New York State
EDUCATION DEPARTMENT
Knowledge › Skill › Opportunity

New York State Testing Program
Grade 8
Mathematics Test

Released Questions

2023

New York State administered the Mathematics Tests in May 2023
and is making approximiately 75% of the questions
from these tests available for review and use.

New York State Testing Program
Grades 3–8 Mathematics

Released Questions from 2023 Exams

Background

As in past years, SED is releasing large portions of the 2023 NYS Grades 3–8 English Language Arts and Mathematics test materials for review, discussion, and use.

For 2023, included in these released materials are at least 75 percent of the test questions that appeared on the 2023 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 Next Generation 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.

One-Credit Constructed-Response Questions

One-credit constructed-response questions require students to complete a task and provide only their final answer. These one-credit questions will often require multiple steps, assessing procedural skills, as well as conceptual understanding and application. While students may show how they arrived at their final answer, only the final answer will be scored.

Two-Credit Constructed-Response Questions

Two-credit constructed-response questions require students to complete tasks and show their work. These two-credit 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.

Three-Credit Constructed-Response Questions

Three-credit constructed-response questions ask students to show their work in completing two or more tasks or a more extensive problem. These three-credit response questions allow students to show their understanding of mathematical procedures, conceptual understanding, and application. Three-credit response questions may also assess student reasoning and the ability to critique the arguments of others. The scoring rubric for all 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 Next Generation Learning Standards Alignment

The alignment(s) to the New York State P–12 Next Generation 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-credit and three-credit 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 Next Generation 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

2023 Mathematics Test Session 1

Grade 8

May 2–4, 2023

RELEASED QUESTIONS

Developed and published under contract with the New York State Education Department by Questar Assessment Inc., 14720 Energy Way, Apple Valley, MN 55124.

Session 1

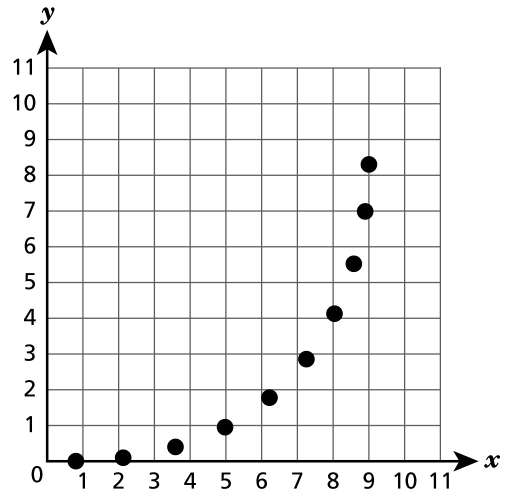
TIPS FOR TAKING THE TEST

Here are some suggestions to help you do your best:

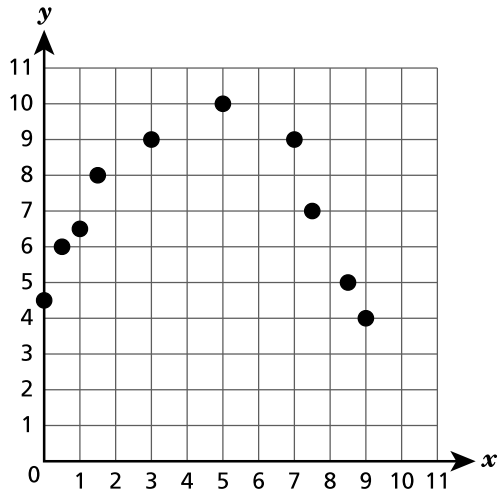
- Read each question carefully and think about the answer before making your choice.
- You have been provided with mathematics tools (a ruler, a protractor, and a calculator) and a reference sheet to use during the test. It is up to you to decide when each tool and the reference sheet will be helpful.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

2 Which scatter plot **best** represents a linear association between y and x ?

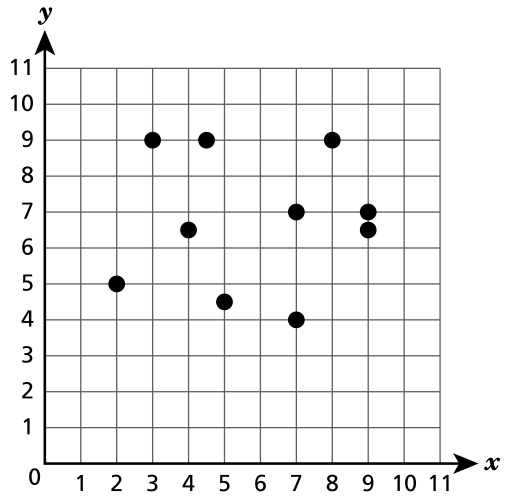
A



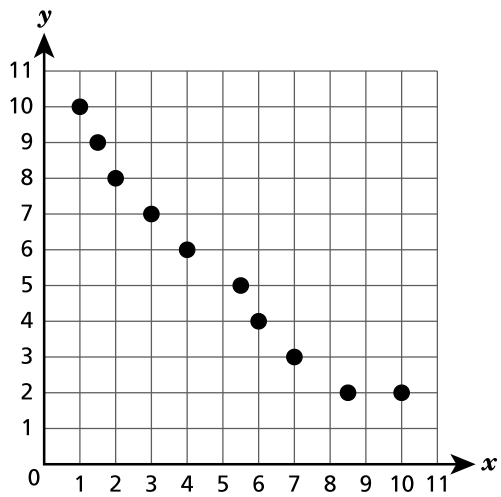
C



B



D



GO ON

3 Quadrilateral $ABCD$ is graphed on a coordinate plane. Vertex A is located at the point $(-2,3)$. The quadrilateral is dilated by a scale factor of 2, with the center of dilation at the origin, to form quadrilateral $A'B'C'D'$. Which ordered pair represents the location of vertex A' ?

A $(-4,5)$

B $(-4,6)$

C $(0,5)$

D $(6,-4)$

7 The equation and the table shown below each represent a different relationship between x and y.

FUNCTION A

$$y = \frac{5}{4}x$$

FUNCTION B

x	y
5	1.5
10	3
15	4.5

Which statement about the functions is true?

A Function A has a greater rate of change than Function B because $1.25 > 3.\overline{3}$.

B Function B has a greater rate of change than Function A because $1.25 < 3.\overline{3}$.

C Function A has a greater rate of change than Function B because $1.25 > 0.3$.

D Function B has a greater rate of change than Function A because $1.25 < 0.3$.

8 Two points are plotted on a coordinate plane. Point A is plotted at $(-11, 8)$ and point B is plotted at $(-2, -4)$. What is the distance, in units, from point A to point B ?

A 13

B 15

C $\sqrt{145}$

D $\sqrt{185}$

12 The rule for a function of x is:

multiply the input value by 2, then subtract 6

The data set for the input values of the function, x, is $\{-1, 1, 3, 5\}$. Which value is one of the output values, y ?

A -2

B -1

C 2

D 4

15 Which expression has a value of $\frac{1}{16}$?

A $(2^{-4})^{-1}$

B $(2^{4})^{-1}$

C $(2^{8})^{-2}$

D $(2^{-8})^{-2}$

16 A cylinder has a radius of 4.8 feet and a height of 8.1 feet. What is the volume, to the nearest tenth of a cubic foot, of the cylinder?

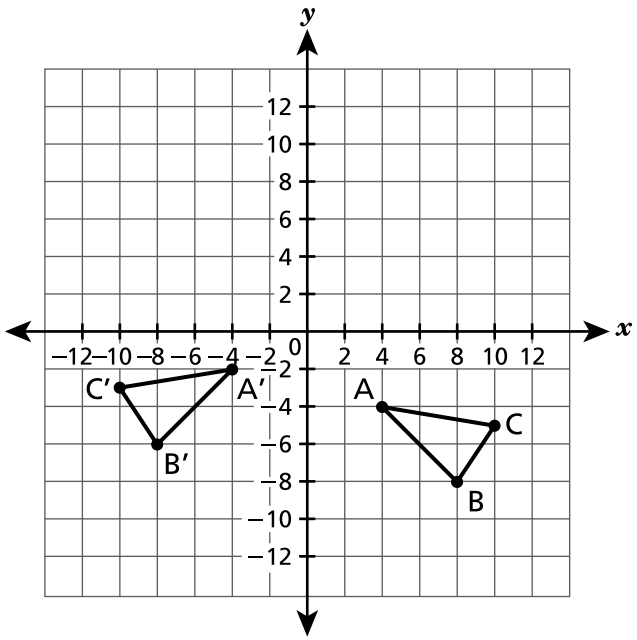
A 989.4

B 586.3

C 244.3

D 186.6

19 Triangle ABC and its congruent image, triangle $A'B'C'$, are graphed on the coordinate plane shown below.



Which sequence of transformations maps triangle ABC onto triangle $A'B'C'$?

A a reflection over the y-axis and then a translation 2 units up

B a reflection over the y-axis and then a translation 2 units down

C a reflection over the x-axis and then a translation 8 units left

D a reflection over the x-axis and then a translation 8 units right

20 Which equation represents the graph of a line on a coordinate plane that passes through the x-intercept at $(9,0)$ and the y-intercept at $(0,-5)$?

A $y = -\frac{9}{5}x - 5$

B $y = \frac{9}{5}x - 5$

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

D $y = \frac{5}{9}x - 5$

22 Trent draws a triangle with one interior angle measuring 34°. Which angle measures could be the measures of the other two interior angles in Trent's triangle?

A 46° and 90°

B 53° and 127°

C 66° and 80°

D 68° and 68°

GO ON

23 Nathan observes the growth of sunflower plants for a science project. He collects data on the relationship between the height, in centimeters, of each sunflower plant during a thirty-day period and the amount of fertilizer, in grams, used on each plant. The equation for the line of best fit for these data is $y = 0.35x + 2$, where y is the height of the plant in centimeters and x is the number of grams of fertilizer used. Based on the model, what does the slope of the line represent?

A the height of the plant

B the amount of fertilizer used

C the average growth of the plant per gram of fertilizer used

D the average amount of fertilizer used per centimeter the plant grew

24 Line segment CD is graphed on a coordinate plane. The line segment is reflected over the x-axis and then rotated 90° clockwise about the origin to create line segment EF.
Which statement is always true about line segment EF ?

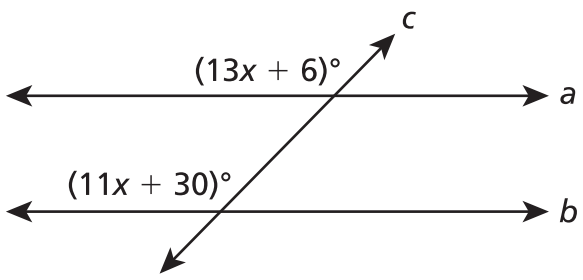
A Line segment EF is congruent to line segment CD.

B Line segment EF is perpendicular to line segment CD.

C Line segment EF is twice the length of line segment CD.

D Line segment EF is one-half the length of line segment CD.

25 In the figure shown below, lines a and b are parallel, and line c is a transversal.



What is the value of x ?

A 6

B 9

C 12

D 18

26 Two functions are described below.

- Function A: A taxi driver charges customers a base amount of $\$3.00$ and also an amount of $\$2.00$ per mile, x, for a total charge, y, to a customer.
- Function B: The equation $y = 3x + 2$ represents the relationship between the number of miles, x, a taxi travels and the total charge, y, to a customer.

Which statement correctly compares the relationship between Function A and Function B ?

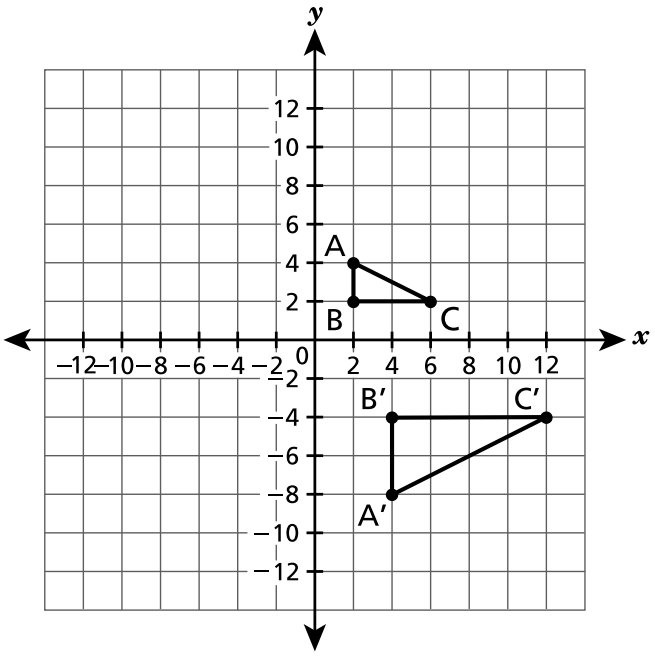
A Function A has both a greater rate of change and a greater initial value.

B Function B has both a greater rate of change and a greater initial value.

C Function A has a greater rate of change than Function B, but the initial value for Function A is less than the initial value for Function B.

D Function B has a greater rate of change than Function A, but the initial value for Function B is less than the initial value for Function A.

29 On a coordinate plane, $\triangle ABC$ undergoes a sequence of transformations to create $\triangle A'B'C'$.



Which sequence of transformations could have been used to take $\triangle ABC$ to $\triangle A'B'C'$?

A a dilation by a scale factor of 2 centered at the origin and then a reflection over the x-axis

B a dilation by a scale factor of 2 centered at the origin and then a reflection over the y-axis

C a dilation by a scale factor of $\frac{1}{2}$ centered at the origin and then a reflection over the x-axis

D a dilation by a scale factor of $\frac{1}{2}$ centered at the origin and then a reflection over the y-axis

GO ON

Grade 8
2023
Mathematics Test
Session 1
May 2–4, 2023

Name: _____

New York State Testing Program

2023 Mathematics Test Session 2

Grade 8

May 2–4, 2023

RELEASED QUESTIONS

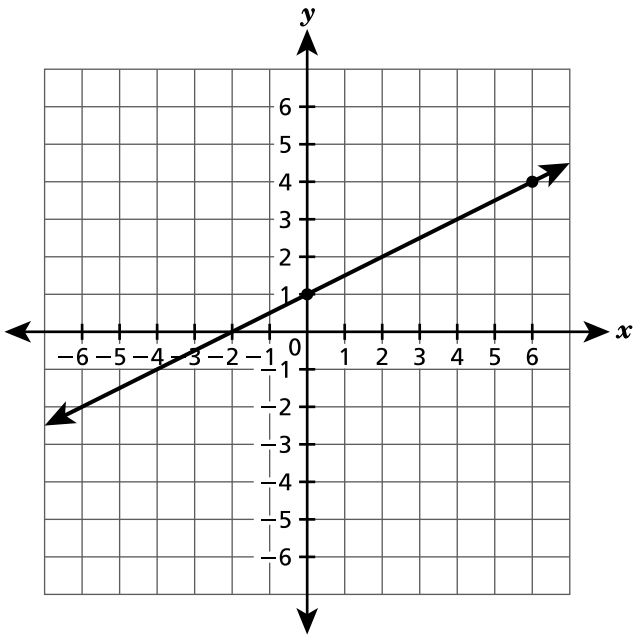
Session 2

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 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.

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



Which equation represents the graph of the line?

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

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

C $y = 2x + 1$

D $y = 2x - 2$

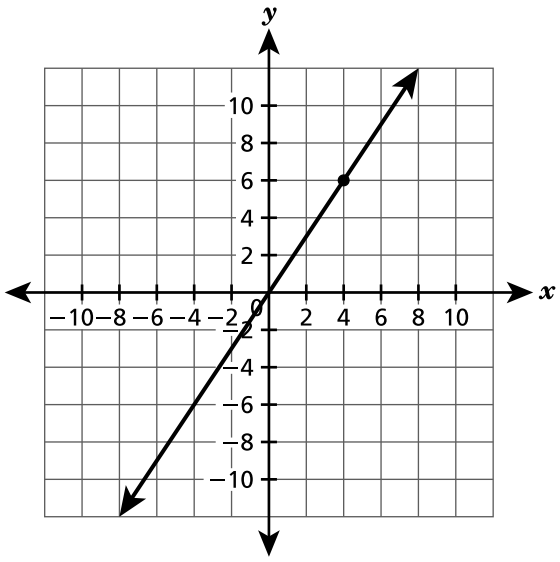
GO ON

34 Function A and Function B are represented by the table and graph shown below.

FUNCTION A

x	y
−6	−12
−2	−4
0	0
2	4

FUNCTION B



Which statement about Function A and Function B is true?

A The rate of change for Function A is less than the rate of change for Function B.

B The rate of change for Function A is greater than the rate of change for Function B.

C The rate of change for Function A is equal to the rate of change for Function B because the graph of the line for each function is linear.

D The rate of change for Function A is equal to the rate of change for Function B because the graph of the line for each function passes through the origin.

35 Which statement about the value of $\sqrt{50}$ is true?

A It is irrational because the decimal equivalent eventually repeats.

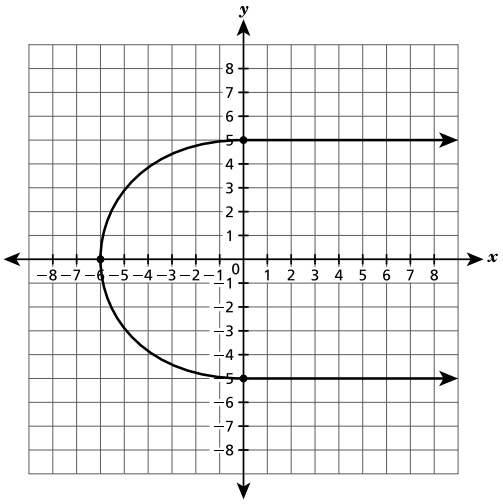
B It is rational because the decimal equivalent eventually terminates.

C It is rational because the value as a decimal is equivalent to a fraction.

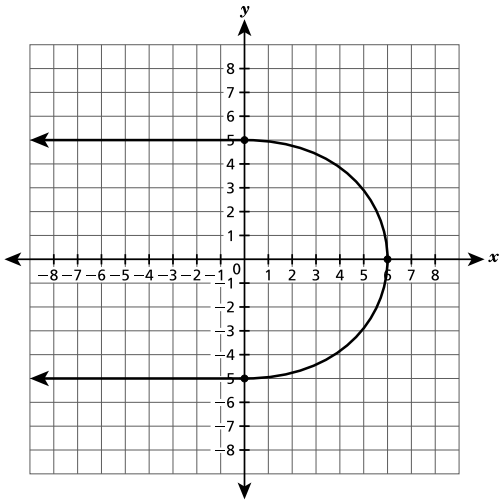
D It is irrational because the decimal equivalent is non-repeating and does not terminate.

36 Which graph represents y as a function of x ?

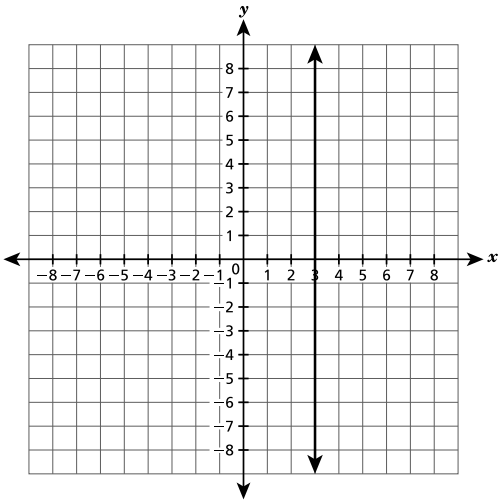
A



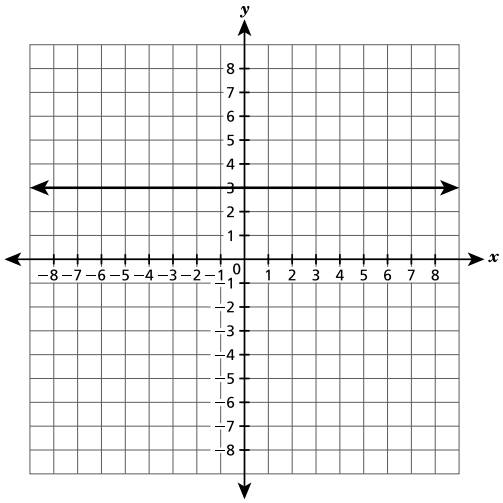
C



B



D



37 A cylindrical container has a height of 56 centimeters and a diameter of 22 centimeters. What is the volume, in cubic centimeters, of the container in terms of π ?

A $1{,}232\pi$

B $3{,}388\pi$

C $6{,}776\pi$

D $27{,}104\pi$

GO ON

38 Quadrilateral $ABCD$ is graphed on a coordinate plane, with point C plotted at $(-4, 3)$. Quadrilateral $ABCD$ is then reflected over the y-axis to create its image $A'B'C'D'$. After the reflection, what are the coordinates of point C' ?

A $(4, 3)$

B $(4, -3)$

C $(-4, 3)$

D $(-4, -3)$

39 **This question is worth 1 credit.**

What is the solution for x in the equation $x^3 = 125$?

Answer _____

GO ON

40 **This question is worth 1 credit.**

Triangle DEF is a right triangle with a right angle at vertex F. Side $\overline{DF}$ has a length of 9 inches and side $\overline{FE}$ has a length of 12 inches. What is the length, in inches, of side $\overline{DE}$?

Answer _____ inches

41 **This question is worth 1 credit.**

An equation is shown below.

$$-8 - 5x = 20$$

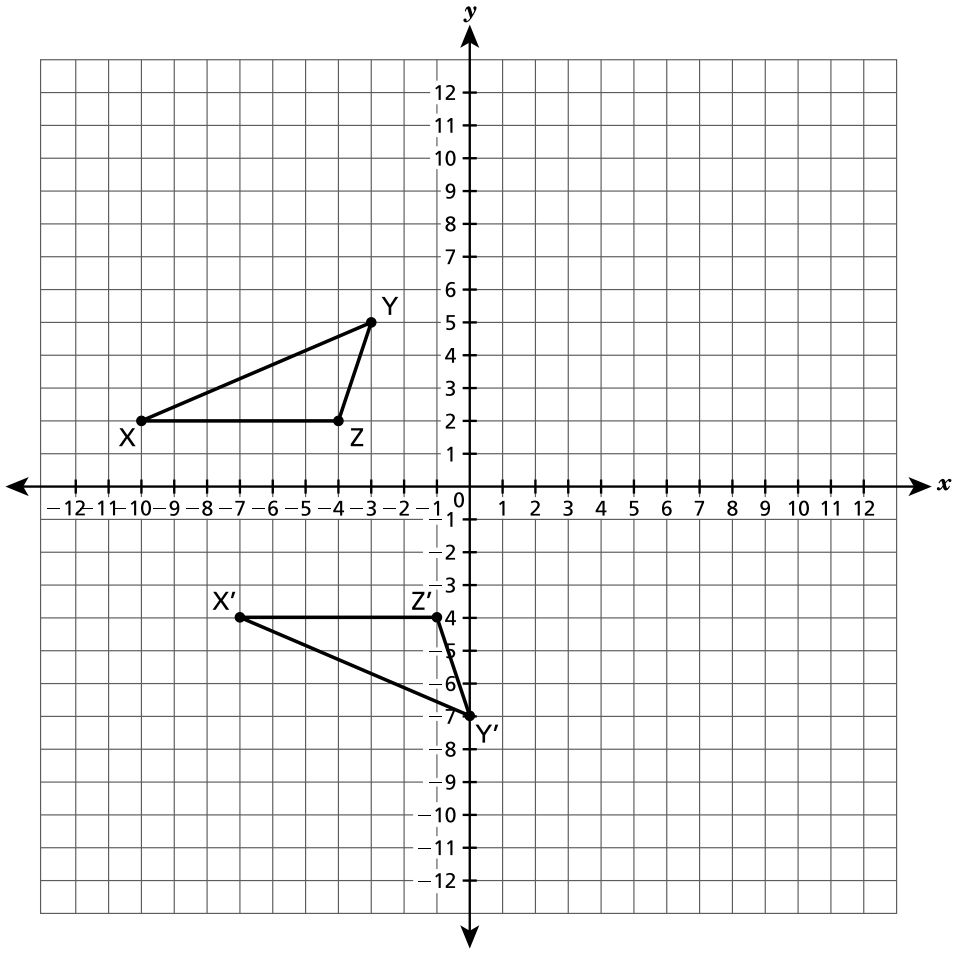
What is the value of x ?

Answer _____

GO ON

42 **This question is worth 2 credits.**

Triangle XYZ and its congruent image triangle X′Y′Z′ are shown on the coordinate plane below.



Describe a sequence of transformations that maps triangle XYZ onto triangle X′Y′Z′.

Explain your answer.

43 **This question is worth 2 credits.**

What value of x makes the equation shown below true?

$$24x + 33 = 3(5x + 21) - 9$$

Show your work.

Answer $x =$ _____

GO ON

44 **This question is worth 2 credits.**

Triangle RST has side lengths of 8 centimeters, 10 centimeters, and 13 centimeters. Is triangle RST a right triangle? Be sure to include what you know about the Pythagorean theorem in your answer.

Explain how you determined your answer.

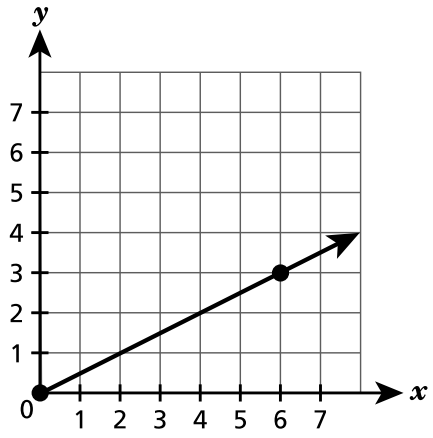
45 **This question is worth 2 credits.**

Function A and Function B are shown below.

FUNCTION A

x	y
−5	−30
−3	−18
2	12
4	24

FUNCTION B



Which function has a greater rate of change? Be sure to include the rate of change for each function in your answer.

Explain how you determined your answer.

46 **This question is worth 2 credits.**

The top surface of a trampoline is in the shape of a circle with a diameter of 12 feet. What is the area, in square feet, of the top circular surface of the trampoline?

Round your answer to the nearest whole number.

Show your work.

Answer _____ square feet

47 **This question is worth 2 credits.**

A student claims the expressions $\frac{5^7}{5^3}$ and $5^6 \times 5^{-2}$ are equivalent. Is the student correct?

Be sure to include what you know about properties of exponents and the value of each expression in simplest form in your answer.

Explain how you determined your answer.

48 **This question is worth 3 credits.**

Three different functions are represented by the equation, table, and graph shown below.

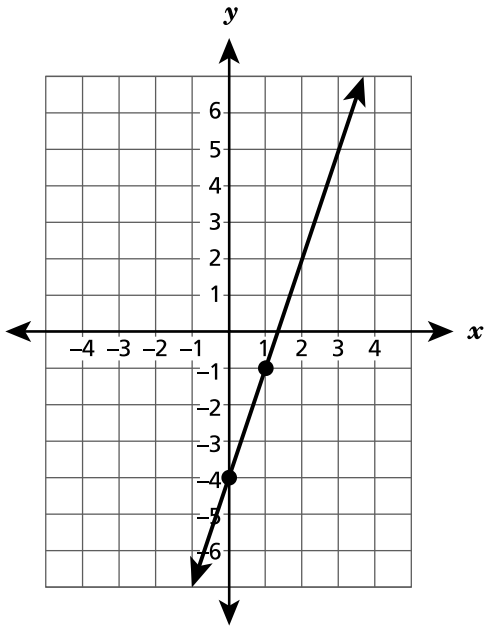
FUNCTION A

$y = 2x + 3$

FUNCTION B

x	y
−1	1
0	0
1	1
2	4

FUNCTION C



Determine whether each function is linear or nonlinear. Be sure to include what you know about the properties of all three functions in your answer.

Explain your answer.

STOP

Grade 8
2023
Mathematics Test
Session 2
May 2–4, 2023

THE STATE EDUCATION DEPARTMENT

THE UNIVERSITY OF THE STATE OF NEW YORK / ALBANY, NY 12234

2023 Mathematics Tests Map to the Standards

Grade 8 Released Questions

Question	Type	Key	Points	Standard	Cluster	Subscore	Secondary Standard(s)	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										
2	Multiple Choice	D	1	NGLS.Math.Content.NY-8.SP.1	Statistics and Probability			0.66		
3	Multiple Choice	B	1	NGLS.Math.Content.NY-8.G.3	Geometry	Geometry		0.71		
7	Multiple Choice	C	1	NGLS.Math.Content.NY-8.EE.5	Expressions and Equations	Expressions and Equations	NGLS.Math.Content.NY-8.F.2	0.45		
8	Multiple Choice	B	1	NGLS.Math.Content.NY-8.G.8	Geometry	Geometry		0.34		
12	Multiple Choice	D	1	NGLS.Math.Content.NY-8.F.1	Functions	Functions		0.55		
15	Multiple Choice	B	1	NGLS.Math.Content.NY-8.EE.1	Expressions and Equations	Expressions and Equations		0.51		
16	Multiple Choice	B	1	NGLS.Math.Content.NY-8.G.9	Geometry	Geometry		0.64		
19	Multiple Choice	A	1	NGLS.Math.Content.NY-8.G.2	Geometry	Geometry		0.58		
20	Multiple Choice	D	1	NGLS.Math.Content.NY-8.EE.6	Expressions and Equations	Expressions and Equations		0.27		
22	Multiple Choice	C	1	NGLS.Math.Content.NY-7.G.2	Geometry	Expressions and Equations	NGLS.Math.Content.NY-8.G.5	0.57		
23	Multiple Choice	C	1	NGLS.Math.Content.NY-8.SP.3	Statistics and Probability			0.49		
24	Multiple Choice	A	1	NGLS.Math.Content.NY-8.G.1a	Geometry	Geometry		0.54		
25	Multiple Choice	C	1	NGLS.Math.Content.NY-8.G.5	Geometry	Geometry		0.58		
26	Multiple Choice	D	1	NGLS.Math.Content.NY-8.F.2	Functions	Functions		0.46		
29	Multiple Choice	A	1	NGLS.Math.Content.NY-8.G.4	Geometry	Geometry		0.57		
Session 2										
33	Multiple Choice	A	1	NGLS.Math.Content.NY-8.EE.6	Expressions and Equations	Expressions and Equations		0.71		
34	Multiple Choice	B	1	NGLS.Math.Content.NY-8.EE.5	Expressions and Equations	Expressions and Equations	NGLS.Math.Content.NY-8.F.2	0.47		
35	Multiple Choice	D	1	NGLS.Math.Content.NY-8.NS.1	The Number System			0.47		
36	Multiple Choice	D	1	NGLS.Math.Content.NY-8.F.1	Functions	Functions		0.48		
37	Multiple Choice	C	1	NGLS.Math.Content.NY-8.G.9	Geometry	Geometry		0.51		
38	Multiple Choice	A	1	NGLS.Math.Content.NY-8.G.3	Geometry	Geometry		0.52		
39	Constructed Response		1	NGLS.Math.Content.NY-8.EE.2	Expressions and Equations	Expressions and Equations			0.59	0.59
40	Constructed Response		1	NGLS.Math.Content.NY-8.G.7	Geometry	Geometry			0.31	0.31
41	Constructed Response		1	NGLS.Math.Content.NY-8.EE.7b	Expressions and Equations	Expressions and Equations			0.5	0.5
42	Constructed Response		2	NGLS.Math.Content.NY-8.G.2	Geometry	Geometry			0.78	0.39
43	Constructed Response		2	NGLS.Math.Content.NY-8.EE.7b	Expressions and Equations	Expressions and Equations			0.92	0.46
44	Constructed Response		2	NGLS.Math.Content.NY-8.G.6	Geometry	Geometry			0.63	0.31
45	Constructed Response		2	NGLS.Math.Content.NY-8.F.4	Functions	Functions			0.8	0.4
46	Constructed Response		2	NGLS.Math.Content.NY-7.G.4	Geometry	Geometry			0.71	0.36
47	Constructed Response		2	NGLS.Math.Content.NY-8.EE.1	Expressions and Equations	Expressions and Equations			0.63	0.32
48	Constructed Response		3	NGLS.Math.Content.NY-8.F.3	Functions	Functions			1.01	0.34

*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.