THIRD SPACE LEARNING

8th Grade NY State Practice Math Test

New York Practice Test
Grade 8

Grade 8

Questions

Name: .... 　　Class: ....

Date: .... 　　Score: ....

SESSION 1:
30 Multiple Choice

Standard: 8.G.8
DOK 1

1 The points A(-1, 2) and B(3, -8) are plotted on the coordinate plane. What is the distance between the points?
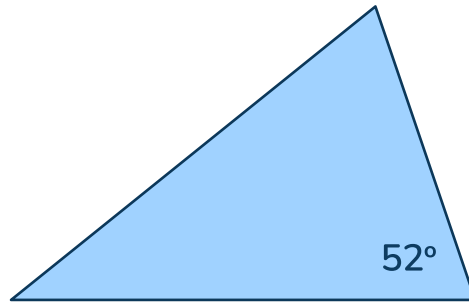
A. $\sqrt{116}$
B. 116
C. $\sqrt{14}$
D. $\sqrt{6}$

Standard: 8.G.5 & 7.G.2
DOK 1

2 If one interior angle of a triangle is given to be 52° what can possibly be the other two angle measures?

A. 52° and 52°
B. 100° and 29°
C. 68° and 60°
D. 60° and 60°

Standard: 8.EE.6
DOK 2

3 Which equation represents the graph of a line on the coordinate plane that has an x-intercept of (-3, 0) and a y-intercept of (0, -9)?
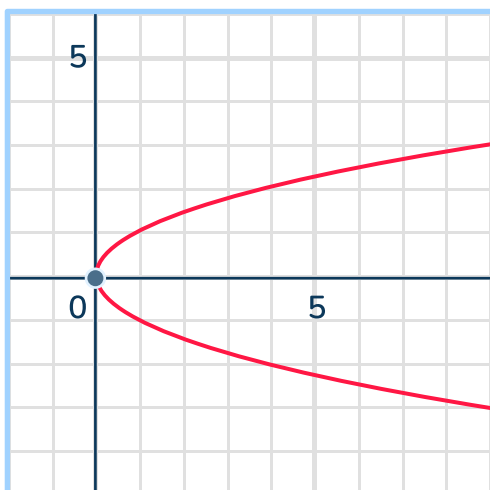
A. $y = 3x + 9$
B. $y = -3x - 9$
C. $y = -3x + 9$
D. $y = 3x - 9$

Standard: 8.F.1

DOK 1

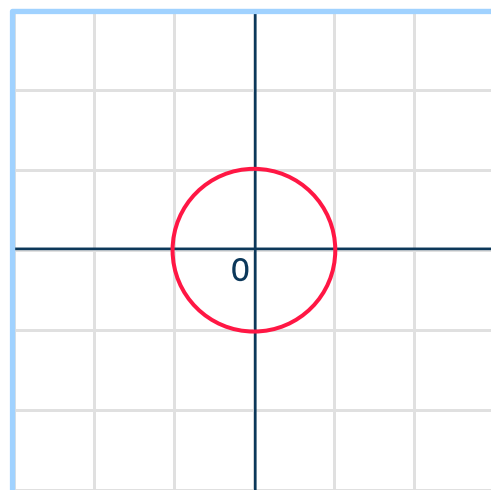**4** Which graph shows y to be a function of x?
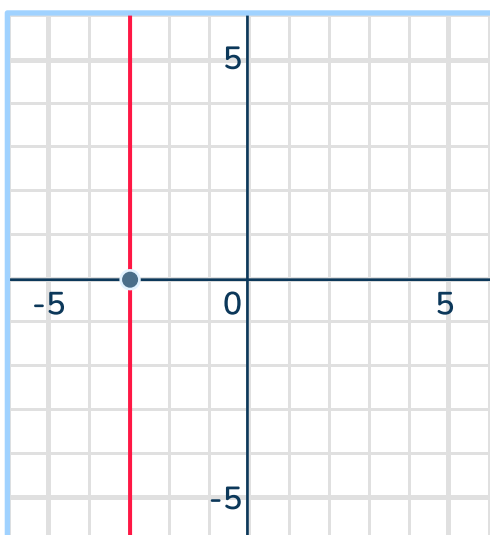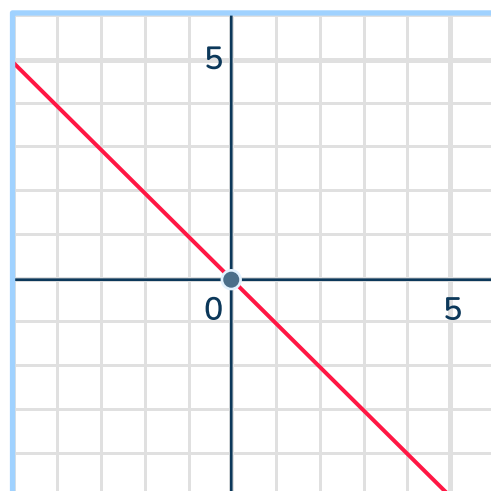
A.

B.

C.

D.

Standard: 8.G.3

DOK 2

5   Triangle ABC has point B(-4, 5). If triangle ABC is reflected over the x-axis, to form triangle A'B'C', what would be the coordinate of B'?

    A. B'(4, 5)
    B. B'(-4, -5)
    C. B'(4, 5)
    D. B'(-4, 5)

Standard: 8.G.9

DOK 2

6   A cylinder has a diameter of 10.2 cm and a height of 13.6 cm. What is the volume of the cylinder rounded to the nearest tenth?

    A. 1,110.7 cm³
    B. 1,111 cm³
    C. 1,110.4 cm³
    D. 1,111.7 cm³

Standard: 8.EE.1

DOK 2

7 Which expression has a value of $\dfrac{1}{64}$

   A. 2^6
   B. $(2^3)^{-3}$
   C. $(2^5)^{-1}$
   D. $(2^3)^{-2}$

Standard: 8.EE.5

DOK 2

8 The table and the equation both show a different relationship between y and x.

Function A

x	y
2	3.5
3	5.25
5	8.75

Function B

$$y = \frac{3}{2}x$$

Which statement about the functions is true?

    A. The rate of change of Function A is less than the rate of change of Function B because 1.75 < 1.5.

    B. The rate of change of Function A is greater than the rate of change of Function B because 1.75 > 1.5.

    C. The rate of change of Function A is less than the rate of change of Function B because 0.75 < 0.5.

    D. The rate of change of Function A is greater than the rate of change of Function B because 1.75 > 1.5.

Standard: 8.G.5

DOK 1

9   In the figure, lines l and m are parallel and t is the transversal. What is the value of x?

t

$5x - 1$

$3x + 23$

m

l
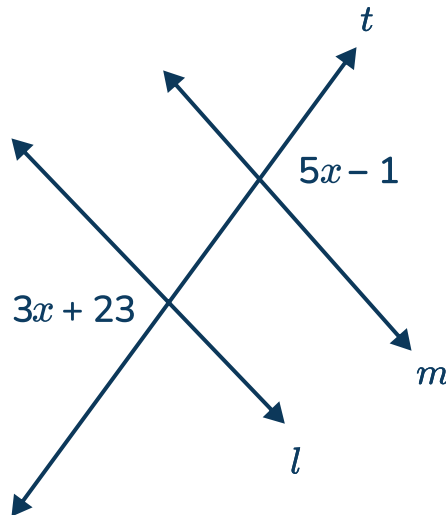
    A. 24

    B. 11

    C. 12

    D. 8

Standard: 8.EE.C.7b

DOK 2

10   What is the solution to the equation?

$2.5(3x - 2) = 2x + 0.5$

    A. $x = 10$

    B. $x = 1.1$

    C. $x = 0.1$

    D. $x = 1$

Standard: 8.EE.B.6

DOK 2

11 Which equation represents the line on the coordinate plane?
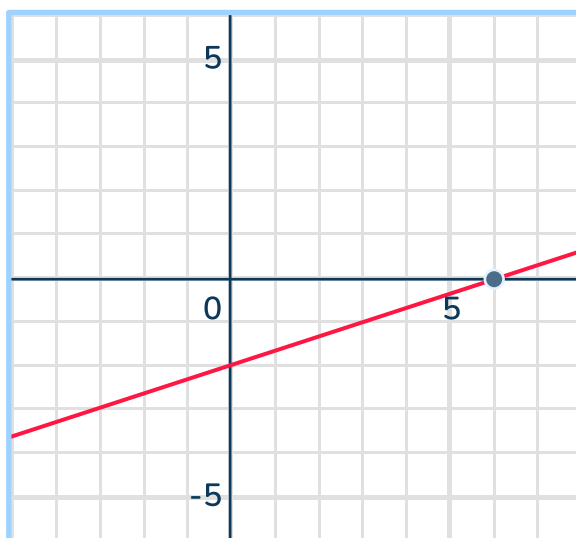
A. $y = \dfrac{1}{2}x - 2$

B. $y = -\dfrac{1}{3}x + 2$

C. $y = \dfrac{1}{3}x - 2$

D. $y = -\dfrac{1}{2}x - 2$

Standard: 8.G.A.3

DOK 1

12 Triangle ABC is plotted on the coordinate plane. If triangle ABC is dilated by a scale factor of $\frac{1}{2}$, what is the coordinate of A'?

A. A' (2, 3)

B. A' ($\frac{1}{2}$,1)

C. A' (-$\frac{1}{2}$,3)

D. A' (2,4)

Standard: 8.EE.A.4
DOK 1

13 What is the value of the expression below?

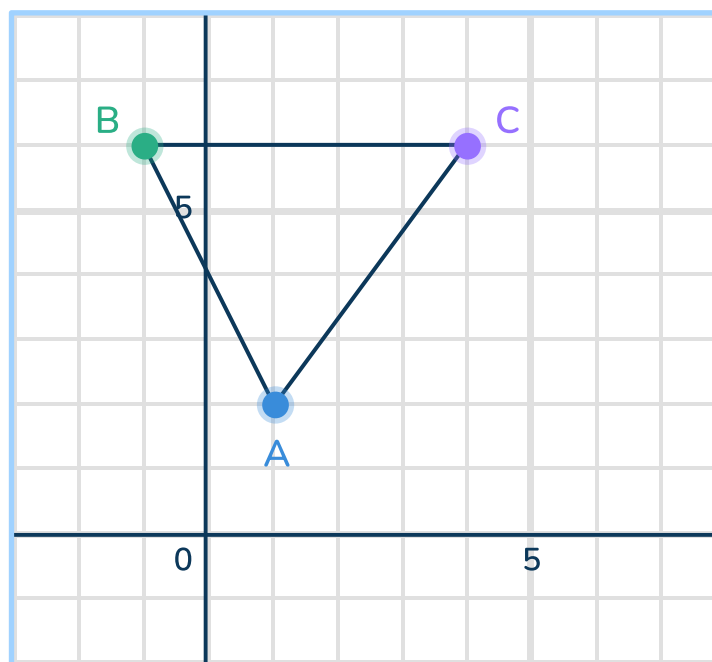$$\frac{2.5 \times 10^7}{0.5 \times 10^3}$$

A. 0.5×10^4

B. 5×10^3

C. 0.5×10^3

D. 5×10^4

Standard: 8.G.C.9
DOK 1

14 A water bottle is in the shape of a cylinder that has a diameter of 4 inches and a height of 9 inches. Which equation can be used to find the volume of the water bottle in cubic inches?

A. $V = \pi (2)^2 (9)$

B. $V = \pi (4)^2 (9)$

C. $V = \pi (2)^3 (9)$

D. $V = \pi (4)^3 (9)$

Standard: 8.EE.B.6

DOK 2

15 On the coordinate plane, the graph of a line passes through the origin and the point (-8, 5). What is the equation of the line?

A. $y = \dfrac{8}{5}x$

B. $y = \dfrac{5}{8}x$

C. $y = -\dfrac{5}{8}x$

D. $y = -\dfrac{8}{5}x$

Standard: 8.F.B.4

DOK 1

16 Linear function A passes through the points (-1, 6) and (5, -7). What is the rate of change of function A?

A. $\dfrac{13}{6}$

B. $-\dfrac{13}{6}$

C. $\dfrac{6}{13}$

D. $-\dfrac{6}{13}$

Standard: 8.SP.A.2

DOK 2

17 Which is the best statement to describe the data in a scatter plot where the y-values are increasing as the x-values are decreasing?

A. The data can be modeled by a horizontal line.

B. The data cannot be modeled by a line.

C. The data can be modeled by a line with a negative slope.

D. The data can be modeled by a line with a positive slope.

Standard: 8.EE.C.8b

DOK 2

18 Which system of equations has infinite solutions?

A. $y = 2x - 4$
    $y = -2x + 4$

B. $x + y = 7$
    $x + 7 = 9$

C. $2y = x + 4$
    $-x + 2y = 17$

D. $3x - 3y = 1$
    $6x = 6y + 2$

Standard: 8.F.B.4

DOK 2

19 Use the table below to answer the question.

Gina runs her family's home repair service. The table below shows the service charges for the amount of hours worked. Which linear equation represents the information in the table?

Hours worked, x	Total amount of money charged, y
0	$80
1	$105
3	$155
5	$205

A. $y = 25x$

B. $y = 25x - 80$

C. $y = 25x + 80$

D. $y = -25x - 80$

Standard: 8.G.A.3
DOK 1

20 What is the scale factor of the dilation that maps triangle ABC to triangle A'B'C'?
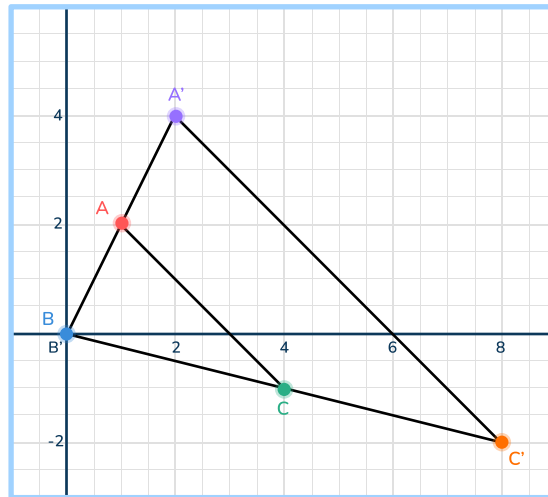
A. $\dfrac{1}{2}$

B. $-\dfrac{1}{2}$

C. 2

D. -2

Standard: 8.G.A.5
DOK 2

21 What is the value of x?
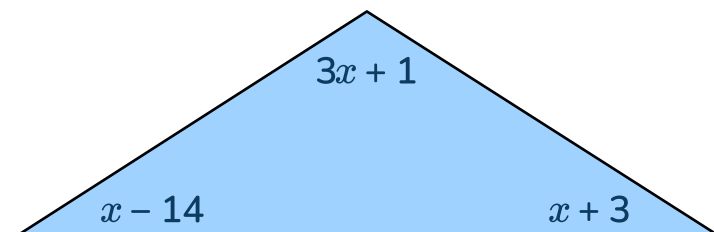
A. 38

B. 60

C. 36

D. 34

Standard: 7.G.8.6
DOK 2

22 There are two boxes that are in the shape of rectangular prisms that were stored in a truck. The dimensions of each box are:

- Box 1 has a height of 2.4 feet, width of 6.7 feet and height of 10.2 feet.
- Box 2 has a height of 5.5 feet, width of 3.2 feet and height of 11.2 feet.

What is the difference in volume between the two boxes?

A. 33 in³
B. 32.10 in³
C. 33.104 in³
D. 32.104 in³

Standard: 8.G.7
DOK 2

23 What is the missing side of the right triangle rounded to the nearest tenth?
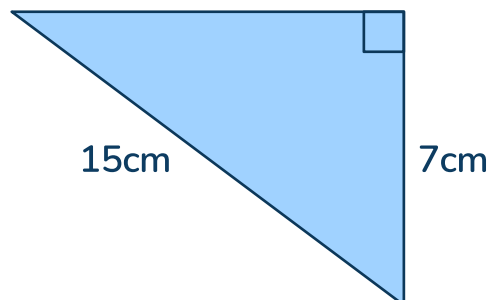
A. 13.3 cm
B. 14.3 cm
C. 16.6 cm
D. 15.5 cm

Standard: 8.F.A.1

DOK 1

24 Which set of coordinates do not represent a function?

A. {(9, 0), (0, 9), (6, 5)}
B. {(1, 1), (2, 1), (3, 1)}
C. {(0, 0), (7, 1), (-6, 1)}
D. {5, 2), (-5, -2), (5, 10)}

Standard: 8.G.A.3

DOK 2

25 If point A (9, 3) is reflected over the x-axis and then translated 3 units up and 4 units left, what are the coordinates of the final image?

A. (-5, 0)
B. (-13, 0)
C. (5, 0)
D. (13, 0)

Standard: 8.EE.4

DOK 2

26 The diameter of Earth is about 1.3×10^4 and the diameter of Jupiter is about 1.4×10^5. How many times larger is the diameter of Jupiter?

    A. 0.108×10^1

    B. 1.08×10^1

    C. 0.108×10^2

    D. 1.08×10^2

Standard: 8.EE.7b

DOK 1

27 What is the solution to the equation below?

$$-\frac{2}{3}(6x - 9) + 4 = \frac{1}{2}(-4x + 16)$$

    A. -1

    B. $-\frac{1}{3}$

    C. 1

    D. $\frac{1}{3}$

Standard: 8.EE.B.5
DOK 2

28 There are two house painters that paint houses in a particular town.

House painter #1 cost per hour can be represented by the graph.
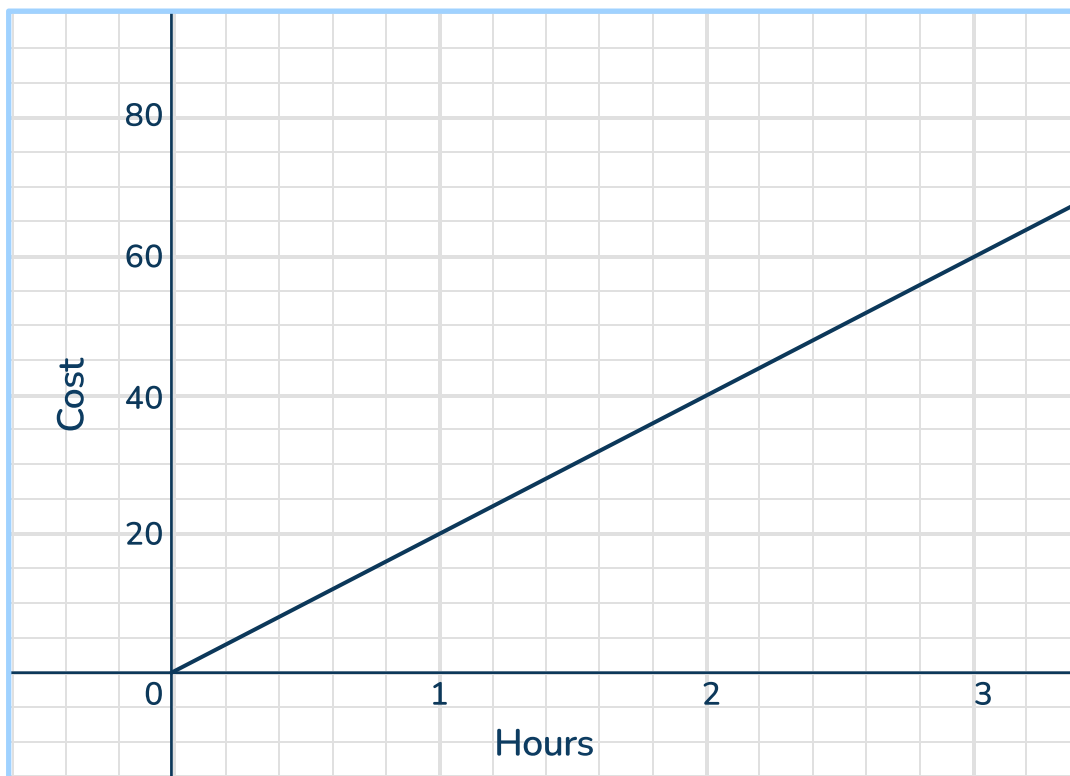
House painter #2 cost per hour can be represented by the equation, $y = 25x$

Based on this information, which statement is true?

    A. House painter #1 charges $5 less per hour than house painter #2?
    B. House painter #1 charges $5 more per hour than house painter #2.
    C. House painter #1 charges the same amount per hour as house painter #2.
    D. House painter #1 charges $15 less per hour than house painter #2.

Standard: 8.F.B.5

DOK 2

29 Between which two values for x is the function nonlinear and decreasing?

A. Between -3 and -2

B. Between -2 and 0

C. Between 0 and 3

D. Between 0 and 10

Standard: 8.G.A.5
DOK 1

30 Line AB and line CD are parallel. What is the value of x rounded to the nearest tenth?
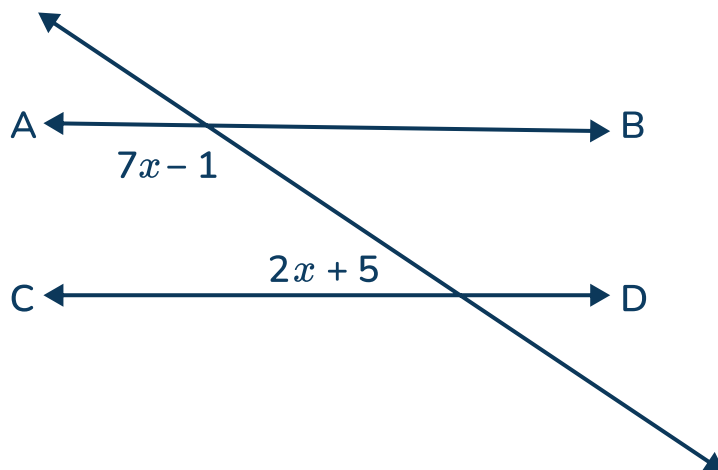
A. 18.6
B. 1.2
C. 35.2
D. 19.6

Session 2:

3 Multiple Choice

10 Constructed Response

Standard: 8.EE.C.7a

DOK 2

31 What value for k will make the equation have no solution?

$12x - 26 + 2 = k(3x - 9)$

    A. 2

    B. 4

    C. 6

    D. 8

Standard: 8.EE.A.1

DOK 2

32 Which expression is equivalent to $5^{-6} \times 5^{-2}$?

    A. $\dfrac{1}{5^{12}}$

    B. $\dfrac{1}{5^{8}}$

    C. 5^{8}

    D. 5^{12}

Standard: 8.G.A.3

DOK 2

33 Which sequence of transformations maps triangle RST to triangle ABC?
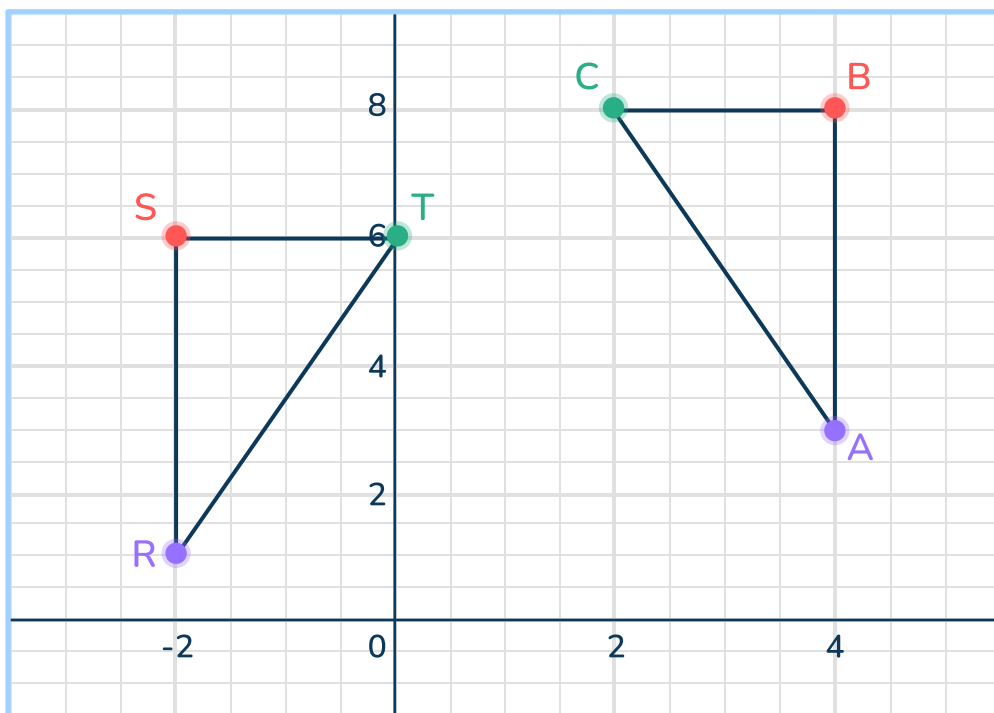
A. Reflection over the line $y = x$ followed by translation of 2 units up and 2 units right.

B. Translation of 2 units right and 2 units up followed by a reflection over the y-axis.

C. Reflection over the y-axis followed by a translation of 2 units up and 2 units right.

D. Reflection over the x-axis followed by a translation of 2 units up and 2 units right.

Constructed response questions:

Standard: 8.F.B.4

DOK 2

Constructed response - 1 point

34   Daniella runs her own tutoring business. Due to the fact that gas prices are on the rise, Daniella charges all of her customers a \$5.00 fee plus \$60 an hour. If this represents a linear relationship, write a function of x that models the situation.

Standard: 8.EE.2 & 8.NS.2

DOK 2

Constructed response - 1 point

35   What is the solution to $x^3 = -216$? Show work.

Standard: 8.G.7

DOK 3

Constructed response - 2 points

36 Johanna is building a fence around her garden. She has 27 feet of fencing to enclose the right triangle shaped garden. If the two shorter sides of the triangular shaped garden are both 8 feet, will she have enough fencing to fully enclose the garden? Show your work to receive full points

Standard: 8.EE.7b

DOK 2

Constructed response - 2 points

37 What value of x makes the equation true?

-12 $(2x + 3)$ - 4 = - 2 $(6x + 2)$

Standard: 8.F.A.2
DOK 3
Constructed response - 2 points

38 Two functions are shown below. What is the difference between the rate of change between Function A and Function B? Be sure to show the rate of change for each function.

Function A:

$y = 40x$

Function B:
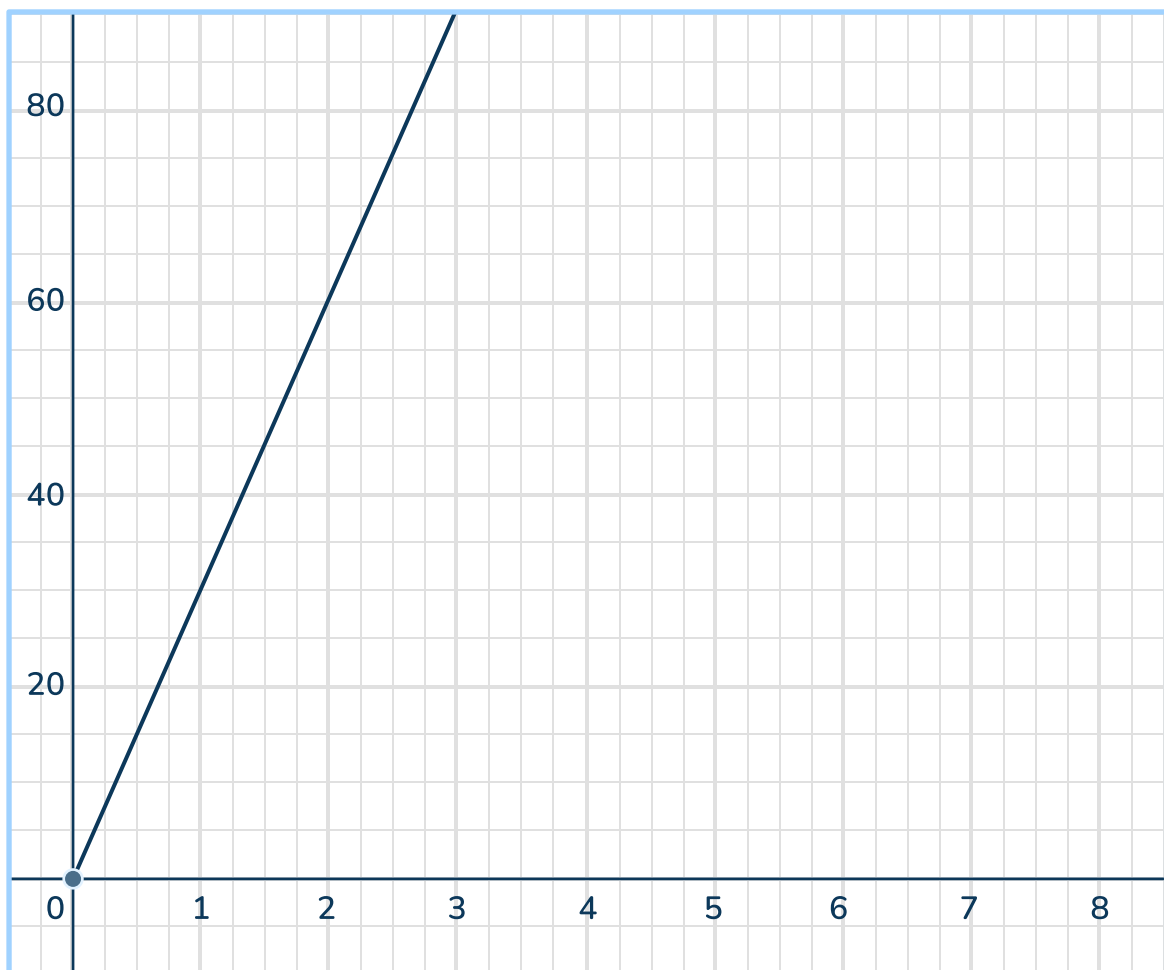
Standard: 8.G.A.5

DOK 3

Constructed response - 2 point

39 Line LK is parallel to line JM and line ST is the transversal. Find the value of x and y. Show all of your work to get full credit.
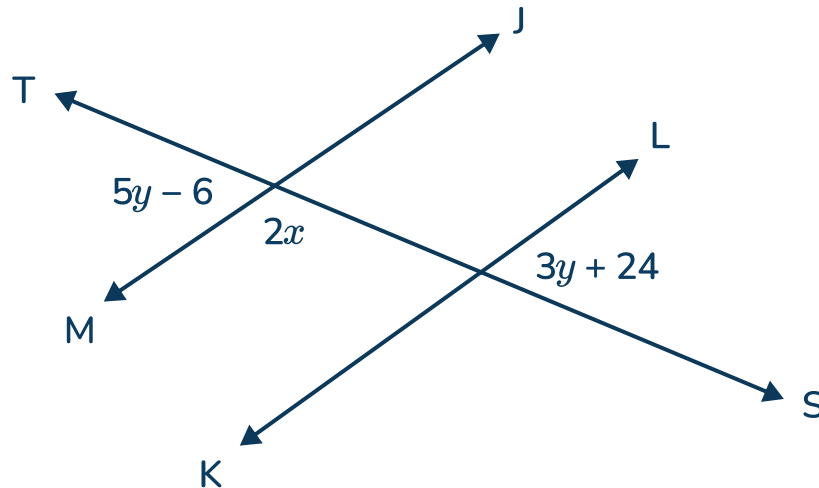
Standard: 8.EE.C.7b

DOK 3

Constructed Response - 2 points

40 Mike solved the equation below. Determine the step where he made the error and correctly solve the problem for x. Round your answer to the nearest hundredth.

2.2 ($3x$ - 1.5) - 0.6 = -1.4 ($2x$ + 7)

Step 1: $6.6x$ - 3.3 - 0.6 = - $2.8x$ - 9.8

Step 2: $6x$ - 3.3 = - $2.8x$ - 9.8

Step 3: $3.2x$ = 6.5

Step 4: x = 2.03125 $\approx$ 2.03

Standard: 8.G.A.2

DOK 3

Constructed response - 2 points

41 Quadrilateral ABCD has points A(-4, 3), B(-4, -2), C(3, 3), and D(3, -2). The quadrilateral is dilated by a scale factor of 2 and then reflected over the line $y = x$. What are the coordinates of the final image?

Standard: 8.EE.A.4

DOK 3

Constructed response - 2 points

42 Saturn is 8.86 x 10^8 miles from the sun. Mercury is about 2.86x10^7 miles from the sun. What is the difference between Mercury's and Saturn's distance from the sun? Express your answer in scientific notation.

Standard: 8.F.A.3

DOK 4

Constructed Response - 3 points

43 Using the three equations below. Identify each one of them as either linear or nonlinear. State a reason why each equation is either linear or nonlinear.

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

- $y = \dfrac{10}{x} - 4$

- $y = 2x(-x + 4)$

Answer Key - Multiple Choice

Item number	Correct answer	Standard(s)	Depth of Knowledge
1	A	**8.G.8**	1
2	C	**8.G.5 & 7.G.2**	1
3	B	**8.EE.6**	2
4	D	**8.F.1**	1
5	B	**8.G.3**	2
6	A	**8.G.9**	2
7	D	**8.EE.1**	2
8	B	**8.EE.5**	2
9	C	**8.G.5**	1
10	D	**8.EE.C.7b**	2
11	C	**8.EE.B.6**	2
12	B	**8.G.A.3**	1
13	D	**8.EE.A.4**	1
14	A	**8.G.C.9**	1
15	C	**8.EE.B.6**	2
16	B	**8.F.B.4**	1
17	C	**8.SP.A.2**	2
18	D	**8.EE.C.8b**	2
19	C	**8.F.B.4**	2
20	C	**8.G.A.3**	1

New York Practice Test | Grade 8 | Answers

Item number	Correct answer	Standard(s)	Depth of Knowledge
21	A	**8.G.A.5**	2
22	C	**7.G.8.6**	2
23	A	**8.G.7**	2
24	D	**8.F.A.1**	1
25	C	**8.G.A.3**	2
26	B	**8.EE.4.2**	2
27	C	**8.EE.7b**	1
28	A	**8.EE.B.5**	2
29	C	**8.F.B.5**	2
30	D	**8.G.A.2**	1
31	B	**8.EE.C.7a**	2
32	B	**8.EE.A.1**	2
33	C	**8.G.A.3**	2
34	Answer on rubric	**8.F.B.4**	2
35	Answer on rubric	**8.EE.2**	2
36	Answer on rubric	**8.G.7**	3
37	Answer on rubric	**8.EE.7b**	2
38	Answer on rubric	**8.F.A.2**	3
39	Answer on rubric	**8.G.A.5**	3
40	Answer on rubric	**8.EE.C.7b**	3

Item number	Correct answer	Standard(s)	Depth of Knowledge
41	Answer on rubric	**8.G.A.2**	3
42	Answer on rubric	**8.EE.4**	3
43	Answer on rubric	**8.F.A.3**	4

Breakdown of Assessment				
The Number System	Expressions, Equations, and Inequalities	Functions	Geometry	Statistics and Probability
2%	40%	19%	40%	2%

Rationales

Item	KEY	Rationale
1	A is correct	This is the correct answer. The student can use the distance formula or the Pythagorean Theorem to calculate the distance between the points. $$\sqrt{(-1-3)^2 + (2-(-8))^2}$$ $$\sqrt{(-4)^2 + (10)^2}$$ $$\sqrt{16+100} = \sqrt{116}$$
	B is incorrect	Students may choose this answer if they forget to include the radical.
	C is incorrect	Students may choose this answer if they struggle with finding the distance between points and forget to square the differences first.
	D is incorrect	Students may choose this answer if they struggle with finding the distance between points.

Item	KEY	Rationale
2	A is incorrect	Students may choose this answer if they struggle with understanding that all angles in a triangle sum to 180°.
	B is incorrect	Students may choose this answer if they struggle with understanding that all angles in a triangle sum to 180°.
	C is correct	This is the correct answer because 52+68+60=180.
	D is incorrect	Students may choose this answer if they struggle with understanding that all angles in a triangle sum to 180°.

Item	KEY	Rationale
3	A is incorrect	A student may choose this answer if they struggle with writing equations of lines.
	B is correct	This is the correct answer. The slope of the line is -3 and the y-intercept is -9 so the equation is $y = -3x -9$. $m = \dfrac{0-(-9)}{-3-0} = \dfrac{9}{-3} = -3$
	C is incorrect	A student may choose this answer if they struggle with writing equations of lines.
	D is incorrect	A student may choose this answer if they struggle with writing equations of lines.

Item	KEY	Rationale
4	A is incorrect	Students may choose this answer if they do not have a strong understanding of functions.
	B is incorrect	Students may choose this answer if they do not have a strong understanding of functions.
	C is incorrect	Students may choose this answer because they might think all lines are functions.
	D is correct	This is the correct answer because it is a linear function.

Item	KEY	Rationale
5	A is incorrect	Students may choose this answer if they struggle with rules of reflected points on the coordinate plane.
	B is correct	This is the correct answer. Reflecting (-4, 5) over the x-axis the y-coordinate changes to be -5. So, the reflected point is (-4, -5)
	C is incorrect	Students may choose this answer if they struggle with rules of reflected points on the coordinate plane.
	D is incorrect	Students may choose this answer if they struggle with rules of reflected points on the coordinate plane.

Item	KEY	Rationale
6	A is correct	This is the correct answer. v = (5.1)² x 13.6 x ∏ v = 26.01 x 13.6 x 3.14 v = 1110.7 cm³
	B is incorrect	Students may choose this answer if they round to the nearest whole number accidentally.
	C is incorrect	Students may choose this answer if they struggle with rounding.
	D is incorrect	Students may choose this answer if they struggle with rounding.

Item	KEY	Rationale
7	A is incorrect	Students may choose this answer if they struggle with the understanding of negative exponents.
	B is incorrect	Students may choose this answer if they struggle with the understanding of negative exponents and laws of exponents.
	C is incorrect	Students may choose this answer if they struggle with the understanding of negative exponents and laws of exponents.
	D is correct	This is the correct answer. $(2^3)^{-2} = 2^{-6} = \dfrac{1}{2^6} = \dfrac{1}{64}$

Item	KEY	Rationale
8	A is incorrect	A student may choose this answer if they mix up greater than and less than sign.
	B is correct	This is the correct answer because the rate of change of Function A is 1.75 and the rate of change of Function B is 1.5. $1.75 > 1.5$
	C is incorrect	Students may choose this answer if they struggle identifying the rate of change of the functions.
	D is incorrect	Students may choose this answer if they struggle identifying the rate of change of the functions.

Item	KEY	Rationale
9	A is incorrect	Students may choose this answer if they struggle with solving equations.
	B is incorrect	Students may choose this answer if they struggle with solving equations.
	C is correct	This is the correct answer. $5x - 1 = 3x + 23$ $2x = 24$ $x = 12$
	D is incorrect	Students may choose this answer if they struggle with solving equations.

Item	KEY	Rationale
10	A is incorrect	Students may choose this answer if they make a calculation error and struggle with solving equations.
	B is incorrect	Students may choose this answer if they make a calculation error and struggle with solving equations.
	C is incorrect	Students may choose this answer if they make a calculation error and struggle with solving equations.
	D is correct	This is the correct answer. $2.5 (3x - 2) = 2x + 0.5$ $7.5x - 5 = 2x + 0.5$ $5.5x = 5.5$ $x = 1$

Item	KEY	Rationale
11	A is incorrect	Students may choose this answer if they miscount the slope.
	B is incorrect	Students may choose this answer if they accidentally think that the y-intercept is +2 and struggle with identifying a positive slope vs a negative slope.
	C is correct	This is the correct answer. The slope is $\frac{2}{6} = \frac{1}{3}$ and the y-intercept is -2 $y = \frac{1}{3}x - 2$
	D is incorrect	Students may choose this answer if they struggle with identifying a positive slope vs a negative slope.

Item	KEY	Rationale
12	A is incorrect	Students may choose this answer if they confuse points.
	B is correct	This is the correct answer. A (1, 2) so A' ($\frac{1}{2}$, 1)
	C is incorrect	Students may choose this answer if they confuse points.
	D is incorrect	Students may choose this answer if they confuse the scale factor and multiply by 2.

Item	KEY	Rationale
13	A is incorrect	Students may choose this answer if they struggle with division with decimals.
	B is incorrect	Students may choose this answer if they struggle with division with exponents.
	C is incorrect	Students may choose this answer if they struggle with division with exponents and decimals.
	D is correct	This is the correct answer. $$\frac{2.5 \times 10^7}{0.5 \times 10^3} = 5 \times 10^4$$ Divide the decimal numbers and subtract the exponents.

Item	KEY	Rationale
14	A is correct	This is the correct answer. The volume of a cylinder is $V = \prod (r^2)(h)$ The radius in this case is 2 and the height is 9. $V = \prod (2)^2 (9)$
	B is incorrect	Students may choose this answer if they forget to take half of the diameter.
	C is incorrect	Students may choose this answer if they cube the radius instead of square it.
	D is incorrect	Students may choose this answer if they use the diameter length instead of the radius and cube that measurement instead of square it.

Item	KEY	Rationale
15	A is incorrect	Students may choose this answer if they struggle with writing a direct variation linear equation.
	B is incorrect	Students may choose this answer if they struggle with writing a direct variation linear equation.
	C is correct	This is the correct answer. The slope of the line is $-\dfrac{5}{8}$, so the equation is $y = -\dfrac{5}{8}x$ The line crosses the origin so the y-intercept is 0.
	D is incorrect	Students may choose this answer if they struggle with writing a direct variation linear equation.

Item	KEY	Rationale
16	A is incorrect	Students may choose this answer if they make a minor mistake with finding the slope.
	B is correct	This is the correct answer. $\dfrac{-7-6}{5-(-1)} = \dfrac{-13}{6}$ Slope is the rate of change.
	C is incorrect	Students may choose this answer if they struggle with finding slope.
	D is incorrect	Students may choose this answer if they struggle with finding slope.

Item	KEY	Rationale
17	A is incorrect	Students may choose this answer if they struggle with the line of best fit.
	B is incorrect	Students may choose this answer if they struggle with the line of best fit.
	C is correct	This is the correct answer. When the x-values decrease as the y-values increase the points will form a line that has a negative slope.
	D is incorrect	Students may choose this answer if they struggle with the line of best fit.

Item	KEY	Rationale
18	A is incorrect	Students may choose this answer if they struggle with solving systems of linear equations.
	B is incorrect	Students may choose this answer if they struggle with solving systems of linear equations.
	C is incorrect	Students may choose this answer if they struggle with solving systems of linear equations.
	D is correct	This is the correct answer. Solving the system using elimination: $3x - 3y = 1$ $6x = 6y + 2$ $3x - 3y = 1$ $6x - 6y = 2$ $2 (3x - 3y = 1)$ $6x - 6y = 2$ $6x - 6y = 2$ $6x - 6y = 2$ These lines coincide meaning there are infinite solutions.

Item	KEY	Rationale
19	A is incorrect	Students may choose this answer if they struggle with interpreting tables that have linear relationships.
	B is incorrect	Students may choose this answer if they struggle with interpreting tables that have linear relationships.
	C is correct	This is the correct answer. Selecting 2 points from the table, (0,80) and (1, 105) the slope is $\frac{105\text{-}80}{1\text{-}0} = \frac{25}{1} = 25$ The y-intercept is identified as (0, 80) So the equation is $y = 25x + 80$
	D is incorrect	Students may choose this answer if they struggle with interpreting tables that have linear relationships.

Item	KEY	Rationale
20	A is incorrect	Students may choose this answer if they struggle with dilations.
	B is incorrect	Students may choose this answer if they struggle with dilations.
	C is correct	This is the correct answer. Comparing the points you can see the scale factor is 2. A(1, 2) and X(2, 4) C(4, -1) and Z(8, -2) B(0, 0) and Y(0, 0)
	D is incorrect	Students may choose this answer if they struggle with dilations.

Item	KEY	Rationale
21	A is correct	This is the correct answer. $x - 14 + 3x + 1 + x + 3 = 180$ $5x - 10 = 180$ $5x = 190$ $x = 38$
	B is incorrect	Students may choose this answer if they struggle with solving equations.
	C is incorrect	Students may choose this answer if they struggle with solving equations.
	D is incorrect	Students may choose this answer if they struggle with solving equations.

Item	KEY	Rationale
22	A is incorrect	Students may choose this answer if they struggle with finding volume.
	B is incorrect	Students may choose this answer if they struggle with finding volume.
	C is correct	This is the correct answer: $V = lwh$ Box 1: 2.4 x 6.7 x 10.2 = 164.016 in³ Box 2: 5.5 x 3.2 x 11.2 = 197.12 in³ 197.12 - 164.016 = 33.104
	D is incorrect	Students may choose this answer if they make a minor calculation error.

Item	KEY	Rationale
23	A is correct	This is the correct answer. $$15^2 = 7^2 + x^2$$ $$225 = 49 + x^2$$ $$176 = x^2$$ $$\sqrt{176} = x$$ $$13.2664 = x$$
	B is incorrect	Students may choose this answer if they struggle with the Pythagorean Theorem.
	C is incorrect	Students may choose this answer if they struggle with the Pythagorean Theorem.
	D is incorrect	Students may choose this answer if they struggle with the Pythagorean Theorem.

Item	KEY	Rationale
24	A is incorrect	Students may choose this answer if they struggle with how to identify functions from a list of coordinates.
	B is incorrect	Students may choose this answer if they struggle with how to identify functions from a list of coordinates.
	C is incorrect	Students may choose this answer if they struggle with how to identify functions from a list of coordinates.
	D is correct	This is the correct answer. This relation does not represent a function because there cannot be any repeat of the x-coordinate or the relation will fail the vertical line test. {(5, 2), (-5, -2), (5, 10)}

Item	KEY	Rationale
25	A is incorrect	A student might choose this answer if they struggle with transformations on the coordinate graphs.
	B is incorrect	A student might choose this answer if they struggle with transformations on the coordinate graphs.
	C is correct	This is the correct answer. (9, 3) reflected over the -axis becomes (9, -3) (9, -3) translated 3 units up and 4 units left is, (9 - 4, -3 + 3) = (5, 0)
	D is incorrect	A student might choose this answer if they struggle with transformations on the coordinate graphs.

Item	KEY	Rationale
26	A is incorrect	Students may choose this answer if they struggle with operations with scientific notation.
	B is correct	This is the correct answer. $\dfrac{1.4 \times 10^5}{1.3 \times 10^4} = 1.08 \times 10^1$
	C is incorrect	Students may choose this answer if they struggle with operations with scientific notation.
	D is incorrect	Students may choose this answer if they struggle with operations with scientific notation.

Item	KEY	Rationale
27	A is incorrect	Students may choose this answer if they do not have a strong command of fractions and solving equations.
	B is incorrect	Students may choose this answer if they do not have a strong command of fractions and solving equations.
	C is correct	This is the correct answer. $-\frac{2}{3}(6x - 9) + 4 = \frac{1}{2}(-4x + 16)$ $-4x + 6 + 4 = -2x + 8$ $-4x + 10 = -2x + 8$ $-2x = -2$ $x = 1$
	D is incorrect	Students may choose this answer if they do not have a strong command of fractions and solving equations.

Item	KEY	Rationale
28	A is correct	This is the correct answer. The rate of change of painter #1 is 20 The rate of change of painter #2 is 25 25-20 = 5
	B is incorrect	Students may choose this answer if they confuse the painters.
	C is incorrect	Students may choose this answer if they struggle with finding rate of change.
	D is incorrect	Students may choose this answer if they struggle with finding rate of change.

Item	KEY	Rationale
29	A is incorrect	Students may choose this answer if they struggle with identifying from a graph when functions are linear and increasing or decreasing.
	B is incorrect	Students may choose this answer if they struggle with identifying from a graph when functions are linear and increasing or decreasing.
	C is correct	This is the correct answer. From the graph, the only part that is nonlinear (not a straight line) is from 0 to 3. It's also the only part of the graph that is decreasing.
	D is incorrect	Students may choose this answer if they struggle with identifying from a graph when functions are linear and increasing or decreasing.

Item	KEY	Rationale
30	A is incorrect	Students may choose this answer if they struggle with angle relationships formed by parallel lines.
	B is incorrect	Students may choose this answer if they struggle with angle relationships formed by parallel lines.
	C is incorrect	Students may choose this answer if they struggle with angle relationships formed by parallel lines.
	D is correct	This is the correct answer. The angles are consecutive interior angles which means they sum to 180. $7x - 1 + 2x + 5 = 180$ $9x + 4 = 180$ $9x = 176$ x = 19.6

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Item	KEY	Rationale
31	A is incorrect	Students may choose this answer if they struggle with identifying when equations have no solution.
	B is correct	This is the correct answer. If $k = 4$ then, $12x - 26 + 2 = k(3x - 9)$ $12x - 26 + 2 = 4(3x - 9)$ $12x - 24 = 12x - 36$ — no solution $-24 \neq -36$
	C is incorrect	Students may choose this answer if they struggle with identifying when equations have no solution.
	D is incorrect	Students may choose this answer if they struggle with identifying when equations have no solution.

Item	KEY	Rationale
32	A is incorrect	Students may choose this answer if they struggle with negative exponents and laws of exponents.
	B is correct	This is the correct answer. $5^{-6} \times 5^{-2}$ $5^{-8} = \dfrac{1}{5^8}$
	C is incorrect	Students may choose this answer if they struggle with negative exponents and laws of exponents.
	D is incorrect	Students may choose this answer if they struggle with negative exponents and laws of exponents.

Item	KEY	Rationale
33	A is incorrect	Students may choose this answer if they struggle with transformations on the coordinate plane.
	B is incorrect	Students may choose this answer if they struggle with transformations on the coordinate plane.
	C is correct	This is the correct answer: R(-2, 1) → (2, 1)→(4, 3) S(-2, 6)→(2, 6) →(4, 8) T(0, 6) →(0, 6) →(2, 8)
	D is incorrect	Students may choose this answer if they struggle with transformations on the coordinate plane.

Item	KEY	Rationale
34	1 point	Students have to correctly write the function. $y = 60x + 5$
	0 points	The student does not write the function.

Item	KEY	Rationale
35	1 point	The student correctly solves the problem. $x^3 = -216$ $x = -6$ Students can solve by taking the cube root of both sides of the equation or rationalize that -6 x -6 x -6 = -216
	0 points	The students do not demonstrate understanding.

Item	KEY	Rationale
36	2 points	The student correctly does the calculations. $8^2 + 8^2 = x^2$ $64 + 64 = x^2$ $128 = x^2$ $11.3 = x$ The triangular garden has a perimeter of 8 + 8+ 11.3 = 27.3 If Johanna only has 27 feet of fencing she will not have enough to enclose the triangular shaped garden.
	1 point	Student only finds the missing hypotenuse length and doesn't fully answer the rest of the question. OR The student calculates the correct hypotenuse length but answers yes to the second part of the question. OR The student fully answers the question with minor calculation errors.
	0 points	The students do not demonstrate understanding.

Item	KEY	Rationale
37	2 points	To receive 2 points the students have to correctly solve the equation. $-12(2x + 3) - 4 = -2 (6x + 2)$ $-24x - 36 - 4 = -12x - 4$ $-12x - 40 = -4$ $-12x = 36$ $x = -3$
	1 point	To receive 1 point the student makes a minor calculation error.
	0 points	The student does not demonstrate understanding.

Item	KEY	Rationale
38	2 points	The rate of change of Function A is 40 to 1 or $\frac{40}{1} = 40$. The rate of change of Function B is 30 to 1 or $\frac{30}{1} = 30$ The difference between the rate of changes is 40 - 30 = 10
	1 point	Students will receive 1 point if they just put the answer 10.
	0 points	Students will receive 0 points if they leave the response blank, or they do not demonstrate understanding.

Item	KEY	Rationale
39	2 points	To receive 2 points. The student needs to show work and the correct answer. $5y - 6 = 3y + 24$ (alt exterior angles) $2y = 30$ $y = 15$ $5(15) - 6 = 69$ $2x + 69 = 180$ $2x = 111$ $x = 55.5$
	1 point	To receive 1 point the student made a minor calculation error or just put the correct answer with no work.
	0 points	The student does not demonstrate understanding.

Item	KEY	Rationale
40	2 points	To receive 2 points students have to identify and explain the step where the mistake was made and correctly solve for x. Step 2 is where the mistake was made. Mike did not subtract 0.6 from -3.3 he subtracted it from $6.6x$. $6.6x - 3.9 = -2.8x - 9.8$ $9.4x - 3.9 = -9.8$ $9.4x = -5.9$ $x = 0.6276595745 \approx 0.63$
	1 point	To receive 1 point. The student identifies the correct step but makes a calculation error when providing explanation and solving for x.
	0 points	Students will receive 0 points if they leave the response blank, or do not demonstrate understanding.

Item	KEY	Rationale
41	2 points	To receive 2 points, students need to correctly identify each of the coordinates. A(-4, 3) → A'(-8, 6) → **A''(6, -8)** B(-4, -2) → B'(-8, -4) → **B''(-4, -8)** C(3, 3) → C'(6, 6) → **C''(6, 6)** D(3, -2) → D'(6, -4) → **D''(-4, 6)**
	1 point	Students will receive 1 point if they make a minor calculation error for one or two of the coordinates.
	0 points	Students will receive 0 points if they leave the response blank, or cannot demonstrate understanding.

Item	KEY	Rationale
42	2 points	To receive 2 points, students need to correctly calculate the distance and express the answer in scientific notation. $8.86 \times 10^8 - (2.86 \times 10^7)$ – rewrite so they have the same exponent $88.6 \times 10^7 - (2.86 \times 10^7)$ 85.74×10^7 8.574×10^8 miles
	1 point	Students will receive 1 point if they correctly find the difference but do not leave the answer in correct scientific notation. OR Students make a minor calculation error and do leave the answer in correct scientific notation.
	0 points	Students will receive 0 points if they leave the response blank, or they do not demonstrate understanding.

Item	KEY	Rationale
43	3 points	To get 3 points, students need to correctly identify each equation as linear or nonlinear and provide an appropriate statement explaining why the equation is linear or nonlinear. $y = \dfrac{x}{4} + 3 \rightarrow$ This is a linear equation because it can be rewritten in the form of y = mx + b, $y = \dfrac{1}{4}x + 3$. The variable x is to the first power and it is the highest power of the equation meaning that it is linear. When it is graphed, the slope of the line is $\dfrac{1}{4}$ and the y-intercept is 3. $y = \dfrac{10}{x}$ -4 $\rightarrow$ This is a nonlinear equation because x is to the -1 power. $y = 10x^{-1}$ -4. Linear equations have a degree of 1 or in other words x has to be to the 1 power. Also the equation cannot be written in the form of y = mx + b $y = 2x$ (-x + 4) $\rightarrow$ This is a nonlinear equation because the highest exponent for x is 2. The equation can be rewritten to be $y = -2x^2 - 8x$. Linear equations have a degree of 1 or in other words x has to be to the 1 power. Also the equation cannot be written in the form of y = mx + b
	2 points	For students to get 2 points, they need to correctly identify 2 of the 3 equations and provide an appropriate explanation.
	1 point	For students to get 1 point, they need to correctly identify 1 of the 3 equations and provide an appropriate explanation.
	0 points	Students will receive 0 points if they leave the response blank, or if they do not demonstrate understanding.

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