



New York State
EDUCATION DEPARTMENT
Knowledge > Skill > Opportunity

**New York State Testing Program
Grade 8
Mathematics Test**

Released Questions

2022

New York State administered the Mathematics Tests in May 2022 and is now making approximately 75% of the questions from these tests available for review and use.



New York State Testing Program Grades 3–8 Mathematics

Released Questions from 2022 Exams

Background

As in past years, SED is releasing large portions of the 2022 NYS Grades 3–8 English Language Arts and Mathematics test materials for review, discussion, and use.

For 2022, included in these released materials are at least 75 percent of the test questions that appeared on the 2022 tests (including all constructed-response questions) that counted toward students' scores. Additionally, SED is also providing a map that details what each released question measures and the correct response to each question. These released materials will help students, families, educators, and the public better understand the tests and the New York State Education Department's expectations for students.

Understanding Math Questions

Multiple-Choice Questions

Multiple-choice questions are designed to assess the New York State P–12 Learning Standards for Mathematics. Mathematics multiple-choice questions will be used mainly to assess standard algorithms and conceptual standards. Multiple-choice questions incorporate both the grade-level standards and the "Standards for Mathematical Practices." Many questions are framed within the context of real-world applications or require students to complete multiple steps. Likewise, many of these questions are linked to more than one standard, drawing on the simultaneous application of multiple skills and concepts.

Short-Response Questions

Short-response questions require students to complete tasks and show their work. Like multiple-choice questions, short-response questions will often require multiple steps, the application of multiple mathematics skills, and real-world applications. Many of the short-response questions will cover conceptual and application standards.

Extended-Response Questions

Extended-response questions ask students to show their work in completing two or more tasks or a more extensive problem. Extended-response questions allow students to show their understanding of mathematical procedures, conceptual understanding, and application. Extended-response questions may also assess student reasoning and the ability to critique the arguments of others. The scoring rubric for short and extended constructed-response questions can be found in the grade-level Educator Guides at <http://www.nysed.gov/state-assessment/grades-3-8-ela-and-math-test-manuals>.

New York State P–12 Learning Standards Alignment

The alignment(s) to the New York State P–12 Learning Standards for Mathematics is/are intended to identify the primary analytic skills necessary to successfully answer each question. However, some questions measure proficiencies described in multiple standards, including a balanced combination of procedure and conceptual understanding. For example, two-point and three-point constructed-response questions require students to show an understanding of mathematical procedures, concepts, and applications.

These Released Questions Do Not Comprise a “Mini Test”

To ensure it is possible to develop future tests, some content must remain secure. This document is *not* intended to be representative of the entire test, to show how operational tests look, or to provide information about how teachers should administer the test; rather, its purpose is to provide an overview of how the test reflects the demands of the New York State P–12 Learning Standards.

The released questions do not represent the full spectrum of the standards assessed on the State tests, nor do they represent the full spectrum of how the standards should be taught and assessed in the classroom. It should not be assumed that a particular standard will be measured by an identical question in future assessments.

Name: _____



New York State Testing Program

2022 Mathematics Test Session 1

Grade 8

April 26–28, 2022

RELEASED QUESTIONS

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Session 1

Grade 8 Mathematics Reference Sheet

CONVERSIONS

1 inch = 2.54 centimeters

1 meter = 39.37 inches

1 mile = 5,280 feet

1 mile = 1,760 yards

1 mile = 1.609 kilometers

1 kilometer = 0.62 mile

1 pound = 16 ounces

1 pound = 0.454 kilogram

1 kilogram = 2.2 pounds

1 ton = 2,000 pounds

1 cup = 8 fluid ounces

1 pint = 2 cups

1 quart = 2 pints

1 gallon = 4 quarts

1 gallon = 3.785 liters

1 liter = 0.264 gallon

1 liter = 1,000 cubic centimeters

FORMULAS

Triangle

$$A = \frac{1}{2}bh$$

Parallelogram

$$A = bh$$

Circle

$$A = \pi r^2$$

Circle

$$C = \pi d \text{ or } C = 2\pi r$$

General Prisms

$$V = Bh$$

Cylinder

$$V = \pi r^2 h$$

Sphere

$$V = \frac{4}{3}\pi r^3$$

Cone

$$V = \frac{1}{3}\pi r^2 h$$

Pythagorean Theorem

$$a^2 + b^2 = c^2$$

Session 1



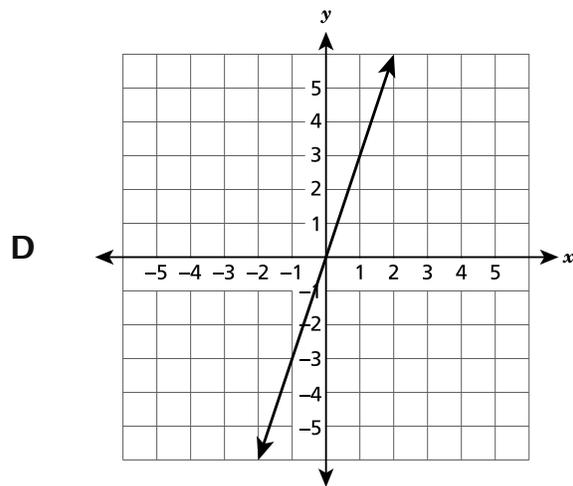
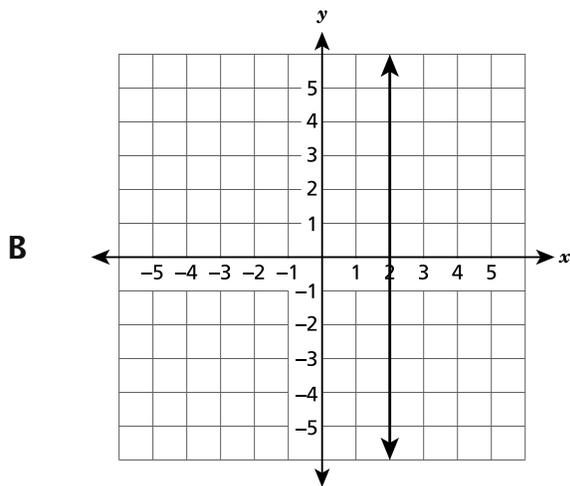
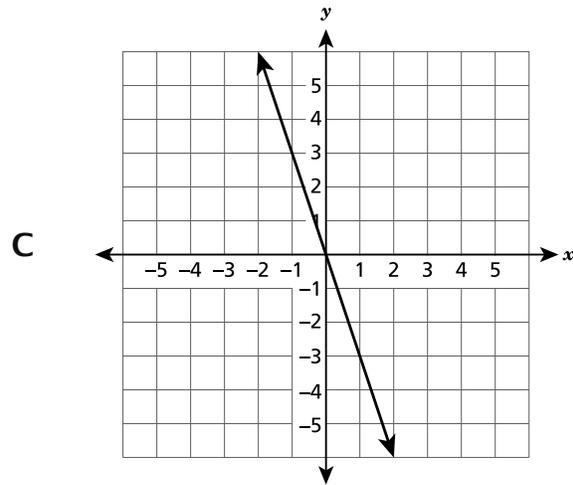
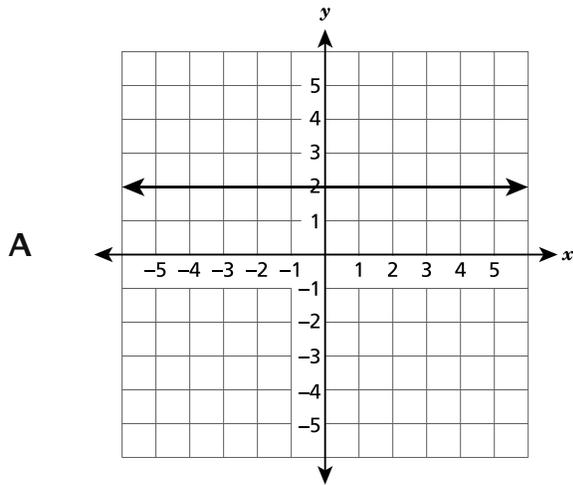
TIPS FOR TAKING THE TEST

Here are some suggestions to help you do your best:

- Read each question carefully and think about the answer before making your choice.
- You have been provided with mathematics tools (a ruler, a protractor, and a calculator) and a reference sheet to use during the test. It is up to you to decide when each tool and the reference sheet will be helpful. You should use mathematics tools and the reference sheet whenever you think they will help you to answer the question.

1

Which graph represents a function that is increasing?



GO ON

2

What is the solution to the equation shown below?

$$2.5(x + 5) = 7.5x - 0.5$$

- A $x = 2.6$
- B $x = 1.1$
- C $x = -2.6$
- D $x = -1.1$

3

There are two boxes of cereal in the shape of rectangular prisms on a shelf. The dimensions of each box of cereal are listed below.

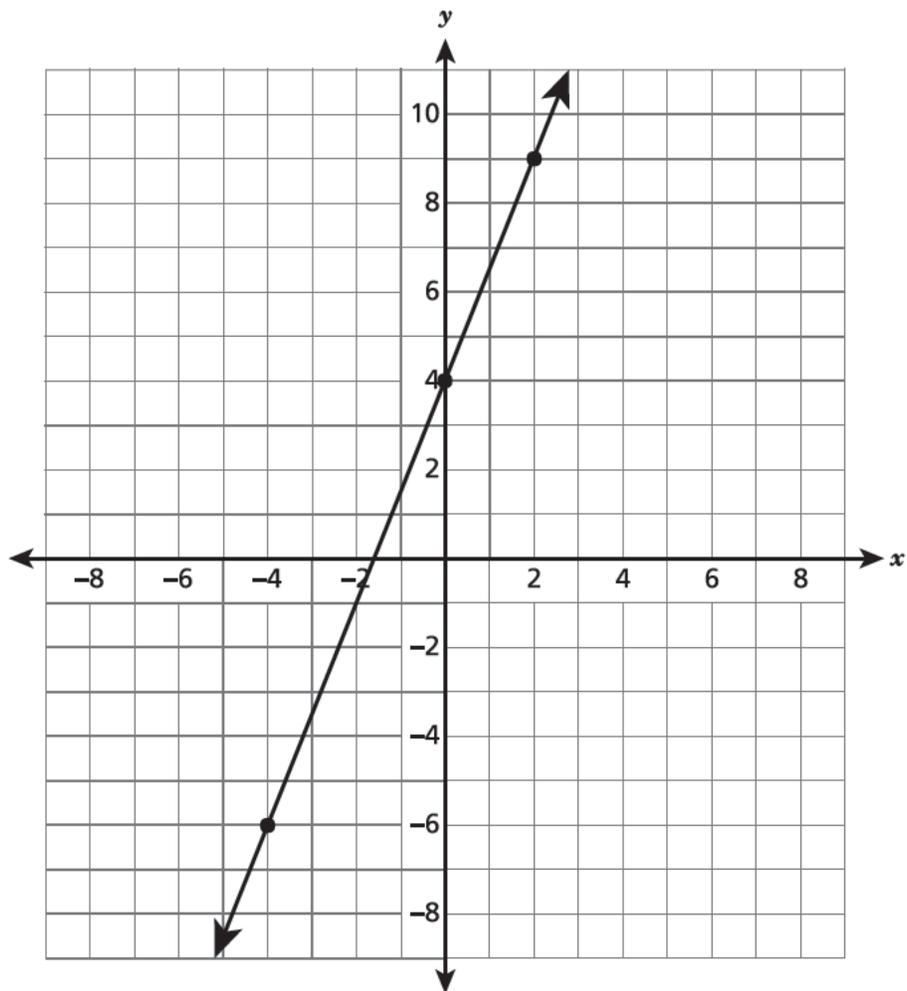
- Box A has a height of 25 centimeters, a length of 20 centimeters, and a width of 9 centimeters.
- Box B has a height of 25 centimeters, a length of 19 centimeters, and a width of 6 centimeters.

What is the difference in volume, in cubic centimeters, between the two boxes of cereal?

- A 1,650
- B 3,900
- C 4,500
- D 7,350

4

Which equation represents the line shown on the coordinate plane below?

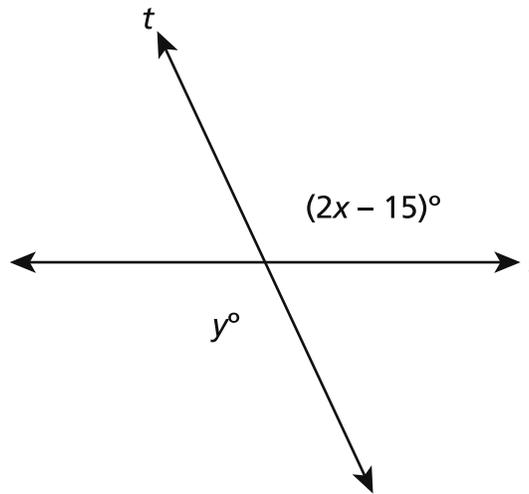


- A $y = \frac{2}{5}x + 4$
- B $y = \frac{2}{3}x + 4$
- C $y = \frac{3}{2}x + 4$
- D $y = \frac{5}{2}x + 4$

GO ON

5

Two intersecting lines, l and t , are shown in the diagram below.



If $y = 115$, what is the value of x ?

- A 40
- B 50
- C 65
- D 115

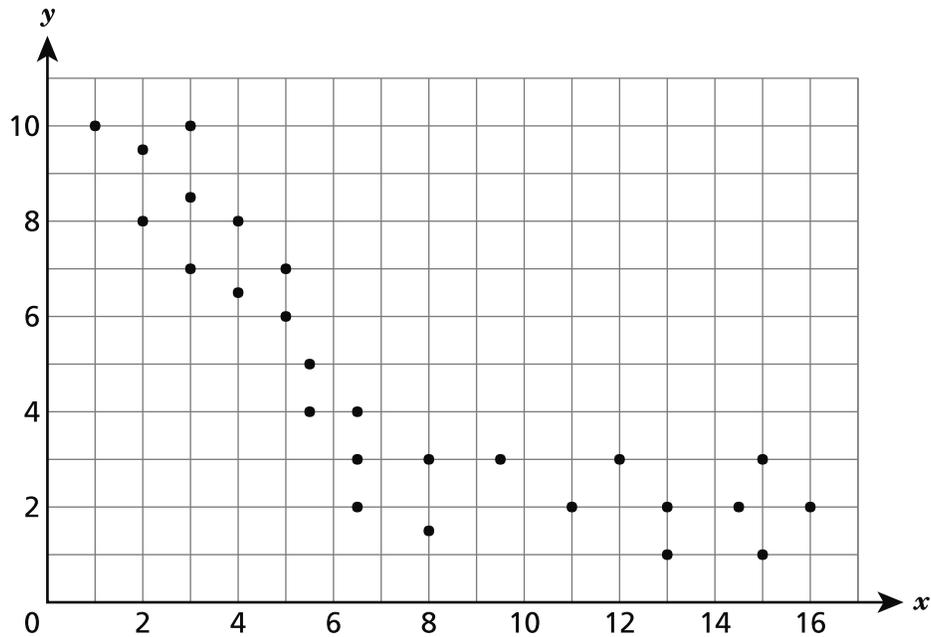
6

Triangle P undergoes a sequence of transformations resulting in triangle Q. Which sequence of transformations could be used to show that triangle Q is similar but not congruent to triangle P?

- A a reflection followed by a translation
- B a rotation followed by a reflection
- C a reflection followed by a rotation
- D a translation followed by a dilation

7

A scatter plot is shown below.



Which statement **best** explains why these data can or cannot be modeled using a line of best fit?

- A A line would not be appropriate because there is a negative association.
- B A line would not be appropriate because the points follow a nonlinear pattern.
- C A line would be appropriate because there is a positive association.
- D A line would be appropriate because the points follow a nonlinear pattern.

8

What is the solution, if any, to the equation $3(x - 2) + 4 = 3x + 6$?

- A $x = 0$
- B $x = 8$
- C There is no solution.
- D There are an infinite number of solutions.

GO ON

14 Which expression is equivalent to $(15^3)(15^{-7})$?

A 15^{-21}

B -15^4

C $\frac{1}{15^4}$

D $\frac{1}{15^{-4}}$

15 Alex opened a savings account with an initial deposit of \$50. Each month, he deposits the same amount of money. He uses the equation $t = 50 + 25m$ to determine t , the total amount of money in his savings account in m months. What is the unit rate and what is the meaning of the unit rate?

A 25; the amount of money Alex deposits each month

B 50; the amount of money Alex deposits each month

C 25; the amount of money Alex initially deposited

D 50; the amount of money Alex initially deposited

16 What is the solution to the equation shown below?

$$-\frac{1}{3}(6y + 6) + 21 = 3y$$

A $y = \frac{19}{5}$

B $y = \frac{27}{5}$

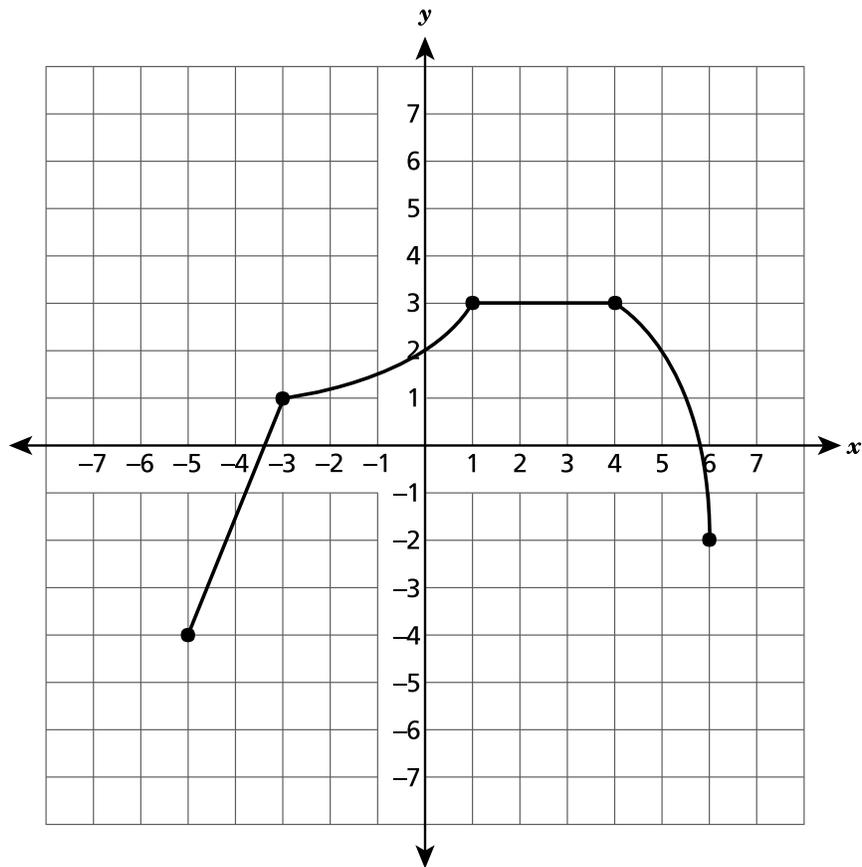
C $y = -\frac{9}{5}$

D $y = -\frac{23}{5}$

GO ON

19

The graph of a function is shown on the coordinate plane below.

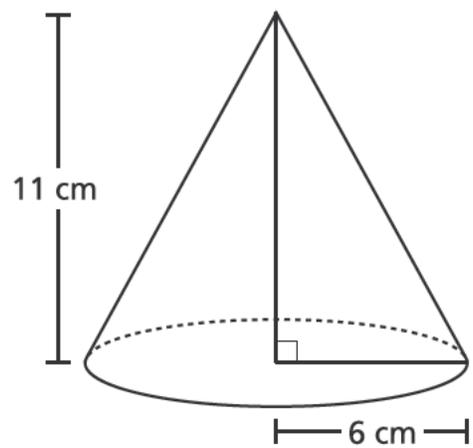


Between which two values of x is the function nonlinear and increasing?

- A -5 and -3
- B -3 and 1
- C 1 and 4
- D 4 and 6

23

The dimensions of a cone are shown in the figure below.

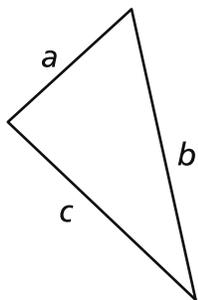


What is the approximate volume, in cubic centimeters, of the cone?

- A 138
- B 415
- C 622
- D 1,244

24

A triangle with side lengths a , b , and c is shown below.

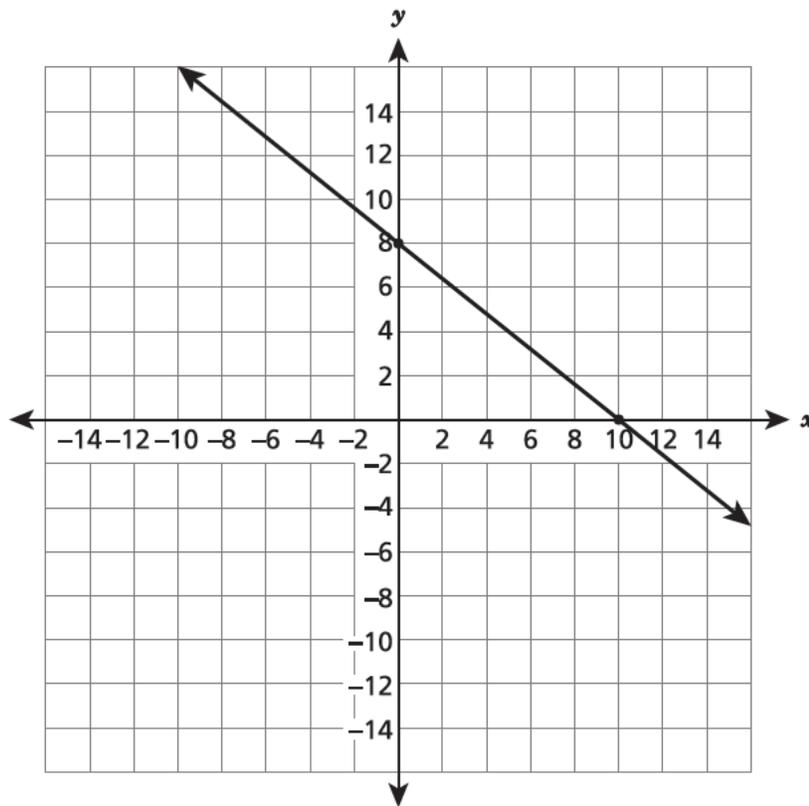


Which statement about the side lengths must be true?

- A $a + b > c$
- B $b + c < a$
- C $a + b < c$
- D $a + c < b$

GO ON

A line is graphed on the coordinate plane shown below.

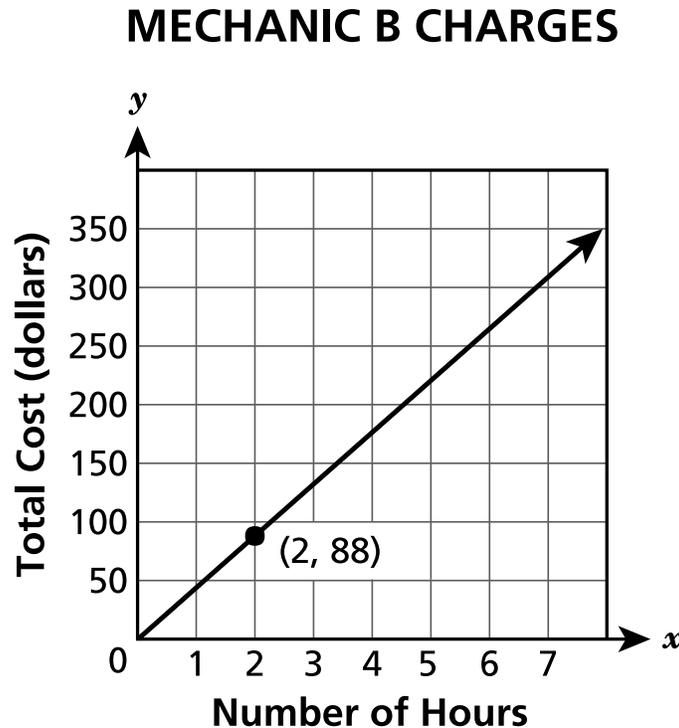


What is the equation of the line?

- A $y = -\frac{4}{5}x + 8$
- B $y = \frac{4}{5}x + 10$
- C $y = -\frac{5}{4}x + 8$
- D $y = \frac{5}{4}x + 10$

There are two mechanics who work on cars. For each mechanic, the relationship between x , the number of hours worked, and y , the total cost, in dollars, is described below.

- The equation $y = 36x$ represents the total cost charged by Mechanic A for the number of hours worked.
- The graph shown below represents the total cost charged by Mechanic B for the number of hours worked.



Based on the information, which statement is true?

- A Mechanic A charges \$8.00 more per hour than Mechanic B.
- B Mechanic B charges \$8.00 more per hour than Mechanic A.
- C Mechanic A charges \$52.00 more per hour than Mechanic B.
- D Mechanic B charges \$52.00 more per hour than Mechanic A.

Grade 8
2022
Mathematics Test
Session 1
April 26–28, 2022

Name: _____



New York State Testing Program

2022 Mathematics Test Session 2

Grade 8

April 26–28, 2022

RELEASED QUESTIONS

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Cone

$$V = \frac{1}{3}\pi r^2 h$$

Pythagorean Theorem

$$a^2 + b^2 = c^2$$

Session 2



TIPS FOR TAKING THE TEST

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- Read each question carefully and think about the answer before making your choice or writing your response.
- You have been provided with mathematics tools (a ruler, a protractor, and a calculator) and a reference sheet to use during the test. It is up to you to decide when each tool and the reference sheet will be helpful. You should use mathematics tools and the reference sheet whenever you think they will help you to answer the question.
- Be sure to show your work when asked.

34 Cory drinks water from a bottle during a bike ride. The average amount of water, in ounces, in his water bottle can be represented by the equation $y = -8x + 32$, where y is the amount of water remaining after x hours. Based on the equation, what amount of water, in ounces, will remain in the bottle after Cory rides for $2\frac{1}{2}$ hours?

- A 8
- B 12
- C 20
- D 32

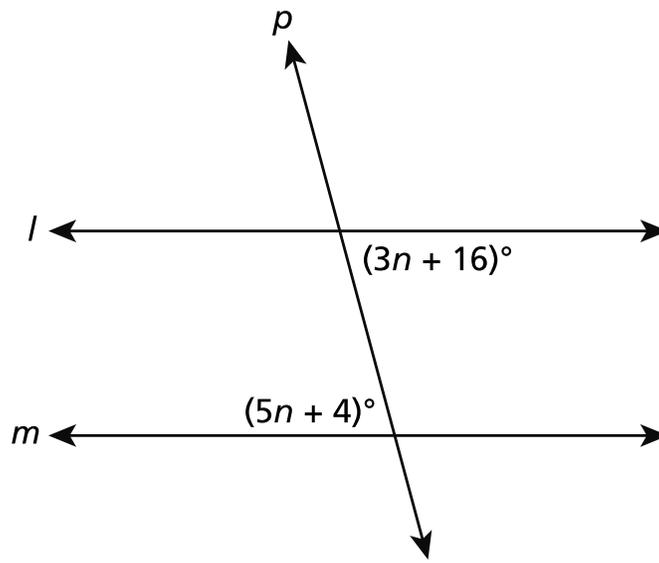
35 Which expression is equivalent to $4^{-5} \times 4^8$?

- A $\frac{4^{-2}}{4^{-1}}$
- B $(4^3)^{-1}$
- C $\frac{4^2}{4^{-1}}$
- D $(4^{-1})^3$

GO ON

36

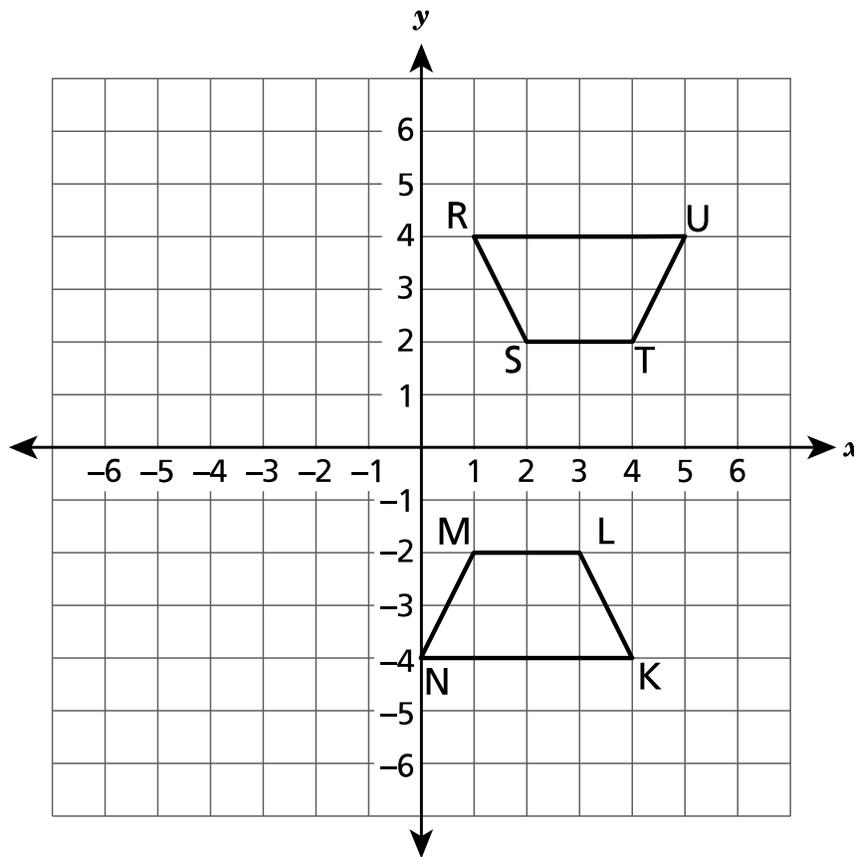
Lines l and m are parallel and intersect transversal p , as shown in the diagram below.



What is the value of n ?

- A 6
- B 10
- C 20
- D 24

Trapezoid RSTU and trapezoid NMLK shown on the coordinate plane are congruent.



Which sequence of transformations will map trapezoid RSTU onto trapezoid NMLK?

- A a reflection over the y -axis, then a translation 1 unit to the right
- B a reflection over the x -axis, then a translation 1 unit to the left
- C a reflection over the y -axis, then a translation 1 unit down
- D a reflection over the x -axis, then a translation 1 unit up

38 Which set of ordered pairs represents a function?

A $\{(-20, 30), (-40, 0), (-40, 50)\}$

B $\{(-30, 0), (-30, 20), (-30, 50)\}$

C $\{(-40, 0), (20, -30), (60, -50)\}$

D $\{(-50, 0), (20, -30), (-50, 60)\}$

39 What value for the constant, n , will result in no solution for the equation shown below?

$$n(5x + 7) = 10x + 12$$

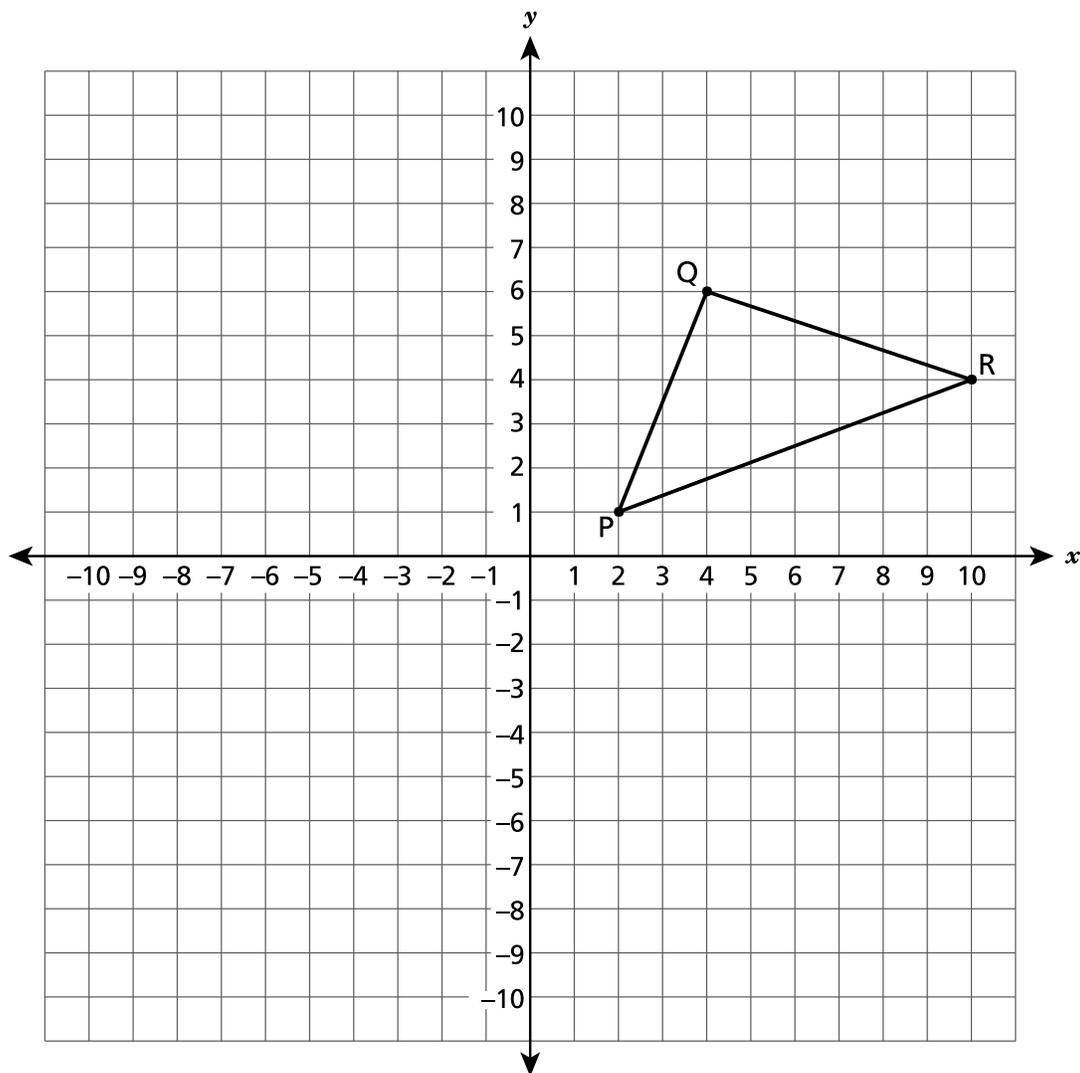
A 5

B 2

C -2

D -5

Triangle QPR is graphed on the coordinate plane below.



Triangle QPR is dilated by a scale factor of $\frac{1}{2}$ with a center of dilation at the origin, resulting in triangle Q'P'R'. What are the coordinates of vertex R'?

- A (2, 5)
- B (5, 2)
- C (8, 20)
- D (20, 8)

GO ON

41

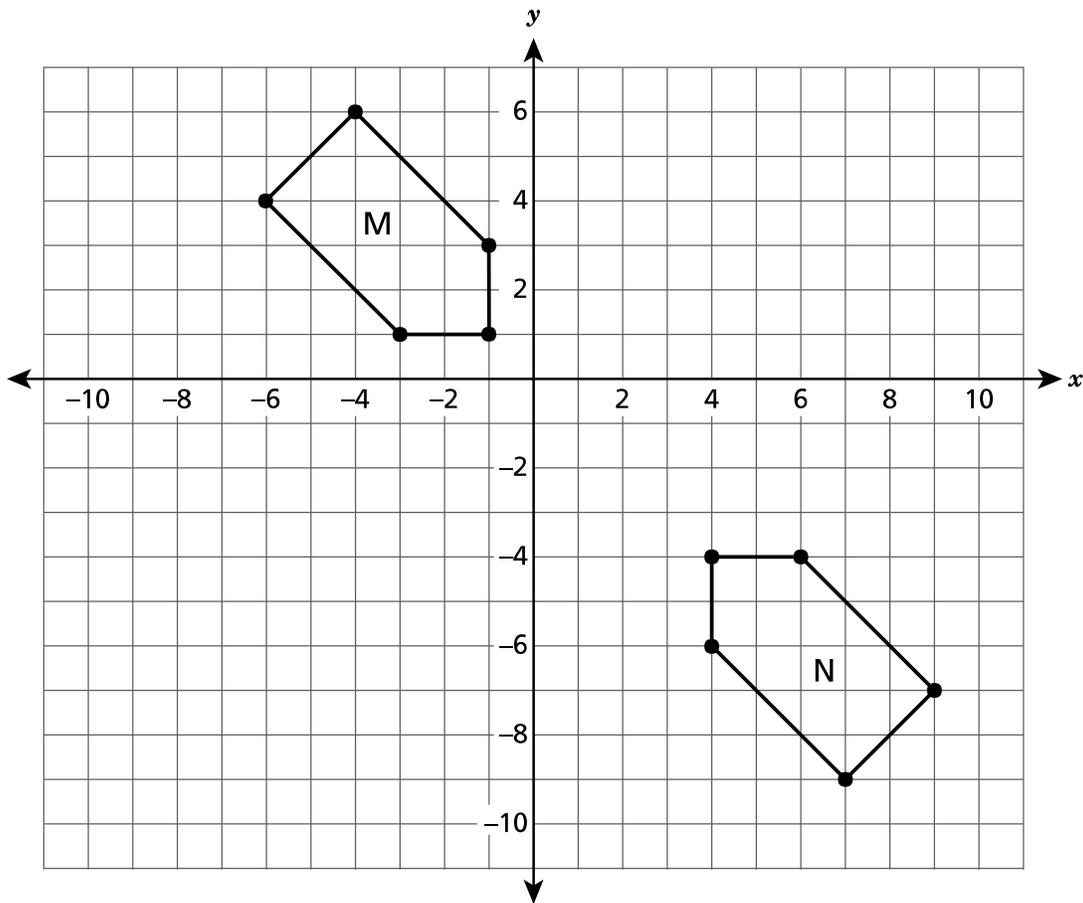
A camper lights an oil lantern at 12 noon and lets it burn continuously. Once the lantern is lit, the lantern burns oil at a constant rate each hour. At 2 p.m., the amount of oil left in the lantern is 63 ounces. At 5 p.m., the amount of oil left in the lantern is $61\frac{1}{2}$ ounces. Based on the average rate of oil burning per hour, how much oil, in ounces, was in the lantern at 12 noon?

Show your work.

Answer _____ ounces

GO ON

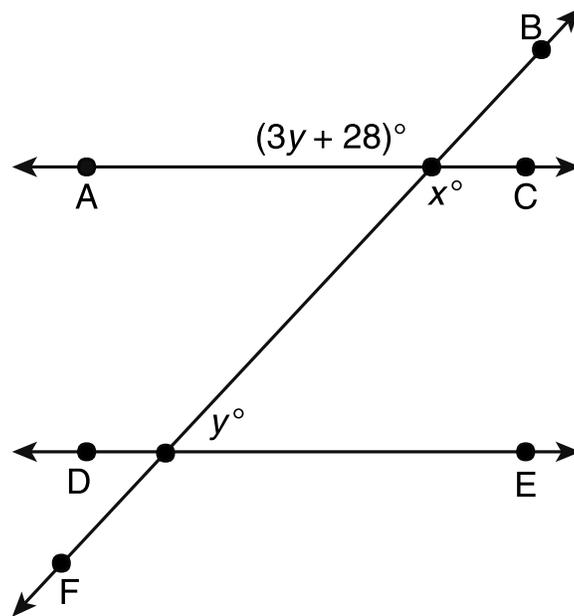
Figure M and its congruent image, figure N, are graphed on the coordinate plane below.



Describe a sequence of transformations that will take figure M onto its congruent image, figure N.

Explain your answer.

- 43 In the figure shown below, \overleftrightarrow{AC} is parallel to \overleftrightarrow{DE} with transversal \overleftrightarrow{BF} .



Determine the values of x and y .

Show your work.

Answer $x =$ _____
 $y =$ _____

GO ON

44

The steps a student took to solve an equation are shown below.

$$\frac{3}{4}(-8x + 20) = -8(-x - 3)$$

Step 1: $-6x + 15 = 8x + 24$

Step 2: $15 = 2x + 24$

Step 3: $-9 = 2x$

Step 4: $x = -\frac{9}{2}$

What error did the student make and what is the correct value of x ?

Explain your answer.

Answer $x =$ _____

GO ON

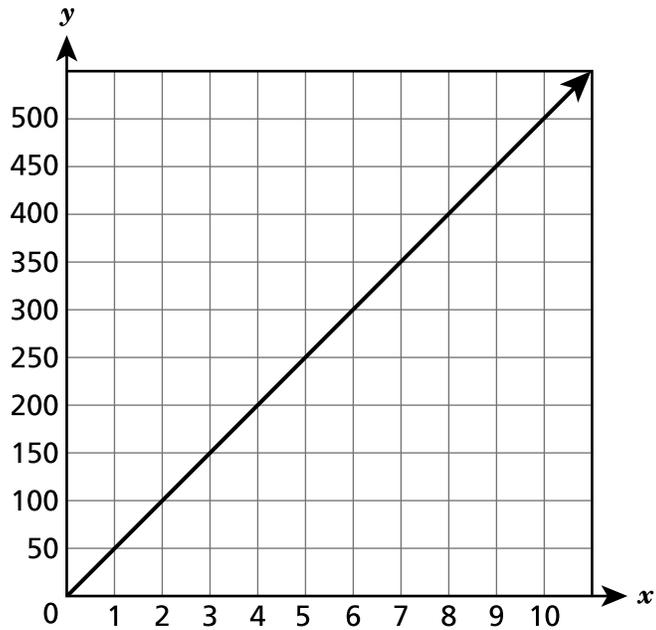
45

Two functions are represented below.

FUNCTION A

$$y = 35x$$

FUNCTION B



What is the difference in the rate of change between Function A and Function B? Be sure to include the rate of change of each function in your answer.

Explain your answer.

46

At the beach, a child uses a container in the shape of a cylinder to build a sand castle. The child completely fills the container with sand.

- The container has a height of 10 inches and a diameter of 12 inches.
- There are 231 cubic inches in one gallon of sand.

What is the approximate volume of sand, in gallons, in the container? Round your answer to the nearest gallon.

Show your work.

Answer _____ gallons

GO ON

- 47** Determine the solution to the equation shown below.

$$3.2 - \frac{1}{2}(x + 4) = 4.8x + 2 - 5.2x$$

Show your work.

Answer $x =$ _____

GO ON

48

Three equations are listed below.

- $y = x(3x + 2)$
- $y = \frac{x}{3} + 2$
- $y = 2 - 3x$

Identify one linear equation and one nonlinear equation from the list. State a reason why each equation you identified is linear or nonlinear.

Linear equation _____

State your reason.

Nonlinear equation _____

State your reason.

STOP

Grade 8
2022
Mathematics Test
Session 2
April 26–28, 2022

THE STATE EDUCATION DEPARTMENT
THE UNIVERSITY OF THE STATE OF NEW YORK / ALBANY, NY 12234
2022 Mathematics Tests Map to the Standards
Grade 8 Released Questions

Question	Type	Key	Points	Standard	Cluster	Multiple Choice Questions	Constructed Response Questions	
						Percentage of Students Who Answered Correctly (P-Value)	Average Points Earned	P-Value (Average Points Earned ÷ Total Possible Points)
Session 1								
1	Multiple Choice	D	1	CCSS.Math.Content.8.F.B.5	Functions	0.83		
2	Multiple Choice	A	1	CCSS.Math.Content.8.EE.C.7b	Expressions and Equations	0.63		
3	Multiple Choice	A	1	CCSS.Math.Content.7.G.B.6	Geometry	0.73		
4	Multiple Choice	D	1	CCSS.Math.Content.8.EE.B.6	Expressions and Equations	0.6		
5	Multiple Choice	C	1	CCSS.Math.Content.7.G.B.5	Expressions and Equations	0.6		
6	Multiple Choice	D	1	CCSS.Math.Content.8.G.A.4	Geometry	0.46		
7	Multiple Choice	B	1	CCSS.Math.Content.8.SP.A.2	Statistics and Probability	0.67		
8	Multiple Choice	C	1	CCSS.Math.Content.8.EE.C.7a	Expressions and Equations	0.65		
14	Multiple Choice	C	1	CCSS.Math.Content.8.EE.A.1	Expressions and Equations	0.43		
15	Multiple Choice	A	1	CCSS.Math.Content.8.F.B.4	Functions	0.48		
16	Multiple Choice	A	1	CCSS.Math.Content.8.EE.C.7b	Expressions and Equations	0.47		
19	Multiple Choice	B	1	CCSS.Math.Content.8.F.B.5	Functions	0.66		
23	Multiple Choice	B	1	CCSS.Math.Content.8.G.C.9	Geometry	0.51		
24	Multiple Choice	A	1	CCSS.Math.Content.7.G.A.2	Expressions and Equations	0.52		

25	Multiple Choice	A	1	CCSS.Math.Content.8.EE.B.6	Expressions and Equations	0.57		
26	Multiple Choice	B	1	CCSS.Math.Content.8.EE.B.5	Expressions and Equations	0.54		
Session 2								
34	Multiple Choice	B	1	CCSS.Math.Content.8.SP.A.3	Statistics and Probability	0.63		
35	Multiple Choice	C	1	CCSS.Math.Content.8.EE.A.1	Expressions and Equations	0.49		
36	Multiple Choice	A	1	CCSS.Math.Content.8.G.A.5	Geometry	0.55		
37	Multiple Choice	B	1	CCSS.Math.Content.8.G.A.2	Geometry	0.73		
38	Multiple Choice	C	1	CCSS.Math.Content.8.F.A.1	Functions	0.66		
39	Multiple Choice	B	1	CCSS.Math.Content.8.EE.C.7a	Expressions and Equations	0.47		
40	Multiple Choice	B	1	CCSS.Math.Content.8.G.A.3	Geometry	0.61		
41	Constructed Response		2	CCSS.Math.Content.8.F.B.4	Functions		0.63	0.31
42	Constructed Response		2	CCSS.Math.Content.8.G.A.2	Geometry		0.75	0.37
43	Constructed Response		2	CCSS.Math.Content.8.G.A.5	Geometry		0.35	0.17
44	Constructed Response		2	CCSS.Math.Content.8.EE.C.7b	Expressions and Equations		0.59	0.29
45	Constructed Response		2	CCSS.Math.Content.8.F.A.2	Functions		0.84	0.42
46	Constructed Response		2	CCSS.Math.Content.8.G.C.9	Geometry		0.52	0.26
47	Constructed Response		2	CCSS.Math.Content.8.EE.C.7b	Expressions and Equations		0.47	0.24
48	Constructed Response		3	CCSS.Math.Content.8.F.A.3	Functions		0.69	0.23

*This item map is intended to identify the primary analytic skills necessary to successfully answer each question. However, some questions measure proficiencies described in multiple standards, including a balanced combination of procedural and conceptual understanding.