



THIRD SPACE  
LEARNING

# 8th Grade Ohio State Practice Math Test

Ohio Practice Test Grade 8

Grade 8

## Questions

Name: .....

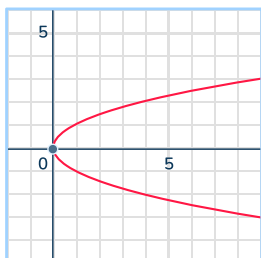
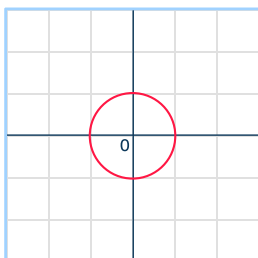
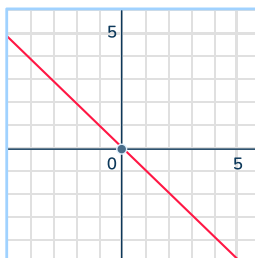
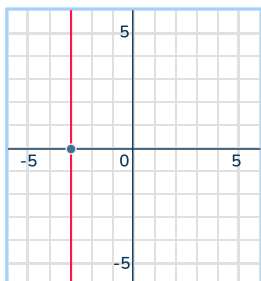
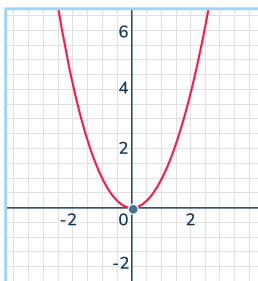
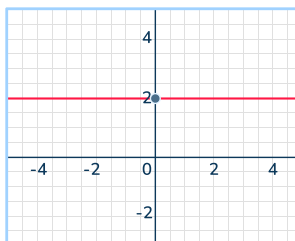
Class: .....

Date: .....

Score: .....

**Standard: 8.F.2****DOK 1**

- 1 Select the graphs that show  $y$  to be a function of  $x$ .

☐☐☐☐☐☐**Standard: 8.EE.1****DOK 2**

- 2 Select the expressions that have a value of  $\frac{1}{64}$ .

☐

$2^6$

☐

$(2^3)^{-3}$

☐

$(2^5)^{-1}$

☐

$(2^3)^{-2}$

☐

$2^{-6}$

**Standard: 8.F.2**

**DOK 1**

- 3 Select all the equations that are **nonlinear** functions.

☐  $y = x^2 - 5$

☐  $y = 5x - 6$

☐  $y = \frac{4}{x} - x$

☐  $y = 3x^2 - 5x$

☐  $y = x - 9 + 6x$

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**Standard: 8.NS.2**

**DOK 2**

- 4 What is a possible value for  $a$  in the inequality below?

$$6.2 < \sqrt{a} < 8.9$$

Answer:\_\_\_\_\_

**Standard: 8.EE.2**

**DOK 2**

5 Select the solution(s) to  $x^2 = 100$ .


- ☐ No solution
- ☐ 50
- ☐ -50
- ☐ 10
- ☐ -10

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**Standard: 8.G.B.8**

**DOK 2**

6 The points A(-1, 2) and B(3, -8) are plotted on the coordinate plane. What is the distance between the points?

 Answer



**Standard: 8.F.4****DOK 3**

- 7 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

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

Select the statement about the functions that is true.

- ☐ The rate of change of Function A is less than the rate of change of Function B  
because  $1.75 < 1.5$ .
- ☐ The rate of change of Function A is greater than the rate of change of Function B  
because  $1.75 > 1.5$ .
- ☐ The rate of change of Function A is less than the rate of change of Function B  
because  $0.75 < 0.5$ .
- ☐ The rate of change of Function A is greater than the rate of change of Function B  
because  $0.75 > 0.5$ .

**Standard: 8.G.9**

**DOK 2**

- 8 A water bottle is in the shape of a cylinder that has a diameter of 4 inches and a height of 9 inches. Create an equation that can be used to find the volume of the water bottle in cubic inches.

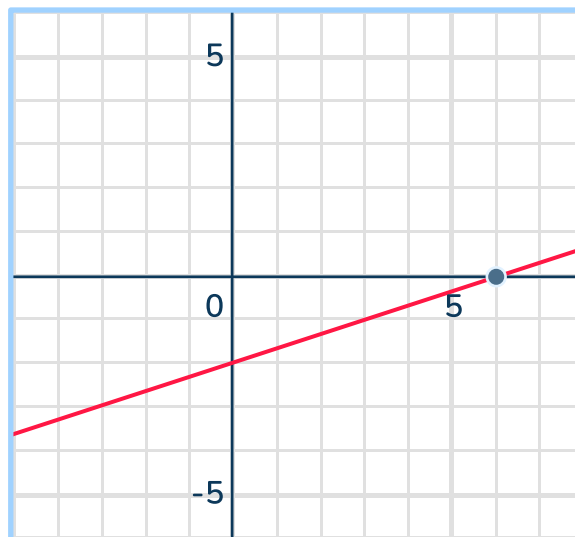
Answer:\_\_\_\_\_

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**Standard: 8.EE.6**

**DOK 2**

- 9 Write an equation that represents the line on the coordinate plane.



Answer:\_\_\_\_\_

**Standard: 8.F.1**

**DOK 1**

**10** Which set of coordinates do not represent a function?

- ☐  $\{(9, 0), (0, 9), (6, 5)\}$
- ☐  $\{(1, 1), (2, 1), (3, 1)\}$
- ☐  $\{(0, 0), (7, 1), (-6, 1)\}$
- ☐  $\{(5, 2), (-5, -2), (5, 10)\}$

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**Standard: 8.G.3**

**DOK 2**

**11** 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?

Answer:\_\_\_\_\_

Standard: 8.F.4

DOK 2

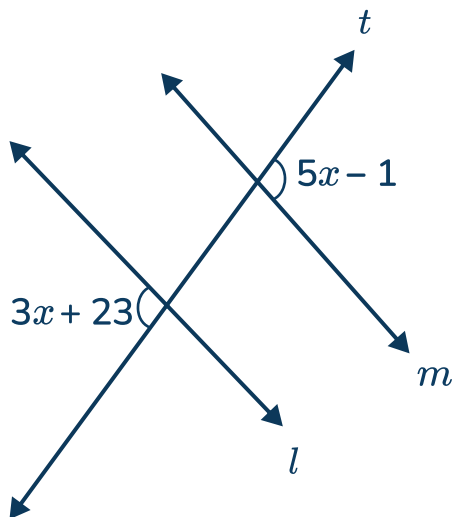
- 12
- Gina runs her family’s home repair service. The table below shows the service charges for the amount of hours worked. Create a linear function that represents the information in the table.


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

Answer:\_\_\_\_\_

**Standard: 8.G.5****DOK 1**

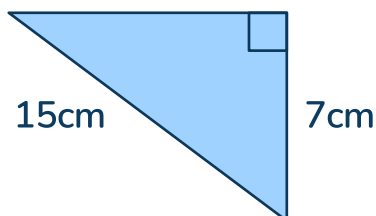
- 13** In the figure, lines  $l$  and  $m$  are parallel and  $t$  is the transversal. What is the value of  $x$ ?



 Answer

**Standard: 8.G.7****DOK 1**

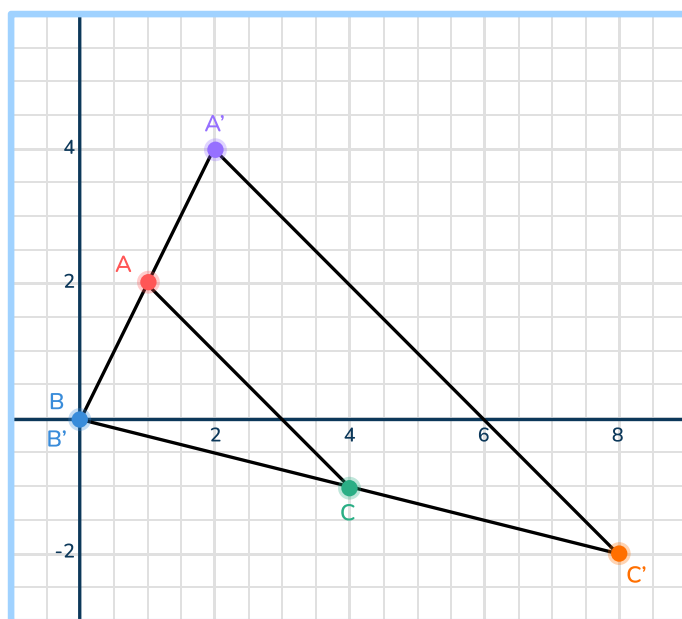
- 14 Select the value that represents the missing side of the right triangle rounded to the nearest tenth.



- ☐ 13.3 cm
- ☐ 14.3 cm
- ☐ 16.6 cm
- ☐ 15.5 cm

**Standard: 8.G.3****DOK 2**

- 15 Kelly plotted triangle ACB and then performed a dilation that mapped triangle ACB to triangle A'C'B'. What is the scale factor of the dilation she performed?



Answer: \_\_\_\_\_

**Standard:** 8.F.4

**DOK** 3

- 16 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. Create a function of  $x$  that models the situation.

Answer:\_\_\_\_\_

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**Standard:** 8.SP.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?
- ☐ The data can be modeled by a horizontal line.
  - ☐ The data cannot be modeled by a line.
  - ☐ The data can be modeled by a line with a negative slope.
  - ☐ The data can be modeled by a line with a positive slope.

Standard: 8.EE.6

DOK 2

18 On the coordinate plane, the graph of a line passes through the origin and the point  $(-8, 5)$ . Write the equation of the line in slope intercept form.

Answer:\_\_\_\_\_

Standard: 8.EE.7.a

DOK 2

19 Select the box that represents the type of solution for each equation.

Equation	No solution	1 solution	Infinite solutions
$2.5 (3x - 2) = 2x + 0.5$			
$-4 (x + 5) - 3x = -7x - 9$			
$2(3x - 7) - x = -1(-5x + 14)$			




**Standard: 8.EE.8.a**

**DOK 1**

- 20** State the set of solutions to the system of equations.

$$3x - 3y = 1$$

$$6x = 6y + 2$$

 Answer

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**Standard: 8.NS.1**

**DOK 1**


- 21** Write  $0.\overline{41}$  as a fraction.

Answer:\_\_\_\_\_

**Standard: 8.G.7**

**DOK 3**

- 22** 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? Be sure to show all of your work in the space provided.


 Answer

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**Standard: 8.EE.4**

**DOK 3**

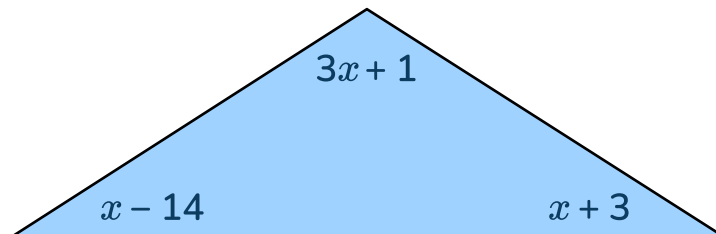
- 23** Saturn is  $8.86 \times 10^8$  miles from the sun. Mercury is about  $2.86 \times 10^7$  miles from the sun. What is the difference between Mercury's and Saturn's distance from the sun? Express your answer in scientific notation.

 Answer

**Standard: 8.G.5**

**DOK 1**

**24** What is the value of  $x$ ?




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**Standard: 8.EE.7.b**

**DOK 3**

**25** What value for  $k$  will the equation have no solution?

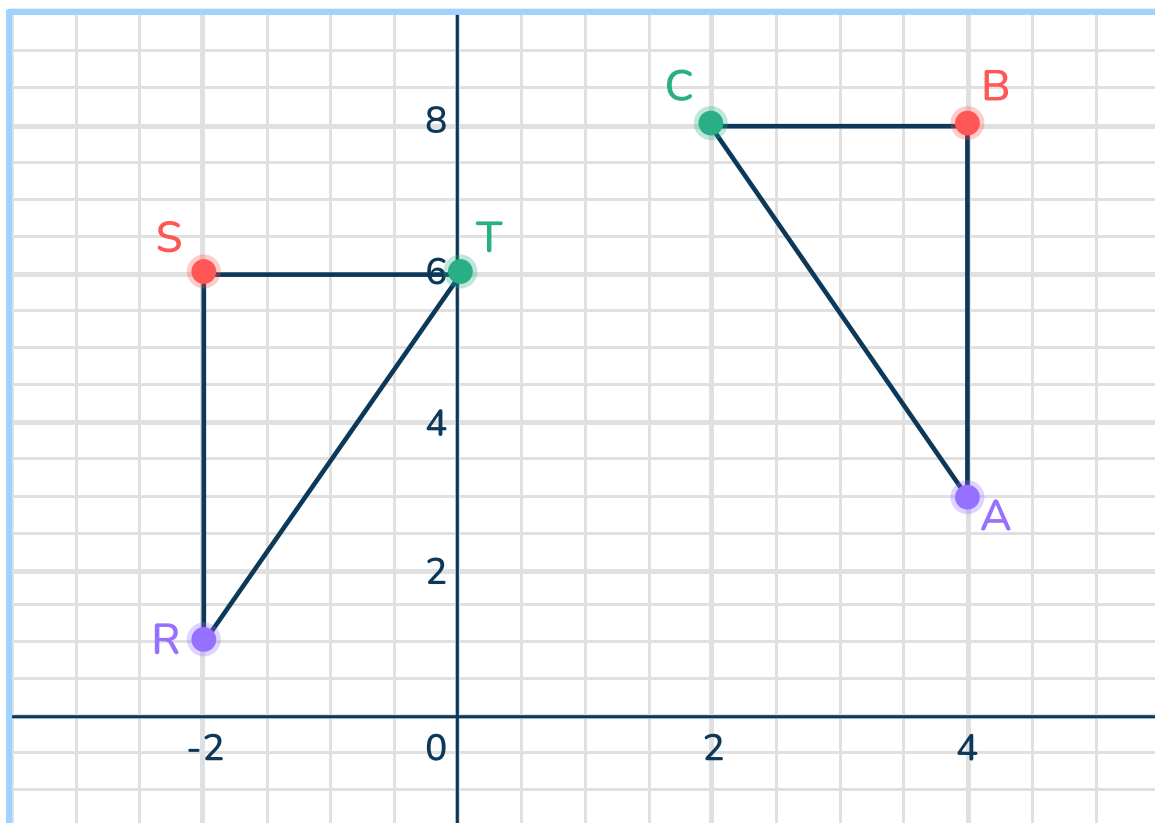
$$12x - 26 + 2 = k(3x - 9)$$

 Answer

Standard: 8.G.2

DOK 3

- 26 Select the sequence of transformations that maps triangle RST to triangle ABC?

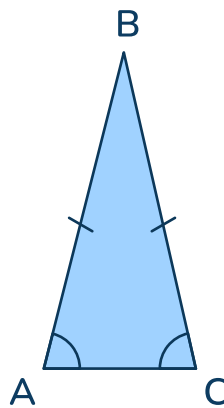


- ☐ Reflection over the line  $y = x$  followed by translation of 2 units up and 2 units right.
- ☐ Translation of 2 units right and 2 units up followed by a reflection over the  $y$ -axis.
- ☐ Reflection over the  $y$ -axis followed by a translation of 2 units up and 2 units right.
- ☐ Reflection over the  $x$ -axis followed by a translation of 2 units up and 2 units right.

**Standard: 8.G.3**

**DOK 2**

- 27 Triangle ABC, was reflected to be Triangle XYZ.  
Select the statements that are true about Triangle XYZ.



- ☐ Angle X = Angle Z
- ☐ Angle X = Angle Y
- ☐  $XY = XZ$
- ☐  $ZY = XY$
- ☐ Angle Z = Angle Y

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**Standard: 8.EE.4**

**DOK 3**

- 28 What is the value of  $p$  and  $q$  in the equation below?

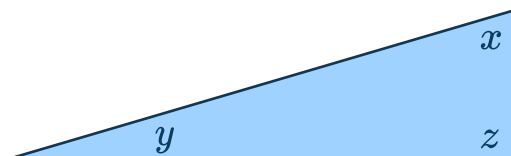
$$(8.2 \times 10^3)(p \times 10^q) = 4.1 \times 10^{12}$$

Answer:  $p =$  \_\_\_\_\_  $q =$  \_\_\_\_\_

**Standard: 8.G.5**

**DOK 3**

- 29 Create an equation for  $z$  in terms of  $x$  and  $y$ .



Answer:  $z =$  \_\_\_\_\_

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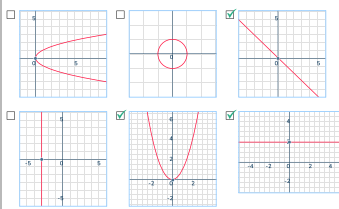
**Standard: 8.F.4**

**DOK 2**

- 30 Write the equation of a line that contains the points (2, 2) and (6, -4).

Answer: \_\_\_\_\_

## Rationales

Item	KEY	Rationale
1		The diagonal line, parabola opened up and the horizontal line are all functions because they represent relations where for every $x$ value there is only one $y$ value. In other words, there is no repetition of $x$ values.

Item	KEY	Rationale
2	$(2^3)^{-2}$ $2^{-6}$	$(2^3)^{-2} = 2^{-6} = \frac{1}{2^6} = \frac{1}{64}$ $2^{-6} = \frac{1}{2^6} = \frac{1}{64}$

Item	KEY	Rationale
3	$y = x^2 - 5$ $y = \frac{4}{x} - x$ $y = 3x^2 - 5x$	$y = x^2 - 5$ is nonlinear because the degree or highest exponent is 2, linear functions have a highest exponent of 1. $y = \frac{4}{x} - x$ is nonlinear because the exponent is raised to the negative 1 power (because it is in the denominator). $y = 3x^2 - 5x$ is nonlinear because the degree or highest exponent is 2.

Item	KEY	Rationale
4	$a = 49$ or $64$	If $a = 49$ , then $\sqrt{a}$ is $\sqrt{49} = 7$ If $a = 64$ , then $\sqrt{a}$ is $\sqrt{64} = 8$

## Ohio State Practice Math Test | Grade 8 | Rationales

Item	KEY	Rationale
5	$x = \pm 10$	$x^2 = 100$ $\sqrt{x^2} = \sqrt{100}$ $x = \pm 10$

Item	KEY	Rationale
6	10.8 units	<p>The student can use the distance formula or the Pythagorean Theorem to calculate the distance between the points.</p> $\sqrt{(-1 - 3)^2 + (2 - (-8))^2}$ $\sqrt{(-4)^2 + (10)^2}$ $\sqrt{16 + 100} = \sqrt{116} = 10.8$

Item	KEY	Rationale
7	The rate of change of Function A is greater than the rate of change of Function B because $1.75 > 1.5$ .	<p>The rate of change of Function A is:</p> $\frac{3.5 - 5.25}{2 - 3} = \frac{-1.75}{-1} = 1.75$ <p>The rate of change of Function B is:</p> $y = \frac{3}{2}x$ $\frac{3}{2} \text{ or } 1.5$ <p>Rate of change is the slope.</p>

Item	KEY	Rationale
8	$V = \pi (2)^2 (9)$	<p>The volume of a cylinder is <math>V = \pi (r^2)(h)</math></p> <p>The radius in this case is 2 and the height is 9.</p> $V = \pi (2)^2(9)$

Item	KEY	Rationale
9	$y = \frac{1}{3}x - 2$	<p>The slope is <math>\frac{2}{6} = \frac{1}{3}</math> and the <math>y</math>-intercept is -2.</p> $y = \frac{1}{3}x - 2$



## Ohio State Practice Math Test | Grade 8 | Rationales

Item	KEY	Rationale
10	$\{(5, 2), (-5, -2), (5, 10)\}$	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. In other words, for every input ( $x$ ) value there is a unique output ( $y$ ) value. In this case, that is not true because 5 is an input value for two different output values. $\{(5, 2), (-5, -2), (5, 10)\}$

Item	KEY	Rationale
11	$(5, 0)$	$(9, 3)$ reflected over the $x$ -axis becomes $(9, -3)$ . $(9, -3)$ translated 3 units up and 4 units left is $(9 - 4, -3 + 3) = (5, 0)$

Item	KEY	Rationale
12	$y = 25x + 80$	Selecting 2 points from the table, $(0, 80)$ and $(1, 105)$ the slope is $\frac{105-80}{1-0} = \frac{25}{1} = 25$ The $y$ -intercept is identified as $(0, 80)$ . So the equation is $y = 25x + 80$

Item	KEY	Rationale
13	$x = 12$	The angles represented by the algebraic expressions are alternate exterior angles which are congruent or equal when the lines are parallel. $5x - 1 = 3x + 23$ $2x = 24$ $x = 12$

## Ohio State Practice Math Test | Grade 8 | Rationales

Item	KEY	Rationale
14	13.3 cm	Using the Pythagorean Theorem to find the missing side: $15^2 = 7^2 + x^2$ $225 = 49 + x^2$ $176 = x^2$ $\sqrt{176} = x$ $13.2664 = x$

Item	KEY	Rationale
15	Scale factor is 2.	Comparing the points you can see the scale factor is 2 because each point from triangle ACB when multiplied by 2 will land on the points of triangle A'C'B'. $A(1, 2) \rightarrow \times 2(1,2) = A'(2, 4)$ $C(4, -1) \rightarrow \times 2(4,-1) = C'(8, -2)$ $B(0, 0) \rightarrow \times 2(0,0) = B'(0, 0)$

Item	KEY	Rationale
16	$y = 60x + 5$	The starting or initial fee is \$5 which is the $y$ -intercept. Then there is a cost of \$60 per hour which represents the rate or the rate of change or the slope. So, the function is $y = 60x + 5$ .

Item	KEY	Rationale
17	The data can be modeled by a line with a negative slope.	When the $x$ -values decrease as the $y$ -values increase the points will form a line that has a negative slope.

## Ohio State Practice Math Test | Grade 8 | Rationales

Item	KEY	Rationale
18	$y = -\frac{5}{8}x$	<p>The equation of a line in slope intercept form is <math>y = mx + b</math> where <math>m</math> is the slope and <math>b</math> is the <math>y</math>-intercept.</p> <p>Find the slope:</p> $\frac{5-0}{-8-0} = -\frac{5}{8}$ <p>Since the line passes through the origin, the origin is the <math>y</math>-intercept.</p> <p>Another way to find the equation is to plot the origin and the point <math>(-8, 5)</math> on a graph. Starting at the origin, which is the <math>y</math>-intercept, count the vertical movement and the horizontal movement until you get to the point <math>(-8, 5)</math></p> <p>The equation is: <math>y = -\frac{5}{8}x</math></p>

Item	KEY	Rationale
19	$2.5(3x - 2) = 2x + 0.5$ has 1 solution.  $-4(x + 5) - 3x = -7x - 9$ has no solution.  $2(3x - 7) - x = -1(-5x + 14)$ has infinite solutions	$2.5(3x - 2) = 2x + 0.5$ $7.5x - 5 = 2x - 0.5$ $5.5x = -5.5$ $x = 1$  $-4(x + 5) - 3x = -7x - 9$ $-4x - 20 - 3x = -7x - 9$ $-7x - 20 = -7x - 9$ $-20 = -9$ Not true so no solution.  $2(3x - 7) - x = -1(-5x + 14)$ $6x - 14 - x = 5x - 14$ $5x - 14 = 5x - 14$ $-14 = -14$ True so infinite solutions.

## Ohio State Practice Math Test | Grade 8 | Rationales

Item	KEY	Rationale
20	Infinite solutions	<p>Solving the system using elimination:</p> $3x - 3y = 1$ $6x = 6y + 2$ $3x - 3y = 1$ $6x - 6y = 2$ $2(3x - 3y = 1)$ $6x - 6y = 2$ $6x - 6y = 2$ $6x - 6y = 2$ <p>These lines coincide meaning there are infinite solutions.</p>

Item	KEY	Rationale
21	$\frac{41}{99}$	<p>Let <math>0.\overline{41}</math> be <math>x = 0.414141\ldots</math></p> <p>Multiply both sides of the equation by 100:</p> $100x = 41.141414\ldots$ <p>Subtract the two equations:</p> $100x - x = 41.141414\ldots - 0.414141\ldots$ $99x = 41$ <p>Solve the equation for <math>x</math>:</p> $x = \frac{41}{99}$

## Ohio State Practice Math Test | Grade 8 | Rationales

Item	KEY	Rationale
22	She will not have enough fencing	$8^2 + 8^2 = x^2$ $64 + 64 = x^2$ $128 = x^2$ $11.3 = x$  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.

Item	KEY	Rationale
23	$8.574 \times 10^8$ miles	$8.86 \times 10^8 - (2.86 \times 10^7)$ Rewrite so they have the same exponent: $88.6 \times 10^7 - (2.86 \times 10^7)$ $85.74 \times 10^7$ $8.574 \times 10^8$ miles

Item	KEY	Rationale
24	$x = 38$	All the angles in a triangle sum to 180.  $x - 14 + 3x + 1 + x + 3 = 180$ $5x - 10 = 180$ $5x = 190$ $x = 38$

Item	KEY	Rationale
25	$k = 4$	If $k = 4$ then, $12x - 26 + 2 = k(3x - 9)$ $12x - 26 + 2 = 4(3x - 9)$ $12x - 24 = 12x - 36$ $-24 \neq -36$ , so no solution.

## Ohio State Practice Math Test | Grade 8 | Rationales

Item	KEY	Rationale
26	Reflection over the $y$ -axis followed by a translation of 2 units up and 2 units right.	$R(-2, 1) \rightarrow (2, 1) \rightarrow A(4, 3)$ $S(-2, 6) \rightarrow (2, 6) \rightarrow B(4, 8)$ $T(0, 6) \rightarrow (0, 6) \rightarrow C(2, 8)$

Item	KEY	Rationale
27	Angle X = Angle Z  $ZY = XY$	A reflection is a congruent transformation and the vertices of Triangle ABC match up with the vertices of Triangle XYZ. So, the equal angles and sides of triangle ABC will match triangle XYZ.  Since $AB = CB$ then $ZY = XY$ and since Angle A = Angle C, then Angle X = Angle Z.

Item	KEY	Rationale
28	$p = 0.5$ $q = 9$	For the given equation $(8.2 \times 10^3)(p \times 10^q) = 4.1 \times 10^{12}$  $8.2 \times p = 4.1$  Solving for $p$ by dividing both sides by 8.2:  $8.2 \div 8.2 \times p = 4.1 \div 8.2$ $p = 0.5$  Using exponent rules:  $3 + q = 12$  Solve for $q$ :  $3 + q - 3 = 12 - 3$ $q = 9$

## Ohio State Practice Math Test | Grade 8 | Rationales

Item	KEY	Rationale
29	$z = 180 - x - y$	<p>The angles in a triangle sum to 180.</p> <p>So, <math>x + y + z = 180</math></p> <p>Solving that equation for <math>z</math> is:</p> $x + y + z = 180$ $x - x + y - x + z = 180 - x - y$ $z = 180 - x - y$

Item	KEY	Rationale
30	$y = -\frac{3}{2}x + 5$	<p>First find the slope:</p> <p>(2, 2) (6, -4)</p> $m = \frac{-4 - 2}{6 - 2} = \frac{-6}{4} = -\frac{3}{2}$ <p>Substitute <math>-\frac{3}{2}</math> for <math>m</math>:</p> $y = mx + b$ $y = -\frac{3}{2}x + b$ <p>Substitute one of the points in for <math>x</math> and <math>y</math> to find the <math>y</math>-intercept, <math>b</math>: (2, 2)</p> $2 = -\frac{3}{2}(2) + b$ $2 = -3 + b$ $5 = b$ $y = -\frac{3}{2}x + 5$

Breakdown of Assessment				
The Number System	Expressions, Equations, and Inequalities	Functions	Geometry	Statistics and Probability
2%	39%	18%	39%	2%






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