

EXIT LEVEL

MATHEMATICS

Fall 2005

MATHEMATICS

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 ounces
	1 quart = 2 pints
	1 pint = 2 cups
	1 cup = 8 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

Metric and customary rulers can be found on the separate Mathematics Chart.

Mathematics Chart

Perimeter	rectangle	$P = 2l + 2w$ or $P = 2(l + w)$
Circumference	circle	$C = 2\pi r$ or $C = \pi d$
Area	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	$A = \pi r^2$
Surface Area	cube	$S = 6s^2$
	cylinder (lateral)	$S = 2\pi rh$
	cylinder (total)	$S = 2\pi rh + 2\pi r^2$ or $S = 2\pi r(h + r)$
	cone (lateral)	$S = \pi rl$
	cone (total)	$S = \pi rl + \pi r^2$ or $S = \pi r(l + r)$
	sphere	$S = 4\pi r^2$
Volume	prism or cylinder	$V = Bh^*$
	pyramid or cone	$V = \frac{1}{3}Bh^*$
	sphere	$V = \frac{4}{3}\pi r^3$
<i>*B represents the area of the Base of a solid figure.</i>		
Pi	π	$\pi \approx 3.14$ or $\pi \approx \frac{22}{7}$
Pythagorean Theorem		$a^2 + b^2 = c^2$
Distance Formula		$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Slope of a Line		$m = \frac{y_2 - y_1}{x_2 - x_1}$
Midpoint Formula		$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$
Quadratic Formula		$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Slope-Intercept Form of an Equation		$y = mx + b$
Point-Slope Form of an Equation		$y - y_1 = m(x - x_1)$
Standard Form of an Equation		$Ax + By = C$
Simple Interest Formula		$I = prt$

DIRECTIONS

Read each question. Then fill in the correct answer on your answer document. If a correct answer is not here, mark the letter for “Not here.”

SAMPLE A

Find the slope of the line $2y = 8x - 3$.

A $-\frac{3}{2}$

B 4

C 8

D Not here

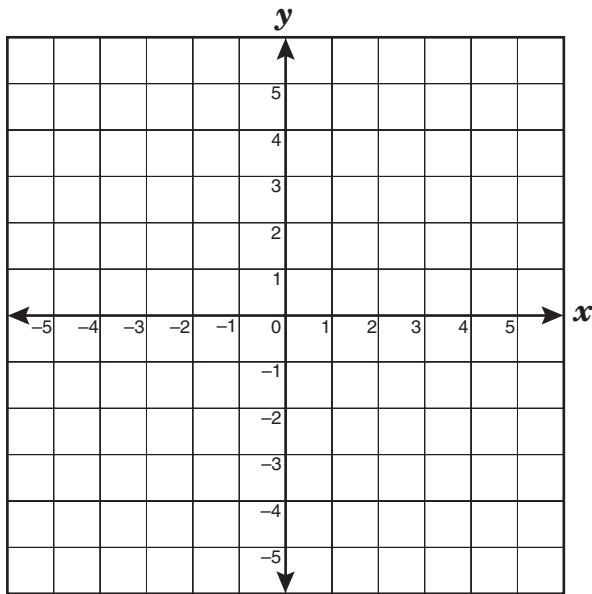
SAMPLE B

Janice uses a rectangular box to store her art supplies. The dimensions of the rectangular box are 22.5 inches by 14 inches by 11.5 inches. What is the volume of this box in cubic inches?

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



- 1 If a line contains the points $(1, -1)$ and $(3, 3)$, which of the following points also lies on this line?

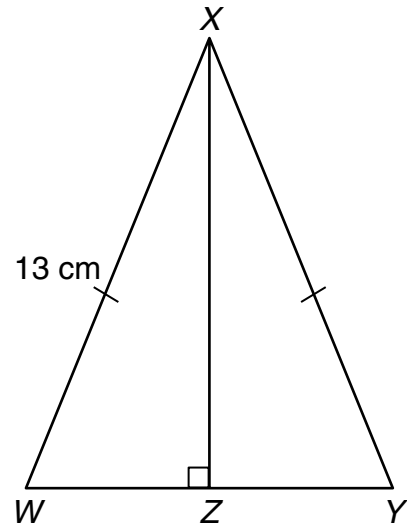


- A $(4, 2)$
- B $(2, 4)$
- C $(2, 1)$
- D $(1, 2)$

- 2 Identify the situation that best represents the amount $f(n)$ in the function $f(n) = 75 + 80n$.

- F Alton paid \$75 each for n gifts and spent \$80 on himself.
- G Bonita spent \$75 on registration fees and \$80 each for n credit hours last semester.
- H Carlton deposited \$75 per month for n months and an extra \$80 in the summer.
- J Dylan worked for 75 hours at n dollars per hour and earned \$80 in tips.

- 3 $\triangle WXY$ is isosceles.



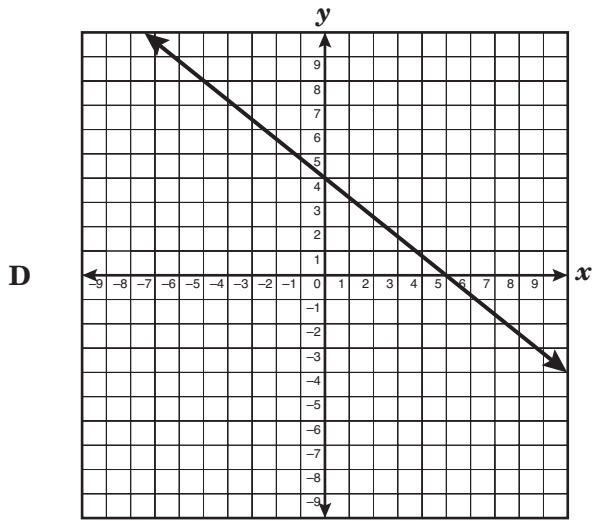
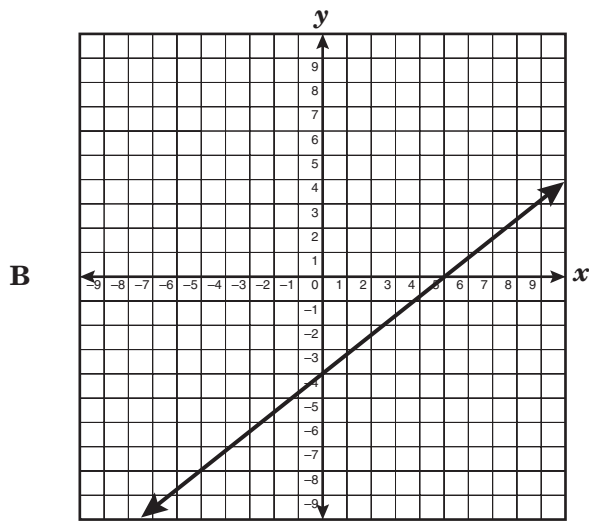
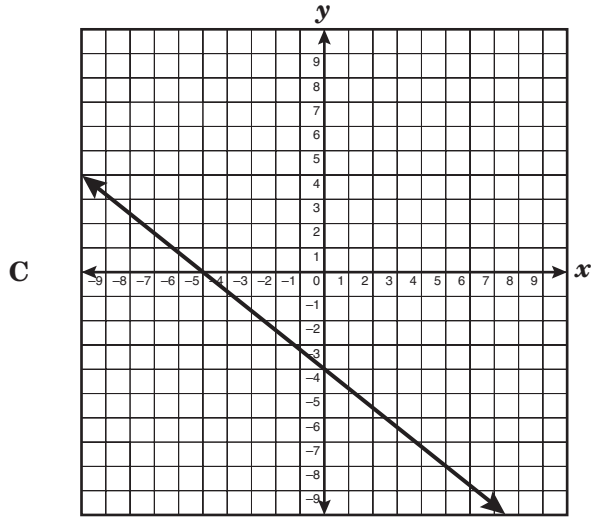
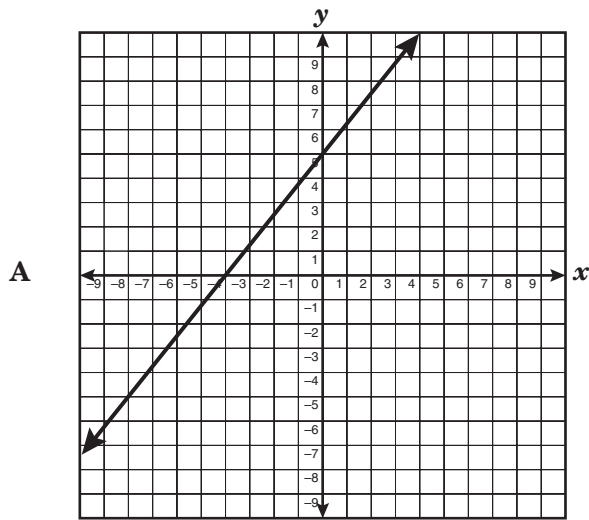
\overline{WY} is 10 centimeters long. Find the length of \overline{XZ} .

- A 5 cm
- B 10 cm
- C 12 cm
- D 13 cm

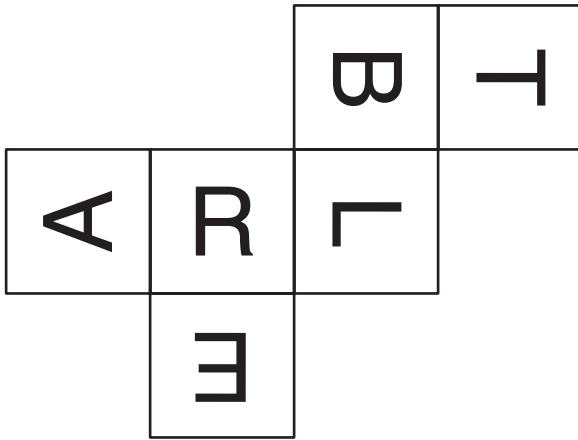
4 Which expression best represents $(3a^2b^3c)(-3ab)(-2a^3bc^3)$?

- F $18a^6b^5c^4$
- G $-18a^6b^3c^3$
- H $18a^6b^9c^4$
- J $-8a^6b^5c^4$

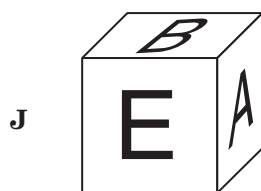
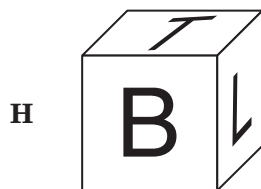
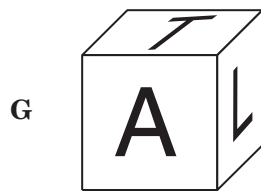
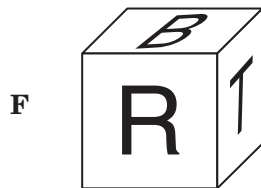
5 Which graph best represents the line that has intercepts at $(5, 0)$ and $(0, -4)$?



- 6 The net below can be folded to form a cube.



Which cube could be formed from this net?



- 7 Which quadratic function has a vertex below the origin and opens upward?

A $y = -x^2 + 3$

B $y = -x^2 - 1$

C $y = x^2 + 5$

D $y = x^2 - 2$

- 8 Mr. Ortega photographed the students in the math club. He arranged the students into 4 parallel rows. Each row had 3 more people than the previous row. If the first 2 rows had a total of 9 people, how many people total were in the group?

F 30

G 27

H 24

J 21

- 9 Mrs. Travis wants to have a clown deliver balloons to her secretary's office. Clowns R Fun charges \$1.25 per balloon and \$6 for delivery. Singing Balloons charges \$1.95 per balloon and \$2 for delivery. What is the minimum number of balloons Mrs. Travis needs to purchase in order for Clowns R Fun to have a lower price than Singing Balloons?
- A 5
B 6
C 11
D 12

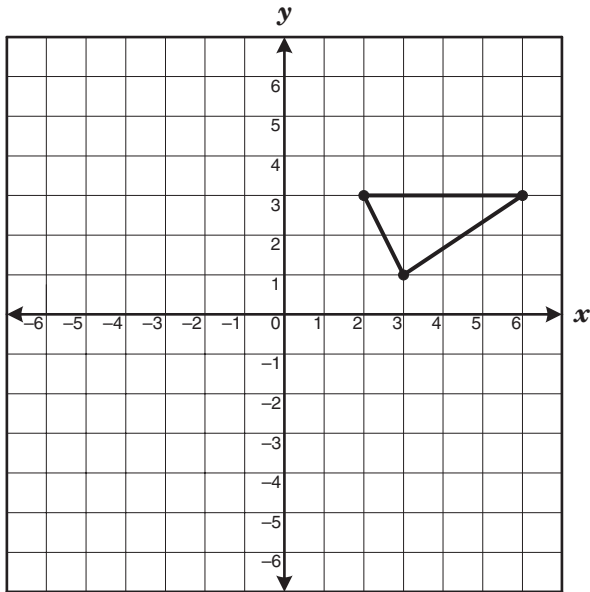
-
- 10 The table below shows h , the approximate height of an Ameri-Willow tree after t years.

Age of Ameri-Willow (years)	Height of Ameri-Willow (feet)
1	8
3	25
6	49
7	57
9	70

Which equation best fits these data?

- F $h = 8.2 + 3.75t$
G $h = 1.12 + 7.82t$
H $h = 7.5 + 0.65t^2$
J $h = -1.24 + 9.75t$

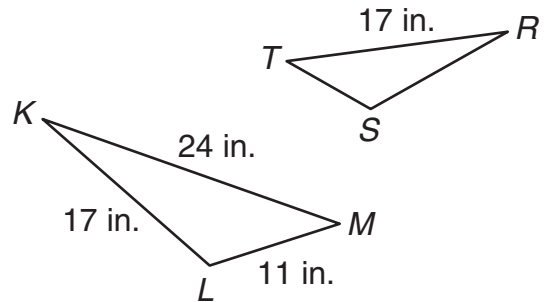
- 11 Look at the triangle graphed on the coordinate grid below.



Which coordinates are the vertices of a triangle congruent to this figure?

- A (3, -1), (2, -3), (6, -3)
- B (-3, 3), (1, 1), (-2, 1)
- C (-4, -1), (0, -1), (-4, -3)
- D (3, 1), (2, 3), (-3, 6)

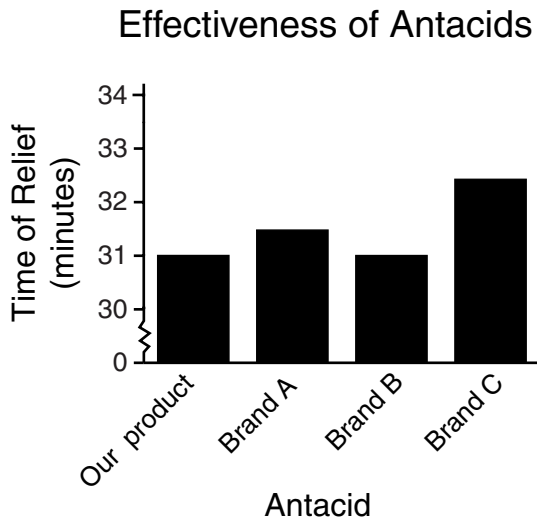
- 12 Look at the figures below.



If $\triangle KLM \sim \triangle RST$, which is closest to the length of \overline{ST} ?

- F 15.52 inches
- G 9.81 inches
- H 7.79 inches
- J 12.04 inches

- 13 A pharmaceutical company claimed that its product relieves acid indigestion more quickly than any other antacid. The company used the graph below to support its claim.

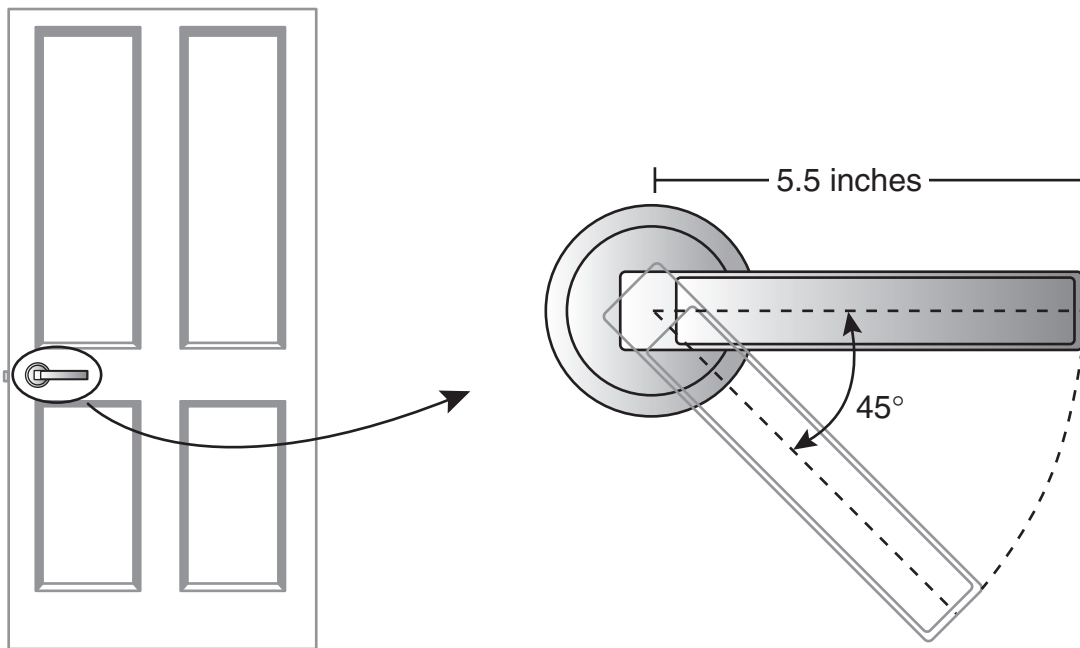


According to the graph, which statement best describes the company's product?

- A Its product works faster than some brands but much slower than others.
- B Its product works many times faster than the other brands.
- C Its product works in about the same time as the other brands.
- D Its product works somewhat slower than the other brands shown.

- 14 The payroll clerk at an appliance store calculates each salesclerk's weekly salary using the function $f(x) = 75 + 0.10x$, where x is each salesclerk's total weekly sales. The best interpretation of this situation is that each salesclerk is paid —
- F \$75 plus a 10% commission on the total weekly sales of all the salesclerks
 - G \$75 plus a 10% commission on his or her weekly sales
 - H \$75 plus a 10% commission on the total weekly profit for the store
 - J the same amount regardless of his or her total weekly sales

- 15 Look at the diagram below.



When the door handle is pushed down to open the door, it makes a 45° angle with its former position. What is the approximate arc length of the path traveled by the outside end of the door handle when the handle is pushed down?

- A 34.56 in.
- B 11.88 in.
- C 4.32 in.
- D 2.16 in.

- 16 An isosceles triangle has legs that are each x inches long and a base that is y inches long. The perimeter of this triangle is 38 inches. The base is 8 inches shorter than the length of a leg. Which system of linear equations can be used to find the length of each of the 3 sides?

F $2x + y = 38$

$y = x - 8$

G $2x + 2y = 38$

$y = x - 8$

H $2x + y = 38$

$x = y - 8$

J $2x + 2y = 38$

$x = y - 8$

- 17 Some students want to order shirts with their school logo. One company charges \$9.65 per shirt plus a setup fee of \$43. Another company charges \$8.40 per shirt plus a \$58 fee. For what number of shirts would the cost be the same?

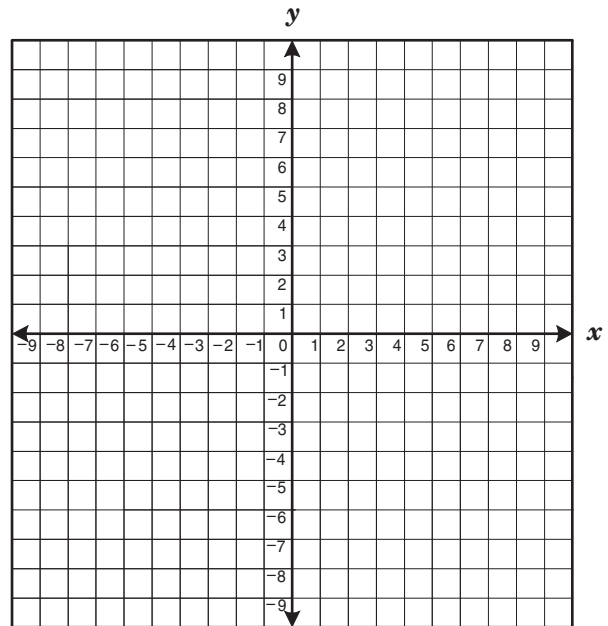
A 6

B 12

C 81

D 159

- 18 How does the graph of $y = 3x + 2$ compare to the graph of $y = 4x + 2$?



F The slope of $y = 3x + 2$ is less steep.

G The slope of $y = 3x + 2$ is steeper.

H The graph of $y = 3x + 2$ has a greater y -intercept.

J The graph of $y = 3x + 2$ has a smaller y -intercept.

- 19 The runners on a cross-country team need to buy bottles of water for their next meet. Each runner will buy at least four bottles, and the coach will buy six extra bottles. Which inequality best describes the total number of bottles, b , the runners and coach will buy in terms of n , the number of runners on the team?
- A $b < 4n + 6$
B $b \geq 6n + 4$
C $b \geq 4n + 6$
D $b < 6n + 4$

- 20 What is the y -intercept of the linear function described by the data below?

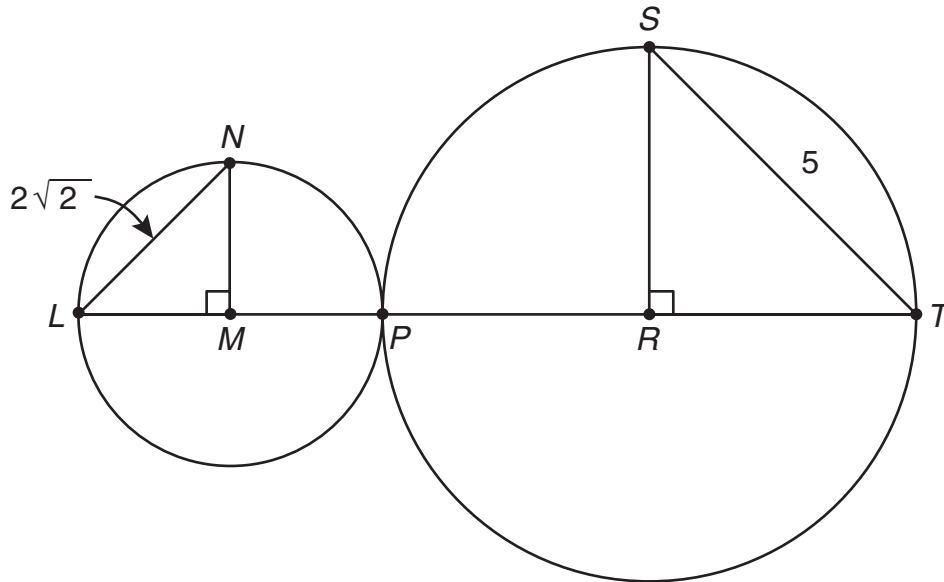
x	y
-6	5.8
-3	3.4
2	-0.6
4	-2.2
7	-4.6

- F (0, 1)
G (1.25, 0)
H (0, -1)
J (0, -1.25)

- 21 The years 707, 1001, and 2332 are examples of palindrome numbers. The year 2002 also represents a palindrome number. What is the nearest year before 2002 that also represents a palindrome number?

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

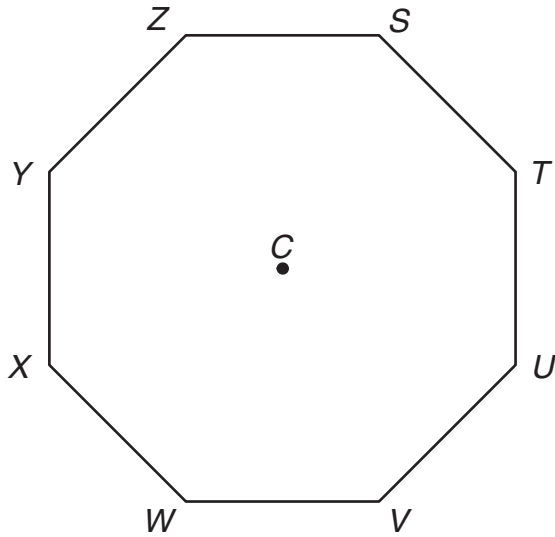
- 22 In the figure below, circle M and circle R intersect at point P .



Which is closest to the length of \overline{LT} ?

- F** 14 units
G 11 units
H 18 units
J 16 units
-
- 23 Which of the following does not describe the graph of the parent function of a quadratic equation?
- A** The graph has its vertex at the origin.
B The graph is a parabola that opens upward.
C The graph has the x -axis as its line of symmetry.
D The graph has a minimum value at $(0, 0)$.
- 24 What is the solution set for the equation $4x^2 + 11x - 10 = -7$?
- F** $\{-3, 0.25\}$
G $\{-3.47, 0.72\}$
H $\{3, -0.25\}$
J $\{-3.85, 1.1\}$

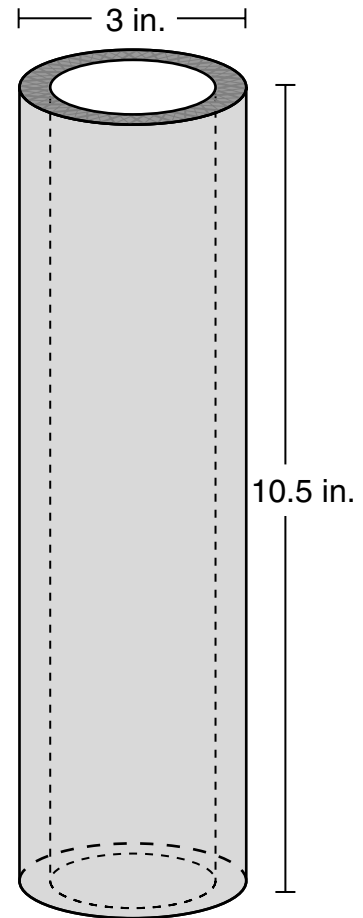
- 25 The regular octagon below shows selected positions on a combination lock.



The dial of the lock is turned 90° clockwise and then 45° counterclockwise. Which pair of points can describe the starting and ending points of a marker on the dial of this lock?

- A T to U
- B S to V
- C W to V
- D Z to W

- 26 A cylindrical piece of pipe insulation is shown below.



If the insulation is 0.5 inch thick, what is the approximate volume of insulation used?

- F 231 in.^3
- G 74 in.^3
- H 41 in.^3
- J 33 in.^3

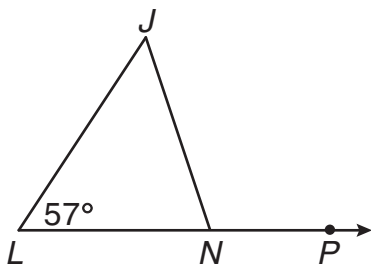
- 27 Kirk repairs computers. He charges an hourly rate plus a base fee for his services. The table below shows the relationship between h , the number of hours of labor, and c , the total cost for Kirk's services.

Hours, h	Total Cost, c
1	\$57
2	\$69
4	\$93
6	\$117

If Kirk decides to keep his base fee the same but increase his hourly rate by \$2, what will be the total cost for 8 hours of work?

- A \$112
- B \$141
- C \$143
- D \$157

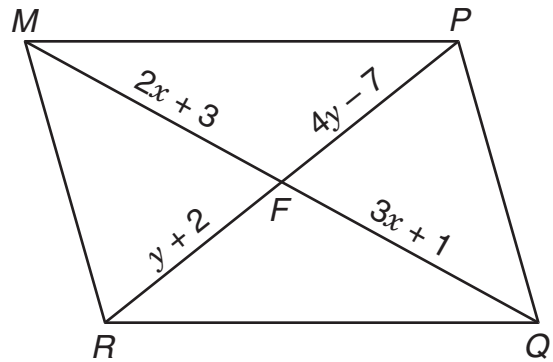
- 28 Look at the diagram below.



Which of the following relationships must be true?

- F $m\angle JNP + m\angle JNL + 57^\circ = 180^\circ$
- G $m\angle NJL + 57^\circ = m\angle JNP$
- H $m\angle JNP = 57^\circ$
- J $m\angle JNL + 57^\circ = m\angle JNP$

- 29 Parallelogram $MPQR$ is shown below.



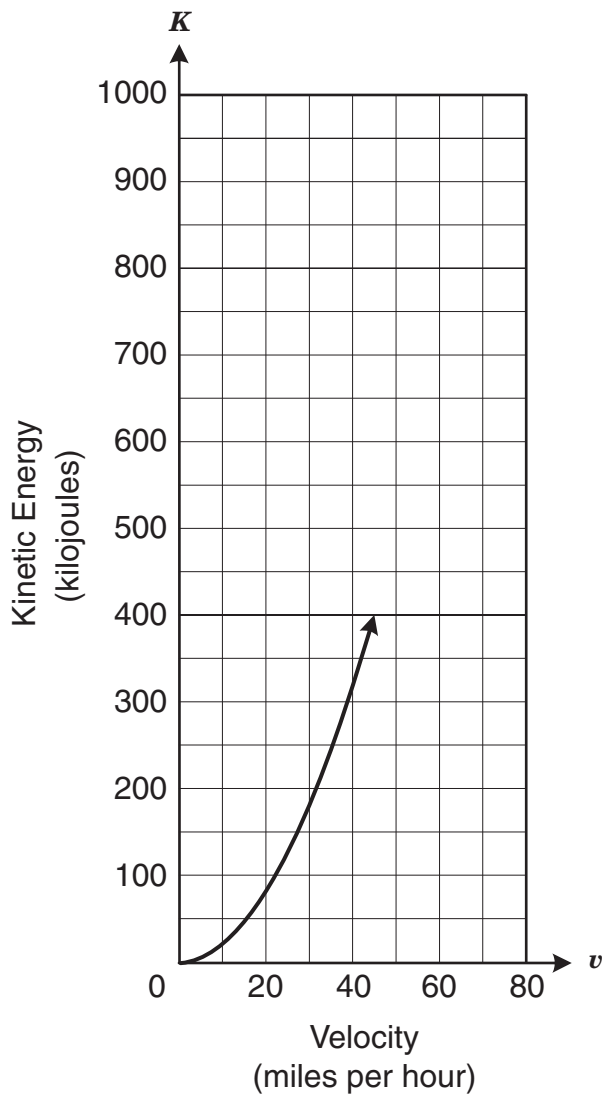
What are the lengths of diagonals MQ and RP ?

- A $MQ = 10$ and $RP = 14$
- B $MQ = 7$ and $RP = 5$
- C $MQ = 14$ and $RP = 10$
- D $MQ = 2$ and $RP = 3$

- 30 Which of the following describes a solid with 1 base and no vertices?

- F Cone
- G Sphere
- H Cylinder
- J Hemisphere

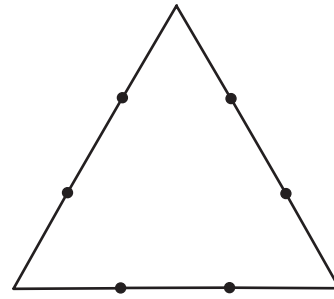
- 31 The graph shows the relationship between a 1-ton car's kinetic energy, K , and its velocity, v .



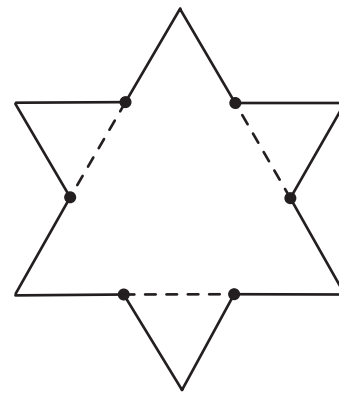
If the kinetic energy of the car is proportional to the square of its velocity, then its kinetic energy when traveling at 60 miles per hour is about —

- A 320 kilojoules
- B 480 kilojoules
- C 720 kilojoules
- D 1280 kilojoules

- 32 A student begins drawing a fractal by dividing each side of an equilateral triangle into 3 segments.



The student then replaces the middle segments with 2 equal segments to form the sides of smaller equilateral triangles.



If the student repeats this process on the 12 sides of the second figure, how many sides will the next figure have?

- F 24
- G 36
- H 48
- J 60

- 33** An appliance store put one kind of refrigerator and one kind of freezer on sale. The total sales of these two appliances were \$8000. The refrigerator was on sale for \$750, and the freezer was on sale for \$325. If f represents the number of freezers sold, which expression can be used to determine the number of refrigerators sold during this sale?

A $\frac{8000 - 325f}{750}$

B $\frac{8000 - 750f}{325}$

C $8000 - 750f$

D $8000 - 325f$

- 34** Only 4 members of the student council attended a meeting, and they greeted one another with handshakes. Each member shook the hand of each of the other members only once, for a total of 6 handshakes. If all 8 student council members had been present and each member had shaken the hand of each of the other members only once, what would have been the total number of handshakes?

F 10

G 21

H 12

J 28

- 35** The volume of a sphere can be found by using the function $V = \frac{4}{3}\pi r^3$, where V represents the volume and r represents the radius. What is the dependent quantity in this function?

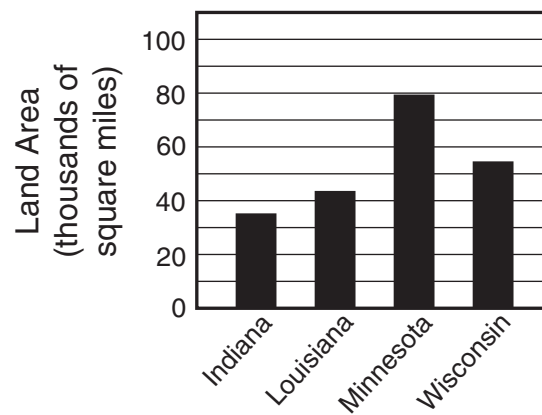
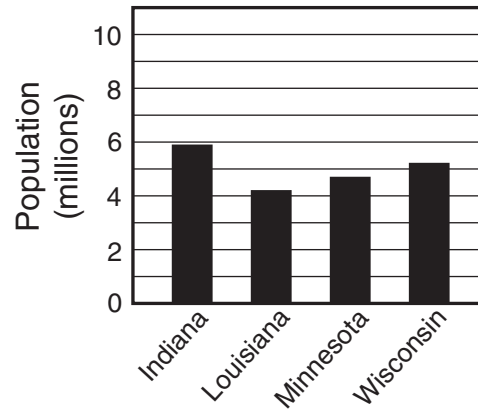
A π

B V

C r

D $\frac{4}{3}$

36 The two bar graphs shown below represent the populations and land areas of four states.



Based on the information given in the bar graphs, which of these four states is the least densely populated?

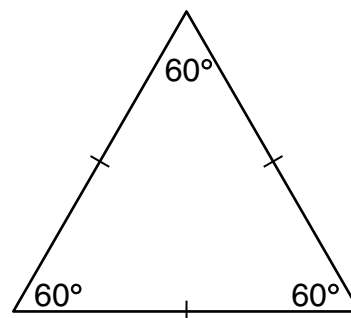
- F** Indiana
- G** Louisiana
- H** Minnesota
- J** Wisconsin

- 37 An insurance company reimbursed members of the Alonzo family 80% of their medical expenses after the family paid the first \$1000 of those expenses. If the family members received \$160 from the insurance company, what were their total medical expenses?
- A \$960
B \$1200
C \$1128
D \$1410

- 38 Brandon wants to reduce a figure that is 9 inches tall and 16 inches wide so that it will fit on a 9-inch-by-12-inch piece of paper. If he reduces the figure proportionally, what is the maximum size the reduced figure could measure?

- F 12 inches by $21\frac{1}{3}$ inches
G 9 inches by 12 inches
H $5\frac{1}{16}$ inches by 9 inches
J $6\frac{3}{4}$ inches by 12 inches

- 39 The area of this regular polygon is 72 square inches.



Find the approximate length of one side of this polygon.

- A 12.9 in.
B 15.8 in.
C 22.3 in.
D 24.0 in.

- 40 The table shows Cain's 7 quiz scores for the first 9-week period. Each score is based on a 50-point scale.

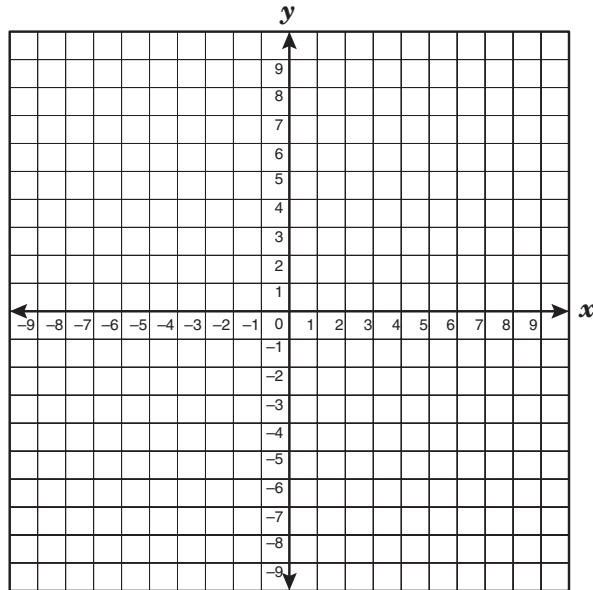
Cain's Quiz Scores

Quiz Number	Score
1	38
2	45
3	42
4	48
5	35
6	41
7	45

Which of the following gives the highest value for Cain's quiz scores for the first 9-week period?

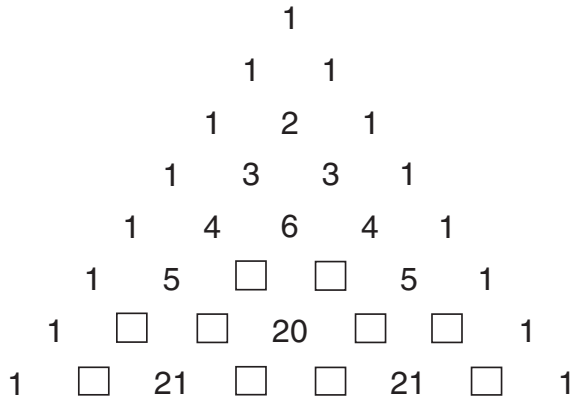
- F** Mode
- G** Mean
- H** Range
- J** Median

- 41 Victor purchased motor oil for \$2 a bottle and car wax for \$4 a bottle. The inequality $2x + 4y < 16$ can be used to determine the number of bottles of motor oil, x , and the number of bottles of car wax, y , Victor purchased for less than \$16, not including tax. Which of the following ordered pairs best represents a reasonable combination of bottles of motor oil and car wax that Victor could have purchased?



- A (4, 2)
- B (2, 3)
- C (5, 2)
- D (3, 2)

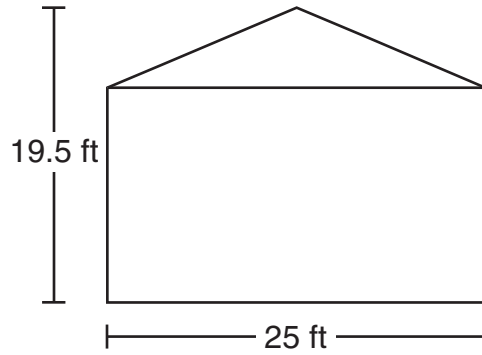
- 42 The figure below shows a partial view of Pascal's triangle.



If each square represents a missing number in Pascal's triangle, which of the following could not be a missing number used to complete the partial view of Pascal's triangle shown above?

- F 24
- G 15
- H 35
- J 10

- 43 The figure below shows a triangle on top of a rectangle.



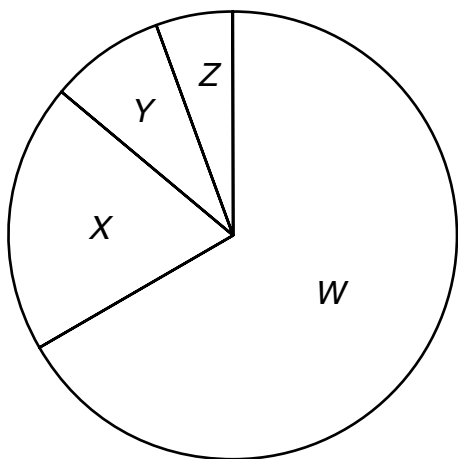
If the area of the triangle is 83 square feet, which of the following best represents the area of the rectangle?

- A 405 ft²
- B 239 ft²
- C 322 ft²
- D 166 ft²

- 44 The formula for the volume of a cylinder with a height of 5 units can be represented as $y = 5\pi x^2$, where x represents the radius. If the cylinder's height is tripled, what is the effect on the graph of y as a function of x ?
- F** The graph is translated up.
G The graph remains the same.
H The graph becomes narrower.
J The graph becomes wider.

- 45 An orange-drink label reads "20% real fruit juice." The other ingredients are water, sugar, and flavoring.

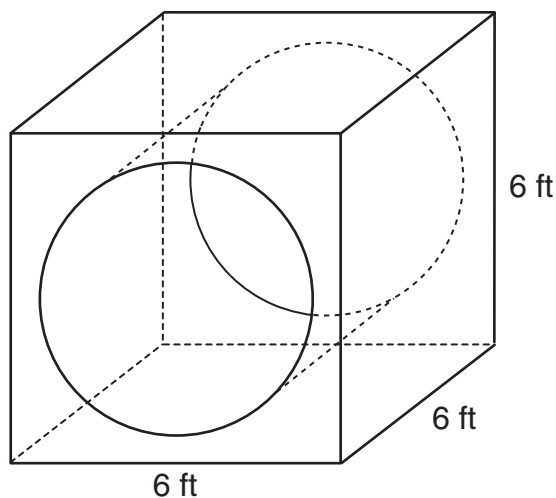
Orange-Drink Ingredients



Which section of the circle graph best represents the amount of real fruit juice in the orange drink?

- A** W
B X
C Y
D Z

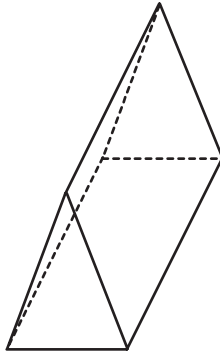
- 46 A cube-shaped piece of playground equipment has a cylindrical portion removed, as shown in the diagram. The diameter of the opening is 5 feet.



What is the approximate volume of the remaining portion of the cube?

- F** 255 ft³
G 122 ft³
H 98 ft³
J 28 ft³

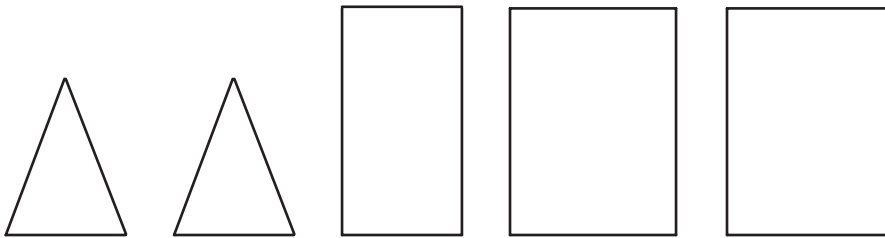
47 Which set of figures can be used to construct a representation of the surface area of the solid shown below?



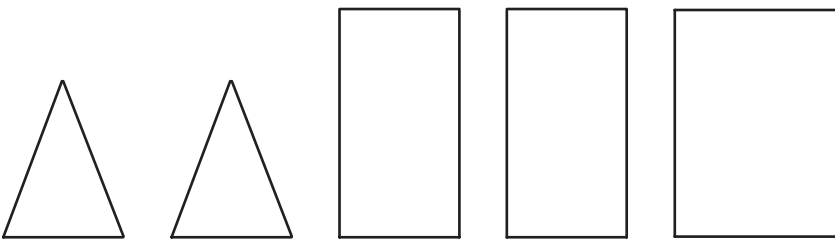
A



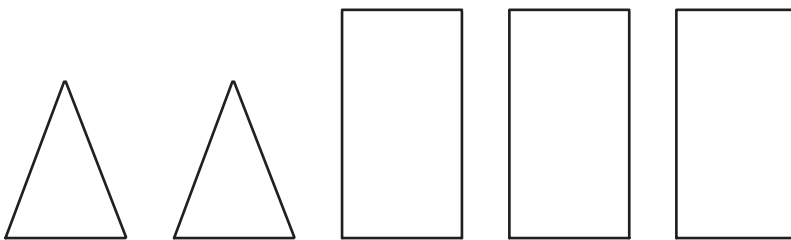
B



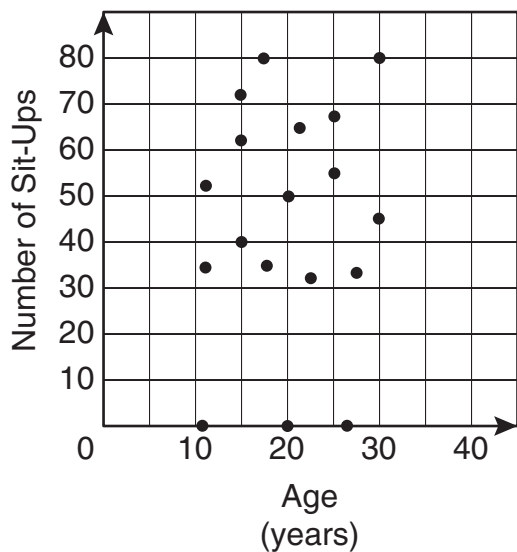
C



D



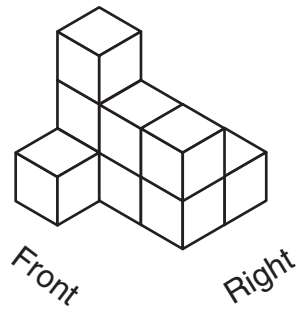
- 48 In a recent survey conducted at a mall, 18 people between the ages of 10 and 35 were asked how many sit-ups they do for exercise on a weekly basis. The data are shown in the scatterplot below.



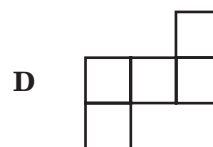
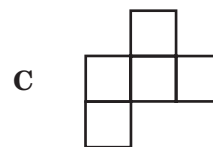
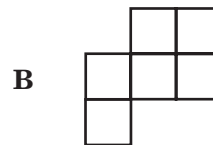
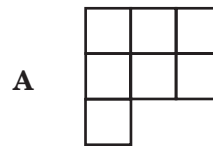
According to the data, what is the relationship between a person's age and the number of sit-ups done on a weekly basis?

- F The younger a person is, the more sit-ups the person does weekly.
- G The older a person is, the more sit-ups the person does weekly.
- H There is a constant correlation between the age of a person and the number of sit-ups done weekly.
- J There is no correlation between a person's age and the number of sit-ups done weekly.

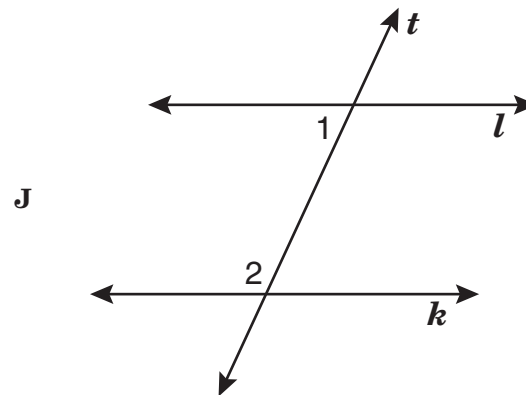
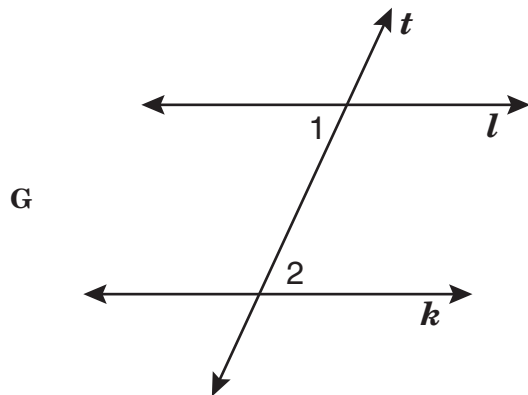
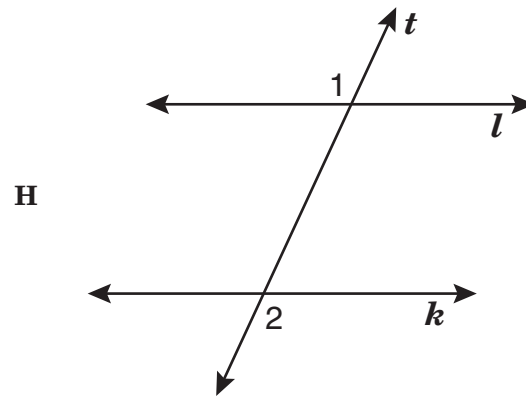
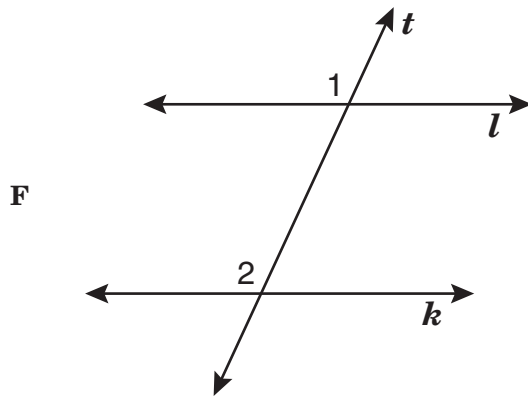
- 49 The 3-dimensional figure shown below represents a structure that Corina built with 9 cubes.



Which of the following best represents the top view of Corina's 9-cube structure?



- 50 Mitch drew lines l , k , and t . Lines l and k were parallel to each other. Mitch measured 2 alternate interior angles. He labeled the angles 1 and 2. Which of the following shows angles 1 and 2 correctly labeled?



- 51 On a certain math problem, Cynthia mistakenly divided a number by 4 and then subtracted 24 and got 12 for her answer. After reading the problem again, she realized that she should have subtracted 24 before dividing by 4. What was the correct answer?

- A -48
- B -28
- C 30
- D 144

- 52 Which two lines are parallel?

- F $6x - 2y = -8$ and $3x + y = -4$
- G $3x - y = -1$ and $9x - 3y = -6$
- H $12x - 4y = -4$ and $x - 3y = -9$
- J $9x - 3y = -6$ and $5x + 15y = 15$

- 53 The table below shows the relationship between I , the current in milliamperes (mA) through a filament, and t , the filament's temperature in degrees Celsius.

Temperature, t (°C)	Current, I (mA)
80	320
90	360
100	400
110	440

Which equation best represents the relationship between the quantities in the table?

- A $I = \frac{1}{4}t$
- B $I = \frac{1}{40}t$
- C $I = 40t$
- D $I = 4t$

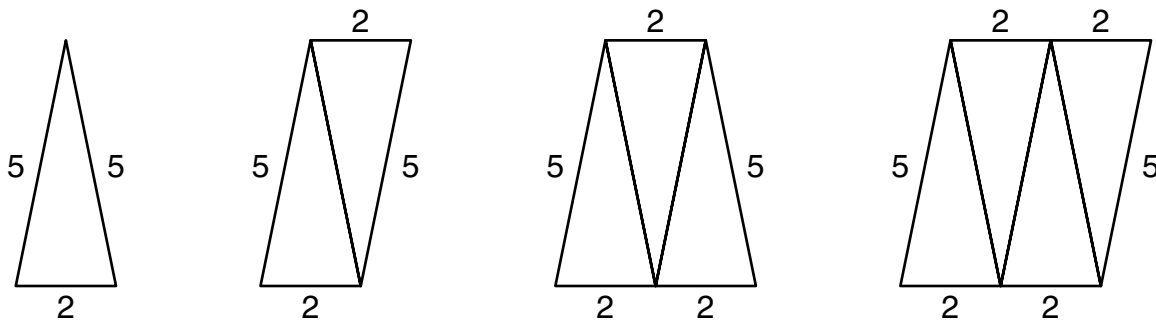
- 54 Mrs. Jones has a piece of carpet that is 12 feet long and 2 feet wide. She wants to cut off a section that is 3 feet long and 1 foot wide. She wants to cut up the remaining piece of carpet into 22 pieces that are 1 foot square. Why is this scenario impossible?

- F A piece 3 feet long by 1 foot wide cannot be cut from the carpet.
- G Some pieces of carpet would be left over.
- H There is not enough carpet to cut all the pieces.
- J The carpet cannot be cut into 1-square-foot pieces.

- 55 The radius of a spherical beach ball is 24 centimeters. If another spherical beach ball has a radius 3 centimeters longer, about how much greater is its surface area, to the nearest square centimeter?

- A 37 cm^2
- B 113 cm^2
- C $1,923 \text{ cm}^2$
- D $24,542 \text{ cm}^2$

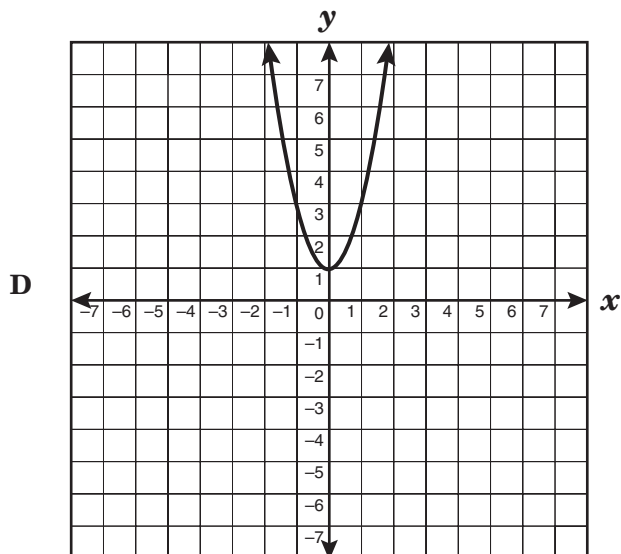
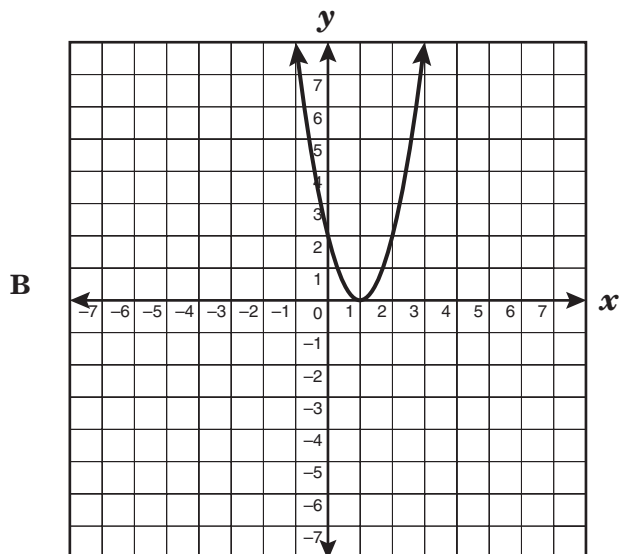
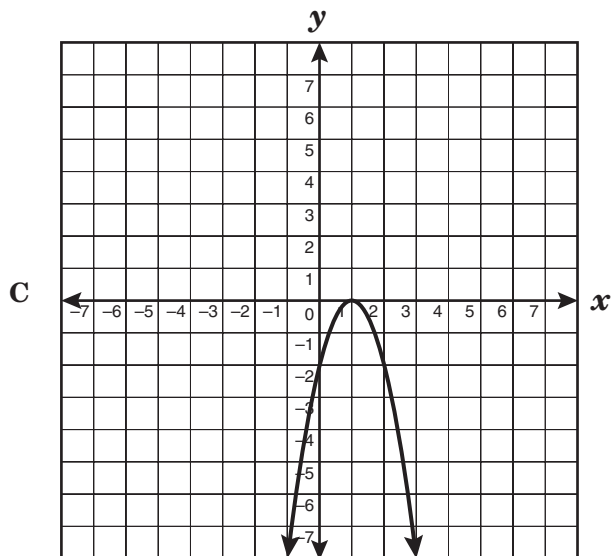
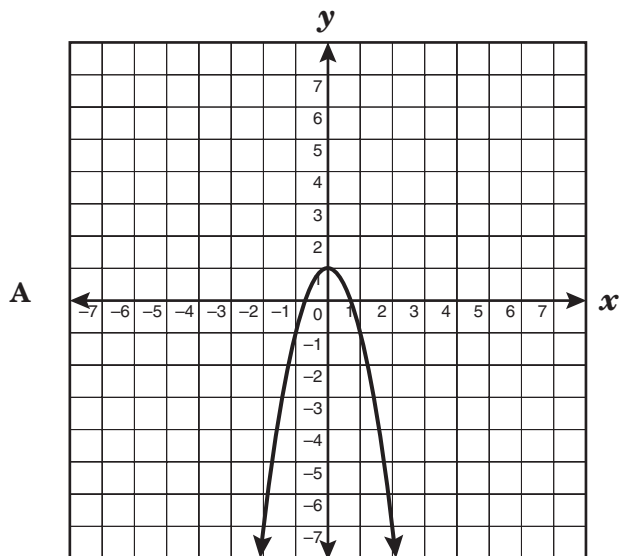
56 Below are congruent isosceles triangles arranged in a sequence to obtain a geometric pattern.



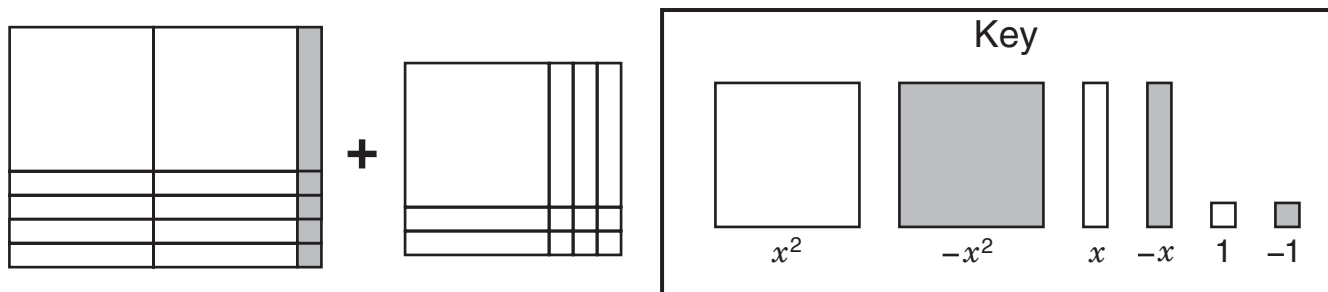
Which expression can be used to find the perimeter of a composite figure made up of t triangles arranged in this pattern?

- F $12t$
- G $2t + 10$
- H $5t + 2$
- J $12t - 5$

57 Which graph best represents the equation $y = 2x^2 + 1$?



58 Look at the two polynomials modeled below using algebra tiles.



Which expression describes the sum of the two polynomials in terms of x ?

- F $3x^2 + 12x - 10$
- G $3x^4 + 12x^2 - 2$
- H $3x^2 + 12x + 2$
- J $2x^4 + 35x^2 - 24$

59 Find the midpoint of the line segment with endpoints $(4, -6.25)$ and $(-15, 12.25)$.

- A $(-5.5, 3)$
- B $(-9.5, 9.25)$
- C $(-11, 6)$
- D $(-19, 18.5)$

60 The math club at Hawthorne High School surveyed 180 students and found that 36 of them have a March birthday. Based on this information, which is the best prediction of the number of students at Hawthorne High School who have a March birthday if there are 867 students enrolled?

- F 289
- G 173
- H 72
- J 24

BE SURE YOU HAVE RECORDED ALL OF YOUR ANSWERS
ON THE ANSWER DOCUMENT.



