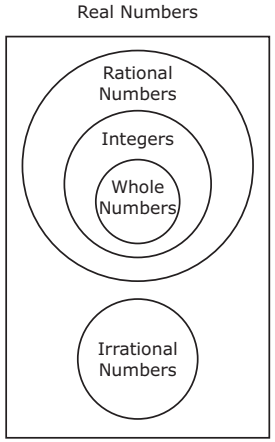
Grade 8 Mathematics Reference Materials

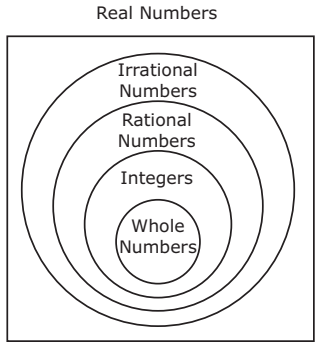
LINEAR EQUATIONS			
Slope-intercept form			$y = mx + b$
Direct variation			$y = kx$
Slope of a line			$m = \frac{y_2 - y_1}{x_2 - x_1}$
CIRCUMFERENCE			
Circle	$C = 2\pi r$	or	$C = \pi d$
AREA			
Triangle			$A = \frac{1}{2}bh$
Rectangle or parallelogram			$A = bh$
Trapezoid			$A = \frac{1}{2}(b_1 + b_2)h$
Circle			$A = \pi r^2$
SURFACE AREA			
	Lateral		Total
Prism	$S = Ph$		$S = Ph + 2B$
Cylinder	$S = 2\pi rh$		$S = 2\pi rh + 2\pi r^2$
VOLUME			
Prism or cylinder			$V = Bh$
Pyramid or cone			$V = \frac{1}{3}Bh$
Sphere			$V = \frac{4}{3}\pi r^3$
ADDITIONAL INFORMATION			
Pythagorean Theorem			$a^2 + b^2 = c^2$
Simple interest			$I = Prt$
Compound interest			$A = P(1 + r)^t$

1 Which correctly shows the relationship between sets of numbers in the real number system?

A



B



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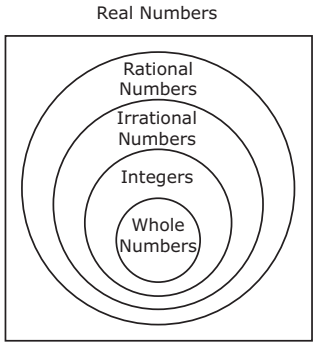

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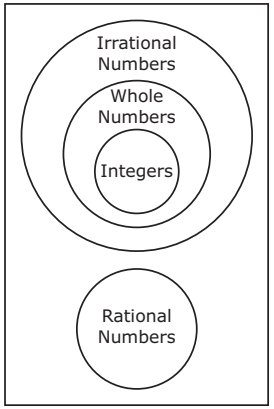
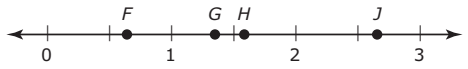


2 Which point on the number line best represents the value $\sqrt{2.7}$?



F point *F*

G point *G*

H point *H*

J point *J*

---

3 The diameter of a bacterium measures approximately 0.000725 millimeter. How is the number written using scientific notation?

A 7.25×10^{-4}

B 725×10^{-6}

C 725×10^{-3}

D 72.5×10^{-5}

---

4 Which list shows the numbers in order from least to greatest?

F $\frac{\sqrt{5}}{12}, \frac{\pi}{15}, \frac{7}{50}, \frac{1}{5}$

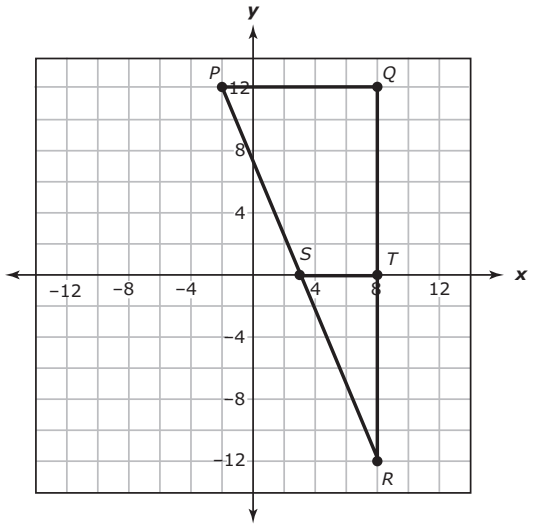
G $\frac{7}{50}, \frac{\sqrt{5}}{12}, \frac{1}{5}, \frac{\pi}{15}$

H $\frac{7}{50}, \frac{1}{5}, \frac{\pi}{15}, \frac{\sqrt{5}}{12}$

J $\frac{\pi}{15}, \frac{7}{50}, \frac{1}{5}, \frac{\sqrt{5}}{12}$

GO ON

5 Triangles *PQR* and *STR* are similar right triangles



Which proportion can be used to show that the slope of $\overline{SR}$ is equal to the slope of $\overline{PR}$?

A $\frac{0 - 12}{3 - 8} = \frac{0 - (-12)}{3 - (-2)}$

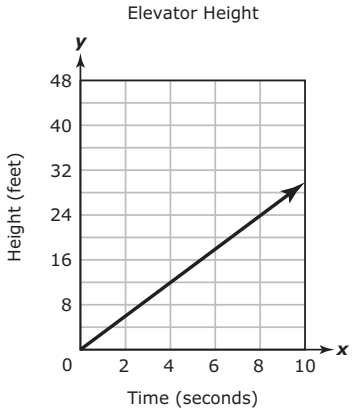
B $\frac{-12 - 0}{3 - 8} = \frac{-12 - 12}{8 - (-2)}$

C $\frac{3 - 8}{0 - (-12)} = \frac{12 - (-12)}{-2 - 8}$

D $\frac{-12 - 0}{8 - 3} = \frac{-12 - 12}{8 - (-2)}$

GO ON

6 Marissa gets on an elevator at the ground level. The elevator ascends without stopping until it reaches Marissa's floor, as shown in the graph.



Which statement best describes the rate of change for this situation?

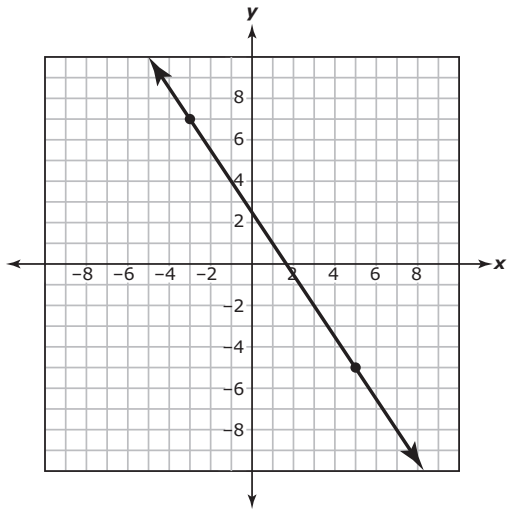
F For every second that passes, the elevator's height increases by $\frac{1}{3}$ foot.

G For every second that passes, the elevator's height increases by 1 foot.

H For every second that passes, the elevator's height increases by 3 feet.

J For every second that passes, the elevator's height increases by 12 feet.

7 What are the slope and *y*-intercept of the linear function shown on the coordinate plane?



A slope = $-\frac{2}{3}$; *y*-intercept = 2

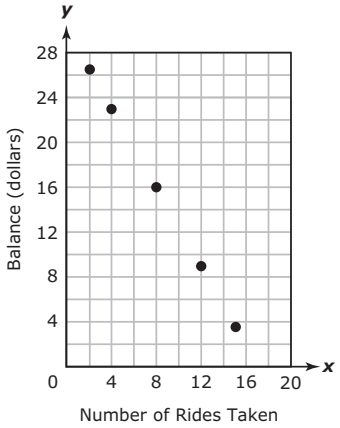
B slope = $-\frac{2}{3}$; *y*-intercept = $\frac{5}{2}$

C slope = $-\frac{3}{2}$; *y*-intercept = 2

D slope = $-\frac{3}{2}$; *y*-intercept = $\frac{5}{2}$

8 Max buys a bus card. The graph and table show the linear relationship between the balance on the card, in dollars, and the number of bus rides taken.

Bus Pass Balance

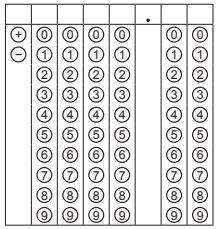


Bus Pass Balance

Number of Rides Taken	Balance (dollars)
2	26.50
4	23.00
8	16.00
12	9.00
15	3.75

What is the slope of this linear function?

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



9 From rest, a remote-controlled car starts moving along a track at a constant rate. After 2 seconds, it has traveled 6 inches. Which table shows the relationship between the time in seconds, x, and the distance traveled in inches, y?

A

Car

Time, x (sec)	Distance, y (in.)
3	1
6	2
9	3
12	4
15	5

B

Car

Time, x (sec)	Distance, y (in.)
3	6
6	12
9	18
12	24
15	30

C

Car

Time, x (sec)	Distance, y (in.)
3	7
6	10
9	13
12	16
15	19

D

Car

Time, x (sec)	Distance, y (in.)
3	9
6	18
9	27
12	36
15	45

10 A parking lot charges a set fee of $3 to use their lot plus $2 for each hour a car is parked in the lot. Which representation best shows the relationship between the number of hours a car is parked in the lot, x, and the total cost for parking in dollars, y?

F

Parking Lot Charges

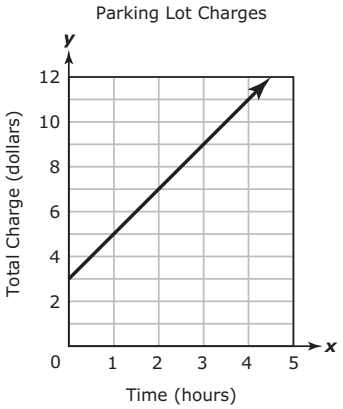
Time, x (hours)	Total Charge, y (dollars)
1	3
2	5
3	7
4	9

H

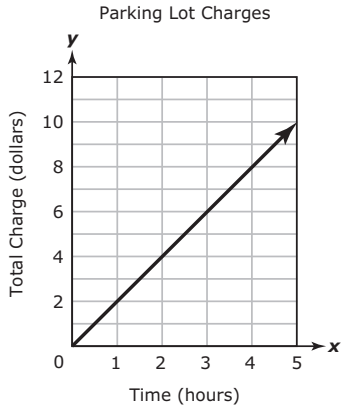
Parking Lot Charges

Time, x (hours)	Total Charge, y (dollars)
0	3
1	5
2	10
3	15

G



J



11 The value of y varies directly with x. When $y = 32$, $x = \frac{1}{4}$. What is the value of y when x is $1\frac{1}{5}$?

A $\frac{3}{320}$

B $\frac{2}{5}$

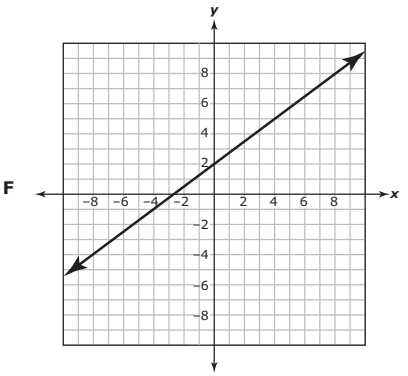
C $153\frac{3}{5}$

D Not here

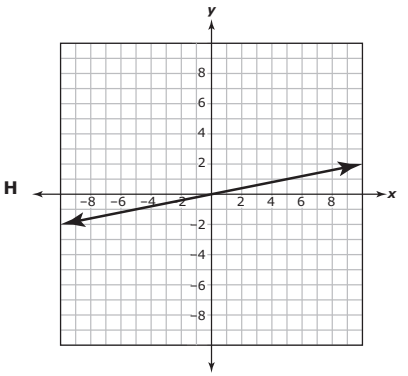
GO ON

12 Which graph shows a non-proportional relationship between x and y?

F



H



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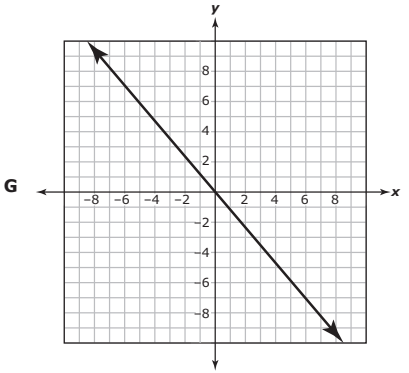
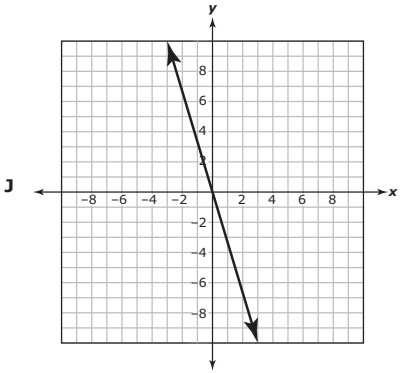


J



GO ON

13 Which set of ordered pairs represents y as a function of x?

A {(0, 0), (1, 2), (2, 4), (2, 6)}

B {(0, 1), (1, 1), (2, 3), (3, 3)}

C {(1, 4), (1, 6), (3, 4), (3, 6)}

D {(1, 6), (2, 5), (2, 4), (3, 3)}

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14 Which situation does NOT represent a proportional relationship?

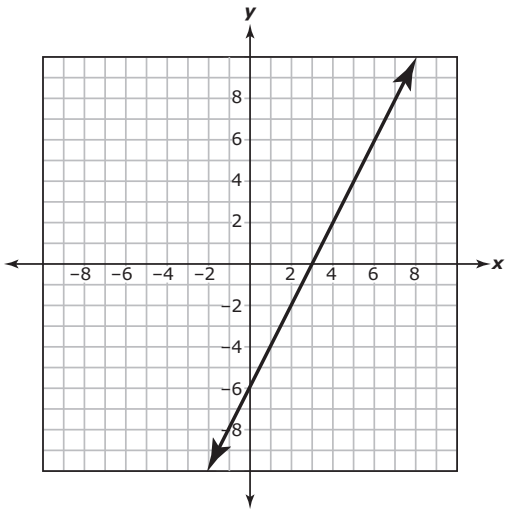
F The amount an employee earns if she works for h hours at a rate of $14.50 for each hour worked

G The cost of buying p pounds of almonds for $6.99 per pound plus a shipping fee of $0.10 per pound

H The amount of simple interest earned over t years if the principal invested is $2,000 and the interest rate is 2%

J The height of a plant, in centimeters, after w weeks if it grows $\frac{1}{2}$ centimeter each week from a starting height of 2 centimeters

15 Which function is best represented by the graph?



A $y = 2x - 6$

B $y = 2x + 3$

C $y = \frac{1}{2}x - 6$

D $y = \frac{1}{2}x + 3$

16 Tam fills a bucket with water. He does not know that the bucket has a hole in it and that water begins to leak out of the bucket immediately after he fills it. The table shows the number of liters remaining in the bucket after x minutes have passed.

Volume of Water in Buckets

Elapsed Time (min), x	Total Volume (L), y
1	4.8
2	3.6
3	2.4
4	1.2
5	0

Which function can be used to find y, the volume of water in the bucket after x minutes have passed?

F $y = -1.2x + 4.8$

G $y = 1.2x + 4.8$

H $y = -1.2x + 6.0$

J $y = 1.2x + 6.0$

17 Two gardeners charge different rates.

- Jordan charges a fee of $20 for each job plus $25.50 per hour worked.
- Kelly charges a fee of $40 for each job plus $15.50 per hour worked.

Which equation can be used to find h, the number of hours Jordan and Kelly work if the total amount they charge is equivalent?

A $40 + 25.5h = 20 + 15.5h$

B $20h + 25.5 = 40h + 15.5$

C $20 + 25.5h = 40 + 15.5h$

D $20h + 25.5h = 40 + 15.5$

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18 Which situation can be represented by this inequality?

$$2x - 1 > x$$

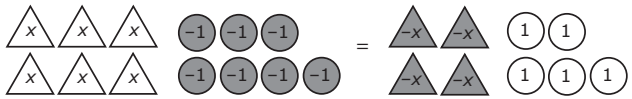
F Corinne is 1 year younger than twice Eli's age. Corinne is older than Eli. If Eli is x years old, what are the possible values of Eli's age?

G Jesse is 1 mile from his home when he starts running today. He ran twice as far today as he ran last week. If he ran x miles last week, how many miles could he have run today?

H Stephanie is the same age as Xavier. If Xavier is x years old, what is Stephanie's age?

J Andre earns $1 less than twice what Cindy earns per hour. Cindy earns x dollars per hour. If Cindy earns more than Andre, how much could Cindy earn?

19 The model represents an equation.



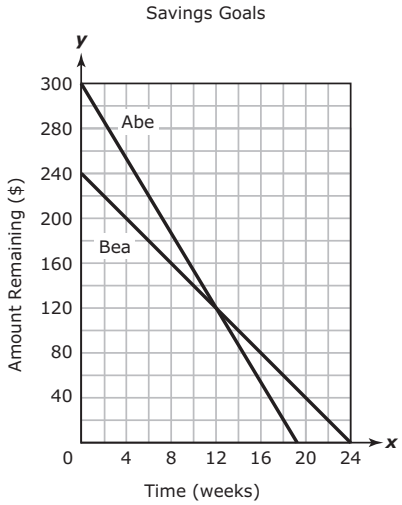
What value of x makes the equation true?

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

					.		
+	0	0	0	0		0	0
−	1	1	1	1		1	1
	2	2	2	2		2	2
	3	3	3	3		3	3
	4	4	4	4		4	4
	5	5	5	5		5	5
	6	6	6	6		6	6
	7	7	7	7		7	7
	8	8	8	8		8	8
	9	9	9	9		9	9

GO ON

20 Abe and Bea decided to save money to buy new tablets, each saving a set amount from their weekly earnings. The graph shows the linear relationship between x, the number of weeks they have been saving and y, the amount, in dollars, they still need to save.



In which week does it appear that Abe and Bea will have the same amount of money left to save in order to reach their goals?

F Week 120

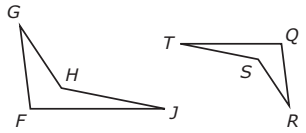
G Week 12

H Week 20

J Week 10

GO ON

21 Figure *FGHJ* is similar to figure *QRST*.



Which proportion must be true?

A $\frac{FG}{QR} = \frac{GH}{ST}$

B $\frac{FJ}{QT} = \frac{GH}{RS}$

C $\frac{GH}{ST} = \frac{HJ}{RS}$

D $\frac{HJ}{RS} = \frac{QR}{FG}$

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22 A square with a perimeter of 40 units is graphed on a coordinate grid. The square is dilated by a scale factor of 0.8 with the origin as the center of dilation. If (x, y) represents the location of any point on the original square, which ordered pair represents the coordinates of a corresponding point on the dilated square?

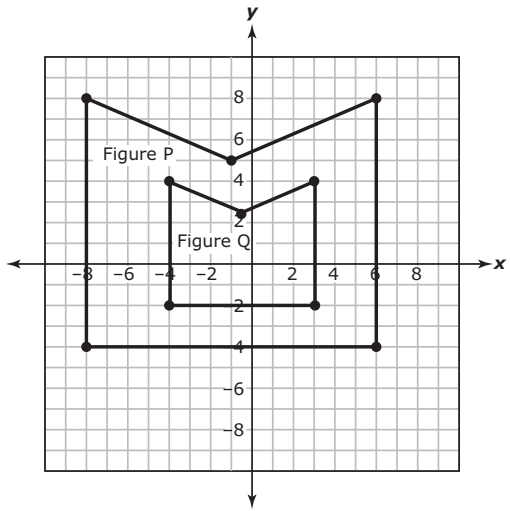
F $(40x, 40y)$

G $(x + 0.8, y + 0.8)$

H $(x + 40, y + 40)$

J $(0.8x, 0.8y)$

23 Figure *P* was dilated with the origin as the center of dilation to form Figure *Q*.



Which rule best represents the dilation that was applied to Figure *P* to create Figure *Q*?

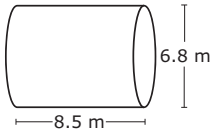
A $(x, y) \rightarrow (4x, 4y)$

B $(x, y) \rightarrow (2x, 2y)$

C $(x, y) \rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right)$

D $(x, y) \rightarrow \left(\frac{1}{4}x, \frac{1}{4}y\right)$

24 A cylinder and its dimensions are shown.



One equation for finding the volume of a cylinder is $V = Bh$, where B represents the area of the base of the cylinder and h represents the height of the cylinder. Which expression could be used to find the volume of the cylinder in cubic meters?

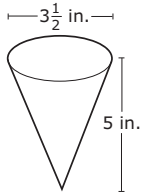
F $\pi(6.8)(8.5)$

G $\pi(3.4)^2(8.5)$

H $\pi(6.8)^2(8.5)$

J $\pi(8.5)^2(6.8)$

25 An office manager buys cups shaped like cones for the water cooler. The dimensions of each cup are shown.



Which measurement is closest to the number of cubic inches of water the cup can hold?

A 92 in.^{3}

B 48 in.^{3}

C 64 in.^{3}

D 16 in.^{3}

26 A glass sphere is filled with water and used to make a snow globe. The sphere has a diameter of 10 centimeters. Which measurement is closest to the volume of the sphere in cubic centimeters?

F 104.7 cm^3

G 1,333.3 cm^3

H 523.3 cm^3

J 4,186.7 cm^3

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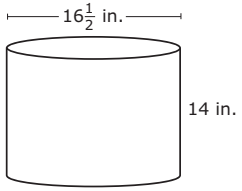
27 A cylinder and its dimensions are shown.



Which measurement is closest to the lateral surface area of the cylinder in square inches?

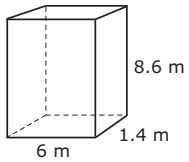
A 1,450.68 $in.^2$

B 725.34 $in.^2$

C 2,992.03 $in.^2$

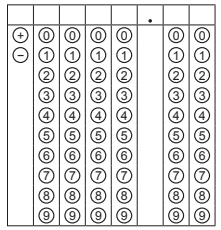
D 939.06 $in.^2$

28 A rectangular prism and its dimensions are shown.



What is the total surface area of the prism in square meters?

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



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29 At an electronics store, the diagonal of a television screen is advertised as being 40.25 inches long. If the screen is 32 inches wide, which measurement is closest to the height of the television screen in inches?

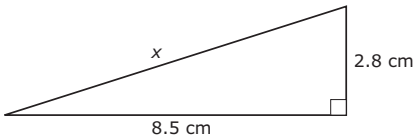
A 24.4 inches

B 8.5 inches

C 51.4 inches

D 68.1 inches

30 A diagram of a right triangle is shown.



Which measurement is closest to the unknown length, *x*, in centimeters?

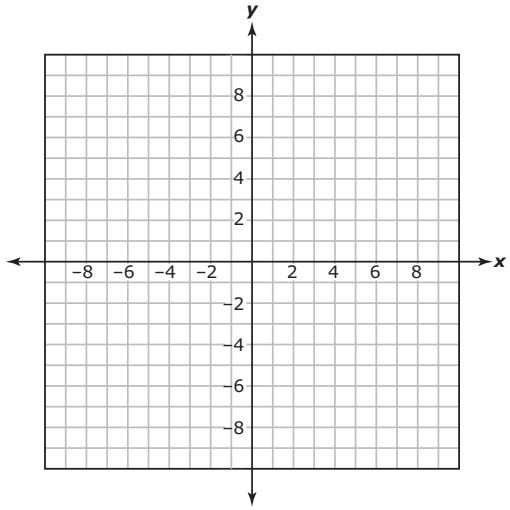
F 40.0 cm

G 8.0 cm

H 11.3 cm

J 8.9 cm

31 Point *P* is located at (9, 7). Point *P* is translated 10 units down and 15 units to the left to produce point *P′*.



Which measurement is closest to the distance, in units, between point *P* and point *P′*?

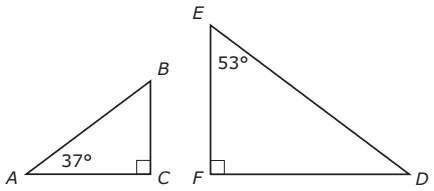
A 25 units

B 11 units

C 18 units

D 9 units

32 Triangles *ABC* and *DEF* are shown.



Which statement is true about the triangles?

F Triangle *ABC* is similar to triangle *DEF* because angle *B* measures 37° and angle *D* measures 53°.

G Triangle *ABC* is similar to triangle *DEF* because angle *B* measures 53° and angle *D* measures 37°.

H Triangle *ABC* is not similar to triangle *DEF* because angles *B* and *D* are not congruent.

J It is not possible to determine if triangles *ABC* and *DEF* are similar because not all angle measures are given.

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33 Which transformation rule, if applied to a polygon on a coordinate grid, does NOT preserve congruence?

A $(x, y) \rightarrow (-x, y)$

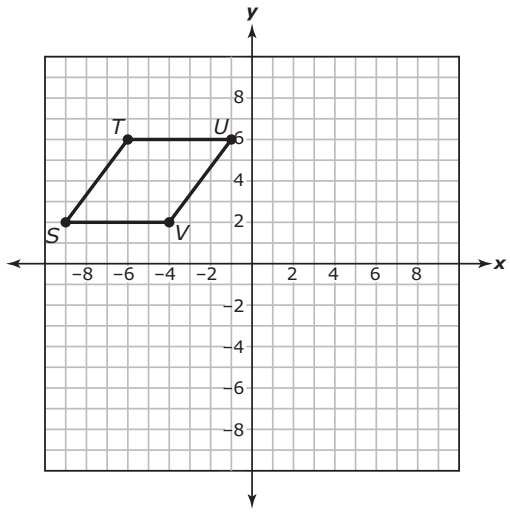
B $(x, y) \rightarrow (y, -x)$

C $(x, y) \rightarrow (3x, 3y)$

D $(x, y) \rightarrow (x + 3, y - 3)$

GO ON

34 The coordinate grid shows a parallelogram. The parallelogram is rotated 90° counterclockwise about the origin.



Which rule best describes this transformation?

F $(x, y) \rightarrow (x, -y)$

G $(x, y) \rightarrow (-x, -y)$

H $(x, y) \rightarrow (y, -x)$

J $(x, y) \rightarrow (-y, x)$

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35 Triangle *JKL* was translated 2 units up and 3 units to the right to create triangle *J'K'L'*. Which rule describes the transformation that was applied to triangle *JKL* to create triangle *J'K'L'*?

A $(x, y) \rightarrow (x + 2, y + 3)$

B $(x, y) \rightarrow (x + 3, y + 2)$

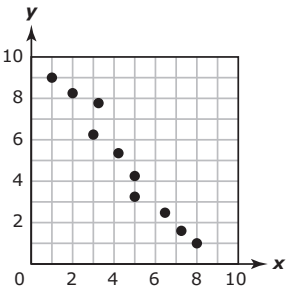
C $(x, y) \rightarrow (2x, 3y)$

D $(x, y) \rightarrow (3x, 2y)$

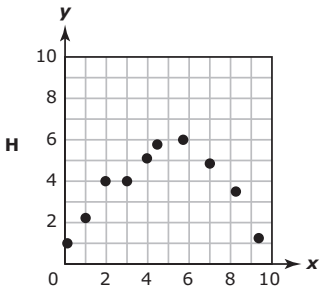
GO ON

36 Which scatterplot does NOT suggest a linear relationship between x and y?

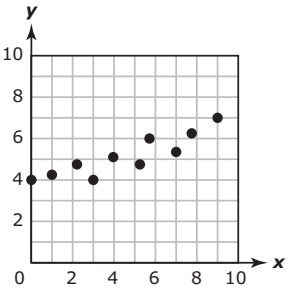
F



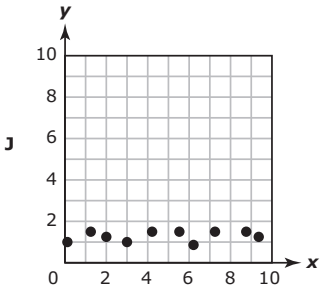
H



G

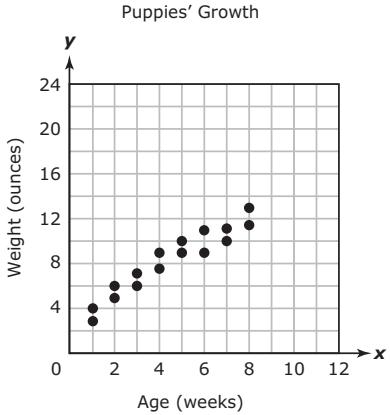


J



GO ON

37 The scatterplot shows the growth of a group of puppies.



Based on the scatterplot, what is the best prediction for the weight of a puppy, in ounces, at 12 weeks old?

A 22 ounces

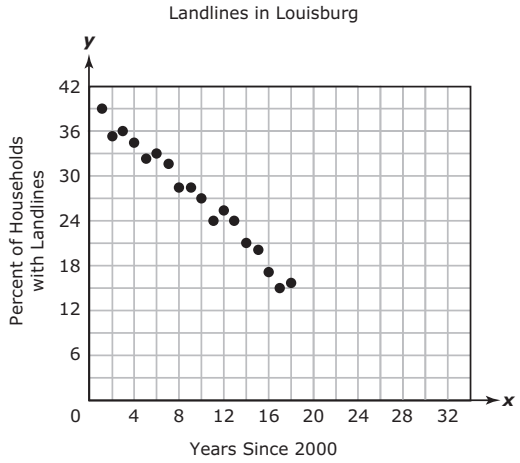
B 20 ounces

C 17 ounces

D 14 ounces

GO ON

38 The scatterplot shows the percentage of households in Louisburg that had landlines each year from 2000 to 2018.



Based on the scatterplot, what is the best prediction of the year when the percentage of households with landlines will be 6%?

F 2020

G 2025

H 2030

J 2035

39 The list shows the heights, in inches, of the five starting players on a girls' basketball team.

66, 59, 61, 63, 58

What is the mean absolute deviation of the heights?

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

					.		
+	0	0	0	0		0	0
−	1	1	1	1		1	1
	2	2	2	2		2	2
	3	3	3	3		3	3
	4	4	4	4		4	4
	5	5	5	5		5	5
	6	6	6	6		6	6
	7	7	7	7		7	7
	8	8	8	8		8	8
	9	9	9	9		9	9

40 James wants to start a savings account. He will deposit a total of $2,000 each year. The chart shows how much money James will have if he does not make any withdrawals from his account.

James's Savings

Year	Payment to Savings	Interest Earned at 2%	Balance
1	$2,000.00	$0.00	$2,000.00
2	$2,000.00	$40.00	$4,040.00
3	$2,000.00	$80.80	$6,120.80
4	$2,000.00	$122.42	$8,243.22
5	$2,000.00	$164.86	$10,408.08
6	$2,000.00	$208.16	$12,616.24
7	$2,000.00	$252.32	$14,868.56
8	$2,000.00	$297.37	$17,165.93

If James continues to save the same amount annually for an additional 4 years and makes no withdrawals, which is closest to the balance in his account?

F $22,000

G $30,000

H $24,000

J $27,000

41 Ms. Neal opened an account with a deposit of $4,000.

- The account earned simple interest annually.
- She did not make any additional deposits or withdrawals.
- At the end of 8 years, the balance in her account was $6,080.

What is the annual interest rate on Ms. Neal's account?

A 5.20%

B 2.08%

C 1.90%

D 6.50%

42 Janina put $3,000.00 in an account that offers 6% interest compounded annually. She makes no additional deposits or withdrawals. Which amount is closest to the interest Janina will have earned at the end of 10 years?

F $480.00

G $1,800.00

H $2,314.68

J $2,372.54

BE SURE YOU HAVE RECORDED ALL OF YOUR ANSWERS.

STOP