Name _____ Date _____ Class _____

8.EE.1

SELECTED RESPONSE

Select the correct answer.

1. Use properties of exponents to write an equivalent expression for $11^2 \cdot 11^5$.

   Ⓐ 11^{10} Ⓒ 11^7

   Ⓑ $11^{\frac{2}{5}}$ Ⓓ 121^7

2. Use properties of exponents to write an equivalent expression for $5^4 \cdot 5^{-7}$.

   Ⓐ $\frac{1}{5^{28}}$ Ⓒ 5^{11}

   Ⓑ $\frac{1}{5^3}$ Ⓓ $5^{-\frac{4}{7}}$

3. Use properties of exponents to write an equivalent expression for $\frac{13^9}{13^6}$.

   Ⓐ $13^{\frac{3}{2}}$ Ⓒ 1^3

   Ⓑ 13^{15} Ⓓ 13^3

4. Use properties of exponents to write an equivalent expression for $(9^4)^6$.

   Ⓐ 9^{24} Ⓒ $\frac{1}{9^2}$

   Ⓑ 9^{10} Ⓓ $9^{\frac{2}{3}}$

5. Simplify the expression $(8^5)^0 + (7+3)^6 \cdot 10^{-8}$.

   Ⓐ $\frac{1}{100}$ Ⓒ 100

   Ⓑ $1\frac{1}{100}$ Ⓓ 101

Select all correct answers.

6. Which of the following expressions are equivalent to 14^6?

   Ⓐ $\frac{14^{18}}{14^3}$ Ⓓ $(14^4)^2$

   Ⓑ $\frac{(14^2)^5}{14^4}$ Ⓔ $(146)^0$

   Ⓒ $14^2 \cdot 14^3$ Ⓕ $14^{-5} \cdot 14^{11}$

7. Which of the following expressions have a value less than 1?

   Ⓐ $\frac{4^{11}}{4^{14}}$ Ⓓ $(2^3)^{-2}$

   Ⓑ $\frac{(3^5)^2}{3^4}$ Ⓔ $(5^4)^2 \cdot 5^{-11}$

   Ⓒ $4^{-1} \cdot 4^5$ Ⓕ $\frac{6^{-4} \cdot 6^6}{6^3}$

Select the correct answer for each lettered part.

8. Determine whether the properties of exponents are used correctly to simplify.

   a. $\frac{5^{10}}{5^5} = 5^2$ ○ Yes ○ No

   b. $(4^8)^3 = 4^{24}$ ○ Yes ○ No

   c. $10^{-4} = \frac{1}{4^{10}}$ ○ Yes ○ No

   d. $15^6 \cdot 15^3 = 15^{18}$ ○ Yes ○ No

   e. $(6^8)^0 = 1$ ○ Yes ○ No

CONSTRUCTED RESPONSE

9. Find the missing exponent. Explain.

$$\frac{5^{11}}{5^?} = 5^4$$

_____

_____

Name _____ Date _____ Class _____

10. Find the missing exponent. Explain your reasoning.

$$7^{?} \cdot (7^5)^4 = 7^{14}$$

11. Is $(17^3)^4 \cdot 17^{-4}$ equal to 17^8? Explain why or why not.

12. Is $\frac{3^{13}}{(3^5)^3}$ equal to 9? Explain why or why not.

13. Write three expressions that are equivalent to 2^6 using three different properties of integer exponents. Show why the expressions are equivalent.

14. Show whether the following expressions are equivalent to 3^4.

a. $\frac{3^2 \cdot 3^8}{(3^3)^2}$

b. $\left(\frac{3^9}{3^5 \cdot 3^6}\right)^2$

15. Three students simplified the expression $\frac{3^3}{9} \cdot 3^{-1}$ as shown below. Which student got the correct answer? What error(s) did each of the other students make, and what should they have done instead?

Student A:

$$\frac{3^3}{9} \cdot 3^{-1} = \frac{1^3}{3} \cdot 3^{-1} = \frac{1}{3} \cdot \frac{1}{3} = \frac{1}{9}$$

Student B: $\frac{3^3}{9} \cdot 3^{-1} = \frac{3^3 \cdot 3^{-1}}{9} = \frac{9^2}{9} = 9$

Student C:

$$\frac{3^3}{9} \cdot 3^{-1} = \frac{3^3}{3^2} \cdot 3^{-1} = 3^1 \cdot 3^{-1} = 3^0 = 1$$

16. The radius of the Sun is roughly 10^9 m, and the radius of Earth is roughly 10^7 m.

a. How many copies of Earth have to line up side-by-side in order to stretch across the face of the Sun? Explain your reasoning.

b. How many copies of Earth could fit inside the Sun? Explain your reasoning.

Name _____ Date _____ Class _____

8.EE.2

SELECTED RESPONSE

Select the correct answer.

1. Evaluate $\sqrt{\frac{1}{4}}$.

   Ⓐ 2 Ⓒ $\frac{1}{8}$

   Ⓑ $\frac{1}{2}$ Ⓓ $-\frac{1}{2}$

2. What is the value of x if $x^2 = 10$?

   Ⓐ $\pm\sqrt{10}$ Ⓒ 5

   Ⓑ $\sqrt{10}$ Ⓓ ± 5

3. Evaluate $\sqrt[3]{\frac{8}{27}}$.

   Ⓐ $\frac{2}{9}$ Ⓒ $\frac{3}{2}$

   Ⓑ $\frac{2}{3}$ Ⓓ 6

4. What is the value of x if $x^3 = 100$?

   Ⓐ $\sqrt[3]{100}$ Ⓒ 10

   Ⓑ $\pm\sqrt[3]{100}$ Ⓓ ± 10

5. Colin has a square garden with an area of 97 square feet. What is the length of each side of the garden?

   Ⓐ 10 ft Ⓒ $\sqrt[3]{97}$ ft

   Ⓑ $\sqrt{97}$ ft Ⓓ $-\sqrt{97}$ ft

Select all correct answers.

6. For which values of x is the expression $\sqrt{x}$ irrational?

   Ⓐ 1
   Ⓑ 2
   Ⓒ 3
   Ⓓ 4
   Ⓔ 5

7. Which of the following expressions are equivalent to rational numbers?

   Ⓐ $\sqrt[3]{0.008}$
   Ⓑ $\sqrt{2}$
   Ⓒ $\sqrt[3]{1}$
   Ⓓ $\sqrt{3}$
   Ⓔ $\sqrt[3]{9}$
   Ⓕ $\sqrt{\frac{9}{64}}$

Match each radical expression with its rational equivalent.

____ 8. $\sqrt{4}$

____ 9. $\sqrt{81}$

____ 10. $\sqrt{0.25}$

____ 11. $\sqrt[3]{\frac{1}{64}}$

____ 12. $\sqrt[3]{-\frac{1}{8}}$

____ 13. $\sqrt{0.49}$

A $-\frac{1}{2}$
B 0.05
C 0.07
D $\frac{1}{4}$
E 0.5
F 0.7
G 2
H 9

CONSTRUCTED RESPONSE

14. Monica's rectangular living room is 12 ft by 15 ft. She has a square rug that covers $\frac{5}{9}$ of the area of the floor. What is the side length of the square rug? Show your work.

15. If $n^3 = 64$, what is the value of n^2? Explain.

Name _____ Date _____ Class _____

16. Terry has two square sheets of wrapping paper. The area of the first is 36 in^2. The side length of the second is 1 inch longer than the first. Find the side length of each piece of wrapping paper and determine the area of the second piece.

17. A rectangular prism measures 2 in. by 4 in. by 8 in. What is the side length of a cube with the same volume? Show your work.

18. What values of x make the equation $x^2 = \sqrt[3]{125}$ a true statement? Show your work.

19. The numbers 1, 64, and 729 are both perfect squares and perfect cubes. Begin by finding the square roots and cube roots of 1, 64, and 729. Use the results to find a pattern. Then use the pattern to find the next number that is both a perfect square and a perfect cube. Show your work.

20. Alex is accenting one wall of his room by painting a pattern of squares across the wall. He wants to alternate between red squares with an area of 25 square inches and blue squares with an area of 16 square inches.

    a. Find the side length of each square. Show your work.

    b. If he has enough room to place 12 of each type of square with no space between them, how long is the wall?

21. A fish tank is in the shape of a cube and has a volume of 27 ft^3. It has glass on the bottom and the four vertical sides, but no top. Where two pieces of glass meet, the edge is reinforced with metal framing.

    a. What is the total area of glass needed to make the fish tank? Show your work.

    b. What is the total length of metal framing needed to reinforce the edges of the fish tank?

Name _____ Date _____ Class _____

8.EE.3

SELECTED RESPONSE

Select the correct answer.

1. What is 12,325 written in scientific notation?

   (A) 1.2325×10^{-4} (C) 1.2325×10^{4}

   (B) 12.325×10^{3} (D) 1.2325×10^{5}

2. What is 0.005007 written in scientific notation?

   (A) 5.007×10^{3} (C) 5.007×10^{-4}

   (B) 5.007×10^{-3} (D) 500.7×10^{-5}

3. What is 1.0315×10^{6} written in standard notation?

   (A) 1,031,500 (C) 0.000010315

   (B) 103,150 (D) 0.0000010315

4. What is 9.2568×10^{-3} written in standard notation?

   (A) 0.0092568 (C) 0.92568

   (B) 0.092568 (D) 9256.8

5. What is 8.305×10^{-7} written in standard notation?

   (A) –83,050,000 (C) 0.00000008305

   (B) 83,050,000 (D) 0.0000008305

Select all correct answers.

6. Which of the following statements are true?

   (A) 3×10^{4} is 50 times as great as 6×10^{2}.

   (B) 5×10^{2} is 100 times as great as 5×10^{-2}.

   (C) 7×10^{-5} is 5000 times as great as 1.4×10^{-9}.

   (D) 8×10^{-12} is 0.0001 times as great as 8×10^{-8}.

   (E) 2×10^{-6} is 0.01 times as great as 2×10^{-4}.

   (F) 1.8×10^{-3} is 0.00002 times as great as 9×10^{4}.

7. Which of the following measurements are equal to 0.000043 L?

   (A) 4.3×10^{2} L

   (B) 4.3×10^{-4} L

   (C) 4.3×10^{-5} L

   (D) 4.3×10^{-2} mL

   (E) 4.3×10^{-8} mL

   (F) 4.3×10^{-10} mL

Match each number with its scientific notation equivalent.

____ 8. 3794

____ 9. 0.000003794

____ 10. 3,794,000

____ 11. 379,400

____ 12. 0.00000000003794

A 3.794×10^{6}

B 3.794×10^{5}

C 3.794×10^{3}

D 3.794×10^{-6}

E 3.794×10^{-10}

F 3.794×10^{-11}

CONSTRUCTED RESPONSE

13. A business sold for 32.6 million dollars. Write that number in scientific notation. Show your work.

    _____

    _____

14. Alea and Carlos are at the beach trying to guess the number of grains of sand. Alea estimates that there are 5×10^{15} grains of sand on the beach. Carlos estimates that there are 2×10^{12} grains of sand on the beach. How many times greater is Alea's estimate than Carlos's? Show your work.

    _____

    _____

15. Which is greater, 5.764×10^{-7} or 0.00000057652? Explain your reasoning.

    _____

    _____

Name _____ Date _____ Class _____

16. Suppose a single bacterium occupies an area of 7.3×10^{-12} m^2. A colony of 100 of the same bacteria occupies an area of 7.3×10^{-6} square units. Which of the following is the best choice of units for the measurement 7.3×10^{-6}: square meters, square centimeters, or square millimeters? Explain your reasoning.

17. Water samples were taken from a river that runs through a city and a town. The city has a population of 5.3×10^5, and the town has a population of 1.06×10^4. The water sample taken from the city had 6.28×10^6 bacteria per liter. The water sample taken from the town had 1.256×10^5 bacteria per liter.

a. How many times greater is the population of the city than the population of the town?

b. How many times greater is the bacteria level in the city's water sample than the bacteria level in the town's water sample?

c. Use these results to make a conjecture about the relationship between population and bacteria levels in the water.

18. The mass of object A is 1.325×10^{-4} kg. The mass of object B is 3.3125×10^3 mg. Michael says that the mass of object B is 25,000,000 times greater than the mass of object A. Ana says that the mass of object B is 25 times greater than the mass of object A. Compare the masses of objects A and B to decide who is correct. Then find the error that the other person most likely made.

19. Mercury is 57,910,000 km from the Sun, Earth is 149,600,000 km from the Sun, and Saturn is 1,429,400,000 km from the Sun.

a. Write the distances in scientific notation.

b. Use the results from part a to find how many times greater Earth's distance from the Sun is than Mercury's distance from the Sun.

c. Use the results from part a to find how many times greater Saturn's distance from the Sun is than Mercury's distance from the Sun.

d. If you knew only the results of the comparisons in parts b and c and not the distances of the three planets from the Sun, what conclusion could you make about the relationship of Earth's distance from the Sun and Saturn's distance from the Sun? Explain.

Name _____ Date _____ Class _____

8.EE.4

SELECTED RESPONSE

Select the correct answer.

1. Write the sum $3.75 \times 10^7 + 7.1 \times 10^6$ in scientific notation.

   (A) 44.6×10^6 (C) 1.085×10^8

   (B) 4.46×10^7 (D) 1.085×10^{14}

2. Write the difference $0.073 - 5.1 \times 10^{-3}$ in scientific notation.

   (A) -5.027×10^{-3} (C) 67.9×10^{-3}

   (B) 5.027×10^{-3} (D) 6.79×10^{-2}

3. Write the product $(8.4 \times 10^4)(9.5 \times 10^3)$ in scientific notation.

   (A) 79.8×10^7 (C) 79.8×10^{12}

   (B) 7.98×10^8 (D) 7.98×10^{13}

4. Write the quotient $\frac{6.25 \times 10^{-6}}{12.5}$ in scientific notation.

   (A) 5×10^{-7} (C) 2×10^{-6}

   (B) 0.5×10^{-6} (D) 2×10^6

5. When you use a calculator to find $(4.1 \times 10^{-3})(3.2 \times 10^{-6})$, what result does the calculator display?

   (A) 1.312E–8 (C) 1.312E10

   (B) 1.312E–6 (D) 1.312E12

Select all correct answers.

6. Identify all of the following values that are equivalent to $0.35 + 1.5 \times 10^{-3}$.

   (A) 1.85 (D) 3.515×10^{-1}

   (B) 0.3515 (E) 1.85E–3

   (C) 1.85×10^{-3} (F) 3.515E–1

7. Identify all of the following values that are equivalent to $\frac{0.75}{2.5 \times 10^6}$.

   (A) 3×10^{-7} (D) 30,000,000

   (B) 3×10^7 (E) 3E–7

   (C) 0.0000003 (F) 3E7

Match each number with its calculator notation equivalent.

____ 8. 9.8×10^4

____ 9. 0.000098

____ 10. 9.8×10^{-6}

____ 11. 9.8×10^7

____ 12. 980,000,000

A 9.8E–6
B 9.8E8
C 9.8E4
D 9.8E7
E 9.8E9
F 9.8E–5

CONSTRUCTED RESPONSE

13. An electronic component measures 1.2×10^{-5} m by 1.5×10^{-4} m. Find the area of this component in square millimeters, and express your answer using scientific notation. Show your work.

14. Simplify $\frac{3 \times 10^{-3} + 6 \times 10^{-2}}{(7 \times 10^4)(3 \times 10^8)}$. Show your work.

15. A company produces plastic discs for use in other products. The company produces 2×10^7 discs daily, each 1.55 mm thick.

    a. If the discs from one day's production were stacked one on top of the other, how tall would the stack be?

    b. Use the results from part a and the facts that 1 km = 1000 m and 1 m = 1000 mm to find the height of the stack in meters and kilometers.

    c. Which unit is most appropriate to use for the height of the stack? Explain.

Name _____ Date _____ Class _____

16. Suppose a grain of dust is in the shape of a sphere with a radius 2×10^{-7} m. What is the volume of the dust grain? Use the volume formula $V = \frac{4}{3}\pi r^3$ with 3.14 as an approximation for π. Write your answer in scientific notation rounded to two decimal places.

17. Suppose a person drinks 8 glasses of water per day and each glass contains 3×10^2 mL of water.

    a. How many milliliters of water does the person drink in 10 years? Use 365 days per year and express your answer using scientific notation.

    b. Of the units milliliters and liters, which is the more appropriate unit for this measurement? Explain your answer.

18. A computer store sells a flash drive that stores 2 gigabytes of data and another that stores 750 megabytes. Which flash drive should you purchase if you need to store a file that uses 9.65×10^7 bytes of storage space as well as 12 files that use 7.5×10^7 bytes each? Show your work. Use the facts that 1 gigabyte = 10^9 bytes and 1 megabyte = 10^6 bytes.

19. On a recent math test, Alessandro was asked to simplify $\frac{7.2 \times 10^2 + 9.63 \times 10^3}{9 \times 10^9}$ and write his answer in standard form. Alessandro used a calculator and determined the answer to be 1.15E–6, which he wrote as 0.000000115. His answer was marked incorrect.

    a. Simplify $\frac{7.2 \times 10^2 + 9.63 \times 10^3}{9 \times 10^9}$. Write your answer in standard form.

    b. Compare your result from part a to Alessandro's answer and describe his likely error.

20. The Sun has a mass of 1.989×10^{30} kg and a diameter of 1,390,000 km. Earth has a mass of 5.972×10^{24} kg and a diameter of 12,756 km. Assuming the Sun and Earth are spheres, determine which has greater average density. Justify your answer. (Use the volume formula $V = \frac{4}{3}\pi r^3$ with 3.14 as an approximation for π. Also use the average density formula $D = \frac{m}{V}$, where m is the mass and V is the volume.)

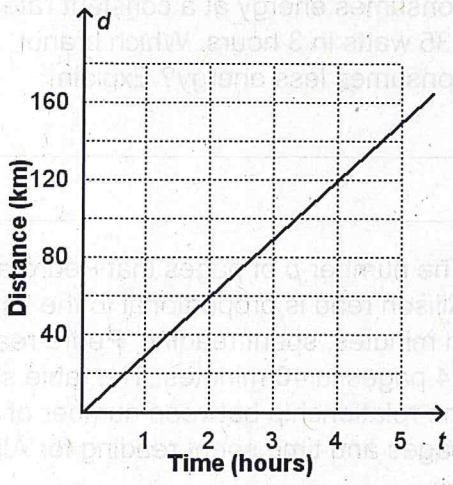
Name _____ Date _____ Class _____

8.EE.5

SELECTED RESPONSE

Select the correct answer.

1. The graph shows a proportional relationship. Use the graph to identify the unit rate.



   (A) 30 hours per kilometer
   (B) 60 kilometers per hour
   (C) 30 kilometers per hour
   (D) $\frac{3}{2}$ kilometers per hour

2. The cost C, in dollars, of a prepaid cell phone call is proportional to the time t, in minutes, that the call lasts. The equation that represents this relationship for carrier A is $C_A = 0.15t$. The table shows the relationship for carrier B. Which carrier has a lower unit rate?

Time (minutes)	Cost (dollars)
2	0.24
5	0.60
10	1.20
30	3.60

   (A) Carrier A
   (B) Carrier B
   (C) Carrier A and carrier B have the same unit rate.
   (D) The relationship cannot be determined.

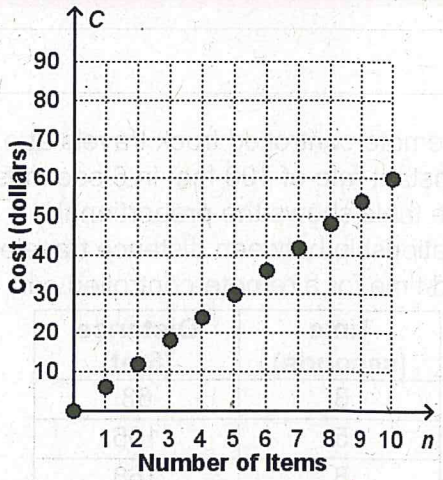
3. The number of pages p that a laser printer prints is proportional to the printing time t, in minutes. Printer A prints 104 pages in 4 minutes. The table shows the relationship between the amount of time and the number of pages printed for printer B. Which printer prints more slowly?

Time (minutes)	Pages printed
3	84
5	140
9	252
14	392

   (A) Printer A
   (B) Printer B
   (C) Printer A and printer B have the same unit rate.
   (D) The relationship cannot be determined.

Select all correct answers.

4. Which of the following proportional situations can be represented by this graph?



   (A) 2 pairs of headphones cost $12.
   (B) 24 carrots cost $4.
   (C) 3 packs of D batteries cost $18.
   (D) 6 bags of apples cost $36.
   (E) 6 jigsaw puzzles cost $10.

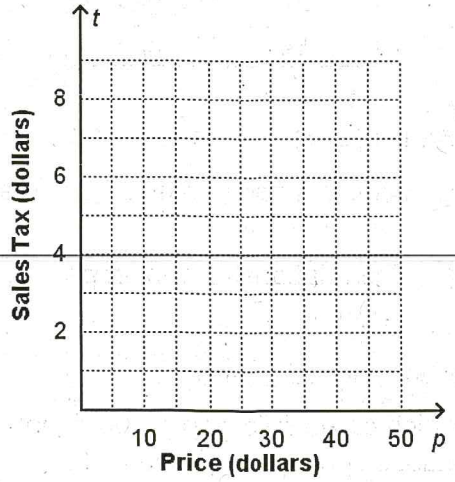
Name _____ Date _____ Class _____

CONSTRUCTED RESPONSE

5. The table shows the proportional relationship between an item's price p and the sales tax t charged for that item.

Price (dollars)	Sales Tax (dollars)
14	1.12
24	1.92
30	2.40
44	3.52

Graph the line that represents this relationship. What is the slope of the line? Interpret the slope.



_____

_____

6. A remote-controlled truck travels at a constant rate of 108 feet in 6 seconds. The table shows the proportional relationship between distance traveled and time for a remote-controlled car.

Time (seconds)	Distance (feet)
3	63
5	105
8	168
12	252

Which travels faster, the car or truck? Explain.

_____

_____

7. Johan is comparing energy consumption for two different brands of refrigerators. The energy consumed e, in watts, is proportional to the time t, in hours, that the refrigerator is operating. The equation $e = 160t$ models the relationship for brand R. Another refrigerator, brand S, consumes energy at a constant rate of 435 watts in 3 hours. Which brand consumes less energy? Explain.

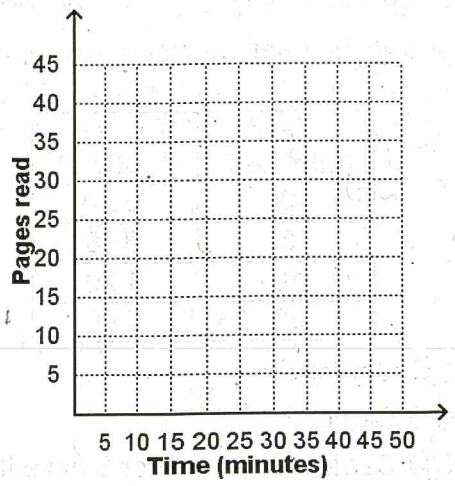
_____

_____

8. The number p of pages that Pedro and Allison read is proportional to the time t, in minutes, spent reading. Pedro reads 24 pages in 40 minutes. The table shows the relationship between number of pages and time spent reading for Allison.

Graph the lines that represent the relationships. Label each line with the name of the student it represents and the axes with the appropriate variables. Who reads faster? Explain.

Time (minutes)	Pages read
15	12
25	20
45	36
50	40



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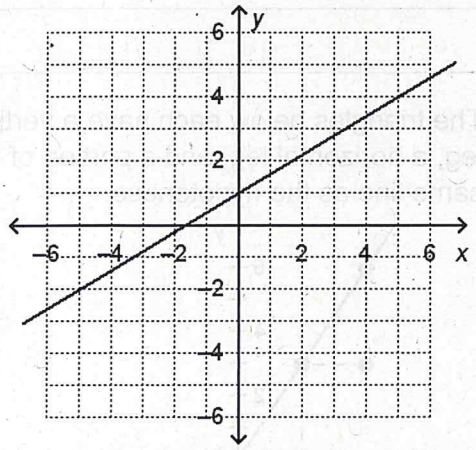
Name _____ Date _____ Class _____

8.EE.6

SELECTED RESPONSE

Select the correct answer.

1. Why is the slope of the line shown the same between any two distinct points on the line?



Ⓐ All right triangles that have a vertical leg, a horizontal leg, and a portion of the line as the hypotenuse are similar, so the ratio of the length of the vertical leg to the length of the horizontal leg is always $\frac{5}{3}$.

Ⓑ All right triangles that have a vertical leg, a horizontal leg, and a portion of the line as the hypotenuse are similar, so the ratio of the length of the vertical leg to the length of the horizontal leg is always $\frac{3}{5}$.

Ⓒ All right triangles that have a vertical leg, a horizontal leg, and a portion of the line as the hypotenuse are congruent, so the ratio of the length of the vertical leg to the length of the horizontal leg is always $\frac{5}{3}$.

Ⓓ All right triangles that have a vertical leg, a horizontal leg, and a portion of the line as the hypotenuse are congruent, so the ratio of the length of the vertical leg to the length of the horizontal leg is always $\frac{3}{5}$.

2. A line passes through the points (0, –4) and (2, –11). If (x, y) is an arbitrary point on the line other than (0, –4), which equation can you write for the line based on the fact that the slope of a line is constant?

Ⓐ $\frac{y-0}{x-(-4)}=-\frac{7}{2}$

Ⓑ $\frac{y-0}{x-(-4)}=-\frac{2}{7}$

Ⓒ $\frac{y-(-4)}{x-0}=-\frac{7}{2}$

Ⓓ $\frac{y-(-4)}{x-0}=-\frac{2}{7}$

3. A line that has a slope of $-\frac{5}{6}$ passes through the origin. Let (x, y) be an arbitrary point on the line other than the origin. Which of the following equations properly uses the fact that the slope of a line is constant to derive an equation of the line?

Ⓐ $\frac{y}{x}=-\frac{5}{6}$

Ⓑ $\frac{y}{x}=\frac{5}{6}$

Ⓒ $\frac{y-5}{x+6}=0$

Ⓓ $\frac{x}{y}=-\frac{5}{6}$

4. For the line that passes through (0, 5) and has a slope of –3, you use the fact that the slope of a line is constant to derive the equation $\frac{y-5}{x-0}=-3$. What is an equivalent form of this equation?

Ⓐ $y=3x-5$

Ⓑ $y=3x+5$

Ⓒ $y=-3x-5$

Ⓓ $y=-3x+5$

Name _____ Date _____ Class _____

CONSTRUCTED RESPONSE

5. A line passes through the origin and the point (4, 8). Show how you can use this information, an arbitrary point (x, y) other than the origin, and the slope formula to find an equation of the line. Then rewrite the equation in the form $y = mx + b$.

6. Mi is deriving an equation of the line with a slope of $-\frac{1}{2}$ and a y-intercept of 4. She lets (x, y) be an arbitrary point on the line other than $(0, 4)$ and proceeds as shown.

$$\frac{\text{change in } y}{\text{change in } x} = m$$

$$\frac{y-0}{x-4} = -\frac{1}{2}$$

$$\frac{y}{x-4} \cdot (x-4) = -\frac{1}{2} \cdot (x-4)$$

$$y = -\frac{1}{2}x + 2$$

a. Looking at Mi's final equation, explain how you know she made a mistake.

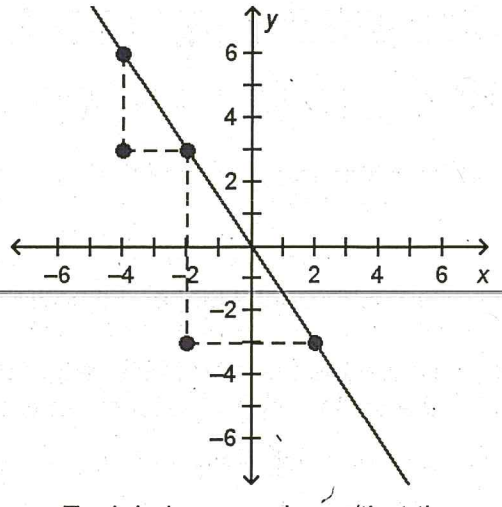
b. Describe what Mi did wrong.

c. Derive a correct equation of the line.

7. A line that passes through the origin has slope m. Show how you can use this information, an arbitrary point (x, y) other than the origin, and the slope formula to derive an equation of the line. Then solve for y to rewrite the equation.

8. A line that passes through the point $(0, b)$ has slope m. Show how you can use this information, an arbitrary point (x, y) other than $(0, b)$, and the slope formula to derive an equation of the line. Then solve for y to rewrite the equation.

9. The triangles below each have a vertical leg, a horizontal leg, and a portion of the same line as the hypotenuse.



a. Explain how you know that the triangles are similar.

b. Use each triangle to determine the slope of the line. Explain why you would expect to get the same slope.

c. Use these results to generalize about the slope of a line calculated using any right triangle with a vertical leg, a horizontal leg, and a portion of the line as the hypotenuse.

Name _____ Date _____ Class _____

8.EE.7a

SELECTED RESPONSE

Select the correct answer.

1. How many solutions does the equation $5x + 17 = 4(3x - 1)$ have?
   - (A) Infinitely many solutions
   - (B) One solution
   - (C) No solutions
   - (D) The number of solutions cannot be determined.
2. How many solutions does the equation $7x - 11 = 5(x - 2) + 2x - 1$ have?
   - (A) Infinitely many solutions
   - (B) One solution
   - (C) No solutions
   - (D) The number of solutions cannot be determined.
3. Which of the following equations has exactly one solution?
   - (A) $-7x + 2 = -3(x - 3) - 4x - 7$
   - (B) $14x = 7(2x + 2)$
   - (C) $5x + 3 = -2(2x + 3)$
   - (D) $3(4x + 2) - 9 = 12x - 3$
4. What is a possible result of simplifying the equation $15x - 4 = 3(5x - 4)$?
   - (A) $-4 = -4$
   - (B) $x = 4$
   - (C) $-4 = -12$
   - (D) $x = 0$
5. Which of the following equations has no solutions?
   - (A) $-6x + 1 = -3(2x + 1) + x$
   - (B) $-5 + 14x = 7(2x) - 5$
   - (C) $4x - 4 = -4(-x + 1)$
   - (D) $-9x + 2 = -3(3x + 2)$

Select all correct answers.

6. Which of the following equations have no solutions?
   - (A) $7x - 9 = 47$
   - (B) $6x - 9 = 3(2x - 3)$
   - (C) $-2x + 10 = 2(-x + 5) + 1$
   - (D) $-x + 20 = x - 4$
   - (E) $-5x - 5 = -5(x - 1)$
7. Suppose a linear equation in one variable, x, is simplified. Which of the following resulting equations would indicate that the original equation has infinitely many solutions?
   - (A) $-4 = -4$
   - (B) $11 = x$
   - (C) $0 = 0$
   - (D) $x = 0$
   - (E) $1 = -1$
   - (F) $x = x$

Select the correct answer for each lettered part.

8. Determine the number of solutions that each equation has.

a. $7x + 5 = 2(4x + 3)$	○ One solution	○ No solutions	○ Infinitely many solutions
b. $x - 2(x - 6) = -x + 12$	○ One solution	○ No solutions	○ Infinitely many solutions
c. $8x + 5 = 5x - 7$	○ One solution	○ No solutions	○ Infinitely many solutions
d. $2(x - 1) = 3(x - 4)$	○ One solution	○ No solutions	○ Infinitely many solutions
e. $4x - 1 = 2(2x - 1)$	○ One solution	○ No solutions	○ Infinitely many solutions

Name _____ Date _____ Class _____

CONSTRUCTED RESPONSE

9. Write a linear equation in one variable that simplifies to the form $a = a$, where a is a number. Write your equation so that one side has parentheses and requires using the distributive property to simplify. How many solutions are there? Solve the equation and explain the result.

10. Write a linear equation in one variable that has no solutions. Write your equation so that one side of the equation has both a variable term with a coefficient other than 1 and a constant term. Show your work. Explain why there are no solutions.

11. Write a linear equation in one variable that has one solution. Write your equation so that there is a variable term and a constant term on each side of the equation. Solve your equation.

12. Sarah attempted to solve the equation $-x + 5(x + 6) = 4x + 30$ as shown, and concluded that there are no solutions.

$$\begin{aligned} -x + 5(x + 6) &= 4x + 30 \\ -x + 5x + 6 &= 4x + 30 \\ 4x - 4x + 6 &= 4x - 4x + 30 \\ 6 &= 30 \end{aligned}$$

Solve the equation, identify Sarah's error, and find the correct number of solutions.

13. Mark and Zoe are hiking a trail. Mark starts before Zoe. The expression $2t + 100$ represents how far, in meters, Mark has hiked t seconds after Zoe starts, and $2t$ represents how far Zoe has hiked t seconds after starting. Is there a time during the hike when Mark and Zoe have hiked the same distance? Explain.

14. a. How many solutions are there to $8x - 7 = 2(2x + 7) - 5$? Show your work, and explain your reasoning.

b. Change one number in the equation in part a so the number of solutions for the resulting equation is different than in part a. How many solutions does your equation have? Show your work, and explain your reasoning.

c. Change one number in your equation in part b so the number of solutions for the new equation differs from the equations in parts a and b. How many solutions does this equation have? Show your work, and explain your reasoning.

15. What are the conditions for the equation $ax + b = c(x + d)$, where a, b, c, and d are numbers and x is a variable, to have no solutions? One solution? Infinitely many solutions? Explain by simplifying the equation for each set of conditions.

Name _____ Date _____ Class _____

8.EE.7b

SELECTED RESPONSE

Select the correct answer.

1. What are the steps to solving the equation $\frac{3}{8}x+\frac{15}{2}=18$?

   (A) Subtract $\frac{15}{2}$ from both sides of the equation, and then multiply both sides of the equation by $-\frac{3}{8}$.

   (B) Add $\frac{15}{2}$ to both sides of the equation, and then multiply both sides of the equation by $\frac{3}{8}$.

   (C) Subtract $\frac{15}{2}$ from both sides of the equation, and then multiply both sides of the equation by $\frac{8}{3}$.

   (D) Add $\frac{15}{2}$ to both sides of the equation, and then multiply both sides of the equation by $\frac{8}{3}$.

2. How do the solutions of the equations $\frac{1}{3}(x-9)=2x+7$ and $\frac{4}{3}(x+4)=-4x$ compare?

   (A) The solution of the equation $\frac{1}{3}(x-9)=2x+7$ is greater than the solution of $\frac{4}{3}(x+4)=-4x$.

   (B) The solution of the equation $\frac{1}{3}(x-9)=2x+7$ is less than the solution of $\frac{4}{3}(x+4)=-4x$.

   (C) The solutions are equal.

   (D) The relationship cannot be determined.

3. A rectangle has length $\frac{1}{2}x+5$ and width $\frac{1}{4}x+4$. If the perimeter of the rectangle is 42 meters, what are the length and the width of the rectangle?

   (A) Length: 8 meters; width: 13 meters

   (B) Length: 13 meters; width: 8 meters

   (C) Length: 15 meters; width: 27 meters

   (D) Length: 27 meters; width: 15 meters

Select all correct answers.

4. Which of the following equations have a positive solution?

   (A) $\frac{1}{2}x+5=\frac{1}{2}(2-x)$

   (B) $\frac{2}{5}(x+5)=\frac{1}{5}(x+4)$

   (C) $\frac{3}{2}(x-8)=\frac{1}{4}x+3$

   (D) $\frac{1}{3}x+6=\frac{3}{4}(x+8)$

   (E) $\frac{5}{2}(x-3)=\frac{5}{3}x-\frac{5}{2}$

CONSTRUCTED RESPONSE

5. Solve the equation $-\frac{3}{5}(x-10)=\frac{6}{5}x+2$. Show your work.

6. Do the equations $\frac{2}{3}(x-6)+3=4x-4$ and $\frac{2}{3}x-6+3=4x-4$ have the same solution? Explain by comparing the two equations.

Name _____ Date _____ Class _____

7. The area A of a trapezoid is given by $A = \frac{1}{2}h(b_1 + b_2)$, where h is the height and b_1 and b_2 are the lengths of the bases. What is the length of the other base if the area is 98 square meters, the height is 7 meters, and the length of one base is 11 meters? Show your work.

8. Ryan and Nate are swimming in a lake. Ryan swims $\frac{5}{4}$ meters per second. Nate swims $\frac{4}{5}$ meter per second. If Nate starts 45 meters ahead of Ryan, how long does it take Ryan to catch Nate? How far must Ryan swim to catch him? Explain.

9. a. Use the distributive property to solve $\frac{1}{4}(x-7)+5=\frac{7}{8}x$. Show your work.

b. Solve the equation from part a by first multiplying both sides by the least common denominator of $\frac{1}{4}$ and $\frac{7}{8}$. Show your work, and compare your result here with that from part a.

c. What property of equality justifies the first step that you took in part b? How is this step helpful?

10. Christian claims he found the solution of the equation $\frac{3}{4}x+5=\frac{1}{2}(x-8)$. His work is shown below. Identify his error, correct the error, and find the actual solution. Show your work.

$$\frac{3}{4}x+5=\frac{1}{2}(x-8)$$
$$\frac{3}{4}x+5=\frac{1}{2}x-4$$
$$\frac{3}{4}x+\frac{1}{2}x+5=\frac{1}{2}x+\frac{1}{2}x-4$$
$$\frac{5}{4}x+5-5=-4-5$$
$$\frac{5}{4}x=-9$$
$$x=-\frac{36}{5}$$

11. The booster club sets up a hot dog stand for fundraising at a middle school. The club receives \$12 in donations while members set up the stand. The club sells hot dogs for \$1.75. Each hot dog costs the club \$0.50, and other supplies cost \$57. The club wants to know how many hot dogs they must sell to break even.

a. Write an equation that represents this situation, where h represents the number of hot dogs sold.

b. Find the number of hot dogs the booster club must sell to break even.

c. If the booster club wants to break even by only selling half the number of hot dogs from part b, how much should it charge for each hot dog? Use p to represent the new price for each hot dog. Show your work.

Name _____ Date _____ Class _____

8.EE.8a

SELECTED RESPONSE

Select the correct answer.

1. How can you tell if an ordered pair is a solution of a system of linear equations by examining the graphs of the equations?

   (A) Neither line passes through the point represented by the ordered pair.

   (B) Just one of the lines passes through the point represented by the ordered pair.

   (C) Both lines pass through the point represented by the ordered pair.

   (D) You cannot tell whether an ordered pair is a solution of a system of linear equations by examining the graphs of the equations.

2. Does the ordered pair (–5, 3) satisfy the system of equations? Explain.

$$\begin{cases} y = -2x - 1 \\ y = -\frac{3}{5}x \end{cases}$$

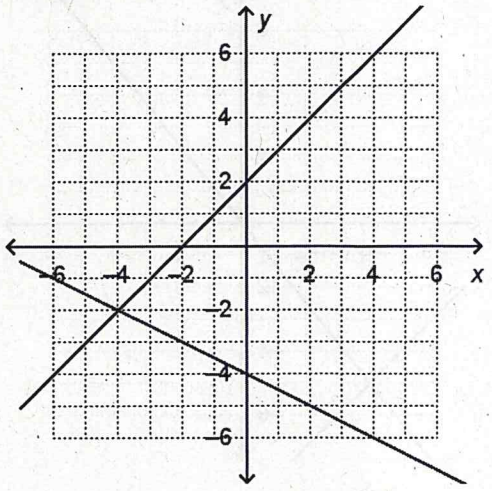
   (A) Yes, because the ordered pair (–5, 3) satisfies both equations of the system.

   (B) No, because the ordered pair (–5, 3) satisfies only the equation $y = -2x - 1$.

   (C) No, because the ordered pair (–5, 3) satisfies only the equation $y = -\frac{3}{5}x$.

   (D) No, because the ordered pair (–5, 3) satisfies neither equation of the system.

3. Which ordered pair is the solution of the system of linear equations?



   (A) (–4, –2) (C) (–2, –4)

   (B) (–4, 2) (D) (2, 4)

Select all correct answers.

4. For which of the following systems of equations is the ordered pair (–8, 4) a solution?

   (A) $\begin{cases} 3x + 4y = 8 \\ -3x + 4y = -40 \end{cases}$

   (B) $\begin{cases} -2x - 3y = 4 \\ 7x + 4y = -40 \end{cases}$

   (C) $\begin{cases} -5x + 2y = 32 \\ 6x - 7y = -20 \end{cases}$

   (D) $\begin{cases} -3x + 5y = 44 \\ 6x - 5y = -68 \end{cases}$

   (E) $\begin{cases} 3x + 8y = 56 \\ -x + 9y = 28 \end{cases}$

CONSTRUCTED RESPONSE

5. Suppose that a graph of a system of linear equations consists of two lines that coincide. How many solutions does the system have? Explain your reasoning.

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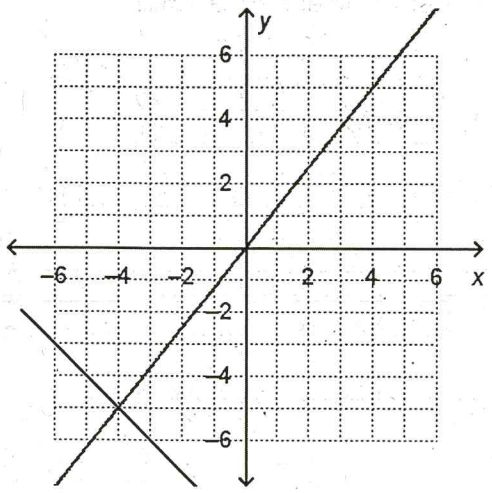
Name _____ Date _____ Class _____

6. Is the ordered pair (–5, –4) a solution of the system of linear equations whose graph is shown? Explain your reasoning.



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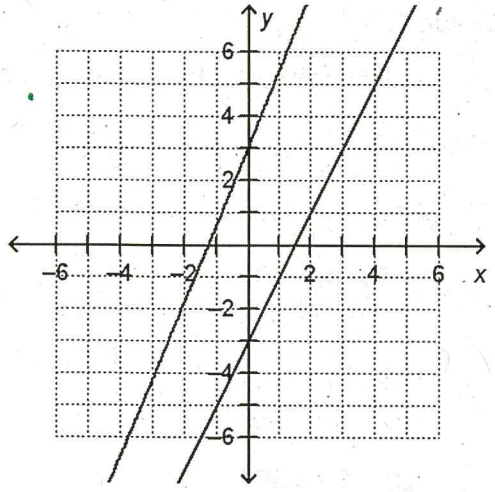
7. Matt concluded that the system whose graph is shown has no solution. Is he correct? Explain your reasoning.



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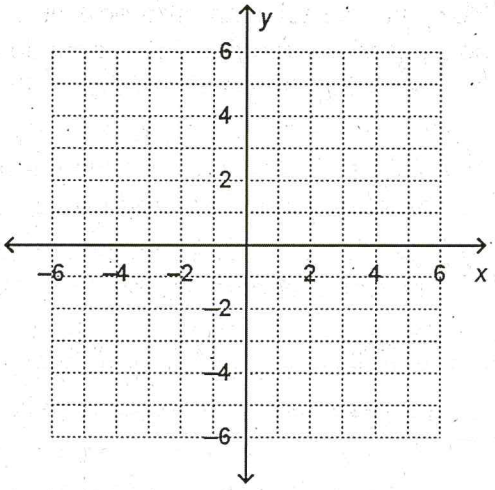
8. Can the same system of linear equations have the ordered pairs (3, 7) and (6, 13) as solutions? Explain your reasoning by providing an example.

_____

_____

9. The solution of a system of linear equations is (–4, 2).

   a. Draw two lines that could represent this system of equations.

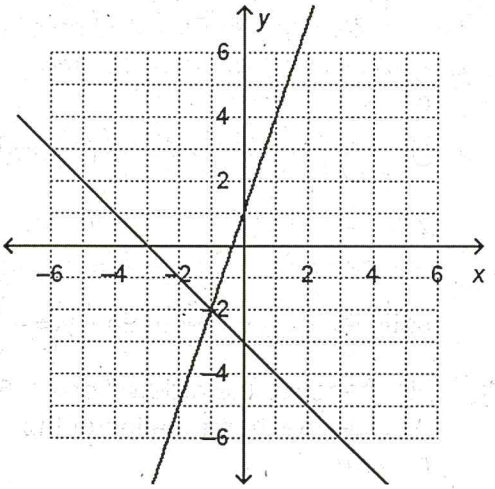


   b. Explain why your graph is correct.

_____

_____

10. Chandler says the solution of the system of equations $y = -x - 3$ and $y = 3x + 1$ is (–2, –1) because the graphs of the equations intersect at the point (–2, –1).



   a. Identify and correct Chandler's error.

_____

   b. Explain how one of the lines could be translated to make Chandler's solution of the system correct.

_____

Name _____ Date _____ Class _____

8.EE.8b

SELECTED RESPONSE

Select the correct answer.

1. What solution(s) does the system of equations have?

$$\begin{cases} -2x+5y=10 \\ -4x+10y=20 \end{cases}$$

(A) There are infinitely many solutions.

(B) The only solution is (5, 4).

(C) The only solution is (10, 6).

(D) There are no solutions.

2. To solve the system of equations $\begin{cases} 4x+y=-12 \\ 5x+2y=25 \end{cases}$, what expression should be substituted for y in the equation $5x + 2y = 25$?

(A) $-\frac{y}{4}-3$

(B) $-4x - 12$

(C) $-\frac{5}{2}x+\frac{25}{2}$

(D) $-\frac{2}{5}y+5$

3. Trudy and Xander are saving money from their newspaper route earnings. Their savings s, in dollars, are related to the time t, in weeks, after they start working. Trudy's savings are given by the equation $s = 40t + 50$, and Xander's savings are given by the equation $s = 35t + 100$. What is the meaning of the solution of the system of equations?

(A) Trudy and Xander both have $450 saved after 10 weeks of working on their newspaper routes.

(B) Trudy and Xander both have $10 saved after 450 weeks of working on their newspaper routes.

(C) Trudy and Xander both have $170 saved after 2 weeks of working on their newspaper routes.

(D) Trudy and Xander both have $130 saved after 2 weeks of working on their newspaper routes.

Select the correct answer for each lettered part.

4. Determine the number of solutions of each system of equations.

a. $\begin{cases} -14x-20y=42 \\ -14x-20y=42 \end{cases}$ ○ Infinitely many solutions ○ One solution ○ No solutions

b. $\begin{cases} x+y=5 \\ -2x-2y=10 \end{cases}$ ○ Infinitely many solutions ○ One solution ○ No solutions

c. $\begin{cases} x+y=6 \\ x+2y=6 \end{cases}$ ○ Infinitely many solutions ○ One solution ○ No solutions

d. $\begin{cases} -x-y=-14 \\ -x-y=14 \end{cases}$ ○ Infinitely many solutions ○ One solution ○ No solutions

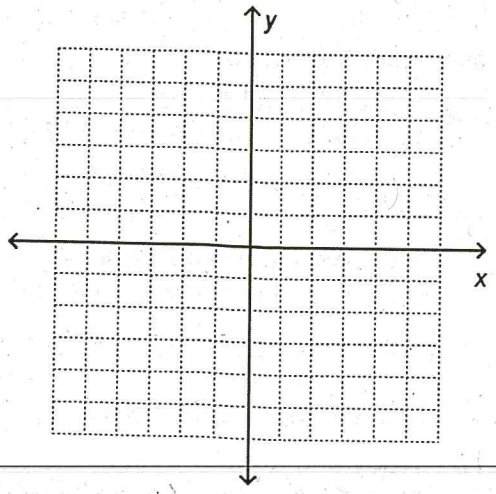
e. $\begin{cases} 3x+y=13 \\ 6x+2y=26 \end{cases}$ ○ Infinitely many solutions ○ One solution ○ No solutions

Name _____ Date _____ Class _____

CONSTRUCTED RESPONSE

5. Estimate the solution of the system of equations by examining its graph. Round each coordinate to the nearest 0.5.

$$\begin{cases} y = 2x + 4 \\ y = \frac{1}{3}x - 2 \end{cases}$$



6. Solve the system algebraically.

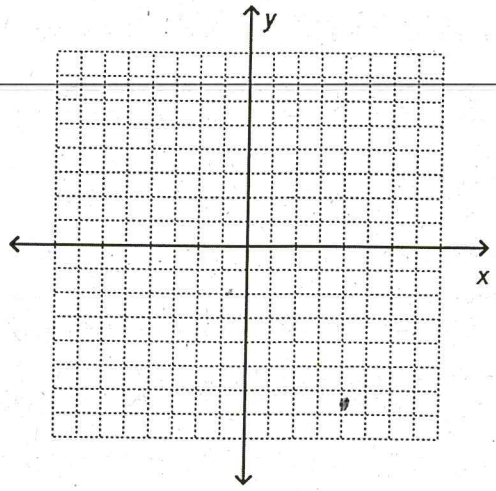
$$\begin{cases} -x + y = 4 \\ 5x + 2y = 1 \end{cases}$$

7. Solve the system of equations by inspection. Explain your reasoning.

$$\begin{cases} -2x + 4y = 5 \\ -2x + 4y = 6 \end{cases}$$

8. The cost c, in dollars, of a taxi ride is related to the distance d, in miles, of the ride. The cost for taxi A is given by the equation $c = 3.5d + 2$, and the cost for taxi B is given by $c = 3d + 5$. For what distance is the cost of each taxi ride the same? How much would this trip cost?

9. Dylan says that (–1, 7) is the solution of the system of equations $\begin{cases} 2x - 3y = -24 \\ x + 4y = 27 \end{cases}$ when each coordinate of the solution is estimated to the nearest 0.5. Graph the system of linear equations. Is Dylan's estimate correct? Explain.



10. Two boats leave a marina 2 hours apart. The distance d, in miles, of each boat from the marina at time t, measured in hours since the second boat left the marina, is given by $d = 8(t + 2)$ for the first boat and $d = 12t$ for the second.

    a. Find the solution of the system of equations algebraically.

    b. What is the meaning of the solution?

Name _____ Date _____ Class _____

8.EE.8c

SELECTED RESPONSE

Select the correct answer.

1. Which pair of points forms a line that does not intersect the line that passes through the points (5, 7) and (7, 7)?

   Ⓐ (–4, –5) and (–1, –2)

   Ⓑ (–5, 3) and (–5, 8)

   Ⓒ (–2, –9) and (3, –4)

   Ⓓ (8, –9) and (11, –9)

2. Skylar is buying watermelon and pineapple for a fruit salad. Watermelon costs $0.59 per pound, and pineapple costs $2.29 per pound. Skylar buys 7 pounds of fruit and spends $9.23. How much does Skylar spend just on pineapple?

   Ⓐ $2.36 Ⓒ $4.00

   Ⓑ $3.00 Ⓓ $6.87

3. The line that passes through the points (–5, –6) and (–3, 2) and the line with equation $y = x - 4$ intersect at what point?

   Ⓐ (–5, –6) Ⓒ (–3, 2)

   Ⓑ (2, –2) Ⓓ (–6, –10)

4. There are 25 coins inside a container. Some of the coins are nickels, and the rest are quarters. The value of the coins is $4.05. Let n represent the number of nickels, and let q represent the number of quarters. Which system of equations represents this situation?

   Ⓐ $\begin{cases} n - q = 25 \\ 0.05n + 0.25q = 4.05 \end{cases}$

   Ⓑ $\begin{cases} n + q = 4.05 \\ 0.05n + 0.25q = 25 \end{cases}$

   Ⓒ $\begin{cases} n + q = 25 \\ 0.05n + 0.25q = 4.05 \end{cases}$

   Ⓓ $\begin{cases} n + q = 25 \\ 5n + 25q = 4.05 \end{cases}$

Use the following information to match each statement with the corresponding system of equations.

While on vacation, Rosa stopped at a souvenir shop to buy keychains and refrigerator magnets for family members and friends. Keychains cost $2 each, and refrigerator magnets cost $1 each. Let x represent the number of keychains that Rosa bought, and let y represent the number of refrigerator magnets.

_____ 5. Rosa bought 12 items and paid a total of $18.

_____ 6. Rosa bought 12 more refrigerator magnets than keychains and paid a total of $18.

_____ 7. Rosa bought 12 items and paid $18 more for the keychains than for the refrigerator magnets.

_____ 8. Rosa bought 18 items and paid $12 more for the refrigerator magnets than for the keychains.

A $\begin{cases} x + y = 12 \\ -2x + y = 18 \end{cases}$

B $\begin{cases} x + y = 12 \\ 2x - y = 18 \end{cases}$

C $\begin{cases} x + y = 12 \\ 2x + y = 18 \end{cases}$

D $\begin{cases} x + y = 18 \\ 2x + y = 12 \end{cases}$

E $\begin{cases} -x + y = 12 \\ 2x + y = 18 \end{cases}$

F $\begin{cases} x + y = 18 \\ -2x + y = 12 \end{cases}$

Name _____ Date _____ Class _____

CONSTRUCTED RESPONSE

9. Does the line that passes through the points (0, 12) and (7, 10) intersect the line $2x + 7y = 21$? Explain your reasoning.

10. Jesse owns a sporting goods store that sells skis and snowboards. The store earns a profit of $52 for each pair of skis sold and a profit of $64 for each snowboard sold. If Jesse's store sells a total of 83 pairs of skis and snowboards and earns a profit of $4892 in November, how many pairs of skis and how many snowboards did the store sell that month?

11. Dan is moving old monitors and printers from an office to the local electronics recycling center. Dan has to move a total number of 60 printers and monitors with a combined weight of 1750 pounds. One monitor weighs 35 pounds, and a printer weighs 25 pounds. Does Dan recycle a greater weight of printers or monitors? Explain using a system of equations.

12. Two containers are being filled with water. One begins with 8 gallons of water and is filled at a rate of 3.5 gallons per minute. The other begins with 24 gallons and is filled at 3.25 gallons per minute.

    a. Write an equation that represents the amount of water w, in gallons, with respect to time t, in minutes, for each container.

    b. Solve the system of equations algebraically. Show your work.

    c. How long would it take for both of the containers to have the same amount of water? How much water would be in each container?

13. Marie, a police officer, spots a speeding car and starts chasing it. The speeding car travels at a constant speed of 130 feet per second. Marie's car reaches a constant speed of 145 feet per second 1725 feet from the start of the chase. During that time, the speeding car has traveled 3150 feet.

    a. Write an equation for each car that relates the distance d, in feet, from where the chase starts to the time t, in seconds, after Marie's car reaches a speed of 145 feet per second.

    b. Solve the system of equations algebraically. Show your work.

    c. What is the meaning of the solution from part b?