25 **Which expression below has the same value as x^3?**

A $3x$

B $x \div 3$

C $x \cdot x \cdot x$

D $3x \cdot 3x \cdot 3x$

26 **Which expression is equivalent to $\dfrac{8a^6}{2a^3}$?**

A $6a^2$

B $6a^3$

C $4a^2$

D $4a^3$

27 **Which graph shows $y = -x^2$?**

A

C

B

D
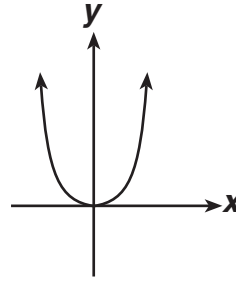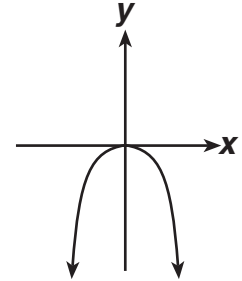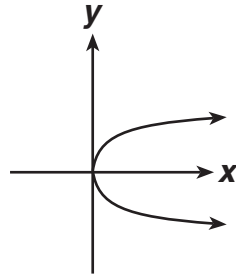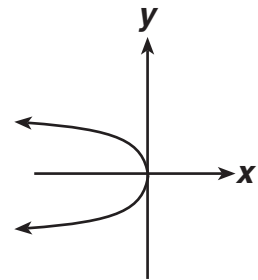
28 Which *best* represents the graph of $y = 2x - 5$?
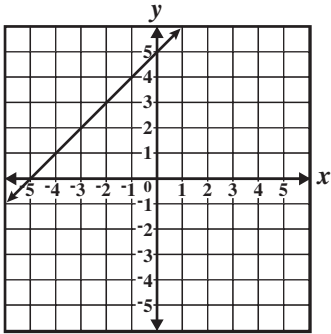
A
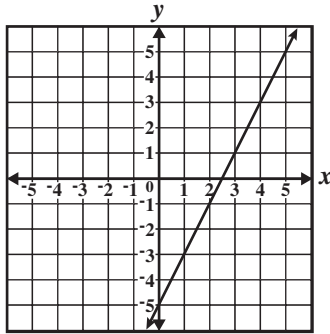
C
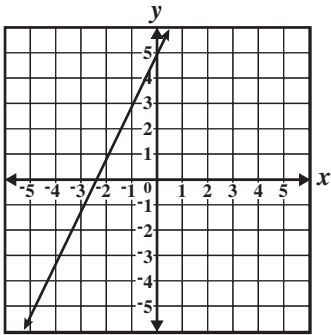
B
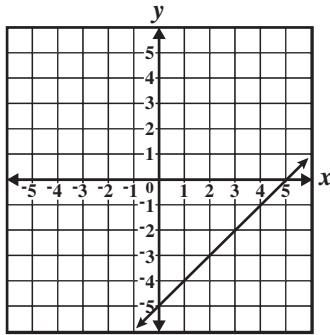
D

29 What is the slope of this line?

(2, 1)

(−2,−2)

A $\dfrac{1}{2}$

B $\dfrac{3}{4}$

C 1

D $\dfrac{4}{3}$
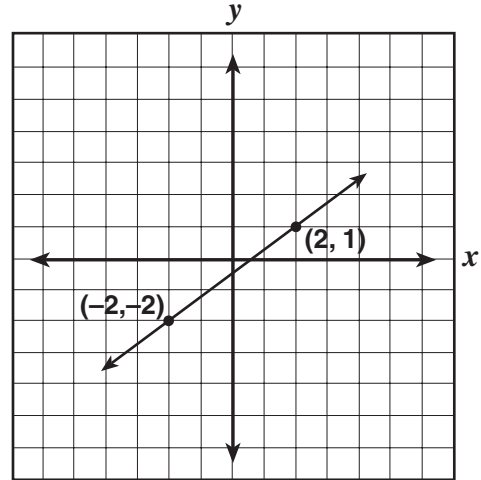
**30** Which statement is true about the slope of line $\overleftrightarrow{AC}$?
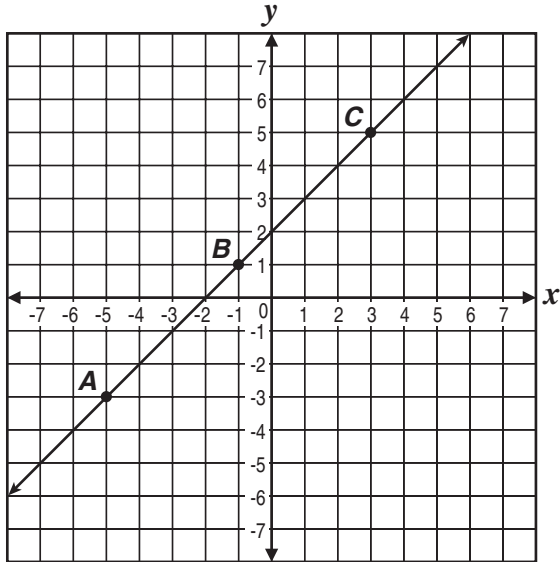
A The slope is the ratio of the *x*- and *y*-intercepts.

B The slope is the same between any two points on the line.

C The slope between point *A* and point *B* is greater than the slope between point *B* and point *C*.

D The slope between point *A* and point *C* is greater than the slope between point *A* and point *B*.

31 Bananas are on sale at the price of 3 pounds for $1.00. Which graph shows the relationship between the number of pounds of bananas bought and the total cost?
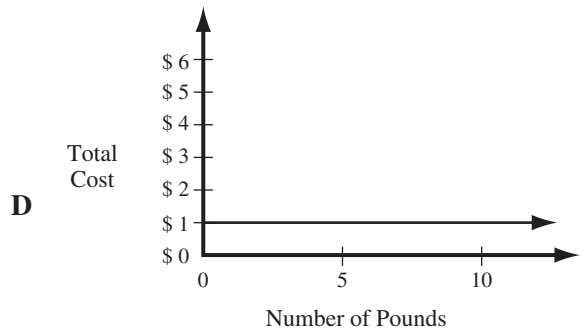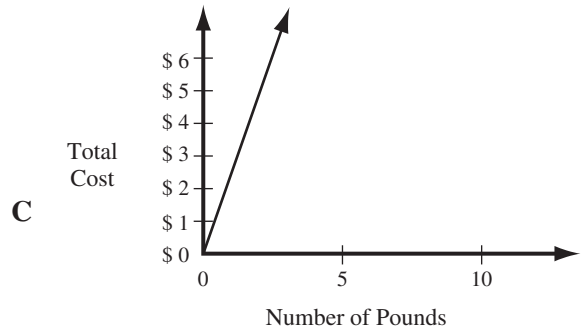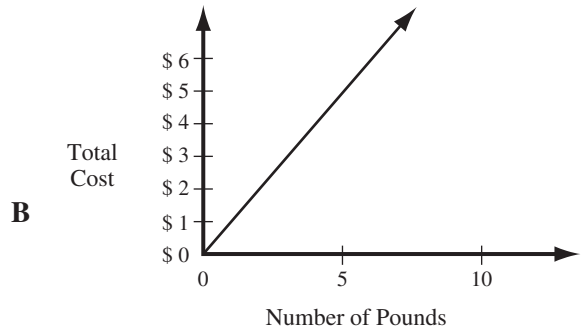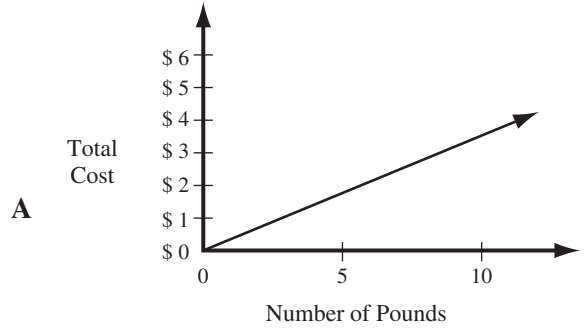
32 What value of x makes the equation below true?

$$\frac{x}{9} + 6 = 8$$

A   2

B   18

C   66

D   126

33 What is the solution set to the inequality $6z + 5 > 35$?

A $\{z: z < 5\}$

B $\{z: z < 24\}$

C $\{z: z > 5\}$

D $\{z: z > 24\}$

34 What is the value of x if $-3x + 2 = -7$?

A $x = -6$

B $x = -3$

C $x = 3$

D $x = 6$

35 Joan needs $60 for a class trip. She has $32. She can earn $4 an hour mowing lawns. If the equation shows this relationship, how many hours must Joan work to have the money she needs?

$$4h + 32 = 60$$

A   7 hours

B   17 hours

C   23 hours

D   28 hours

36 A duck flew at 18 miles per hour for 3 hours, then at 15 miles per hour for 2 hours. How far did the duck fly in all?

A   69 miles

B   75 miles

C   81 miles

D   84 miles

37 Juanita earns $36 for 3 hours of work. At that rate, how long would she have to work to earn $720?

A   12 hours

B   20 hours

C   60 hours

D   140 hours

38 The distance a spring stretches varies directly with the force applied to it. If a 7-pound weight stretches a spring a distance of 24.5 inches, how far will the spring stretch if a 12-pound weight is applied?

A   3.4 inches

B   19.5 inches

C   42 inches

D   294 inches

39 Marisa's car gets an average of 28 miles per gallon of gas. She plans to drive 200 miles today and 220 miles tomorrow. How many gallons of gas should she expect to use in all?

A 15 gallons

B 28 gallons

C 56 gallons

D 67 gallons

40 How many millimeters are in 20 centimeters?

A 0.02 millimeters

B 0.2 millimeters

C 200 millimeters

D 20,000 millimeters

41 The chart below describes the speed of four desktop printers.

Printer	Description
Roboprint	Prints 2 pages per second
Voltronn	Prints 1 page every 2 seconds
Vantek Plus	Prints 160 pages in 2 minutes
DLS Pro	Prints 100 pages per minute

Which printer is the *fastest*?

A Roboprint

B Voltronn

C Vantek Plus

D DLS Pro

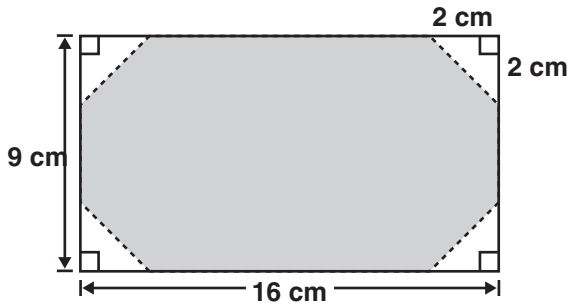**42** What is the area of trapezoid *QRST* in square units? $\left(A = \frac{1}{2}h(b_1 + b_2)\right)$
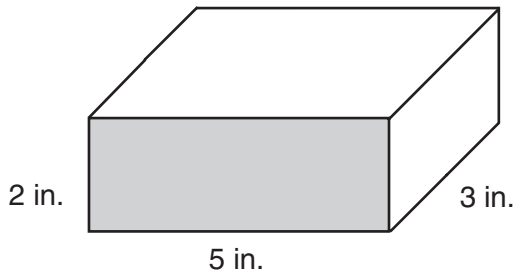

A 22

B 27

C 38

D 48

— 18 —
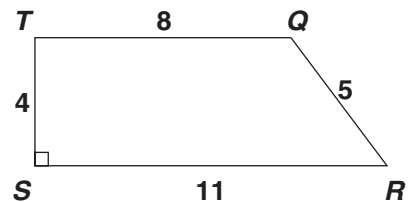
43 Cherie cut four congruent triangles off the corners of a rectangle to make an octagon, as shown below.

2 cm

2 cm

9 cm

16 cm

What is the area of the shaded octagon?

A 128 cm²

B 136 cm²

C 140 cm²

D 152 cm²

44 What is the volume of the rectangular solid shown below?

2 in.

3 in.

5 in.

A 10 cubic inches

B 25 cubic inches

C 30 cubic inches

D 62 cubic inches

45 In the figure below, D is the midpoint of $\overline{AC}$, and $\overline{BD}$ is perpendicular to $\overline{AC}$.

B

25 cm

A   D   C

30 cm
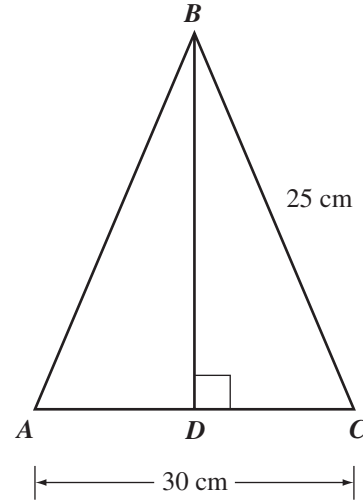
What is the length of $\overline{BD}$?

A 15 centimeters

B 16 centimeters

C 18 centimeters

D 20 centimeters

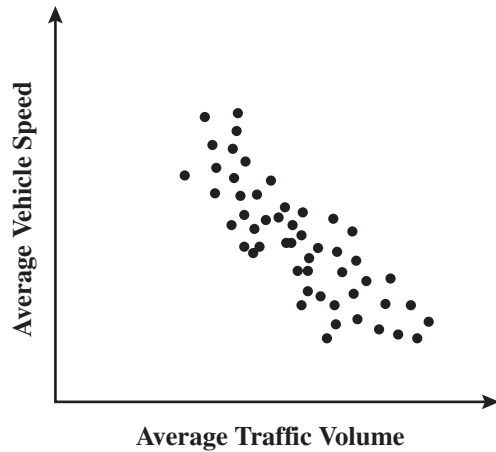**46** The box-and-whisker plot below represents the daily high temperatures at a beach in April.

Daily High Temperatures

60°F   70°F   80°F   90°F   100°F
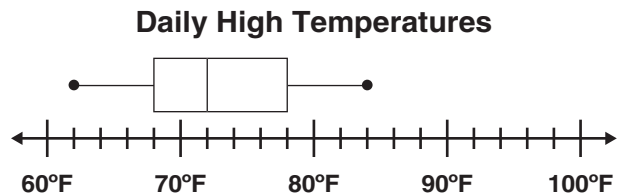
What was the median daily high temperature?

A 68°F

B 72°F

C 78°F

D 84°F

— 19 —

47 The scatter plot below shows the average traffic volume and average vehicle speed on a certain freeway for 50 days in 1999.

Which statement *best* describes the relationship between average traffic volume and average vehicle speed shown on the scatter plot?

A   As traffic volume increases, vehicle speed increases.

B   As traffic volume increases, vehicle speed decreases.

C   As traffic volume increases, vehicle speed increases at first, then decreases.

D   As traffic volume increases, vehicle speed decreases at first, then increases.

48 The following data represent the number of years different students in a certain group have gone to school together: 12, 5, 8, 16, 15, 9, 19. These data are shown on the box-and-whisker plot below.
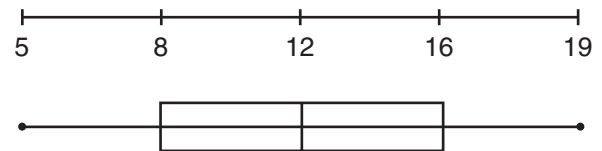
What is the median of the data?

A   5

B   8

C   12

D   16

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Question Number	Correct Answer	Standard	Year of Test
1	C	7NS1.1	2004
2	B	7NS1.2	2003
3	B	7NS1.2	2005
4	B	7NS1.3	2004
5	C	7NS1.3	2005
6	A	7NS1.4	2003
7	B	7NS1.5	2004
8	A	7NS1.6	2003
9	B	7NS1.7	2003
10	D	7NS1.7	2004
11	B	7NS1.7	2005
12	C	7NS2.1	2004
13	A	7NS2.2	2005
14	C	7NS2.3	2003
15	A	7NS2.3	2005
16	A	7NS2.4	2004
17	C	7NS2.5	2003
18	C	7NS2.5	2005
19	A	7AF1.1	2004
20	A	7AF1.2	2005
21	B	7AF1.3	2003
22	C	7AF1.3	2004
23	B	7AF1.3	2005
24	D	7AF1.5	2005
25	C	7AF2.1	2004
26	D	7AF2.2	2004
27	C	7AF3.1	2005
28	C	7AF3.3	2003
29	B	7AF3.3	2004
30	B	7AF3.3	2005

Question Number	Correct Answer	Standard	Year of Test
31	A	7AF3.4	2003
32	B	7AF4.1	2003
33	C	7AF4.1	2003
34	C	7AF4.1	2004
35	A	7AF4.1	2005
36	D	7AF4.2	2003
37	C	7AF4.2	2003
38	C	7AF4.2	2004
39	A	7AF4.2	2005
40	C	7MG1.1	2004
41	A	7MG1.3	2003
42	C	7MG2.1	2005
43	B	7MG2.2	2004
44	C	7MG2.3	2005
45	D	7MG3.3	2003
46	B	7PS1.1	2005
47	B	7PS1.2	2003
48	C	7PS1.3	2004