

# 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

<b>Perimeter</b>	rectangle	$P = 2l + 2w$ or $P = 2(l + w)$
<b>Circumference</b>	circle	$C = 2\pi r$ or $C = \pi d$
<b>Area</b>	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	$A = \pi r^2$
<b>Surface Area</b>	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	$S = 4\pi r^2$
<b>Volume</b>	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>		
<b>Pi</b>	$\pi$	$\pi \approx 3.14$ or $\pi \approx \frac{22}{7}$
<b>Pythagorean Theorem</b>		$a^2 + b^2 = c^2$
<b>Distance Formula</b>		$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
<b>Slope of a Line</b>		$m = \frac{y_2 - y_1}{x_2 - x_1}$
<b>Midpoint Formula</b>		$M = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$
<b>Quadratic Formula</b>		$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
<b>Slope-Intercept Form of an Equation</b>		$y = mx + b$
<b>Point-Slope Form of an Equation</b>		$y - y_1 = m(x - x_1)$
<b>Standard Form of an Equation</b>		$Ax + By = C$
<b>Simple Interest Formula</b>		$I = prt$

**DIRECTIONS**

Read each question. Then fill in the correct answer on your answer document.

**SAMPLE A**

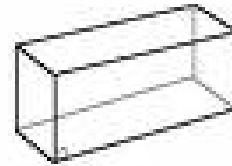
Find the slope of the line  
 $2y = 8x - 3$

- A**  $-\frac{3}{2}$
- B** 4
- C** 8

**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?

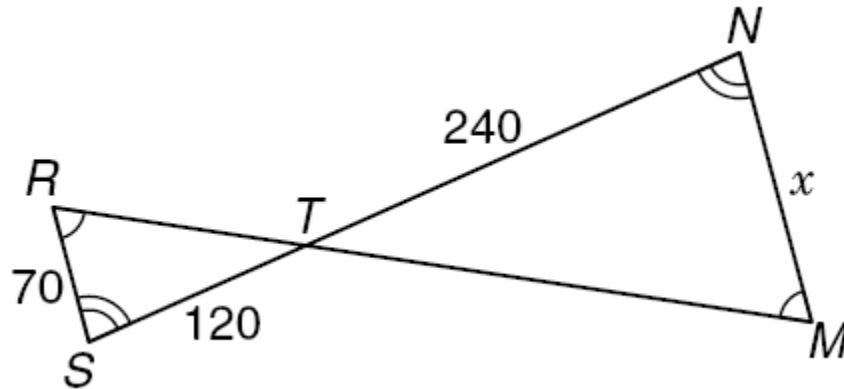


**Volume** = length x width x height

- F** 3622.5 cubic inches
- G** 315 cubic inches
- H** 48 cubic inches



1. If  $\triangle TSR$  is similar to  $\triangle TNM$ , what is the length of  $x$ ?



- A 240 units
- B 140 units
- C 70 units



2. How would the graph of the function  $y = x^2 + 4$  change if the function were changed to  $y = x^2 + 1$ ?

- F** The graph would shift 3 units to the left.
- G** The graph would shift 3 units down.
- H** The graph would shift 3 units to the right.



3. The table shows the results of a survey given to 450 graduating seniors about their educational plans after high school.

### Educational Plans

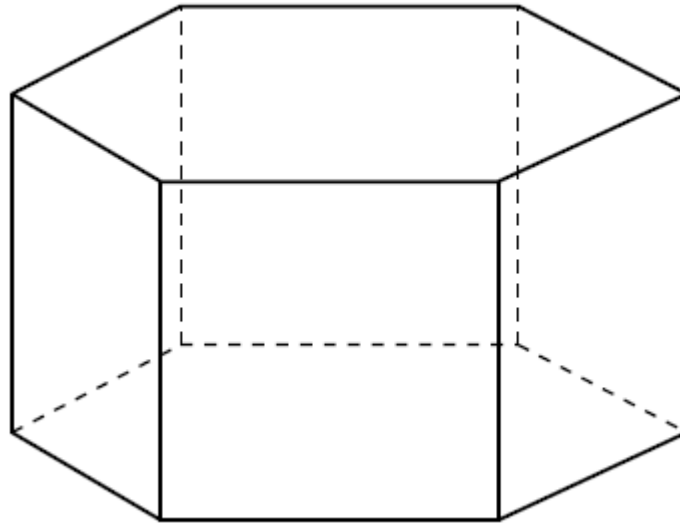
Type of School	Percent of Students
University	44
Community college	26
Technical school	15
Undecided	15

Based on the table, which of the following statements is true?

- A The fewest students plan to go to community college.
- B Most students plan to attend technical school.
- C Fewer than half of the students plan to attend a university.



4. The drawing shows a 3-dimensional solid.



Which best represents the shape of the solid when viewed from the top?

- F** Rectangle
- G** Hexagon
- H** Triangle

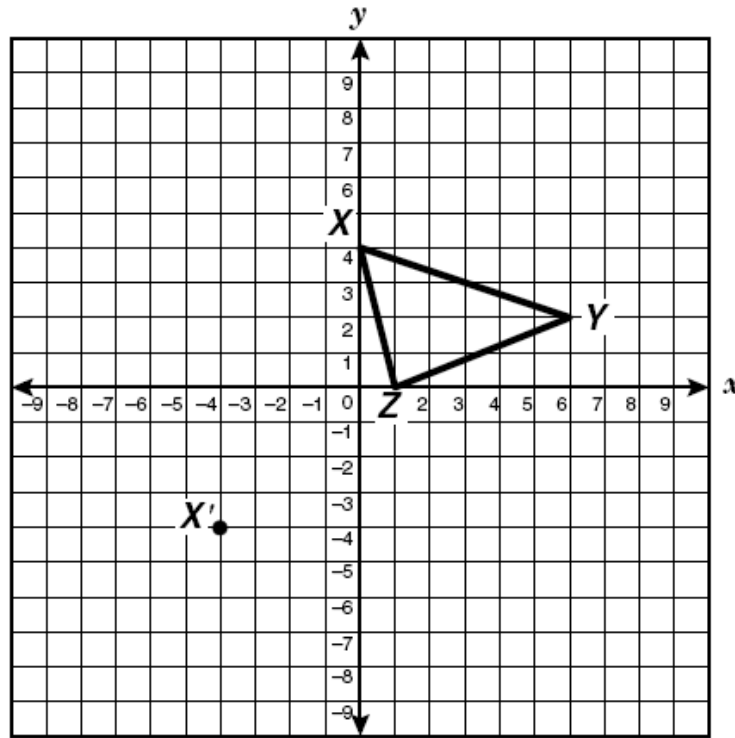


5. A recycling center pays \$0.35 per pound of glass that it receives. Some students want to raise \$500 by recycling glass. About how many pounds of glass will they need?

- A 1500 pounds
- B 34 pounds
- C 6,200 pounds



6. Triangle XYZ is translated so that X is moved to X'.



Which coordinate pair best represents Y'?

- F (-3, 8)
- G (2, -2)
- H (2, -6)



7. A hot-air balloon is launched from a height of 475 feet above sea level.
- It rises at a rate of 85 feet per minute
  - $t$  is the time in minutes it takes the balloon to reach a certain height

Which equation can be used to determine how many minutes it will take the balloon to reach a height of 9245 feet above sea level?

- A**  $9245 = 85 + 475t$
- B**  $9245 - 475t = 85$
- C**  $9245 = 475 + 85t$
- 

8. Which expression is equivalent to  $\frac{(8x^3)(2x^5)}{4x^6}$ ?

- F**  $2x^4$
- G**  $4x^2$
- H**  $4x^8$



9. Which equation describes a line that has a y-intercept of 5 and a slope of 2?

**Slope-Intercept Form of an Equation:**

$$y = mx + b$$

**A**  $y = 2x + 5$

**B**  $y = 2x - 5$

**C**  $y = \frac{1}{2}x + 2$

- 
10. Which function includes the data from the table?

X	Y
2	4
4	5
6	6

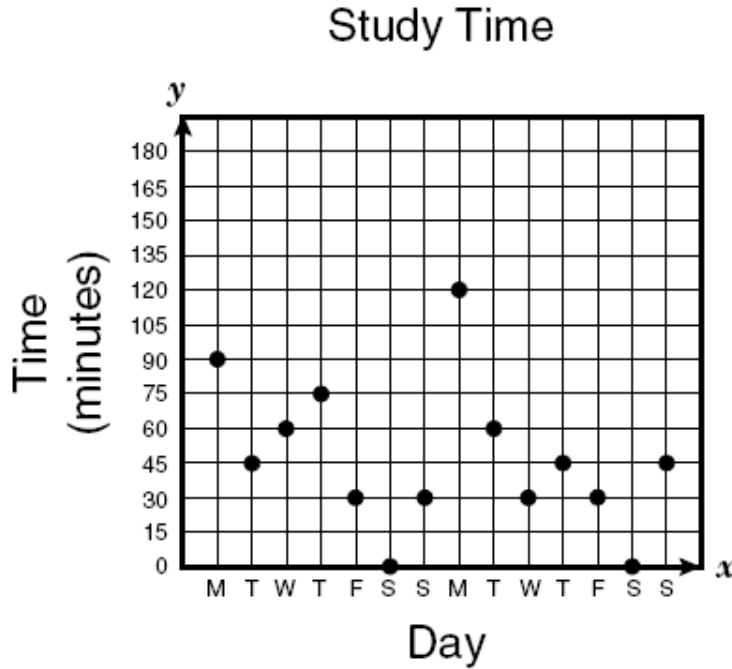
**F**  $y = 2x + 1$

**G**  $y = \frac{x}{2} + 3$

**H**  $y = 2x - 9$

**GO ON** 

11. The graph below shows the amount of time Dennis spent studying over a 2-week period.



Use the graph to decide which of the following statements would be a valid conclusion for this data?

- A Dennis earned good grades during this 2-week period.
- B Dennis studied more on Fridays than on Mondays.
- C Dennis studied for total of 660 minutes.



**12.** Mr. Collins invested some money.

- The money will double in value every 10 years.
- He started with \$2,000

How much will there be after 50 years?

**F** \$16,000

**G** \$64,000

**H** \$128,000



13. The rectangle shown below has an area of

$$x^2 + 7x + 12$$

The width is  $(x + 3)$ .

Area = length x width
-----------------------



What is the length of the rectangle?

- A  $x + 4$
- B  $x - 6$
- C  $x + 10$



14. If  $(x, -4)$  is a solution to the equation  $4x - 5y = 8$ , what is the value of  $x$ ?

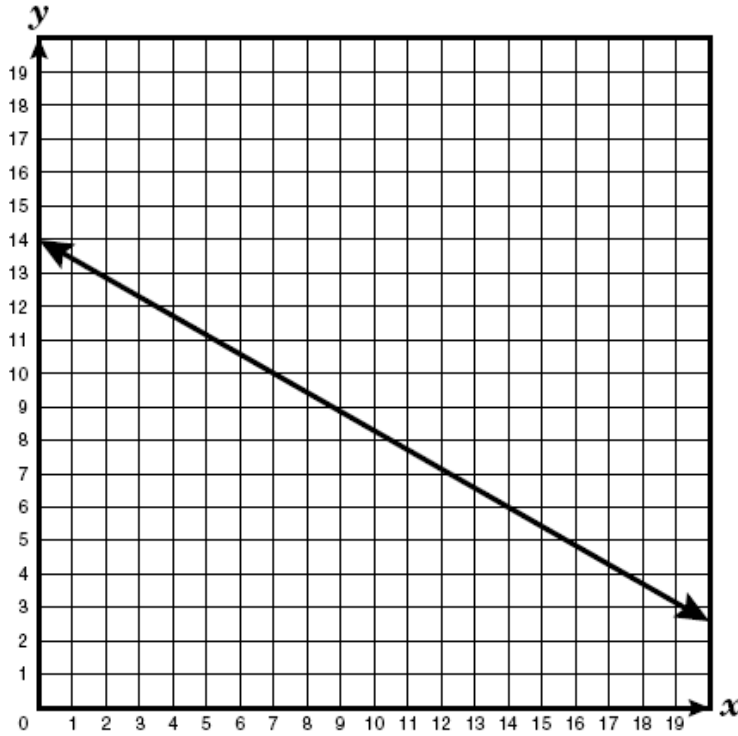
F 24

G -3

H 7



15. What is the slope of the linear function shown in the graph?



A  $\frac{2}{5}$

B  $-\frac{4}{7}$

C  $-\frac{1}{8}$



**16.** Simplify the algebraic expression  $3(x + 3) + 2(x + 3)$ .

**F**  $5x + 15$

**G**  $6x - 6$

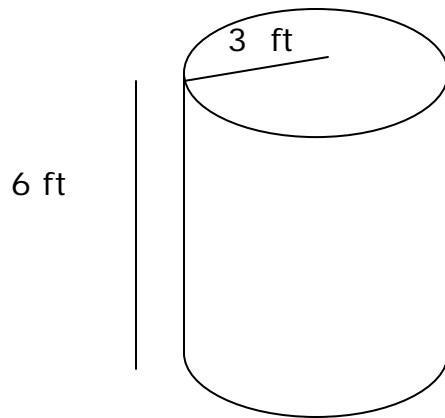
**H**  $-6x^2 - 54$



17. A cylindrical tank is shown below.

- The tank's radius is 3 feet
- The tank's height is 6 feet.

What is the approximate volume of this water tank?



Area of a circle:  $A = \pi r^2$   
Volume of a cylinder:  $V = \text{area of the base} \times \text{height}$

- A**  $18 \text{ ft}^3$
- B**  $371 \text{ ft}^3$
- C**  $162 \text{ ft}^3$

**GO ON** 

**18.** The amount of material needed to make a basketball best represents the ball's —

**F** Perimeter

**G** Surface area

**H** Volume



19. Jerome received a gift card for \$20 worth of video game rentals. If the cost of renting a video game is \$2.50, which table best describes  $b$ , the balance remaining on the gift card after he rents  $n$  video games?

**A**

$n$	$b$
0	\$20.00
1	\$17.50
2	\$15.00

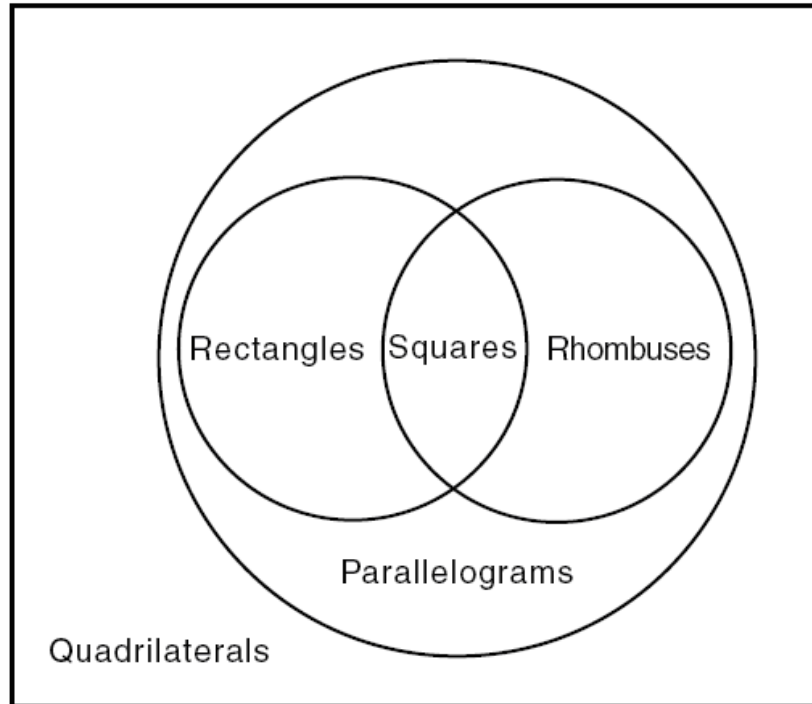
**B**

$n$	$b$
0	\$20.00
1	\$15.00
2	\$10.00

**C**

$n$	$b$
0	\$17.50
1	\$15.00
2	\$13.50

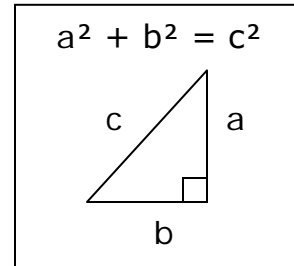
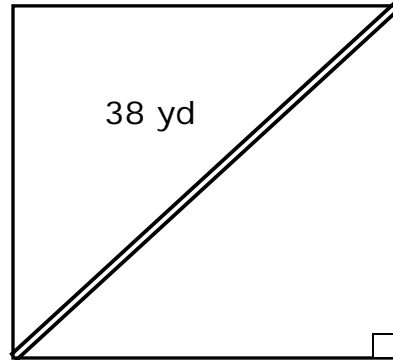




20. Which of the following is a valid conclusion based on the diagram shown above?
- F All rectangles are parallelograms.
  - G All quadrilaterals are parallelograms.
  - H All rhombuses are rectangles.



21. A square park has a diagonal walkway from 1 corner to another. If the walkway is about 38 yards long, what is the approximate length of each side of the park?



- A** 19 yd  
**B** 54 yd  
**C** 27 yd

**GO ON** 

22. The temperature in degrees Celsius,  $C$ , is  $\frac{5}{9}$  of the difference between the temperature in degrees Fahrenheit,  $F$ , and the constant 32. Which equation best represents this relationship?

**F**  $C = F + \frac{5}{9}(F - 32)$

**G**  $C = \frac{5}{9} - F + 32$

**H**  $C = \frac{5}{9}(F - 32)$

- 
23. Sam is a math student who believes that  $xy^2 = (xy)^2$ . Roy informs Sam that this theory is not always true. Which pair of values for  $x$  and  $y$  could Roy use to show Sam this theory is not always true?

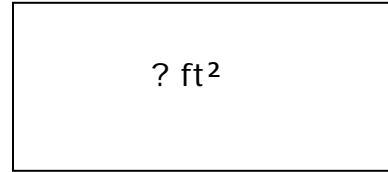
**A**  $x = 0$  and  $y = -2$

**B**  $x = 2$  and  $y = 1$

**C**  $x = 12$  and  $y = -2$



24. Two rectangular gardens are shown below. The larger garden is twice as long and twice as wide as the smaller garden.



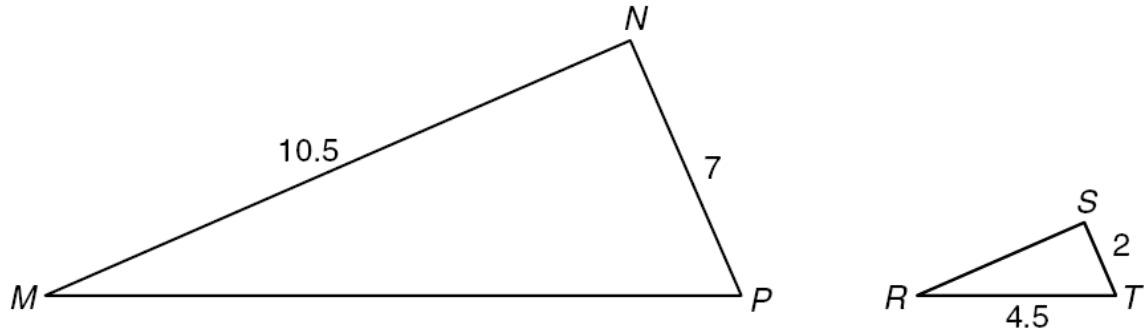
$$\text{Area} = \text{length} \times \text{width}$$

What is the area of the larger garden?

- F 1,200 ft<sup>2</sup>
- G 2,400 ft<sup>2</sup>
- H 3,600 ft<sup>2</sup>



25.  $\triangle MNP \sim \triangle RST$  is shown below.



Which scale factor was used to transform  $\triangle MNP$  to  $\triangle RST$ ?

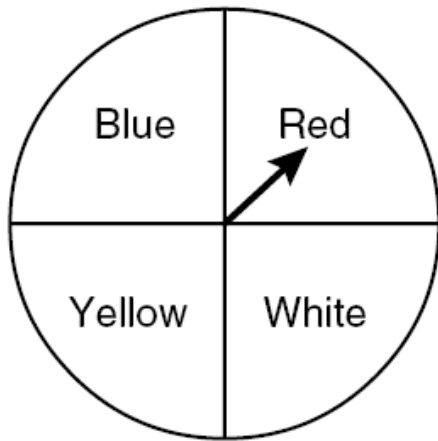
A  $\frac{1}{3}$

B  $\frac{1}{2}$

C  $\frac{2}{7}$

**GO ON** 

26. A spinner was spun 20 times. The results are shown in the table below.



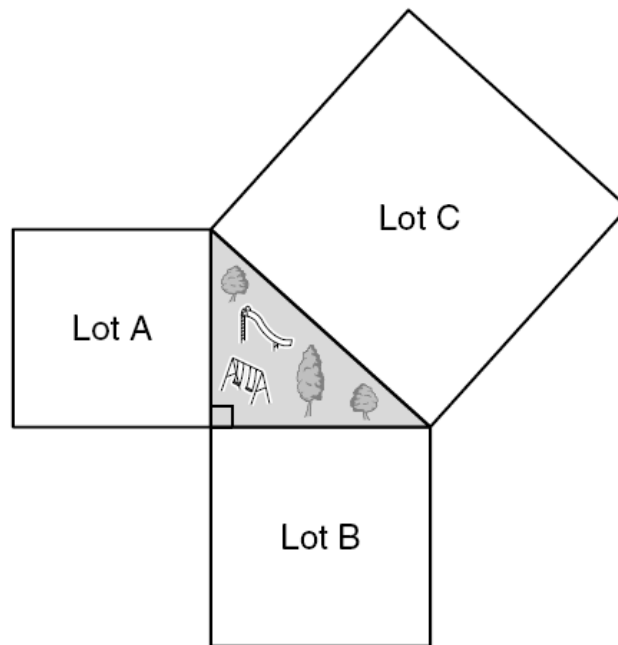
Red	9
White	5
Blue	4
Yellow	2

Which color on the spinner has the same experimental probability as theoretical probability?

- F** Red
- G** White
- H** Yellow



27. The drawing below shows 3 square parking lots that enclose a grassy area shaped like a right triangle.



**Pythagorean Theorem:**

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

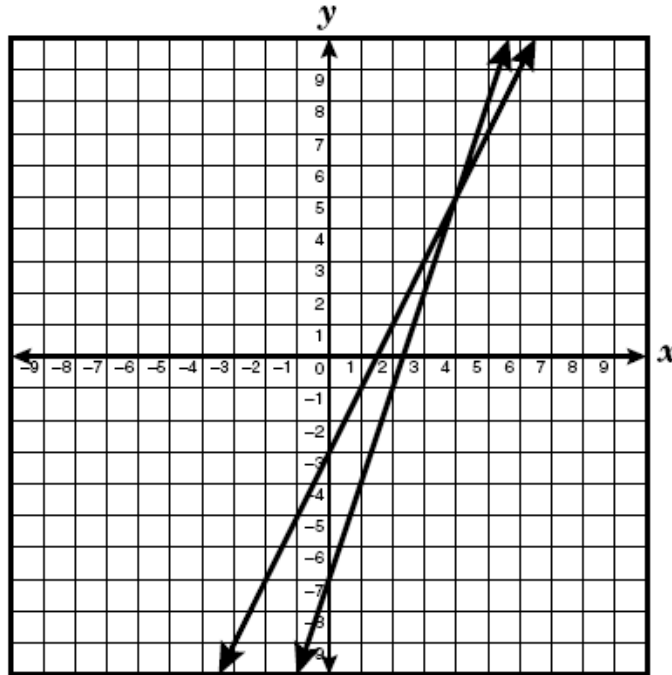
If Lot A's perimeter is 300 yards and Lot B's perimeter is 400 yards, what is the length of one side of Lot C?

- A 125 yards
- B 300 yards
- C 400 yards



28. The graph shows the linear equations:

$$y = 2x - 3 \quad \text{and} \quad y = 3x - 7$$



If  $2x - 3 = 3x - 7$ , what is the value of  $x$ ?

**F** 4

**G** 10

**H** 2

**GO ON** 

- 29.** The scale factor of two similar polygons is 2:3. The perimeter of the larger polygon is 150 centimeters. What is the perimeter of the smaller polygon?

- A** 100 cm
- B** 12 cm
- C** 230 cm



- 30.** Adam's age is 4 years less than twice Beth's age. If Adam is 16 years old, which equation can be used to determine Beth's age?

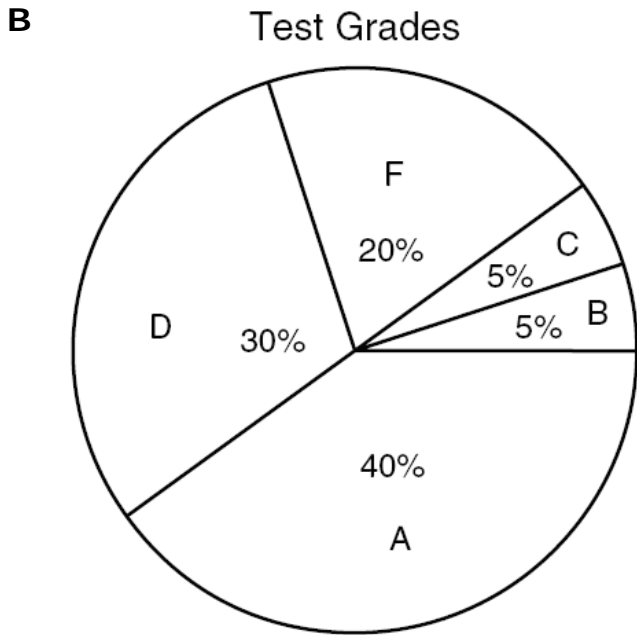
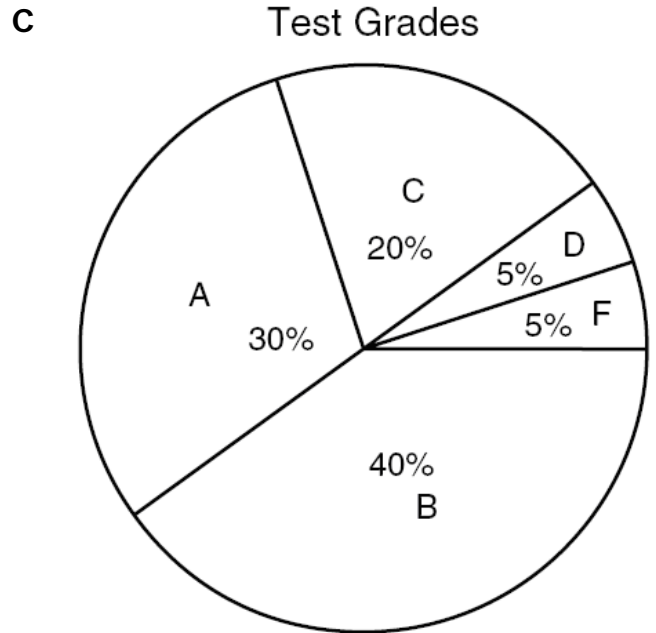
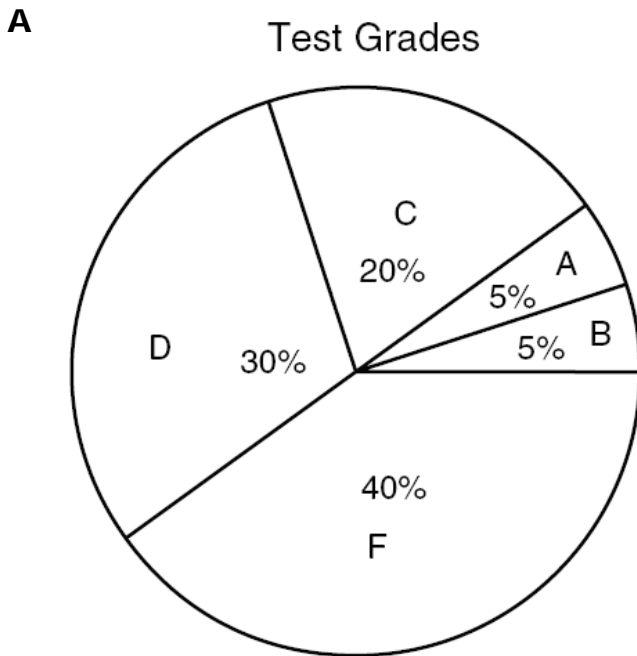
**F**  $2(4 - x) = 16$

**G**  $2x - 4 = 16$

**H**  $2(x - 4) = 16$



31. Of 40 students taking a test. 12 students received an A. 16 students received a B. 8 students received a C. 2 students received a D. The remaining received an F. Which circle graph best represents this data?



32. Which equation could be used to generate this table of values?

X	Y
-1	2
0	1
1	2
2	5

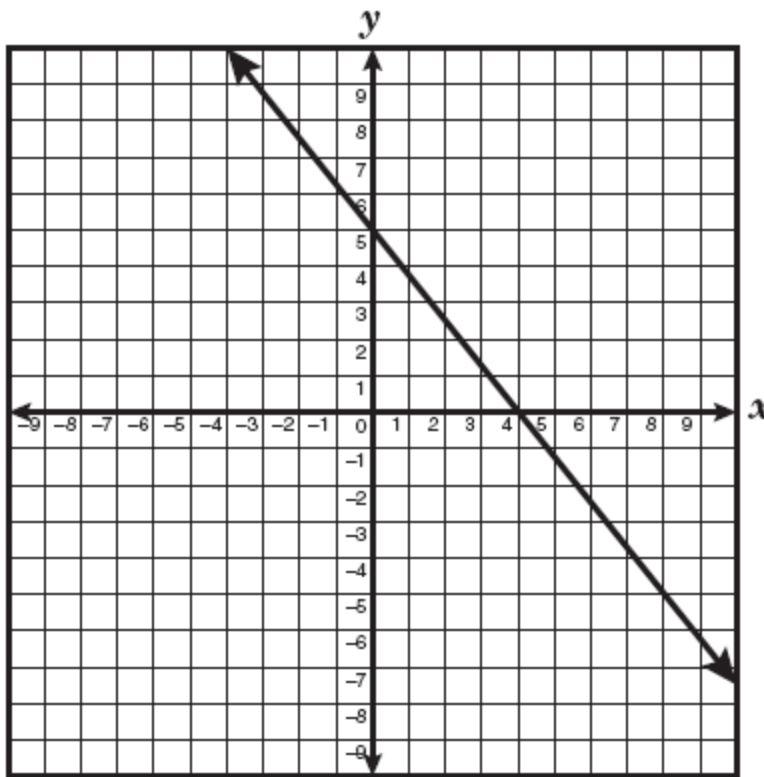
**F**  $y = x^2 + 1$

**G**  $y = 5x - 3$

**H**  $y = 3x^2 - 8$



33. What are the x- and y-intercepts of the function graphed below?



- A** (0, 4) and (5, 4)  
**B** (4, 0) and (0, 5)  
**C** (5, 4) and (4, 5)



34. Which of the following will always produce an even integer for any given integer,  $n$ ?

**F**  $2n - 1$

**G**  $3n$

**H**  $2n$

- 
35. If  $y = x^3$ , what is equivalent to  $x^{12}$ ?

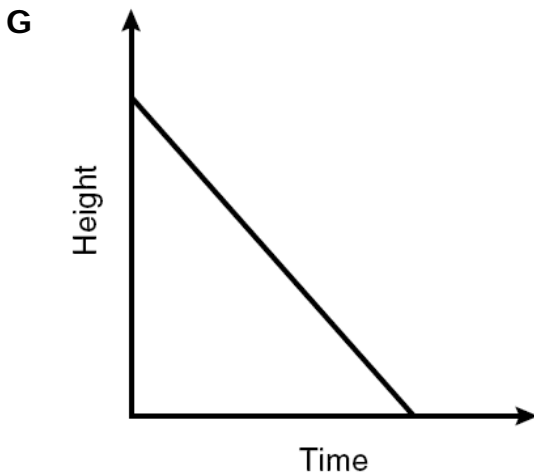
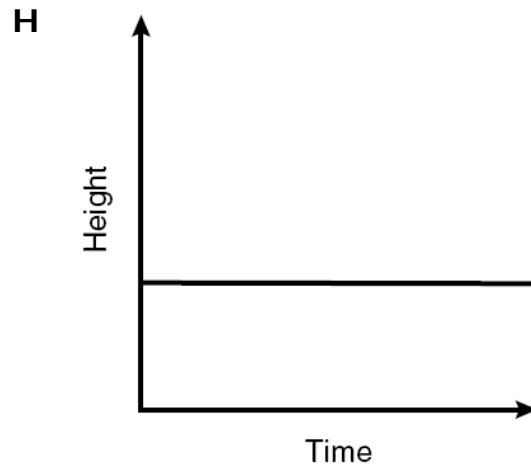
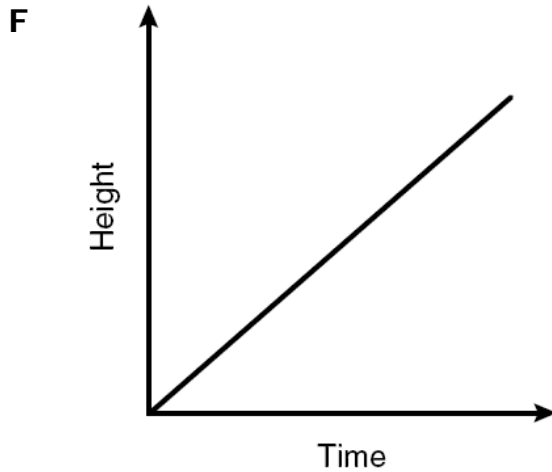
**A**  $y^4$

**B**  $y^2$

**C**  $y^8$



36. Which graph best represents the relationship between the height of a burning candle and the amount of time that passes as the candle burns?



37. Look at the graph below?

**Allison's Total Earnings**



- A Allison will earn \$1000 if she sells \$2000 worth of merchandise.
- B Allison will earn \$700 if she sells \$5000 worth of merchandise.
- C Allison will earn \$200 if she sells \$4000 worth of merchandise.



38. Jake's square backyard covers an area of 104 square meters.

$$\begin{array}{c} \text{Area:} \\ A = l \times w \end{array}$$

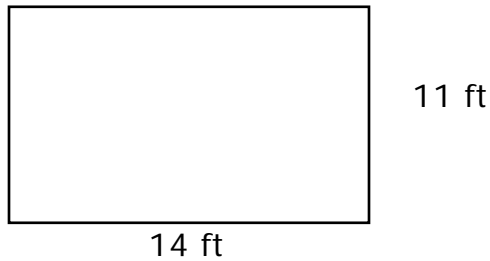
$$A = 100\text{m}^2$$

What is the length of each side of Jake's backyard?

- F 50 m
- G 20 m
- H 10 m



- 39.** Ms. Hill wants to carpet her rectangular living room, which measures 14 feet by 11 feet.



$$\text{Area} = \text{length} \times \text{width}$$

How many square feet of carpet does Mrs. Hill need to purchase to carpet her entire living room?

- A** 154 ft<sup>2</sup>
- B** 122 ft<sup>2</sup>
- C** 25 ft<sup>2</sup>



40. Which equation best describes the relationship between the corresponding values of  $x$  and  $y$  shown in the table?

<b>X</b>	<b>Y</b>
-2	-12
0	-6
1	-3
4	6

**F**  $y = x - 10$

**G**  $y = 8x^2$

**H**  $y = 3x - 6$



**41.** A band is traveling to a concert.

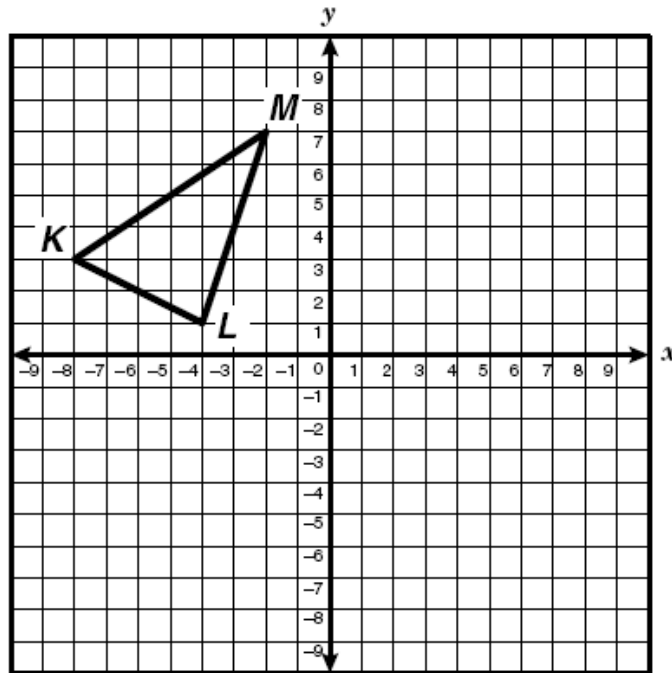
- It takes 45 minutes to load the bus
- It takes 1 hour 45 minutes to travel to the concert site.

What should be the first step in determining the band's departure time?

- A** Subtract the loading time from the travel time
- B** Subtract the travel time from the loading time
- C** Add the travel time and loading time together



42.  $\triangle KLM$  has coordinates  $K(-8, 3)$ ,  $L(-4, 1)$ , and  $M(-2, 7)$ .



What will be the new coordinates of point M if the triangle is translated 4 units to the right and 3 units down?

**F** (0, -2)

**G** (2, 4)

**H** (6, -1)

