Keystone Algebra Sample Questions from CDTs

http://static.pdesas.org/content/documents/Algebra_I_AAEC_with_Samples_and_Glossary_Rotate_2011-05-03.pdf

Module 1

Operations with Real Numbers and Expressions

A1.1.1.1.1

(1) A list of values is shown below.

$$4.7\overline{4} \quad 4\frac{3}{4} \quad \sqrt{20} \quad \frac{17}{4}$$

What is the order of the values from **least** to **greatest**?

A. $\frac{17}{4}$ $\sqrt{20}$ $4.7\overline{4}$ $4\frac{3}{4}$

B. $\frac{17}{4}$ $4.7\overline{4}$ $4\frac{3}{4}$ $\sqrt{20}$

C. $4\frac{3}{4}$ $4.7\overline{4}$ $\frac{17}{4}$ $\sqrt{20}$

D. $4\frac{3}{4}$ $\sqrt{20}$ $\frac{17}{4}$ $4.7\overline{4}$

(2) What is the order of the values from least to greatest?

5^{-3} $\frac{4}{7}$ $\sqrt{5}$ $\frac{3}{8}$ 0.003

Keystone Algebra Sample Questions from CDTs

A1.1.1.1.2

(3) Which is equiavalent to $3\sqrt{80x}$?

A. $12\sqrt{5x}$

B. $5\sqrt{40x}$

C. $6\sqrt{40x}$

D. $48\sqrt{5x}$

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(4) An expression is shown below.

$$2\sqrt{51x}$$

Which value of x makes the expression equivalent to $10\sqrt{51}$?

A. 5

B. 25

C. 50

D. 100

(5) An expression is shown below.

$$\sqrt{87x}$$

For which value of x should the expression be further simplified?

A. $x = 10$

B. $x = 13$

C. $x = 15$

D. $x = 20$

(6) The last experiment required simplifying $7\sqrt{425}$. The steps taken are shown below.

$7\sqrt{425}$

step 1: $7(\sqrt{400} + \sqrt{25})$

step 2: $7(20 + 5)$

step 3: $7(25)$

step 4: 175

One of the steps shown is incorrect.

C. Rewrite the incorrect step so that it is correct.

correction: _____

D. Using the corrected step from part C, simplify $7\sqrt{425}$.

(7) Simplify $\sqrt{120}$

A1.1.1.2.1

(8)

Two monomials are shown below.

$450x^2y^5$ $3{,}000x^4y^3$

What is the least common multiple (LCM) of these monomials?

A. $2xy$

B. $30xy$

C. $150x^2y^3$

D. $9{,}000x^4y^5$

(9) Find the greatest common factor (GCF) for the two polynomials.

$$300ab^2c$$
$$500a^2bc^3$$

A) $100abc$ B) $100a^2b^2c$

C) $1500abc$ D) $1500a^2b^2c^3$

(10) Find the least common multiple (LCM) for the two polynomials.

$$108xy^2$$
$$27xyz$$

A) $27xy$ B) $108xyz$

C) $108xy^2z$ D) $2916xyz$

A1.1.1.3.1

(11) Simplify:

$$2(2\sqrt{4})^{-2}$$

A. $\frac{1}{8}$

B. $\frac{1}{4}$

C. 16

D. 32

(12) Simplify

$$\frac{1}{6}(\sqrt{36} \div 3^{-2}) + 4^3 \div |-8|$$

A1.1.1.4.1

(13)

A theme park charges $52 for a day pass and $110 for a week pass. Last month, 4,432 day passes were sold and 979 week passes were sold. Which is the **closest estimate** of the total amount of money paid for the day and week passes for last month?

A. $300,000

B. $400,000

C. $500,000

D. $600,000

A1.1.1.5.1

(14)

Simplify:

$$(4x^3 + 2x^2 + 7x + 8) + (7x^3 + 10x + 2)$$

A. $11x^3 + 2x^2 + 17x + 10$

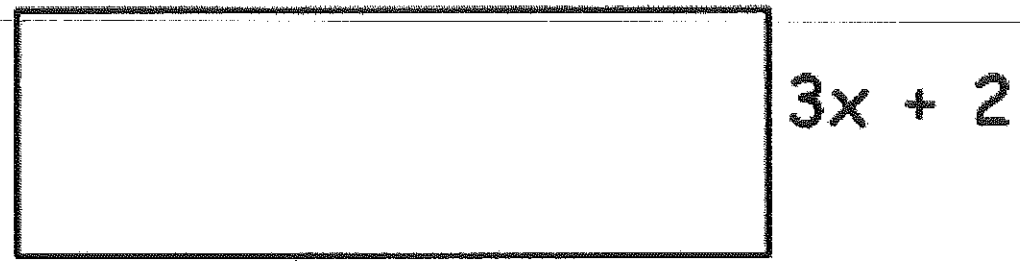
B. $11x^3 + 12x^2 + 7x + 10$

C. $11x^3 + 12x^2 + 9x + 8$

D. $11x^6 + 19x^2 + 10$

15

Find the perimeter.



16

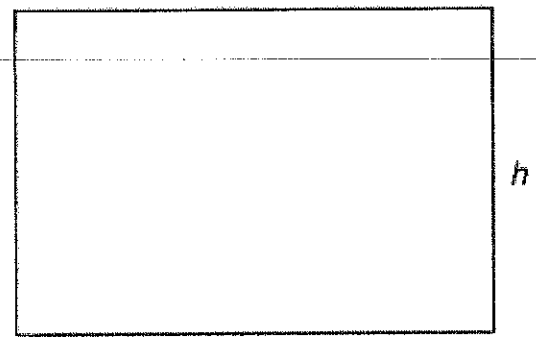
A polynomial expression is shown below.

$$(mx^3 + 3)(2x^2 + 5x + 2) - (8x^5 + 20x^4)$$

The expression is simplified to $8x^3 + 6x^2 + 15x + 6$.
What is the value of m?

17

Keng creates a painting on a rectangular canvas with a width that is four inches longer than the height, as shown in the diagram below.



A. Write a polynomial expression, in simplified form, that represents the area of the canvas.

Keng adds a 3-inch-wide frame around all sides of his canvas.

B. Write a polynomial expression, in simplified form, that represents the total area of the canvas and the frame.

Keng is unhappy with his 3-inch-wide frame, so he decides to put a frame with a different width around his canvas. The total area of the canvas and the new frame is given by the polynomial $h^2 + 8h + 12$, where h represents the height of the canvas.

C. Determine the width of the new frame. Show all your work. Explain why you did each step.

A1.1.1.5.2

18

Which is a factor of the trinomial $x^2 - 2x - 15$?

A. $(x - 13)$

B. $(x - 5)$

C. $(x + 5)$

D. $(x + 13)$

(19) When the expression $x^2 - 3x - 18$ is factored completely, which is one of its factors?

A. $(x - 2)$

B. $(x - 3)$

C. $(x - 6)$

D. $(x - 9)$

A1.1.1.5.3

(20) Simplify:

$$\frac{x^2-3x-10}{x^2+6x+8}; \quad x \neq -4, -2$$

A. $-\frac{1}{2}x - \frac{5}{4}$

B. $x^2 - \frac{1}{2}x - \frac{5}{4}$

C. $\frac{x-5}{x+4}$

D. $\frac{x+5}{x-4}$

Linear Equations

A1.1.2.1.1

(21) Jenny has a job that pays her $8 per hour plus tips ($t$). Jenny worked for 4 hours on Monday and made $65 in all. Which equation could be used to find t, the amount Jenny made in tips?

A. $65 = 4t + 8$

B. $65 = 8t \div 4$

C. $65 = 8t + 4$

D. $65 = 8(4) + t$

A1.1.2.1.2

(22) An equation is shown below.

$$5(3x + 7) = 10$$

Which is a result of correctly applying the distributive property in the equation?

A. $5 \cdot 3x + 5 \cdot 7 = 10$

B. $3x + 7 = 2$

C. $5(7 + 3x) = 10$

D. $(3x + 7)5 = 10$

(23) One of the steps Jamie used to solve an equation is shown below.

$$-5(3x + 7) = 10$$
$$-15x + -35 = 10$$

Which statements describe the procedure Jamie used in this step and identify the property that justifies the procedure?

A. Jamie added −5 and $3x$ to eliminate the parentheses. This procedure is justified by the associative property.

B. Jamie added −5 and $3x$ to eliminate the parentheses. This procedure is justified by the distributive property.

C. Jamie multiplied $3x$ and 7 by −5 to eliminate the parentheses. This procedure is justified by the associative property.

D. Jamie multiplied $3x$ and 7 by −5 to eliminate the parentheses. This procedure is justified by the distributive property.

A1.1.2.1.3

(24) Francisco purchased x hot dogs and y hamburgers at a baseball game. He spent a total of $10. The equation below describes the relationship between the number of hot dogs and the number of hamburgers purchased.

$$3x + 4y = 10$$

The ordered pair (2, 1) is a solution of the equation. What does the solution (2, 1) represent?

A. Hamburgers cost 2 times as much as hot dogs.

B. Francisco purchased 2 hot dogs and 1 hamburger.

C. Hot dogs cost $2 each and hamburgers cost $1 each.

D. Francisco spent $2 on hot dogs and $1 on hamburgers.

A1.1.2.2.1

(25)

Anna burned 15 calories per minute running for x minutes and 10 calories per minute hiking for y minutes. She spent a total of 60 minutes running and hiking and burned 700 calories. The system of equations shown below can be used to determine how much time Anna spent on each exercise.

$$15x + 10y = 700$$

$$x + y = 60$$

What is the value of x, the minutes Anna spent running?

A. 10

B. 20

C. 30

D. 40

A1.1.2.2.2

(26)

Samantha and Maria purchased flowers. Samantha purchased 5 roses for x dollars each and 4 daisies for y dollars each and spent \$32 on the flowers. Maria purchased 1 rose for x dollars and 6 daisies for y dollars each and spent \$22. The system of equations shown below represents this situation.

$$5x + 4y = 32$$

$$x + 6y = 22$$

Which statement is true?

A. A rose costs \$1 more than a daisy.

B. Samantha spent \$4 on each daisy.

C. Samantha spent more on daisies than she did on roses.

D. Samantha spent over 4 times as much on daisies as she did on roses.

(27) Nolan has $15.00, and he earns $6.00 an hour babysitting. The equation below can be used to determine how much money in dollars (m) Nolan has after any number of hours of babysitting (h).

$$m = 6h + 15$$

A. After how many hours of babysitting will Nolan have $51.00?

hours: _____

Claire has $9.00. She makes $8.00 an hour babysitting.

B. Use the system of linear equations below to find the number of hours of babysitting after which Nolan and Claire will have the same amount of money.

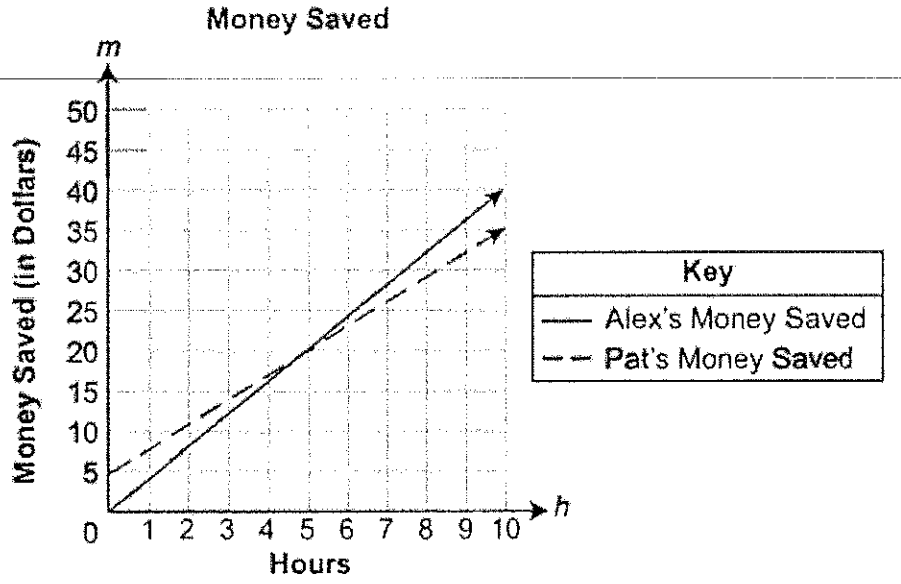
$$m = 6h + 15$$

$$m = 8h + 9$$

hours: _____

28

The graph below displays the amount of money Alex and Pat will each have saved after their hours of babysitting.



C. Based on the graph, for what domain (*h*) will Alex have more money saved than Pat? Explain your reasoning.

29

1. The height of a stack of 1 bowl is 2 inches and the height of a stack of 5 bowls is 5 inches.

Write an equation to represent this scenario.

2. What do the x and y variables represent?

What is the height, in inches, of a stack of 10 bowls?

Linear Inequalities

A1.1.3.1.1

(D)

A compound inequality is shown below.

$$5 < 2 - 3y < 14$$

What is the solution of the compound inequality?

A. $-4 > y > -1$

B. $-4 < y < -1$

C. $1 > y > 4$

D. $1 < y < 4$

(31) Solve and Graph: $|2x + 3| \leq 1$

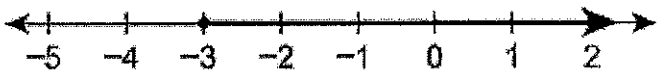
(32) Solve and Graph

$$\left|2x - 1\right| > 3$$

(33) **A baseball team had $1,000 to spend on supplies. The team spent $185 on a new bat. New baseballs cost $4 each. Write an inequality that can be used to determine the number of new baseballs (b) that the team can purchase.**

A1.1.3.1.2

(34) The solution set of an inequality is graphed on the number line below.



The graph shows the solution set of which inequality?

A. $2x + 5 < -1$

B. $2x + 5 \leq -1$

C. $2x + 5 > -1$

D. $2x + 5 \geq -1$

A1.1.3.1.3

(35)

A baseball team had $1,000 to spend on supplies. The team spent $185 on a new bat. New baseballs cost $4 each. The inequality $185 + 4b \leq 1{,}000$ can be used to determine the number of new baseballs (b) that the team can purchase. Which statement about the number of new baseballs that can be purchased is true?

A. The team can purchase 204 new baseballs.

B. The minimum number of new baseballs that can be purchased is 185.

C. The maximum number of new baseballs that can be purchased is 185.

D. The team can purchase 185 new baseballs, but this number is neither the maximum nor the minimum.

A1.1.3.2.1

Keystone Algebra Sample Questions from CDTs

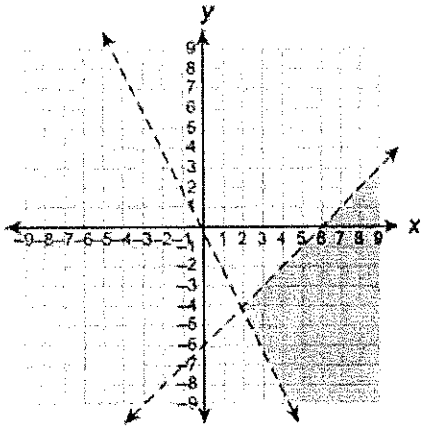
(36) A system of inequalities is shown below.

$$y < x - 6$$

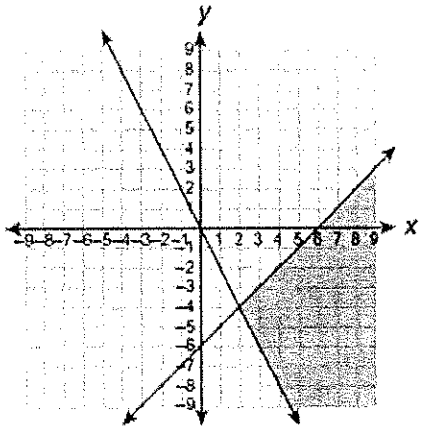
$$y > -2x$$

Which graph shows the solution set of the system of inequalities?

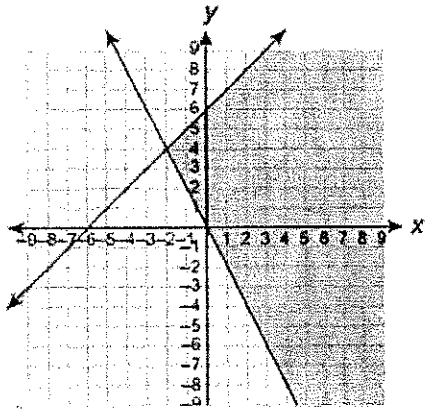
A.



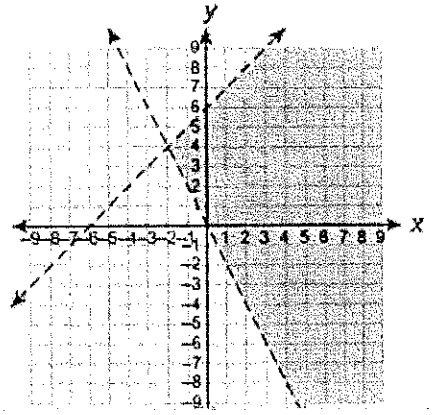
B.



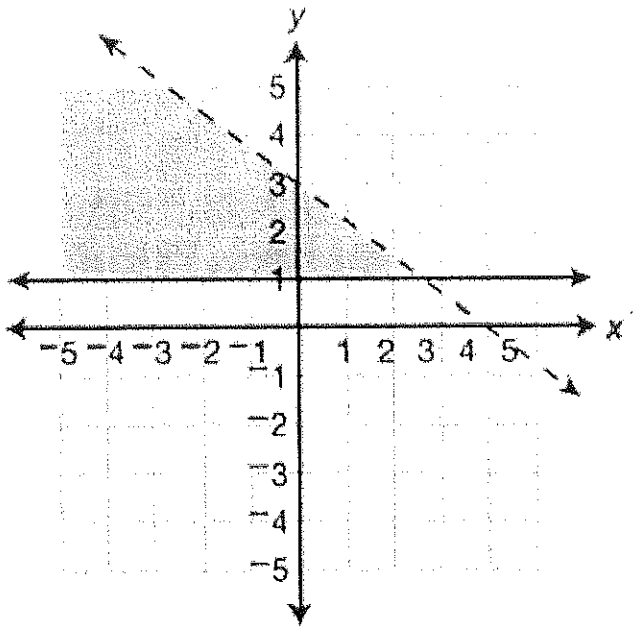
C.



D.



(37) The solution set to a system of linear inequalities is graphed below.



Write a system of 2 linear inequalities which would have the solution set shown in the graph.

A1.1.3.2.2

(38) Tyreke always leaves a tip of between 8% and 20% for the server when he pays for his dinner. This can be represented by the system of inequalities shown below, where y is the amount of tip and x is the cost of dinner.

$$y > 0.08x$$

$$y < 0.2x$$

Which of the following is a true statement?

A. When the cost of dinner, x, is \$10, the amount of tip, y, must be between \$2 and \$8.

B. When the cost of dinner, x, is \$15, the amount of tip, y, must be between \$1.20 and \$3.00.

C. When the amount of tip, y, is \$3, the cost of dinner, x, must be between \$11 and \$23.

D. When the amount of tip, y, is \$2.40, the cost of dinner, x, must be between \$3 and \$6.

Module 2

Functions

A1.2.1.1.1

(39) Tim's scores in the first 5 times he played a video game are listed below.

4,526 4,599 4,672 4,745 4,818

Tim's scores follow a pattern. Which expression can be used to determine his score after n times he played the video game?

A. $73n + 4{,}453$

B. $73(n + 4{,}453)$

C. $4{,}453n + 73$

D. $4{,}526n$

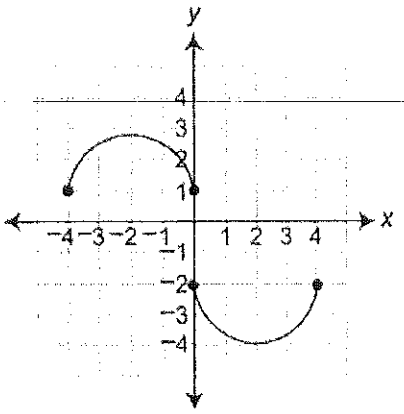
A1.2.1.1.2

Keystone Algebra Sample Questions from CDTs

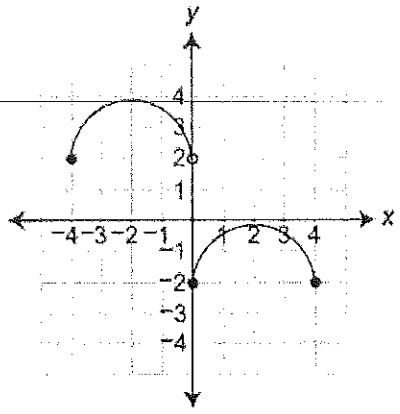
40

Which graph shows y as a function of x?

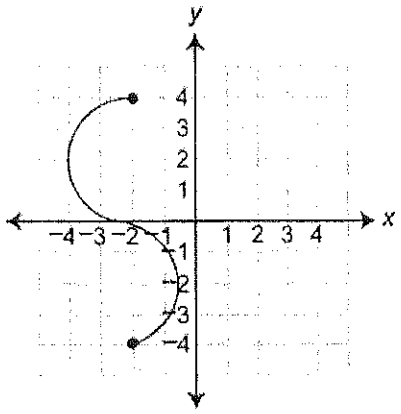
A.



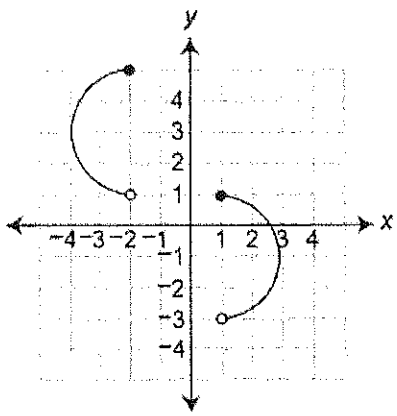
B.



C.



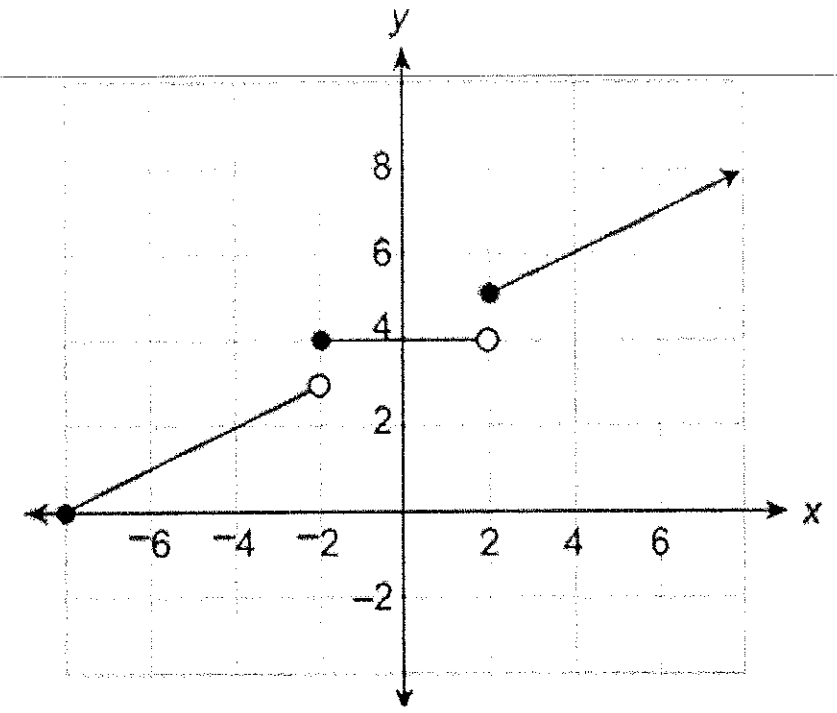
D.



A1.2.1.1.3

41

The graph of a function is shown below.



Which value is **not** in the range of the function?

A. 0

B. 3

C. 4

D. 5

A1.2.1.2.1

42

A pizza restaurant charges for pizzas and adds a delivery fee. The cost in dollars (c) to have any number of pizzas (p) delivered to a home is described by the function $c = 8p + 3$. Which statement is true?

A. The cost of 8 pizzas is $11.

B. The cost of 3 pizzas is $14.

C. Each pizza costs $8 and the delivery fee is $3.

D. Each pizza costs $3 and the delivery fee is $8.

Keystone Algebra Sample Questions from CDTs

A1.2.1.2.2

43 The table below shows values of y as a function of x.

x	y
2	10
6	25
14	55
26	100
34	130

Which linear equation best describes the relationship between x and y?

A. $y = 2.5x + 5$

B. $y = 3.75x + 2.5$

C. $y = 4x + 1$

D. $y = 5x$

44 When they are 84 miles from home, Hector begins recording their distance driven (d), in miles, after h hours in the table below.

Distance by Hour

Time in Hours (h)	Distance in Miles (d)
0	84
1	146
2	208
3	270

The pattern continues.

A. Write an equation to find the distance driven (d), in miles, after a given number of hours (h).

#44 is continued on next page

B. Hector also kept track of the remaining gasoline. The equation shown below can be used to find the gallons of gasoline remaining (g) after distance driven (d), in miles.

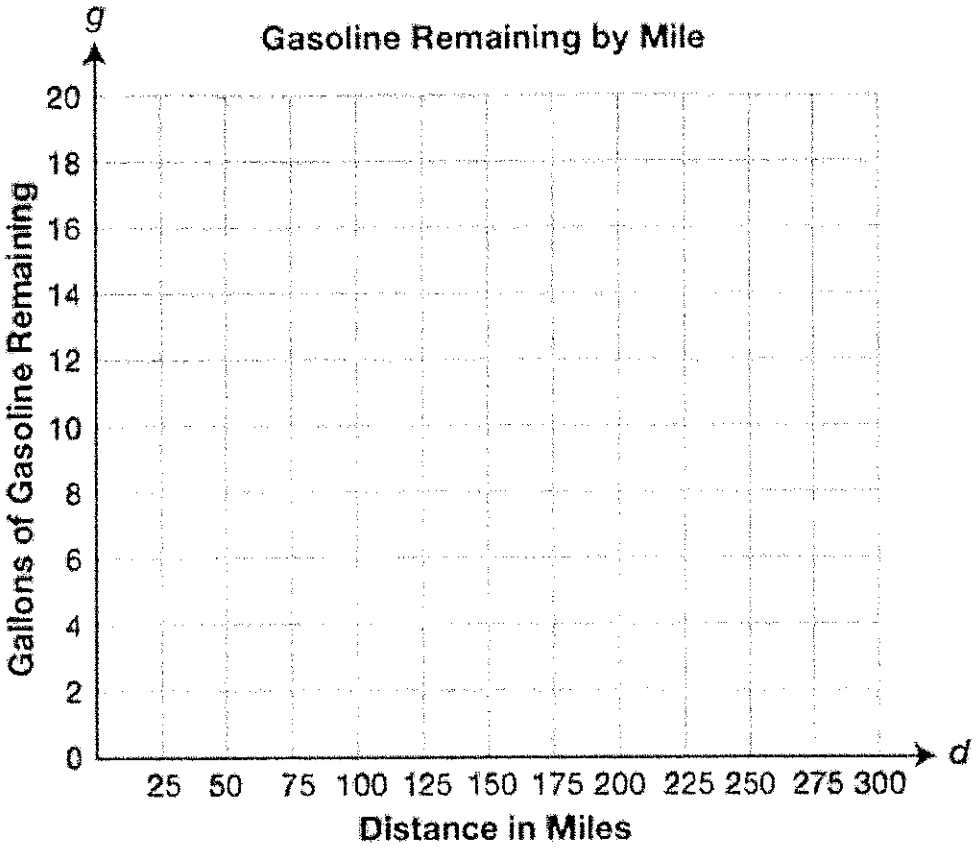
$$g = 16 - \frac{1}{20}d$$

Use the equation to find the missing values for gallons of gasoline remaining.

Gasoline Remaining by Mile

Distance in Miles (d)	Gallons of Gasoline Remaining (g)
100	
200	
300	

C. Draw the graph of the line formed by the points in the table from **part B**.



D. Explain why the slope of the line drawn in **part C** must be negative.

(45)

Ben's Model Airplane Sales

Model Airplanes Sold	Total Profit
12	$68
15	$140
20	$260
22	$308

A. Write a linear equation, in slope-intercept form, to represent the amount of Ben's total profit (y) based on the number of model airplanes (x) he sold.

B. How much did Ben spend on his model-building materials?

C. What is the fewest number of model airplanes Ben needed to sell in order to make a profit?

D. What is a reasonable value in the range that would be a negative number?

Coordinate Geometry

A1.2.2.1.1

(46)

Jeff's restaurant sells hamburgers. The amount charged for a hamburger, h, is based on the cost for a plain hamburger plus an additional charge for each topping, t, as shown in the equation below.

$$h = 0.60t + 5$$

What does the number 5 represent in the equation?

A. the number of toppings

B. the cost of a plain hamburger

C. the additional cost for 1 topping

D. the cost of a hamburger with 1 topping

A1.2.2.1.2

(47)

Xavier is riding on his bike at a constant speed of 15 miles per hour. What is the closest approximation of how long it will take Xavier to ride 5 miles?

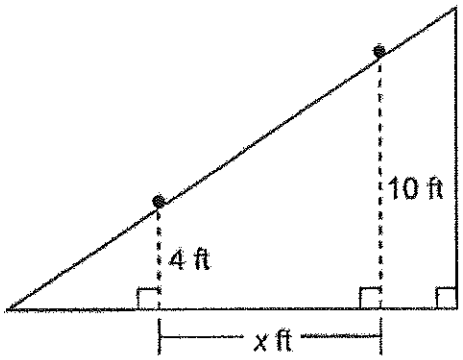
A. 0.15 hour

B. 0.2 hour

C. 0.33 hour

D. 0.5 hour

(48) A ball rolls down a ramp with a slope of $\frac{2}{3}$. At one point the ball is 10 feet high, and at another point the ball is 4 feet high, as shown in the diagram below.



What is the horizontal distance (x), in feet, the ball traveled as it rolled down the ramp from 10 feet high to 4 feet high?

A. 6

B. 9

C. 14

D. 15

A1.2.2.1.3

Keystone Algebra Sample Questions from CDTs

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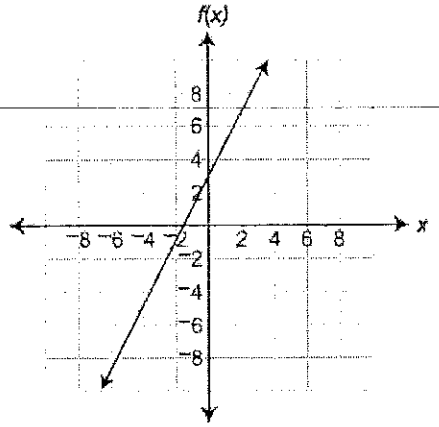
A graph of a linear equation is shown below.



Which equation describes the graph?

A. $y = 0.5x - 1.5$

B. $y = 0.5x + 3$

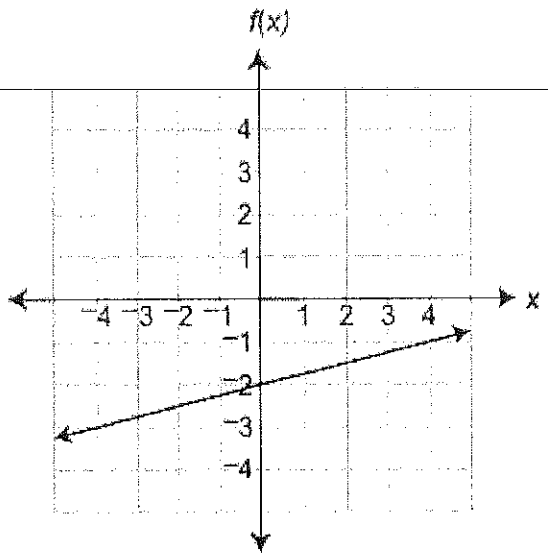
C. $y = 2x - 1.5$

D. $y = 2x + 3$

A1.2.2.1.4

(50)

A linear equation is graphed on the coordinate plane below.



What are the slope and *y*-intercept of the graph?

A. slope: $\frac{1}{4}$
y-intercept: −2

B. slope: $\frac{1}{4}$
y-intercept: 8

C. slope: 4
y-intercept: −2

D. slope: 4
y-intercept: 8

51

A juice machine dispenses the same amount of juice into a cup each time the machine is used. The equation below describes the relationship between the number of cups (x) into which juice is dispensed and the gallons of juice (y) remaining in the machine.

$$x + 12y = 180$$

How many gallons of juice are in the machine when it is full?

A. 12

B. 15

C. 168

D. 180

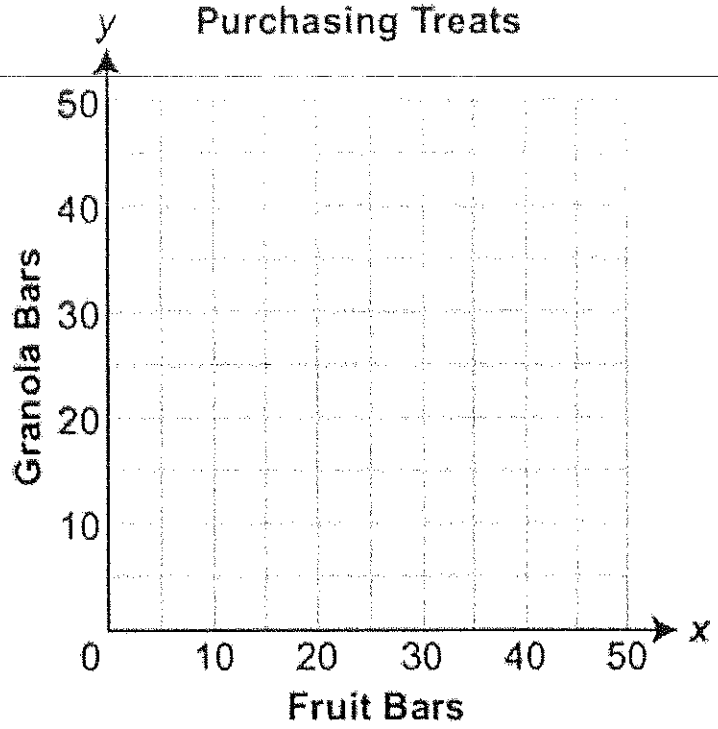
52

Georgia is purchasing treats for her classmates. Georgia can spend exactly $10.00 to purchase 25 fruit bars, each equal in price. Georgia can also spend exactly $10.00 to purchase 40 granola bars, each equal in price.

A. Write an equation which can be used to find all combinations of fruit bars (x) and granola bars (y) that will cost exactly $10.00.

#52 is continued on the next page

B. Graph the equation from **part A** below.



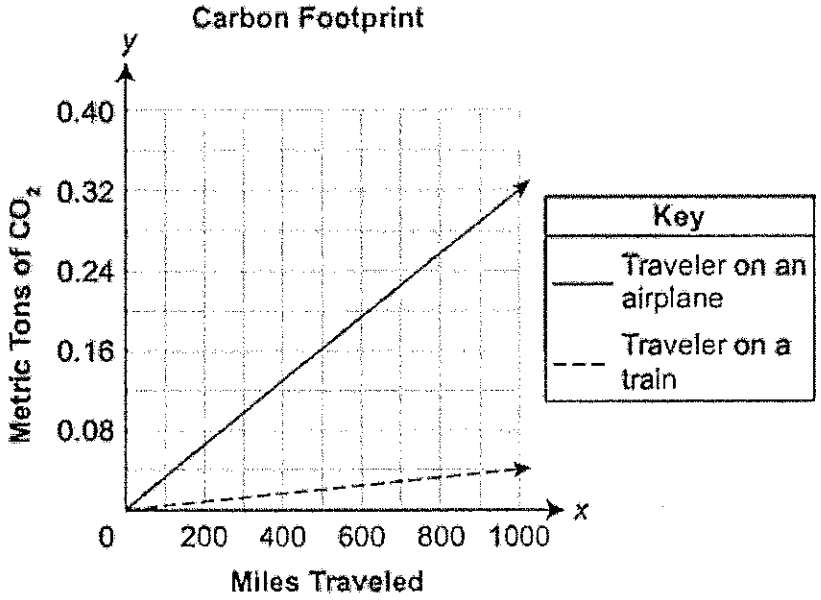
C. What is the slope of the line graphed in **part B**?

D. Explain what the slope from **part C** means in the context of Georgia purchasing treats.

53 The train is going at a constant speed of 80 miles per hour.

A. How many hours will it take for the train to travel 1,120 miles?

Ahava is very concerned about the environment. The graph below displays the carbon dioxide (CO_2), in metric tons, for each traveler on an airplane and each traveler on a train.

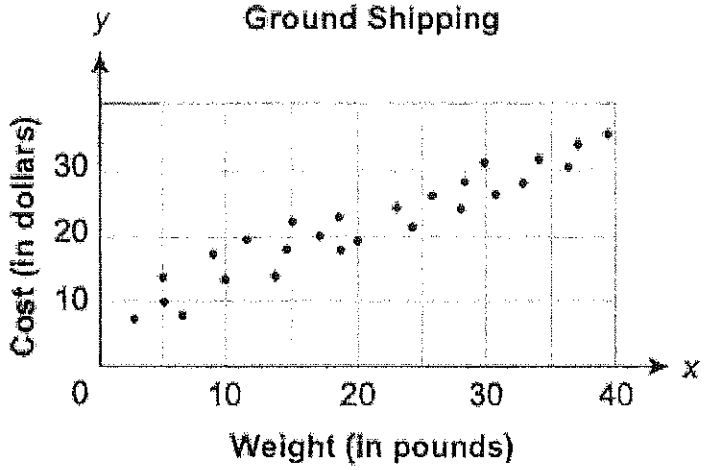


C. What is the equation to find the metric tons of CO_2 produced (y) by a traveler on an airplane for miles traveled (x)?

A1.2.2.2.1

(54)

The scatterplot below shows the cost, y, of ground shipping packages from Harrisburg, PA, to Minneapolis, MN, based on the package weight, x.



Which equation **best** describes the line of best fit?

A. $y = 0.37x + 1.57$

B. $y = 0.37x + 10.11$

C. $y = 0.68x + 2.32$

D. $y = 0.68x + 6.61$

Data Analysis

A1.2.3.1.1

(55) The daily high temperatures in degrees Fahrenheit in Allentown, PA for a period of 10 days are shown below.

76 80 89 96 98 100 98 91 89 82

Which statement correctly describes the data?

A. The median value is 98.

B. The interquartile range is 16.

C. The lower quartile value is 76.

D. The upper quartile value is 96.

(56) The daily high temperatures, in degrees Fahrenheit (°F), of a town are recorded for one year. The median high temperature is 62°F. The interquartile range of high temperatures is 32. Which is **most likely** to be true?

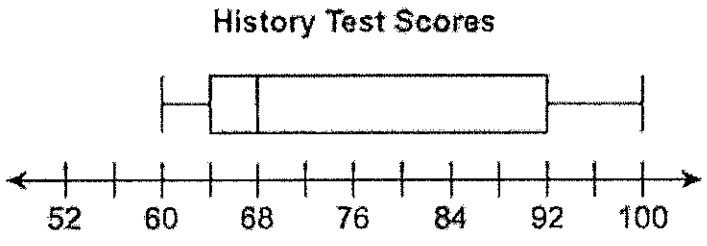
A. Approximately 25% of the days had a high temperature less than 30°F.

B. Approximately 25% of the days had a high temperature greater than 62°F.

C. Approximately 50% of the days had a high temperature greater than 62°F.

D. Approximately 75% of the days had a high temperature less than 94°F.

(57) The box-and-whisker plot shown below represents students' test scores on Mr. Ali's history test.



A. What is the range of scores for the history test?

B. What is the **best** estimate for the percent of students scoring greater than 92 on the test?

#57 is continued on the next page

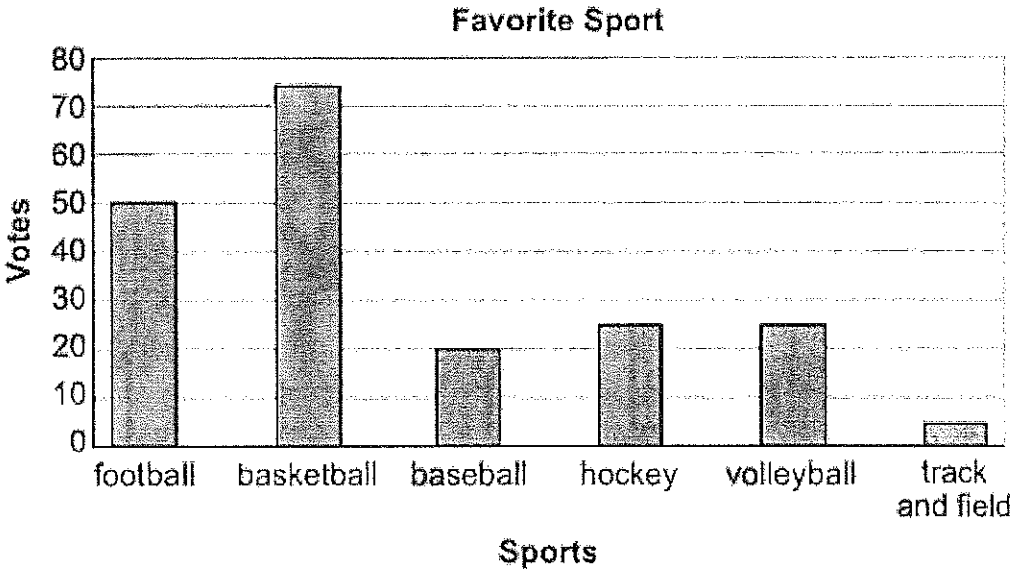
Mr. Ali wanted more than half of the students to score 75 or greater on the test.

C. Explain how you know that more than half of the students did not score greater than 75.

A1.2.3.2.1

(58)

Vy asked 200 students to select their favorite sport and then recorded the results in the bar graph below.



Vy will ask another 80 students to select their favorite sport. Based on the information in the bar graph, how many more students of the next 80 asked will select basketball than football as their favorite sport?

A. 10

B. 20

C. 25

D. 30

A1.2.3.2.2

(54)

The points scored by a football team are shown in the stem-and-leaf plot below.

Points

0	6
1	2 3 4 7
2	0 3 4 4 7 8 8 8
3	0 7 8

Key: 1 \| 3 = 13

What was the median number of points scored by the football team?

A. 24
B. 27
C. 28
D. 32

(60)

The weight, in pounds, of each wrestler on the high school wrestling team at the beginning of the season is listed below.

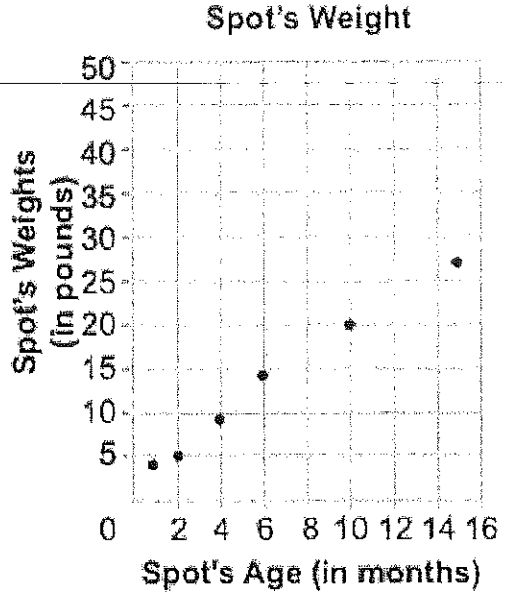
178 142 112 150 206 130

A. What is the median weight of the wrestlers?

B. What is the mean weight of the wrestlers?

A1.2.3.2.3

(61) John recorded the weight of his dog Spot at different ages as shown in the scatterplot below.



Based on the line of best fit, what will be Spot's weight after 18 months?

A. 27 pounds
B. 32 pounds
C. 36 pounds
D. 50 pounds

A1.2.3.3.1

(62) A number cube with sides labeled 1–6 is rolled two times, and the sum of the numbers that end face up is calculated. What is the probability that the sum of the numbers is 3?

A. $\frac{1}{18}$

B. $\frac{1}{12}$

C. $\frac{1}{9}$

D. $\frac{1}{2}$