Missouri MAP Grade 8 Math Practice

Exam Materials
Pages 2 - 33
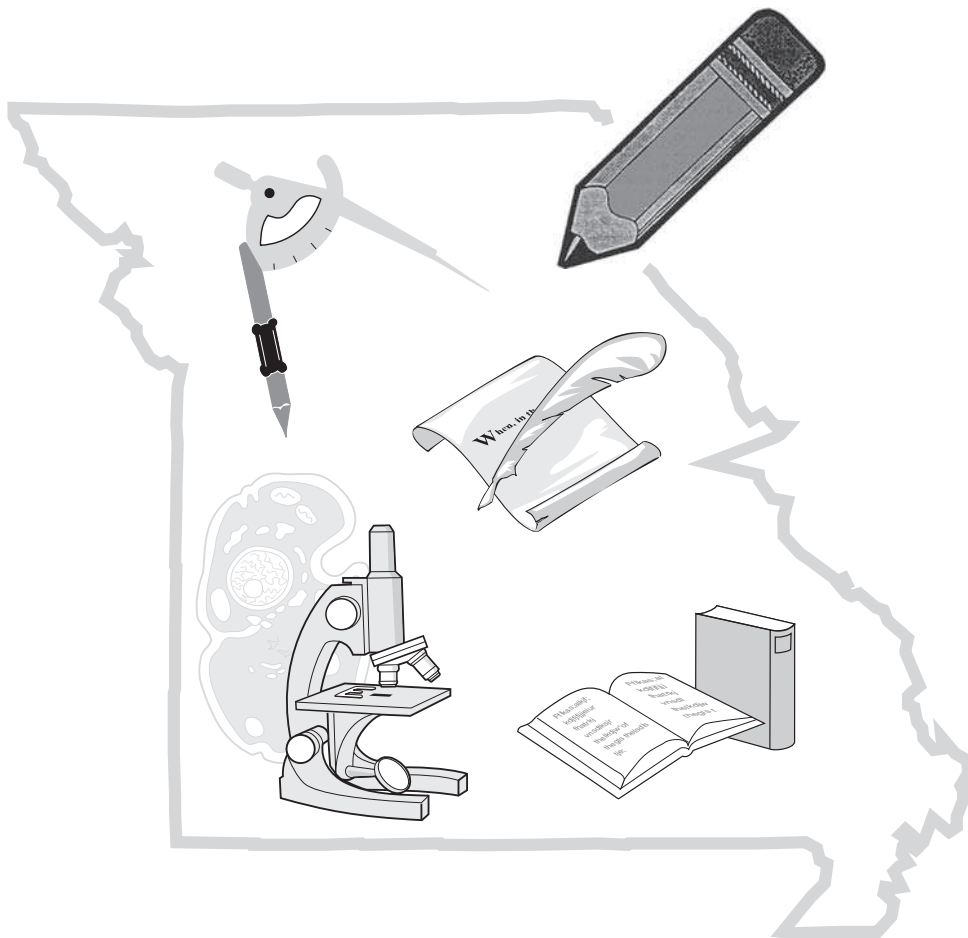
Answer Key Materials
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Name: _____

District/School: _____

Missouri Assessment Program

Released Practice Form
Grade 8
Mathematics

Missouri Department of Elementary
and Secondary Education

1. On average, the moon is 384,400 kilometers from the Earth. How is this distance written in scientific notation?

    A. 0.3844×10^{-6}

    B. 3.844×10^{-5}

    C. 3.844×10^{5}

    D. 0.3844×10^{6}

2. An equation is shown.

    $x^3 = 125$

    What are all the possible values of x?

    A. $^-5$ only

    B. 5 only

    C. $^-5$ and 5

    D. 5 and 25

3. Write each number in the box labeled for the interval in which the number is located.

Between 0 and 1	Between 1 and 2	Between 2 and 3

Between 3 and 4	Between 4 and 5	Between 5 and 6

    $\sqrt{2}$ $(\sqrt{3.5})^2$ $\sqrt{5}$ $\dfrac{\pi}{2}$

Go on to the next page.

4. In a science lab, substance X has a mass of 6.10×10^{-7} grams. The mass of substance Y is twice as much as that of substance X. What is the mass, in grams, of substance Y?

    A. 1.22×10^{-5}

    B. 1.22×10^{-6}

    C. 1.22×10^{-7}

    D. 1.22×10^{-8}

5. A system of equations is shown.

    $$y = \frac{2}{3}x - 6$$
    $$3y - 2x = 9$$

    How many solutions does the system have, and why?

    A. There are no solutions because the slopes and y-intercepts are the same.

    B. There are infinitely many solutions because the slopes and y-intercepts are the same.

    C. There are no solutions because the slopes are the same and the y-intercepts are different.

    D. There are infinitely many solutions because the slopes are the same and the y-intercepts are different.

6. Figure 1 is rotated 90° counterclockwise about the origin to form Figure 2.
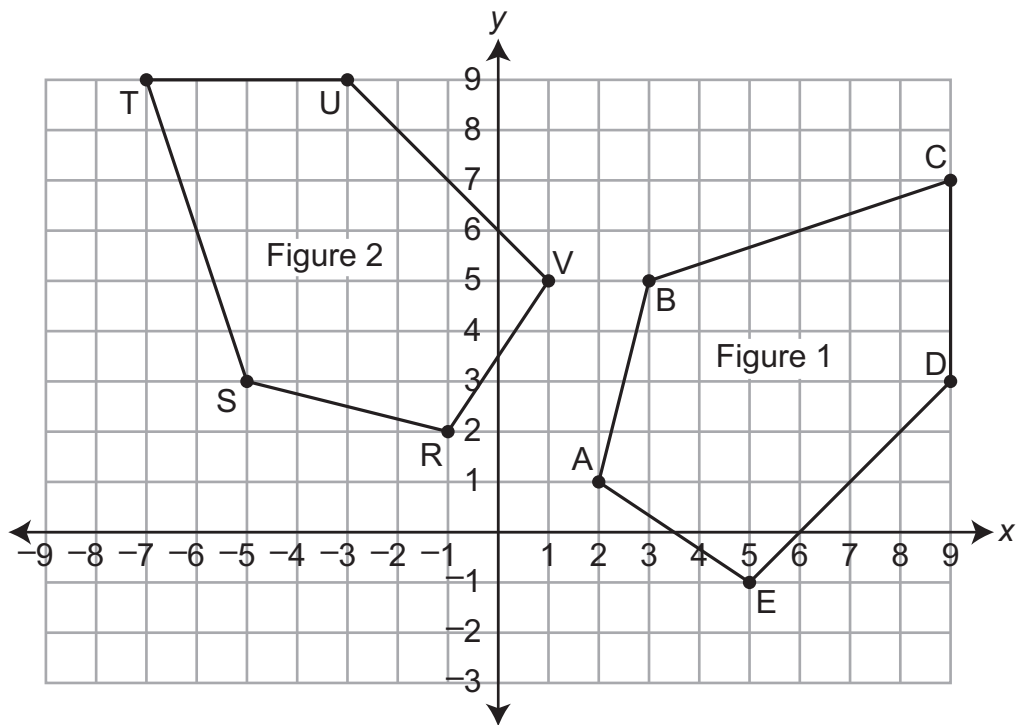
Select the **three** statements that are correct.

A. $\overline{AB} \cong \overline{RV}$

B. $\angle A \cong \angle S$

C. $\angle C \cong \angle T$

D. $\overline{BC} \cong \overline{ST}$

E. $\angle B \cong \angle V$

F. $\angle D \cong \angle U$

7. The dance floor at a hotel is in the shape of a square. The area of the ballroom floor is 576 square meters. To find the length, in meters, of each side of the dance floor, Jolie evaluates the expression shown.

$$\sqrt{576}$$

What is the length, in meters, of each side of the dance floor?

A. 16

B. 24

C. 144

D. 288

8. Select the **three** expressions that are equal to 1.

A. $({}^-8)^0$

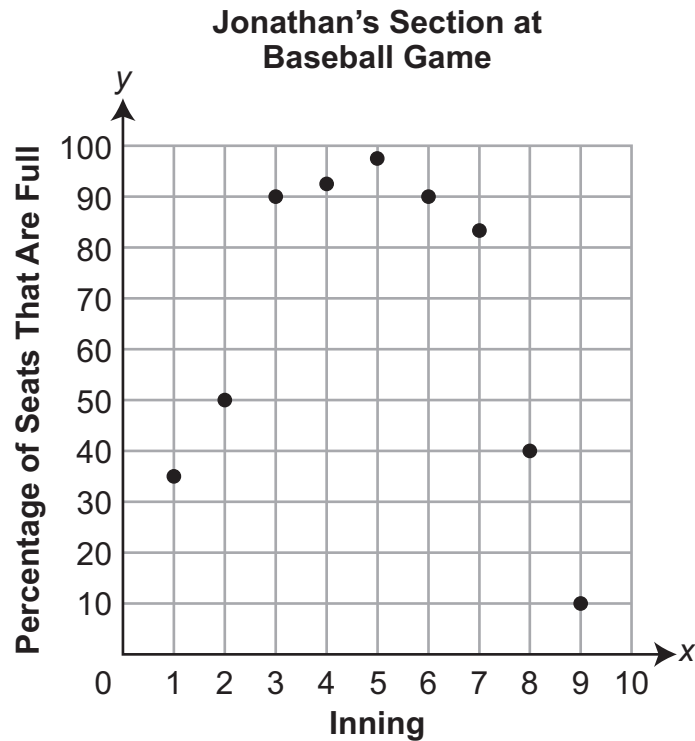B. $1^{\,{}^-4}$

C. $\dfrac{({}^-1)^2}{({}^-1)^6}$

D. ${}^-1^6$

E. 2^1

F. $\dfrac{({}^-1)^2}{({}^-1)^3}$

Go on to the next page.

9. Jonathan goes to a baseball game. At the beginning of each of the nine innings in the game, he estimates the percentage of seats in his section that are full. He makes a graph to show the relationship between the inning, x, and the percentage of seats in his section that are full, y.


Jonathan's Section at Baseball Game

Which statement about the section in which Jonathan sits at the baseball game is most likely true?

A. Most of the fans left during the eighth inning.

B. The greatest number of fans arrived during the second inning.

C. There was at least one point during the game in which Jonathan's section was 100% full.

D. The same seats were full at the beginning of the third inning as at the beginning of the sixth inning.

10. A square pyramid has a base that is 4 inches wide and a slant height of 7 inches. What is the surface area, in square inches, of the pyramid?
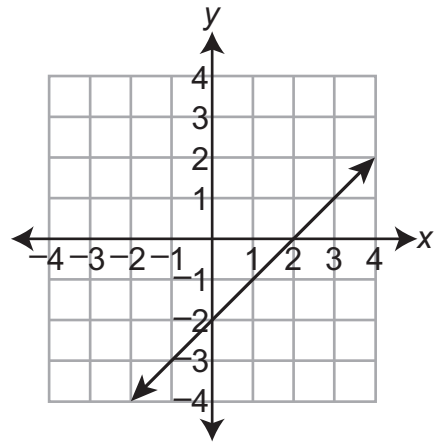
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11. Which graph shows a linear function?
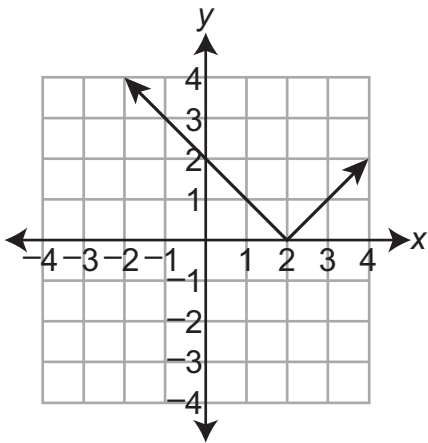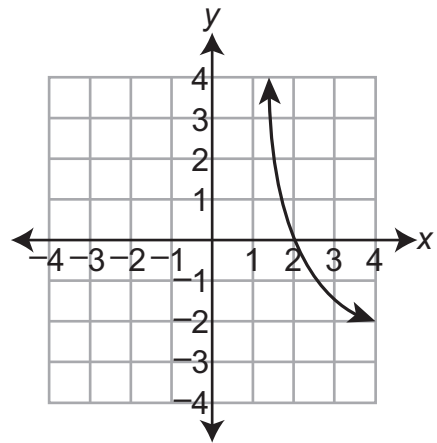
A.

B.

C.

D.

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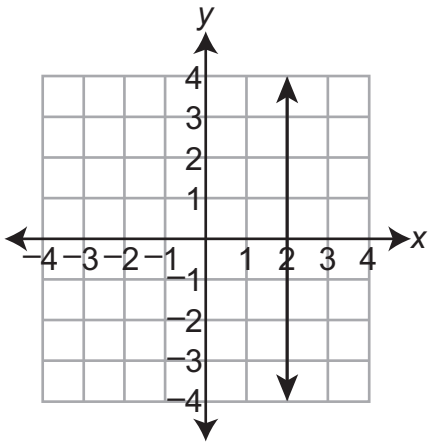
12. Lucy has a lemonade stand. The table shows Lucy's profits when she sells different amounts of lemonade.

Lucy's Lemonade Stand

| Lemonade Sold (cups)	Profit ($)
6	1
7	2
8	3
9	4
10	5

Which equation could Lucy use to determine her profit, y, when she sells x cups of lemonade?

A. $y = x - 5$

B. $y = 5x - 1$

C. $y = x$

D. $y = x + 5$

13. The equation shows the average cost, y, in dollars, of electricity per kilowatt hour (kWh) used, x, for homes in the state of Missouri in 2011.

$$y = \frac{1}{10}x$$

Based on the equation, what would be the cost, in dollars, for a home using 0 kWh of electricity in 2011?

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14. The graph of a system of equations is shown on the coordinate plane.
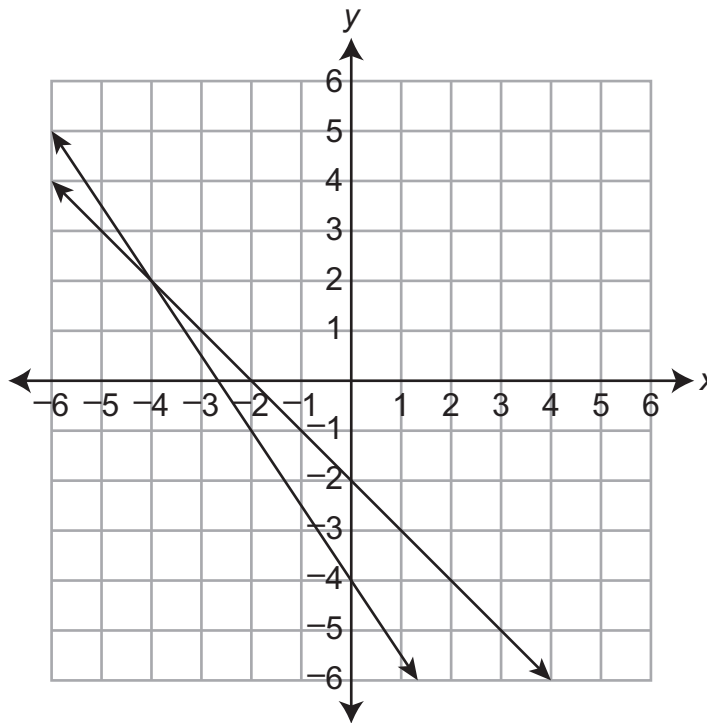
What is the solution to the system of equations?

A. $(^-4, 2)$

B. $(^-2, ^-4)$

C. $(0, ^-2)$

D. $(0, ^-4)$

Go on to the next page.

15. Mr. Rose surveyed his students about the amounts of time they spent studying for his final exam and their final exam scores. He graphed the results on a coordinate plane. Which graph shows the **best** approximation of the line of best fit for Mr. Rose's data?

A.

B.

C.

D.

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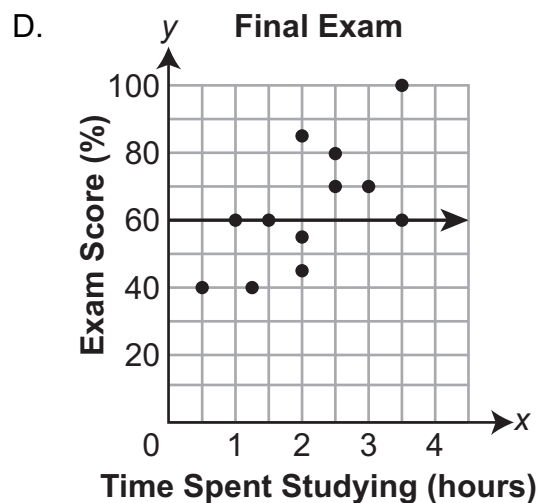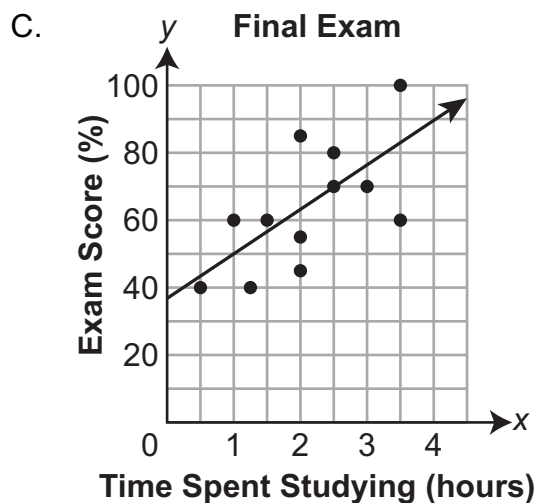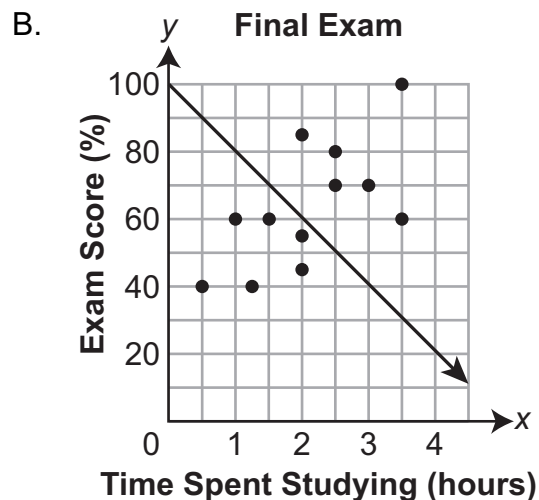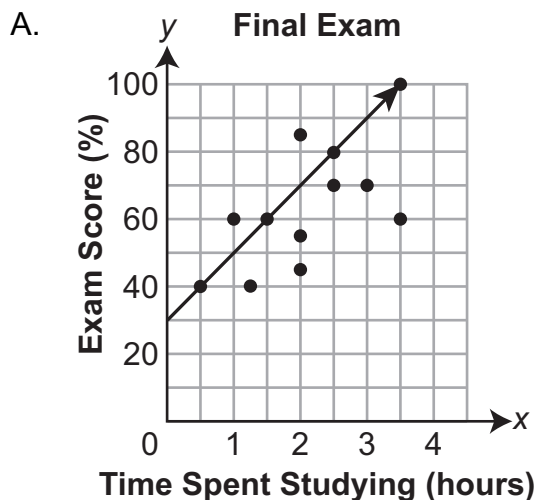
16. Function 1 is shown on the coordinate plane.
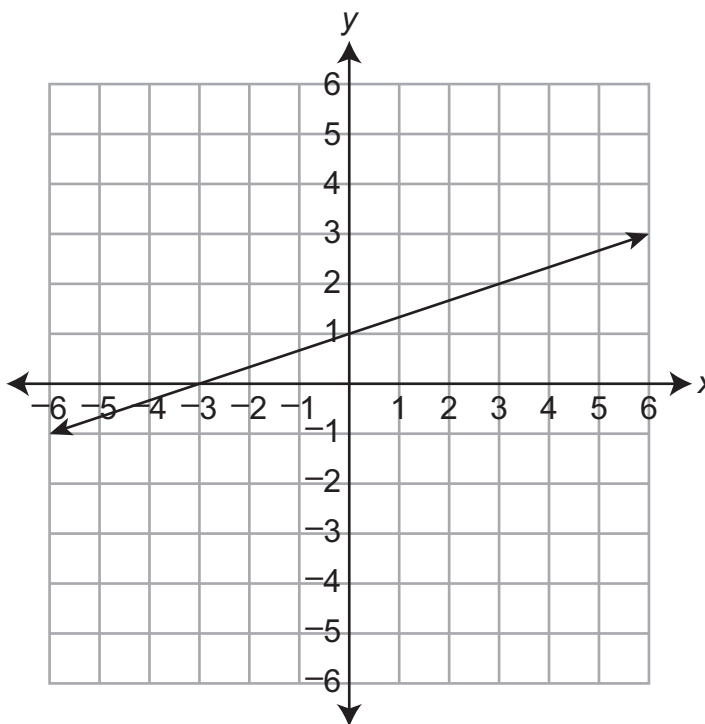
Function 2 is represented by the equation $y = 3x + 1$. Which statement about the rate of change is correct?

A. Function 1 has a greater rate of change.

B. Function 2 has a greater rate of change.

C. Both functions have the same rate of change.

D. There is not enough information to determine which function has the greater rate of change.

17. At the zoo, the aquarium is 36 feet north of the gift shop. The monkey habitat is 323 feet east of the gift shop. What is the distance, in feet, from the aquarium to the monkey habitat?

A. 287

B. 321

C. 325

D. 359

18. Barry and Omar each sell potato salad in their sandwich shops. Barry uses the graph shown to determine the total cost for different amounts of potato salad.

Potato Salad Cost at Barry's Sandwich Shop
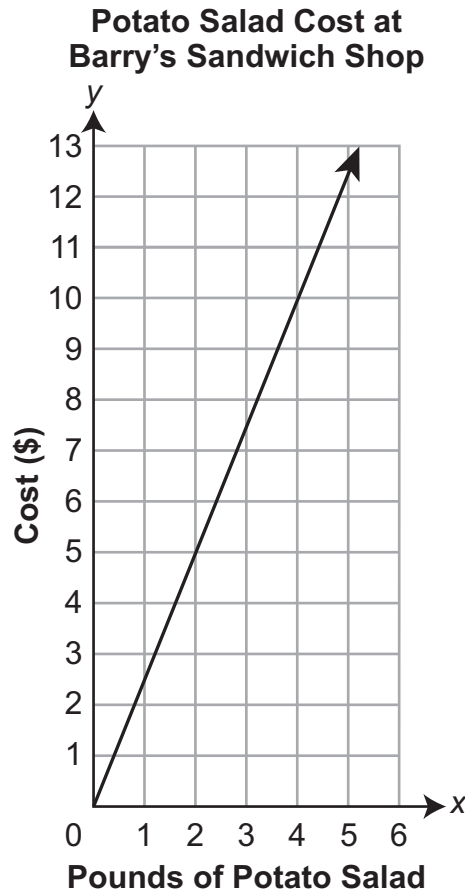
Omar uses the equation $y = 2.89x$ to determine the total cost, y, in dollars, for x pounds of potato salad. Which statement about the cost of potato salad at Barry's and Omar's sandwich shops is true?

A. The cost per pound at Barry's sandwich shop is less than the cost per pound at Omar's sandwich shop.

B. The cost per pound at Omar's sandwich shop is less than the cost per pound at Barry's sandwich shop.

C. The cost per pound at the cheaper sandwich shop depends on how many pounds of potato salad a customer purchases.

D. It is impossible to determine which sandwich shop charges less per pound based on the given information.

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19. Quadrilateral ABCD is translated to form quadrilateral A'B'C'D'.
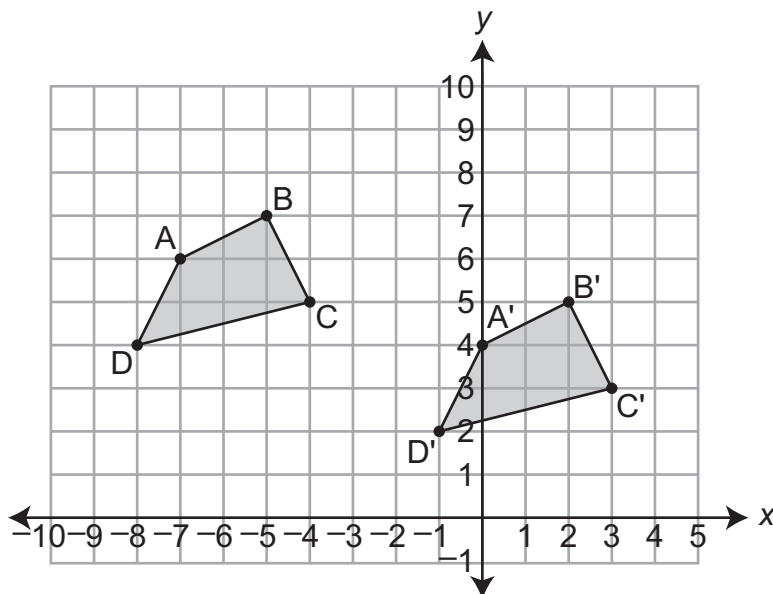
How can the translation of quadrilateral ABCD to quadrilateral A'B'C'D' be described using coordinates?

A. $(x - 7, y - 2)$

B. $(x - 2, y - 7)$

C. $(x - 2, y + 7)$

D. $(x + 7, y - 2)$

20. Beth earns $35,000 per year at her job as a salesperson. She also earns 15% of her total sales for the year. She writes the function shown to represent the total amount of money she earns each year, y, in dollars, as a function of her total sales for the year, x, in dollars.

$$y = 0.15x + 35,000$$

For each statement in the table, mark whether it is true or false.

	True	False
The graph of Beth's function is a straight line.		
The slope of Beth's function is 15.		
The y-intercept of Beth's function is 35,000.		

Go on to the next page.

21. The figure shows a large triangle divided into two smaller triangles.

$x°$

65°   105°   50°
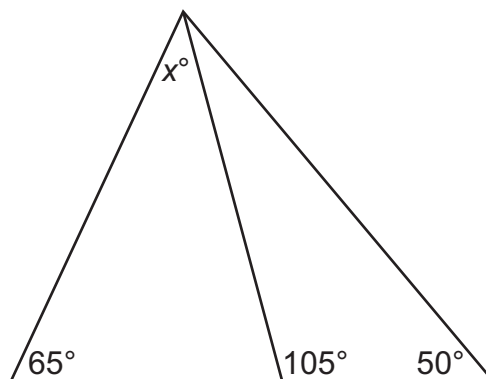
What is the value of x in the figure?

22. Henry surveys 80 people. He asks each person two questions:

    • Have you ever taken a taxi?
    • Have you ever visited another state?

He makes the two-way table to show the results of his survey.

Henry's Survey Results

	Has Taken a Taxi	Has Not Taken a Taxi	Total
Has Visited Another State	18	42	60
Has Not Visited Another State	6	14	20
Total	24	56	80

Complete each sentence with "more likely", "less likely", or "equally as likely" based on the results from Henry's survey.

A random person from Henry's survey is _____ to have taken a taxi than to have **not** taken a taxi.

A random person from Henry's survey who has taken a taxi is _____ to have visited another state than to have **not** visited another state.

A random person from Henry's survey who has **not** visited another state is _____ to have taken a taxi than to have **not** taken a taxi.

Go on to the next page.

23. A rug has two quadrilaterals woven into its design. On a diagram, the smaller quadrilateral is labeled GHIJ. The second quadrilateral, labeled KLMN, is a dilation of GHIJ. Quadrilateral GHIJ is similar to quadrilateral KLMN. Select the **two** statements that **must** be true.

    A. Angle G is congruent to angle H.

    B. Angle G is congruent to angle K.

    C. If the length of side KL = 2GH, then 2MN = IJ.

    D. The sum of angles H and I is equal to the sum of angles K and L.

    E. The sum of angles G, H, and I is equal to the sum of angles K, L, and M.

STOP.

1. Which linear equation has no solution?

    A. $7x + 2 = 3x + 2$

    B. $7x + 2 = 3x + 4x + 2$

    C. $3x + 2x - 5 = 5 + 4x + x$

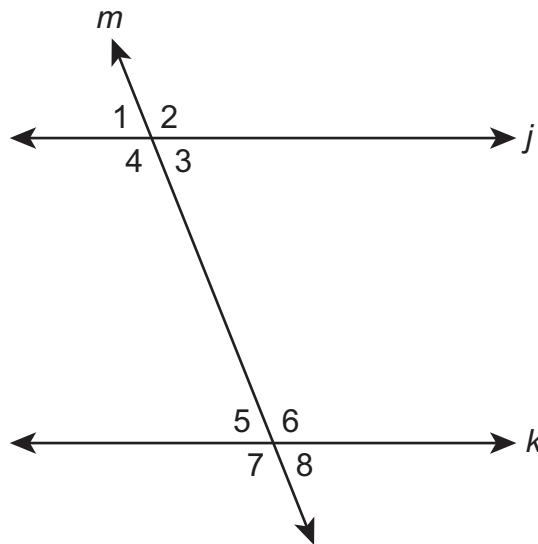   D. $3x + 2x - 5 = 6 - 11 + 5x$

2. A linear equation is shown.

    $y = \dfrac{2}{3}x - 4$

    What is the *y*-intercept of the graph of the equation?

Go on to the next page.

3. In the figure, lines *j* and *k* are parallel to one another. Line *m* intersects both parallel lines to create 8 numbered angles, none of which are right angles.

Garrett measures angles 1 and 6. He says the measure of angle 1 is 65° and the measure of angle 6 is 125°. Jennifer claims Garrett is incorrect. Which statement could Jennifer use to prove her claim?

A. Angles 1 and 4 are congruent, and the sum of the measures of angles 4 and 6 must be 180°.

B. Angles 1 and 3 are congruent, and the sum of the measures of angles 3 and 6 must be 180°.

C. Angles 1 and 7 are supplementary, and the sum of the measures of angles 6 and 7 must be 180°.

D. Angles 2 and 6 are supplementary, and the sum of the measures of angles 1 and 2 must be 180°.

Go on to the next page.

4. An expression is shown.

$$\frac{4 \times 10^6}{2 \times 10^2}$$

Write an equivalent expression in scientific notation.

☐ x 10 ☐

5. The fraction $\frac{7}{11}$ can be represented as an equivalent repeating decimal in the form shown.
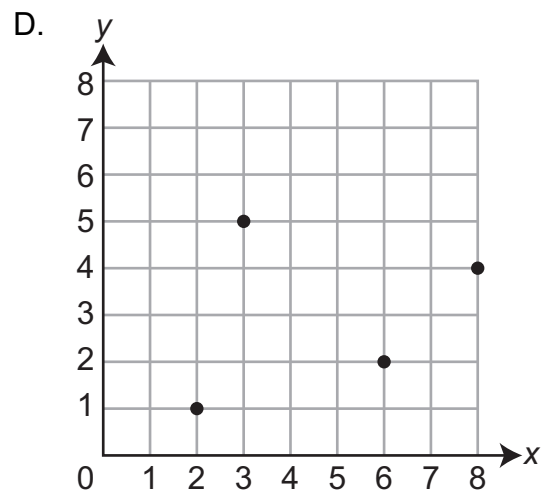
$$0.\overline{\boxed{}}$$

Write the equivalent repeating decimal.

$$0.\overline{\boxed{}}$$

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6. The table shows four input values and their associated output values.

Input (x)	Output (y)
1	2
2	6
3	5
4	8

Which graph represents the function shown in the table?

A.

B.

C.

D.

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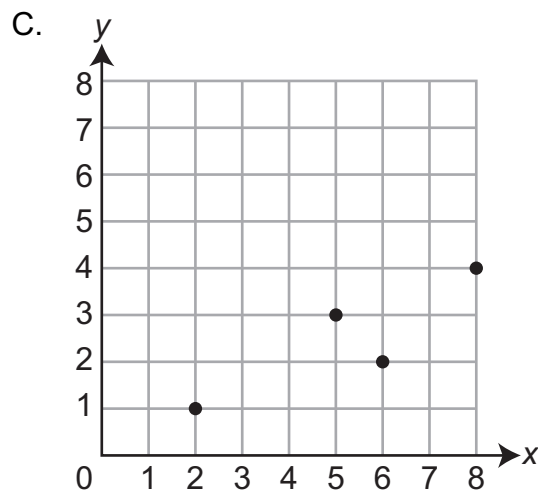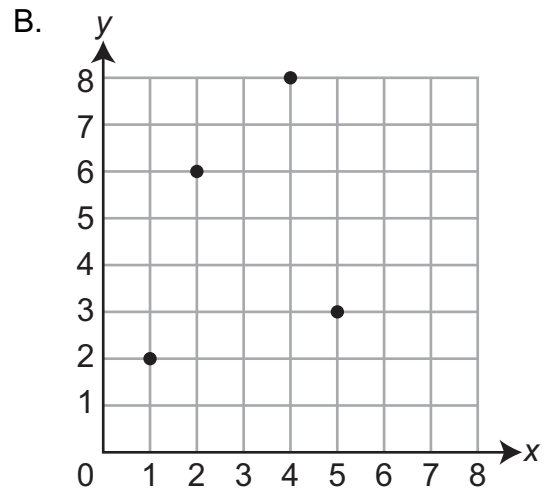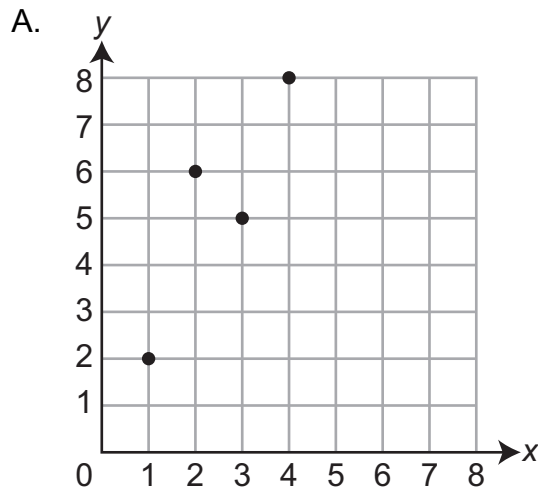
7. Bill mows 21 lawns per week. Which graph has a slope that represents the number of lawns Bill mows per **day**?

A. **Bill's Mowing**
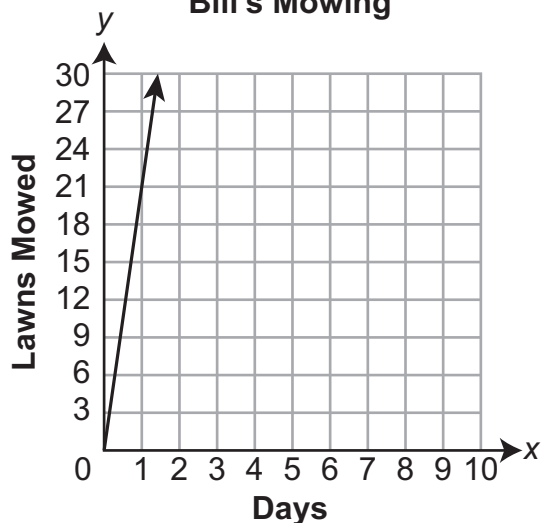
B. **Bill's Mowing**
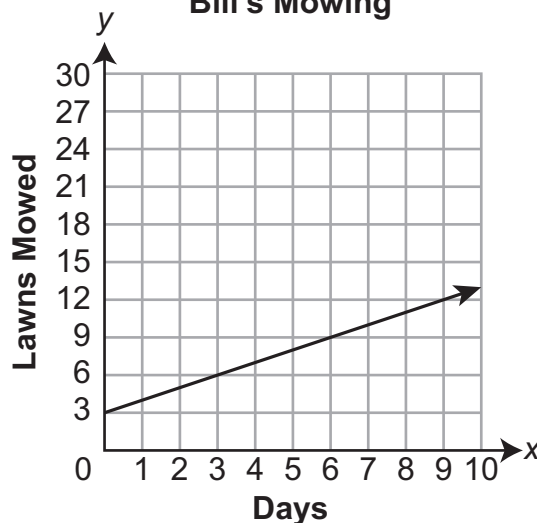
C. **Bill's Mowing**

D. **Bill's Mowing**

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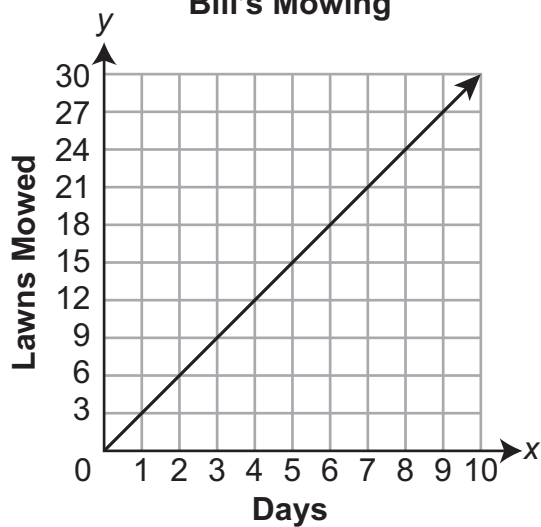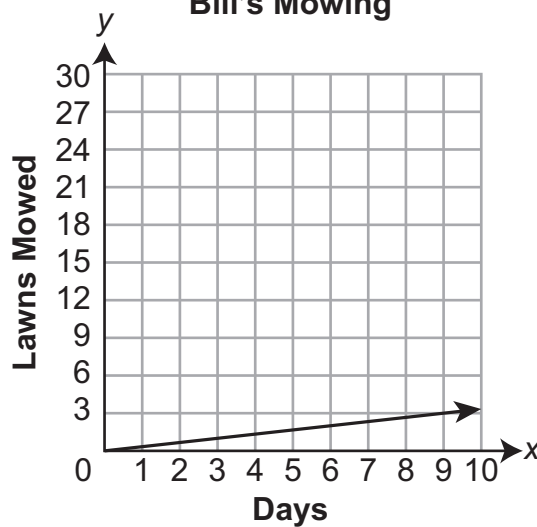
8. Triangle ABC and triangle A'B'C' are shown on the coordinate plane.
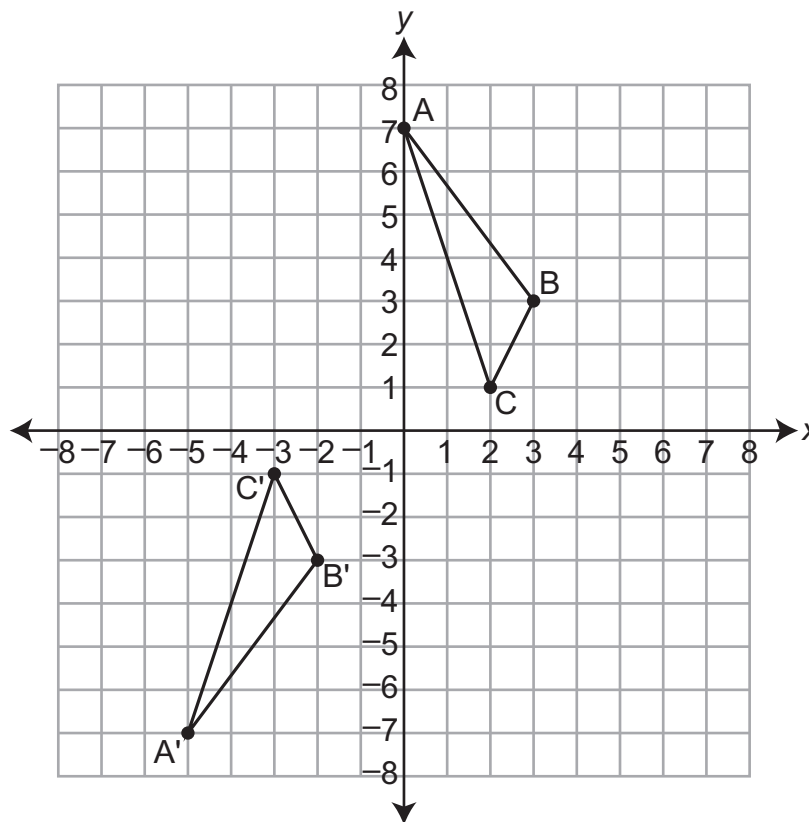
Which sequence of transformations maps triangle ABC onto triangle A'B'C'?

A. a rotation of 180 degrees and then a translation left 1 unit

B. a translation left 5 units and then a reflection over the *x*-axis

C. a reflection over the *y*-axis and then a translation down 8 units

D. a reflection over the *x*-axis and then a reflection over the *y*-axis

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9. The graph of a line is shown.
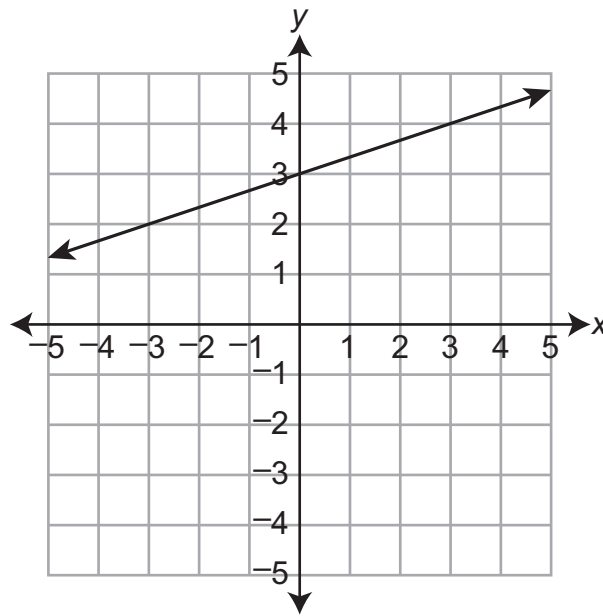
Write an equation in **slope-intercept form** that represents the graphed line.

10. A marching band director draws the triangle shown to represent the band's formation at the beginning of a song.
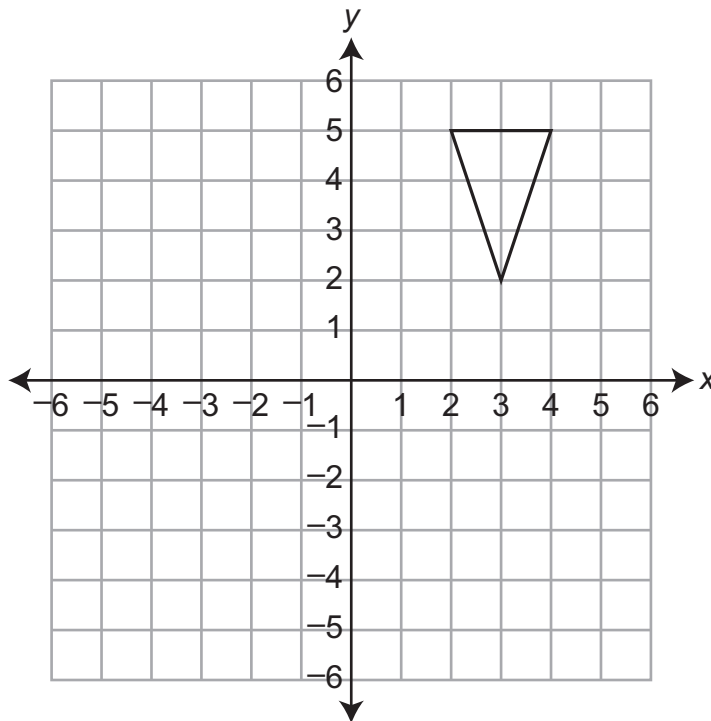
The marching band director wants the formation to rotate 90° clockwise about the origin once the song starts. Draw a triangle to represent the formation of the band after the rotation.

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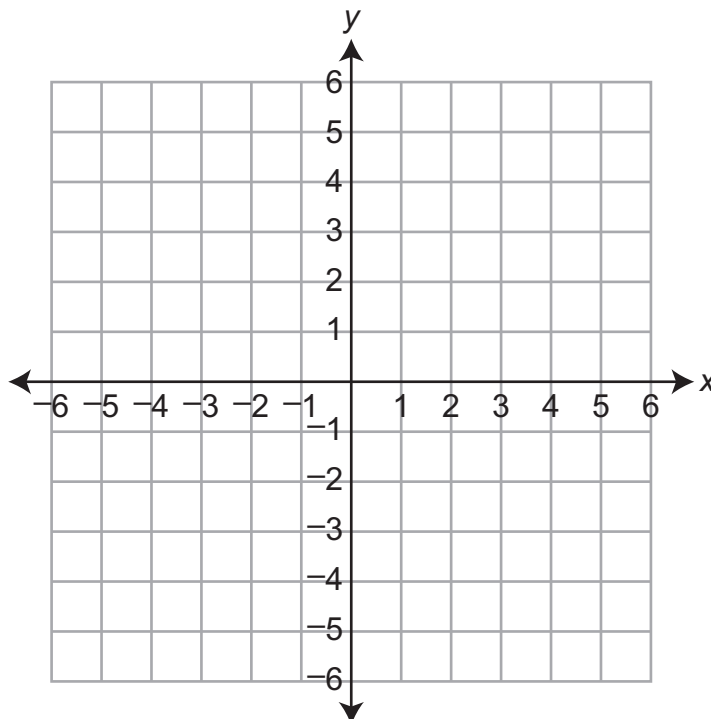
11. Select the **three** rational numbers.

    A. $\dfrac{6}{11}$

    B. $\left(\dfrac{6}{11}\right)^2$

    C. $\sqrt{6}$

    D. $(\sqrt{6})^2$

    E. 6π

    F. $(6\pi)^2$

12. A pile of gravel is in the shape of a cone. The radius of the pile of gravel is 9 feet at the base. The height of the pile of gravel is 8 feet. What is the volume of gravel, in cubic feet, in the pile?

    A. 48π

    B. 72π

    C. 216π

    D. 648π

13. Kayla sells hats at a store for gift cards.

    • Kayla already has $42.50 in gift cards at the store.
    • The hats Kayla sells have a cash value of x dollars.
    • The store pays an additional 30% when hats are sold for gift cards rather than for cash.
    • After selling the hats for gift cards, Kayla has $140.26 in gift cards at the store.

    To determine the cash value of the hats she sells, Kayla writes the equation $42.5 + x + 0.3x = 140.26$. What is the cash value of the hats Kayla sells?

    A. $24.44

    B. $48.73

    C. $75.20

    D. $96.46

Go on to the next page.

14. The water in a barrel is 24 inches deep. When the plug is pulled out of the barrel, the water depth is reduced 3 inches each hour. Owen creates an equation in the form of $y = mx + b$ to represent the height of the water in the barrel after the plug has been removed. What should be the slope, m, of Owen's equation and what does it mean?

    A. The slope is 24 because that is the amount of water in the barrel at the beginning.

    B. The slope is $^{-}$24 because that is the amount of water in the barrel at the beginning.

    C. The slope is 3 because the depth of the water in the barrel is decreasing by 3 inches per hour.

    D. The slope is $^{-}$3 because the depth of the water in the barrel is decreasing by 3 inches per hour.

15. Three sides of a triangle measure 25 inches, 24 inches, and 7 inches. Which statement about the side lengths is correct?

    A. The side lengths create a right triangle, because $7 + 24 > 25$.

    B. The side lengths create a right triangle, because $7^2 + 24^2 = 25^2$.

    C. The side lengths do not create a right triangle, because $7 + 24 \neq 25$.

    D. The side lengths do not create a right triangle, because $7^2 + 24^2 > 25^2$.

16. An amusement park sells adult tickets and child tickets. Adult tickets cost more than child tickets. Heather purchased 10 tickets for $71 to give to her family. She created the system of equations shown to model this situation.

$$12x + 5y = 71$$

$$x + y = 10$$

    The solution to Heather's system is (3, 7). Which statement correctly interprets this solution?

    A. Heather purchased 7 child tickets and 3 adult tickets.

    B. Heather purchased 3 child tickets and 7 adult tickets.

    C. Each child ticket costs $7 and each adult ticket costs $3.

    D. Each child ticket costs $3 and each adult ticket costs $7.

Go on to the next page.

17. Sarah surveyed 100 people. She asked each person two questions:
    - Do you listen to jazz?
    - Do you play a musical instrument?

    Sarah made the following two-way table to display information about the responses.

	Plays a Musical Instrument	Does Not Play a Musical Instrument	Total
Listens to Jazz	14	4	18
Does Not Listen to Jazz	40	42	82
Total	54	46	100

Of the people Sarah surveyed who listen to jazz, what is the probability that a randomly selected person also plays a musical instrument?

18. Shaun is doing a science experiment. He has x liters of a solution that is 50% salt. He has y liters of a different solution that is 10% salt. He combines the two solutions together and ends up with 4 liters of a solution that is 35% salt. To represent this situation, he writes the system of equations shown.

$$x + y = 4$$

$$0.5x + 0.1y = 1.4$$

Which ordered pair represents the number of liters of each of the two solutions Shaun started with?

A. (0.65, 3.35)

B. (0.75, 3.25)

C. (2.5, 1.5)

D. (3.5, 0.5)

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19. Select the **two** nonlinear functions.

A.

x	y
3	9
4	16
5	25
6	36

B.
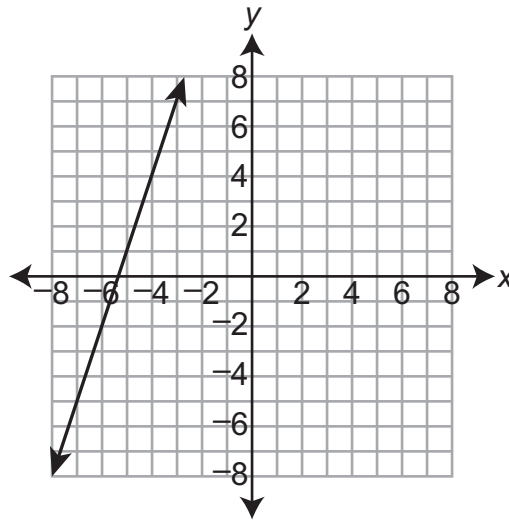
C. {(−3, 0), (−1, −1), (0, −3)}

D. $y = \dfrac{x}{2} + 5$

E.

x	y
−2	1
−1	1
0	1
2	1
3	1

Go on to the next page.

20. Jerry buys gray modeling clay and pink modeling clay. Gray modeling clay costs $4 per pound. Pink modeling clay costs $5 per pound. Jerry orders a total of 14 pounds of modeling clay for $60. To represent this situation, Jerry writes the system of equations shown.

$$y = {}^-x + 14$$

$$y = -\frac{4}{5}x + 12$$

In his system, x represents the number of pounds of gray modeling clay Jerry buys and y represents the number of pounds of pink modeling clay Jerry buys. Plot a point to represent the number of pounds of each type of modeling clay Jerry buys.

Jerry's Modeling Clay

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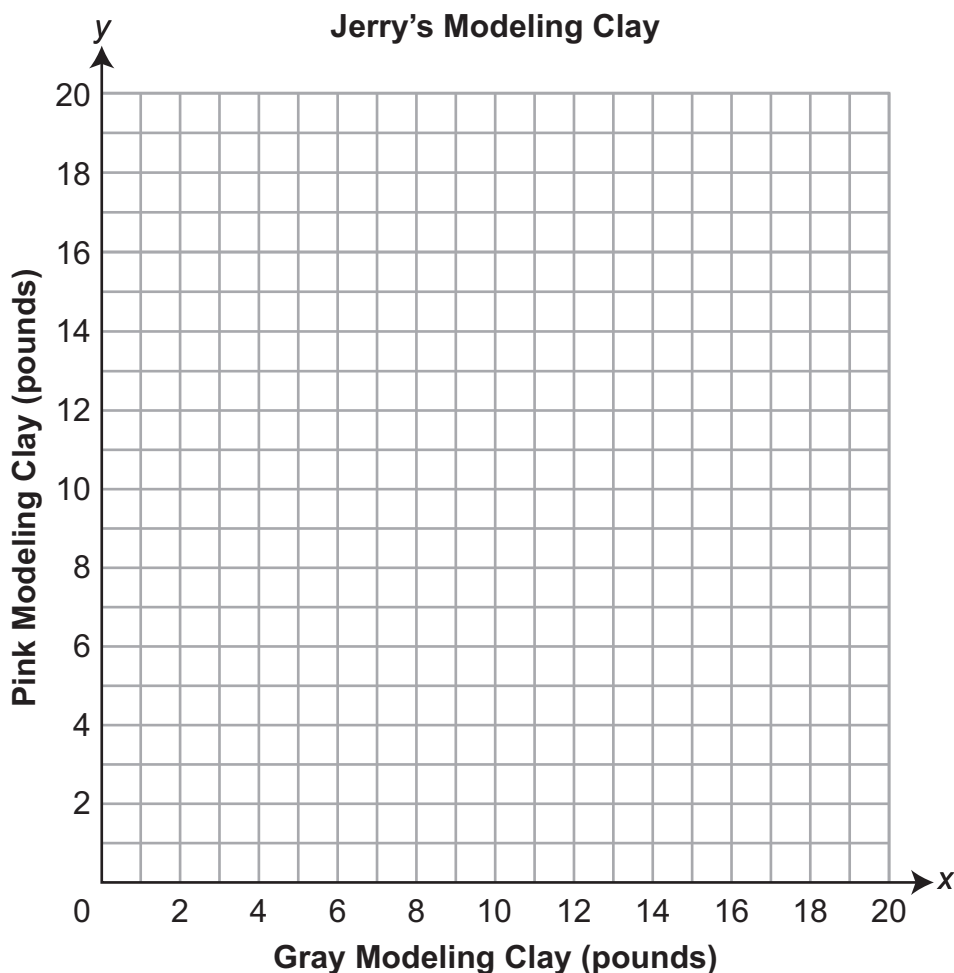
21. Students from various grades were surveyed about the number of sit-ups they could each complete in one minute. The results are shown on the scatterplot.

Sit-Up Survey

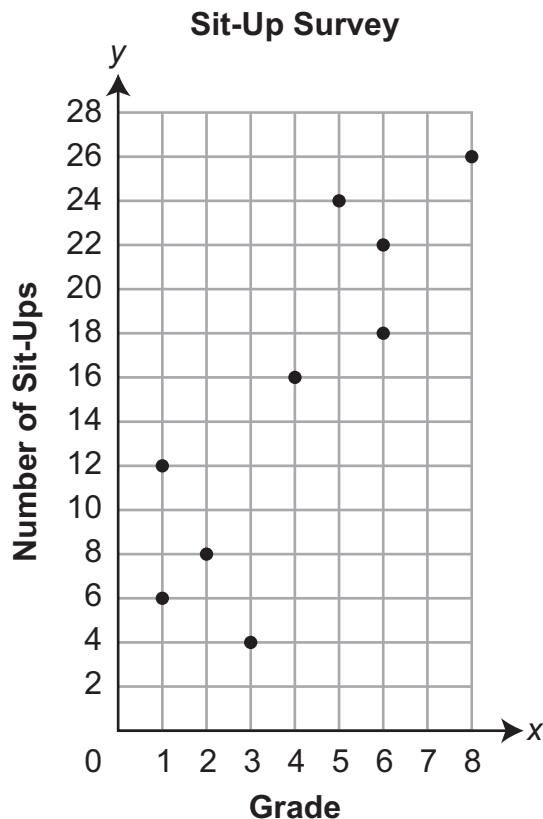The line $y = 2.8x + 3.9$ can be used as a line of best fit for the data. Select the **three** statements about the data that make sense in the context of the situation.

A. A student in grade 3 should be expected to complete about 4 sit-ups in one minute.

B. A student in grade 4 should be expected to complete about 15 sit-ups in one minute.

C. A student in grade 10 should be expected to complete about 32 sit-ups in one minute.

D. Each time a student moves on to the next grade, that student should be expected to complete about 3 **more** sit-ups in one minute.

E. Each time a student moves on to the next grade, that student should be expected to complete about 4 **more** sit-ups in one minute.

F. Each time a student moves on to the next grade, that student should be expected to complete about 7 **more** sit-ups in one minute.

Go on to the next page.

22. Which statement explains why the slope between any two points of a linear graph is the same?

    A. The sum of the *y*-coordinates divided by the sum of the *x*-coordinates of any two points is the same.

    B. The difference of the *y*-coordinates divided by the difference of the *x*-coordinates of any two points is the same.

    C. The sum of the *x*- and *y*-coordinates of one point divided by the sum of the *x*- and *y*-coordinates of another point is the same for any two points.

    D. The difference of the *x*- and *y*-coordinates of one point divided by the difference of the *x*- and *y*-coordinates of another point is the same for any two points.

23. Rounded to the nearest whole number, what is the distance, in units, between (⁻3, 2) and (2, ⁻8)?

    A. 6

    B. 7

    C. 11

    D. 15

STOP.

1. An equation with one solution is shown.

   $^-4(6x - 1.5) = 2x + 2(5 - 5x)$

   Solve the equation for x. Then change **one** term in the equation so that it has no solution. Show or explain how you determined that the equation has no solution.

2. An employee of a company earns a base amount for each week of work plus an hourly rate. The manager of the employee spilled some ink on a table that shows the employee's weekly earnings, in dollars, for different numbers of hours of work. The table is shown below.

Employee's Weekly Earnings

Time (hours)	2	4	6	⬛	10
Amount Earned	$31	$⬛	$63	$79	$⬛5

What are the unknown values in the table? Use the table to create an equation to represent the employee's earnings, y, in dollars, for x hours of work. Then use your equation to calculate the number of hours the employee would need to work to earn $311. Be sure to show all your calculations.

STOP.

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Scoring Guide and Rubric

Session 1
All items worth 1 point

Item	Type	MLS	Answer
1	Multiple Choice	8.EEI.A.3	C
2	Multiple Choice	8.EEI.A.2.a	B
3	Technology Enhanced (Online) Constructed Response (Paper)	8.NS.A.2	Between 1 and 2: $\sqrt{2}$ and $\frac{\pi}{2}$ Between 2 and 3: $\sqrt{5}$ Between 3 and 4: $(\sqrt{3.5})^2$ (All correct to receive credit)
4	Multiple Choice	8.EEI.A.4.a	B
5	Multiple Choice	8.EEI.C.8.c	C
6	Multi-Select Response	8.GM.A.1.a	C, D, F
7	Multiple Choice	8.EEI.A.2.b	B
8	Multi-Select Response	8.EEI.A.1	A, B, C
9	Multiple Choice	8.F.B.5	B
10	Short Answer	8.GM.C.9.a	72
11	Multiple Choice	8.F.A.3.b	B
12	Multiple Choice	8.EEI.B.6.b	A
13	Short Answer	8.F.B.4.c	0
14	Multiple Choice	8.EEI.C.8.a	A
15	Multiple Choice	8.DSP.A.2	C
16	Multiple Choice	8.F.A.2	B
17	Multiple Choice	8.GM.B.7	C
18	Multiple Choice	8.EEI.8.5.b	A
19	Multiple Choice	8.GM.A.3	D
20	Technology Enhanced (Online) Short Answer (Paper)	8.F.A.3.a	True: Graph of function is a straight line and y-intercept of function is 35,000. False: slope of function is 15. (All correct to receive credit)
21	Short Answer	8.GM.A.5.a	40
22	Technology Enhanced (Online) Short Answer (Paper)	8.DSP.A.4.a	First: less likely, Second: more likely Third: less likely (All correct to receive credit)
23	Multi-Select Response	8.GM.A.5.d	B and E

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Session 2
All items worth 1 point

Item	Type	MLS	Answer
1	Multiple Choice	8.EEI.C.7.a	C
2	Short Answer	8.F.A.3.a	(0,-4)
3	Multiple Choice	8.GM.A.5.c	B
4	Short Answer	8.EEI.A.4.a	First box: 2, Second box: 4
5	Technology Enhanced (Online) Short Answer (Paper)	8.NS.A.1.c	.63 or .63636
6	Multiple Choice	8.F.A.1.c	A
7	Multiple Choice	8.EEI.B.5.a	C
8	Multiple Choice	8.GM.A.2.a	B
9	Short Answer	8.GM.A.3	y = x/3 + 3
10	Technology Enhanced (Online) Constructed Response (Paper)	8.NS.A.1.a	Plot points at (5,-2) (2,-3), (5,-4) and draw lines to connect the points
11	Multi-Select Response	8.NS.A.1.a	A, B, D
12	Multiple Choice	8.GM.C.9.b	C
13	Multiple Choice	8.EEI.C.7.b	C
14	Multiple Choice	8.F.B.4.a	D
15	Multiple Choice	8.GM.B.6	B
16	Multiple Choice	8.EEI.C.8.b	A
17	Short Answer	8.DSP.A.4.b	14/18
18	Multiple Choice	8.EEI.C.8.d	C
19	Multi-Select Response	8.F.A.3.c	A and C
20	Technology Enhanced (Online) Constructed Response (Paper)	8.EEI.C.8.a	Plot point at (10,4)
21	Multi-Select Response	8.DSP.A.3	B, C, D
22	Multiple Choice	8.EEI.B.6.a	B
23	Multiple Choice	8.GM.B.8	C

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Session 3

Item	Type	MLS	Answer
1	Performance Event	8.EEI.C	**Exemplary Response** Solving -4(6x-1.5) = 2x + 2(5-5x) for x, I get x=-1/4. If I change 6x to 2x then: -4(2x-1.5) = 2x + 2(5-5x) -8x + 6 = 2x + 10 – 10x -8x + 6 = -8x + 10 6 = 10 6 does not equal 10 so there is no solution **Scoring** **4 points available** <u>3 points</u>: The student changes one term in the equation and shows or explains how the changed equation results in an equation with no solution. On the left side of the equation, the student could change one of the following: -4 to -4/3 (equation solves to 2 = 10) or 6x to 2 x (equation solves to 6 = 10) or 1.5 to 4x (equation solves to 0 = 10). On the right side of the equation, the student could change one of the following:2x to -14x (equation solves to 6=10) or 2 to 26/5 (equation solves to 6=26) or 5 to -8x (equation solves to 6=0) or 5x to 13x (equation solves to 6=10) <u>1 point</u>: The student solves the given equation for x (x = -1/4)
2	Performance Event	8.F.A	**Exemplary Response** An equation that represents the employee's earnings, y, for x hours of work is y=8x+15. Using this equation, the missing values (hours, earnings) in the table are (4,$47), (8,$79) and (10,$95). For an employee to earn $311, they would have to work 37 hours. I solved the following equation x: 311 = 8x + 15 -15 -15 <u>296</u> = <u>8x</u> 8 8 37 = x

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			Scoring **4 points available** 2 points: The student creates an equivalent equation for y=8+15 and lists the three unknown values in the table. Other variables may be used as long as they are defined. Note: Instead of listing the three unknown values in the table, the student may instead show or explain how their equation was created. 2 point: The student provides the number of work hours (37) to earn $311, including all calculations.