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.

Continued on the next page

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	$V = \frac{4}{3}\pi r^3$
**B represents the area of the Base of a solid figure.*		
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.

SAMPLE A

Find the slope of the line

$$2y = 8x - 3$$

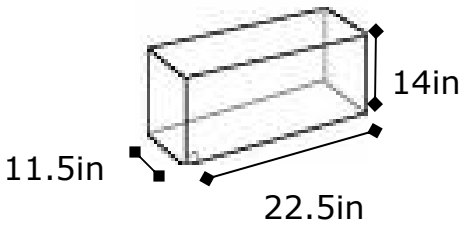
Slope: slope is represented by *m*. It represents how steep a line is and whether it is pointing uphill or downhill.

A 6
B 4
C 7

SAMPLE B

The dimensions of the rectangular box are 22.5 inches long, by 14 inches tall, by 11.5 inches wide.

What is the volume of this box in cubic inches?

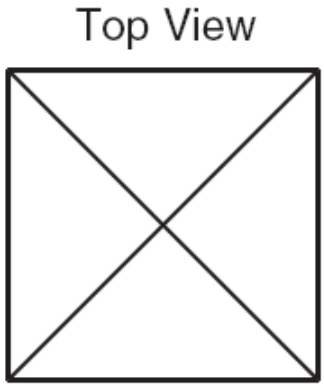


Volume = length x width x height

F 3622.5 in³
G 463.5 in³
H 30 in³

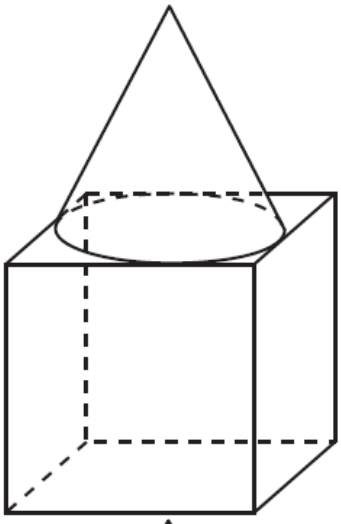
STOP

1. The drawing shows the top view of a 3-dimensional object.

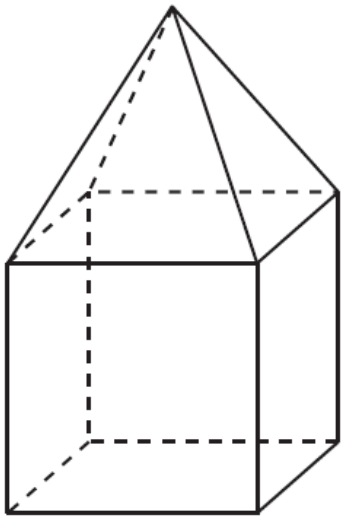


Which of the following drawings best represents this 3-dimensional object?

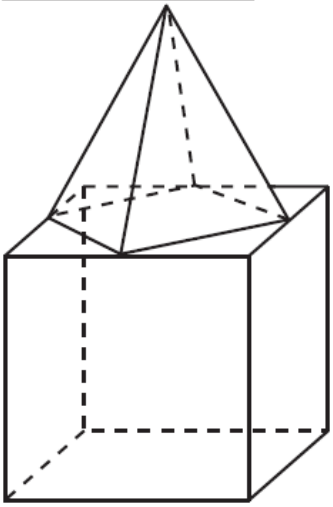
A



C

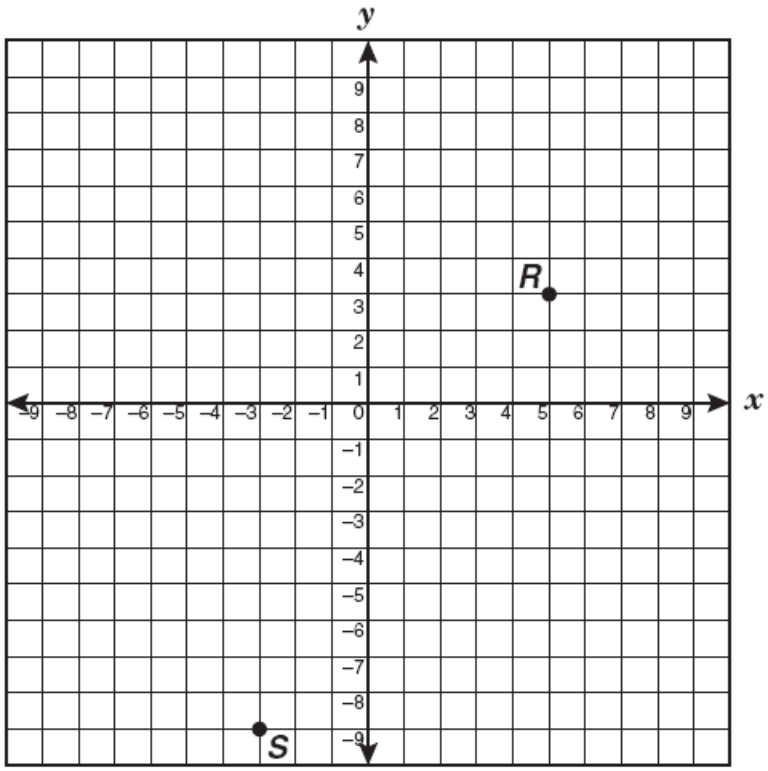


B



GO ON

2. Which linear function represents the line passing through points **R** and **S**?



F $y = 1.5x - 4.5$

G $y = 0.5x + 1.5$

H $y = 3x + 2$

GO ON

3. Lee, Kelly, Linda, and Mary all took the same math test. Linda earned a lower score than Kelly, but she did not earn the lowest score. The highest test-scorer's name does not begin with an L. Mary earned a higher score than Kelly.

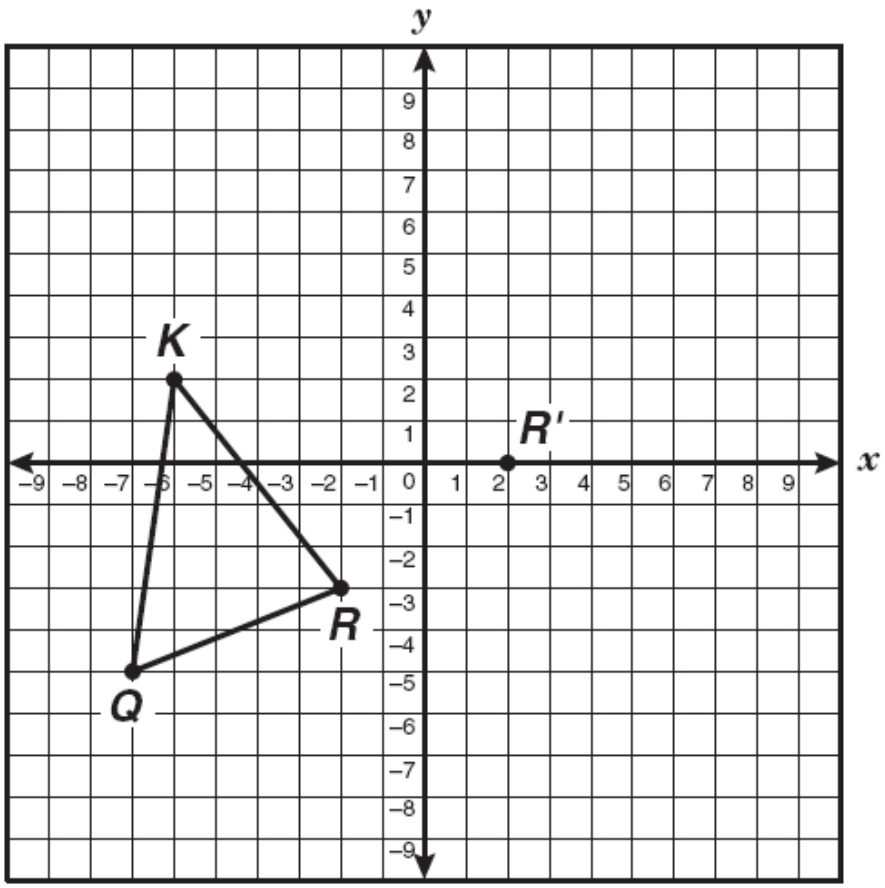
Which person earned the lowest score on the math test?

A Mary

B Lee

C Kelly

4. ΔKQR is **translated** so that **R** is mapped to **R'**.



Translated: moved

Which ordered pair best represents either point **Q'**?

F (−3, −2)

G (−9, 3)

H (8, −7)

GO ON

5. Ms. Adams bought a refrigerator that cost $1200, including tax. The cost of electricity to run this refrigerator is estimated at $78 per year.

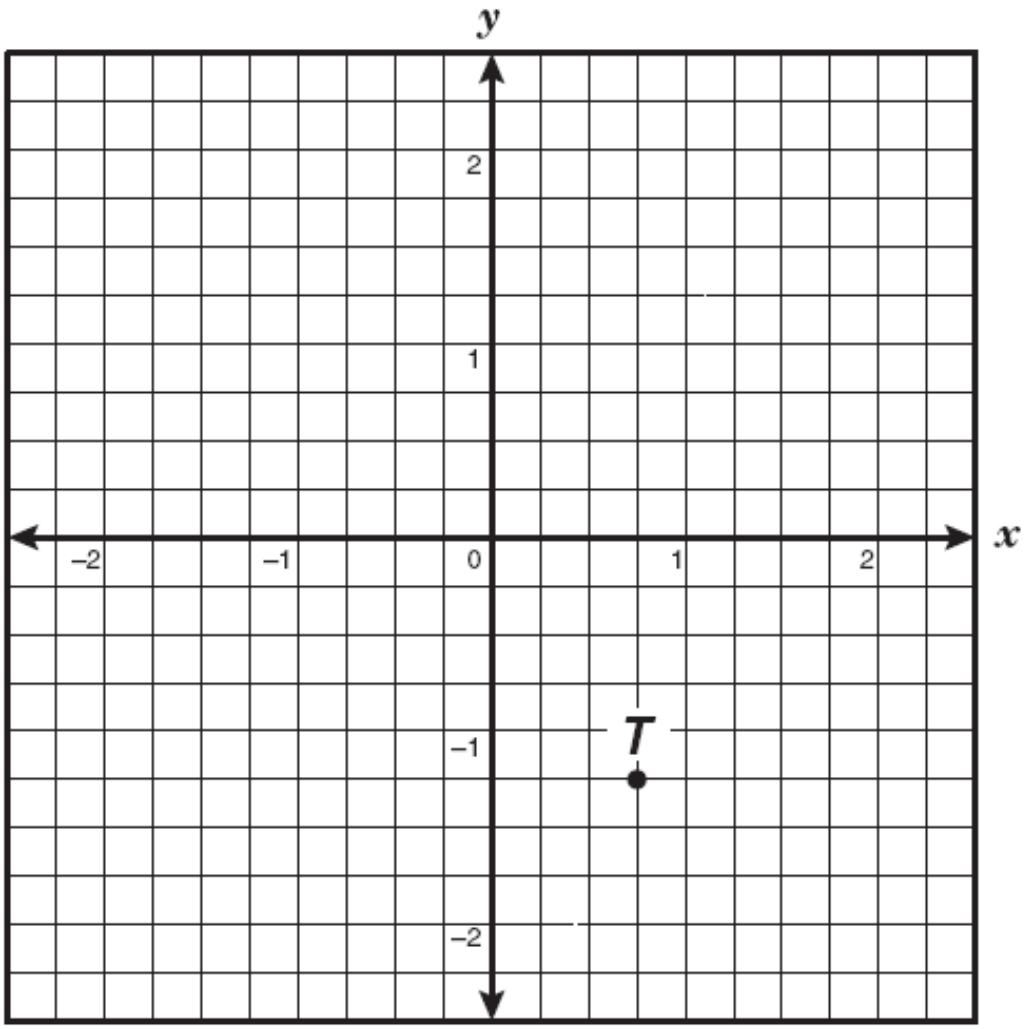
Which equation best represents ***c***, the total cost of the refrigerator including electricity over ***n*** years of operation?

A $c = 1200(n + 78)$

B $c = 1200 + 78n$

C $c = 1200 - 78n$

6. Which of the following ordered pairs best represents the location of point **T**?



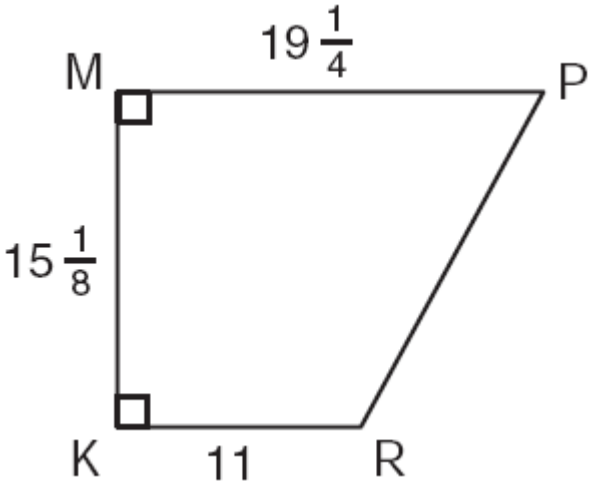
F $\left(\frac{5}{2},\frac{2}{4}\right)$

G $\left(\frac{3}{4},-\frac{5}{4}\right)$

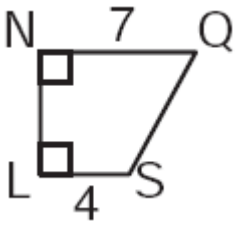
H $\left(-\frac{1}{4},\frac{3}{2}\right)$

GO ON

7. Trapezoid **KMPR** is **similar** to trapezoid **LNQS.**



Similar: similar figures are proportional to one another.



Trapazoid: quadrilateral with one set of parallel sides.

Which is closest to the perimeter of trapezoid **LNQS**?

A 23 units

B 75 units

C 8 units

GO ON

8. An artist painted a mural from the photograph shown below.

If the artist used a scale of $\frac{1}{2}$ inch to represent 1 foot, which of the following best represents the dimensions in feet of the mural?

F $2\frac{1}{2}$ ft by 4 ft

G 9 ft by 15 ft

H 6 ft by 10 ft

GO ON

9. The price for this year's season tickets to a city hockey team's games was reduced by 15% from last year's ticket price, x. As a result, there was a 22% increase in the number of season-tickets sold this year.

If a total of 4000 season tickets were sold last year, which expression could be used to determine the total sales from this year's season tickets?

A $4000 + x$

B $4000(1 + 0.22)(1 - 0.15)x$

C $x - 4000(1 + 0.22) - 0.15$

10. If y is a function of x in the equation $y = x^2 - 9$, which statement is true?

Independent variable: variable that does not change based on the other variables.

Dependent variable: the value of the dependent variable depends on the value of another variable

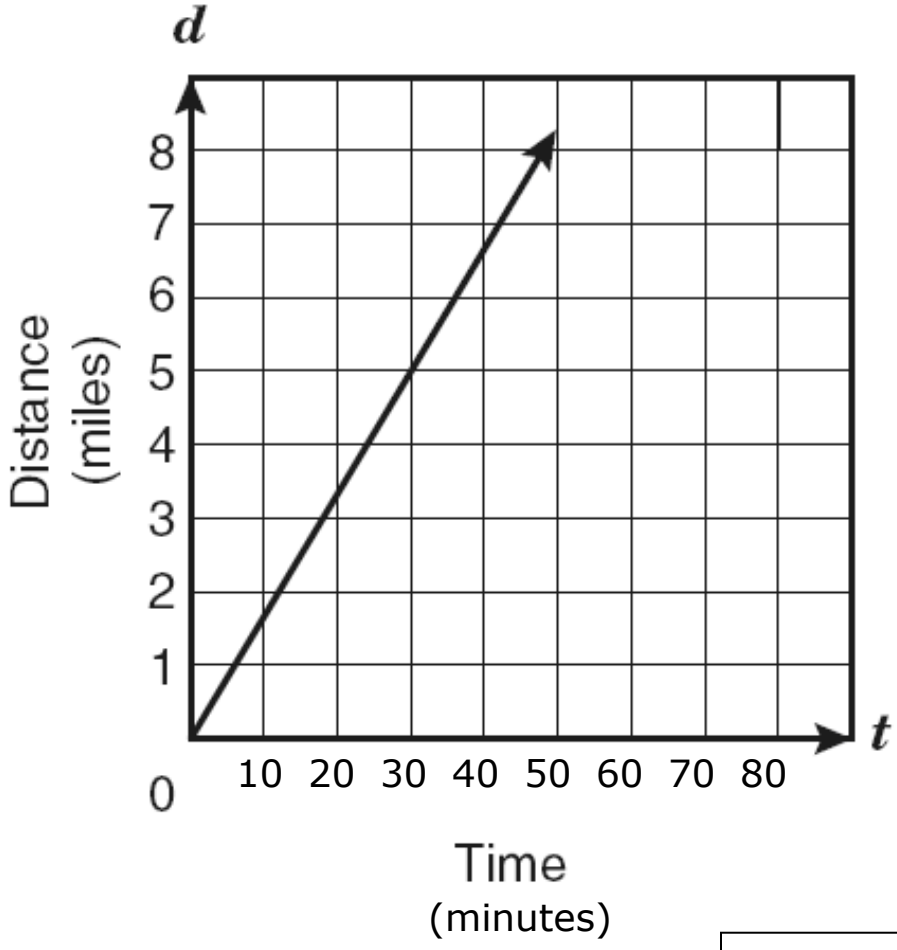
F The dependent variable y is equal to 2 more than the independent variable x.

G The independent variable x is equal to 9 less than the dependent variable y.

H The dependent variable y is equal to 9 less than the square of the independent variable x.

GO ON

11. The graph shows the distance a motorbike can travel at a constant speed with respect to time.



1 hour = 60 minutes

Which of the following best describes the meaning of the slope of the line representing this situation?

A The motorbike travels at a speed of about 5 miles per hour.

B The motorbike travels at a speed of about 2.5 miles per hour.

C The motorbike travels at a speed of about 10 miles per hour.

GO ON

12. For a spring break special, an amusement park charged $10 per person for admission with unlimited rides. The regular admission price is $5 per person plus $0.50 per ride.

Which of the following statements is true?

F If a person plans to get on more than 15 rides, the regular admission price costs less.

G The spring break special costs less no matter how many rides a person plans to get on.

H If a person plans to get on fewer than 10 rides, the regular admission price costs less.

13. The table below shows the relationship between ***p***, the number of cell phones a company produces, and ***d***, the number of cell phones that are **defective**.

Defective: does not work

Cell Phones

Number Produced (p)	Number Defective (d)
100	5
200	10
300	15
400	20
500	25

Which equation can be used to describe this relationship?

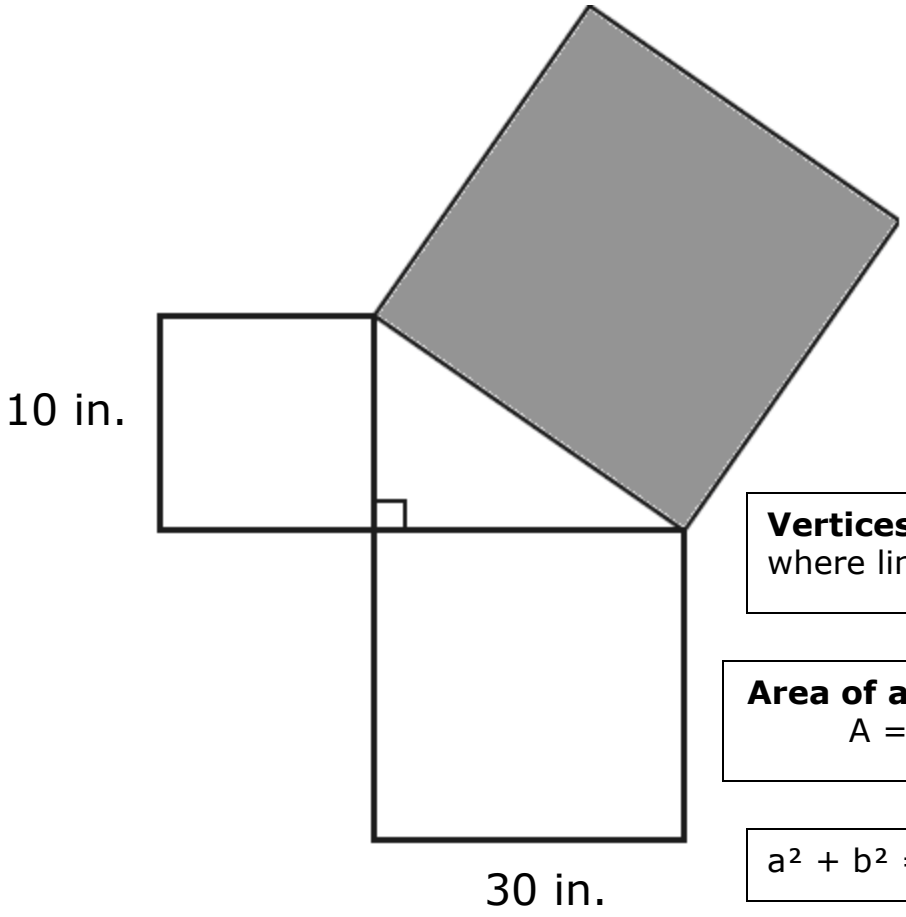
A $d = 20p$

B $d = 0.05p$

C $d = p - 95$

GO ON

14. The drawing below shows how 3 squares can be joined at their vertices to form a right triangle.



Vertices: points where lines meet

Area of a Square:
$A = s^2$

$a^2 + b^2 = c^2$

Which is closest to the area in square inches of the shaded square?

F 1096 in.^{2}

G 67 in.^{2}

H 5243 in.^{2}

GO ON

15. Simplify the expression $6 - 3(5x + 2) - 10x$.

A $-25x$

B $9 - 25x$

C $5x + 7$

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16. Jerry has a CD case that contains 4 country music CDs, 1 rock-and-roll CD, 2 rap CDs, and 3 classical CDs. What is the probability of Jerry randomly selecting a classical CD and then, without replacing it, randomly selecting a rap CD from his case?

F $\frac{3}{62}$

G $\frac{1}{15}$

H $\frac{1}{3}$

17. Shirley graphed a function of the form $y = ax^2 + c$. She then translated the graph 8 units up, resulting in the function $y = -\frac{2}{3}x^2 + 5$.

Which of the following best represents Shirley's original function?

A $y = -\frac{2}{3}x^2 + 12$

B $y = -\frac{2}{3}x^2 - 3$

C $y = -\frac{2}{3}x^2 - 1$

GO ON

18. Last year a married couple could have calculated their estimated income tax, using the equation $t = 0.25c - 6525$. In this equation, ***t*** represents the estimated income tax and ***c*** represents their combined taxable income.

If a married couple had a combined taxable income between $60,000 and $64,000, which of the following is a reasonable amount for their income tax?

F $3,525

G $8,975

H $15,500

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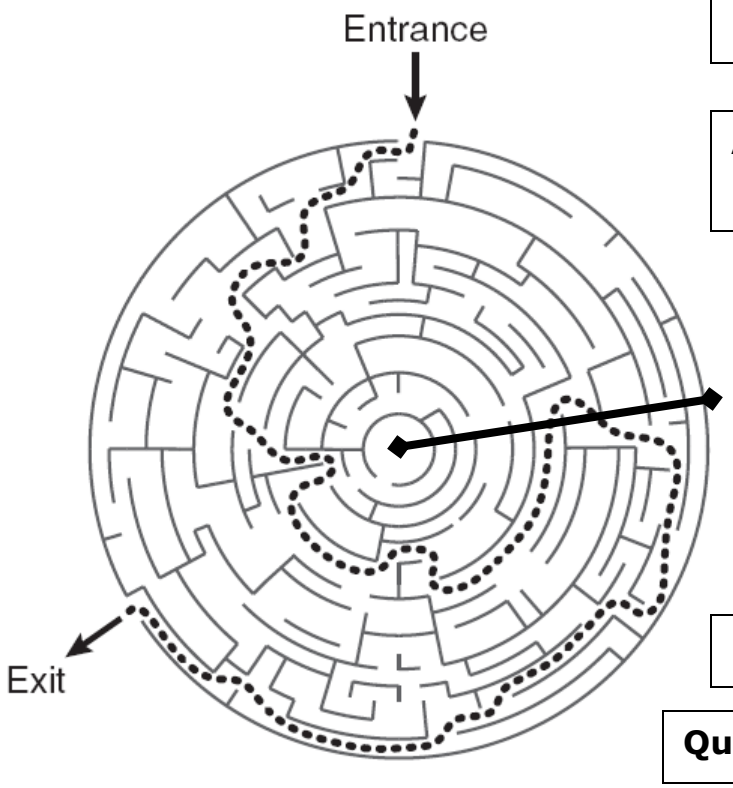
19. Bruce went to a barbershop for a haircut. The price for a haircut at this barbershop is $15, tax included. If Bruce tipped the barber 10% of the cost of the haircut and the tax, how much change in dollars and cents should he have received if he paid with a $20 bill?

A $0.10

B $10.00

C $3.50

20. The owner of an amusement park created a circular maze that has a radius of 50 feet.



Circumference:
$C = 2\pi r$

Area of a Circle:
$A = \pi r^2$

Double: multiply by 2

Quadruple: multiply by 4

If the owner doubles the radius of the maze, which statement describes what will happen to the circumference and area of the maze?

F The circumference and the area will double.

G The circumference and the area will quadruple.

H The circumference will double, and the area will quadruple.

GO ON

21. Stephen claims that the exterior angle for any **regular polygon** is either an **acute angle** or an **obtuse angle**.

Polygon: a shape with three or more straight sides

Regular polygon: polygons with all sides equal and all angles equal

Acute angle: angle measuring less than 90°

Obtuse angle: angle measuring more than 90°

If each of the following polygons is regular, which one could disprove Stephen's theory?

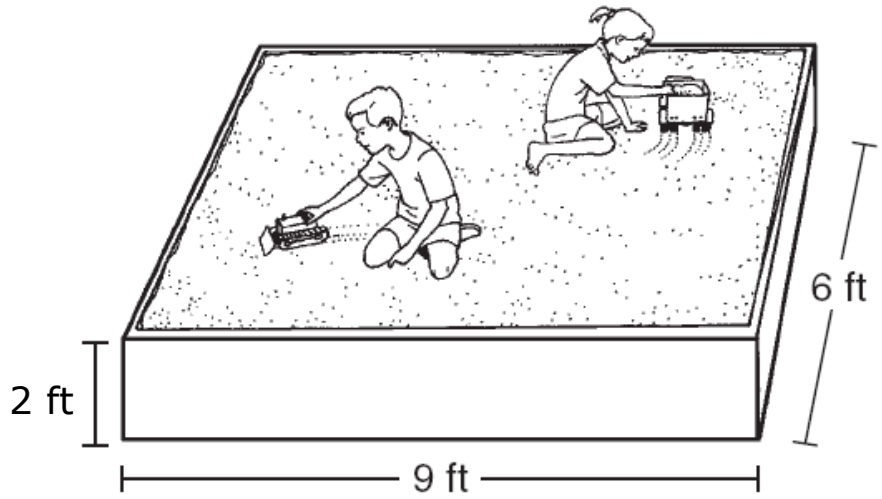
A Triangle

B Quadrilateral

C Pentagon

GO ON

22. Mr. Bergman built a rectangular sandbox for his children, as shown below.



Volume = length x width x height

How many cubic feet of sand will Mr. Bergman need to completely fill this sandbox?

F 108 ft^3

G 19 ft^3

H 81 ft^3

GO ON

23. A toad is 25 feet in front of the bullfrog. Every time the toad jumps 1 foot, the bullfrog jumps 3 feet.

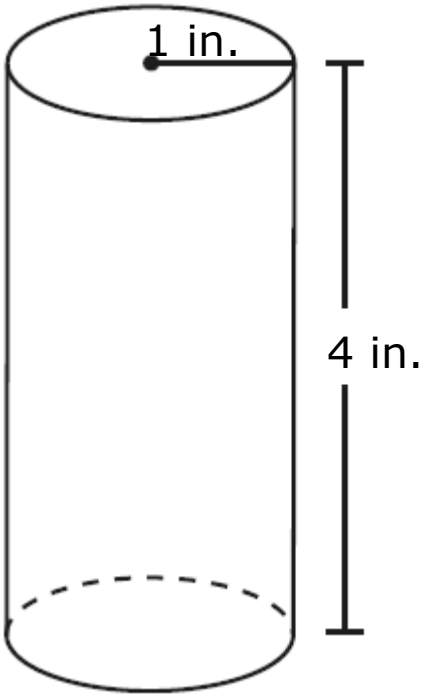
If both the toad and the bullfrog jump the same direction, how many jumps will it take for the bullfrog to pass the toad?

A 9

B 7

C 13

24. Look at the cylinder shown below.



V = Base x height

Base = πr^2

Which equation is closest to the volume, V, of this cylinder?

F $V = 16 \text{ in}^3$

G $V = 13 \text{ in}^3$

H $V = 45 \text{ in}^3$

GO ON

25. Nikki and Laura went to a store to buy DVDs on sale for $5 each, tax included. Nikki purchased two and a half times as many DVDs as Laura purchased. Together they purchased 14 DVDs.

Which system of **linear equations** can be used to determine ***n***, the number of DVDs Nikki purchased, and ***l***, the number of DVDs Laura purchased?

Linear equations:
equation of a line

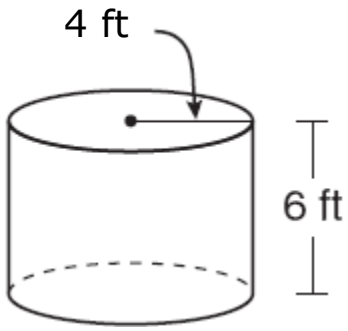
A $n + l = 14$
$n = \frac{5}{8}l$

B $n + l = 14$
$n = 3l$

C $n + l = 14$
$n = 2\frac{1}{2}l$

GO ON

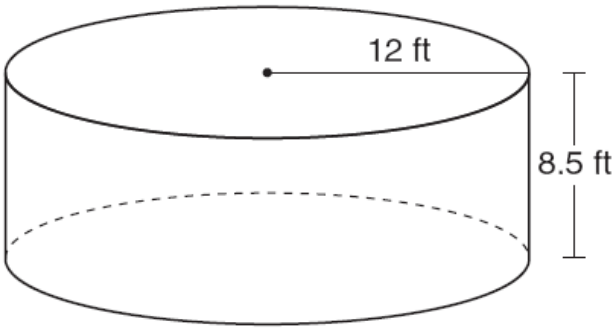
26. Look at the cylinder shown below.



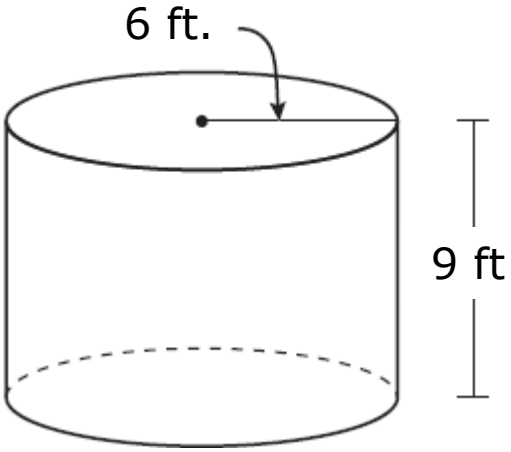
Similar: proportional to one another.

Which of the following cylinders is **similar** to the one above?

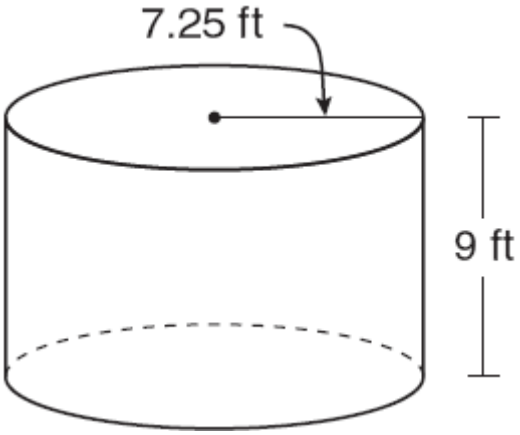
F



H

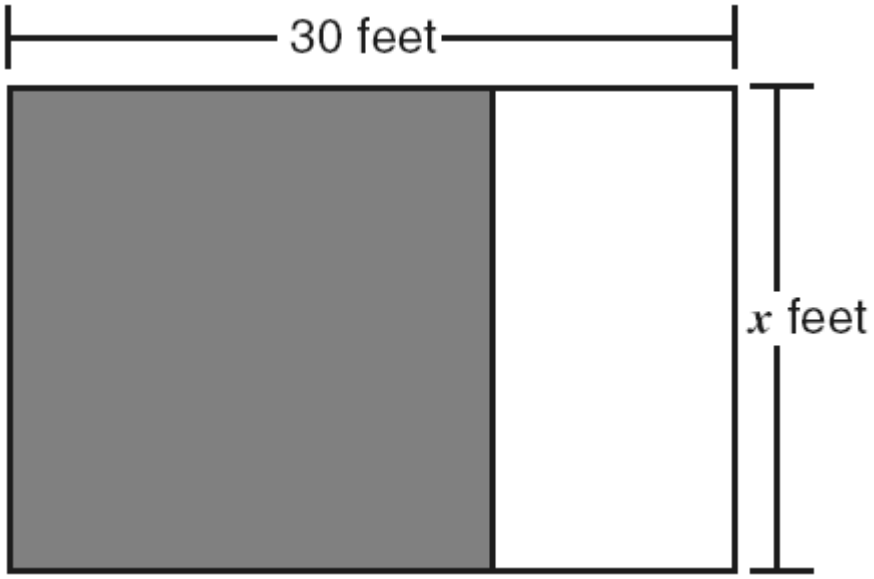


G



GO ON

27. The area of the shaded portion of the rectangle shown below is 440 square feet.



How can the area of the unshaded portion of the rectangle be expressed in terms of x in square feet?

A 440x − 30

B (30 − 440)x

C 30x − 440

GO ON

28. Which lists the functions of the form $y = ax^2$ in order from the widest to the narrowest graph?

F $y = \frac{2}{3}x^2$, $y = 2x^2$, $y = \frac{1}{2}x^2$

G $y = \frac{1}{2}x^2$, $y = \frac{2}{3}x^2$, $y = 2x^2$

H $y = 2x^2$, $y = \frac{1}{2}x^2$, $y = \frac{2}{3}x^2$

GO ON

29. The squares below show a pattern.

Stage 1	
Stage 2	
Stage 3	
Stage 4	

Which expression can be used to find the number of squares at stage ***n***?

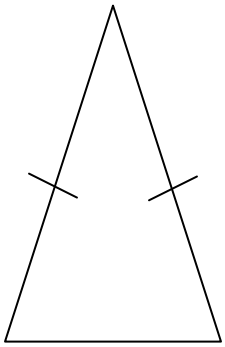
A $n^2 + n$

B $4n - 2$

C $2n^2$

GO ON

30. The length of each leg of an **isosceles triangle** is 5 centimeters more than twice the length of the base. If the perimeter of this isosceles triangle is 95 centimeters, what is the length of the base?



Isosceles triangle: triangle with two equal sides

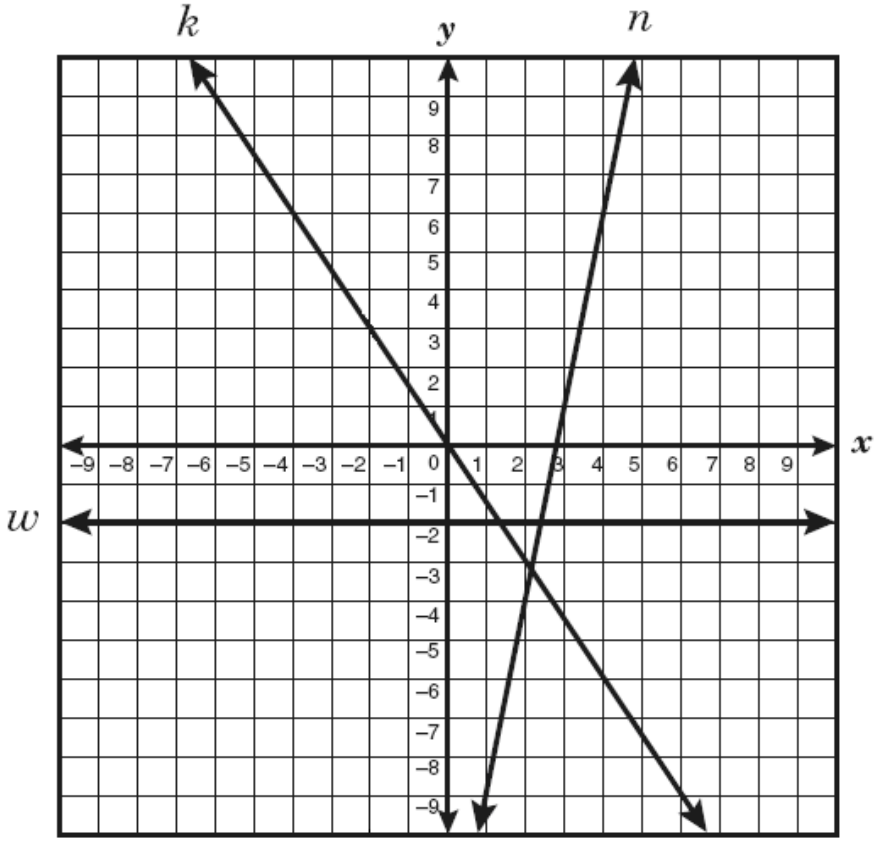
F 17 cm

G 39 cm

H 8 cm

GO ON

31. Which line appears to have a slope of zero?



A Line n

B Line k

C Line w

GO ON

32. Jeremy's house is 45 feet wide. In a photograph the house was 2.5 inches wide, and 2 inches high.

How high is Jeremy's house?

F 98 ft

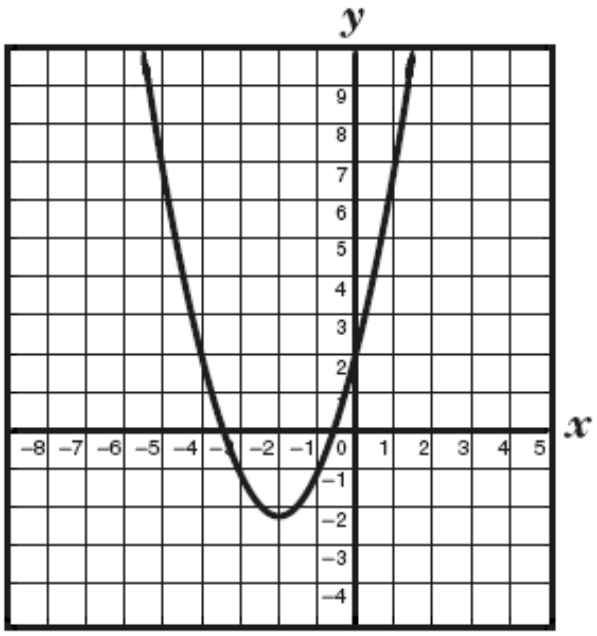
G 36 ft

H 8 ft

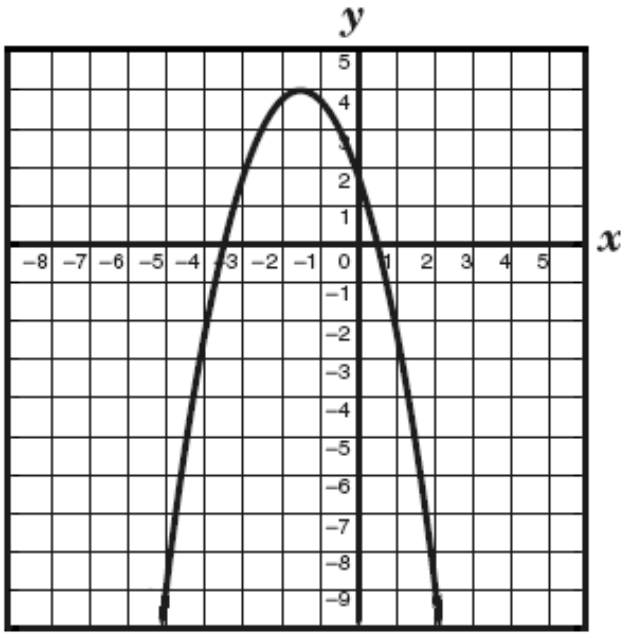
GO ON

33. Which graph best represents an equation that has the roots $x = -3\frac{1}{2}$ and $x = \frac{1}{2}$?

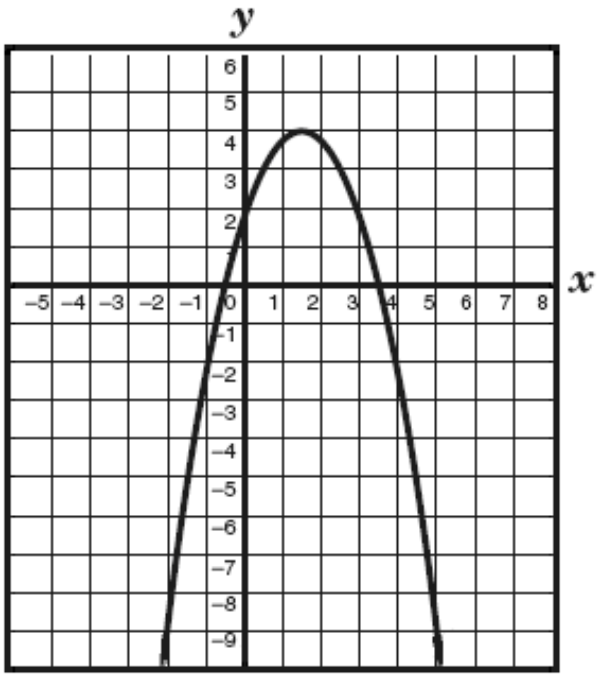
A



B

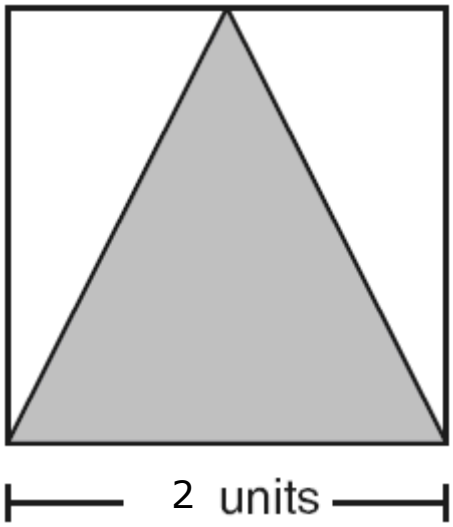


C



GO ON

34. A triangle is **inscribed** in a square, as shown below.



Area of a triangle:
A = $\frac{1}{2}$ base x height

Inscribed: drawn within another figure

What is the area of the shaded triangle inscribed in the square?

F 7 units²

G $\frac{1}{2}$ unit²

H 2 units²

GO ON

35. The table below shows the experimental results of rolling a **fair number cube** 50 times during a classroom activity.

Fair number cube: a cube with a number, 1 through 6, on each side

Number Cube Data

Outcome	Frequency
1	7
2	12
3	10
4	9
5	8
6	4

Theoretical probability: the probability of something occurring based on mathematical probability

Experimental results: the actual results found through an experiment.

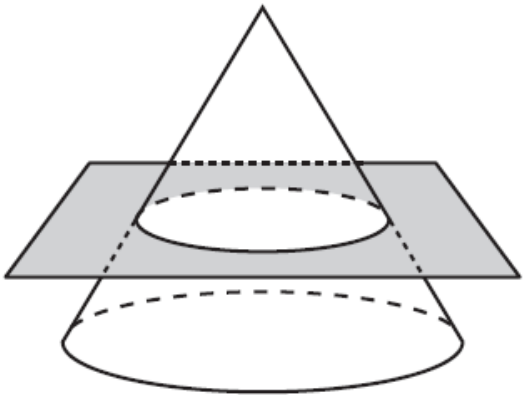
What is the difference between the **theoretical probability** of rolling a number less than 4 and the **experimental results** recorded in the table above?

A 8%

B 79%

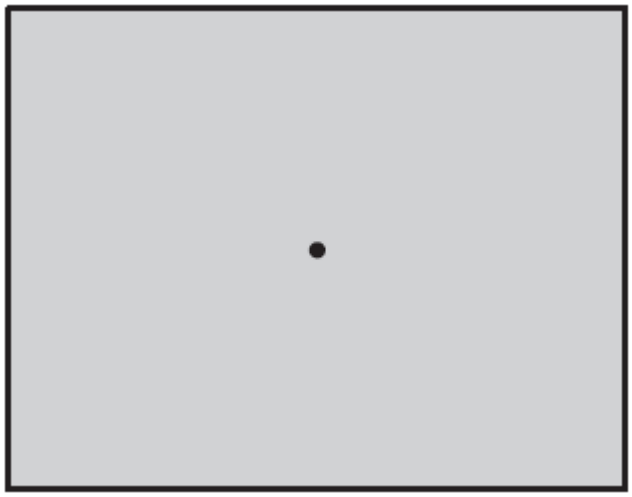
C 58%

36. Lee designed a table that appears to be a cone with a wooden board passing through it, as shown below.

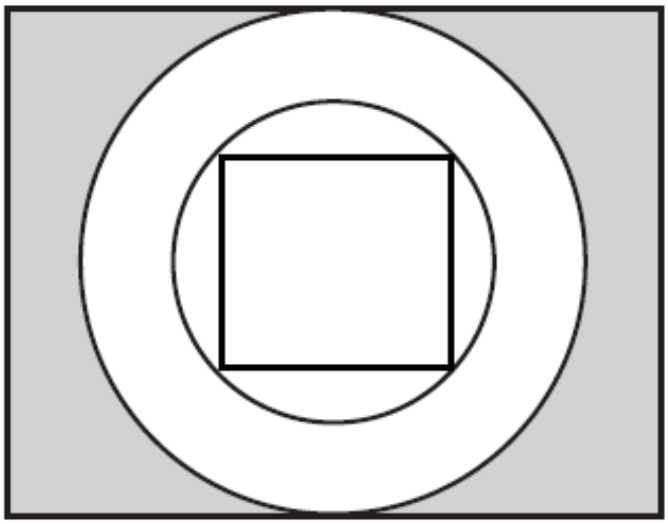


Which of the following best represents a top view of this table?

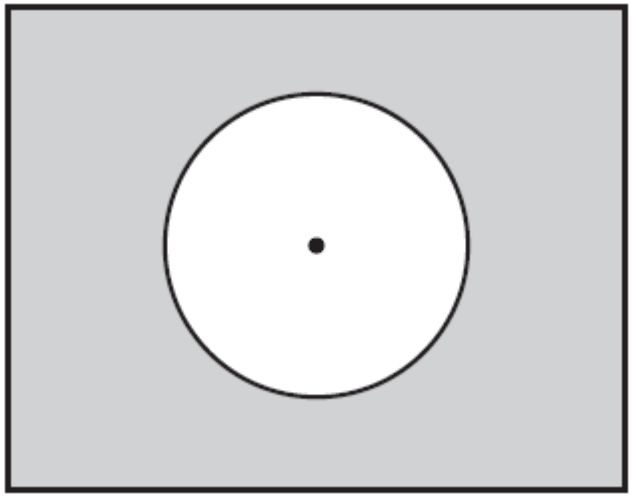
F



H



G



GO ON

37. A rectangle has a length of $2x + 1$ and a width of $5x - 4$.

A = length x width

Which expression best describes the area of the rectangle?

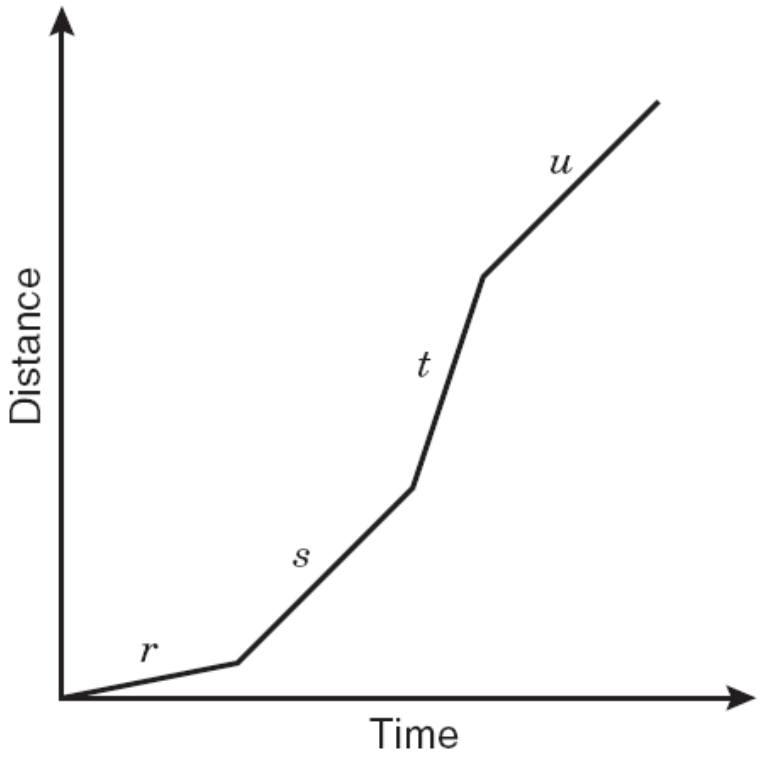
A $14x - 6$

B $7x - 3$

C $10x^2 - 3x - 4$

GO ON

38. The graph below represents Cathy's bicycle trip from her house to a friend's house.



On which segment of the graph does it appear that Cathy was riding her bicycle at the slowest pace?

F *r*

G *s*

H *t*

GO ON

39. A chemist started an experiment with 5 grams of salt. The salt was used at a rate of 0.01 gram per minute.

Which equation best describes the relationship between ***s***, the amount of salt remaining in grams, and ***t***, the time in minutes?

A $s = 5.01t$

B $s = 4.99t$

C $s = 5 - 0.01t$

40. The table shows the first-class postage rates for different years.

Year	Rate
1995	$0.32
1991	$0.29
1989	$0.25
1985	$0.22
1981	$0.18
1978	$0.15
1975	$0.13
1974	$0.10
1971	$0.08

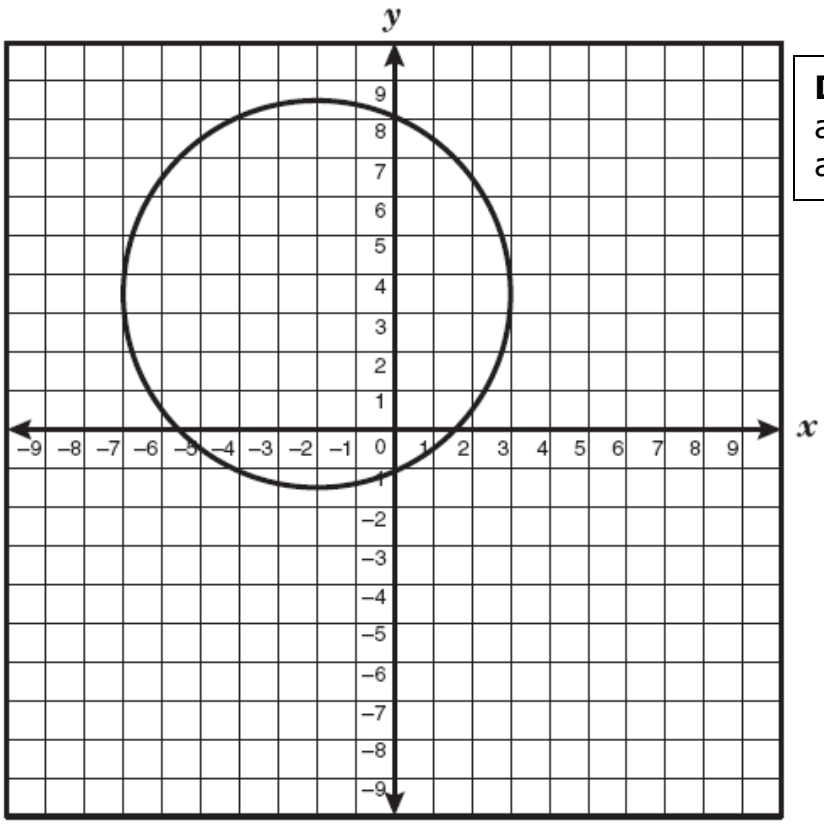
Which conclusion is true for the data given?

F The rate for first-class postage was above $0.18 during the 1970s.

G The rate for first-class postage remained below $0.32 during the 1990s.

H The rate for first-class postage remained below $0.29 during the 1980s.

41. The circle shown below has a **diameter** of 10 units.



Diameter: distance across the center of a circle

Which of the following ordered pairs best represents the location of the center of the circle?

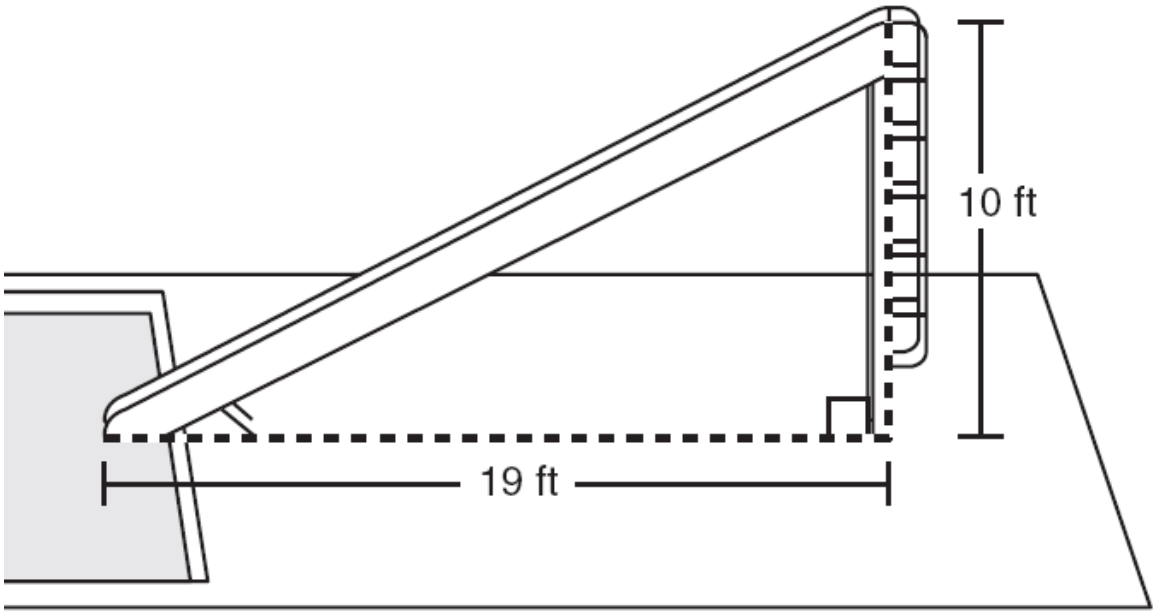
A $(-1\frac{1}{2}, 3)$

B $(-5, 4)$

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

GO ON

42. A slide was installed at the local swimming pool, as shown below.



$a^2 + b^2 = c^2$

Which is closest to the length of the slide?

F 6 ft

G 81 ft

H 21 ft

GO ON

43. Which of the following is equivalent to the expression 2^{12}?

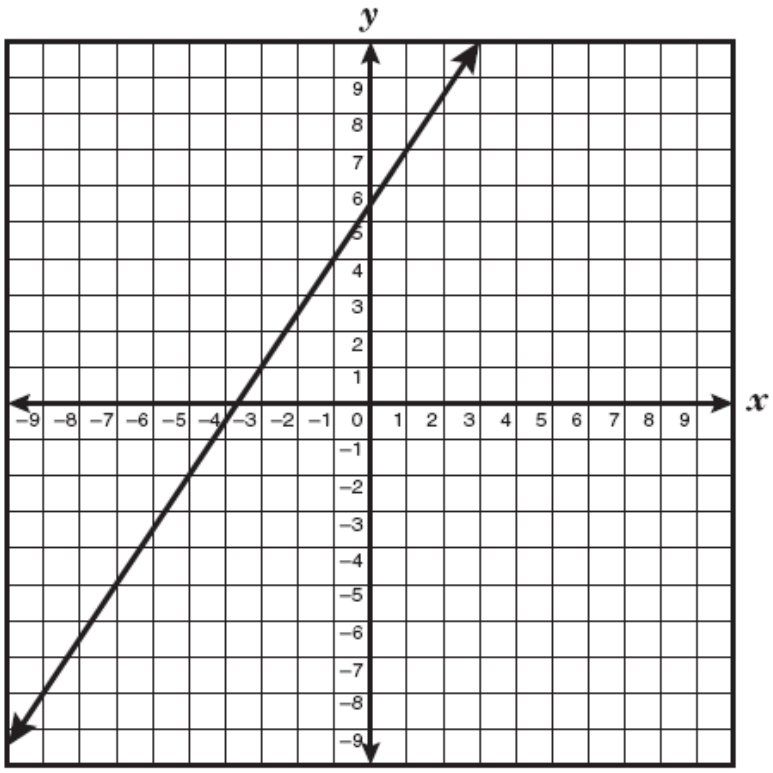
A $(2^7)(2^8)$

B $(2^3)^4$

C $(2^2)^3$

GO ON

44. Which table best describes points on the line graphed below?



F

x	*y*
–7	–5
–3	–1
–1	4
1	7
3	9

G

x	*y*
10	–5
7	–2
–3	–1
–5	1
–7	3

H

x	*y*
–9	–8
–5	–2
–1	4
1	7
3	10

GO ON

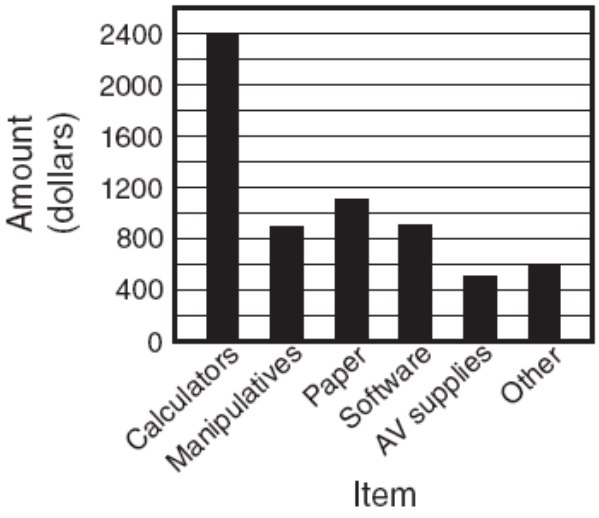
45. The table shows a math department's budget for the upcoming school year.

Math Department Budget

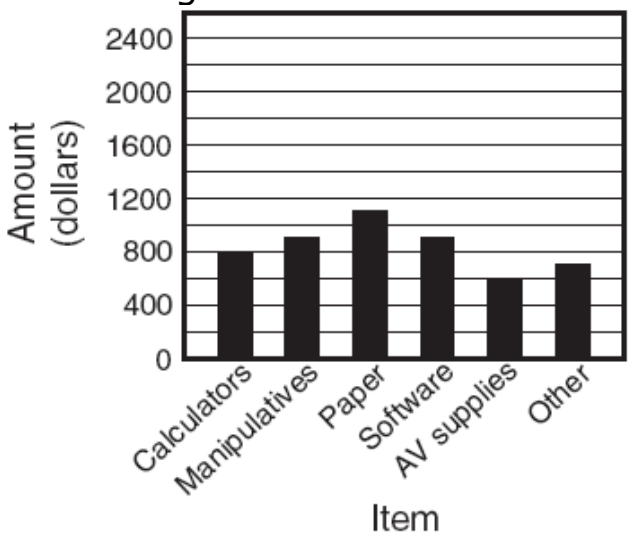
Item	Amount (dollars)
Calculators	2400
Manipulatives	900
Paper	1100
Software	900
AV Supplies	500
Other	600

Which bar graph best represents the data given in the table?

A



C



B