



# ***New York State Testing Program***

**2016 Common Core  
Mathematics Test**

**Grade 8**

**Scoring Leader Materials**

**Training Set**

munotes

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

## 2-Point Holistic Rubric

<b>2 Point</b>	<p>A two-point response includes the correct solution to the question and demonstrates a thorough understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"><li>• indicates that the student has completed the task correctly, using mathematically sound procedures</li><li>• contains sufficient work to demonstrate a thorough understanding of the mathematical concepts and/or procedures</li><li>• may contain inconsequential errors that do not detract from the correct solution and the demonstration of a thorough understanding</li></ul>
<b>1 Point</b>	<p>A one-point response demonstrates only a partial understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"><li>• correctly addresses only some elements of the task</li><li>• may contain an incorrect solution but applies a mathematically appropriate process</li><li>• may contain the correct solution but required work is incomplete</li></ul>
<b>0 Point*</b>	<p>A zero-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.</p>

\*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

Score Points:

<b>3 Point</b>	<p>A three-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.</p> <p>This response</p> <ul style="list-style-type: none"> <li>• indicates that the student has completed the task correctly, using mathematically sound procedures</li> <li>• contains sufficient work to demonstrate a thorough understanding of the mathematical concepts and/or procedures</li> <li>• may contain inconsequential errors that do not detract from the correct solution(s) and the demonstration of a thorough understanding</li> </ul>
<b>2 Point</b>	<p>A two-point response demonstrates a partial understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"> <li>• appropriately addresses most, but not all aspects of the task using mathematically sound procedures</li> <li>• may contain an incorrect solution but provides sound procedures, reasoning, and/or explanations</li> <li>• may reflect some minor misunderstanding of the underlying mathematical concepts and/or procedures</li> </ul>
<b>1 Point</b>	<p>A one-point response demonstrates only a limited understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"> <li>• may address some elements of the task correctly but reaches an inadequate solution and/or provides reasoning that is faulty or incomplete</li> <li>• exhibits multiple flaws related to misunderstanding of important aspects of the task, misuse of mathematical procedures, or faulty mathematical reasoning</li> <li>• reflects a lack of essential understanding of the underlying mathematical concepts</li> <li>• may contain the correct solution(s) but required work is limited</li> </ul>
<b>0 Point*</b>	<p>A zero-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.</p>

\*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).

## 2016 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 does the work in other than a designated "Show your work" area, that work should still be scored. (Additional paper is an allowable accommodation for a student with disabilities if indicated on the student's Individual Education Program or Section 504 Accommodation Plan.)
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 blank, the student should still receive full credit.
3. In questions that provide ruled lines for students to write an explanation of their work, mathematical work shown elsewhere on the page should be considered and scored.
4. If the student provides one legible response (and one response only), teachers should score the response, even if it has been crossed out.
5. If the student has written more than one response but has crossed some out, teachers should score only the response that has **not** been crossed out.
6. Trial-and-error responses are **not** subject to Scoring Policy #5 above, since crossing out is part of the trial-and-error process.
7. If a response shows repeated occurrences of the same conceptual error within a question, the student should **not** be penalized more than once.
8. In questions that require students to provide bar graphs,
  - in Grades 3 and 4 only, touching bars are acceptable
  - in Grades 3 and 4 only, space between bars does **not** need to be uniform
  - in all grades, widths of the bars must be consistent
  - in all grades, bars must be aligned with their labels
  - in all grades, scales must begin at 0, but the 0 does **not** need to be written
9. In questions requiring number sentences, the number sentences must be written horizontally.
10. In pictographs, the student is permitted to use a symbol other than the one in the key, provided that the symbol is used consistently in the pictograph; the student does not need to change the symbol in the key. The student may **not**, however, use multiple symbols within the chart, nor may the student change the value of the symbol in the key.
11. 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.
12. 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.

Jude incorrectly simplified the expression  $\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$ , as shown below.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 = \left(\frac{1}{8}\right)^6 = \frac{1}{262,144}$$

Describe the mistake that Jude made.

**Answer**

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Correctly simplify the expression.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$$

**Answer** \_\_\_\_\_

## EXEMPLARY RESPONSE

52

Jude incorrectly simplified the expression  $\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$ , as shown below.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 = \left(\frac{1}{8}\right)^6 = \frac{1}{262,144}$$

Describe the mistake that Jude made.

**Answer**

Jude multiplied the fractions, irrespective of the exponents, and then added and applied the exponents. He should have applied the law of exponents without changing the fractions.

Correctly simplify the expression.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$$

$$\left(\frac{1}{2}\right)^6 = \frac{1}{64}$$

OR other equivalent solution

**Answer**  $\frac{1}{64}$



Jude incorrectly simplified the expression  $\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$ , as shown below.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 = \left(\frac{1}{8}\right)^6 = \frac{1}{262,144}$$

Describe the mistake that Jude made.

**Answer**

She multiplied the exponents together and the denominator. ~~She multiplied the whole thing by 6 to get the 6th power, she only raised the denominator~~  
 she should have squared  $\frac{1}{2}$  then multiplied it by  $\frac{1}{2}$  then cube  $\frac{1}{2}$  and multiply it by the product.  
 Correctly simplify the expression.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$$

$$\frac{1}{4} \times \frac{1}{2} \times \frac{1}{8} = \frac{1}{64}$$

**Answer**

$$\frac{1}{64}$$

### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly identifies Jude's mistake and follows a correct procedure to simplify the expression.

## GUIDE PAPER 2

52

Jude incorrectly simplified the expression  $\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$ , as shown below.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 = \left(\frac{1}{8}\right)^6 = \frac{1}{262,144}$$

Describe the mistake that Jude made.

**Answer**

He multiplied all the fractions together then did the exponents.

Correctly simplify the expression.

$$\begin{aligned} &\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 \\ &\frac{1}{4} \times \frac{1}{2} \times \frac{1}{8} \\ &\frac{1}{8} \times \frac{1}{8} \\ &\frac{1}{64} \end{aligned}$$

**Answer**

$\frac{1}{64}$

### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly identifies Jude's mistake and follows a correct procedure to simplify the expression.

## GUIDE PAPER 3

52

Jude incorrectly simplified the expression  $\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$ , as shown below.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 = \left(\frac{1}{8}\right)^6 = \frac{1}{262,144}$$

Describe the mistake that Jude made.

**Answer**

he multiplied the denominators

Correctly simplify the expression.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 = \frac{1}{2}^6 = 0.015625$$

**Answer** 0.015625

### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly identifies Jude's mistake and follows a correct procedure to simplify the expression.

## GUIDE PAPER 4

52

Jude incorrectly simplified the expression  $\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$ , as shown below.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 = \left(\frac{1}{8}\right)^6 = \frac{1}{262,144}$$

Describe the mistake that Jude made.

**Answer**

The fraction  $\left(\frac{1}{2}\right)^2$  and  $\left(\frac{1}{2}\right)^3$  were added incorrectly. Instead of  $\left(\frac{1}{2}\right)^5$ , Jude had  $\left(\frac{1}{2}\right)^6$ .

Correctly simplify the expression.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 = \left(\frac{1}{2}\right)^5 = \frac{1}{64}$$

**Answer**  $\frac{1}{64}$

### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The expression is simplified correctly; however, the explanation of Jude's mistake is incorrect. The response addresses some elements of the task correctly.

## GUIDE PAPER 5

52

Jude incorrectly simplified the expression  $\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$ , as shown below.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 = \left(\frac{1}{8}\right)^6 = \frac{1}{262,144}$$

Describe the mistake that Jude made.

**Answer**

Jude multiplied the denominator when they should have ~~found~~ the answer to each one then multiplied them.

Correctly simplify the expression.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$$

$$\frac{1}{4} \times \frac{1}{2} \times \frac{1}{8} = \frac{1}{256}$$

**Answer**  $\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 = \frac{1}{256}$

### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response correctly identifies Jude's mistake; however, a calculation error is made when simplifying the expression, resulting in an incorrect solution.

## GUIDE PAPER 6

52

Jude incorrectly simplified the expression  $\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$ , as shown below.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 = \left(\frac{1}{8}\right)^6 = \frac{1}{262,144}$$

Describe the mistake that Jude made.

**Answer**

The answer is correctly  $1/64$   
which equals  $1/8^2$  not  $1/8^6$  she  
added the exponents 2, 1, 3 and got  
6.

Correctly simplify the expression.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 = \frac{1}{64} = 1/8^2$$

**Answer** \_\_\_\_\_

### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response does not explain the mistake correctly; however, the expression is simplified correctly.

## GUIDE PAPER 7

52

Jude incorrectly simplified the expression  $\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$ , as shown below.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 = \left(\frac{1}{8}\right)^6 = \frac{1}{262,144}$$

Describe the mistake that Jude made.

**Answer**

Jude did not multiply correctly for for better find the answer it should be  $\frac{1}{64}$  and the multiplication for the answer is wrong.

Correctly simplify the expression.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$$

$$\begin{array}{r} 3 \\ + 3 \\ \hline 6 \end{array}$$

**Answer**  $\frac{1}{8}^6 = \frac{1}{64}^6$

### Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in task. The response does not adequately explain Jude's mistake. Two different answers are given [ $\frac{1}{64}$  and  $(\frac{1}{64})^6$ ]; in addition,  $(\frac{1}{64})^6$  is not equal to  $(\frac{1}{8})^6$ .

52

Jude incorrectly simplified the expression  $\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$ , as shown below.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 = \left(\frac{1}{8}\right)^6 = \frac{1}{262,144}$$

Describe the mistake that Jude made.

**Answer**

The mistake Jude made was she multiplied the exponents 2 and 6 instead of adding them.

Correctly simplify the expression.

$$\begin{array}{c} \left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 \\ \text{add} \\ \left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 \\ \text{multiply} \\ \left(\frac{1}{8}\right)^5 \end{array}$$

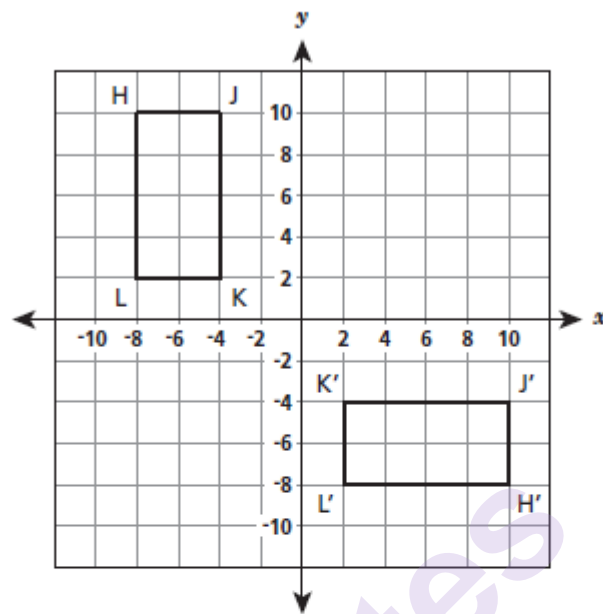
**Answer**  $\frac{1}{8^5}$

### Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in task. The response does not explain the mistake correctly and the solution is incorrect.



Congruent rectangles  $HJKL$  and  $H'J'K'L'$  are shown on the coordinate grid below.



Describe a sequence of transformations on rectangle  $HJKL$  that would result in rectangle  $H'J'K'L'$ .

**Answer**

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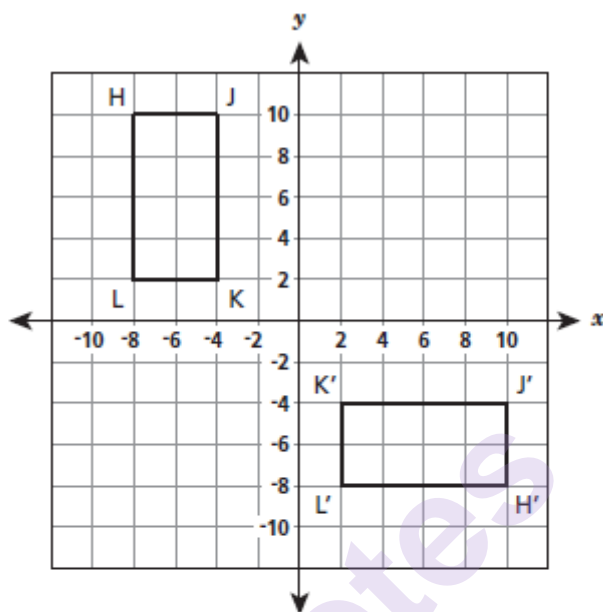
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## EXEMPLARY RESPONSE

53

Congruent rectangles HJKL and H'J'K'L' are shown on the coordinate grid below.



Describe a sequence of transformations on rectangle HJKL that would result in rectangle H'J'K'L'.

**Answer**

Rotate  $90^\circ$  clockwise about the origin, then reflect over the  $x$ -axis ( $y = 0$ ) OR

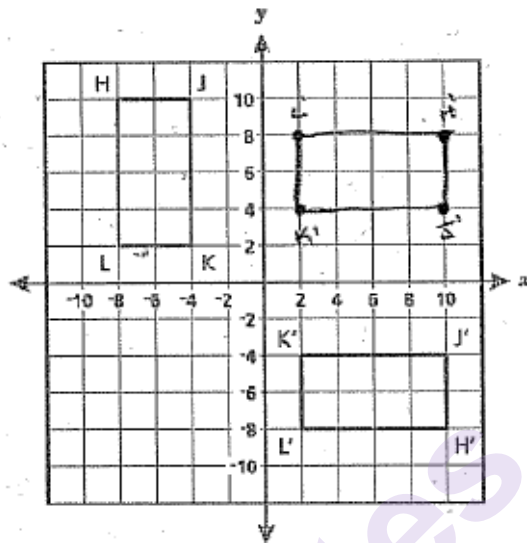
Reflect over the  $x$ -axis, then rotate  $90^\circ$  counterclockwise about the origin OR

Rotate  $90^\circ$  counterclockwise about the origin, then reflect over the  $y$ -axis ( $x = 0$ ) OR

Reflect over the  $y$ -axis, then rotate  $90^\circ$  clockwise about the origin.

OR other valid response

Congruent rectangles HJKL and H'J'K'L' are shown on the coordinate grid below.



Describe a sequence of transformations on rectangle HJKL that would result in rectangle H'J'K'L'.

**Answer**

In order for triangle HJKL to lie  
as triangle H'J'K'L', you need to make  
a rotation of  $90^\circ$  clockwise and a  
reflection over the x-axis.

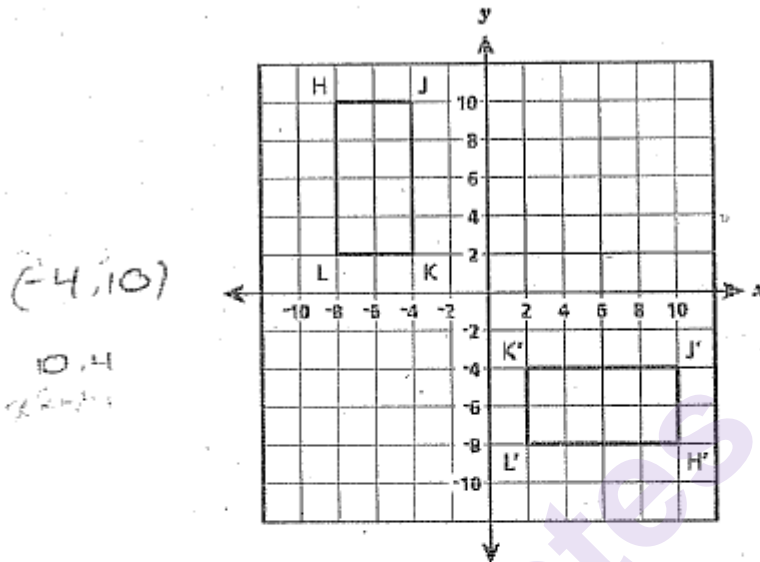
### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. A correct sequence of transformations is provided. Although the response does not indicate the center of rotation, it is implied that the rotation is done about the origin. Referring to rectangles HJKL and H'J'K'L' as triangles is considered an inconsequential that does not detract from the correct solution.

## GUIDE PAPER 2

53

Congruent rectangles HJKL and H'J'K'L' are shown on the coordinate grid below.



Describe a sequence of transformations on rectangle HJKL that would result in rectangle H'J'K'L'.

**Answer**

Rotate  $90^\circ$  counter-clockwise  
about the origin, then reflect  
across the y-axis.

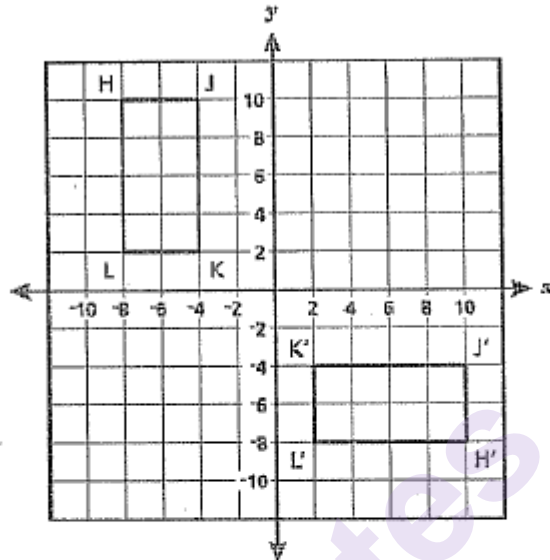
### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly describes the sequence of transformations.

## GUIDE PAPER 3

53

Congruent rectangles HJKL and H'J'K'L' are shown on the coordinate grid below.



Describe a sequence of transformations on rectangle HJKL that would result in rectangle H'J'K'L'.

**Answer**

Rotate  $90^\circ$  clockwise, Reflect  
over the x-axis

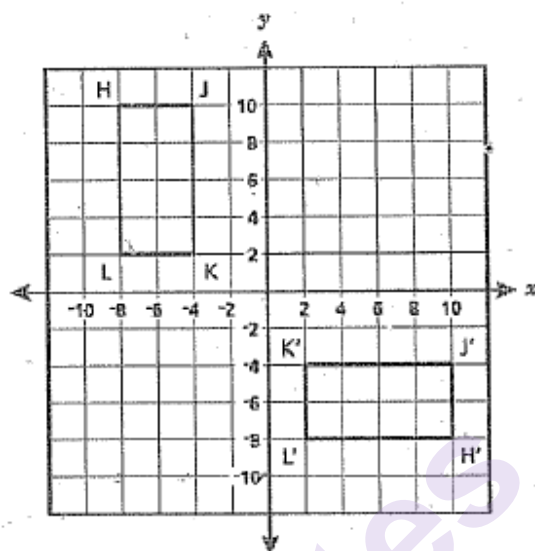
### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. A correct sequence of transformations is provided. The center of rotation about the origin is implied; its omission is an inconsequential error that does not detract from the correct solution.

## GUIDE PAPER 4

53

Congruent rectangles HJKL and H'J'K'L' are shown on the coordinate grid below.



Describe a sequence of transformations on rectangle HJKL that would result in rectangle H'J'K'L'.

**Answer**

Reflect the rectangle about the  $x$ -axis, then rotate the image about point L counterclockwise  $90^\circ$ . After that, translate the image 2 units down, and 10 units to the right.

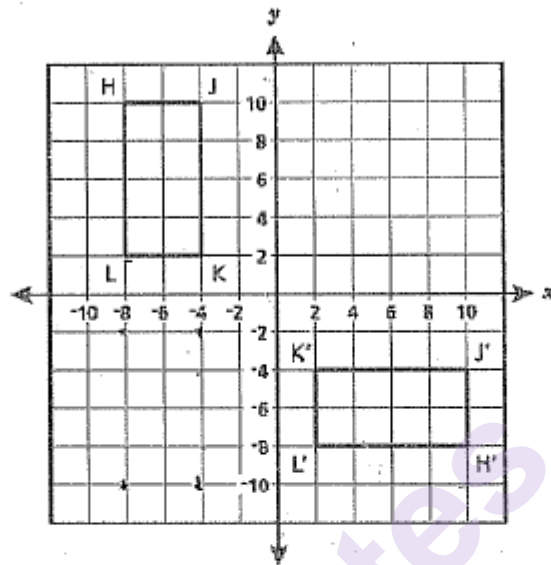
### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response correctly describes reflection over the  $x$ -axis. However, while it is possible to obtain rectangle H'J'K'L' via rotation about point L and then translating, the magnitude of the  $y$ -component of the translation is incorrect: the translation required would be 6 units down.

## GUIDE PAPER 5

53

Congruent rectangles HJKL and H'J'K'L' are shown on the coordinate grid below.



Describe a sequence of transformations on rectangle HJKL that would result in rectangle H'J'K'L'.

**Answer**

The rectangle HJKL was reflected  
across the x-axis then rotated  
90° clockwise around the origin

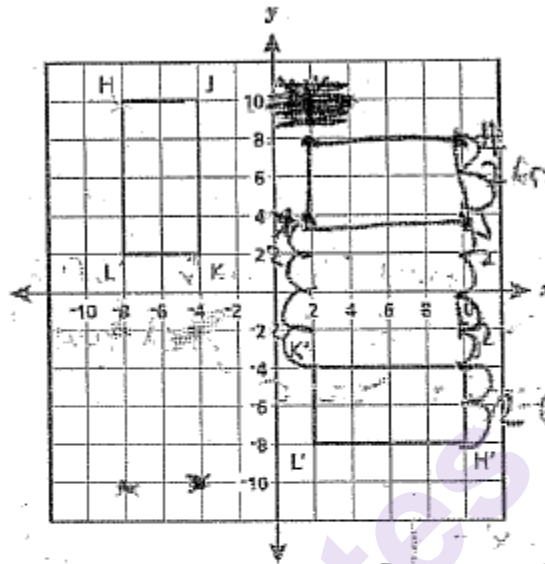
### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response correctly describes reflection over the  $x$ -axis; however, a 90° clockwise rotation is incorrect: it should have been counterclockwise about the origin.

## GUIDE PAPER 6

53

Congruent rectangles HJKL and H'J'K'L' are shown on the coordinate grid below.



Describe a sequence of transformations on rectangle HJKL that would result in rectangle H'J'K'L'.

**Answer**

First rotate the angle then  
do a reflection from the  
x axis

### Score Point 1 (out of 2 points)

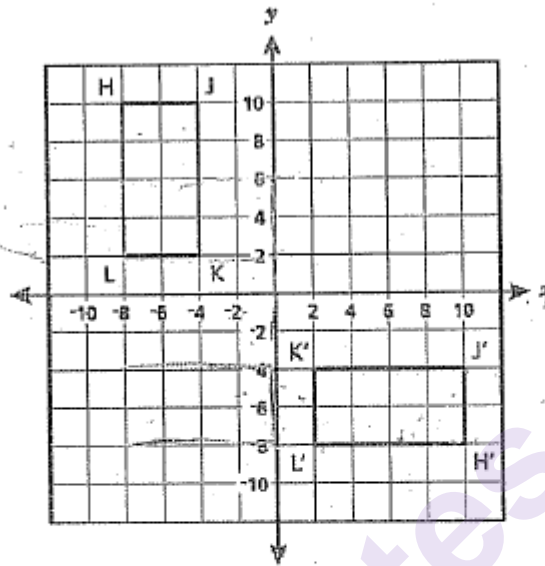
This response demonstrates a partial understanding of the mathematical concepts in the task. The statement “reflection from the x-axis” correctly refers to reflection over the x-axis; however, the description of the rotation is not specific enough to earn full credit.



## GUIDE PAPER 7

53

Congruent rectangles HJKL and H'J'K'L' are shown on the coordinate grid below.



Describe a sequence of transformations on rectangle HJKL that would result in rectangle H'J'K'L'.

**Answer**

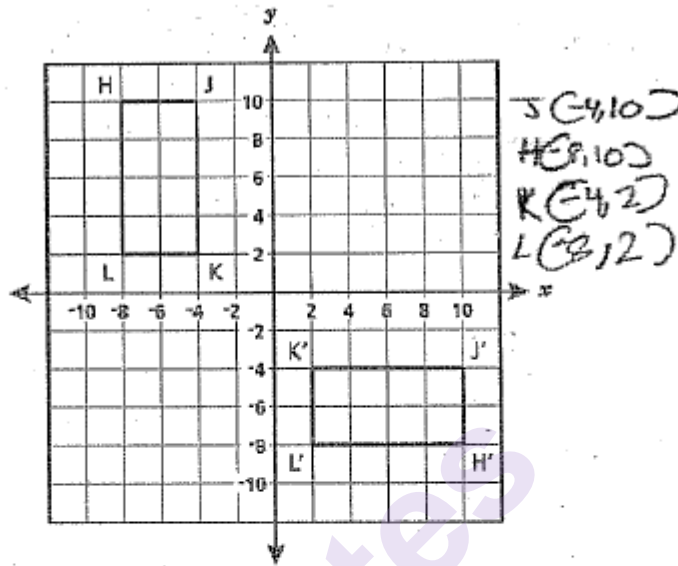
A rotation  $90^\circ$ , and a translation  
5 units down and 5 units to  
the right.

### Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in task. No direction of rotation is provided and the statement about translation is incorrect.

53

Congruent rectangles HJKL and H'J'K'L' are shown on the coordinate grid below.



Describe a sequence of transformations on rectangle HJKL that would result in rectangle H'J'K'L'.

**Answer**

$J(-4, 10)$   $H(-8, 10)$   $K(-4, 2)$   $L(-8, 2)$

### Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in task. The response provides correct coordinates of rectangle HJKL; however, this does not address the task.

54

Write an equation of a function that is not linear.

**Answer** \_\_\_\_\_

Use your equation to explain why your function is not linear.

**Answer**

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## EXEMPLARY RESPONSE

54

Write an equation of a function that is not linear.

**Answer**  $y = x^2$  OR  $f(x) = x^3$  OR other non-linear function

Use your equation to explain why your function is not linear.

**Answer**

$y = x^2$  is not a linear function because it is a parabola instead of a straight line. The

points (0, 0), (2, 4), and (-2, 4) are part of the  $y = x^2$  graph and do not form a

straight line.

OR other valid explanation

54

Write an equation of a function that is not linear.

**Answer**  $y = x^2 - 10x + 12$

Use your equation to explain why your function is not linear.

**Answer**

It is a quadratic, therefore not being a straight line, but a curved line (like a  $\cup$ ).

**Score Point 2 (out of 2 points)**

This response demonstrates a thorough understanding of the mathematical concepts in the task. A correct example of a non-linear function is given and the explanation correctly identifies why the function is not linear.

## GUIDE PAPER 2

54

Write an equation of a function that is not linear.

Answer ~~11/2~~  $y = x^2 + 3x + 2$

Use your equation to explain why your function is not linear.

Answer

It would be a parabola.

### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. A correct example of a non-linear function is given and the explanation correctly identifies why the function is not linear.

## GUIDE PAPER 3

54

Write an equation of a function that is not linear.

**Answer**  $y = x^2 + 7x - 4$

Use your equation to explain why your function is not linear.

**Answer**

This function is not linear  
because it involves an  $x^2$ .

### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. A correct example of a non-linear function is given and the explanation correctly identifies why the function is not linear.

## GUIDE PAPER 4

54

Write an equation of a function that is not linear.

**Answer**  $x^2 + 4x + 32$

Use your equation to explain why your function is not linear.

**Answer**

This function is not linear because it is a quadratic that, when graphed, will form a parabola.

### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. An incorrect example of a non-linear function is given: the example is an expression, not a function. The response correctly explains why a quadratic function is not linear.



## GUIDE PAPER 5

54

Write an equation of a function that is not linear.

**Answer**  $x^2 + 2 = 18$

Use your equation to explain why your function is not linear.

**Answer**

This isn't a linear function because it has an  $x^2$ .

### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. An incorrect example of a non-linear function is given; it does not contain a second variable. The response correctly explains why this equation is not linear.

## GUIDE PAPER 6

54

Write an equation of a function that is not linear.

**Answer**  $y = x^2 + 1$

Use your equation to explain why your function is not linear.

**Answer**

It is not linear because a linear when plotted on a grid will be a straight line.

### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. A correct example of a non-linear function is given. Although the response correctly states that a linear function is graphed as a straight line, it does not adequately explain that the graph of the given function is not straight.

## GUIDE PAPER 7

54

Write an equation of a function that is not linear.

Answer  $4x + 0y = 4$

Use your equation to explain why your function is not linear.

Answer

I added a zero to make it nonlinear.

### Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in task. An incorrect example of a non-linear function is given and the explanation of why this function is not linear is incorrect.

54

Write an equation of a function that is not linear.

Answer  $y = 3x$

Use your equation to explain why your function is not linear.

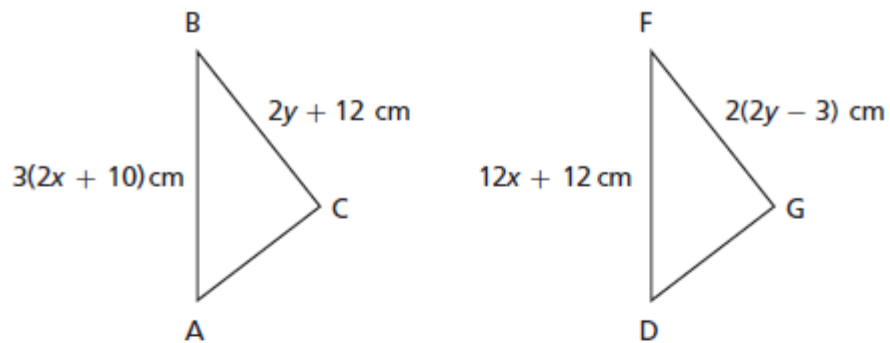
Answer

It's not linear because I wrote  
it as  $y = mx + b$

**Score Point 0 (out of 2 points)**

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in task. An incorrect example of a non-linear function is given and the explanation of why this function is not linear is incorrect.

Triangle ABC is translated to create triangle DFG, as shown below.



In these triangles, side AB is congruent to side DF, and side BC is congruent to side FG. Determine the values of  $x$  and  $y$ .

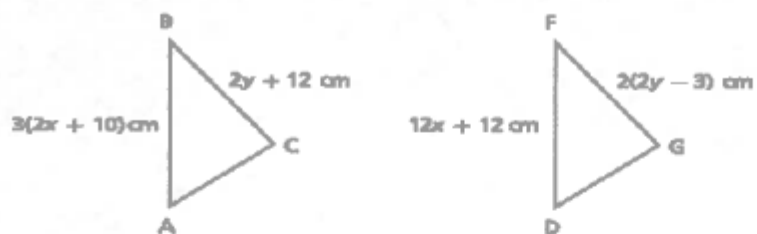
**Show your work.**

**Answer**  $x =$  \_\_\_\_\_ and  $y =$  \_\_\_\_\_

## EXEMPLARY RESPONSE

55

Triangle ABC is translated to create triangle DFG, as shown below.



In these triangles, side AB is congruent to side DF, and side BC is congruent to side FG. Determine the values of  $x$  and  $y$ .

*Show your work.*

$$3(2x + 10) = 12x + 12$$

$$6x + 30 = 12x + 12$$

$$\begin{array}{r} -6x \quad -6x \\ 30 = 6x + 12 \end{array}$$

$$30 = 6x + 12$$

$$\begin{array}{r} -12 \quad -12 \\ 18 = 6x \end{array}$$

$$18 = 6x$$

$$\begin{array}{r} \div 6 \quad \div 6 \\ 3 = x \end{array}$$

$$3 = x$$

$$2y + 12 = 2(2y - 3)$$

$$2y + 12 = 4y - 6$$

$$\begin{array}{r} -2y \quad -2y \\ 12 = 2y - 6 \end{array}$$

$$12 = 2y - 6$$

$$\begin{array}{r} +6 \quad +6 \\ 18 = 2y \end{array}$$

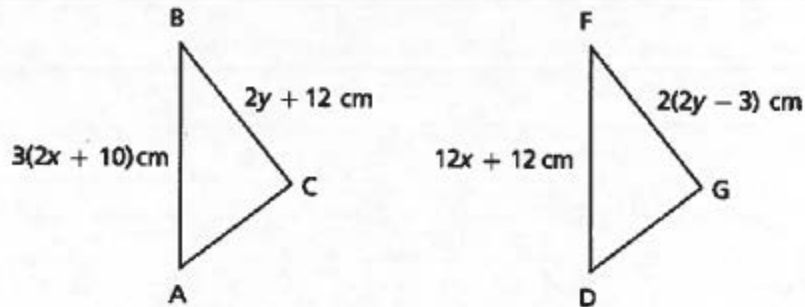
$$18 = 2y$$

$$\begin{array}{r} \div 2 \quad \div 2 \\ 9 = y \end{array}$$

$$9 = y$$

Answer  $x = \underline{3}$  and  $y = \underline{9}$

Triangle ABC is translated to create triangle DFG, as shown below.



In these triangles, side AB is congruent to side DF, and side BC is congruent to side FG. Determine the values of  $x$  and  $y$ .

Show your work.

$$\begin{aligned}
 &AB = DF & BC = FG \\
 &3(2x + 10) = 12x + 12 & 2y + 12 = 2(2y - 3) \\
 &6x + 30 = 12x + 12 & 2y + 12 = 4y - 6 \\
 &\quad -6x & \quad -6x \\
 &30 = 6x + 12 & 2y + 12 = 4y \\
 &\quad -12 & \quad -12 \\
 &18 = 6x & 2y = 4y \\
 &\quad \frac{18}{6} = \frac{6x}{6} & \quad \frac{2y}{2} = \frac{4y}{2} \\
 &\quad x = 3 & \quad y = 4 \\
 &\text{Answer } x = \underline{3 \text{ cm}} \text{ and } y = \underline{4 \text{ cm}}
 \end{aligned}$$

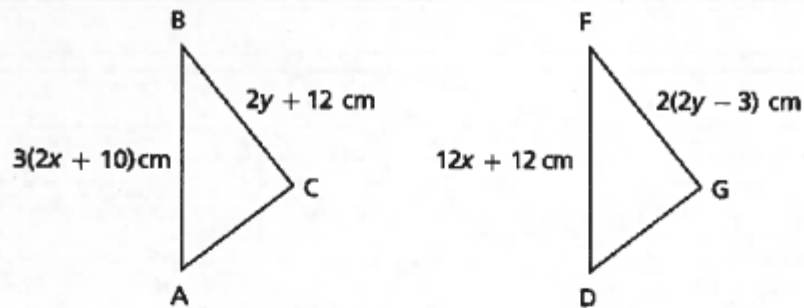
### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response follows a correct procedure to solve for the values of  $x$  and  $y$ .

## GUIDE PAPER 2

55

Triangle ABC is translated to create triangle DFG, as shown below.



In these triangles, side AB is congruent to side DF, and side BC is congruent to side FG. Determine the values of  $x$  and  $y$ .

**Show your work.**

$$\begin{array}{l}
 3(2x + 10) = 12x + 12 \\
 6x + 30 = 12x + 12 \\
 -30 \quad -30 \\
 6x = 12x - 18 \\
 -6x = -18 \\
 6x = 18 \\
 x = 3
 \end{array}
 \qquad
 \begin{array}{l}
 2y + 12 = 2(2y - 3) \\
 2y + 12 = 4y - 6 \\
 -2y = -18 \\
 y = 9
 \end{array}$$

**Answer**  $x = 3$  cm and  $y = 9$  cm

### Score Point 2 (out of 2 points)

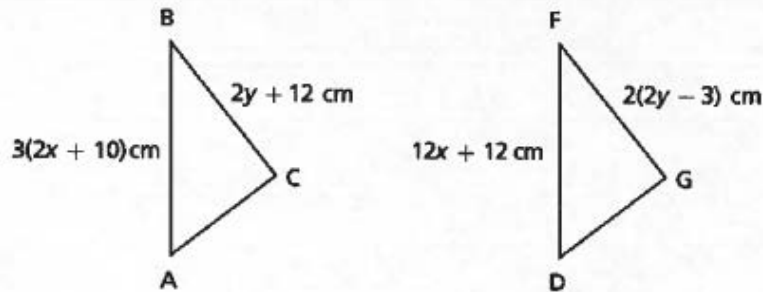
This response demonstrates a thorough understanding of the mathematical concepts in the task. The response follows a correct procedure to solve for the values of  $x$  and  $y$ .



# GUIDE PAPER 3

55

Triangle ABC is translated to create triangle DFG, as shown below.



In these triangles, side AB is congruent to side DF, and side BC is congruent to side FG. Determine the values of  $x$  and  $y$ .

Show your work.

$$\begin{aligned}
 3(2x + 10) \text{ cm} &= 12x + 12 \text{ cm} \\
 6x + 30 \text{ cm} &= 12x + 12 \text{ cm} \\
 -6x & \quad -6x \\
 \hline
 30 \text{ cm} &= 6x + 12 \\
 -12 \text{ cm} & \quad -12 \\
 \hline
 18 \text{ cm} &= 6x \\
 \frac{18 \text{ cm}}{6} &= \frac{6x}{6} \\
 3 &= x
 \end{aligned}$$

$$\begin{aligned}
 2y + 12 \text{ cm} &= 2(2y - 3) \text{ cm} \\
 2y + 12 \text{ cm} &= 4y - 6 \text{ cm} \\
 -24 & \quad -24 \\
 \hline
 12 \text{ cm} &= 2y - 6 \text{ cm} \\
 +6 \text{ cm} & \quad +6 \text{ cm} \\
 \hline
 18 \text{ cm} &= 2y \\
 \frac{18 \text{ cm}}{2} &= \frac{2y}{2} \\
 9 &= y
 \end{aligned}$$

check  $x$  values

$$\begin{aligned}
 3(2(3) + 10) \text{ cm} &= 12(3) + 12 \text{ cm} \\
 3(6 + 10) \text{ cm} &= 36 + 12 \text{ cm} \\
 3(16) \text{ cm} &= 48 \text{ cm} \\
 48 \text{ cm} &= 48 \text{ cm} \checkmark
 \end{aligned}$$

check values of  $y$

$$\begin{aligned}
 2(9) + 12 \text{ cm} &= 2(2(9) - 3) \text{ cm} \\
 18 + 12 &= 2(18 - 3) \\
 30 &= 2(15) \\
 30 &= 30 \checkmark
 \end{aligned}$$

Answer  $x = 3$  and  $y = 9$

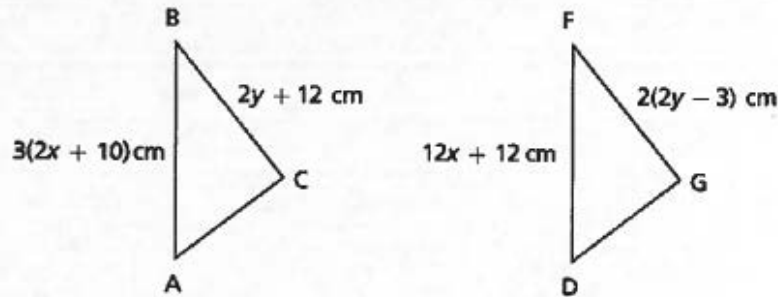
## Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response follows a correct procedure to solve for the values of  $x$  and  $y$ .

## GUIDE PAPER 4

55

Triangle ABC is translated to create triangle DFG, as shown below.



In these triangles, side AB is congruent to side DF, and side BC is congruent to side FG. Determine the values of  $x$  and  $y$ .

**Show your work.**

$$\begin{aligned}
 &3x(2x+10) = 12x+12 \\
 &6x+30x = 12x+12 \\
 &36x = 12x+12 \\
 &\quad -12x \\
 &\hline
 &24x = 12 \\
 &\quad \div 24 \\
 &\hline
 &x = 0.5
 \end{aligned}$$

$$\begin{aligned}
 &2y+12 = 2(2y-3) \\
 &2y+12 = 4y-6 \\
 &\quad -2y \quad -2y \\
 &\hline
 &12 = 2y-6 \\
 &\quad +6 \quad +6 \\
 &\hline
 &18 = 2y \\
 &\quad \div 2 \quad \div 2 \\
 &\hline
 &y = 9
 \end{aligned}$$

**Answer**  $x = 0.5$  and  $y = 9$

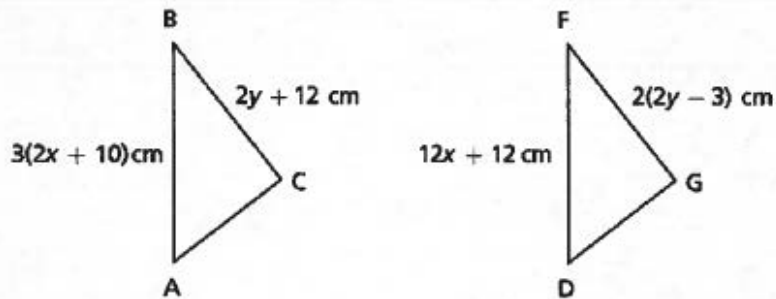
### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The work follows a correct procedure to find the value of  $y$ ; however, a calculation error (10 is multiplied by  $3x$  rather than 3) results in an incorrect solution for  $x$ .

## GUIDE PAPER 5

55

Triangle ABC is translated to create triangle DFG, as shown below.



In these triangles, side AB is congruent to side DF, and side BC is congruent to side FG. Determine the values of  $x$  and  $y$ .

**Show your work.**

$$\begin{array}{rcl}
 3(2x + 10) & = & 12x + 12 \\
 6x + 30 & = & 12x + 12 \\
 \underline{-12} & & \underline{-12} \\
 6x + 18 & = & 12x \\
 \underline{-6x} & & \underline{-6x} \\
 18 & = & 6x \\
 \underline{18 \div 6} & & \underline{6 \div 6} \\
 x & = & 6
 \end{array}
 \qquad
 \begin{array}{rcl}
 2(2y - 3) & = & 2y + 12 \\
 4y - 6 & = & 2y + 12 \\
 \underline{-2y + 6} & & \underline{-2y + 12} \\
 2y & = & 18 \\
 \underline{2 \div 2} & & \underline{18 \div 2} \\
 y & = & 9
 \end{array}$$

**Answer**  $x =$  6 and  $y =$  9

### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The work follows a correct procedure to find the value of  $y$ ; however, a calculation error ( $18 \div 6 = 6$ ) results in an incorrect solution for  $x$ .

## 55

Diagram showing two triangles,  $\triangle ABC$  and  $\triangle FGD$ .

Triangle  $ABC$  has side  $AB = 3(2x + 10) \text{ cm}$  and side  $BC = 2y + 12 \text{ cm}$ .

Triangle  $FGD$  has side  $FD = 12x + 12 \text{ cm}$  and side  $FG = 2(2y - 3) \text{ cm}$ .

**Show your work.**

Show your work.

$2x + 12 = 2(2y + 3)$   
 $2x + 12 = 4y - 6$   
 $2x - 12 = 4y - 6$   
 $2x = 4y - 18$   
 $x = 2y - 9$   
 $3(2x + 10) = 12x + 12$   
 $5x + 30 = 12x + 12$   
 $-30$   
 $5x = 12x - 18$   
 $-12x$   
 $-7x = -18$   
 $x = 2.57$

$2y + 12 = 2(2y + 3)$   
 $2y + 12 = 4y - 6$   
 $2y - 12 = 4y - 6$   
 $2y = 4y - 18$   
 $-4y$   
 $-2y = -18$   
 $-2$   
 $y = 9$

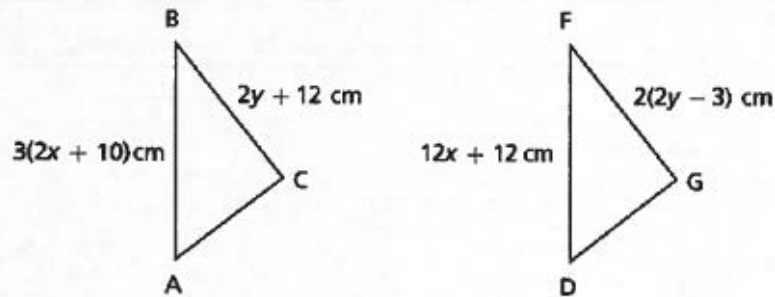
Answer  $x = 2.57$  and  $y = 9$

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## GUIDE PAPER 7

55

Triangle ABC is translated to create triangle DFG, as shown below.



In these triangles, side AB is congruent to side DF, and side BC is congruent to side FG. Determine the values of  $x$  and  $y$ .

**Show your work.**

$$\begin{array}{r}
 3(2x+10) \quad 2y+12 \\
 (6x+30) \quad 2y+12 \\
 \underline{-12 \quad -12} \\
 (6x+18) \quad 2y \\
 \underline{18 \quad 2} \\
 6x+36 \quad 36 \\
 \underline{6 \quad 6} \\
 6 \quad 6
 \end{array}$$

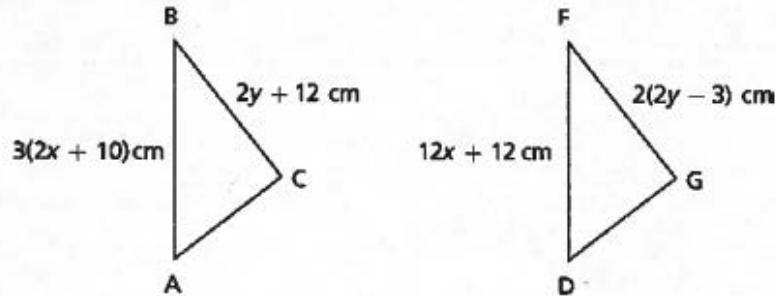
$$\begin{array}{r}
 12x+12 \quad 2(2y-3) \\
 12x+12 \quad (4y-6) \\
 \underline{-6 \quad +6} \\
 12x+6 \quad 4y \\
 \underline{12 \quad 4} \\
 48x+72 \quad 4y \\
 \underline{72 \quad 4} \\
 48x+72 \quad 4y
 \end{array}$$

**Answer**  $x = 6$  and  $y = 48$

### Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in task. Both answers and the work to obtain them are incorrect.

Triangle ABC is translated to create triangle DFG, as shown below.



In these triangles, side AB is congruent to side DF, and side BC is congruent to side FG. Determine the values of  $x$  and  $y$ .

**Show your work.**

$y = mx + b$

$$\begin{array}{r} 3(2x + 10) \\ 6x + 30 \end{array}$$

$$\begin{array}{r} 2y + 12 \\ -12 \\ \hline 2y \end{array}$$

$$\begin{array}{r} 3(2x + 10) = 2y + 12 \\ 6x + 30 = 2y + 12 \\ -2y \quad -2y \\ \hline 6x + 28 = 12 \\ -28 \quad -28 \\ \hline 6x = -16 \\ \frac{6x}{6} = \frac{-16}{6} \\ x = -\frac{8}{3} \end{array}$$

$$\begin{array}{r} 12x + 12 = 2(2y - 3) \\ 12x + 12 = 4y - 6 \\ -4y \quad -4y \\ \hline 12x + 8 = -6 \\ -8 \quad -8 \\ \hline 12x = -14 \\ \frac{12x}{12} = \frac{-14}{12} \\ x = -\frac{7}{6} \end{array}$$

**Answer**  $x = -\frac{8}{3}$  and  $y = -\frac{7}{6}$

### Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in task. Both answers and the work to obtain them are incorrect.

A reporter collected data on  $y$ , the current market value, in dollars, of a certain car for various years,  $x$ , after it had been purchased new. The equation below was fit to the data.

$$y = 16,500 - 1,500x$$

What does the slope of the graph of this equation represent?

**Answer**

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What does the  $y$ -intercept of the graph of this equation represent?

**Answer**

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## EXEMPLARY RESPONSE

56

A reporter collected data on  $y$ , the current market value, in dollars, of a certain car for various years,  $x$ , after it had been purchased new. The equation below was fit to the data.

$$y = 16,500 - 1,500x$$

What does the slope of the graph of this equation represent?

**Answer**

The value in dollars by which the current market value of the car decreases

each year.

OR other equivalent answer

What does the  $y$ -intercept of the graph of this equation represent?

**Answer**

The original cost of the car.

OR other equivalent answer



56

A reporter collected data on  $y$ , the current market value, in dollars, of a certain car for various years,  $x$ , after it had been purchased new. The equation below was fit to the data.

$$y = 16,500 - 1,500x$$

$\downarrow$  value                       $\downarrow$  years

What does the slope of the graph of this equation represent?

**Answer**

The slope ( $m$ ) represents the value that is removed per year.

What does the  $y$ -intercept of the graph of this equation represent?

**Answer**

The  $y$ -intercept ( $b$ ) represents the starting value of the car.

### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response provides a correct interpretation of the slope and  $y$ -intercept.

## GUIDE PAPER 2

56

A reporter collected data on  $y$ , the current market value, in dollars, of a certain car for various years,  $x$ , after it had been purchased new. The equation below was fit to the data.

$$y = b + mx$$
$$y = 16,500 - (1,500)x$$

What does the slope of the graph of this equation represent?

**Answer**

The slope represents how much the price decreases yearly, which is 1,500

What does the y-intercept of the graph of this equation represent?

**Answer**

It represents the starting price of the car when it first came out

### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response provides a correct interpretation of the slope and y-intercept.

## GUIDE PAPER 3

56

A reporter collected data on  $y$ , the current market value, in dollars, of a certain car for various years,  $x$ , after it had been purchased new. The equation below was fit to the data.

$$y = 16,500 - 1,500x$$

What does the slope of the graph of this equation represent?

**Answer**

The slope represents that the car is \$1,500 less than the year before.

What does the  $y$ -intercept of the graph of this equation represent?

**Answer**

The  $y$ -intercept is what the car's original starting price was.

### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response provides a correct interpretation of the slope and  $y$ -intercept.

## GUIDE PAPER 4

56

A reporter collected data on  $y$ , the current market value, in dollars, of a certain car for various years,  $x$ , after it had been purchased new. The equation below was fit to the data.

$$y = 16,500 - 1,500x$$

What does the slope of the graph of this equation represent?

**Answer**

The change in value <sup>of the car</sup> over a certain amount of time (years)

What does the y-intercept of the graph of this equation represent?

**Answer**

The initial value of the car

### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. A correct interpretation of the y-intercept is provided; however, the interpretation of the slope is incomplete: the response does not indicate that the value of the car is decreasing as opposed to increasing.

## GUIDE PAPER 5

56

A reporter collected data on  $y$ , the current market value, in dollars, of a certain car for various years,  $x$ , after it had been purchased new. The equation below was fit to the data.

$$y = 16,500 - 1,500x$$

What does the slope of the graph of this equation represent?

**Answer**

The slope of the graph of this equation represents how much the market value of a car decreased.

What does the y-intercept of the graph of this equation represent?

**Answer**

The y-intercept of the graph of this equation represents the amount of dollars it started off with at 0 years.

### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response provides an incomplete interpretation of the slope: it does not indicate the change as occurring over time. A correct interpretation of the y-intercept is provided.

## GUIDE PAPER 6

56

A reporter collected data on  $y$ , the current market value, in dollars, of a certain car for various years,  $x$ , after it had been purchased new. The equation below was fit to the data.

$$y = 16,500 - 1,500x \quad y = mx + b$$

What does the slope of the graph of this equation represent?

**Answer**

The amount of money the car loses value each year

What does the  $y$ -intercept of the graph of this equation represent?

**Answer**

The value of the car on the current market value

### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response provides a correct interpretation of the slope; however, the  $y$ -intercept is incorrectly interpreted as the current market value of the car.

## GUIDE PAPER 7

56

A reporter collected data on  $y$ , the current market value, in dollars, of a certain car for various years,  $x$ , after it had been purchased new. The equation below was fit to the data.

$$y = 16,500 - 1,500x$$

What does the slope of the graph of this equation represent?

**Answer**

The slope represents how much money the car costs a year

What does the  $y$ -intercept of the graph of this equation represent?

**Answer**

The  $y$ -intercept represents how much the car is worth

### Score Point 0 (out of 2 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in task. The interpretations of the slope and the  $y$ -intercept are incorrect.

56

A reporter collected data on  $y$ , the current market value, in dollars, of a certain car for various years,  $x$ , after it had been purchased new. The equation below was fit to the data.

$$y = 16,500 - 1,500x$$

What does the slope of the graph of this equation represent?

**Answer**

The Slope Represents how much  
it went down

What does the  $y$ -intercept of the graph of this equation represent?

**Answer**

The  $y$ -intercept of the graph represents  
where it intercepts on the  $y$  axis

**Score Point 0 (out of 2 points)**

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in task. An incomplete explanation of the slope is provided: it does not specify that the change occurs over time and the word “it” is not specific. In addition, the response does not explain what the  $y$ -intercept represents.



57

A triangle with vertices at  $A(-1, 1)$ ,  $B(-2, 1)$ , and  $C(-1, 4)$  is translated. The image of vertex A has coordinates at  $(3, -1)$ .

Determine the coordinates of either the image of vertex B or the image of vertex C.

**Show your work.**

munotes

**Answer** \_\_\_\_\_

## EXEMPLARY RESPONSE

57

A triangle with vertices at  $A(-1, 1)$ ,  $B(-2, 1)$ , and  $C(-1, 4)$  is translated. The image of vertex A has coordinates at  $(3, -1)$ .

Determine the coordinates of either the image of vertex B or the image of vertex C.

*Show your work.*

Vertex A

$$(-1, 1) + (4, -2) = (3, -1)$$

OR

Translation Matrix

$$(3, -1) - (-1, 1) = (4, -2)$$

THEN use this to solve for either:

Vertex B

$$(-2, 1) + (4, -2) = (2, -1)$$

OR

Vertex C

$$(-1, 4) + (4, -2) = (3, 2)$$

OR other valid process

**Answer** Vertex B'(2, -1) OR Vertex C'(3, 2)

57

A triangle with vertices at  $A(-1, 1)$ ,  $B(-2, 1)$ , and  $C(-1, 4)$  is translated. The image of vertex  $A$  has coordinates at  $(3, -1)$ .

Determine the coordinates of either the image of vertex  $B$  or the image of vertex  $C$ .

**Show your work.**

$$\begin{array}{c} \begin{array}{c} y \\ (-1, 1) \end{array} \rightarrow \begin{array}{c} x \\ (3, -1) \end{array} \\ \text{4 over to the right} \\ \text{down 2 units} \end{array}$$

$$B = (-2, 1)$$

$$-2 + 4 = (2, -1)$$

$$\begin{array}{c} C = (-1, 4) \\ (3, 2) \end{array}$$

**Answer**  $B'(2, -1), C'(3, 2)$

### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response follows a correct procedure  $[(x + 4, y - 2)]$  to translate vertices  $B$  and  $C$  and provides correct coordinates for vertices  $B'$  and  $C'$ .

## GUIDE PAPER 2

57

A triangle with vertices at  $A(-1, 1)$ ,  $B(-2, 1)$ , and  $C(-1, 4)$  is translated. The image of vertex  $A$  has coordinates at  $(3, -1)$ .

Determine the coordinates of either the image of vertex  $B$  or the image of vertex  $C$ .

**Show your work.**

triangle  $\rightarrow$  translated  $T_{(x+4)(y-2)}$

$A(-1, 1)$	$A'(3, -1)$
$B(-2, 1)$	$B'(2, -1)$
$C(-1, 4)$	$C'(3, 2)$

**Answer**  $C'(3, 2)$

### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response follows a correct procedure  $[(x + 4, y - 2)]$  to translate vertices  $B$  and  $C$  and provides correct coordinates for vertex  $C'$ .

## GUIDE PAPER 3

57

A triangle with vertices at  $A(-1, 1)$ ,  $B(-2, 1)$ , and  $C(-1, 4)$  is translated. The image of vertex A has coordinates at  $(3, -1)$ .

Determine the coordinates of either the image of vertex B or the image of vertex C.

Show your work.

$$\begin{array}{l} +4 \quad -2 \\ A(-1, 1) \\ +4 \quad -2 \\ B(-2, 1) \\ +4 \quad -2 \\ C(-1, 4) \end{array} \quad \begin{array}{l} A'(3, -1) \\ B'(-8, -1) \\ C'(3, 2) \end{array}$$

Answer  $C'(3, 2)$

### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response follows a correct procedure  $[(x + 4, y - 2)]$  to translate vertices B and C and provides correct coordinates for vertex C'. Although a calculation error is made when solving for the coordinates of vertex B', a solution is only required for one of the vertices.

## GUIDE PAPER 4

57

A triangle with vertices at  $A(-1, 1)$ ,  $B(-2, 1)$ , and  $C(-1, 4)$  is translated. The image of vertex  $A$  has coordinates at  $(3, -1)$ .

Determine the coordinates of either the image of vertex  $B$  or the image of vertex  $C$ .

**Show your work.**

$$A = (-1, 1) \quad A' = (3, -1)$$

$$-1 - 3 = -4$$

$$-1 - (-4) = 3$$

$$1 - (-1) = 2$$

$$1 - 2 = -1$$

$$B = (-2, 1) \quad B' = (2, 2)$$

$$-2 - (-4) = 2$$

$$-2 - 2 = -4$$

$$1 - (-1) = 2$$

$$1 - 2 = -1$$

$$C = (-1, 4) \quad C' = (3, 2)$$

$$-1 - (-4) = 3$$

$$-1 - 3 = -4$$

$$4 - 2 = 2$$

$$4 - 2 = 2$$

**Answer**  $B' = (2, 2)$   
 $C' = (3, 2)$

### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response follows a correct procedure  $[(x + 4, y - 2)]$  to translate vertices  $B$  and  $C$  and provides correct coordinates for vertex  $C'$ ; however, incorrect coordinates for vertex  $B'$  are also circled and explicitly included as part of the solution.

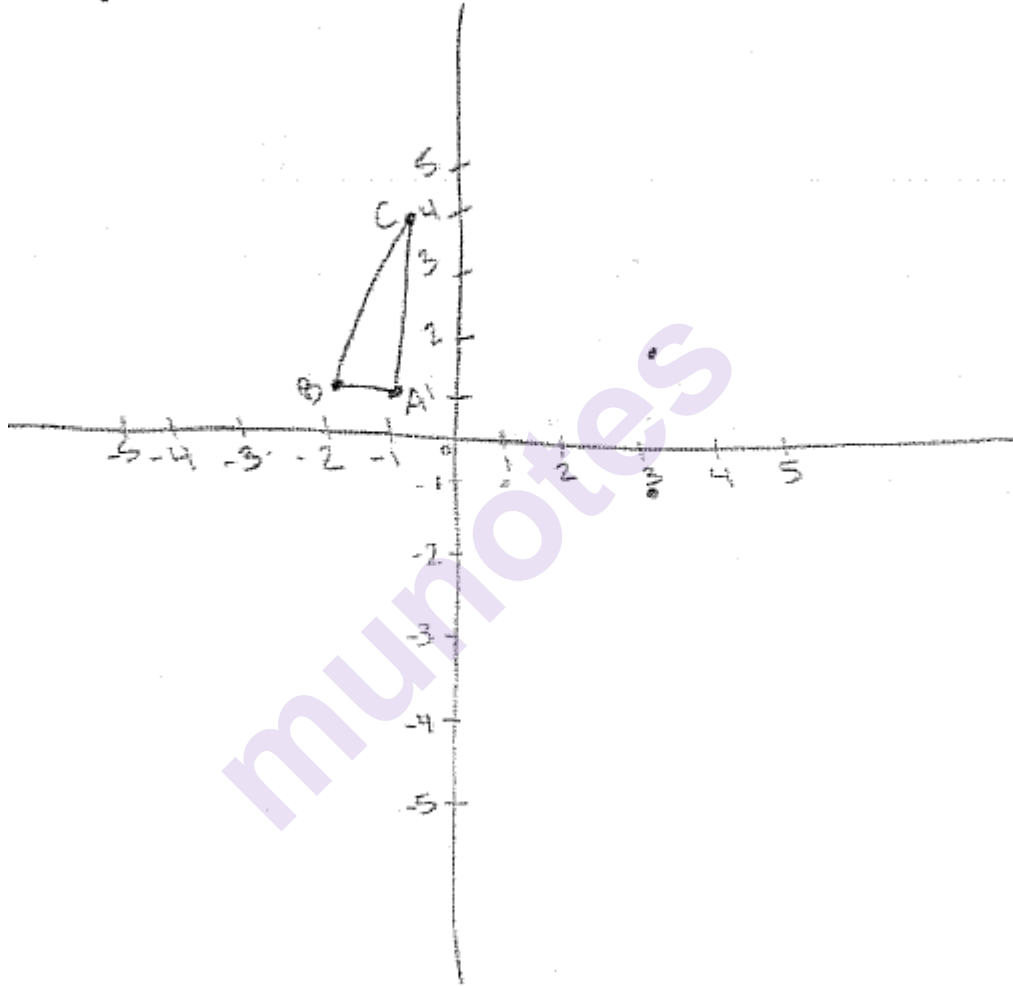
## GUIDE PAPER 5

57

A triangle with vertices at  $A(-1, 1)$ ,  $B(-2, 1)$ , and  $C(-1, 4)$  is translated. The image of vertex  $A$  has coordinates at  $(3, -1)$ .

Determine the coordinates of either the image of vertex  $B$  or the image of vertex  $C$ .

**Show your work.**



**Answer**

$C(3, 2)$

### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. Vertices  $A'$  and  $C'$  are correctly plotted on a graph—although they are unlabeled—and correct coordinates are provided for vertex  $C'$ . Holistically, the graph provided is not sufficient to count as complete work.

## GUIDE PAPER 6

57

A triangle with vertices at  $A(-1, 1)$ ,  $B(-2, 1)$ , and  $C(-1, 4)$  is translated. The image of vertex A has coordinates at  $(3, -1)$ .

Determine the coordinates of either the image of vertex B or the image of vertex C.

**Show your work.**

$$\begin{array}{l} A(-1, 1) \quad A(3, -1) \\ B(-2, 1) \quad B(2, -1) \\ C(-1, 4) \quad C(3, 2) \end{array}$$

**Answer**  $(4, -2)$

### Score Point 1 (out of 2 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response follows a correct procedure  $[(x + 4, y - 2)]$  to translate vertices B and C; however, the transformation matrix is chosen as the solution rather than any of the vertices.



## GUIDE PAPER 7

57

A triangle with vertices at  $A(-1, 1)$ ,  $B(-2, 1)$ , and  $C(-1, 4)$  is translated. The image of vertex A has coordinates at  $(3, -1)$ .

Determine the coordinates of either the image of vertex B or the image of vertex C.

**Show your work.**

**Answer**

$$B' = (-2, 1) \Rightarrow (3, 2)$$

### 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 coordinates of  $B'$  and  $C'$  are correct, no work is provided to support the solution.

57

A triangle with vertices at  $A(-1, 1)$ ,  $B(-2, 1)$ , and  $C(-1, 4)$  is translated. The image of vertex  $A$  has coordinates at  $(3, -1)$ .

Determine the coordinates of either the image of vertex  $B$  or the image of vertex  $C$ .

*Show your work.*

$$A(-1, 1) = (3, -1)$$
$$B(-2, 1) = (4, -2)$$

**Answer**  $B(4, -2)$

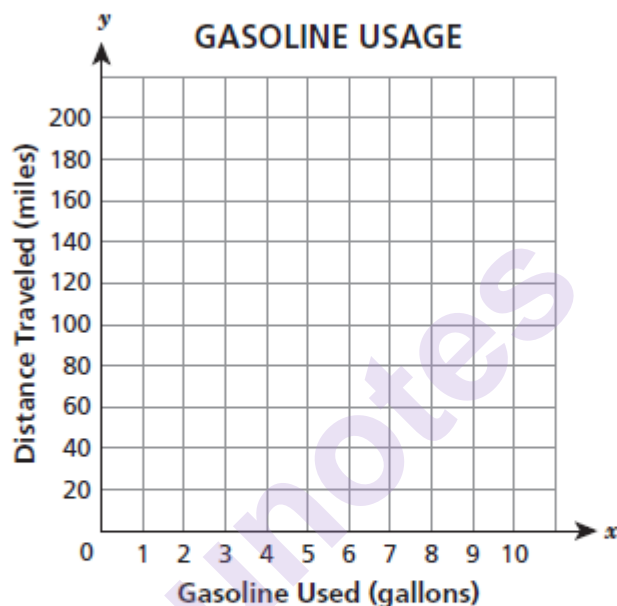
**Score Point 0 (out of 2 points)**

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. The transformation matrix is incorrectly taken to be the coordinates of  $B'$ .

Stanley drove his car on a business trip. When he left, the mileage was 840 miles, and when he returned, the mileage was 1,200 miles. The car used 12 gallons of gasoline for this trip.

Draw a graph on the grid below to show the relationship between gasoline used,  $x$ , and the distance traveled,  $y$ , during Stanley's trip.

Carla made the same trip as Stanley, but her car used only 10 gallons of gasoline. Graph the gasoline usage of Carla's car on the same grid as Stanley's car.



How do the slopes for Stanley's and Carla's cars compare?

***Explain your answer in terms of the unit rate.***

***Answer***

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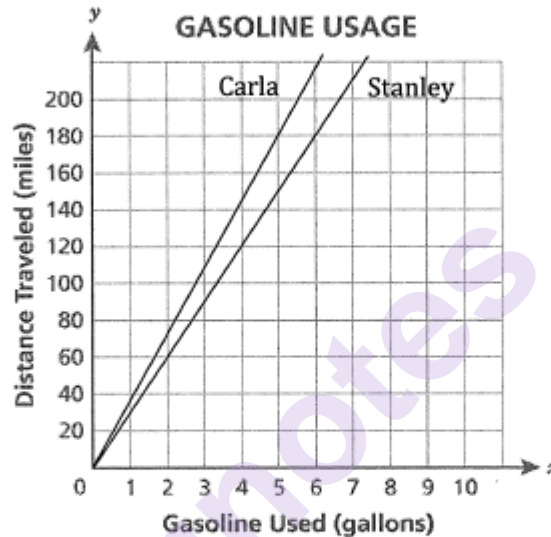
## EXEMPLARY RESPONSE

58

Stanley drove his car on a business trip. When he left, the mileage was 840 miles, and when he returned, the mileage was 1,200 miles. The car used 12 gallons of gasoline for this trip.

Draw a graph on the grid below to show the relationship between gasoline used,  $x$ , and the distance traveled,  $y$ , during Stanley's trip.

Carla made the same trip as Stanley, but her car used only 10 gallons of gasoline. Graph the gasoline usage of Carla's car on the same grid as Stanley's car.



How do the slopes for Stanley's and Carla's cars compare?

**Explain your answer in terms of the unit rate.**

**Answer**

Carla's slope is steeper than Stanley's. For every gallon of gas used, Carla travels 36 miles while Stanley travels 30 miles.

OR other equivalent explanation

# GUIDE PAPER 1

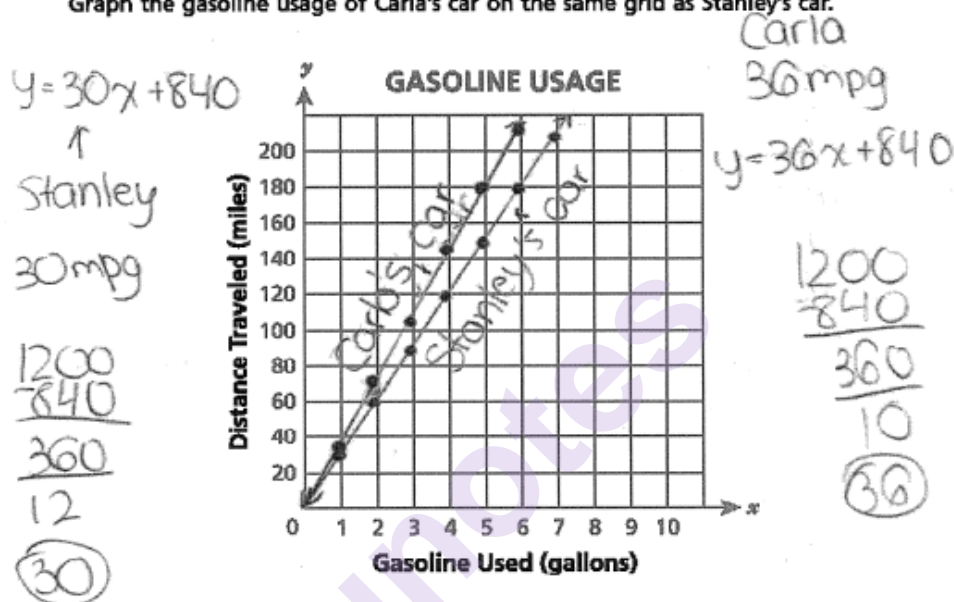
Additional

58

Stanley drove his car on a business trip. When he left, the mileage was 840 miles, and when he returned, the mileage was 1,200 miles. The car used 12 gallons of gasoline for this trip.

Draw a graph on the grid below to show the relationship between gasoline used,  $x$ , and the distance traveled,  $y$ , during Stanley's trip.

Carla made the same trip as Stanley, but her car used only 10 gallons of gasoline. Graph the gasoline usage of Carla's car on the same grid as Stanley's car.



How do the slopes for Stanley's and Carla's cars compare?

Explain your answer in terms of the unit rate.

Answer

Carla's car travels 36 mpg. Stanley's car only travels 30 mpg. Carla's car's slope is steeper than Stanley's and her car travels farther per gallon than Stanley's.

## Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. Both graphs are correct and the unit rates are appropriately compared.

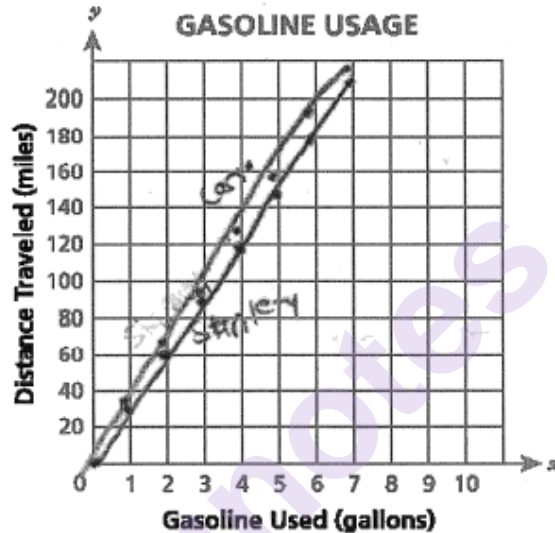
## GUIDE PAPER 2

58

Stanley drove his car on a business trip. When he left, the mileage was 840 miles, and when he returned, the mileage was 1,200 miles. The car used 12 gallons of gasoline for this trip.

Draw a graph on the grid below to show the relationship between gasoline used,  $x$ , and the distance traveled,  $y$ , during Stanley's trip.

Carla made the same trip as Stanley, but her car used only 10 gallons of gasoline. Graph the gasoline usage of Carla's car on the same grid as Stanley's car.



How do the slopes for Stanley's and Carla's cars compare?

**Explain your answer in terms of the unit rate.**

**Answer**

Carla got better gas mileage than Stanley because she got 36 miles per gallon while he only got 30 miles per gallon.

### Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. Both graphs are correct and the unit rates are appropriately compared.

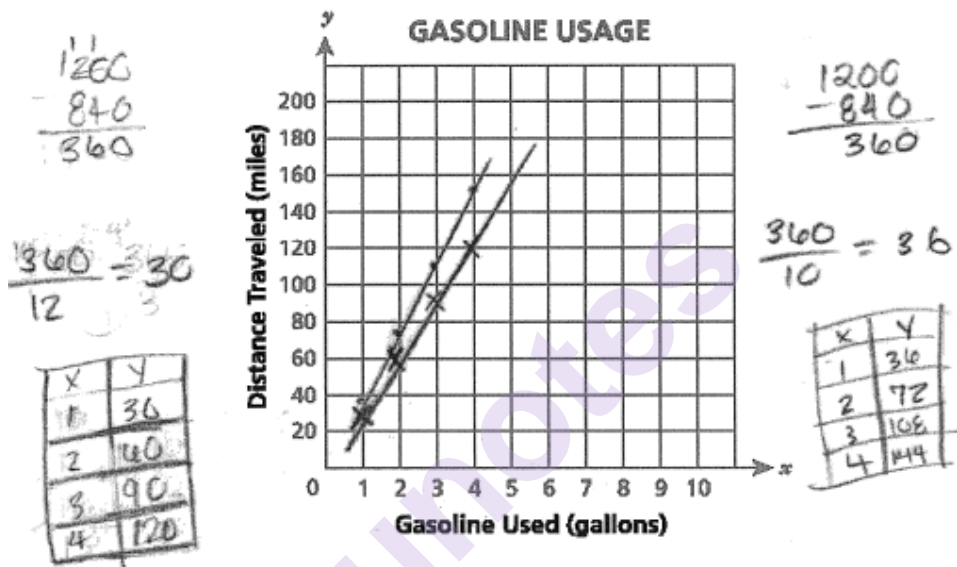
## GUIDE PAPER 3

58

Stanley drove his car on a business trip. When he left, the mileage was 840 miles, and when he returned, the mileage was 1,200 miles. The car used 12 gallons of gasoline for this trip.

Draw a graph on the grid below to show the relationship between gasoline used,  $x$ , and the distance traveled,  $y$ , during Stanley's trip.

Carla made the same trip as Stanley, but her car used only 10 gallons of gasoline. Graph the gasoline usage of Carla's car on the same grid as Stanley's car.



How do the slopes for Stanley's and Carla's cars compare?

*Explain your answer in terms of the unit rate.*

**Answer**

The slope is greater for Carla's car because she has a higher rate of miles per gallon.

### Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. Both graphs are correct and the unit rates are appropriately compared.

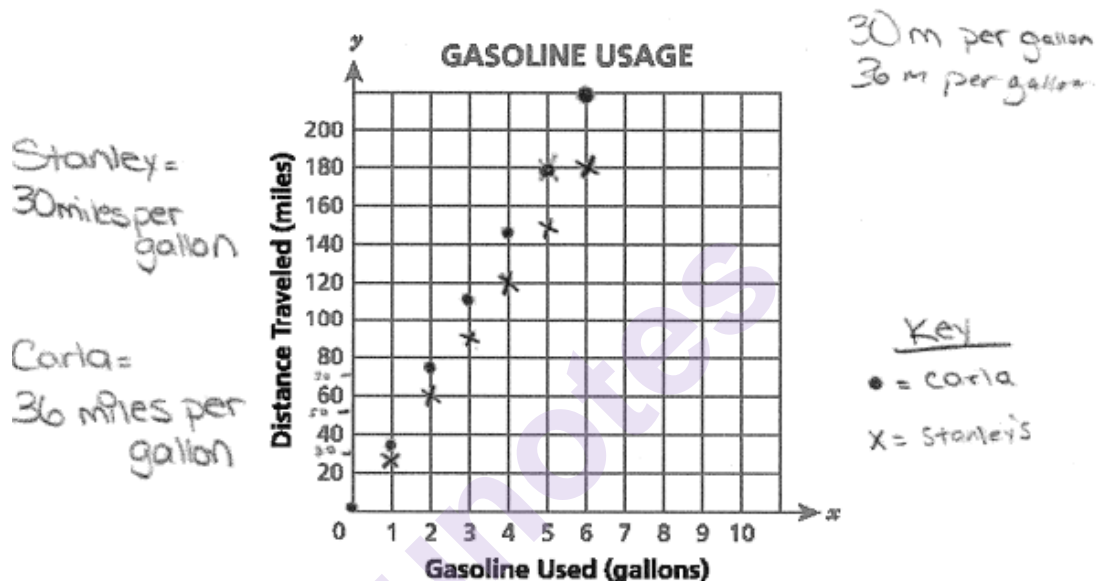
## GUIDE PAPER 4

58

Stanley drove his car on a business trip. When he left, the mileage was 840 miles, and when he returned, the mileage was 1,200 miles. The car used 12 gallons of gasoline for this trip.

Draw a graph on the grid below to show the relationship between gasoline used,  $x$ , and the distance traveled,  $y$ , during Stanley's trip.

Carla made the same trip as Stanley, but her car used only 10 gallons of gasoline. Graph the gasoline usage of Carla's car on the same grid as Stanley's car.



How do the slopes for Stanley's and Carla's cars compare?

**Explain your answer in terms of the unit rate.**

**Answer**

In terms of unit rate Carla could go 36 miles per gallon while Stanley could only go 30 to the gallon.

### Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. Although the points are plotted correctly, they are not connected with lines. The comparison of the unit rates is correct. The response addresses most, but not all aspects of the task.



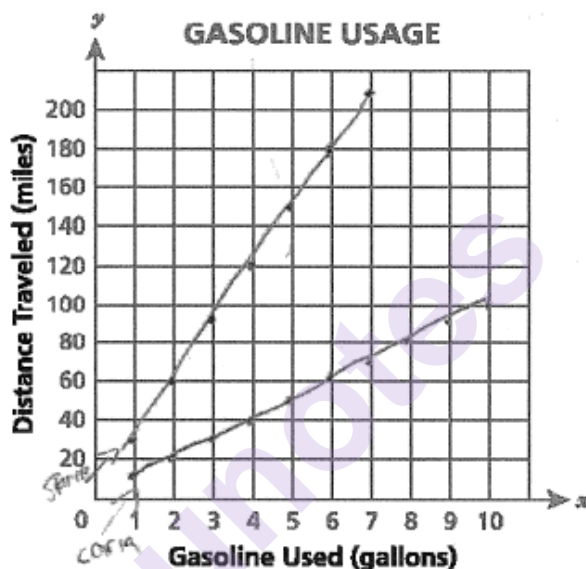
## GUIDE PAPER 5

58

Stanley drove his car on a business trip. When he left, the mileage was 840 miles, and when he returned, the mileage was 1,200 miles. The car used 12 gallons of gasoline for this trip.

Draw a graph on the grid below to show the relationship between gasoline used,  $x$ , and the distance traveled,  $y$ , during Stanley's trip.

Carla made the same trip as Stanley, but her car used only 10 gallons of gasoline. Graph the gasoline usage of Carla's car on the same grid as Stanley's car.



How do the slopes for Stanley's and Carla's cars compare?

**Explain your answer in terms of the unit rate.**

**Answer**

carla's car get 36 m.p.g  
and Stanley's get 30 m.p.g

### Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. Only one line is plotted correctly; however, the comparison of the unit rates is correct. Although correct unit rates are provided, the units (miles per hour rather than miles per gallon) are incorrect. The response addresses most elements of the task correctly.

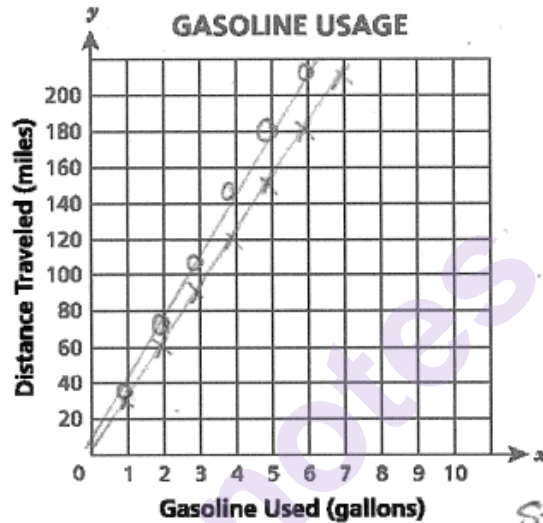
## GUIDE PAPER 6

58

Stanley drove his car on a business trip. When he left, the mileage was 840 miles, and when he returned, the mileage was 1,200 miles. The car used 12 gallons of gasoline for this trip.

Draw a graph on the grid below to show the relationship between gasoline used,  $x$ , and the distance traveled,  $y$ , during Stanley's trip.

Carla made the same trip as Stanley, but her car used only 10 gallons of gasoline. Graph the gasoline usage of Carla's car on the same grid as Stanley's car.



Stanley = x  
Carla = o

How do the slopes for Stanley's and Carla's cars compare?

**Explain your answer in terms of the unit rate.**

**Answer**

The slope for Carla is more positive than the slope for Stanley because she traveled to the end point quicker than Stanley with less gas.

### Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. Both graphs are correct; however, the comparison of the slopes does not adequately reference the unit rates. The response addresses most, but not all aspects of the task.

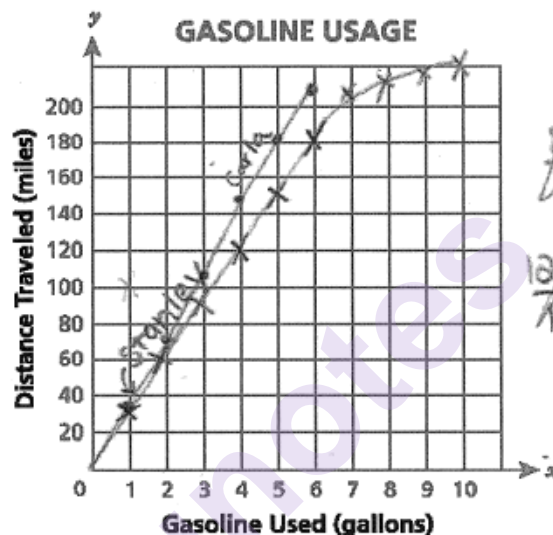
## GUIDE PAPER 7

58

Stanley drove his car on a business trip. When he left, the mileage was 840 miles, and when he returned, the mileage was 1,200 miles. The car used 12 gallons of gasoline for this trip.

Draw a graph on the grid below to show the relationship between gasoline used,  $x$ , and the distance traveled,  $y$ , during Stanley's trip.

Carla made the same trip as Stanley, but her car used only 10 gallons of gasoline. Graph the gasoline usage of Carla's car on the same grid as Stanley's car.



$$\frac{840}{x} = \frac{1200}{12}$$

$$\frac{1200x}{1200} = \frac{10,080}{1200}$$

$$x = 8.4$$

100mi every  
1gallon

How do the slopes for Stanley's and Carla's cars compare?

**Explain your answer in terms of the unit rate.**

**Answer**

Carla - 1 gallon : 36 miles

Stanley - 1 gallon : 30 miles

### Score Point 1 (out of 3 points)

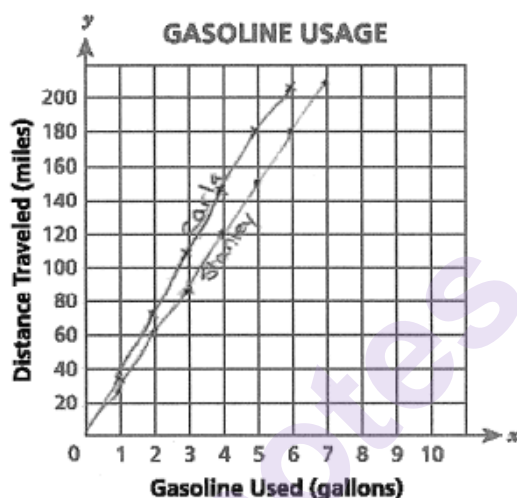
This response demonstrates only a limited understanding of the mathematical concepts in the task. One graph is correct while the other graph is partially correct: it curves at the top. Although correct unit rates are calculated, a contradictory statement appears in the work (100 miles every gallon). The response addresses some elements of the task correctly but reflects a lack of essential understanding.

58

Stanley drove his car on a business trip. When he left, the mileage was 840 miles, and when he returned, the mileage was 1,200 miles. The car used 12 gallons of gasoline for this trip.

Draw a graph on the grid below to show the relationship between gasoline used,  $x$ , and the distance traveled,  $y$ , during Stanley's trip.

Carla made the same trip as Stanley, but her car used only 10 gallons of gasoline. Graph the gasoline usage of Carla's car on the same grid as Stanley's car.



How do the slopes for Stanley's and Carla's cars compare?

**Explain your answer in terms of the unit rate.**

**Answer**

The slope for Stanley is  $\frac{3}{2}$  and Carla's slope is  $\frac{9}{5}$ . As you can see on the grid Carla goes faster than Stanley and Carla doesn't use a lot of gasoline.

### Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. Both graphs are correct; however, the unit rates are calculated incorrectly and are not adequately compared. The response addresses some elements of the task correctly but reflects a lack of essential understanding.

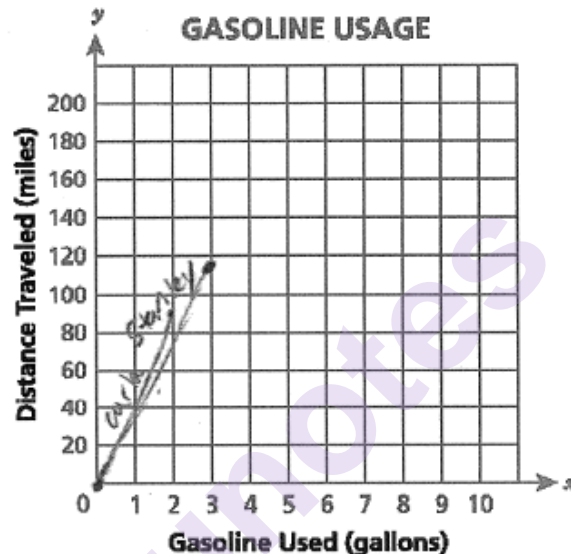
## GUIDE PAPER 9

58

Stanley drove his car on a business trip. When he left, the mileage was 840 miles, and when he returned, the mileage was 1,200 miles. The car used 12 gallons of gasoline for this trip.

Draw a graph on the grid below to show the relationship between gasoline used,  $x$ , and the distance traveled,  $y$ , during Stanley's trip.

Carla made the same trip as Stanley, but her car used only 10 gallons of gasoline. Graph the gasoline usage of Carla's car on the same grid as Stanley's car.



How do the slopes for Stanley's and Carla's cars compare?

**Explain your answer in terms of the unit rate.**

**Answer**

carla's slope was more because her car goes more miles per gallon than stanley's

### Score Point 1 (out of 3 points)

This response demonstrates a limited understanding of the mathematical concepts in the task. The response correctly compares the slopes; however, the unit rates are not sufficiently addressed and both graphs are plotted incorrectly. The response addresses some elements of the task correctly but reflects a lack of essential understanding.

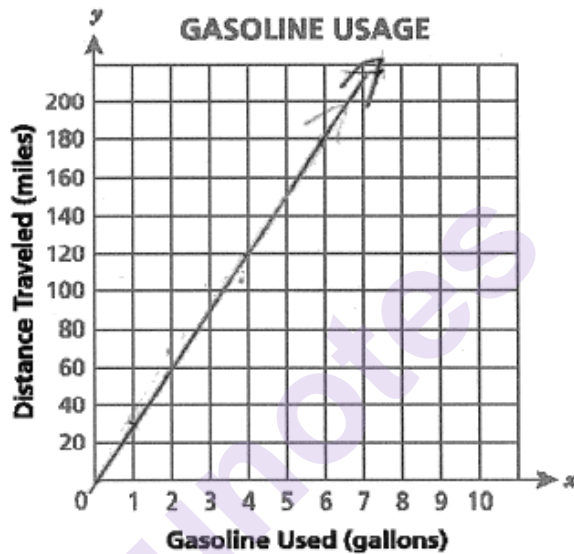
## GUIDE PAPER 10

58

Stanley drove his car on a business trip. When he left, the mileage was 840 miles, and when he returned, the mileage was 1,200 miles. The car used 12 gallons of gasoline for this trip.

Draw a graph on the grid below to show the relationship between gasoline used,  $x$ , and the distance traveled,  $y$ , during Stanley's trip.

Carla made the same trip as Stanley, but her car used only 10 gallons of gasoline. Graph the gasoline usage of Carla's car on the same grid as Stanley's car.



How do the slopes for Stanley's and Carla's cars compare?

**Explain your answer in terms of the unit rate.**

**Answer**

Carla's slope is less steep because  
it only goes up by 30 miles/gallon

### Score Point 0 (out of 3 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in task. Only one correct line is plotted and the unit rate provided for Carla's car is incorrect. In addition, the comparison to Stanley's car is incorrect.

# GUIDE PAPER 11

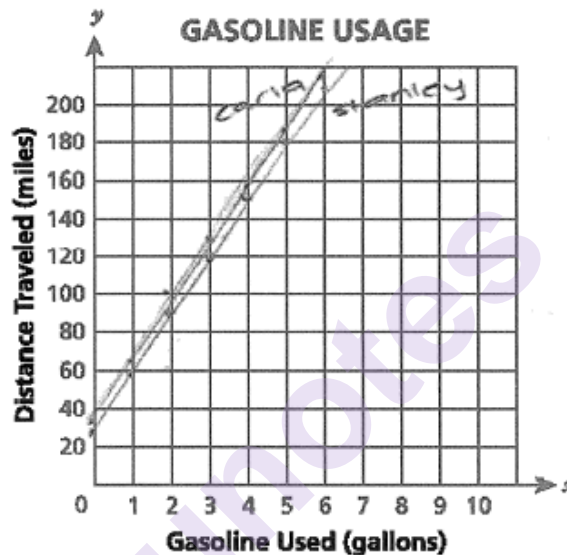
Additional

58

Stanley drove his car on a business trip. When he left, the mileage was 840 miles, and when he returned, the mileage was 1,200 miles. The car used 12 gallons of gasoline for this trip.

Draw a graph on the grid below to show the relationship between gasoline used,  $x$ , and the distance traveled,  $y$ , during Stanley's trip.

Carla made the same trip as Stanley, but her car used only 10 gallons of gasoline. Graph the gasoline usage of Carla's car on the same grid as Stanley's car.



$$\begin{array}{r} 1,200 \\ - 840 \\ \hline 360 \end{array}$$

How do the slopes for Stanley's and Carla's cars compare?

*Explain your answer in terms of the unit rate.*

**Answer**

Carla drives 36 miles each hour  
while Stanley drives 30 miles each hour

## 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. Both lines are incorrect: they do not start at the origin. Although correct unit rates are calculated, there is no work to support the answer and the interpretation of the unit rates is faulty.



Tim is selling tickets to a school sporting event to raise money for his club. He put some extra money in his box before he began. As he sells tickets, he records the number of tickets he has sold and the total amount of money in the box. Some of his data are shown below.

**TOTAL AMOUNT OF MONEY  
FROM TICKET SALES**

Number of Tickets Sold	Total Money in Box (dollars)
7	108.75
13	146.25
18	177.50

Assuming all the tickets are the same price, write an equation that represents the situation in the table. Explain how to use your equation to determine the amount of money originally in the box before any tickets were sold and the price of each ticket.

**Show your work.**

**Answer**

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## EXEMPLARY RESPONSE

59

Tim is selling tickets to a school sporting event to raise money for his club. He put some extra money in his box before he began. As he sells tickets, he records the number of tickets he has sold and the total amount of money in the box. Some of his data are shown below.

**TOTAL AMOUNT OF MONEY  
FROM TICKET SALES**

Number of Tickets Sold	Total Money in Box (dollars)
7	108.75
13	146.25
18	177.50

Assuming all the tickets are the same price, write an equation that represents the situation in the table. Explain how to use your equation to determine the amount of money originally in the box before any tickets were sold and the price of each ticket.

*Show your work.*

$$\$177.50 - \$146.25 = \$31.25$$

for 18 - 13 tickets

\$31.25 for 5 tickets

$$\$31.25 \div 5 = \$6.25 \text{ per ticket}$$

$$\$6.25t + b = M$$

t = number of tickets

b = money to start

M = money now in box

$$\$6.25(13) + b = \$146.25$$

$$\$81.25 + b = \$146.25$$

$$b = \$146.25 - \$81.25$$

$$b = \$65$$

*Answer*

$$M = \$6.25t + \$65$$

The money in the box to begin with is like the y-intercept of the equation, \$65. The slope of the

equation, \$6.25, is the price of the ticket. When t=0, or when there have been no ticket sales, the

equation gives \$65 as the amount of money originally in the box.

59

Tim is selling tickets to a school sporting event to raise money for his club. He put some extra money in his box before he began. As he sells tickets, he records the number of tickets he has sold and the total amount of money in the box. Some of his data are shown below.

**TOTAL AMOUNT OF MONEY  
FROM TICKET SALES**

Number of Tickets Sold	Total Money in Box (dollars)
7	108.75
13	146.25
18	177.50

Assuming all the tickets are the same price, write an equation that represents the situation in the table. Explain how to use your equation to determine the amount of money originally in the box before any tickets were sold and the price of each ticket.

**Show your work.**

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{146.25 - 108.75}{13 - 7} = \frac{37.5}{6} = 6.25$$

$$y = 6.25x + b$$

$$108.75 = 6.25(7) + b$$

$$108.75 = 43.75 + b$$

$$b = 65$$

$$y = 6.25x + 65$$

**Answer**

By using the slope intercept formula, you can see that your equation is  $y = 6.25x + 65$  where your slope (6.25) is the price per ticket and your y-intercept (65) is the money Tim put in before selling any tickets.

### Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. A correct equation is written and used to correctly determine the money originally in the box and the price of each ticket.

## GUIDE PAPER 2

59

Tim is selling tickets to a school sporting event to raise money for his club. He put some extra money in his box before he began. As he sells tickets, he records the number of tickets he has sold and the total amount of money in the box. Some of his data are shown below.

**TOTAL AMOUNT OF MONEY  
FROM TICKET SALES**

Number of Tickets Sold	Total Money in Box (dollars)
7	108.75
13	146.25
18	177.50

Assuming all the tickets are the same price, write an equation that represents the situation in the table. Explain how to use your equation to determine the amount of money originally in the box before any tickets were sold and the price of each ticket.

**Show your work.**

$$y = 6.25x + 65$$

$$\frac{146.25 - 108.75}{13 - 7} = \frac{37.5}{6} = 6.25$$

$$y = 6.25x + b$$

$$108.75 = 6.25(7) + b$$

$$108.75 = 43.75 + b$$

$$108.75 - 43.75 = b$$

$$65 = b$$

**Answer**

In this equation the y-intercept is the money that was in the box before tickets were sold and the slope is the price per ticket

### Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. A correct equation is written and used to correctly determine the money originally in the box and the price of each ticket.

## GUIDE PAPER 3

59

Tim is selling tickets to a school sporting event to raise money for his club. He put some extra money in his box before he began. As he sells tickets, he records the number of tickets he has sold and the total amount of money in the box. Some of his data are shown below.

**TOTAL AMOUNT OF MONEY  
FROM TICKET SALES**

Number of Tickets Sold	Total Money in Box (dollars)
7	108.75
13	146.25
18	177.50

$$5\sqrt{31.25} \\ 6.25$$

$$\begin{array}{r} 177.5 \\ -146.25 \\ \hline 31.25 \end{array}$$

$$31.25 \div 5 = 6.25$$

Assuming all the tickets are the same price, write an equation that represents the situation in the table. Explain how to use your equation to determine the amount of money originally in the box before any tickets were sold and the price of each ticket.

**Show your work.**

$$y = 6.25x + 65$$

$$\begin{array}{r|l} 6 & 102.5 \\ 5 & 96.25 \\ 4 & 90 \\ 3 & 83.75 \\ 2 & 77.5 \\ 1 & 71.25 \\ 0 & 65 \end{array}$$

**Answer**

The data shows that each ticket is worth \$6.25 and there was originally \$65 in the box. My equation represents the table because \$6.25 is my rate of change and \$65 is my initial value.

### Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. A correct equation is written and used to correctly determine the money originally in the box and the price of each ticket.

## GUIDE PAPER 4

59

Tim is selling tickets to a school sporting event to raise money for his club. He put some extra money in his box before he began. As he sells tickets, he records the number of tickets he has sold and the total amount of money in the box. Some of his data are shown below.

**TOTAL AMOUNT OF MONEY  
FROM TICKET SALES**

Number of Tickets Sold	Total Money in Box (dollars)
7	108.75
13	146.25
18	177.50

Assuming all the tickets are the same price, write an equation that represents the situation in the table. Explain how to use your equation to determine the amount of money originally in the box before any tickets were sold and the price of each ticket.

**Show your work.**

$$\begin{array}{r} 108.75 - 146.25 \\ 7 - 13 \\ \hline -37.5 \\ -6 \\ \hline 6.25 \end{array}$$

**Answer**

$$\begin{array}{l} y = mx + b \\ y = 6.25(x) + b \\ 108.75 = 6(25)(7) + b \\ 108.75 = 43.75 + b \\ -43.75 - 43.75 \\ \hline 65.0 = b \end{array}$$

The rate of change is 6.25 dollars per ticket and initial value 65 is the amount of money originally in the box.

### Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The slope and y-intercept are correctly calculated and interpreted as the price of each ticket and the money originally in the box; however, a complete equation combining the two is never written. The response addresses most, but not all aspects of the task.

## GUIDE PAPER 5

59

Tim is selling tickets to a school sporting event to raise money for his club. He put some extra money in his box before he began. As he sells tickets, he records the number of tickets he has sold and the total amount of money in the box. Some of his data are shown below.

**TOTAL AMOUNT OF MONEY  
FROM TICKET SALES**

Number of Tickets Sold	Total Money in Box (dollars)
7	108.75
13	146.25
18	177.50

Assuming all the tickets are the same price, write an equation that represents the situation in the table. Explain how to use your equation to determine the amount of money originally in the box before any tickets were sold and the price of each ticket.

**Show your work.**

$$108.75 - 15.53 = 93.22$$

$$146.25 - 13 = 133.25$$

$$177.50 - 18 = 159.50$$

**Answer**

After doing my work I found the price of each ticket was \$6.25 and the extra money he put was \$43.75.

$$108.75 + 6.25 = 115$$

$$146.25 + 6.25 = 152.50$$

$$177.50 + 6.25 = 183.75$$

6.25  
Price

$y = 6.25x + 43.75$   
equation

### Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The price of each ticket is correctly calculated; however, the original amount of money is incorrectly solved for by adding the price of one ticket to 37.50, resulting in an incorrect y-intercept in the written equation. The response correctly addresses most, but not all aspects of the task.

## GUIDE PAPER 6

59

Tim is selling tickets to a school sporting event to raise money for his club. He put some extra money in his box before he began. As he sells tickets, he records the number of tickets he has sold and the total amount of money in the box. Some of his data are shown below.

65

1	71.25
2	77.5
3	83.75
4	90
5	96.25
6	102.5
7	108.75

**TOTAL AMOUNT OF MONEY FROM TICKET SALES**

Number of Tickets Sold	Total Money in Box (dollars)
6	108.75
13	146.25
18	177.50

7-13

$108.75 - 146.25$

$-6$

$-37.5$

Assuming all the tickets are the same price, write an equation that represents the situation in the table. Explain how to use your equation to determine the amount of money originally in the box before any tickets were sold and the price of each ticket.

Show your work.

Per ticket started      total

$$(6.25x) + 65 = D$$

Answer

I used the equation  $6.25x + 65 = D$   
 because 37.5 dollars was made selling  
 7-13 tickets and 31.25 was made selling  
 13-18 I subtracted and got 6.25 as my  
 total for ticket I kept subtracting and got  
 65 as I started.

### Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The price of each ticket and money originally in the box are correctly calculated and a correct equation is written; however, the response does not adequately explain how to use the equation to solve for these values. The response addresses most, but not all aspects of the task.



## GUIDE PAPER 7

59

Tim is selling tickets to a school sporting event to raise money for his club. He put some extra money in his box before he began. As he sells tickets, he records the number of tickets he has sold and the total amount of money in the box. Some of his data are shown below.

**TOTAL AMOUNT OF MONEY  
FROM TICKET SALES**

Number of Tickets Sold	Total Money in Box (dollars)
7	108.75
13	146.25
18	177.50

Assuming all the tickets are the same price, write an equation that represents the situation in the table. Explain how to use your equation to determine the amount of money originally in the box before any tickets were sold and the price of each ticket.

**Show your work.**

$$\frac{177.50 - 108.75}{18 - 7} = \frac{68.75}{11} = 6.25$$

$$y = 6.25x + b$$

$$b = 71.25$$

**Answer**

$$y = 6.25x + 71.25$$

You can use the equation because all you need to know is how many tickets were sold.

### Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The price of each ticket is correctly calculated and an appropriate equation is written; however, the original amount of money is incorrect with no work shown to support how it was obtained. In addition, the response does not demonstrate how the equation is used to determine these values.



Tim is selling tickets to a school sporting event to raise money for his club. He put some extra money in his box before he began. As he sells tickets, he records the number of tickets he has sold and the total amount of money in the box. Some of his data are shown below.

**TOTAL AMOUNT OF MONEY  
FROM TICKET SALES**

Number of Tickets Sold	Total Money in Box (dollars)
7	108.75
13	146.25
18	177.50

Assuming all the tickets are the same price, write an equation that represents the situation in the table. Explain how to use your equation to determine the amount of money originally in the box before any tickets were sold and the price of each ticket.

**Show your work.**

$$\begin{aligned}
 13x - 7x &= 146.25 - 108.75 \\
 6x &= 37.50 \\
 x &= \$6.25 \\
 6.25 \times 7 &= 43.75 \\
 108.75 - 43.75 &= 65
 \end{aligned}$$

**Answer**

By using the equation,  $13x - 7x = 146.25 - 108.75$ , finding  $x$  will give you the price of each ticket which is \$6.25. If you multiply 6.25 by 7, the result is \$43.75. When you subtract 43.75 from 108.75, you get 65, which is the amount of money originally in the box.

### Score Point 1 (out of 3 points)

This response demonstrates a limited understanding of the mathematical concepts in the task. The price of each ticket and money originally in the box are correctly calculated; however, no general equation is provided and the answer does not adequately explain how the equation is used to determine the ticket price and the original amount of money.

## GUIDE PAPER 9

59

Tim is selling tickets to a school sporting event to raise money for his club. He put some extra money in his box before he began. As he sells tickets, he records the number of tickets he has sold and the total amount of money in the box. Some of his data are shown below.

**TOTAL AMOUNT OF MONEY  
FROM TICKET SALES**

Number of Tickets Sold	Total Money in Box (dollars)
7	108.75
13	146.25
18	177.50

66  
56

37.5  
31.25

Assuming all the tickets are the same price, write an equation that represents the situation in the table. Explain how to use your equation to determine the amount of money originally in the box before any tickets were sold and the price of each ticket.

**Show your work.**

$$y = \frac{37.5}{6}x = 6.25$$

**Answer**

One ticket cost \$6.25. I wrote the equation  $y = \frac{37.5}{6}x$ , so I divided  $37.5 \div 6$  and got 6.25.

### Score Point 1 (out of 3 points)

This response demonstrates a limited understanding of the mathematical concepts in the task. The price of each ticket is correctly calculated and interpreted as a slope in the equation; however, no attempt is made to solve for the original amount of money, resulting in no y-intercept in the equation. The response addresses some elements of the task correctly but reflects a lack of essential understanding.

## GUIDE PAPER 10

59

Tim is selling tickets to a school sporting event to raise money for his club. He put some extra money in his box before he began. As he sells tickets, he records the number of tickets he has sold and the total amount of money in the box. Some of his data are shown below.

**TOTAL AMOUNT OF MONEY  
FROM TICKET SALES**

Number of Tickets Sold	Total Money in Box (dollars)
7	108.75
13	146.25
18	177.50

Assuming all the tickets are the same price, write an equation that represents the situation in the table. Explain how to use your equation to determine the amount of money originally in the box before any tickets were sold and the price of each ticket.

**Show your work.**

$$\frac{108.75}{7} = x \quad \boxed{15.5 = x}$$

**Answer**

each ticket was \$15.5.

### Score Point 0 (out of 3 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in task. The work shows an incorrect procedure to find the price per ticket. There is no work to find the original amount of money and there is no final equation.

# GUIDE PAPER 11

Additional

59

Tim is selling tickets to a school sporting event to raise money for his club. He put some extra money in his box before he began. As he sells tickets, he records the number of tickets he has sold and the total amount of money in the box. Some of his data are shown below.

**TOTAL AMOUNT OF MONEY  
FROM TICKET SALES**

Number of Tickets Sold	Total Money in Box (dollars)
7	108.75
13	146.25
18	177.50

→  
→ 11.05

Assuming all the tickets are the same price, write an equation that represents the situation in the table. Explain how to use your equation to determine the amount of money originally in the box before any tickets were sold and the price of each ticket.

**Show your work.**

$$432.50 \div 38 = x$$

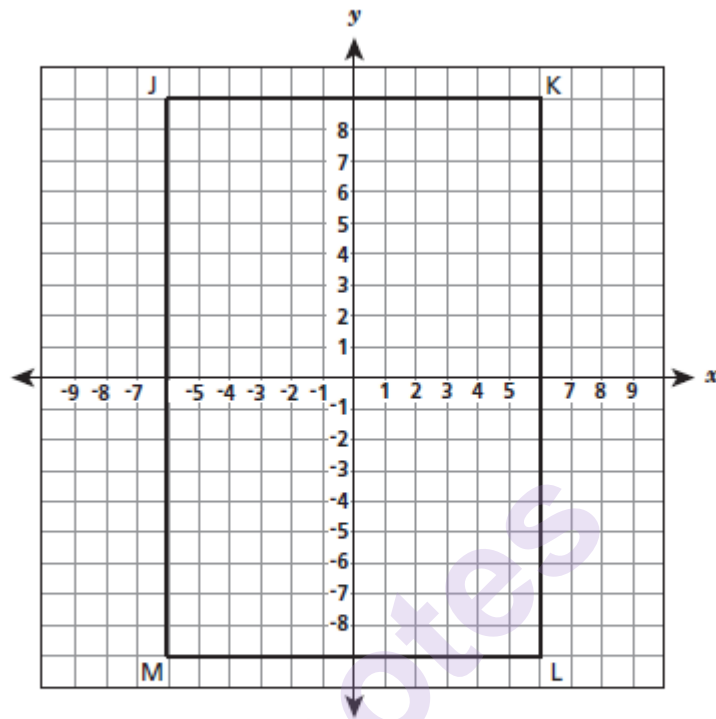
**Answer**

You can use my equation by adding  
all numbers up and then divide it to get  
the amount of money for each ticket.

## 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. The work shows an incorrect procedure to find the price per ticket. There is no work to find the original amount of money. The interpretation of the equation is incorrect.

Rectangle JKLM is shown on the coordinate grid below.



## EXEMPLARY RESPONSE

60

Rectangle JKLM undergoes a sequence of transformations, resulting in rectangle J'K'L'M'.

The length of side K'L' is 6 units. The coordinates of vertex K' are  $(-3, 2)$ , and the coordinates of vertex M' are  $(3, -2)$ .

Describe a sequence of transformations to rectangle JKLM that would result in rectangle J'K'L'M'.

Show your work.

$$KL(s) = K'L'$$

$$18(s) = 6$$

$$s = 1/3$$

$$K'(6 \times 1/3 = 2, 9 \times 1/3 = 3) \text{ so } K'(2, 3)$$

$$M'(-6 \times 1/3 = -2, -9 \times 1/3 = -3) \text{ so } M'(-2, -3)$$

Counterclockwise rotation:  $(x, y) \rightarrow (-y, x)$

$$K'(2, 3) \rightarrow K'(-3, 2)$$

$$M'(-2, -3) \rightarrow M'(3, -2)$$

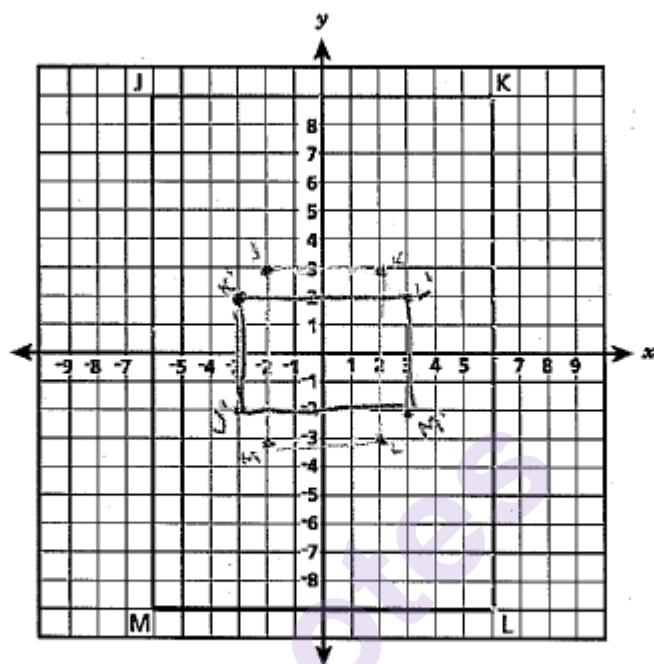
~~Answer~~

Dilation of a scale factor  $1/3$  centered at the origin,  
then a  $90^\circ$  counterclockwise rotation about the origin (or  $270^\circ$  clockwise rotation).

OR a  $90^\circ$  counterclockwise rotation about the origin, then a dilation  
of a scale factor  $1/3$  centered at the origin

OR other valid response

Rectangle JKLM is shown on the coordinate grid below.



60

Rectangle JKLM undergoes a sequence of transformations, resulting in rectangle J'K'L'M'.

The length of side K'L' is 6 units. The coordinates of vertex K' are  $(-3, 2)$ , and the coordinates of vertex M' are  $(3, -2)$ .

Describe a sequence of transformations to rectangle JKLM that would result in rectangle J'K'L'M'.

**Show your work.**

$$KL = 18 \text{ units}$$

$$K'L' = 6 \text{ units}$$

$$\frac{6}{18} = \frac{1}{3}$$

$$K(2, 3) \rightarrow \text{rotation } 90^\circ \text{ counterclockwise} \rightarrow (-3, 2)$$

$$(-y, x)$$

$$M(-2, -3) \rightarrow (3, -2)$$

$$J(-2, 3) \rightarrow (-3, -2)$$

$$L(2, -3) \rightarrow (3, 2)$$

**Answer**

A dilation by a scale factor of  $\frac{1}{3}$ , followed by

a rotation  $90^\circ$  counterclockwise about

the origin.

### Score Point 3 (out of 3 points)

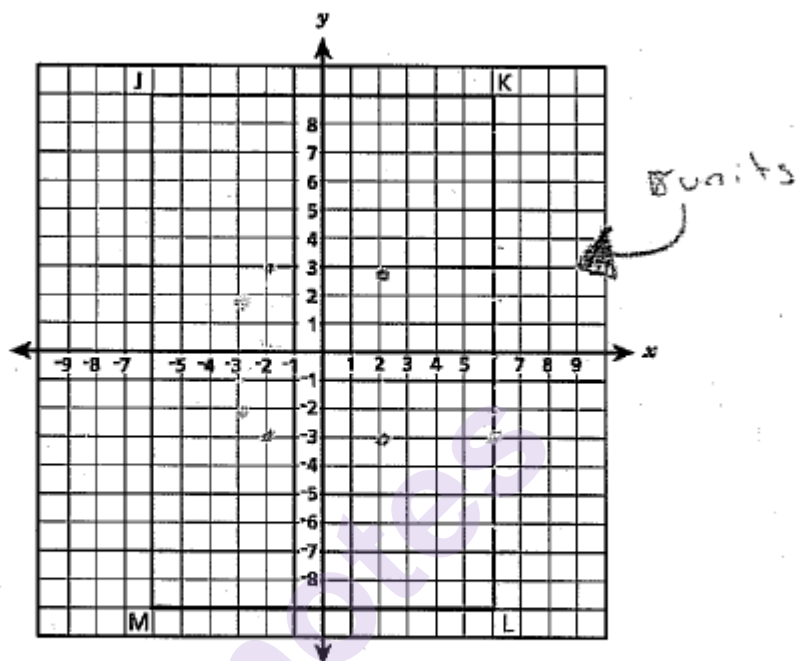
This response demonstrates a thorough understanding of the mathematical concepts in the task. The sequence of transformations is correct and supported by the work.



## GUIDE PAPER 2a

60

Rectangle JKLM is shown on the coordinate grid below.



## GUIDE PAPER 2b

60

Rectangle JKLM undergoes a sequence of transformations, resulting in rectangle J'K'L'M'.

The length of side K'L' is 6 units. The coordinates of vertex K' are  $(-3, 2)$ , and the coordinates of vertex M' are  $(3, -2)$ .

Describe a sequence of transformations to rectangle JKLM that would result in rectangle J'K'L'M'.

**Show your work.**

Rotate  $90^\circ$  counter clockwise

$$\begin{aligned} K(6, 9) \div 3 &= K(2, 3) = K'(-3, 2) \\ L(6, 9) \div 3 &= L(2, 3) = L'(-3, -2) \\ J(6, 9) \div 3 &= J(-2, 3) = J'(-3, -3) \\ M(-6, 9) \div 3 &= M(-2, -3) = M'(3, -2) \end{aligned}$$

**Answer**

First the shape was dilated  
by  $1/3$  then it was rotated  $90^\circ$   
counterclockwise.

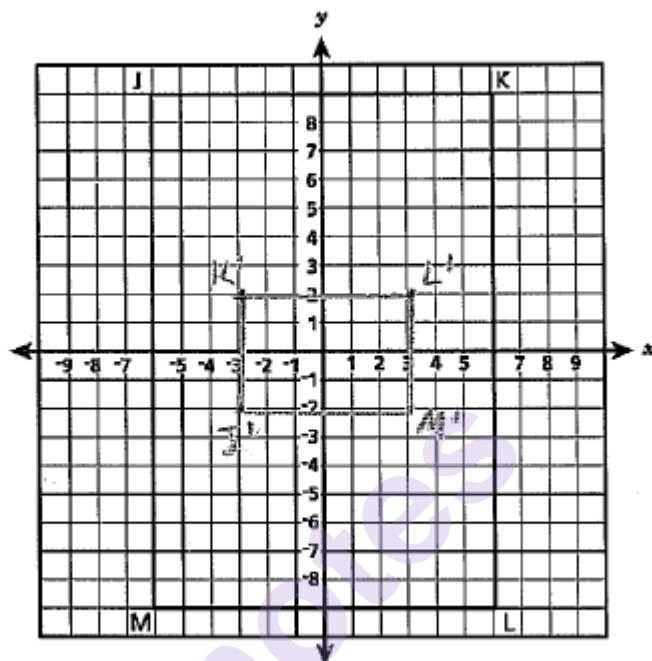
### Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The sequence of transformations is correct and supported by the work. The center of rotation is not specified; however, it is implied that rotation is done about the origin.

## GUIDE PAPER 3a

60

Rectangle JKLM is shown on the coordinate grid below.



## GUIDE PAPER 3b

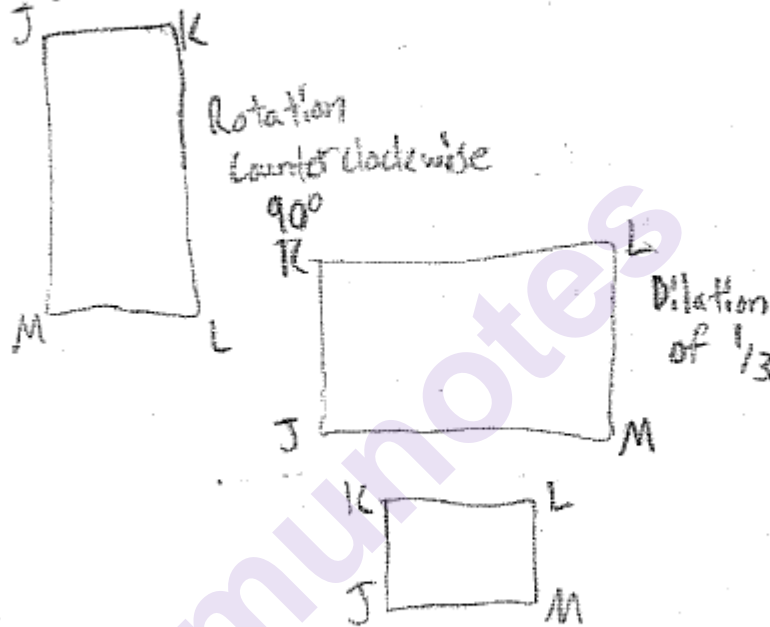
60

Rectangle JKLM undergoes a sequence of transformations, resulting in rectangle J'K'L'M'.

The length of side K'L' is 6 units. The coordinates of vertex K' are  $(-3, 2)$ , and the coordinates of vertex M' are  $(3, -2)$ .

Describe a sequence of transformations to rectangle JKLM that would result in rectangle J'K'L'M'.

**Show your work.**



**Answer**

- Rotation Counter clockwise 90°
- Dilation of 1/3

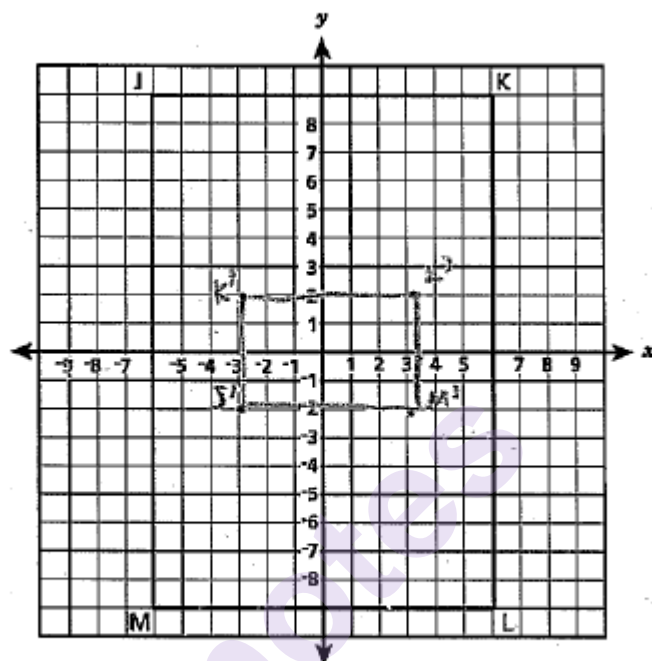
### Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The sequence of transformations is correct and supported by the work. The center of rotation is not specified; however, it is implied that rotation is done about the origin.

## GUIDE PAPER 4a

60

Rectangle JKLM is shown on the coordinate grid below.



## GUIDE PAPER 4b

60

Rectangle JKLM undergoes a sequence of transformations, resulting in rectangle J'K'L'M'.

The length of side K'L' is 6 units. The coordinates of vertex K' are  $(-3, 2)$ , and the coordinates of vertex M' are  $(3, -2)$ .

Describe a sequence of transformations to rectangle JKLM that would result in rectangle J'K'L'M'.

**Show your work.**

$$\begin{aligned}
 J(-6, 9) &\rightarrow (-3, -2) \\
 K(6, 9) &\rightarrow (-3, 2) \\
 L(6, -9) &\rightarrow (3, 2) \\
 M(-6, -9) &\rightarrow (3, -2)
 \end{aligned}$$

$J(-6, 9) \xrightarrow{90^\circ \text{ c.c.w.}} (-9, 6) \xrightarrow{\text{Dilation: } \frac{1}{2}} J'(-3, 2)$   
 $K(6, 9) \xrightarrow{90^\circ \text{ c.c.w.}} (-9, 6) \xrightarrow{\text{Dilation: } \frac{1}{2}} K'(-3, 2)$   
 $L(6, -9) \xrightarrow{90^\circ \text{ c.c.w.}} (9, 6) \xrightarrow{\text{Dilation: } \frac{1}{2}} L'(3, 2)$   
 $M(-6, -9) \xrightarrow{90^\circ \text{ c.c.w.}} (9, 6) \xrightarrow{\text{Dilation: } \frac{1}{2}} M'(3, -2)$

**Answer**

All coordinates of the rectangle JKLM  
under go rotation and dilation. All coordinates  
under go a rotation  $90^\circ$  counter-clockwise  
and are dilated by a scale factor of  
 $\frac{1}{2}$ .

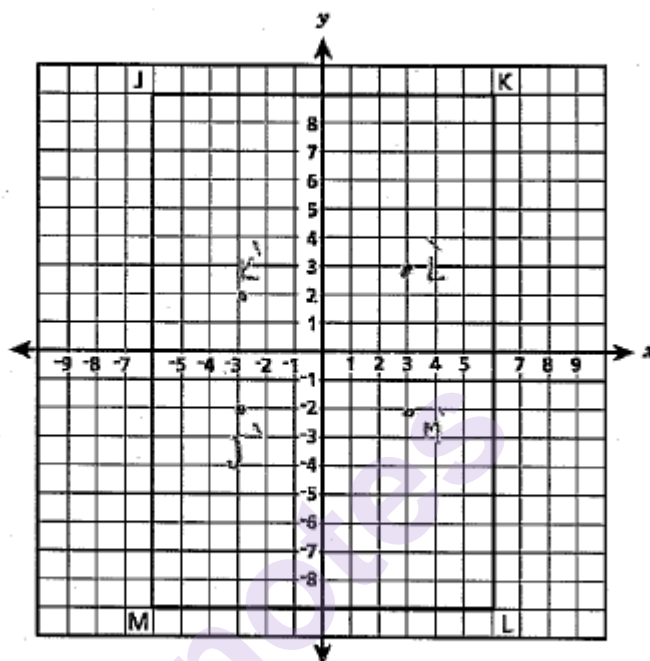
### Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. A  $90^\circ$  counterclockwise rotation is a correct statement to describe one part of the sequence of the transformations; however, the scale factor of the dilation is incorrect. The response addresses most, but not all elements of the task correctly.

## GUIDE PAPER 5a

60

Rectangle JKLM is shown on the coordinate grid below.



## GUIDE PAPER 5b

60

Rectangle JKLM undergoes a sequence of transformations, resulting in rectangle J'K'L'M'.

The length of side K'L' is 6 units. The coordinates of vertex K' are  $(-3, 2)$ , and the coordinates of vertex M' are  $(3, -2)$ .

Describe a sequence of transformations to rectangle JKLM that would result in rectangle J'K'L'M'.

**Show your work.**

**Answer**

This rectangle went through a dilation of  $\frac{1}{3}$  this rectangle also went through rotation 90° clockwise

### Score Point 2 (out of 3 points)

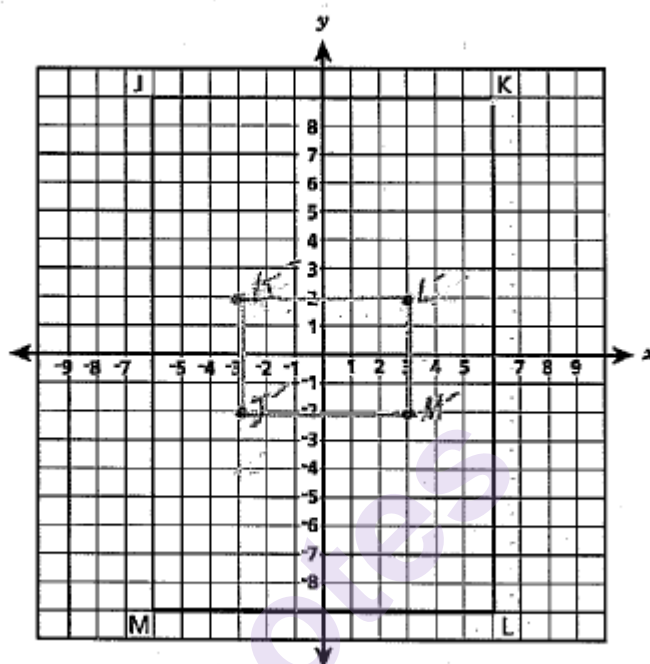
This response demonstrates a partial understanding of the mathematical concepts in the task. Rotation and dilation are correctly described as parts of the sequence of transformations; however, the direction of rotation is incorrect. The response correctly addresses most, but not all aspects of the task.



## GUIDE PAPER 6a

60

Rectangle JKLM is shown on the coordinate grid below.



## GUIDE PAPER 6b

60

Rectangle JKLM undergoes a sequence of transformations, resulting in rectangle J'K'L'M'.

The length of side K'L' is 6 units. The coordinates of vertex K' are  $(-3, 2)$ , and the coordinates of vertex M' are  $(3, -2)$ .

Describe a sequence of transformations to rectangle JKLM that would result in rectangle J'K'L'M'.

**Show your work.**

$$K = (6, 9) \div 3 = (2, 3)$$

$$(2, 3) \text{ Rotation } 90^\circ = (-3, 2) = K'$$

**Answer**

Dilation of  $\frac{1}{3}$ , then a rotation of  $90^\circ$

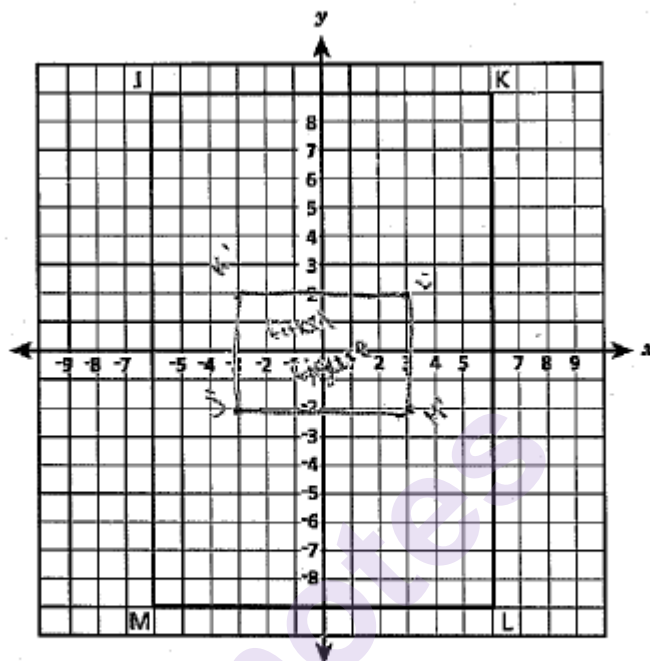
### Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. Rotation and dilation are correctly described as parts of the sequence of transformations; however, the direction of rotation is not specified. The response correctly addresses most, but not all aspects of the task.

## GUIDE PAPER 7a

60

Rectangle JKLM is shown on the coordinate grid below.



## GUIDE PAPER 7b

60

Rectangle JKLM undergoes a sequence of transformations, resulting in rectangle J'K'L'M'.

The length of side K'L' is 6 units. The coordinates of vertex K' are  $(-3, 2)$ , and the coordinates of vertex M' are  $(3, -2)$ .

Describe a sequence of transformations to rectangle JKLM that would result in rectangle J'K'L'M'.

**Show your work.**

$$K = (6, 9)$$

$$K' = (-3, 2)$$

$$M = (6, 9)$$

$$M' = (3, -2)$$

**Answer**

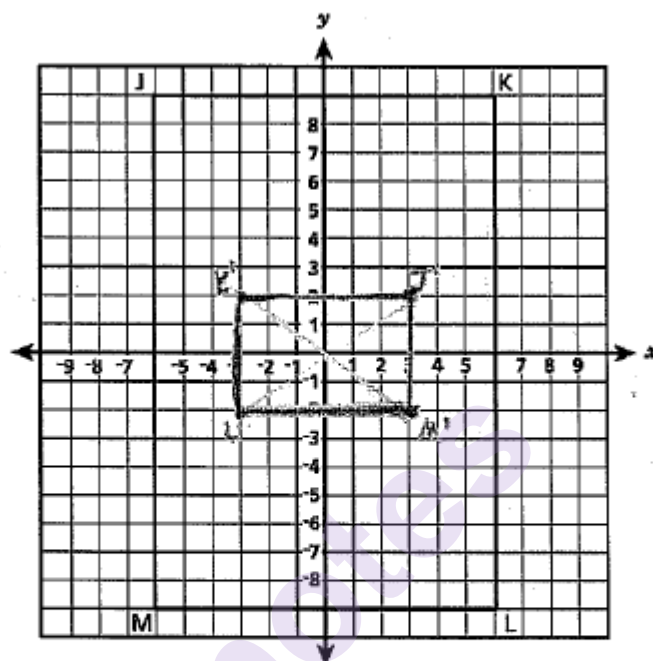
A rotation of  $90^\circ$  counter clockwise and a dilation of -2

counter clockwise

### Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. A  $90^\circ$  counterclockwise rotation is a correct description of one transformation. There is no work shown to find the dilation scale factor, and the dilation factor of  $-2$  is incorrect. Although the response recognizes rotation and dilation are parts of the sequence of transformations, the negative value for the dilation scale factor reflects a lack of essential understanding.

Rectangle JKLM is shown on the coordinate grid below.



$$\begin{aligned} K &= (-3, 2) \\ M &= (3, -2) \\ K'L' &= 6 \text{ units} \end{aligned}$$

Rectangle JKLM undergoes a sequence of transformations, resulting in rectangle J'K'L'M'.

The length of side K'L' is 6 units. The coordinates of vertex K' are  $(-3, 2)$ , and the coordinates of vertex M' are  $(3, -2)$ .

Describe a sequence of transformations to rectangle JKLM that would result in rectangle J'K'L'M'.

**Show your work.**

$$\begin{array}{ll} M = (-6, -9) & M' = (3, -2) \\ J = (-6, 9) & J' = (3, 2) \\ K = (-6, 9) & K' = (-3, 2) \\ L = (-6, 9) & L' = (-3, -2) \end{array}$$

**Answer**

A dilation of  $\frac{1}{3}$  and a rotation  $180^\circ$   
clockwise

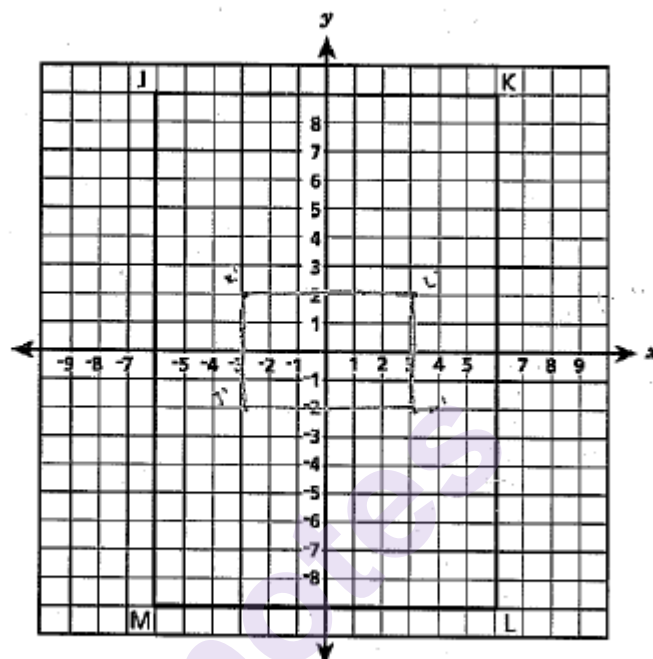
### Score Point 1 (out of 3 points)

This response demonstrates a limited understanding of the mathematical concepts in the task. A correct dilation factor is given; however, the direction and degree of rotation is incorrect. The response correctly addresses some elements of the task, but reflects a lack of essential understanding.

## GUIDE PAPER 9a

60

Rectangle JKLM is shown on the coordinate grid below.



## GUIDE PAPER 9b

60

Rectangle JKLM undergoes a sequence of transformations, resulting in rectangle J'K'L'M'.

The length of side K'L' is 6 units. The coordinates of vertex K' are  $(-3, 2)$ , and the coordinates of vertex M' are  $(3, -2)$ .

Describe a sequence of transformations to rectangle JKLM that would result in rectangle J'K'L'M'.

**Show your work.**

**Answer**

A sequence of transformations to rectangle JKLM that would result in rectangle J'K'L'M' would be a dilation of 3 on a rotation of  $270^\circ$ .

### Score Point 1 (out of 3 points)

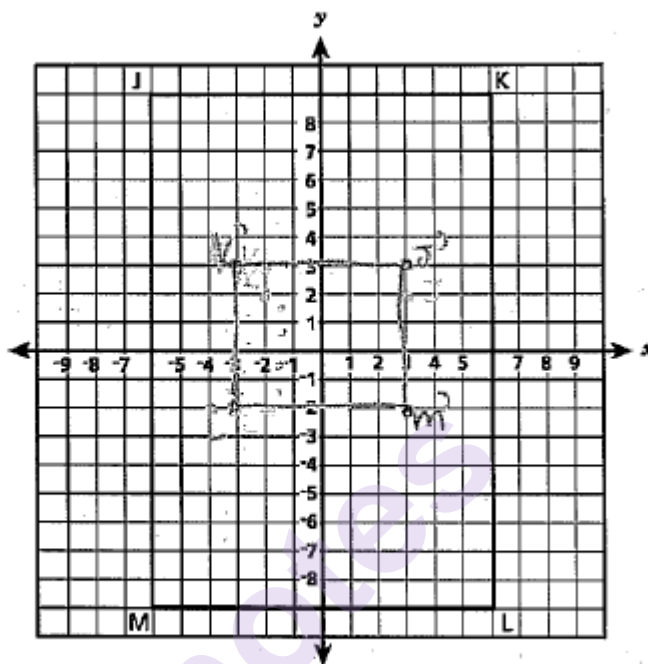
This response demonstrates a limited understanding of the mathematical concepts in the task. The dilation scale factor of 3 is incorrect and the direction of rotation is not specified: it must be clockwise for the given magnitude of  $270^\circ$ . The response correctly addresses some elements of the task, but reflects a lack of essential understanding.



## GUIDE PAPER 10a

60

Rectangle JKLM is shown on the coordinate grid below.



## GUIDE PAPER 10b

60

Rectangle JKLM undergoes a sequence of transformations, resulting in rectangle J'K'L'M'.

The length of side K'L' is 6 units. The coordinates of vertex K' are  $(-3, 2)$ , and the coordinates of vertex M' are  $(3, -2)$ .

Describe a sequence of transformations to rectangle JKLM that would result in rectangle J'K'L'M'.

**Show your work.**

a reflection and a dilation  
by  $-2$

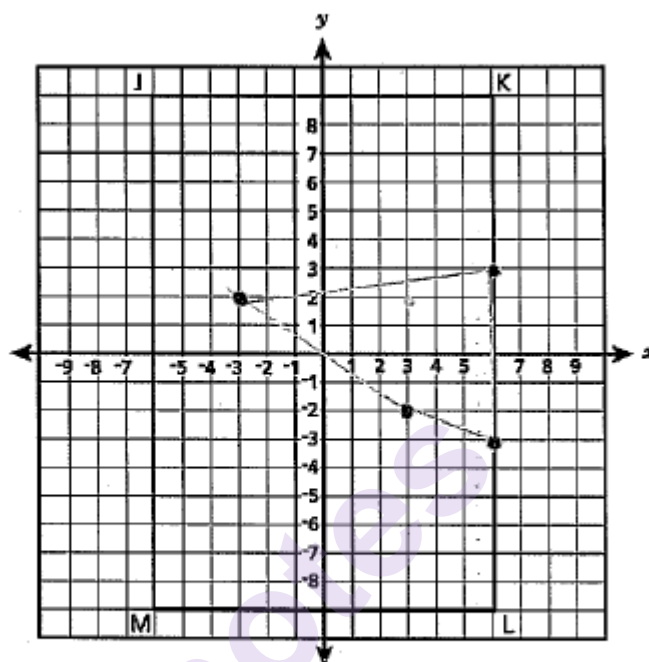
**Answer**

A reflection and a dilation <sup>by  $-2$</sup>  would  
make J'K'L'M' from JKLM.

### 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. The dilation factor of  $-2$  is incorrect, and reflection is not a correct transformation. Although the response recognizes dilation is one part of the sequence of transformations, the negative value for dilation scale factor reflects no overall understanding.

Rectangle JKLM is shown on the coordinate grid below.



60

Rectangle JKLM undergoes a sequence of transformations, resulting in rectangle J'K'L'M'.

The length of side K'L' is 6 units. The coordinates of vertex K' are  $(-3, 2)$ , and the coordinates of vertex M' are  $(3, -2)$ .

Describe a sequence of transformations to rectangle JKLM that would result in rectangle J'K'L'M'.

**Show your work.**

**Answer**

the sequence of transformations to  
rectangle J'K'L'M' is that it shaped  
like a triangle.

**Score Point 0 (out of 3 points)**

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in task. The response is irrelevant and shows no understanding of the necessary transformations.

Oliver works at a bookstore. He packed 20 identical paperbacks and 9 identical textbooks in a box. The total mass of the books was 44.4 pounds. After he put 1 more textbook and 5 more paperbacks in the box, the total mass of the books was 51 pounds.

Write a system of equations that can be used to determine  $p$ , the mass, in pounds, of one paperback, and  $t$ , the mass, in pounds, of one textbook.

**Answer**

---

---

Solve the system of equations to find the two masses.

**Show your work.**

**Mass of one paperback** \_\_\_\_\_ pound(s)

**Mass of one textbook** \_\_\_\_\_ pound(s)

## EXEMPLARY RESPONSE

61

Oliver works at a bookstore. He packed 20 identical paperbacks and 9 identical textbooks in a box. The total mass of the books was 44.4 pounds. After he put 1 more textbook and 5 more paperbacks in the box, the total mass of the books was 51 pounds.

Write a system of equations that can be used to determine  $p$ , the mass, in pounds, of one paperback, and  $t$ , the mass, in pounds, of one textbook.

**Answer**

$$20p + 9t = 44.4$$

OR other valid systems

$$25p + 10t = 51$$

Solve the system of equations to find the two masses.

**Show your work.**

$$20p + 9t = 44.4$$

$$20p = 44.4 - 9t$$

$$p = 2.22 - 0.45t$$

$$25(2.22 - 0.45t) + 10t = 51$$

$$55.5 - 11.25t + 10t = 51$$

$$55.5 - 1.25t = 51$$

$$-1.25t = -4.5$$

$$t = 3.6$$

$$20p + 9(3.6) = 44.4$$

$$20p + 32.4 = 44.4$$

$$20p = 12$$

$$p = 0.6$$

OR other valid process

**Mass of one paperback** 0.6 pound(s)

**Mass of one textbook** 3.6 pound(s)

# GUIDE PAPER 1

Additional

61

Oliver works at a bookstore. He packed 20 identical paperbacks and 9 identical textbooks in a box. The total mass of the books was 44.4 pounds. After he put 1 more textbook and 5 more paperbacks in the box, the total mass of the books was 51 pounds.

Write a system of equations that can be used to determine  $p$ , the mass, in pounds, of one paperback, and  $t$ , the mass, in pounds, of one textbook.

**Answer**

$$\begin{aligned} 20p + 9t &= 44.4 \\ + 25p + 10t &= 51 \end{aligned}$$

Solve the system of equations to find the two masses.

**Show your work.**

$$\begin{aligned} -1.25(20p + 9t &= 44.4) \\ + 25p + 10t &= 51 \\ \hline -25p - 11.25t &= -55.5 \\ + 25p + 10t &= 51 \\ \hline -1.25t &= -4.5 \\ -1.25 &-1.25 \\ \hline t &= 3.6 \end{aligned}$$

$$\begin{aligned} 20p + 9t &= 44.4 \\ 20p + 9(3.6) &= 44.4 \\ 20p + 32.4 &= 44.4 \\ -32.4 &-32.4 \\ \hline 20p &= 12 \\ 20 &20 \\ \hline p &= 0.6 \end{aligned}$$

Mass of one paperback 0.6 pound(s)

Mass of one textbook 3.6 pound(s)

## Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response provides a correct system of equations to solve for the values  $p$  and  $t$  and the system is solved correctly.

## GUIDE PAPER 2

61

Oliver works at a bookstore. He packed 20 identical paperbacks and 9 identical textbooks in a box. The total mass of the books was 44.4 pounds. After he put 1 more textbook and 5 more paperbacks in the box, the total mass of the books was 51 pounds.

Write a system of equations that can be used to determine  $p$ , the mass, in pounds, of one paperback, and  $t$ , the mass, in pounds, of one textbook.

**Answer**

$$20p + 9t = 44.4$$

$$p = -.2t + 1.32$$

Solve the system of equations to find the two masses.

**Show your work.**

$$20(-.2t + 1.32) + 9t = 44.4$$

$$-4t + 26.4 + 9t = 44.4$$

$$13t + 26.4 = 44.4$$

$$-26.4 \quad -26.4$$

$$\frac{5t}{5} = \frac{18}{5}$$

$$t = 3.6$$

$$5p + 1t = 6.6$$

$$-1p \quad -1p$$

$$\frac{5p}{5} = \frac{-1t + 6.6}{5}$$

$$p = -.2t + 1.32$$

$$p = -.2(3.6) + 1.32$$

$$p = -.72 + 1.32$$

$$p = .6$$

Mass of one paperback .6 pound(s)

Mass of one textbook 3.6 pound(s)

### Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response provides a correct system of equations to solve for the values of  $p$  and  $t$ ; the second equation is equivalent to  $5p + t = 6.6$  and is a correct equation describing the mass of 5 paperbacks and 1 textbook. The system of equations is solved correctly.



## GUIDE PAPER 3

61

Oliver works at a bookstore. He packed 20 identical paperbacks and 9 identical textbooks in a box. The total mass of the books was 44.4 pounds. After he put 1 more textbook and 5 more paperbacks in the box, the total mass of the books was 51.0 pounds.

Write a system of equations that can be used to determine  $p$ , the mass, in pounds, of one paperback, and  $t$ , the mass, in pounds, of one textbook.

**Answer**

$$\begin{aligned} \cancel{20x + 9y} &= \cancel{44.4} & P = \\ \cancel{25x + 14y} &= \cancel{51.0} \\ \cancel{5x + 5y} &= \cancel{10.2} \end{aligned}$$

Solve the system of equations to find the two masses.

**Show your work.**

$$5x + 5y = 10.2$$

$$\frac{2y}{2} = \frac{-5x + 10.2}{2}$$

$$y = -2.5x + 5.1$$

$$20(.6) + 9y = 44.4$$

$$12 + 9y = 44.4$$

$$9y = 32.4$$

Mass of one paperback .6 pound(s)

Mass of one textbook 3.6 pound(s)

$$20x + 9(-2.5x + 5.1) = 44.4$$

$$20x + (-22.5x + 45.9) = 44.4$$

$$-2.5x + 45.9 = 44.4$$

$$-2.5x = -1.5$$

$$x = .6$$

### Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response provides a correct system of equations to solve for the values of  $p$  and  $t$ . Although the system of equations is crossed out in the answer blank, correct equations are rewritten in the work below and the system is solved correctly.

## GUIDE PAPER 4

61

Oliver works at a bookstore. He packed 20 identical paperbacks and 9 identical textbooks in a box. The total mass of the books was 44.4 pounds. After he put 1 more textbook and 5 more paperbacks in the box, the total mass of the books was 51 pounds.

Write a system of equations that can be used to determine  $p$ , the mass, in pounds, of one paperback, and  $t$ , the mass, in pounds, of one textbook.

**Answer**

$$20p + 9t = 44.4 \quad 25p + 10t = 51$$

Solve the system of equations to find the two masses.

**Show your work.**

$$\begin{array}{r} 5(20p + 9t = 44.4) \\ - 4(25p + 10t = 51) \\ \hline 100p + 45t = 222 \\ - 100p - 40t = -204 \\ \hline 5t = 18 \end{array}$$

Mass of one paperback 0.6 pound(s)

Mass of one textbook 3.6 pound(s)

### Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response provides a correct system of equations to solve for the values  $p$  and  $t$  and solves it correctly; however, the required work is incomplete.

## GUIDE PAPER 5

61

Oliver works at a bookstore. He packed 20 identical paperbacks and 9 identical textbooks in a box. The total mass of the books was 44.4 pounds. After he put 1 more textbook and 5 more paperbacks in the box, the total mass of the books was 51 pounds.

Write a system of equations that can be used to determine  $p$ , the mass, in pounds, of one paperback, and  $t$ , the mass, in pounds, of one textbook.

**Answer**

$$\begin{aligned} 20p + 9t &= 44.4 \\ (9) \quad 5p + t &= 51.0 \end{aligned}$$

Solve the system of equations to find the two masses.

**Show your work.**

$$\begin{array}{r} 20p + 9t = 44.4 \\ -45p - 9t = -459.0 \\ \hline -25p = -414.6 \\ \hline -25 \quad -25 \\ \hline p = 16.584 \end{array}$$

$$\begin{aligned} 5(16.6) + t &= 51 \\ 83 + t &= 51 \\ -83 \quad -83 \\ \hline t &= -32 \end{aligned}$$

Mass of one paperback 16.58 pound(s)

Mass of one textbook 32 pound(s)

### Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response has only one correct equation: the second equation has incorrect coefficients of  $p$  and  $t$ . This incorrect system is then correctly solved. The solution is missing a negative sign by 32 (it should be negative 32), suggesting an understanding that mass must be positive. The response correctly addresses most, but not all elements of the task.

## GUIDE PAPER 6

61

Oliver works at a bookstore. He packed 20 identical paperbacks and 9 identical textbooks in a box. The total mass of the books was 44.4 pounds. After he put 1 more textbook and 5 more paperbacks in the box, the total mass of the books was 51 pounds.

Write a system of equations that can be used to determine  $p$ , the mass, in pounds, of one paperback, and  $t$ , the mass, in pounds, of one textbook.

**Answer**

$$\begin{aligned} 20p + 9t &= 44.4 \\ 25p + 14t &= 51 \end{aligned}$$

Solve the system of equations to find the two masses.

**Show your work.**

$$\begin{aligned} 10(20p + 9t) &= 444 \\ 9(25p + 14t) &= 51 \\ \hline 200p + 90t &= 444 \\ -225p + 126t &= 459 \\ \hline -25p + 27t &= 903 \\ -25p &= 903 - 27t \\ 25p &= 27t - 903 \\ p &= \frac{27t - 903}{25} \end{aligned}$$

Mass of one paperback 6 pound(s)

Mass of one textbook 5 pound(s)

### Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response provides a correct system of equations to solve for the values of  $p$  and  $t$  and correctly solves for the value of  $p$ . However, there is no work solving for  $t$ , and the solution of 5 is incorrect. The response correctly addresses most, but not all elements of the task.

## GUIDE PAPER 7

61

Oliver works at a bookstore. He packed 20 identical paperbacks and 9 identical textbooks in a box. The total mass of the books was 44.4 pounds. After he put 1 more textbook and 5 more paperbacks in the box, the total mass of the books was 51 pounds.

Write a system of equations that can be used to determine  $p$ , the mass, in pounds, of one paperback, and  $t$ , the mass, in pounds, of one textbook.

**Answer**

$$20t + 9p = 44.4 \text{ lbs.}$$

$$21t + 14p = 51 \text{ lbs.}$$

Solve the system of equations to find the two masses.  $p =$

**Show your work.**

$$20t + 9p = 44.4 \text{ lbs.}$$

$$21p + 14t = 51 \text{ lbs}$$

$$\begin{array}{r} 21p \\ - 21t \\ \hline \end{array}$$

$$14t = 51 - 21t$$

$$\frac{14t}{14} = \frac{-21t}{14} + \frac{51}{14}$$

$$t = -1.5p + 3.6$$

$$t = -1.5(0.351) + 3.6$$

$$t = 4.265$$

Mass of one paperback 0.351 pound(s)

Mass of one textbook 4.265 pound(s)

$$\begin{array}{r} 20p + 9t = 44.4 \\ - 20t \\ \hline \end{array}$$

$$9t = 44.4 - 20p$$

$$\frac{9t}{9} = \frac{-20p}{9} + \frac{44.4}{9}$$

$$t = -2.2\bar{2}p + 4.9\bar{3}$$

$$\begin{array}{r} 1.5p + 3.6 = -2.2\bar{2}p + 4.9\bar{3} \\ + 2.2\bar{2}p \\ \hline \end{array}$$

$$3.7p + 3.6 = 4.9\bar{3}$$

$$\begin{array}{r} 3.7p + 3.6 = 4.9\bar{3} \\ - 3.6 \\ \hline \end{array}$$

$$\frac{3.7p}{3.7} = \frac{1.3}{3.7}$$

$$p = 0.351$$

### Score Point 1 (out of 3 points)

This response demonstrates a limited understanding of the mathematical concepts in the task. The response has only one correct equation: the second equation has incorrect coefficients of  $p$  and  $t$ . The system is then solved incorrectly, even accounting for the prior error in the coefficients. The response addresses some elements of the task correctly but exhibits multiple flaws in reasoning.

# GUIDE PAPER 8

Additional

61

Oliver works at a bookstore. He packed 20 identical paperbacks and 9 identical textbooks in a box. The total mass of the books was 44.4 pounds. After he put 1 more textbook and 5 more paperbacks in the box, the total mass of the books was 51 pounds.

Write a system of equations that can be used to determine  $p$ , the mass, in pounds, of one paperback, and  $t$ , the mass, in pounds, of one textbook.

**Answer**

$$\begin{aligned} 20p + 9t &= 44.4 \\ t + 5p &= 6.6 \end{aligned}$$

Solve the system of equations to find the two masses.

**Show your work.**

$$\begin{aligned} t + 5p &= 6.6 & 20(1.6) + 9(3.3) &= 44.4 \\ 3.3 + 5 \times 6 &= 6.6 & 12 + 29.7 &= 44.4 \\ 6.6 &= 6.6 \checkmark & 44.4 &= 44.4 \checkmark \end{aligned}$$

Mass of one paperback 1.6 pound(s)

Mass of one textbook 3.3 pound(s)

## Score Point 1 (out of 3 points)

This response demonstrates a limited understanding of the mathematical concepts in the task. The response provides a correct system of equations to solve for the values of  $p$  and  $t$ . One correct and one incorrect solution are provided via trial-and-error: there is no work for formally solving the system of equations. The response addresses some elements of the task correctly, but reflects a lack of essential understanding of how to solve a system of equations.

## GUIDE PAPER 9

61

Oliver works at a bookstore. He packed 20 identical paperbacks and 9 identical textbooks in a box. The total mass of the books was 44.4 pounds. After he put 1 more textbook and 5 more paperbacks in the box, the total mass of the books was 51 pounds.

Write a system of equations that can be used to determine  $p$ , the mass, in pounds, of one paperback, and  $t$ , the mass, in pounds, of one textbook.

**Answer**

$$44.4 = 20p + 9t$$

Solve the system of equations to find the two masses.

**Show your work:**

20 paperbacks  
9 textbooks

$$51 = 25p + 10t$$

$$44.4 = 20p + 9t$$

Mass of one paperback 1.1 pound(s)

Mass of one textbook 2 pound(s)

### Score Point 1 (out of 3 points)

This response demonstrates a limited understanding of the mathematical concepts in the task. The response provides a correct system of equations to solve for the values of  $p$  and  $t$ ; however, the solution is incorrect and there is no work provided.

## GUIDE PAPER 10

61

Oliver works at a bookstore. He packed 20 identical paperbacks and 9 identical textbooks in a box. The total mass of the books was 44.4 pounds. After he put 1 more textbook and 5 more paperbacks in the box, the total mass of the books was 51 pounds.

Write a system of equations that can be used to determine  $p$ , the mass, in pounds, of one paperback, and  $t$ , the mass, in pounds, of one textbook.

**Answer**

$$y = 1.53p + 0t$$

Solve the system of equations to find the two masses.

**Show your work.**

$$\frac{44.4}{29} = 1.53$$

Mass of one paperback 1.53 pound(s)

Mass of one textbook 1.53 pound(s)

### 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. The equation, work, and solution provided are incorrect.



# GUIDE PAPER 11

Additional

61

Oliver works at a bookstore. He packed 20 identical paperbacks and 9 identical textbooks in a box. The total mass of the books was 44.4 pounds. After he put 1 more textbook and 5 more paperbacks in the box, the total mass of the books was 51 pounds.

Write a system of equations that can be used to determine  $p$ , the mass, in pounds, of one paperback, and  $t$ , the mass, in pounds, of one textbook.

**Answer**

$$20p + 9t = 44.4 \text{ lbs}$$

Solve the system of equations to find the two masses.

**Show your work.**

$$20(.60) + 9(3.6)$$

5

3  
+ 2

Mass of one paperback .60 pound(s)

Mass of one textbook 3.6 pound(s)

## 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. The work does not contain a system of equations: only one correct equation is provided. Although the solution is correct, there is no work to support how they were obtained.

