Name: _____

New York State Testing Program

2022 Mathematics Test Session 1

Grade 8

April 26–28, 2022

RELEASED QUESTIONS

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.

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

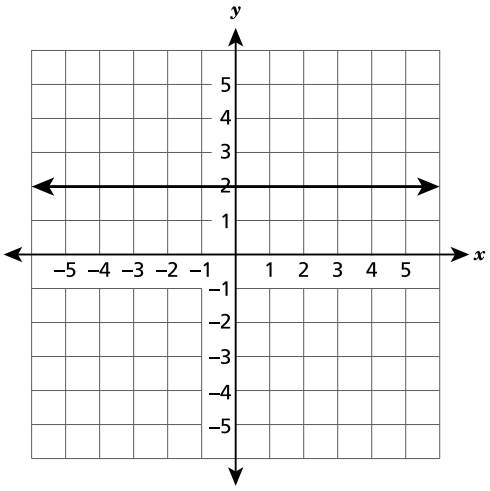
1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 gallon = 3.785 liters
1 liter = 0.264 gallon
1 liter = 1,000 cubic centimeters

FORMULAS

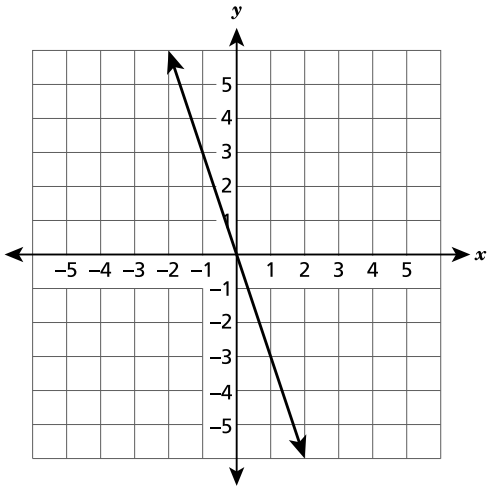
Triangle	$A = \frac{1}{2}bh$
Parallelogram	$A = bh$
Circle	$A = \pi r^2$
Circle	$C = \pi d$ or $C = 2\pi r$
General Prisms	$V = Bh$
Cylinder	$V = \pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$
Cone	$V = \frac{1}{3}\pi r^2 h$
Pythagorean Theorem	$a^2 + b^2 = c^2$

1 Which graph represents a function that is increasing?

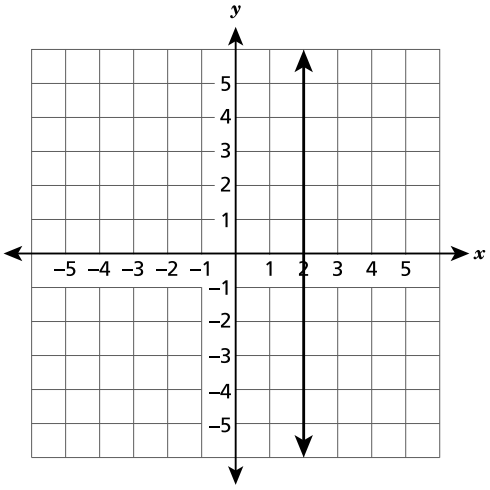
A



C



B



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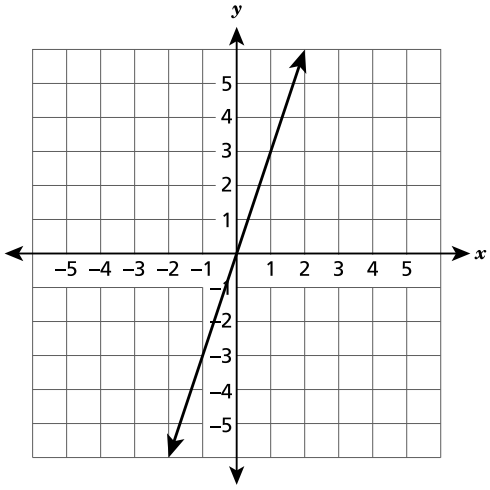


GO ON

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?

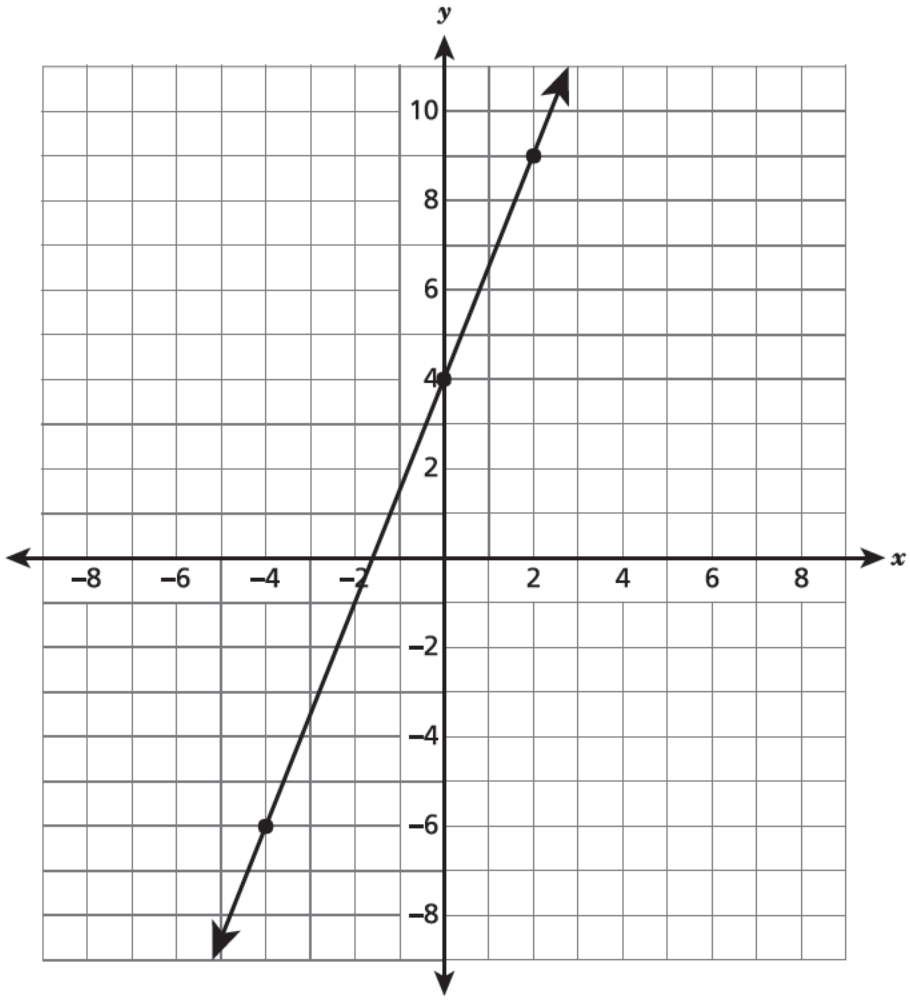
A 1,650

B 3,900

C 4,500

D 7,350

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



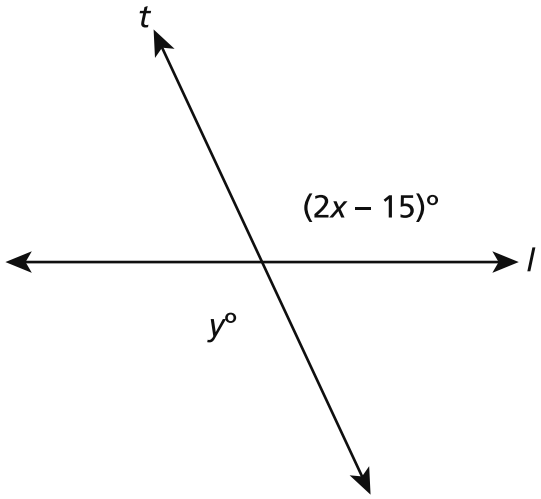
A $y = \frac{2}{5}x + 4$

B $y = \frac{2}{3}x + 4$

C $y = \frac{3}{2}x + 4$

D $y = \frac{5}{2}x + 4$

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?

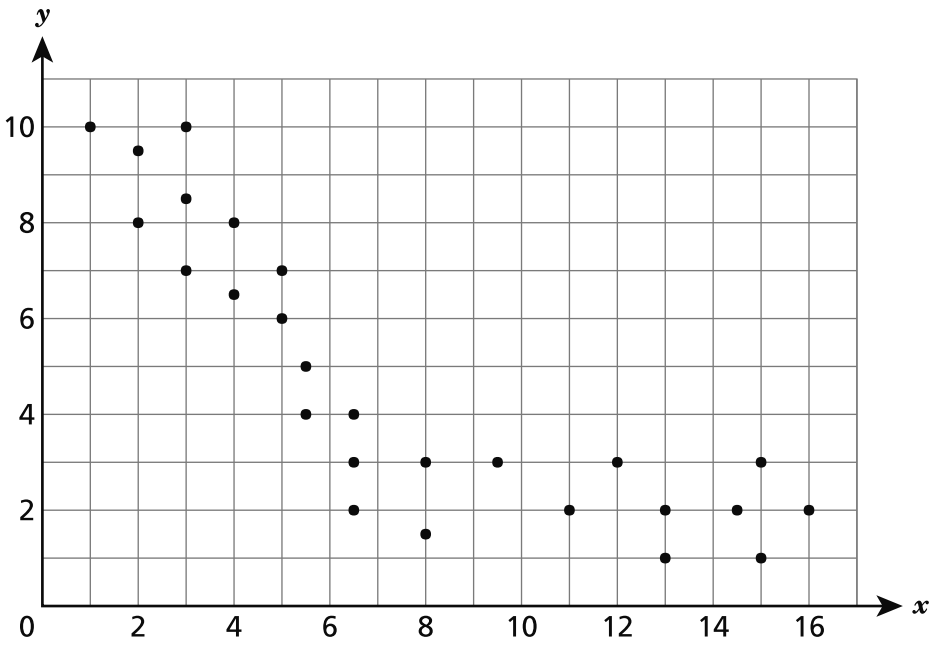
A a reflection followed by a translation

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

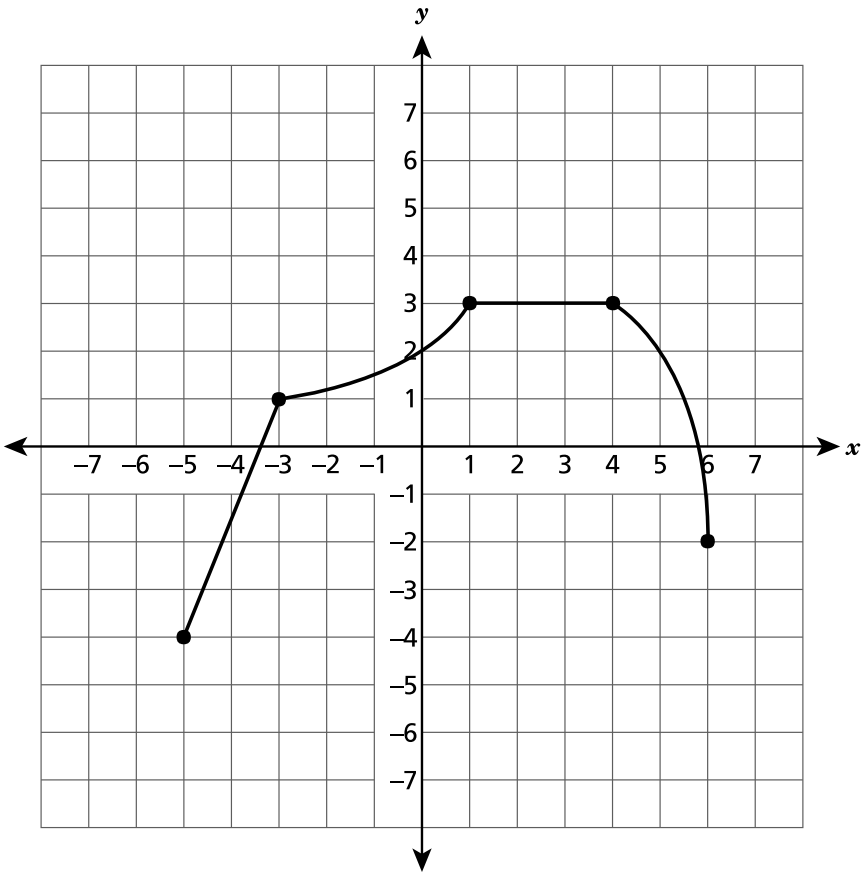
B $y = \frac{27}{5}$

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?

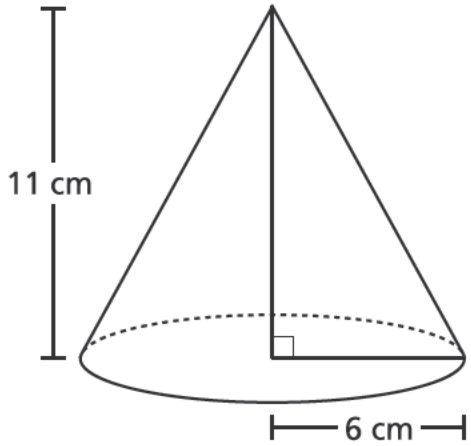
A -5 and -3

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?

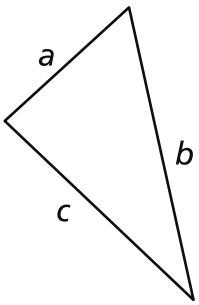
A 138

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?

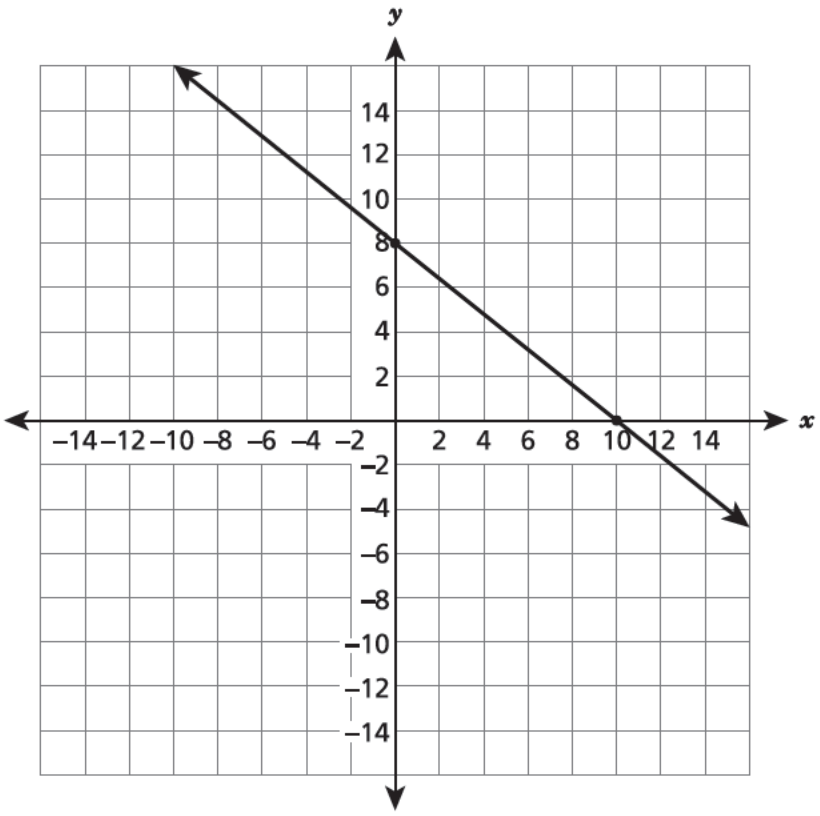
A $a + b > c$

B $b + c < a$

C $a + b < c$

D $a + c < b$

25 A line is graphed on the coordinate plane shown below.



What is the equation of the line?

A $y = -\frac{4}{5}x + 8$

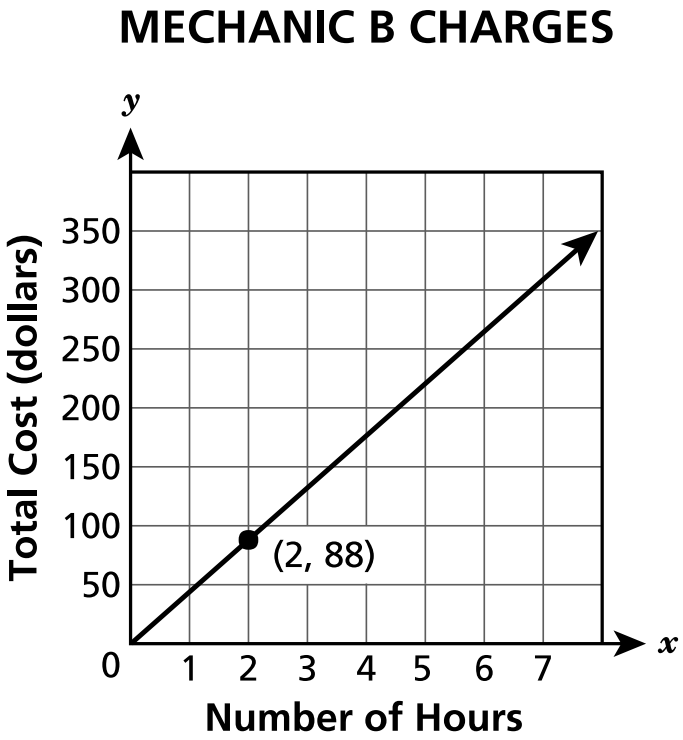
B $y = \frac{4}{5}x + 10$

C $y = -\frac{5}{4}x + 8$

D $y = \frac{5}{4}x + 10$

26 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.

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.

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 $4^{-5} \times 4^{8}$?

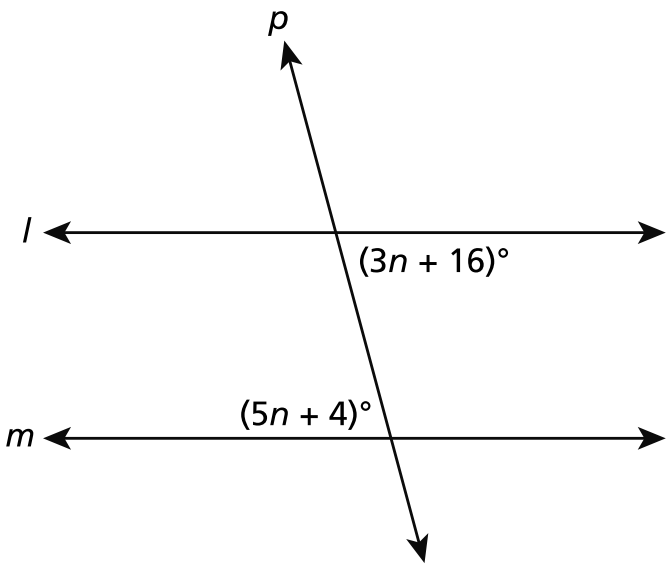
A $\frac{4^{-2}}{4^{-1}}$

B $\left(4^{3}\right)^{-1}$

C $\frac{4^{2}}{4^{-1}}$

D $\left(4^{-1}\right)^{3}$

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



What is the value of *n*?

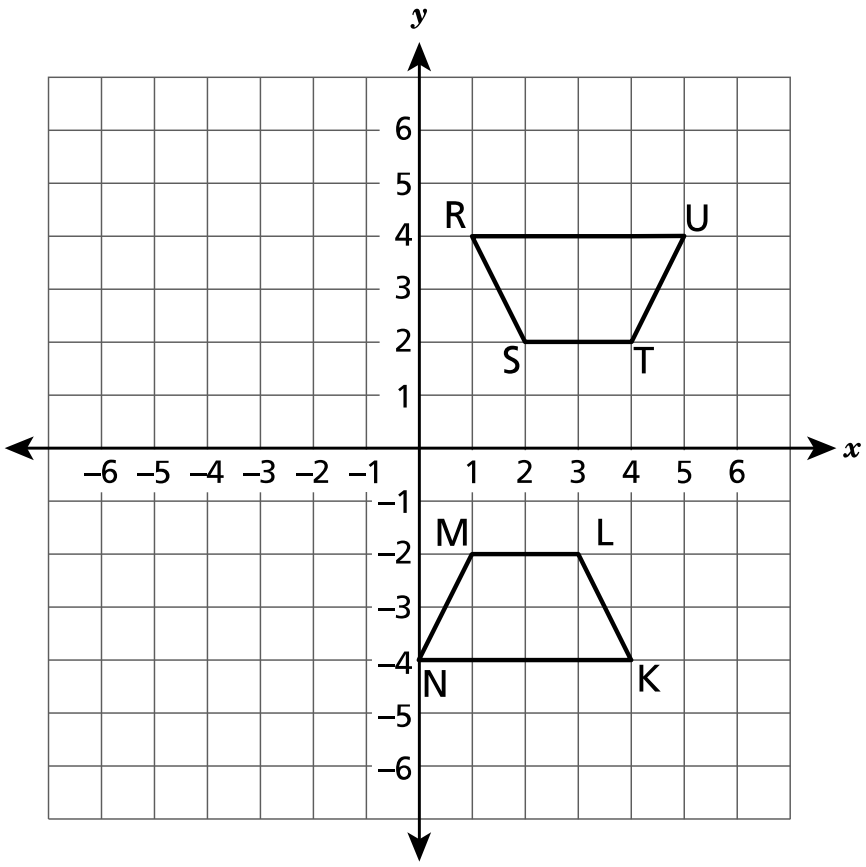
A 6

B 10

C 20

D 24

37 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

GO ON

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?

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

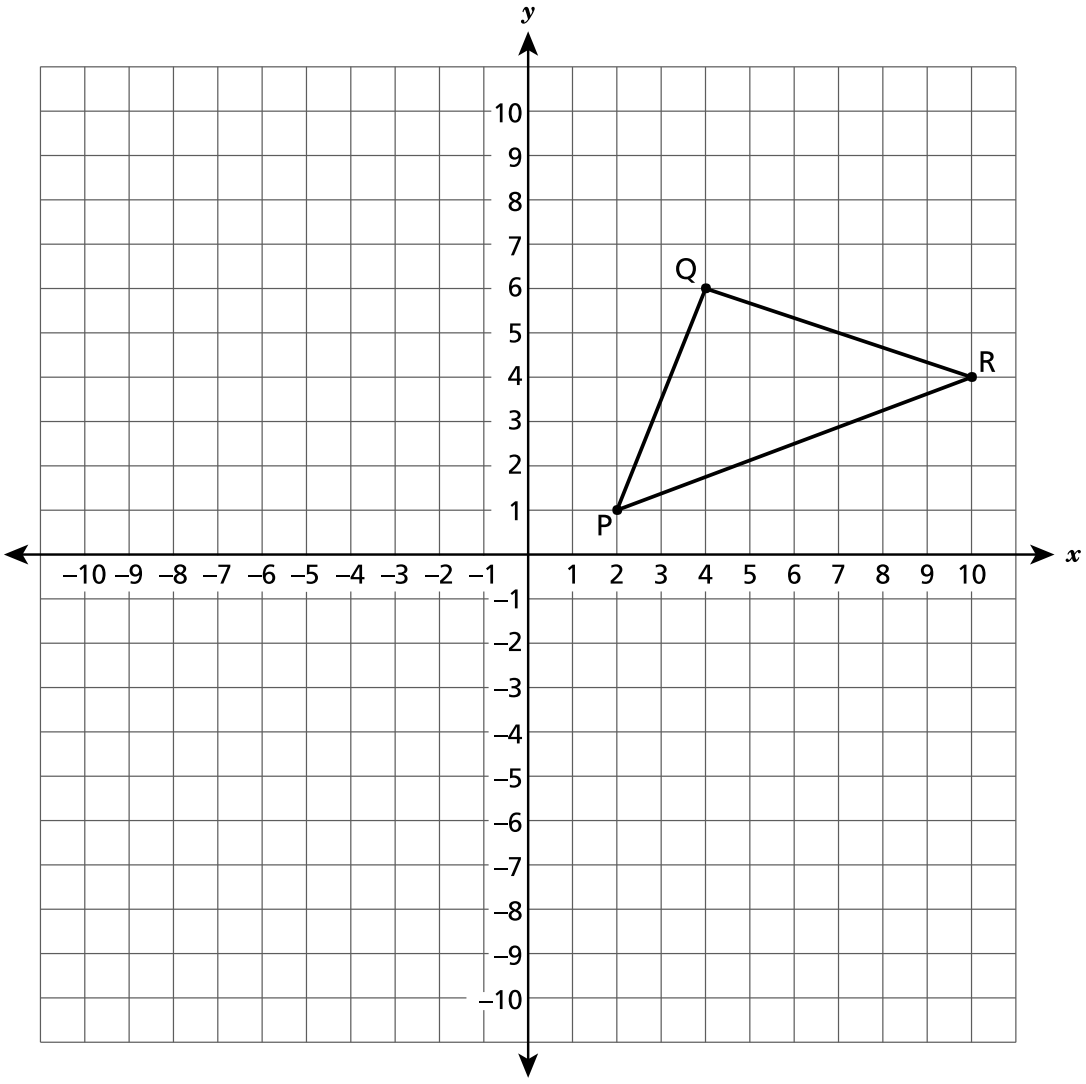
A 5

B 2

C -2

D -5

40 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 $\mathrm{Q'P'R'}$. What are the coordinates of vertex $\mathrm{R'}$?

A $(2, 5)$

B $(5, 2)$

C $(8, 20)$

D $(20, 8)$

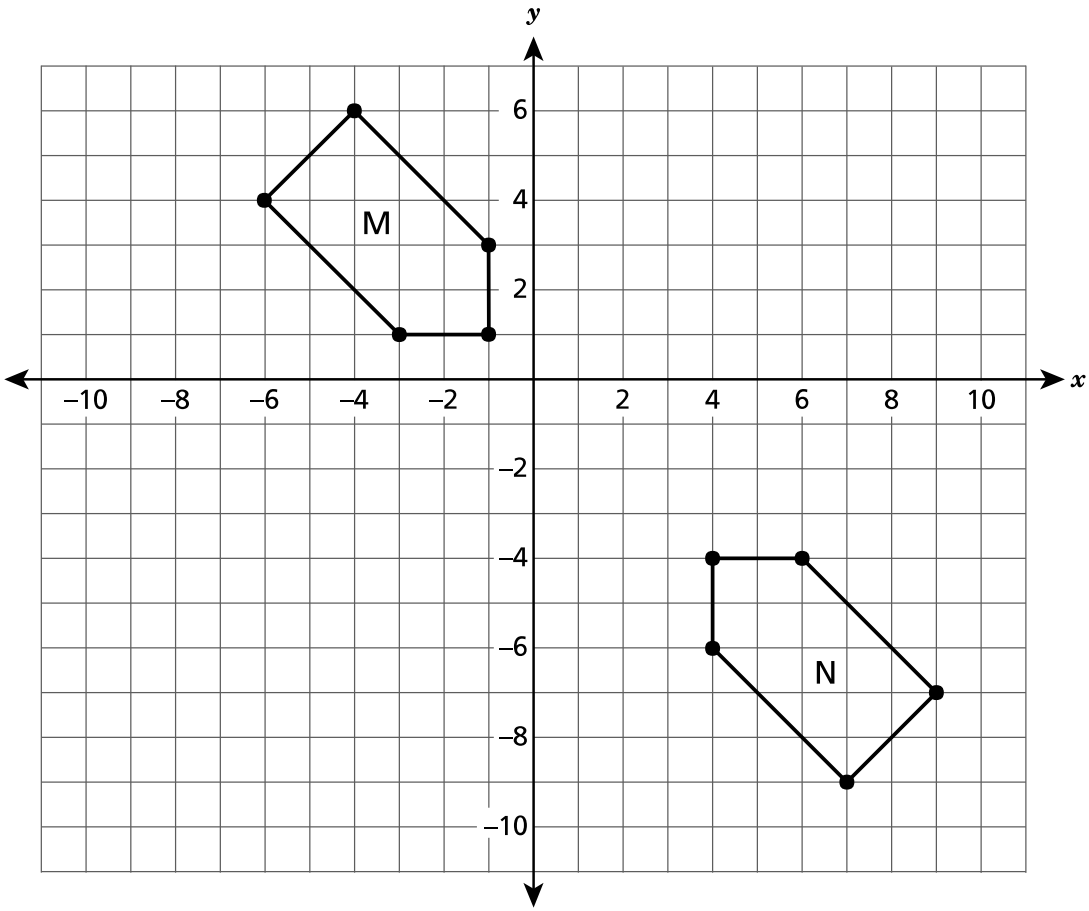
GO ON

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

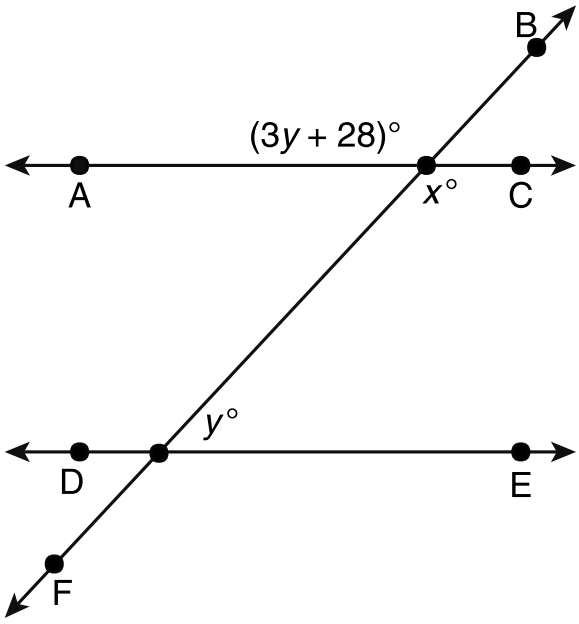
42 Figure M and its congruent image, figure N, are graphed on the coordinate plane below.



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 $x =$ _____

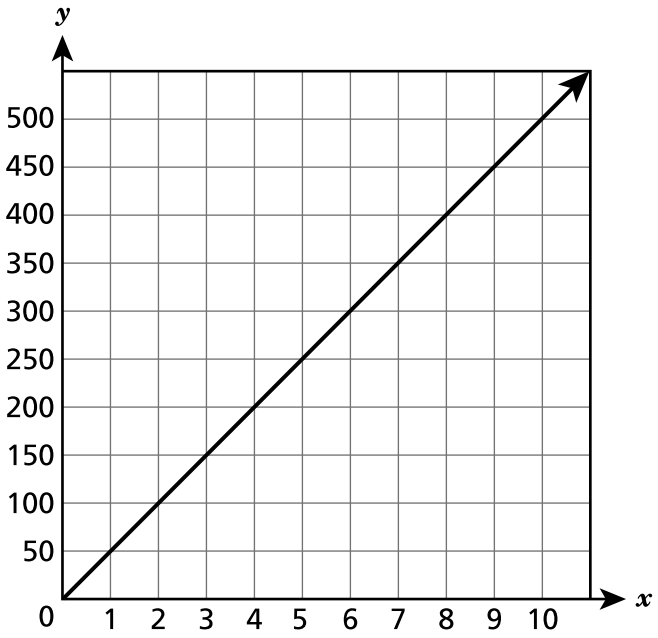
GO ON

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 $x =$ _____

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

THE STATE EDUCATION DEPARTMENT

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

2022 Mathematics Tests Map to the Standards

Grade 8

Question	Type	Key	Points	Standard	Cluster
Session 1					
1	Multiple Choice	D	1	CCSS.Math.Content.8.F.B.5	Functions
2	Multiple Choice	A	1	CCSS.Math.Content.8.EE.C.7b	Expressions and Equations
3	Multiple Choice	A	1	CCSS.Math.Content.7.G.B.6	Geometry
4	Multiple Choice	D	1	CCSS.Math.Content.8.EE.B.6	Expressions and Equations
5	Multiple Choice	C	1	CCSS.Math.Content.7.G.B.5	Expressions and Equations
6	Multiple Choice	D	1	CCSS.Math.Content.8.G.A.4	Geometry
7	Multiple Choice	B	1	CCSS.Math.Content.8.SP.A.2	Statistics and Probability
8	Multiple Choice	C	1	CCSS.Math.Content.8.EE.C.7a	Expressions and Equations
14	Multiple Choice	C	1	CCSS.Math.Content.8.EE.A.1	Expressions and Equations
15	Multiple Choice	A	1	CCSS.Math.Content.8.F.B.4	Functions
16	Multiple Choice	A	1	CCSS.Math.Content.8.EE.C.7b	Expressions and Equations
19	Multiple Choice	B	1	CCSS.Math.Content.8.F.B.5	Functions
23	Multiple Choice	B	1	CCSS.Math.Content.8.G.C.9	Geometry
24	Multiple Choice	A	1	CCSS.Math.Content.7.G.A.2	Expressions and Equations
25	Multiple Choice	A	1	CCSS.Math.Content.8.EE.B.6	Expressions and Equations
26	Multiple Choice	B	1	CCSS.Math.Content.8.EE.B.5	Expressions and Equations
Session 2					
34	Multiple Choice	B	1	CCSS.Math.Content.8.SP.A.3	Statistics and Probability
35	Multiple Choice	C	1	CCSS.Math.Content.8.EE.A.1	Expressions and Equations
36	Multiple Choice	A	1	CCSS.Math.Content.8.G.A.5	Geometry
37	Multiple Choice	B	1	CCSS.Math.Content.8.G.A.2	Geometry
38	Multiple Choice	C	1	CCSS.Math.Content.8.F.A.1	Functions
39	Multiple Choice	B	1	CCSS.Math.Content.8.EE.C.7a	Expressions and Equations
40	Multiple Choice	B	1	CCSS.Math.Content.8.G.A.3	Geometry
41	Constructed Response		2	CCSS.Math.Content.8.F.B.4	Functions
42	Constructed Response		2	CCSS.Math.Content.8.G.A.2	Geometry
43	Constructed Response		2	CCSS.Math.Content.8.G.A.5	Geometry
44	Constructed Response		2	CCSS.Math.Content.8.EE.C.7b	Expressions and Equations
45	Constructed Response		2	CCSS.Math.Content.8.F.A.2	Functions
46	Constructed Response		2	CCSS.Math.Content.8.G.C.9	Geometry
47	Constructed Response		2	CCSS.Math.Content.8.EE.C.7b	Expressions and Equations
48	Constructed Response		3	CCSS.Math.Content.8.F.A.3	Functions

*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.

2-Point Holistic Rubric

2 Points	A 2-point response includes the correct solution to the question and demonstrates a thorough understanding of the mathematical concepts and/or procedures in the task. This response • indicates that the student has completed the task correctly, using mathematically sound procedures • contains sufficient work to demonstrate a thorough understanding of the mathematical concepts and/or procedures • may contain inconsequential errors that do not detract from the correct solution and the demonstration of a thorough understanding
1 Point	A 1-point response demonstrates only a partial understanding of the mathematical concepts and/or procedures in the task. This response • correctly addresses only some elements of the task • may contain an incorrect solution but applies a mathematically appropriate process • may contain the correct solution but required work is incomplete
0 Points*	A 0-point response is incorrect, irrelevant, incoherent, or contains a correct solution obtained using an obviously incorrect procedure. Although some elements may contain correct mathematical procedures, holistically they are not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task.

* Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session completely blank (no response attempted).

3-Point Holistic Rubric

3 Points	A 3-point response includes the correct solution(s) to the question and demonstrates a thorough understanding of the mathematical concepts and/or procedures in the task. This response • indicates that the student has completed the task correctly, using mathematically sound procedures • contains sufficient work to demonstrate a thorough understanding of the mathematical concepts and/or procedures • may contain inconsequential errors that do not detract from the correct solution(s) and the demonstration of a thorough understanding
2 Points	A 2-point response demonstrates a partial understanding of the mathematical concepts and/or procedures in the task. This response • appropriately addresses most but not all aspects of the task using mathematically sound procedures • may contain an incorrect solution but provides sound procedures, reasoning, and/or explanations • may reflect some minor misunderstanding of the underlying mathematical concepts and/or procedures
1 Point	A 1-point response demonstrates only a limited understanding of the mathematical concepts and/or procedures in the task. This response • may address some elements of the task correctly but reaches an inadequate solution and/or provides reasoning that is faulty or incomplete • exhibits multiple flaws related to misunderstanding of important aspects of the task, misuse of mathematical procedures, or faulty mathematical reasoning • reflects a lack of essential understanding of the underlying mathematical concepts • may contain the correct solution(s) but required work is limited
0 Points*	A 0-point response is incorrect, irrelevant, incoherent, or contains a correct solution obtained using an obviously incorrect procedure. Although some elements may contain correct mathematical procedures, holistically they are not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task.

* Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session completely blank (no response attempted).

2022 2- and 3-Point Mathematics Scoring Policies

Below are the policies to be followed while scoring the mathematics tests for all grades:

1. If a student shows the work in other than a designated "Show your work" or "Explain" area, that work should still be scored.
2. If the question requires students to show their work, and the student shows appropriate work and clearly identifies a correct answer but fails to write that answer in the answer space, the student should still receive full credit.
3. If students are directed to show work or provide an explanation, a correct answer with **no** work shown or **no** explanation provided, receives **no** credit.
4. If students are **not** directed to show work, any work shown will **not** be scored. This applies to items that do **not** ask for any work and items that ask for work for one part and do **not** ask for work in another part.
5. If the student provides one legible response (and one response only), the rater should score the response, even if it has been crossed out.
6. If the student has written more than one response but has crossed some out, the rater should score only the response that has **not** been crossed out.
7. If the student provides more than one response, but does not indicate which response is to be considered the correct response and none have been crossed out, the student shall not receive full credit.
8. If the student makes a conceptual error (that is an error in understanding rather than an arithmetic or computational error), that student shall not receive more than 50% credit.
9. Trial-and-error responses are **not** subject to Scoring Policy #6 above, since crossing out is part of the trial-and-error process.
10. If a response shows repeated occurrences of the same conceptual error within a question, the conceptual error should **not** be considered more than once in gauging the demonstrated level of understanding.
11. In questions requiring number sentences, the number sentences must be written horizontally.
12. When measuring angles with a protractor, there is a +/- 5 degrees deviation allowed of the true measure.
13. Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session completely blank (no response attempted). This is not to be confused with a score of zero wherein the student does respond to part or all of the question but that work results in a score of zero.

EXEMPLARY RESPONSE

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.

$$\text{Rate of change} = \frac{\Delta \text{ounces}}{\Delta \text{hours}} = \frac{63 - 61\frac{1}{2}}{5 \text{ p.m.} - 2 \text{ p.m.}} = \frac{1\frac{1}{2}}{3} = \frac{1 \text{ ounce}}{2 \text{ hours}}$$

Since noon to 2 p.m. = 2 hours

$2 \times \frac{1}{2} = 1$ ounce

So, the amount of oil in the lantern at 12 noon is:

$63 + 1 = 64$ ounces

or other valid process

Answer 64 ounces

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.

It burns at a constant rate each hour.
2 p.m: 63 ounces
5 p.m $61\frac{1}{2}$
3 hours difference
$63 - 61.5 = 1.5$
$1.5 \div 3 = .5$
1 p.m: 63.5 12 p.m: 64 ounces

Answer 64 ounces

Score Point 2 (out of 2 points)

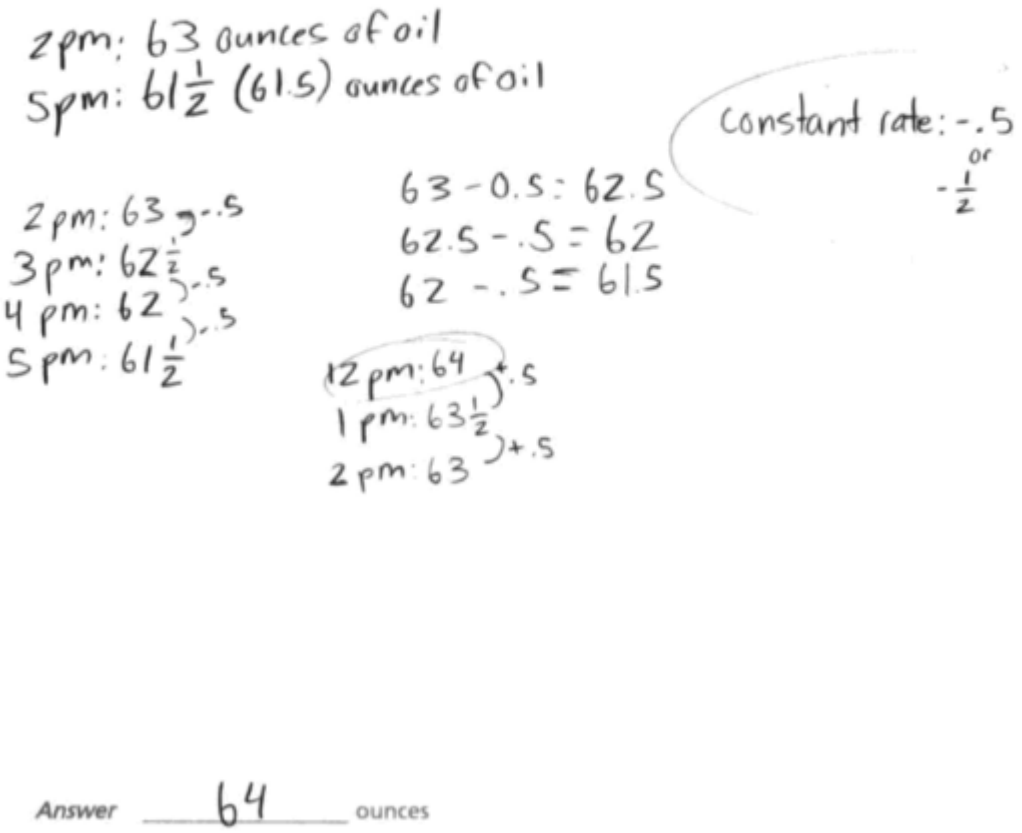
This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The rate of change is correctly calculated and applied to determine the correct amount of oil in the lantern at 12 noon. This response is complete and correct.

GUIDE PAPER 2

41

A camper lights an oil lantern at 12 noon and lets it burn continously. 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 64 ounces

Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The rate of change is correctly calculated and applied to determine the correct amount of oil in the lantern at 12 noon. This response is complete and correct.

GUIDE PAPER 3

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.

$\frac{63-61.5}{2-5} = \frac{1.5}{-3} = -.5$

$Y=ax+b$

$63= -.5(2) + b$

$63= -1 + b$

$+1 \quad +1$

$64 = b$

Answer 64 ounces

Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The rate of change is correctly calculated and the amount of oil in the lantern at 12 noon is correctly determined using an equation. This response is complete and correct.

GUIDE PAPER 4

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.

63-61 1/2=1 1/2
3 ÷ 1 1/2=.6
.6 × 2=1.2
63+1.2=64.2

Answer 64.2 ounces

Score Point 1 (out of 2 points)

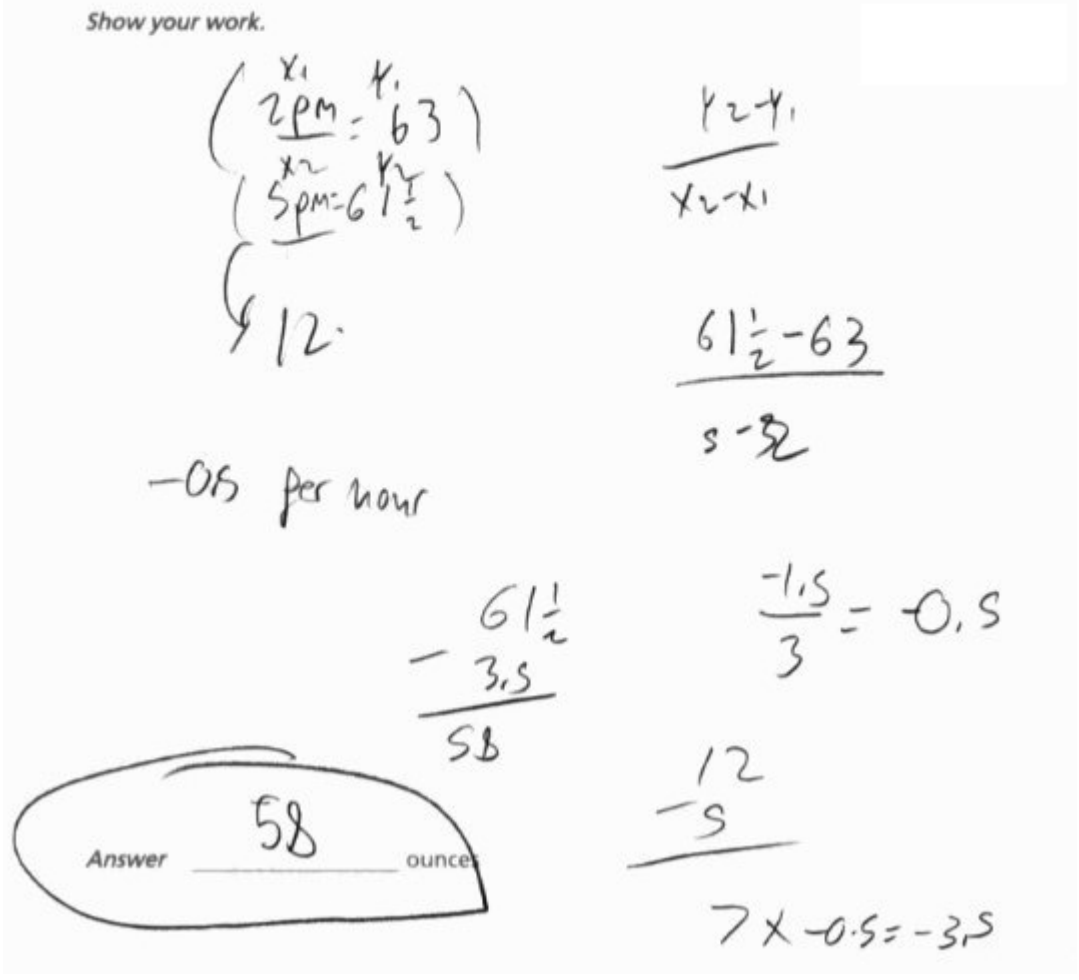
This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The rate of change is miscalculated due to a calculation error. The obtained rate of change is correctly used to determine the amount of oil in the lantern at 12 noon. This response correctly addresses only some elements of the task.

GUIDE PAPER 5

41

A camper lights an oil lantern at 12 noon and ~~lets it burn continously~~. 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.



Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The rate of change is correctly calculated, but the solution is determined for 12 midnight, not 12 noon. This response correctly addresses only some elements of the task.

GUIDE PAPER 6

41

A camper lights an oil lantern at 12 noon and lets it burn continously. 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.

$5-2=3$

$63-61\frac{1}{2}=1\frac{1}{2}$

$12 \to 2 = 2\text{hrs}$

$1\frac{1}{2} \div 3 = \frac{3}{6}$

$\frac{3}{6} \times 2 = 1$

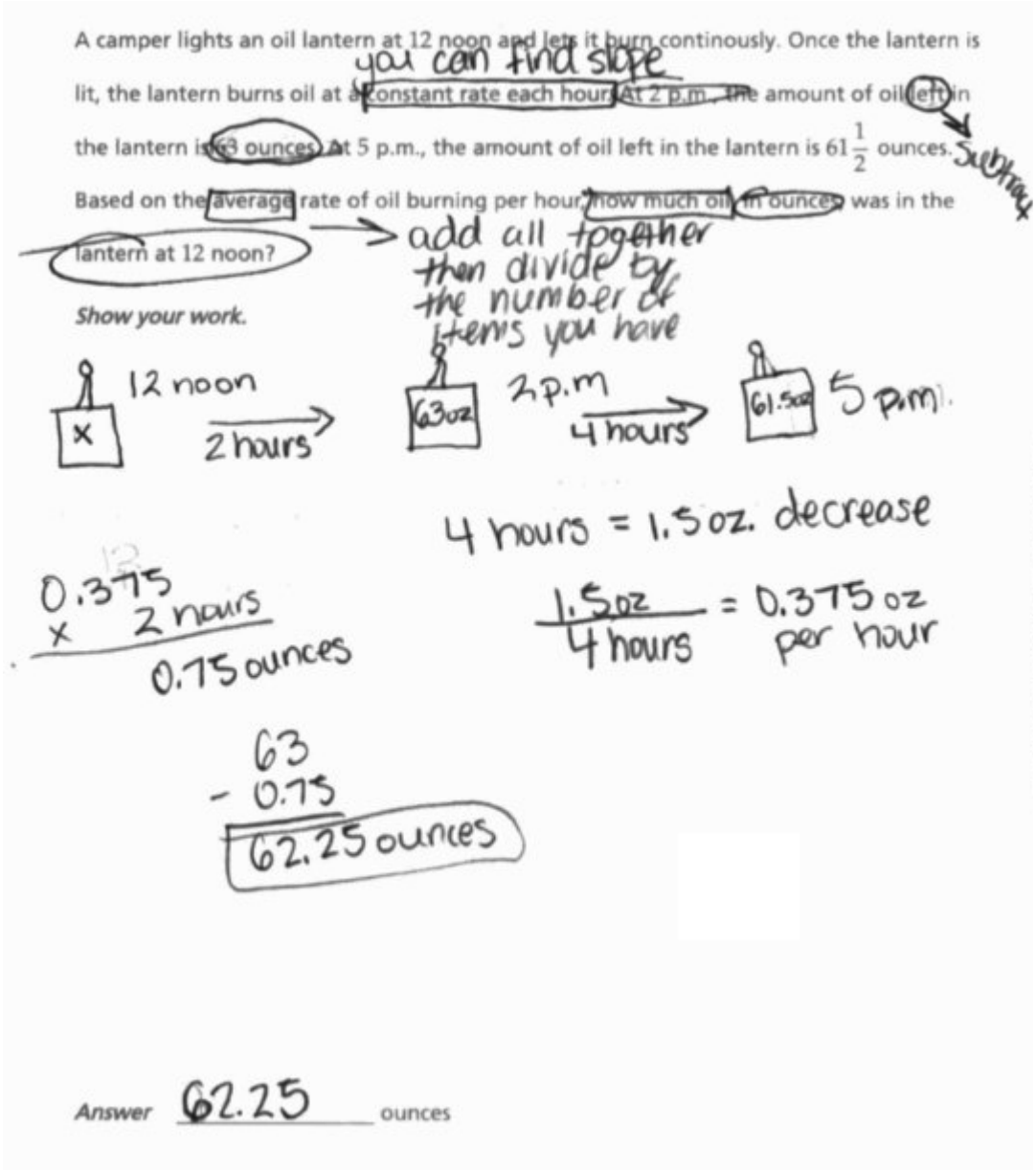
Answer 1 ounces

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The amount of oil burned in two hours is correctly calculated, but the final step of adding this amount to the 2 p.m. total is omitted. This response correctly addresses only some elements of the task.

GUIDE PAPER 7

41



Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. The difference between 2 p.m. and 5 p.m. is incorrectly calculated as four hours, which causes the rate of change to be incorrect. The amount of oil burned in two hours is subtracted from the amount of oil in the lantern at 2 p.m. when it should be added.

41

A camper lights an oil lantern at 12 noon and lets it burn continously. 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.

$63 - 61\frac{1}{2} = 1\frac{1}{2}$

$63 + 1\frac{1}{2} = 64\frac{1}{2}$

Answer $64\frac{1}{2}$ ounces

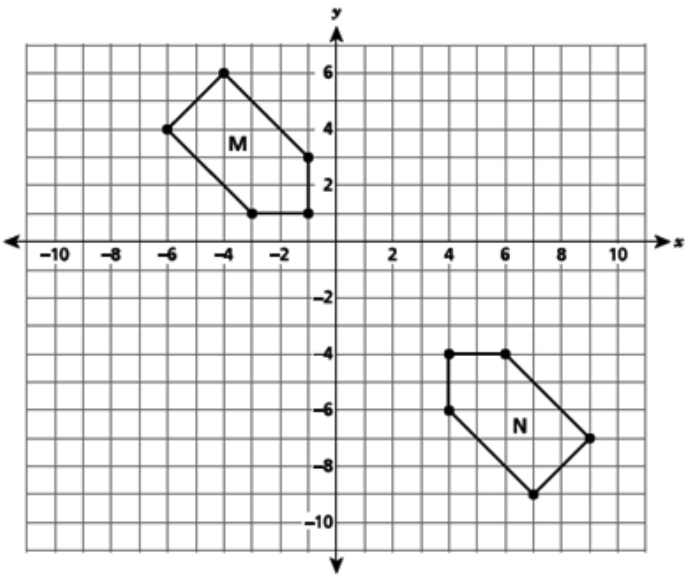
Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. An incorrect procedure is used to obtain an incorrect solution.

EXEMPLARY RESPONSE

42

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.

Rotate figure M clockwise or counterclockwise 180° about the origin and then translate 3 units to the right and 3 units down

or

Reflect figure M over the *x*-axis, reflect over the *y*-axis, and then translate 3 units to the right and 3 units down

or

Reflect figure M over the *y*-axis, reflect over the *x*-axis, and then translate 3 units to the right and 3 units down

or

Reflect figure M over the line $y = x$, and then translate 3 units to the right and 3 units down

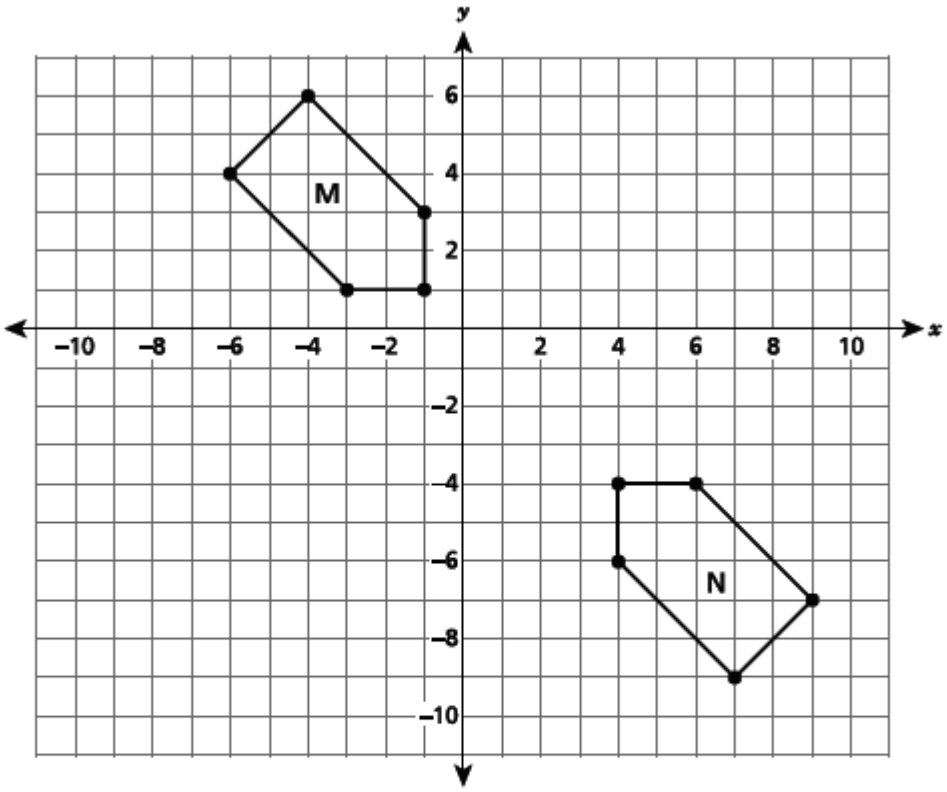
or

Reflect figure M over the line $y = x - 3$

or other valid process

42

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.

First reflect over the x-axis, translate 3 units down, reflect over the y-axis, and then translate 3 units to the right.

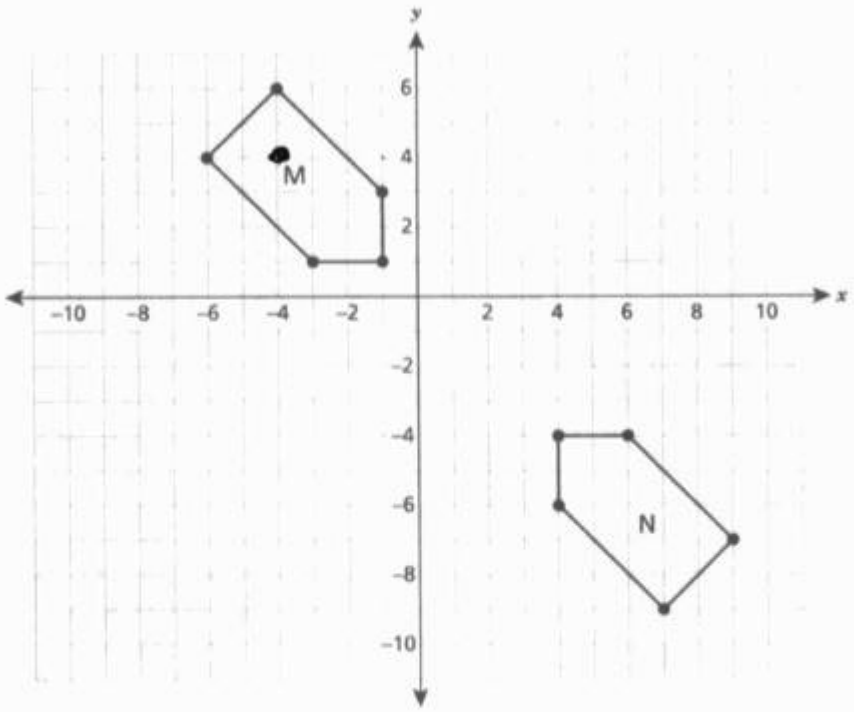
Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. A correct sequence of transformations is described to take figure M onto its congruent image, figure N. This response is complete and correct.

GUIDE PAPER 2

42

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.

A translation of 3 units up then 3 units to the left, and a rotation of 180°

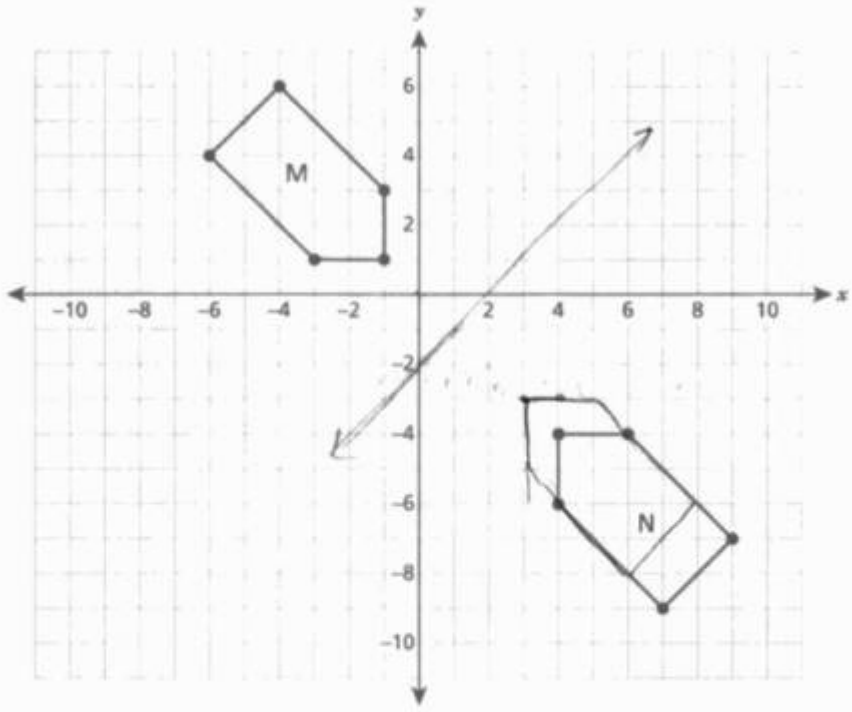
Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. A correct sequence of transformations is described to take figure M onto its congruent image, figure N.

GUIDE PAPER 3

42

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.

~~a trans~~ A reflection of figure M over line $y = x - 2$ followed by ~~and~~ a translation one unit down, one unit right would map figure M on top of figure N.

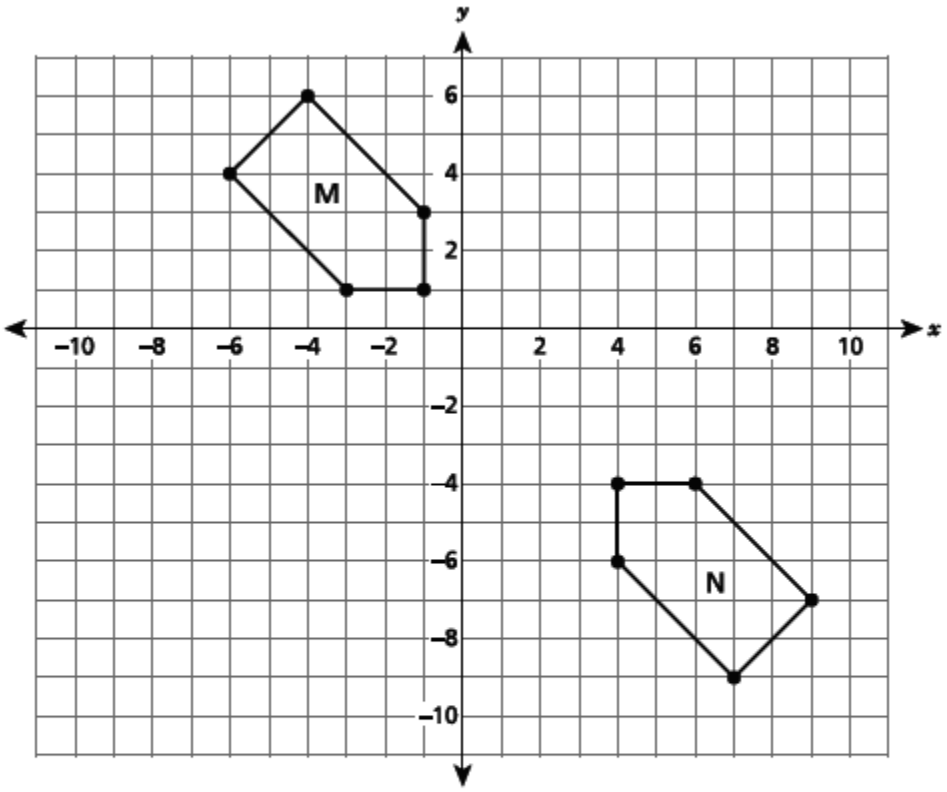
Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. A correct sequence of transformations is described to take figure M onto its congruent image, figure N.

GUIDE PAPER 4

42

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.

M is translated three to the left and two up, then reflected across the x=y line.

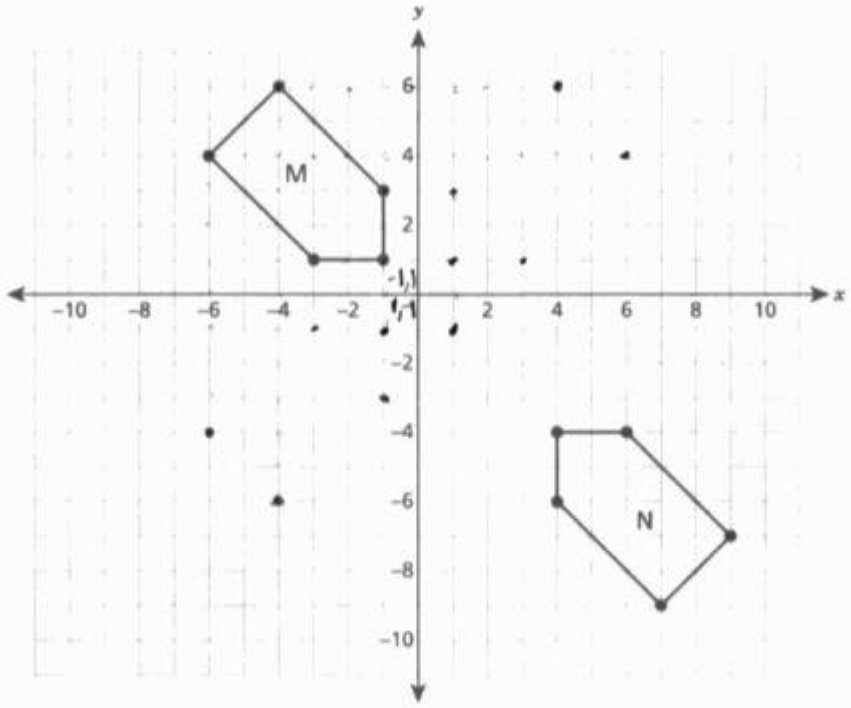
Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The reflection over the line $y = x$ is part of a correct sequence of transformations, but the translation should be three up not "*two up.*" This response correctly addresses only some elements of the task.

GUIDE PAPER 5

42

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.

Reflection over Y and then a 90° rotation clockwise.

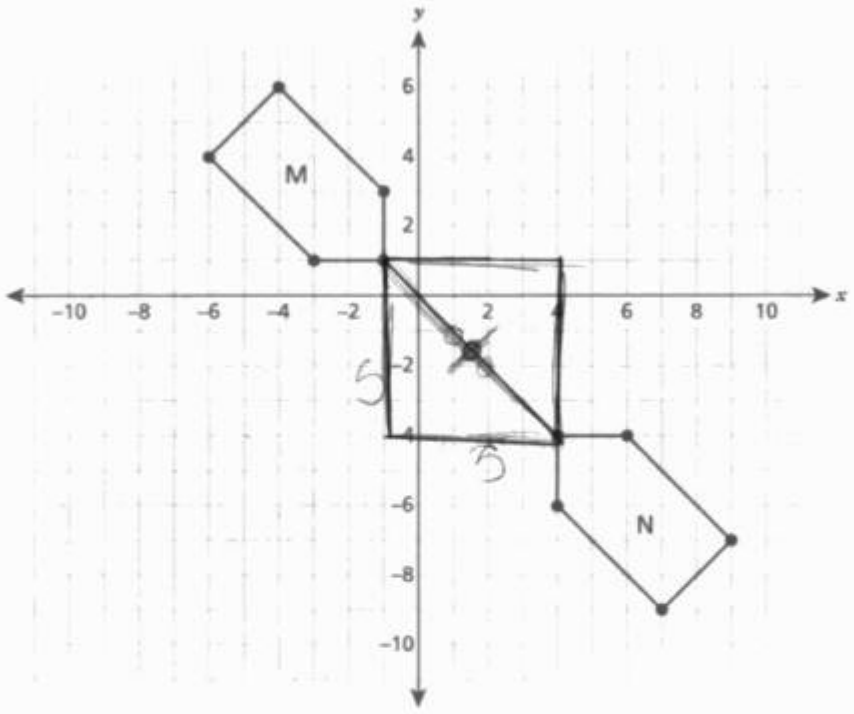
Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The reflection and rotation correctly transforms figure M into the IV quadrant in the correct orientation; however, the translation is not addressed. This response correctly addresses only some elements of the task.

GUIDE PAPER 6

42

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.

They rotated 180° around the point (1.5, 1.5)

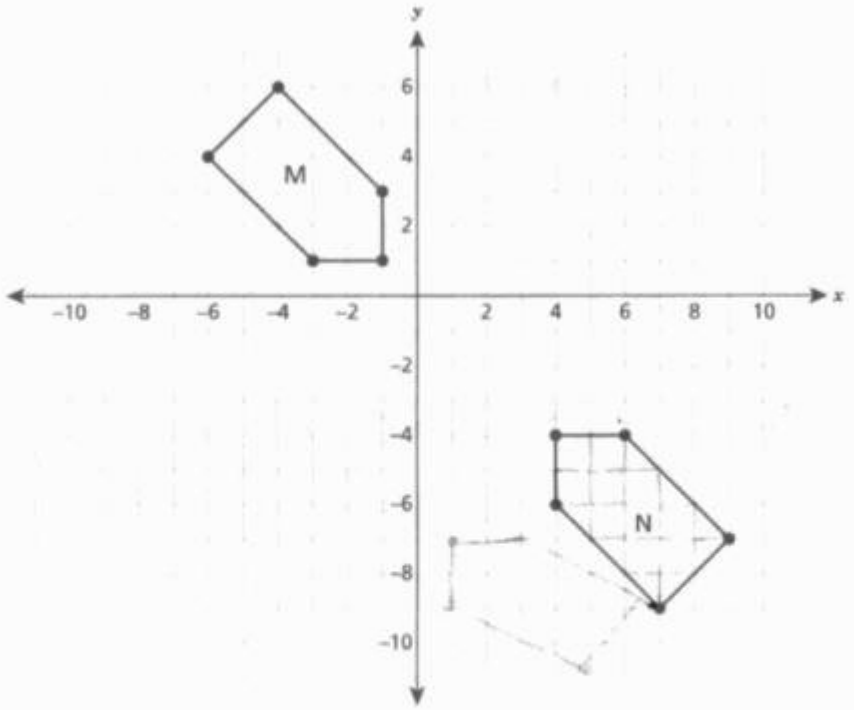
Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. Although the point of rotation is plotted correctly in the figure, an incorrect point is written in the explanation. As plotted in the figure, this transformation would be correct. This response correctly addresses only some elements of the task.

GUIDE PAPER 7

42

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.

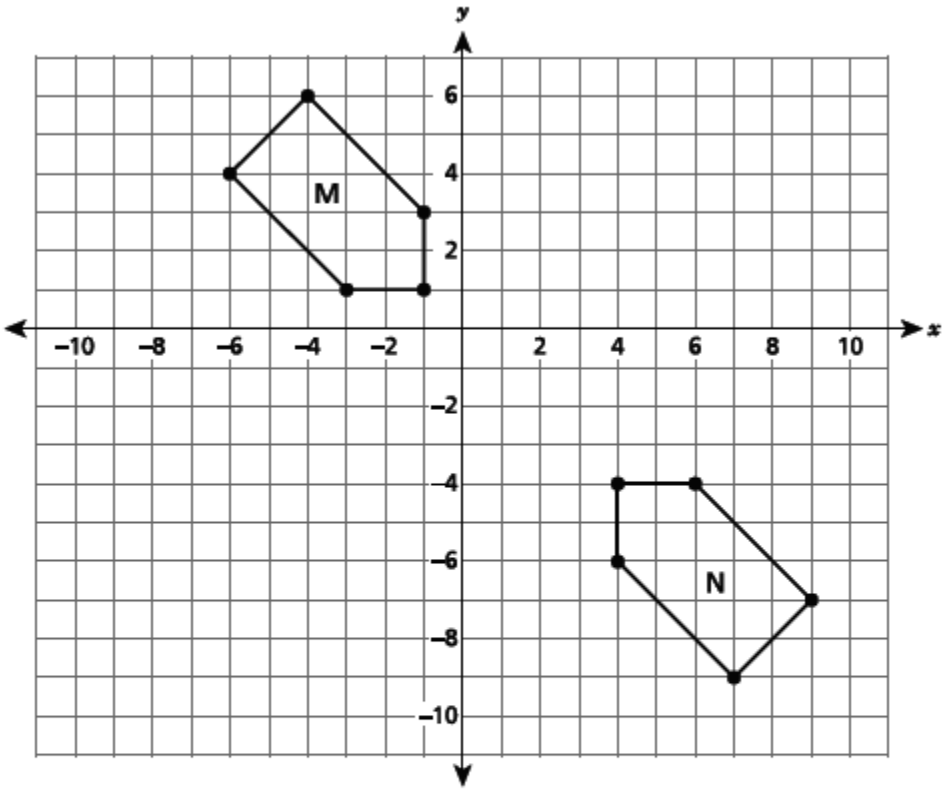
The figure flipped and rotated which showed different points on the graph.

Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. This response is lacking any detail that could convey any understanding.

42

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.

You can do a reflection over the x axis and you can move 2 units down.

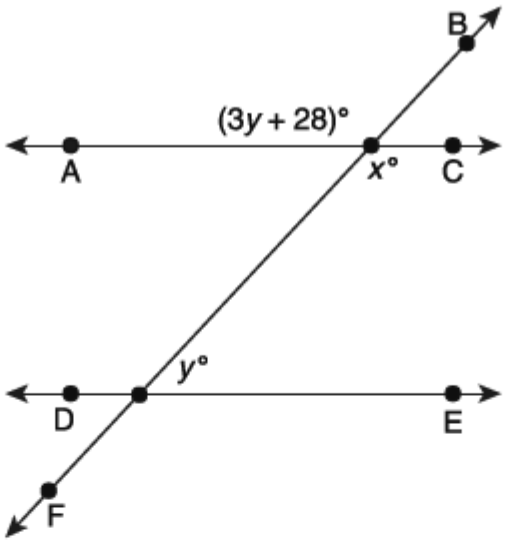
Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. Although the reflection over the *x*-axis can be part of a correct sequence of transformations, the reflection over the *y*-axis is ignored and an incorrect translation is described.

EXEMPLARY RESPONSE

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.

Given $\overleftrightarrow{AC}$ is parallel to $\overleftrightarrow{DE}$ with transversal $\overleftrightarrow{BF}$, then

the opposite angles are equivalent, and $3y + 28 = x$,

and the sum of consecutive interior angles is 180°.

$y + (3y + 28) = 180$

$4y + 28 = 180$

$4y = 152$

$y = 38$

Since the sum of supplementary angles is 180°, then

$x + y = 180$

$x + 38 = 180$

$x = 142$

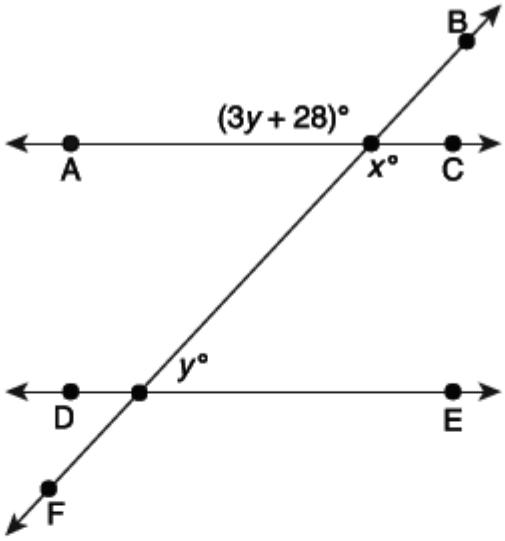
or other valid process

Answer $x =$ 142

$y =$ 38

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.

$3y+28+y=180$
$4y+28=180$
$4y=152$
$y=38$

$38+x=180$
$x=142$

Answer $x =$ 142

$y =$ 38

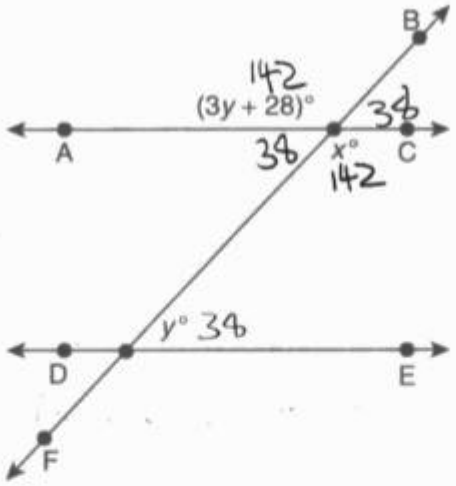
Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The solutions are solved using sound algebraic procedures and demonstrating understanding of the supplementary relationship with angles formed by parallel lines cut by a transversal. This response is complete and correct.

GUIDE PAPER 2

43

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



3(34)+28
114+28
142

Determine the values of x and y.

Show your work.

$3y + 28 + y = 180$

$4y + 28 = 180$
$-28 \quad -28$
$\frac{4y}{4} = \frac{152}{4}$
$y = 38$

Answer $x = 142$
$y = 38$

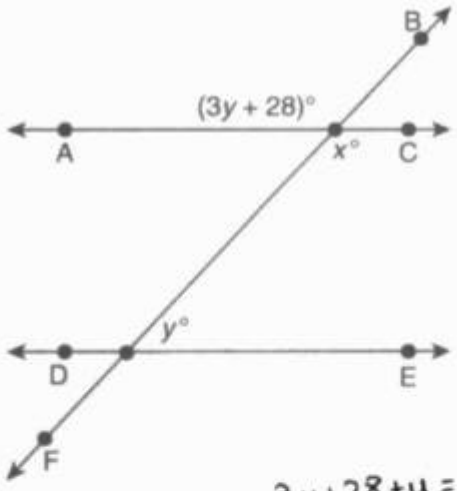
Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The solutions are solved using sound algebraic procedures and demonstrating understanding of the supplementary relationship with angles formed by parallel lines cut by a transversal. This response is complete and correct.

GUIDE PAPER 3

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.

$3y+28+y=180$

$4y+28=180$

$-28 \quad -28$

$\frac{4y}{4} = \frac{152}{4}$

$y=38$

$180-38=142$

$x=142$

Answer $x = 142$

$y = 38$

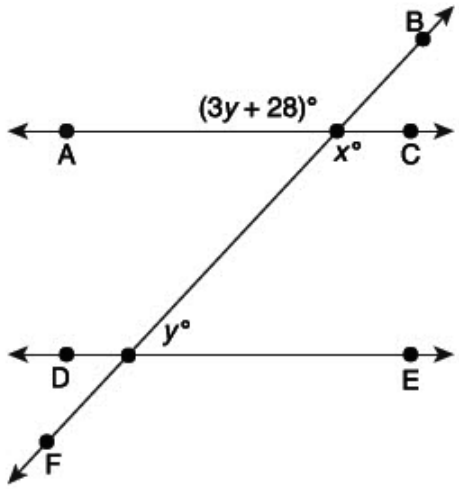
Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The solutions are solved using sound algebraic procedures and demonstrating understanding of the supplementary relationship with angles formed by parallel lines cut by a transversal. This response is complete and correct.

GUIDE PAPER 4

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.

$(3y + 28) + y = 180$

$3y + 28 + y = 180$

$4y + 28 = 180$

$-28 \quad -28$

$4y = 152 \rightarrow y = 38$

$x = 152$

Answer $x =$ x=152

$y =$ y=38

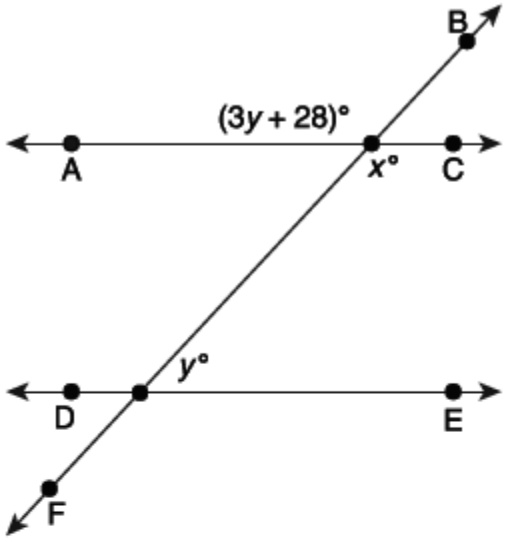
Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The process to solve for y is correct, and the y solution is correct. No work is shown for x, so it is unclear how the incorrect value of x is calculated. This response correctly addresses only some elements of the task.

GUIDE PAPER 5

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.

$X = 3y + 28$
$D = y$
$3y + 28 + y = 180$
$4y + 28 = 180$
$4y = 152$
$Y = 38$
$3(38) + 28 = x$
$76 + 28 = x$
$X = 104$

Answer $x =$ 104

$y =$ 38

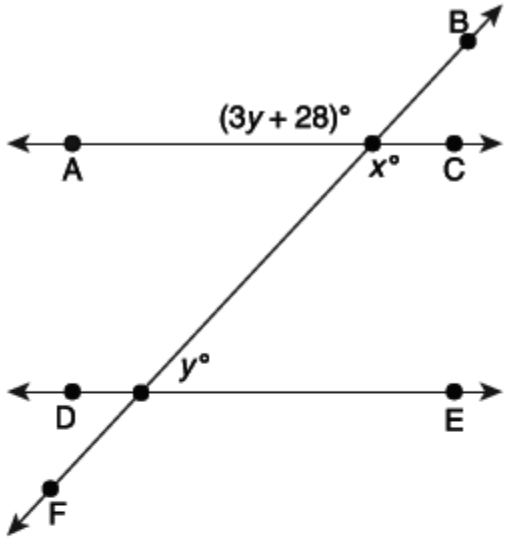
Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The value of y is correctly calculated using a sound procedure. A calculation error ($3 \times 38 \neq 76$) results in an incorrect value of x. This response correctly addresses only some elements of the task.

GUIDE PAPER 6

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.

3y+28+y=180
4y+28=180
-28 -28
4/4y=152/4
y=38

Answer $x =$

3y+28+x=180
3(38)+28+x=180
114+28+x=180
142+x=180
-142 -142

x=38

$y =$ y=38

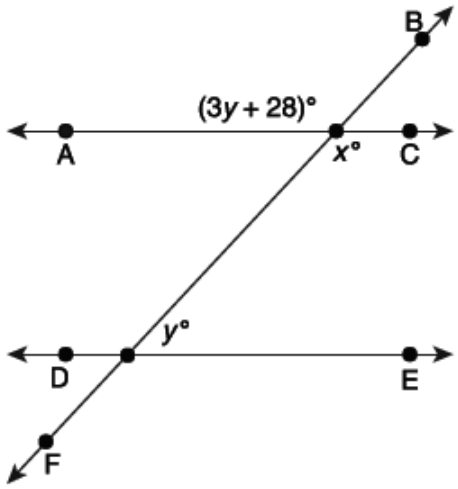
Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The value of y is correctly calculated using a sound procedure. The equation used to solve for x is incorrect. This response correctly addresses only some elements of the task.

GUIDE PAPER 7

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.

$(3y + 28$ degrees$)$
$y = 43$ degrees
$3(43$ degrees$) + 28$ degrees
$= 157$
$x = 136$

Answer $x =$ 43 degrees I found this by using the protractervthat was given at the beginining of the test.

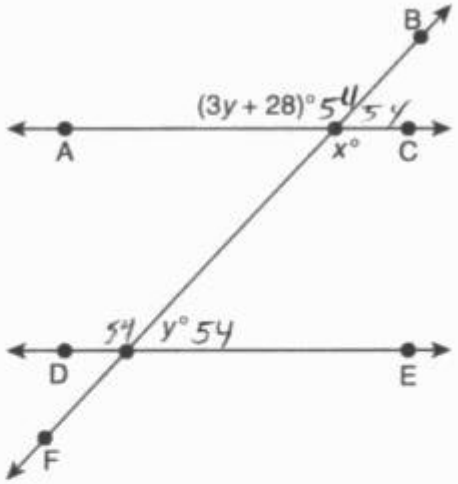
$y =$ 157 degrees I found this by using the protracter that was given atthe beginining of the test.

Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. An incorrect procedure is used to determine an incorrect solution.

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.

54
54
108

$34 + 28 = 180$
$-28 \quad -28$
162

$\frac{34}{3} = \frac{162}{3}$

180°
108
72
54

Answer $x =$ 72
$y =$ 54

Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. An incorrect equation is used to solve for the value of y. An error occurs when subtracting 28 ($180 - 28 \neq 162$). The calculated values of x and y do not sum to 180, which shows a lack of understanding of supplementary angles.

EXEMPLARY RESPONSE

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.

An error is made in Step 2 when $-6x$ is added to $8x$ to get $2x$, but $6x$ should be added to $8x$ get $14x$. The value of x is $-9/14$.

or other valid explanation

Answer $x =$ $-9/14$

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

$15 = 14x + 24$
$-24 \quad -24$
$-9 = 14x$
$\frac{-9}{14} = \frac{14x}{14}$ $x =$

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

Explain your answer.

The student subtracted 6x from 9x when they wers supposed to add 6x to 9x.

Answer $x = \frac{-9}{14}$

Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The error is correctly explained. The correct value of x is provided. This response is complete and correct.

GUIDE PAPER 2

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.

The student made an error in step 1-2. the student did 8x-6x instead of 8x+6x. They end up etting 2x which is wrong.

Answer $x =$ $\frac{-9}{14}$

Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The error is correctly explained. The correct value of x is provided. This response is complete and correct.

GUIDE PAPER 3

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.

Step 1 is correct but when he got to step 2 and substracted the 6x to 8x but you are supposed to add it because you have to change the symbol.

Answer $x =$

$-6x + 15 = 8x + 24$

$15 = 14x + 24$

$-9 = 14x$

$-\frac{9}{14}$

Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The error is correctly explained. The correct value of x is provided. This response is complete and correct.

GUIDE PAPER 4

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.

The student didn't do the opposite operation when adding. Instead of doing 6x+8x he didn't change change the negative sign, and he did -6x+8x.

$-6+(-8)$

$15 = 14x + 24$

$-14x = 9$

$-9 = 14x$

Answer $x =$ -0.64

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The error is correctly explained; however, the value of x is incorrect as it is rounded or truncated. This response correctly addresses only some elements of the task.

GUIDE PAPER 5

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.

they subtracted -6x instead of adding it to balance out the equation.

Answer $x =$ -9/14

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The value of x is correct. The explanation correctly identifies the location of the mistake; however, an incorrect sign is used: the error should be described as adding $-6x$, or subtracting $6x$. This response correctly addresses only some elements of the task.

GUIDE PAPER 6

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.

The student didn´t combined like terms correctly.

Answer $x =$ -9/14

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The value of x is correct. The explanation is incomplete: it is unclear which terms are being incorrectly combined. This response correctly addresses only some elements of the task.

GUIDE PAPER 7

44

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

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

Step 1: $-6x + 15 = 8x + 24$ → 39

Step 2: $15 = 2x + 24$

Step 3: $-9 = 2x$ $\frac{39}{2} = \frac{2x}{2}$

Step 4: $x = -\frac{9}{2}$ $x = 19.5$

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

Explain your answer.

The student subtracted 15 - 24 instead of adding it, which gave you 39 then you had to divide it by 2.

Answer $x =$ 19.5

Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. The error is incorrectly identified and explained. The value of x is incorrectly determined. Holistically, no understanding is shown.

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.

in step 3 the student didnt get rid of the coefficient

Answer $x =$ -4.5

Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. The explanation of the error is incorrect. A decimal equivalent of −⅘ is provided as the solution.

EXEMPLARY RESPONSE

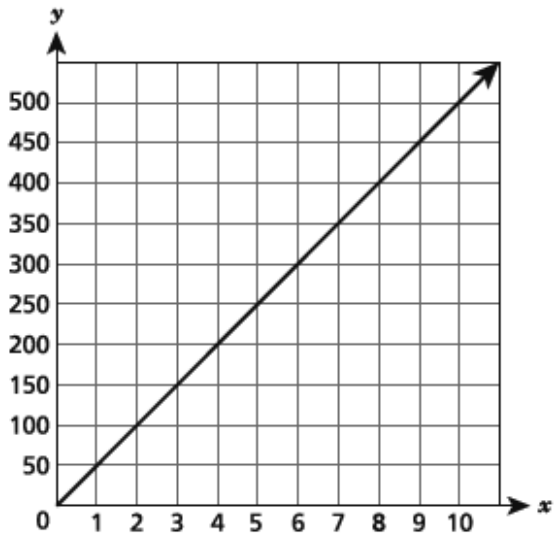
45

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.

Function A has a rate of change of 35, represented by the slope of the given equation.

The line for Function B passes through the points (1, 50), (2, 100), (3, 150), etc. So, the slope is 50 ÷ 1 or a rate of change of 50.

The difference in the rates of change between the two functions is:

50 − 35 = 15 *or* Function B has a rate of change that is 15 units greater than Function A

or

35 − 50 = −15 *or* Function A has a rate of change that is 15 units less than Function B

or other valid explanation

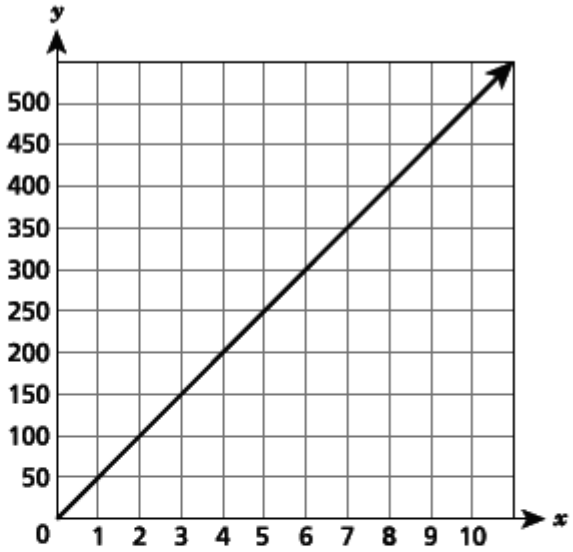
45

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.

function a

$y = 35x$

$m = 35$

function b

$m = \frac{rise}{run} = \frac{50}{1} = 50$

$m = 50$

$50 - 35 = 15$

The difference in rate of change is 15. The rate of change for function b is 50 and the rate of change for function a is 35, and when you subtract 35 from 50, you get a difference of 15.

Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The rates of change are correctly determined for both functions. The difference in the rates of change between the functions is correctly explained. This response is complete and correct.

GUIDE PAPER 2

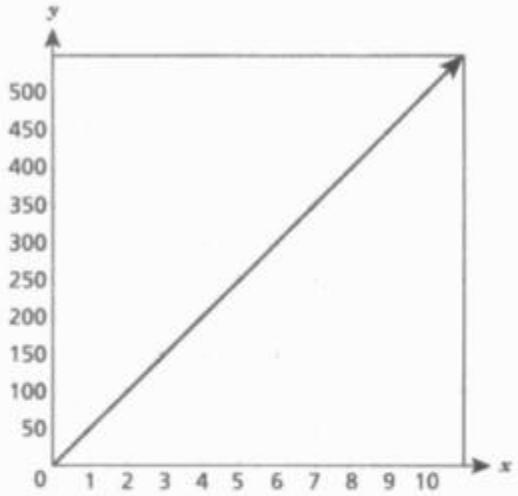
45

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.

The difference in the rate of change between Function A and Function B is -15. This is because the rate of change in Function A is 35 and the rate of change in Function B is 50. 35 - 50 = -15

Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The rates of change are correctly determined for both functions. The difference in the rates of change between the functions is correctly explained. This response is complete and correct.

GUIDE PAPER 3

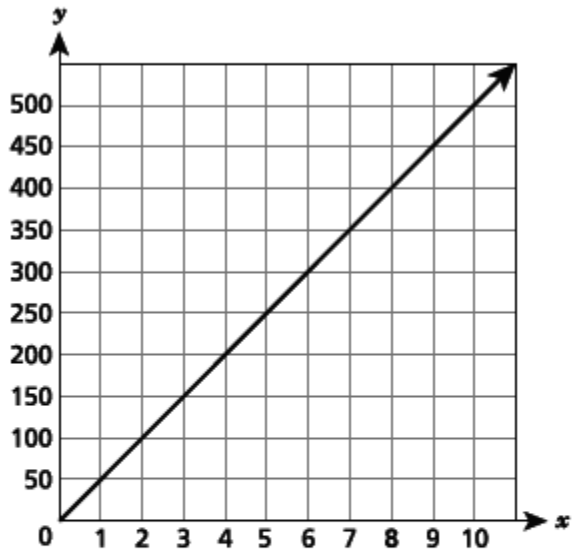
45

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.

The difference is 15 because the rate of change for funcion A is 35 and function B is 50, and 50-35=15.

Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The rates of change are correctly determined for both functions. The difference in the rates of change between the functions is correctly explained. This response is complete and correct.

GUIDE PAPER 4

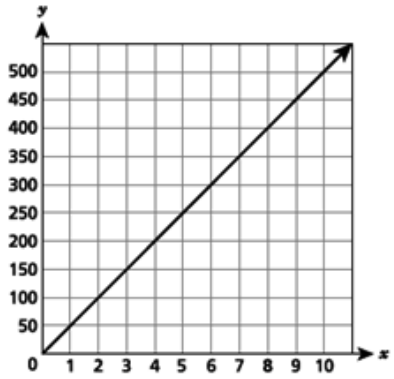
45

Two functions are represented below.

FUNCTION A

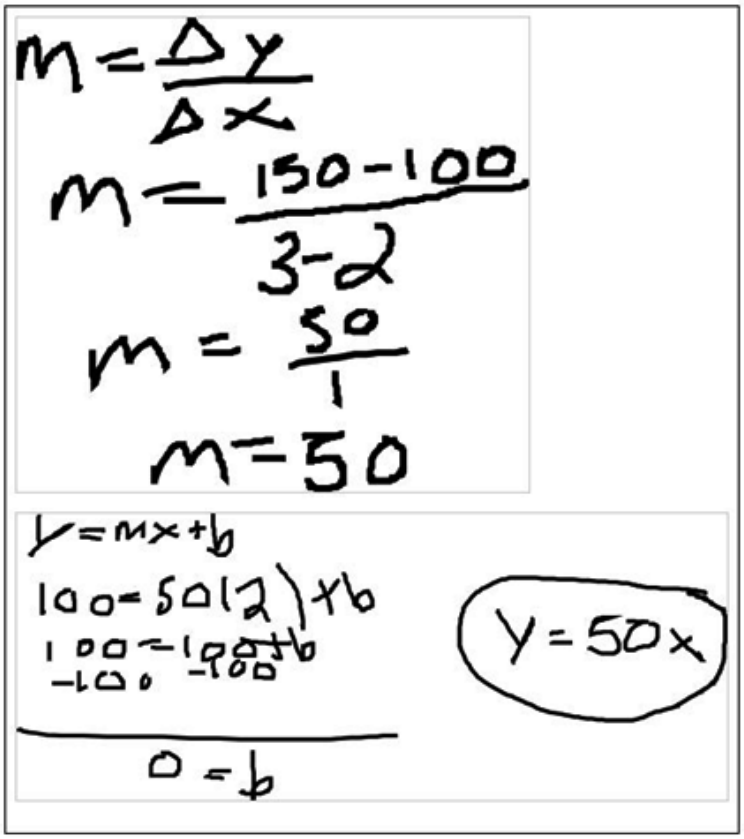
$y = 35x$

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.



Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. A correct equation is written for Function B, and the rate of change is correctly identified and defined for this function; however, the rate of change for Function A and the difference in the rates of change between the functions are not addressed. This response correctly addresses only some elements of the task.

GUIDE PAPER 5

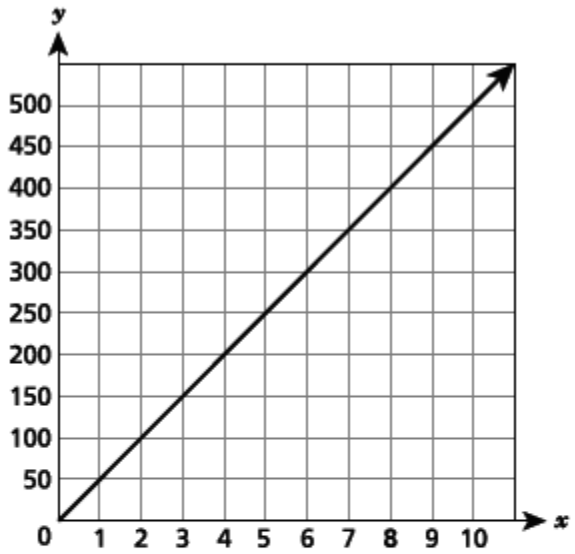
45

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.

function b goes $y = \frac{50}{1}\ x$

function a goes $y = \frac{35}{1}\ x$

meaning function B is a faster rate of change

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The rates of change of both functions are correctly identified, but the difference in the rates of change between the functions is not calculated. This response correctly identifies only some elements of the task.

GUIDE PAPER 6

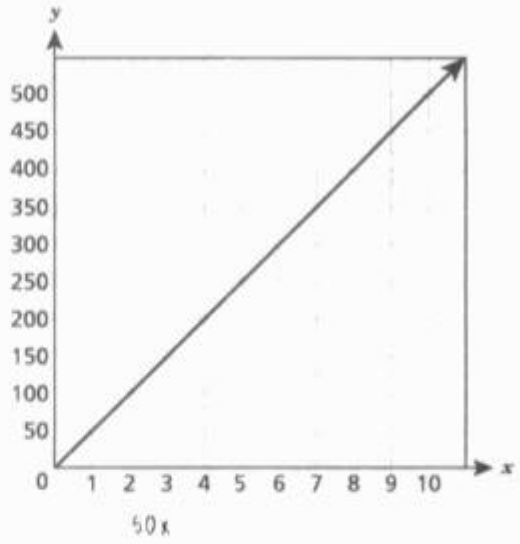
45

Two functions are represented below.

FUNCTION A

$y = 35x$

FUNCTION B



50x

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.

The difference in rates of change in function A and B is 15x. Since fuction A has a rate of change of 35x, and function B has a rate of change of 50x; subtracting the two constant rates gives a difference of 15x.

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The value of the coefficients represents correct rates of change; however, attaching the variable x is not correct. Again, the value of the coefficient represents the difference in the rates of change between the functions; however, attaching the variable x is not correct. This response correctly addresses only some elements of the task.

GUIDE PAPER 7

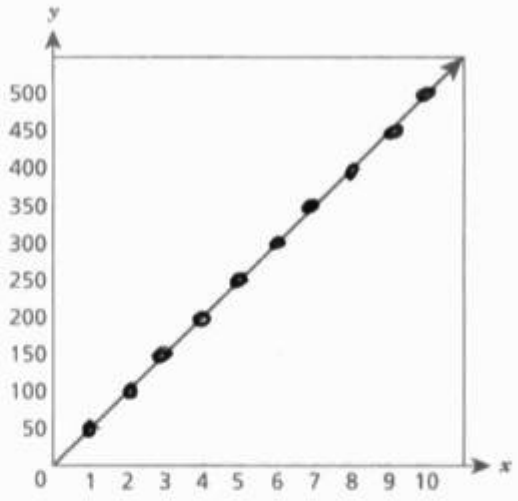
45

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.

Function b will stay constant because it keep increasing by 50. function A doesn't stay constant

Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. Although the response contains the correct rate of 50 for Function B, the explanation is contradictory. The difference in the rates of change between the functions is not calculated.

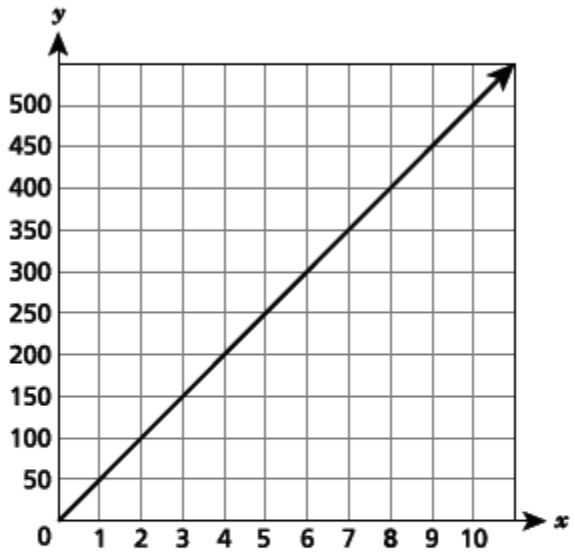
45

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.

the rate of change for a is 35 while b is 2 so the difference is 32.

Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. The rate of change for B is incorrect, and the difference between the provided rate of change of Function A and that of Function B is incorrectly calculated.

EXEMPLARY RESPONSE

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.

$V = \pi r^2 h$

$r = \frac{1}{2}d$, so $r = \frac{1}{2}(12) = 6$ inches

$V = \pi 6^2(10) = 360\pi$ cubic inches *or* 1131 cubic inches

(While using a value such as 1131 in place of 360π is the result of early rounding, in that the full value displayed on the calculator is very cumbersome and unwieldy, it is acceptable in this instance to use the rounded value because this does not detract from demonstrating a full understanding.)

To convert to gallons, divide by 231, so

$V = 360\pi \div 231 \approx 4.8959$ gallons

Then round to the nearest gallon, which is 5.

or other valid process

Answer 5 gallons

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.

$\frac{12}{2} = 6$

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

Show your work.

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

$\pi(6)^2 \cdot 10$

$\pi 36 \cdot 10$

360π

1130.97

231 | 1130.97 (4.89597)

924

206.97

Answer about 5 gallons

Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The volume of the sand is correctly calculated and rounded to the nearest gallon to determine the correct solution. This response is complete and correct.

GUIDE PAPER 2

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.

$V = \pi r^2 h$

$V = \pi \cdot 6^2 \cdot 10$

$V = 1130.97$

$$231 \overline{)1130.97} \quad 4.89$$

Answer 5 gallons

Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The volume of the sand is correctly calculated and rounded to the nearest gallon to determine the correct solution. This response is complete and correct.

GUIDE PAPER 3

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.

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

$V = \pi \times 6^2 \times 10$

$V = 360\pi \text{ inches}^3$

$360\pi \text{inches}^3 \div 231 \text{inches}^3 \text{ /gallon}$

=_approximately_5_gallons

Answer 5 gallons

Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The volume of the sand is correctly calculated and rounded to the nearest gallon to determine the correct solution. This response is complete and correct.

GUIDE PAPER 4

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.

$V = \pi r^2 h$
$V = \pi 6^2 10$
$\pi 36 \cdot 10$
$\pi \cdot 360$
1130.97
$1130.97 \div 231 = 4.89$

Answer 4 gallons

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The volume of the sand is correctly calculated. The conversion to gallons uses the correct process, but the solution is not rounded to the nearest gallon. This response correctly addresses only some elements of the task.

GUIDE PAPER 5

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.

12/2=6^2=36*10=360/231 1.558... about 2

Answer About 2 gallons

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The value of π is omitted while computing the volume of the sand. A correct process is used to convert to gallons, and the provided solution is rounded to the nearest gallon. This response correctly addresses only some elements of the task.

GUIDE PAPER 6

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.

$v = \pi r \times r \times h$
$v = \pi \times 6 \times 6 \times 10$
$v = \pi \times 360$
$v = 1131$

Answer v=1131 gallons

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The volume of the sand is correctly calculated, but the conversion to gallons is not addressed. This response correctly addresses only some elements of the task.

GUIDE PAPER 7

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.

$V = \pi r^2 h$

$V = \pi 12^2 10 = 1440$

$1440 \div 231 = 6.23 =$

6

Answer 6 gallons

Score Point 0 (out of 2 points)

Although the provided solution is correctly converted to the nearest gallon, holistically, this response is not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task. The diameter is used for the radius in the equation. While calculating the volume, π is written in the equation, but ignored in the work.

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.

$V = \pi r^2 h$
$V = \pi\ 24^2\ 10$
$V = 5760\pi$

Answer $V = 5760\pi$ gallons

Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. Double the value of the diameter is used for the radius in the volume equation, which is a conceptual error. The volume of the sand is not converted to gallons.

EXEMPLARY RESPONSE

47

Determine the solution to the equation shown below.

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

Show your work.

$3.2 - ½ (x + 4) = 4.8x + 2 - 5.2x$

$3.2 - ½ x - 2 = 4.8x + 2 - 5.2x$

$1.2 - ½ x = 2 - 0.4x$

$-0.8 - ½ x = -0.4x$

$-0.8 = 0.1x$

$x = -8$

or other valid process

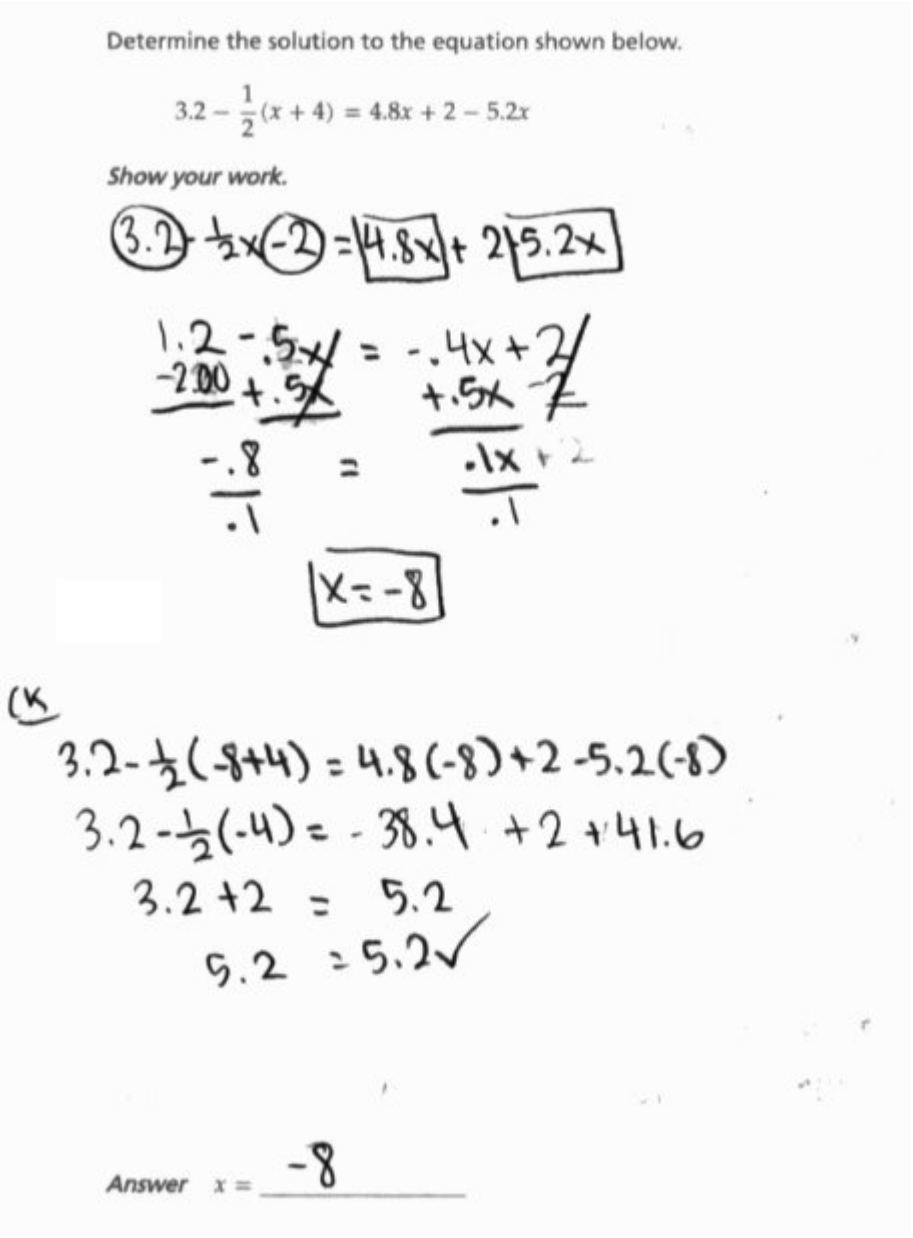
Answer $x =$ -8

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 $x =$ -8

Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The equation is solved correctly using mathematically sound procedures. Although not required, the solution is checked. This response is complete and correct.

GUIDE PAPER 2

47

Determine the solution to the equation shown below.

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

Show your work.

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

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

$3.2-2=5.3x+2-5.2x$

$1.2=0.1x+2$

$-0.8=0.1x$

$x=-8$

Answer $x =$ x=-8

Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The equation is solved correctly using mathematically sound procedures. This response is complete and correct.

GUIDE PAPER 3

47

Determine the solution to the equation shown below.

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

Show your work.

3.2 - 1/2x -2 - 2 = -0.4x
-0.8=0.1x
.1x=-0.8
x = -8

Answer $x =$ -8

Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. The equation is solved correctly using mathematically sound procedures. The amount of work shown is sufficient for full credit. This response is complete and correct.

GUIDE PAPER 4

47

Determine the solution to the equation shown below.

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

Show your work.

1.2 - 1/2 x = -0.4 x +2

-8

Answer $x =$ -8

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. Although the equation is solved correctly, the work to show how the solution is obtained is limited.

GUIDE PAPER 5

47

Determine the solution to the equation shown below.

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

Show your work.

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

$3.2 - 0.5x - 2 = -0.4x + 2$

$1.2 - 0.5x = -0.4x + 2$

$+0.4x \quad +0.4x$

$1.2 - 0.1x = 2$

$-1.2 \quad -1.2$

$\frac{-0.1x}{-1} = \frac{0.8}{-0.1}$

$x = 8$

Answer $x =$ 8

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. The distribution property is used correctly, and the like terms are combined correctly, but a sign error occurs in the final step. This response contains an incorrect solution but applies a mathematically appropriate process.

GUIDE PAPER 6

47

Determine the solution to the equation shown below.

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

Show your work.

$3.2-\frac{1}{2}x+2=-0.4x+2$

$5.2-\frac{1}{2}x=-0.4x+2$

$5.2=0.1x+2$

$3.2=0.1x$

$x=32$

Answer $x =$ x=32

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts and procedures in the task. An error is made when distributing ($-\frac{1}{2} \times 4 \neq 2$). The rest of the work is correct. This response correctly addresses only some elements of the task.

GUIDE PAPER 7

47

Determine the solution to the equation shown below.

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

Show your work.

3.2-1/2(x+4)=4.8x+2-5.2x
3.2-1/2+4x= 4.8x+2-5.2x
3.2-1/2+4x= -0.4x+2
3.2-1/2= -4.4x+2
1.2-1/2=-4.4x
0.7=-4.4x
x=-6.285714286...

Answer $x =$ -6.285714286...

Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. A distribution error occurs ($-\frac{1}{2}(x + 4) \neq -\frac{1}{2} + 4x$). The final solution is incorrectly obtained with an inverted division ($x = -0.7/4.4$, not $x = -4.4/0.7$). Holistically, this response shows no overall understanding of how to solve this equation.

47

Determine the solution to the equation shown below.

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

Show your work.

$3.2-0.5(x+4)=4.8x+2-5.2x$

$3.2-0.5x-2x=4.8x+2-5.2x$

$3.2-2.5x=-0.4x+2$

$-3.2+0.4x \quad +0.4x-3.2$

$\frac{-2.1x}{2.1} = \frac{-1.2}{2.1}$

$x = -0.57$

Answer $x =$ -0.57

Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. An error is made when distributing ($-0.5(x + 4) \neq -0.5x - 2x$). The final division should be a division by -2.1 on both sides, which would make the solution positive. The solution is inappropriately rounded.

EXEMPLARY RESPONSE

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 $y = x/3 + 2$ *or* $y = 2 - 3x$

State your reason.

The equation is linear if x has an exponent of 0 or 1. In either equation x has an exponent of 1.

or

The equation is in the $y = mx + b$ format, which is a standard linear form.

or

When graphed, a straight line is drawn.

or other valid reason

Nonlinear equation $y = x\,(3x + 2)$

State your reason.

The equation $y = x\,(3x + 2)$ is a quadratic equation, which is nonlinear, and its graph is a parabola (curve). When substituting values into this equation for x, the function does not increase at a constant rate.

x	y
0	0
1	5
2	16

or other valid reason

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

State your reason.

x is to the first power, if it is to the first power it is a linear equation, the highest degree of x is 1

Nonlinear equation $y = x(3x+2)$

State your reason.

$y = x(3x+2) = y = 3x^2 + 2x$, this is a nonlinear equation because x is to the second power (the highest degree of

Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. A correct linear equation is chosen, and a correct explanation is provided. A correct nonlinear equation is chosen, and a correct explanation is provided. This response is complete and correct.

GUIDE PAPER 2

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

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

State your reason.

The x's power goes to 1 which makes it linear.

Nonlinear equation

y=x(3x+2)

State your reason.

When you distribute the x it will be x^2 and for the equation to be linear the x has to be to the power of 0 or 1.

Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. A correct linear equation is chosen, and a correct explanation is provided. A correct nonlinear equation is chosen, and a correct explanation is provided. This response is complete and correct.

GUIDE PAPER 3

48

Three equations are listed below.

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

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 2-3x

State your reason.

The equation fits into y=mx+b format, and has a negative line/slope

Nonlinear equation x(3x+2)

State your reason.

It's a quadratic equation, due to the x being squared; the equation doesn't have a straight line.

Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts and procedures in the task. Correct equations are identified as linear and nonlinear, and the explanations are sufficient to show a thorough understanding. Writing expressions instead of equations is considered inconsequential.

GUIDE PAPER 4

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 $y=2-3x$

State your reason.

It is in $y=mx+b$ form, so it is linear.

Nonlinear equation $y=x(3x+2)$

State your reason.

The x will not be to the first power because $1x+3x=3x^2$, so it is not linear

Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts and procedures in the task. Correct linear and nonlinear equations are identified. The explanation of the linear equation is correct, but the explanation of the nonlinear equation contains an incorrect statement. The variable x to the power of 0 is not addressed and will make an equation linear. This response appropriately addresses most but not all aspects of the task.

GUIDE PAPER 5

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 y = 2 − 3x

State your reason.

The exponent on the x isn't a number other than 1 or 0.

Nonlinear equation y = x(3x+2)

State your reason.

The x is being distributed.

Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts and procedures in the task. Correct linear and nonlinear equations are chosen. The explanation of the linear equation is correct and is understood to mean that the exponent on the x must be 1 or 0. The nonlinear equation is insufficiently explained. This response appropriately addresses most but not all aspects of the task.

GUIDE PAPER 6

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 $\frac{x}{3} + 2$

State your reason.

This equation has a constant rate of change.

Nonlinear equation $x(3x+2)$

State your reason.

This equation does not have a constant rate of change.

Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts and procedures in the task. Correct linear and nonlinear equations are chosen. The explanations are not specific enough as they do not show how the rates of change are related to the algebraic forms of the equations. This response appropriately addresses most but not all aspects of the task.

GUIDE PAPER 7

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

State your reason.

Because it's written like a linear equation is written ($y = mx + b$)

Nonlinear equation $y = 2 - 3x$

State your reason.

the x is on the end and it shouldn't be.

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts and procedures in the task. A correct linear equation is chosen with a valid explanation. An incorrect nonlinear equation is chosen, and an incorrect explanation is provided. This response reflects a lack of essential understanding.

48

Three equations are listed below.

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

$y = 3x^2 + 7$

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 $y = 2 - 3x$

State your reason.

The equation is linear because it is not exponential

Nonlinear equation $y = x(3x + 2)$

State your reason.

The equation is exponential

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts and procedures in the task. Correct linear and nonlinear equations are chosen. The explanations are not completely accurate, but holistically, there is some understanding that an exponential equation is nonlinear. This response reflects a lack of essential understanding.

GUIDE PAPER 9

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 y= 2-3x is linear.

State your reason.

because it has an exponent of 1 or zero.

Nonlinear equation y=x/3+2

State your reason.

because the x is a fraction.

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts and procedures in the task. A correct linear equation is chosen. The explanation of the linear equation does not make it clear that the exponent is attached to a variable, but correctly identifies the exponent as being only 1 or 0. An incorrect nonlinear equation is chosen, and an incorrect explanation is provided. This response reflects a lack of essential understanding.

GUIDE PAPER 10

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 y=2-3x

State your reason.

because it fits in to the equation format, y=mx+b
y=2-3x and there is a soloution

Nonlinear equation y=x/3+2

State your reason.

it has a fraction and has to be divided and cannot be pluged in to fit a graph.

Score Point 0 (out of 3 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. Although a correct linear equation is chosen, the explanation does not clearly identify $y = mx + b$ as linear, and inappropriately suggests that having a solution is important for determining linearity. An incorrect nonlinear equation is chosen, and an incorrect explanation is provided.

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 $y=x(3x+2)$

State your reason.

Because it goes in a stright line I think.

Nonlinear equation $y=\frac{x}{3}+2$

State your reason.

Because it it does not go stright.

Score Point 0 (out of 3 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. Incorrect linear and nonlinear equations are chosen, so even though the reasons convey the concept of linearity, holistically, this response shows no overall understanding.