



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

2017 Common Core  
Mathematics Test

Grade **8**

Scoring Leader Materials

Training Set



## 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

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### FORMULAS

Triangle

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

Parallelogram

$$A = bh$$

Circle

$$A = \pi r^2$$

Circle

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

General Prisms

$$V = Bh$$

Cylinder

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

Sphere

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

Cone

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

Pythagorean Theorem

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

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## 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).

## 2017 2- and 3-Point Mathematics Scoring Policies

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

1. If a student shows the work in other than a designated “Show your work” or “Explain” area, that work should still be scored.
2. If the question requires students to show their work, and the student shows appropriate work and clearly identifies a correct answer but fails to write that answer in the answer blank, the student should still receive full credit.
3. If students are directed to show work, a correct answer with **no** work shown receives **no** credit.
4. If students are **not** directed to show work, any work shown will **not** be scored. This applies to items that do **not** ask for any work and items that ask for work for one part and do **not** ask for work in another part.
5. If the student provides one legible response (and one response only), the rater should score the response, even if it has been crossed out.
6. If the student has written more than one response but has crossed some out, the rater should score only the response that has **not** been crossed out.
7. Trial-and-error responses are **not** subject to Scoring Policy #6 above, since crossing out is part of the trial-and-error process.
8. If a response shows repeated occurrences of the same conceptual error within a question, the conceptual error should **not** be considered more than once in gauging the demonstrated level of understanding.
9. In questions requiring number sentences, the number sentences must be written horizontally.
10. 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.

52

Determine the solution to the equation below.

$$-3.1x + 7 - 7.4x = 1.5x - 6\left(x - \frac{3}{2}\right)$$

*Show your work.*

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

## EXEMPLARY RESPONSE

52

Determine the solution to the equation below.

$$-3.1x + 7 - 7.4x = 1.5x - 6\left(x - \frac{3}{2}\right)$$

*Show your work.*

$$-3.1x + 7 - 7.4x = 1.5x - 6x + 9$$

$$-10.5x + 7 = -4.5x + 9$$

$$-10.5x + 4.5x = 9 - 7$$

$$-6x = 2$$

$$x = \frac{2}{-6} = -\frac{1}{3}$$

or other valid process

$$x = -\frac{1}{3}$$

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

52

Determine the solution to the equation below.

$$-3.1x + 7 - 7.4x = 1.5x - 6\left(x - \frac{3}{2}\right)$$

**Show your work.**

$$\begin{array}{r} -3.1x + 7 - 7.4x = 1.5x - 6x + \frac{18}{2} \\ + 6.6x \\ \hline -3.1x + 7 - 1.4x = 1.5x + \frac{18}{2} \\ + 3.1x \\ \hline 7 - 1.4x = 4.6x + 9 \\ -7 \qquad \qquad \qquad -7 \\ \hline -1.4x = 4.6x + 2 \\ -4.6x \qquad -4.6x \\ \hline -6.0x = 2 \\ \frac{-6.0x}{-6} = \frac{2}{-6} \\ x = -\frac{1}{3} \end{array}$$

**Answer**  $x = -\frac{1}{3}$

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. The equation is solved correctly using appropriate procedures.

## GUIDE PAPER 2

52

Determine the solution to the equation below.

$$-3.1x + 7 - 7.4x = 1.5x - 6\left(x - \frac{3}{2}\right)$$

**Show your work.**

$$-3.1x + 7 - 7.4x = 1.5x - 6\left(x - \frac{3}{2}\right)$$

$$-10.5x + 7 = 1.5x - 6x + 9$$

$$-10.5x + 7 = -4.5x + 9$$

$$\begin{array}{r} +10.5x \quad +10.5x \\ \hline 7 = 6x + 9 \end{array}$$

$$7 = 6x + 9$$

$$-2 = 6x$$

$$-\frac{1}{3} = x$$

$$-10.5\left(-\frac{1}{3}\right) + 7 = 1.5x - 6x + 9$$

$$3.5 + 7 = -4.5\left(\frac{1}{3}\right) + 9$$

$$3.5 + 7 = 1.5 + 9$$

$$10.5 = 10.5$$

**Answer**

$$x = -\frac{1}{3}$$

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. The equation is solved correctly using appropriate procedures.

## GUIDE PAPER 3

52

Determine the solution to the equation below.

$$-3.1x + 7 - 7.4x = 1.5x - 6\left(x - \frac{3}{2}\right)$$

**Show your work.**

$$-3.1x + 7 - 7.4x = 1.5x - 6\left(x - \frac{3}{2}\right)$$

$$-3.1x + 7 - 7.4x = 1.5x - 6x + 9$$

$$-10.5x + 7 = -4.5x + 9$$

$$+4.5 \qquad +4.5$$

$$-6x + 7 = 9$$

$$-7 \quad -7$$

$$-6x = 2$$

$$\frac{-6}{-6} \quad \frac{-6}{-6}$$

$$x = -0.\bar{3}$$

**Answer**  $-0.\bar{3}$

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. The equation is solved correctly using appropriate procedures. Providing the solution as a repeating decimal is acceptable and correct.

## GUIDE PAPER 4

52

Determine the solution to the equation below.

$$-3.1x + 7 - 7.4x = 1.5x - 6\left(x - \frac{3}{2}\right)$$

**Show your work.**

$$\begin{aligned} -3.1x + 7 - 7.4x &= 1.5x - 6x + 9 \\ -10.5x + 7 &= -4.5x + 9 \\ \hline -10.5x &= -4.5x + 2 \\ + 4.5x &+ 4.5x \\ \hline -6x &= 2 \\ \frac{-6x}{-6} &= \frac{2}{-6} \\ x &= -0.3 \end{aligned}$$

**Answer**  $-0.3$

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

This response demonstrates only a partial understanding of the mathematical concepts in the task. The equation is solved correctly; however, the solution is truncated by not providing the overline (vinculum) to indicate that the decimal repeats. The response contains an incorrect solution but applies an appropriate process.

## GUIDE PAPER 5

52

Determine the solution to the equation below.

$$-3.1x + 7 - 7.4x = 1.5x - 6\left(x - \frac{3}{2}\right)$$

**Show your work.**

$$-3.1x + 7 - 7.4x = 1.5x - 6\left(x - \frac{3}{2}\right)$$

$$\underline{-3.1x} + 7 - \underline{7.4x} = \underline{1.5x} - \underline{6x} + \underline{9}$$

$$\begin{array}{r} -10.5x + 7 = -4.5x + 9 \\ +4.5x \quad +4.5x \end{array}$$

$$-6x + 7 = 9$$

$$\underline{-7} \quad \underline{-7}$$

$$\underline{-6} = \underline{2}$$

$$\underline{-6} \quad \underline{-6}$$

$$x = -3$$

**Answer**

$$x = -3$$

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

This response demonstrates only a partial understanding of the mathematical concepts in the task. The equation is solved using appropriate procedures; however, the final step of the work incorrectly evaluates  $2 \div -6 = -3$ . The response contains an incorrect solution but applies an appropriate process.

## GUIDE PAPER 6

52

Determine the solution to the equation below.

$$-3.1x + 7 - 7.4x = 1.5x - 6\left(x - \frac{3}{2}\right)$$

**Show your work.**

$$\begin{aligned}
 & -3.1x + 7 - 7.4x = 1.5x - 6\left(x - \frac{3}{2}\right) \\
 & \textcircled{-3.1x} + \textcircled{7} - \textcircled{7.4x} = \textcircled{1.5x} - \textcircled{6x} + \textcircled{9} \\
 & \textcircled{-10.5x} + \textcircled{7} = \textcircled{-4.5x} + \textcircled{9} \\
 & \quad \quad \quad \frac{-15x}{-15} = \frac{16}{-15} \\
 & \quad \quad \quad x = -1.06
 \end{aligned}$$

**Answer**  $x = -1.1$

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

This response demonstrates only a partial understanding of the mathematical concepts in the task. Like terms are correctly combined on each side of the equation; however, sign errors occur when combining like terms across the equals sign resulting in the incorrect equation  $-15x = 16$ . The response correctly addresses only some elements of the task.

# GUIDE PAPER 7

52

Determine the solution to the equation below.

$$-3.1x - 7 - 7.4x = 1.5x - 6\left(x - \frac{3}{2}\right)$$

**Show your work.**

$$\begin{array}{r} -3.1x \\ -7.4x \\ \hline +10.5x \end{array}$$

$$\begin{array}{r} 7 \\ + -6 \end{array}$$

**Answer**

13

## Score Point 0 (out of 2 points)

Holistically, this response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. Although an attempt is made to combine like terms, the work is incomplete and incorrect.

52

Determine the solution to the equation below.

$$-3.1x + 7 - 7.4x = 1.5x - 6\left(x - \frac{3}{2}\right)$$

**Show your work.**

$$\begin{aligned} -3.1(4) + 7 - 7.4(4) \\ = 1.5x - 6\left(x - \frac{3}{2}\right) \end{aligned}$$

**Answer**

4

**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 value 4 is inappropriately substituted for  $x$  only in the left side of the equation and is incorrectly chosen as the solution.

53

A cylinder and a cone have the same volume. The cylinder has a radius of 2 inches and a height of 3 inches. The cone has a radius of 3 inches. What is the height of the cone?

*Show your work.*

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

## EXEMPLARY RESPONSE

53

A cylinder and a cone have the same volume. The cylinder has a radius of 2 inches and a height of 3 inches. The cone has a radius of 3 inches. What is the height of the cone?

*Show your work.*

$$\begin{aligned}V_{\text{cyl}} &= V_{\text{cone}} \\ \pi r_{\text{cyl}}^2 h_{\text{cyl}} &= \frac{1}{3} \pi r_{\text{cone}}^2 h_{\text{cone}} \\ \pi(2)^2(3) &= \frac{1}{3} \pi(3)^2 h_{\text{cone}} \\ 12\pi &= 3\pi h_{\text{cone}} \\ h_{\text{cone}} &= 4\end{aligned}$$

or other valid process

Answer: 4 inches

53

A cylinder and a cone have the same volume. The cylinder has a radius of 2 inches and a height of 3 inches. The cone has a radius of 3 inches. What is the height of the cone?

*Show your work.*

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

$$2^2 3 = \frac{1}{3} 3^2 h$$

$$4 \cdot 3 = 3h$$

$$\frac{12}{3} = \frac{3h}{3}$$

$$4 = h$$

Answer: 4 inches

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. The height of the cone is calculated correctly by equating the two volumes.

## GUIDE PAPER 2

53

A cylinder and a cone have the same volume. The cylinder has a radius of 2 inches and a height of 3 inches. The cone has a radius of 3 inches. What is the height of the cone?

*Show your work.*

Cy = Cone

$$C: R=2$$

$$h=3$$

↓

$$\pi r^2 h$$

$$\pi 2^2 3$$

$$\pi 4 3$$

$$12\pi$$

$$\text{Cone: } R=3$$

$$h=?$$

↓

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

$$\frac{1}{3} \pi 3^2 h$$

$$\frac{1}{3} 9 \pi h$$

$$3\pi h = 12$$

$$3\pi(4) = 12\pi$$

Answer: 4 inches

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. The height of the cone is calculated correctly by equating the two volumes.

## GUIDE PAPER 3

53

A cylinder and a cone have the same volume. The cylinder has a radius of 2 inches and a height of 3 inches. The cone has a radius of 3 inches. What is the height of the cone?

*Show your work.*

Cylinder  
 $V = \pi r^2 h$   
 $V = \pi (2)^2 (3)$   
 $V = \pi 4 \cdot 3$   
 $V = 12\pi$

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

$$\frac{12\pi}{3} = \frac{3\pi h}{3}$$

$$\frac{4\pi}{\pi} = \frac{h\pi}{\pi}$$

$$h = 4$$

Answer: 4 inches

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. The height of the cone is calculated correctly by equating the two volumes.

# GUIDE PAPER 4

53

A cylinder and a cone have the same volume. The cylinder has a radius of 2 inches and a height of 3 inches. The cone has a radius of 3 inches. What is the height of the cone?

*Show your work.*

Cylinder

$$V = \frac{4}{3} \pi r^2 h$$

$$V = \frac{4}{3} \times 3.14 \times 2^2 \times 3$$

$$\frac{4 \times 3.14 \times 2^2 \times 3}{3}$$

$$= \frac{150.72}{3}$$

$$= 50.24 \text{ in}^2$$

Cone

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

$$50.24 \text{ in}^2 = \frac{1}{3} \times 3.14 \times 3^2 \times h$$

$$= \frac{1 \times 3.14 \times 9 \times h}{3}$$

$$50.24 = \frac{9.42}{3} \times h$$

$$\frac{50.24}{9.42} = h$$

$$h = 5.3$$

**Answer:** 5.3 inches

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

This response demonstrates only a partial understanding of the mathematical concepts in the task. The two volumes are properly equated to determine the height of the cone; however, the volume of the cylinder is calculated incorrectly with an extraneous factor of  $\frac{4}{3}$  and the value of  $\pi$  is inappropriately approximated as 3.14. The response correctly addresses only some elements of the task.

# GUIDE PAPER 5

53

A cylinder and a cone have the same volume. The cylinder has a radius of 2 inches and a height of 3 inches. The cone has a radius of 3 inches. What is the height of the cone?

**Show your work.**

$V = \frac{1}{3} \pi r^2 h$   
 $V = \pi r^2 h$   
 $3.14 \times 2^2 \times 3 = 37.68$   
 Volume  
 12.56

Answer: 4 inches

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

This response demonstrates only a partial understanding of the mathematical concepts in the task. The volume of the cylinder is calculated correctly and the solution for the height of the cone is correct; however, the work for the volume of the cone only includes the general formula and the value of  $\pi$  is inappropriately approximated as 3.14. The response contains the correct solution but the required work is incomplete.

## GUIDE PAPER 6

53

A cylinder and a cone have the same volume. The cylinder has a radius of 2 inches and a height of 3 inches. The cone has a radius of 3 inches. What is the height of the cone?

*Show your work.*

cylinder  $(2^2 \cdot 3 \cdot \pi)$

$$\frac{4(3)\pi}{12\pi}$$

$$\frac{1}{3} \pi 3^2 h$$

$$\frac{1}{3} 9$$

$$= 3(4)$$

Answer: 4 inches

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

This response demonstrates only a partial understanding of the mathematical concepts in the task. The volume of the cylinder is calculated correctly; however, the work for the volume of the cone drops the values  $\pi$  and  $h$  from the expression when simplifying. The response contains the correct solution but the required work is faulty or incomplete.

## GUIDE PAPER 7

53

A cylinder and a cone have the same volume. The cylinder has a radius of 2 inches and a height of 3 inches. The cone has a radius of 3 inches. What is the height of the cone?

*Show your work.*

<p><u>Cylinder:</u>  <math>V = \pi r^2 h</math>  <math>V = 3.14(2)^2 \cdot 3</math>  <math>V = 37.68</math></p>	<p><u>cone:</u> <math>\frac{1}{3}(3.14) 3^2(h)</math>  <math>v = \frac{1}{3} 28.26h</math>  <math>v = \frac{28.26}{3}</math>  <math>v = 9.42 \text{ in}^2</math></p>	<p><u>Evidence:</u>  <math>v = \frac{1}{3}(3.14) 3^2(9.42)</math>  <math>v = 226.2092</math>  <hr style="border: 0.5px solid black;"/> <math>v = \frac{1}{3}(3.14) 3^2(28.26)</math>  <math>v = 226.2092</math></p>
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Answer, 28.26 inches

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

Holistically, this response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. Although the volume of the cylinder is calculated correctly, the variable  $h$  is dropped when calculating the volume of the cone. In addition, the values 28.26 and 9.42 are both misinterpreted as the height of the cone in the work labeled “Evidence”, indicating a lack of understanding that the height has a unique value. The two calculations in the “Evidence” are incorrectly evaluated to the same result despite using different values for the height and the resulting volume is contradictory to the previous work.

53

A cylinder and a cone have the same volume. The cylinder has a radius of 2 inches and a height of 3 inches. The cone has a radius of 3 inches. What is the height of the cone?

*Show your work.*

$$\text{Cylinder: } V = \pi r^2 h$$

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

$$= \pi r^2 h$$

Answer: 4 inches

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

Holistically, this response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. The solution of 4 is correct; however, only a transcription of the formulas from the reference sheet is shown. No work is shown, therefore the response contains no support for the solution.

54

Determine the solution, if any, to the system of equations below.

$$\begin{aligned}8x - 2y &= 1 \\ -4x + y &= 3\end{aligned}$$

**Show your work.**

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

## EXEMPLARY RESPONSE

54

Determine the solution, if any, to the system of equations below.

$$\begin{aligned}8x - 2y &= 1 \\ -4x + y &= 3\end{aligned}$$

**Show your work.**

$$\begin{aligned}8x - 2y &= 1 \\ 2 \times (-4x + y) &= (3) \times 2\end{aligned}$$

$$\begin{array}{r}8x - 2y = 1 \\ -8x + 2y = 6 \\ \hline 0x + 0y = 7 \quad \rightarrow \quad 0 \neq 7 \quad \text{No Solution}\end{array}$$

OR

$$\begin{aligned}-2y &= -8x + 1 \\ y &= 4x + 3\end{aligned}$$

$$\begin{aligned}y &= 4x - \frac{1}{2} \\ y &= 4x + 3\end{aligned}$$

The equations in slope-intercept form have the same slope but different  $y$ -intercepts, so they represent parallel lines and will never intersect: no solution.

or other valid process

**Answer**           No Solution

54

Determine the solution, if any, to the system of equations below.

$$\begin{aligned} 8x - 2y &= 1 \\ -4x + y &= 3 \end{aligned}$$

Doesn't  
have to  
have one

Show your work.

$$\begin{aligned} 8x - 2y &= 1 & \rightarrow & \cancel{8x} + 2y = 1 \\ 2(-4x + y - 3) & \rightarrow & \cancel{-8x} + 2y = 6 \\ \hline & & 0 + 0 &= 7 \\ & & \boxed{0 \neq 7} & \end{aligned}$$

$$\begin{aligned} 8x - 2y &= 1 \\ -8x & \quad -8x \\ \hline -2y &= -8x + 1 \\ -2 & \\ \hline y &= 4x - 1/2 \end{aligned}$$

$$\begin{aligned} (-4x) + (4x - 1/2) &= 3 \\ 0 - 1/2 &= 3 \\ \boxed{-1/2 \neq 3} & \end{aligned}$$

Check

**Answer** NO solutions**Score Point 2 (out of 2 points)**

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response completes the task correctly using mathematically sound procedures.

## GUIDE PAPER 2

54

Determine the solution, if any, to the system of equations below.

$$\begin{aligned} 8x - 2y &= 1 \\ -4x + y &= 3 \\ +4x & \end{aligned}$$

**Show your work.**

$$\begin{aligned} 8x - 2y &= 1 + 2y \\ +2y - 1 & \end{aligned}$$

$$\frac{8x - 1}{2} = \frac{2y}{2}$$

$$4x - 0.5 = y$$

$$y = 4x + 3$$

$$4x + 3 = 4x - 0.5$$

**Answer** no solution

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response completes the task correctly using mathematically sound procedures. Although no final statement of inequality is provided, the work is sufficiently developed and correct to establish full understanding.

# GUIDE PAPER 3

54

Determine the solution, if any, to the system of equations below.

$$\begin{cases} 8x - 2y = 1 \\ -4x + y = 3 \end{cases}$$

**Show your work.**

$$\begin{array}{r} \cancel{8x - 2y} = 1 \\ + \cancel{-4x + y} = 3 \\ \hline 4x - y = -2 \end{array} \qquad \begin{array}{r} \cancel{8x - 2y} = 1 \\ + \cancel{-8x + 2y} = 6 \\ \hline \end{array}$$

**Answer**

no solution

## Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The response completes the task correctly using mathematically sound procedures. Although no final statement of inequality is provided, the work is sufficiently developed and correct to establish full understanding.

# GUIDE PAPER 4

54

Determine the solution, if any, to the system of equations below.

$$\begin{aligned} 8x - 2y &= 1 \\ -4x + y &= 3 \end{aligned}$$

**Show your work.**

$$\begin{array}{r} 8x - 2y = 1 \\ 2(-4x + y = 3) \\ \hline -8x + 2y = 6 \end{array}$$

$$\begin{array}{r} \cancel{8}x - \cancel{2}y = 1 \\ -\cancel{8}x + \cancel{2}y = 6 \\ \hline 0 = -5 \end{array}$$

**Answer** no solution

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

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response provides a correct answer using mathematically sound procedures; however, in the final step of the work the right side of the equations are subtracted rather than added. The response correctly addresses only some elements of the task.

## GUIDE PAPER 5

54

Determine the solution, if any, to the system of equations below.

$$\begin{aligned} 8x - 2y &= 1 \\ -4x + y &= 3 \end{aligned}$$

**Show your work.**

$$\begin{array}{r} 8x - 2y = 1 \\ -8x \quad -8x \\ \hline -2y = -8x + 1 \\ -2 \quad -2 \\ \hline y = 4x - 2 \end{array}$$

$$\begin{array}{r} -4x + y = 3 \\ +4x \quad +4x \\ \hline y = 4x + 3 \end{array}$$

- Same slope = Parallel lines!
- No solution

**Answer** No solutions  $\emptyset$

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

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response provides a correct answer using mathematically sound procedures; however, the first equation is rearranged into slope-intercept form incorrectly. The response correctly addresses only some elements of the task.

# GUIDE PAPER 6

54

Determine the solution, if any, to the system of equations below.

$$\begin{aligned} 8x - 2y &= 1 \\ -4x + y &= 3 \end{aligned}$$

**Show your work.**

$$\begin{aligned} \cancel{4x} + \boxed{y} &= 3 \\ +4x & \quad +4x \\ \boxed{y} &= 4x + 3 \\ y &= 4(7) + 3 \\ y &= 28 + 3 \\ \boxed{y} &= \boxed{31} \end{aligned}$$

$$\boxed{(7, 31)}$$

$$\begin{aligned} 8x - 2y &= 1 \\ 8x - 2(4x + 3) &= 1 \\ \boxed{8x} - \boxed{8x} - 6 &= 1 \\ \boxed{0x} - 6 &= 1 \\ +6 & \quad +6 \\ \boxed{x} &= \boxed{7} \end{aligned}$$

**Answer** (7, 31)

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

This response demonstrates only a partial understanding of the mathematical concepts in the task. The substitution method is used appropriately to solve the system of equations; however, the system is incorrectly solved as  $x = 7$  rather than  $0 = 7$ . This incorrect  $x$ -value is then used to appropriately solve for the value of  $y$ . The response contains an incorrect solution but applies an appropriate process.

# GUIDE PAPER 7

54

Determine the solution, if any, to the system of equations below.

$$\begin{aligned}8x - 2y &= 1 \\ -4x + y &= 3\end{aligned}$$

Show your work.

$$\begin{aligned}8x - 2y &= 1 \\ -8x & \quad -3x \\ \hline -2y &= 1 - 8x \\ \frac{-2y}{-2} &= \frac{-2x + 1}{-2} \\ y &= 4x - 0.5\end{aligned}$$

$$\begin{aligned}-4x + y &= 3 \\ +4x & \quad +4x \\ \hline y &= 4x + 3\end{aligned}$$

Answer

~~2, 3~~ 2, 3

## 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 both equations are rearranged into slope-intercept form, the work is not developed any further and the answer provided is incorrect.

54

Determine the solution, if any, to the system of equations below.

$$\begin{aligned}8x - 2y &= 1 \\ -4x + y &= 3\end{aligned}$$

**Show your work.**

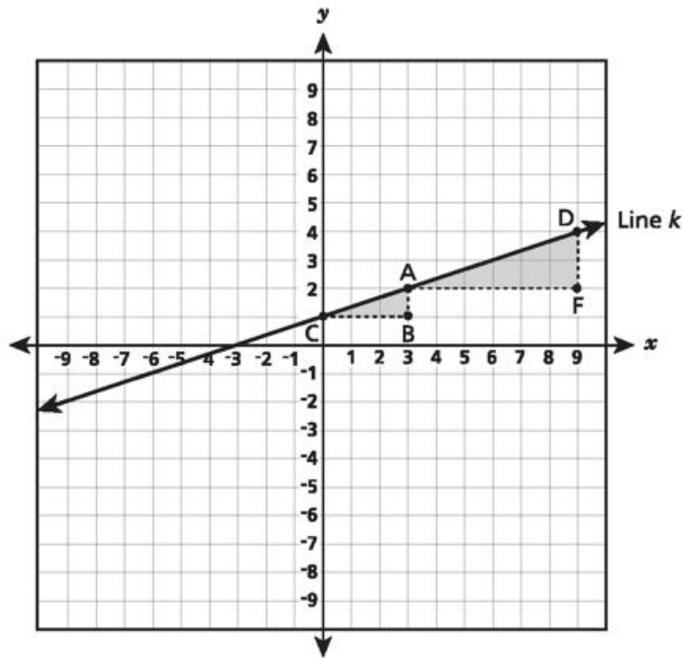
$$\begin{array}{r} \textcircled{1} \quad 8x - 2y = 1 \\ \textcircled{2} \quad -4x + y = 3 \\ \hline -32x + 8y = 4 \\ 32x + 8y = 24 \\ \hline 4 = 24 \\ \frac{4}{4} = \frac{24}{4} \\ x = 6 \end{array}$$

**Answer** One solution.**Score Point 0 (out of 2 points)**

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. An attempt is made to use the elimination method to solve the system of equations; however, numerous errors in the work demonstrate no overall understanding of using the procedure correctly and the answer provided is incorrect.

55

The hypotenuses of similar triangles ABC and DFA both lie on line  $k$ , as shown below.



Demonstrate whether the slope of line  $k$  is constant between points C and D. Use the leg lengths of triangles ABC and DFA in your answer.

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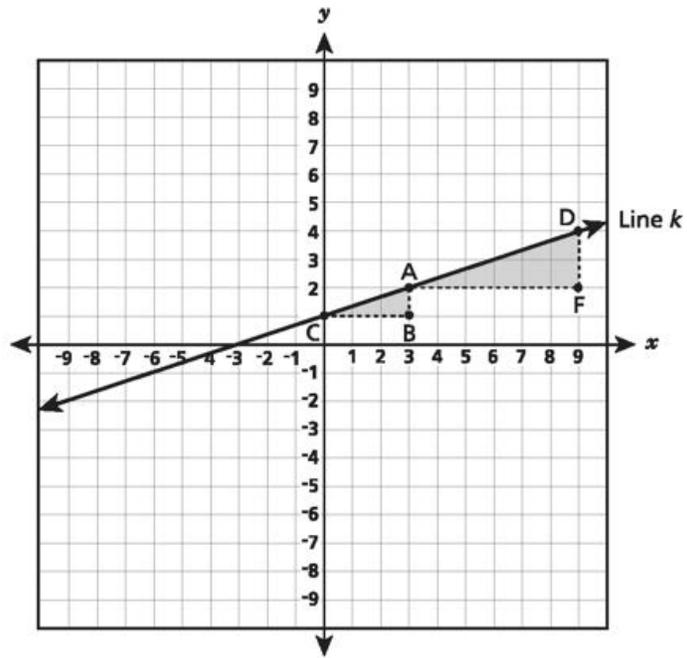
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# EXEMPLARY RESPONSE

55

The hypotenuses of similar triangles ABC and DFA both lie on line  $k$ , as shown below.



Demonstrate whether the slope of line  $k$  is constant between points C and D. Use the leg lengths of triangles ABC and DFA in your answer.

The slope of segment  $\overline{CA}$  is  $BA \div CB = \frac{1}{3}$  and the slope of segment  $\overline{AD}$  is

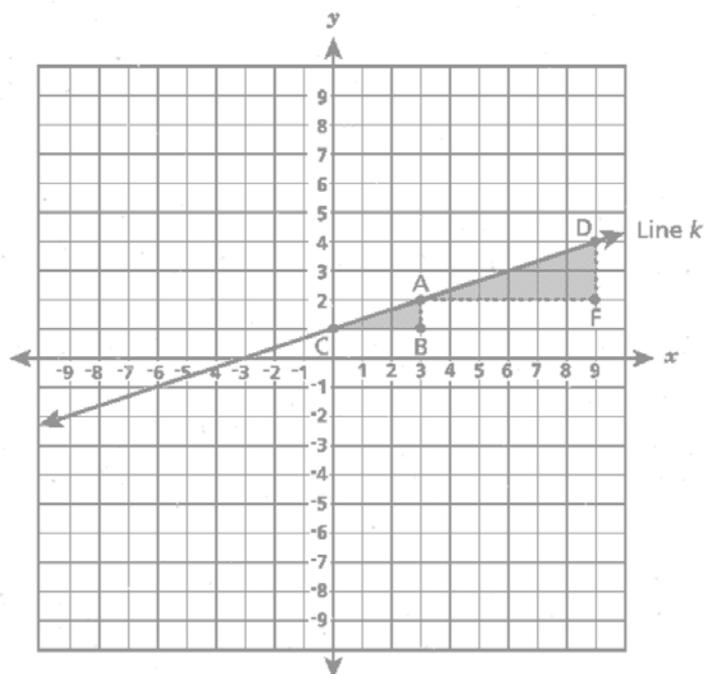
$FD \div AF = \frac{2}{6} = \frac{1}{3}$ . Both are  $\frac{1}{3}$  so the slope of line  $k$  between points C and D is

constant.

Or other valid response

55

The hypotenuses of similar triangles ABC and DFA both lie on line  $k$ , as shown below.



Demonstrate whether the slope of line  $k$  is constant between points C and D. Use the leg lengths of triangles ABC and DFA in your answer.

Yes, the slope of line  $k$  is constant between points C and D. The slope of  $\overline{CA}$  is  $\frac{1}{3}$ , and the slope of  $\overline{AD}$  is  $\frac{2}{6}$ , which simplifies to  $\frac{1}{3}$ .

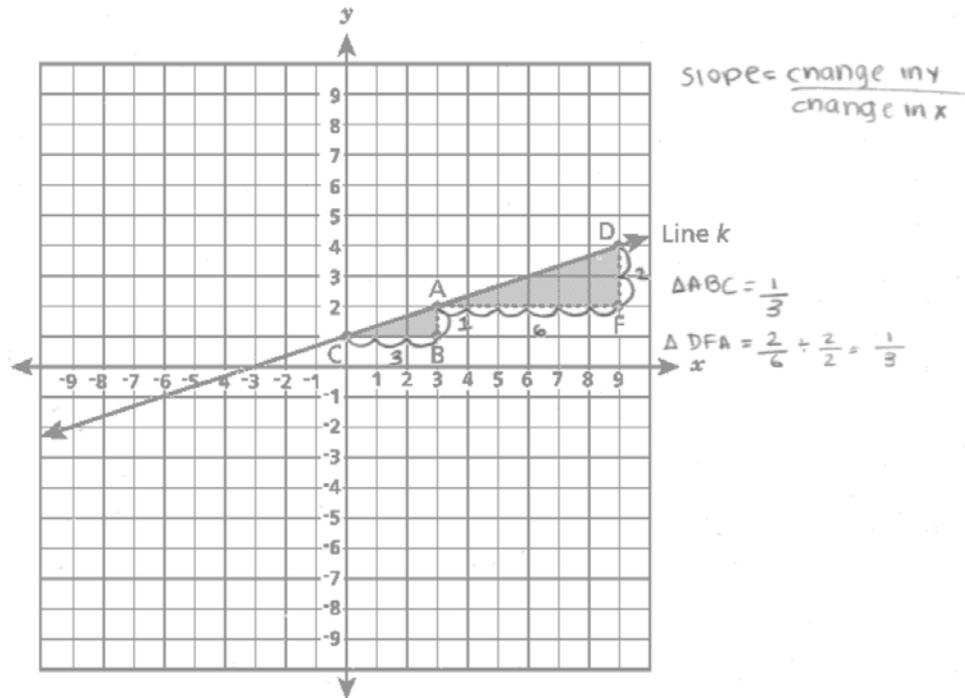
### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The slope of line  $k$  is correctly shown to be constant using the leg lengths of the triangles.

## GUIDE PAPER 2

55

The hypotenuses of similar triangles ABC and DFA both lie on line  $k$ , as shown below.



Demonstrate whether the slope of line  $k$  is constant between points C and D. Use the leg lengths of triangles ABC and DFA in your answer.

The slope of line  $k$  is constant between points C and D. This is because when you find the slope, change in  $y$  over change in  $x$  of triangle ABC, the slope is  $\frac{1}{3}$ . and the slope of Triangle DFA is  $\frac{2}{6}$  which can also simplify to  $\frac{1}{3}$  meaning the slope is the same / constant.

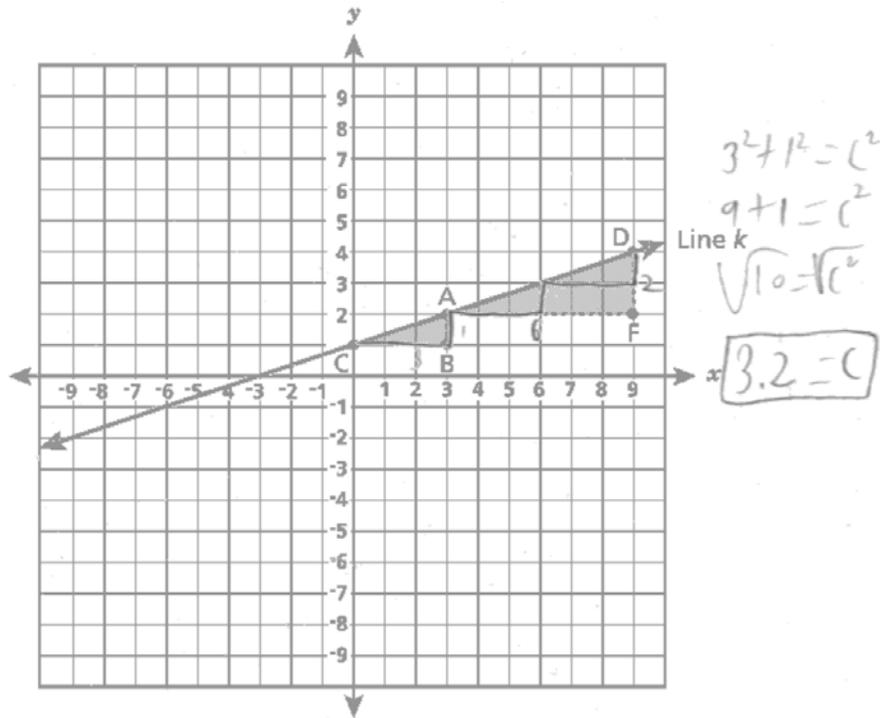
### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The slope of line  $k$  is correctly shown to be constant using the leg lengths of the triangles.

# GUIDE PAPER 3

55

The hypotenuses of similar triangles ABC and DFA both lie on line *k*, as shown below.



Demonstrate whether the slope of line *k* is constant between points C and D. Use the leg lengths of triangles ABC and DFA in your answer.

The slope between C and D are constant because  
 1 over 3 (ABC) and 2 over 6 (DFA) are the same lengths  
 one is just multiplied by 2.

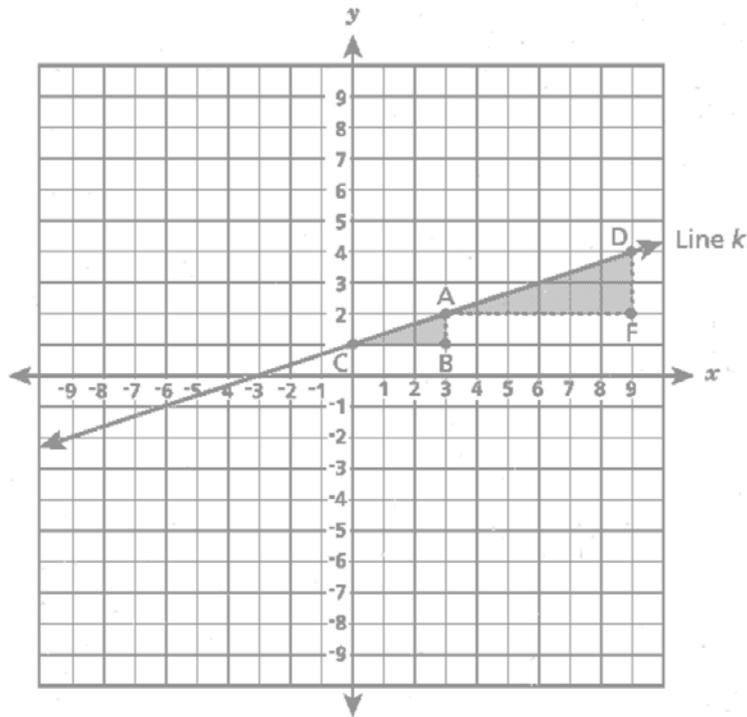
### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The slope of line *k* is correctly shown to be constant using the leg lengths of the triangles.

# GUIDE PAPER 4

55

The hypotenuses of similar triangles ABC and DFA both lie on line  $k$ , as shown below.



Demonstrate whether the slope of line  $k$  is constant between points C and D. Use the leg lengths of triangles ABC and DFA in your answer.

Yes because  $\frac{1}{3}$  and  $\frac{2}{6}$  are the same thing.

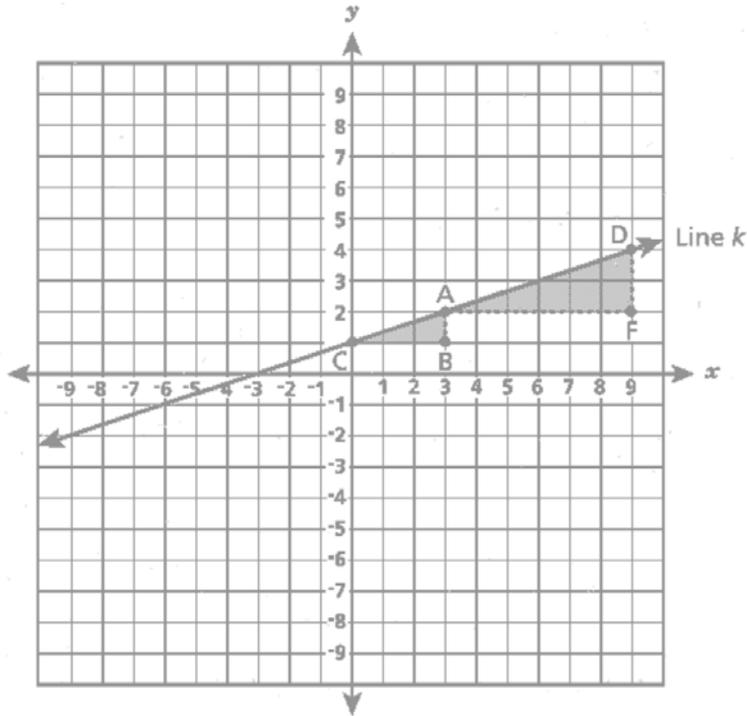
## Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The slope of line  $k$  is correctly identified as constant; however, the explanation does not sufficiently demonstrate how the values  $\frac{1}{3}$  and  $\frac{2}{6}$  are related to the slope or the leg lengths of the triangles. The response addresses only some elements of the task.

# GUIDE PAPER 5

55

The hypotenuses of similar triangles ABC and DFA both lie on line  $k$ , as shown below.



Demonstrate whether the slope of line  $k$  is constant between points C and D. Use the leg lengths of triangles ABC and DFA in your answer.

The graph is constantly increasing by  $\frac{1}{3}$  through ABC and DFA.

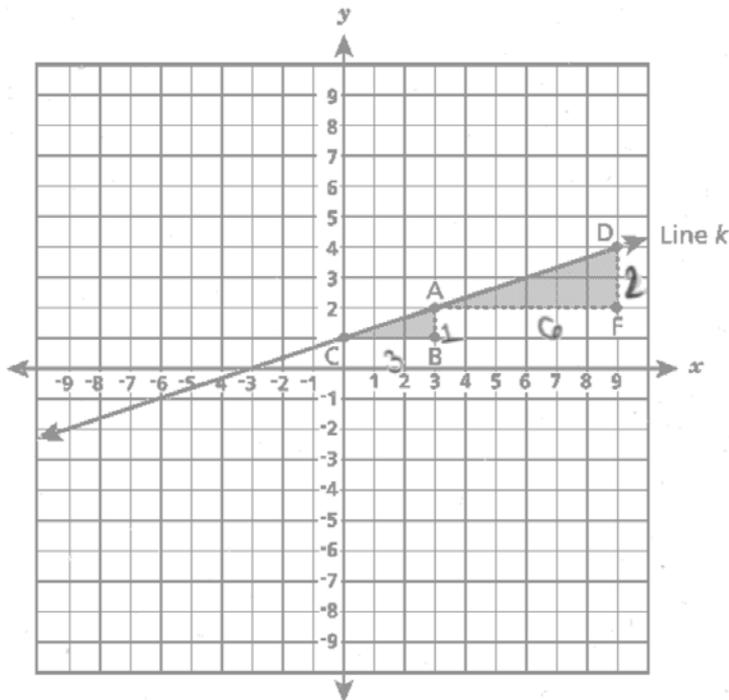
## Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The slope of line  $k$  is correctly shown to be constant; however, the explanation does not sufficiently demonstrate how the value  $\frac{1}{3}$  relates to the leg lengths of the triangles. The response addresses only some elements of the task.

# GUIDE PAPER 6

55

The hypotenuses of similar triangles ABC and DFA both lie on line  $k$ , as shown below.



Demonstrate whether the slope of line  $k$  is constant between points C and D. Use the leg lengths of triangles ABC and DFA in your answer.

The slope of line  $k$  is constant because  
the leg lengths of triangle ABC is 3 and 1 and  
the leg lengths of triangle DFA is 6 and 2.

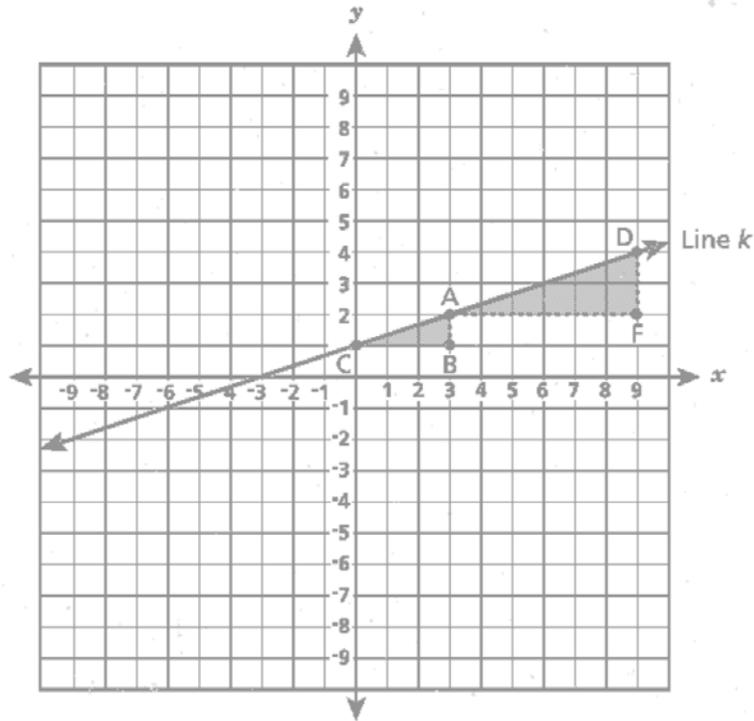
## Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The slope of line  $k$  is identified as constant; however, the explanation does not sufficiently link the slope to the leg lengths of the triangles using division. The response addresses only some elements of the task.

# GUIDE PAPER 7

55

The hypotenuses of similar triangles ABC and DFA both lie on line  $k$ , as shown below.



Demonstrate whether the slope of line  $k$  is constant between points C and D. Use the leg lengths of triangles ABC and DFA in your answer.

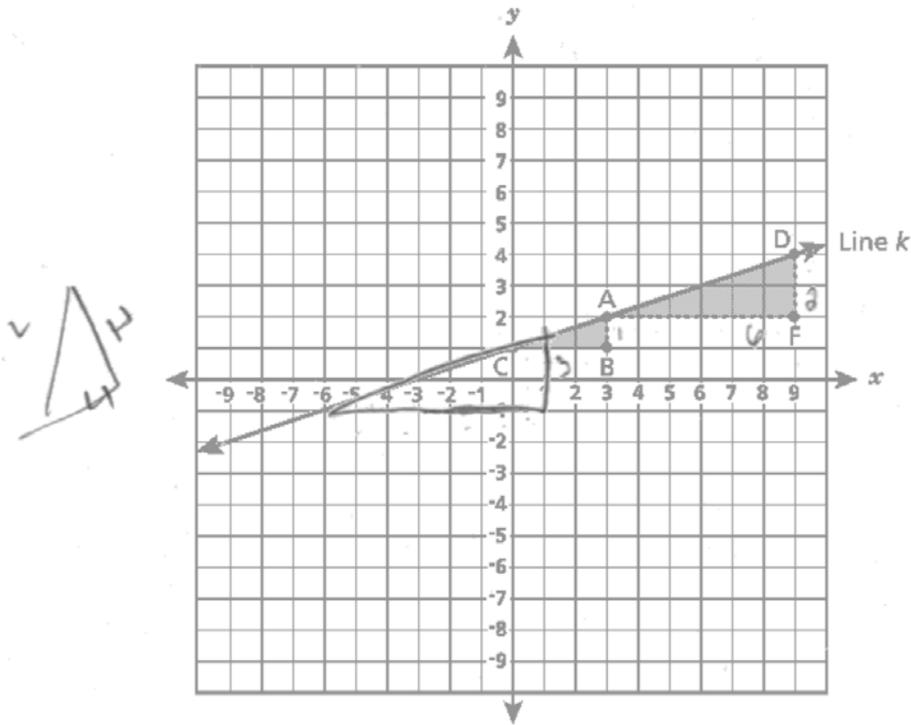
The slope is constant rise 3  
over 1.

## 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 slope of line  $k$  is incorrectly stated reciprocally and it is not explained in relation to the leg lengths of the triangles.

55

The hypotenuses of similar triangles ABC and DFA both lie on line  $k$ , as shown below.



Demonstrate whether the slope of line  $k$  is constant between points C and D. Use the leg lengths of triangles ABC and DFA in your answer.

The slope of line  $k$  is not constant because the slopes are different.

### 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 response incorrectly states that the slope of line  $k$  is not constant.

56

The values in the table below represent Function B, which is a linear function.

$x$	$y$
-3	-7
-1	-1
1	5
3	11

Function L is represented by the equation  $y = 6x + 4$ . Compare Functions B and L by determining which one has the greater rate of change and which one has the greater  $y$ -intercept. Explain why your answers are correct.

**Show your work.**

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## EXEMPLARY RESPONSE

56

The values in the table below represent Function B, which is a linear function.

$x$	$y$
-3	-7
-1	-1
1	5
3	11

Function L is represented by the equation  $y = 6x + 4$ . Compare Functions B and L by determining which one has the greater rate of change and which one has the greater  $y$ -intercept. Explain why your answers are correct.

**Show your work.**

Function B:

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - (-7)}{-1 - (-3)} = \frac{6}{2} = 3$$

$$y = mx + b$$

$$y = 3x + b$$

$$-7 = 3(-3) + b$$

$$-7 = -9 + b$$

$$b = 2$$

Function B:  $y = 3x + 2$

Function L:  $y = 6x + 4$

The slope,  $m$ , represents the rate of change. The slope of Function L is 6, which  


---

 is greater than 3, the slope of Function B. The  $y$ -intercept is  $b$ . The  $y$ -intercept of  


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 Function L is 4, which is greater than 2, the  $y$ -intercept of Function B.  


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or other valid response

56

The values in the table below represent Function B, which is a linear function.

x	y
-3	-7
-1	-1
1	5
3	11

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

Function L is represented by the equation  $y = 6x + 4$ . Compare Functions B and L by determining which one has the greater rate of change and which one has the greater y-intercept. Explain why your answers are correct.

Show your work.

~~$y = 6x + 4$~~   
 $y = 6x + 4$   
 $y = 3x + b$   
 $11 = 3(3) + b$   
 $11 = 9 + b$   
 $-9 \quad -9$   
 $2 = b$   
 $y = 3x + 2$

Function L has a greater rate of change and a greater y-intercept, than Function B because  $6 > 3$  and  $4 > 2$ .

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. The rate of change and y-intercept of Function B are correctly calculated and compared to Function L.

## GUIDE PAPER 2

56

The values in the table below represent Function B, which is a linear function.

$x$	$y$
-3	-7
-1	-1
1	5
3	11

Function L is represented by the equation  $y = 6x + 4$ . Compare Functions B and L by determining which one has the greater rate of change and which one has the greater  $y$ -intercept. Explain why your answers are correct.

**Show your work.**

$$y = 3x + 2$$

$(1, 5)$      $(3, 11)$   
 $x_1, y_1$      $x_2, y_2$

$x$      $y$   
 $\uparrow$      $\uparrow$      $r = mx + b$

$\frac{11 - 5}{3 - 1} = \frac{6}{2} = 3$

$5 = 3(1) + b$   
 $5 = 3 + b$   
 $-\frac{3}{3}$      $-\frac{3}{3}$   
 $2 = b$

Function L has a greater  $y$  intercept  
and the greater rate of change. Function  
B's rate of change is 3 while Function L's  
rate of change is 6. Function B's  $y$  intercept  
is 2 while Function L's is 4.

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. The rate of change and  $y$ -intercept of Function B are correctly calculated and compared to Function L. The value of the rate of change of Function B is missing from the explanation; however, it is clearly identified in the work. The omission is inconsequential, and does not detract from the demonstration of understanding.

# GUIDE PAPER 3

56

The values in the table below represent Function B, which is a linear function.

$x$	$y$
-3	-7
-1	-1
1	5
3	11

$y =$

$$\frac{6}{2} = 3x$$

$$-1 = 3(-1) + b$$

$$-1 = -3 + b$$

$$+3 \quad +3$$

$$\underline{\quad} \quad \underline{\quad}$$

$$2 = b$$

Function L is represented by the equation  $y = 6x + 4$ . Compare Functions B and L by determining which one has the greater rate of change and which one has the greater  $y$ -intercept. Explain why your answers are correct.

**Show your work.**

$$y = mx + b$$

$$-1 = 3(-1) + b$$

$$-1 = -3 + b$$

$$+3 \quad +3$$

$$\underline{\quad} \quad \underline{\quad}$$

$$2 = b$$

Function B

$$y = 3x + 2$$

Function L

$$y = 6x + 4$$

Function L has a greater rate of change because compared  
to function B where you get 3 for every 1 in function L you  
get 6 for every one. Also function L has a greater y intercept  
because 4 is greater than 2.

## Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The rate of change and  $y$ -intercept of Function B are correctly calculated and compared to Function L.

# GUIDE PAPER 4

56

The values in the table below represent Function B, which is a linear function.

$x$	$y$
-3	-7
-1	-1
1	5
3	11

Function L is represented by the equation  $y = 6x + 4$ . Compare Functions B and L by determining which one has the greater rate of change and which one has the greater y-intercept. Explain why your answers are correct.

**Show your work.**

Function L:  $y = 6x + 4$

Function B:  $\frac{y^2 - y^1}{x^2 - x^1} \rightarrow \frac{11 - 5}{3 - 1} = \frac{6}{2}$

Function B:  $y = \frac{6}{2}x + 1.5$

$x$	$y$
-3	-7
-1	-1
1	5
3	11

The rate of change of function L is greater than the rate of change of function B because 6 is greater than  $\frac{6}{2}$ . The y-intercept of function L is also greater than the y-intercept of function B because 4 is greater than 1.5.

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

This response demonstrates only a partial understanding of the mathematical concepts in the task. The rate of change of Function B is calculated correctly and the explanation correctly compares the functions; however, the y-intercept of Function B is calculated incorrectly. The response correctly addresses only some elements of the task.

# GUIDE PAPER 5

56

The values in the table below represent Function B, which is a linear function.

function L  $y = 6x + 4$

x	y
-3	-14
-1	-2
1	10
3	22

function B

x	y
-3	-7
-1	-1
1	5
3	11

$y = 3x + 2$

Function L is represented by the equation  $y = 6x + 4$ . Compare Functions B and L by determining which one has the greater rate of change and which one has the greater y-intercept. Explain why your answers are correct.

**Show your work.**

function L  $y = 6x + 4$

function B  $y = 3x + 2$

greater rate of change

greater y intercept

rate of change is less than function L

y intercept is less than function L

Function L has a greater rate of change and function L has a greater y-intercept. (reasoning above)

## Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The rate of change and y-intercept of Function B are correctly calculated and compared to Function L; however, the explanation incorrectly includes the variable  $x$  in the rates of change. The response correctly addresses only some elements of the task.

# GUIDE PAPER 6

56

The values in the table below represent Function B, which is a linear function.

$x$	$y$
-3	-7
-1	-1
1	5
3	11

Function L is represented by the equation  $y = 6x + 4$ . Compare Functions B and L by determining which one has the greater rate of change and which one has the greater y-intercept. Explain why your answers are correct.

**Show your work.**

$$\frac{-7+1}{-3+1} = \frac{-6}{-2} = 3$$

$$(-3, -7)$$

$$-7 = 3(-3) + B$$

$$-7 = -6 + B$$

$$-7 = -7$$

$$y = 3x - 1$$

Function L has the greater rate of change and y-intercept.

My answer is correct because I used two pairs of

points from Function B to determine the slope and y-intercept.

After that I saw Function L being greater.

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

This response demonstrates only a partial understanding of the mathematical concepts in the task. The rate of change of Function B is calculated correctly and the explanation correctly compares the functions; however, the y-intercept of Function B is calculated incorrectly and the explanation is weak (*After that I saw Function L being greater*). The response correctly addresses only some elements of the task.

# GUIDE PAPER 7

56

The values in the table below represent Function B, which is a linear function.

$x$	$y$
-3	-7
-1	-1
1	5
3	11

$\left. \begin{array}{l} +2 \\ +2 \\ +2 \end{array} \right\}$        $\left. \begin{array}{l} +6 \\ +6 \\ +6 \end{array} \right\}$

Function L is represented by the equation  $y = 6x + 4$ . Compare Functions B and L by determining which one has the greater rate of change and which one has the greater y-intercept. Explain why your answers are correct.

**Show your work.**

*y goes up 6%*  
*x goes up 2*

$$\begin{aligned} -7+6 &= -1 \\ -1+6 &= -7 \\ -3+2 &= -1 \\ -1-2 &= -3 \end{aligned}$$

I found the answer by looking at the difference  
for x it was 2 because -3 and -1 are +2 away, y is bigger  
because -7 and -1 has a difference of 6. My answers are  
correct because I took the 4 numbers used 2 and saw the differ-  
ence and looked at the other 2 to make sure.

### 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 response only addresses the changes in  $x$ -values and  $y$ -values of Function B without taking their ratio to determine the rate of change of the function. Function L and the  $y$ -intercepts of both functions are not addressed.

56

The values in the table below represent Function B, which is a linear function.

$x$	$y$
-3	-7
-1	-1
1	5
3	11

Function L is represented by the equation  $y = 6x + 4$ . Compare Functions B and L by determining which one has the greater rate of change and which one has the greater  $y$ -intercept. Explain why your answers are correct.

**Show your work.**

$$L = y = \frac{6}{1}x + 4$$

$$B = \frac{1}{3}x + 7$$

Function L has a higher slope  $\rightarrow$   
 $y$ -intercept has a

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

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. The rate of change and  $y$ -intercept of Function B are incorrect and have no supporting work. Although the comparison of the rates of change is correct, the comparison of the  $y$ -intercepts is incorrect for the values shown.

57

The values given in the table below lie on the graph of a linear function.

$x$	$y$
0.25	1.00
0.50	1.75
0.75	2.50

What equation represents this linear function?

*Show your work.*

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

## EXEMPLARY RESPONSE

57

The values given in the table below lie on the graph of a linear function.

$x$	$y$
0.25	1.00
0.50	1.75
0.75	2.50

What equation represents this linear function?

*Show your work.*

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1.75 - 1.00}{0.50 - 0.25} = \frac{0.75}{0.25} = 3$$

$$y = mx + b$$

$$(1.00) = (3)(0.25) + b$$

$$1.00 = 0.75 + b$$

$$b = 0.25$$

or other valid process

**Answer**      $y = 3x + 0.25$

57

The values given in the table below lie on the graph of a linear function.

$x$	$y$
0.25	1.00
0.50	1.75
0.75	2.50

What equation represents this linear function?

**Show your work.**

$$y = mx + b$$

$$m = \frac{\Delta y}{\Delta x}$$

$$m = \frac{1.75 - 1}{0.5 - 0.25}$$

$$m = \frac{0.75}{0.25}$$

$$m = 3$$

$$y = 3x + b$$

$$1.75 = 3(0.50) + b$$

$$b = 1.75 - 1.50$$

$$b = 0.25$$

$$y = 3x + 0.25$$

**Answer**  $y = 3x + 0.25$

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. The slope and y-intercept are correctly calculated and a correct equation is provided.

## GUIDE PAPER 2

57

The values given in the table below lie on the graph of a linear function.

$x$	$y$
0.25	1.00
0.50	1.75
0.75	2.50

What equation represents this linear function?

**Show your work.**

$$(0.25, 1.00)(0.50, 1.75)$$

$$\frac{1.00 - 1.75}{0.25 - 0.50} = \frac{-0.75}{-0.25} = 3$$

$$1.00 = 0.25(3) - 0.75 + 0.75$$

$$1.00 = 0.75 - 0.75 + 0.75$$

$$1.00 = 0.75 + 0.25$$

**Answer**  $y = 3x + 0.25$

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. The slope and y-intercept are correctly calculated and a correct equation is provided.

# GUIDE PAPER 3

57

The values given in the table below lie on the graph of a linear function.

$x$	$y$
0.25	1.00
0.50	1.75
0.75	2.50

What equation represents this linear function?

**Show your work.**

$$\frac{1.75 - 1.00}{0.50 - 0.25} = \frac{.75}{.25} = 3$$

$$y = 3x + b$$

$$2.50 = 3(.75) + b$$

$$\begin{array}{r} 2.50 = 2.25 + b \\ 2.25 \quad -2.25 \\ \hline .25 = b \end{array}$$

$$.25 = b$$

$$y = 3x + .25$$

**Answer**  $y = 3x + .25$

## Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The slope and y-intercept are correctly calculated and a correct equation is provided.

# GUIDE PAPER 4

57

The values given in the table below lie on the graph of a linear function.

$x$	$y$
0.25	1.00
0.50	1.75
0.75	2.50

{ }

What equation represents this linear function?

**Show your work.**

$$y = mx + b$$

$$\text{slope} = \frac{.75}{.25} = 3$$

$$\text{slope} = 3$$

$$y = 3x + b$$

$$y = 3(.50) + b$$

$$1.75 = 3(.50) + b$$

$$1.75 = 1.5 + b$$

$$1.75 - 1.5 = b$$

$$0.25 = b$$

**Answer**      $b = .25$     

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

This response demonstrates only a partial understanding of the mathematical concepts in the task. The slope and y-intercept are correctly calculated; however, the solution for the y-intercept is chosen incorrectly as the answer. The response contains an incorrect solution but applies an appropriate process.

## GUIDE PAPER 5

57

The values given in the table below lie on the graph of a linear function.

$x$	$y$
0.25	1.00
0.50	1.75
0.75	2.50

What equation represents this linear function?

**Show your work.**

$$\frac{2.50 - 1.75}{0.75 - 0.50} = \frac{0.75}{0.25} = 3$$

$$\frac{1.75 - 1.00}{0.50 - 0.25} = \frac{0.75}{0.25} = 3$$

$$y = 3x$$

**Answer**      $y = 3x$     

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

This response demonstrates only a partial understanding of the mathematical concepts in the task. The slope is calculated correctly and used appropriately in an equation; however, the  $y$ -intercept is not addressed. The response correctly addresses only some elements of the task.

# GUIDE PAPER 6

57

The values given in the table below lie on the graph of a linear function.

$x$	$y$
0.25	1.00
$y_1$ 0.50	$y_1$ 1.75
$y_2$ 0.75	$y_2$ 2.50

What equation represents this linear function?

**Show your work.**

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{2.50 - 1.75}{0.75 - 0.50} = \frac{.75}{.25} = 3$$

$$\begin{array}{r} .25 \\ \times 3 \\ \hline .75 \\ + 1.00 \\ \hline 1.75 \end{array}$$

**Answer** 1.75

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

This response demonstrates only a partial understanding of the mathematical concepts in the task. The slope is calculated correctly; however, the y-intercept is not addressed and an equation is not provided. The response correctly addresses only some elements of the task.

# GUIDE PAPER 7

57

The values given in the table below lie on the graph of a linear function.

	0.00	0.25	
-0.25	0.25	1.00	-0.75
0.25	0.50	1.75	0.75
0.25	0.75	2.50	0.75

What equation represents this linear function?

**Show your work.**

0.25

Answer 0.25

## Score Point 0 (out of 2 points)

Holistically, this response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. Although the  $y$ -intercept is correctly determined by extrapolating from the trend of the table, it is unclear if it is understood as the  $y$ -intercept. The slope is not addressed and an equation is not provided.

57

The values given in the table below lie on the graph of a linear function.

$x$	$y$
0.25	1.00
0.50	1.75
0.75	2.50

$-25 \left( \begin{array}{c} 0.25 \\ 0.50 \\ 0.75 \end{array} \right) -75$

What equation represents this linear function?

**Show your work.**

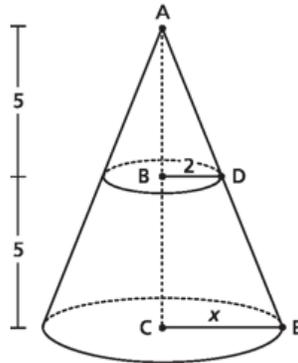
$$y = mx + b$$
$$y = 1/3x +$$

**Answer**  $y = 1/3x$

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

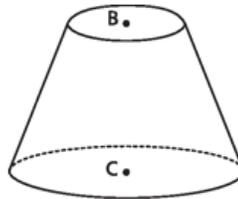
This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. The slope and equation provided are incorrect and are not supported by the work. The y-intercept is not addressed.

The circular base of the cone below has center C. Another circle, with center B, is parallel to the base. This circle is the base of a smaller cone with height AB. The measurements in the diagram are given in inches.



Triangle ABD is similar to triangle ACE.

The smaller cone is removed to create a new object, as shown below.



What is the volume of this new object? Round your answer to the nearest tenth.

*Show your work.*

*Answer* \_\_\_\_\_ cubic inches

## EXEMPLARY RESPONSE

58

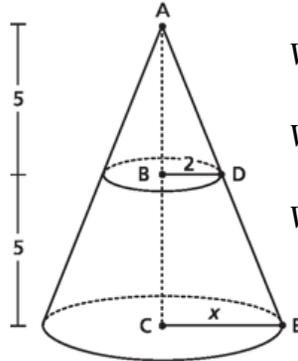
The circular base of the cone below has center C. Another circle, with center B, is parallel to the base. This circle is the base of a smaller cone with height AB. The measurements in the diagram are given in inches.

Similar triangles mean that

$$\frac{CE}{BD} = \frac{AC}{AB} \text{ so:}$$

$$\frac{x}{2} = \frac{5+5}{5}$$

$$x = 4$$



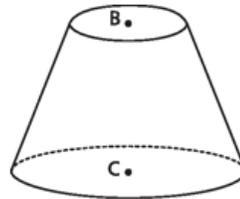
$$V_{\text{cone}} = \frac{1}{3} \pi r^2 h$$

$$V_{ACE} = \frac{1}{3} \pi (4)^2 (10)$$

$$V_{ACE} = \frac{160}{3} \pi \approx 167.551608$$

Triangle ABD is similar to triangle ACE.

The smaller cone is removed to create a new object, as shown below.



$$V_{ABD} = \frac{1}{3} \pi (2)^2 (5)$$

$$V_{ABD} = \frac{20}{3} \pi \approx 20.94395$$

What is the volume of this new object? Round your answer to the nearest tenth.

*Show your work.*

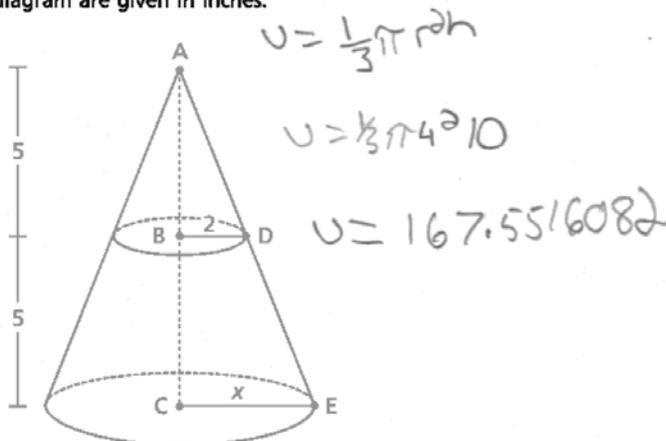
$$V = V_{ACE} - V_{ABD} = \frac{160}{3} \pi - \frac{20}{3} \pi = \frac{140}{3} \pi \approx 146.607657$$

or other valid process

**Answer** 146.6 cubic inches

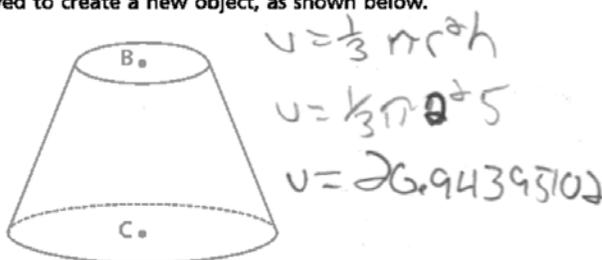
58

The circular base of the cone below has center C. Another circle, with center B, is parallel to the base. This circle is the base of a smaller cone with height AB. The measurements in the diagram are given in inches.



Triangle ABD is similar to triangle ACE.

The smaller cone is removed to create a new object, as shown below.



What is the volume of this new object? Round your answer to the nearest tenth.

Show your work.

$$\begin{array}{r}
 167.5516082 \\
 - 20.94395102 \\
 \hline
 146.6076572 \\
 \text{146.6}
 \end{array}$$

Answer  $V \approx 146.6 \text{ in}^3$  cubic inches

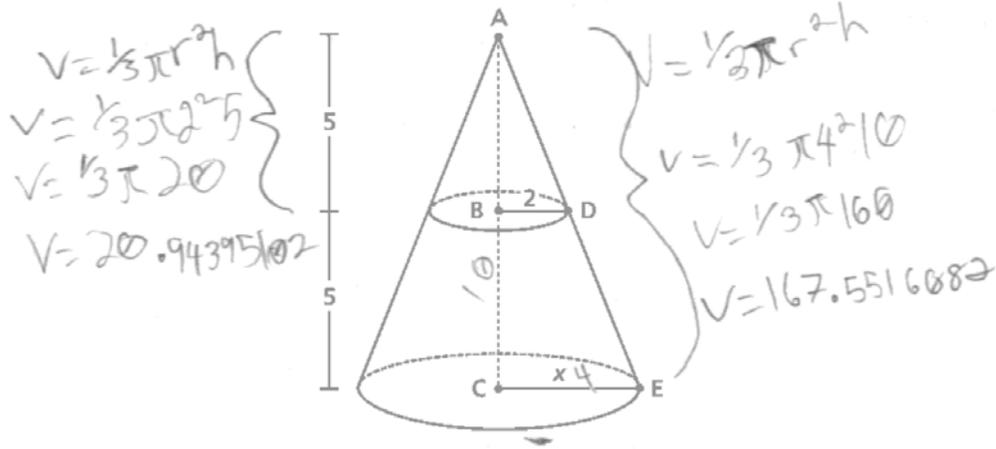
Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The volume of the new object is calculated correctly by subtracting the volume of the smaller cone from the volume of the whole cone and the solution is correctly rounded to the nearest tenth.

## GUIDE PAPER 2

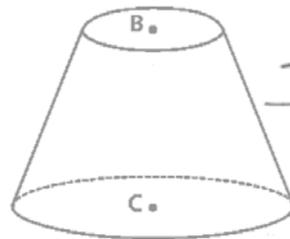
58

The circular base of the cone below has center C. Another circle, with center B, is parallel to the base. This circle is the base of a smaller cone with height AB. The measurements in the diagram are given in inches.



Triangle ABD is similar to triangle ACE.

The smaller cone is removed to create a new object, as shown below.



$$\begin{array}{r}
 \text{V of first object} \\
 - \text{V of second object} \\
 \hline
 146.6076572
 \end{array}$$

What is the volume of this new object? Round your answer to the nearest tenth.

**Show your work.**

**Answer** 146.6 cubic inches

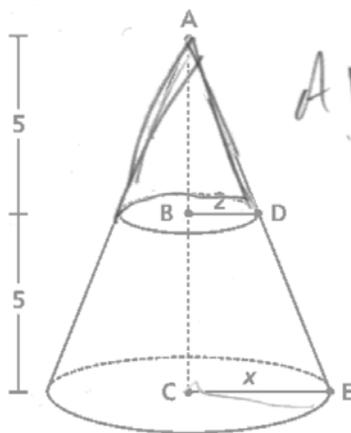
### Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The volume of the new object is calculated correctly by subtracting the volume of the smaller cone from the volume of the whole cone and the solution is correctly rounded to the nearest tenth.

# GUIDE PAPER 3

58

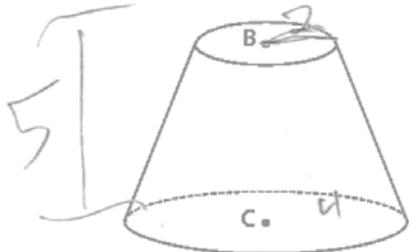
The circular base of the cone below has center C. Another circle, with center B, is parallel to the base. This circle is the base of a smaller cone with height AB. The measurements in the diagram are given in inches.



$$\begin{aligned}
 ABD &= 20.94 \\
 V &= \frac{1}{3}\pi r^2 h \\
 &= \frac{1}{3}\pi 2^2 \times 5 \\
 &= \frac{1}{3}\pi 20 \\
 &= 20.943 \\
 ACE &= \frac{1}{3}\pi 160 \\
 ACE &= 167.55
 \end{aligned}$$

Triangle ABD is similar to triangle ACE.

The smaller cone is removed to create a new object, as shown below.



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

What is the volume of this new object? Round your answer to the nearest tenth.

Show your work.

$$\begin{aligned}
 &167.55 \\
 V &= - 20.94 \\
 \hline
 &146.61
 \end{aligned}$$

Answer 146.6 cubic inches

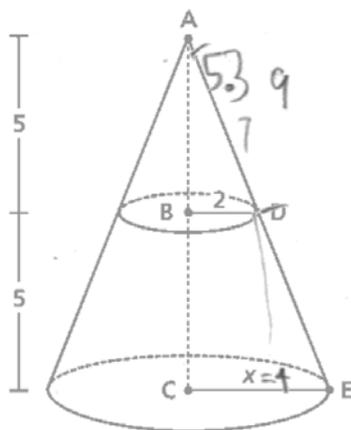
## Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The volume of the new object is calculated correctly by subtracting the volume of the smaller cone from the volume of the whole cone and the solution is correctly rounded to the nearest tenth.

# GUIDE PAPER 4

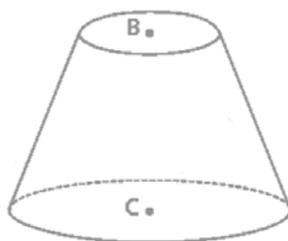
58

The circular base of the cone below has center C. Another circle, with center B, is parallel to the base. This circle is the base of a smaller cone with height AB. The measurements in the diagram are given in inches.



Triangle ABD is similar to triangle ACE.

The smaller cone is removed to create a new object, as shown below.



What is the volume of this new object? Round your answer to the nearest tenth.

Show your work.

Answer 146.6 cubic inches

~~$5^2 = 25$   
 $25 \cdot 4 = 100$   
 $20 = 20$~~

$167.5$   
 $- 20.9$   
 $146.6$

$V = \frac{1}{3} \pi (2^2) (3)$   
 $V = \frac{1}{3} \pi 4^2 (10)$   
 $V = 167.5$

## Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The volume of the new object is calculated correctly by subtracting the volume of the smaller cone from the volume of the whole cone and the solution is correctly rounded to the nearest tenth; however, there is no work to demonstrate how the volume of the smaller cone was obtained. The response appropriately addresses most, but not all aspects of the task.

# GUIDE PAPER 5

58

The circular base of the cone below has center C. Another circle, with center B, is parallel to the base. This circle is the base of a smaller cone with height AB. The measurements in the diagram are given in inches.

show your work:

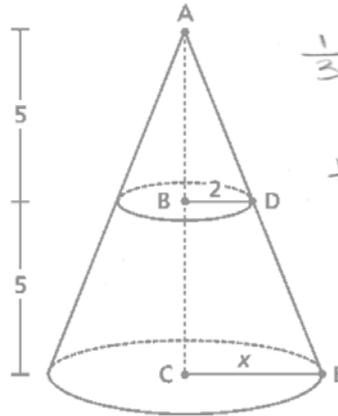
$$\frac{1}{3} \times \pi \times 4^2 \times 10$$

$$167.55$$

$$- 167.55$$

$$\underline{20.94}$$

$$146.61$$



show your work:

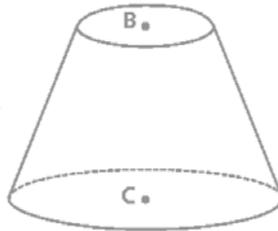
$$\frac{1}{3} \times \pi \times r^2 \times h$$

$$\frac{1}{3} \times \pi \times 2^2 \times 5$$

$$20.94$$

Triangle ABD is similar to triangle ACE.

The smaller cone is removed to create a new object, as shown below.



What is the volume of this new object? Round your answer to the nearest tenth.

**Show your work.**

**Answer** 146.61 cubic inches

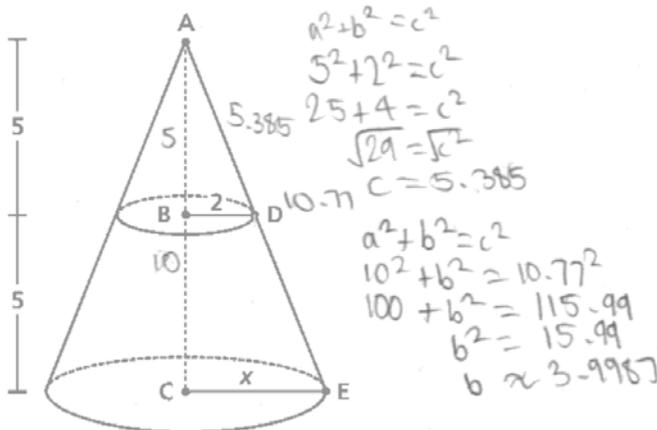
## Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The volume of the new object is calculated correctly by subtracting the volume of the smaller cone from the volume of the whole cone; however, the solution is not rounded to the nearest tenth as required. The response appropriately addresses most, but not all aspects of the task.

# GUIDE PAPER 6

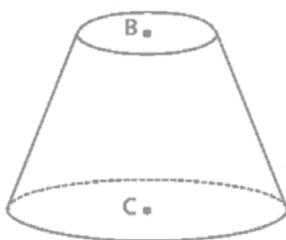
58

The circular base of the cone below has center C. Another circle, with center B, is parallel to the base. This circle is the base of a smaller cone with height AB. The measurements in the diagram are given in inches.



Triangle ABD is similar to triangle ACE.

The smaller cone is removed to create a new object, as shown below.



What is the volume of this new object? Round your answer to the nearest tenth.

Show your work.

Handwritten work:

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

$$V = \frac{1}{3} \pi (2)^2 (5)$$

$$V = 20.94395$$
  

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

$$V = \frac{1}{3} \pi (10)^2 (10)$$

$$V = 1047.4427$$

**Answer** 146.5 cubic inches

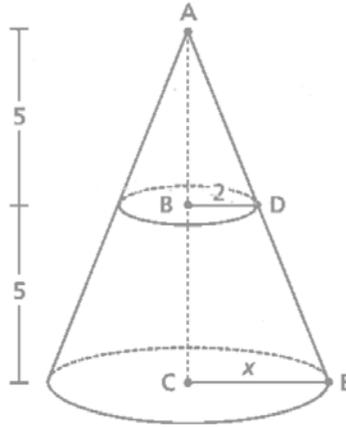
## Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The volume of the new object is calculated appropriately by subtracting the volume of the smaller cone from the volume of the whole cone; however, early rounding when using the Pythagorean Theorem to determine the value of  $x$  results in an incorrect solution. The response contains an incorrect solution but provides sound procedures and reasoning.

# GUIDE PAPER 7

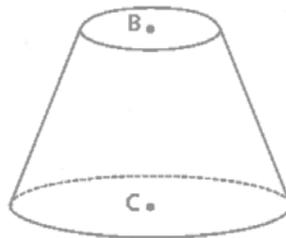
58

The circular base of the cone below has center C. Another circle, with center B, is parallel to the base. This circle is the base of a smaller cone with height AB. The measurements in the diagram are given in inches.



Triangle ABD is similar to triangle ACE.

The smaller cone is removed to create a new object, as shown below.



What is the volume of this new object? Round your answer to the nearest tenth.

Show your work.

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

$$V = \frac{1}{3} \pi (2)^2 (5)$$

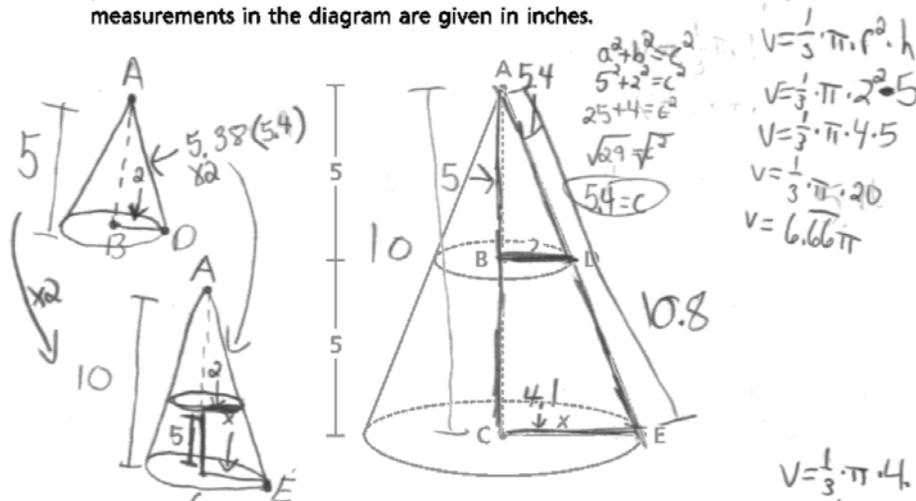
Answer 20.9 cubic inches

## Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The volume of the smaller cone is calculated correctly and appropriately rounded to the nearest tenth; however, the volumes of the whole cone and the new object are not addressed. The response addresses some elements of the task correctly but is incomplete.

58

The circular base of the cone below has center C. Another circle, with center B, is parallel to the base. This circle is the base of a smaller cone with height AB. The measurements in the diagram are given in inches.



Triangle ABD is similar to triangle ACE.

The smaller cone is removed to create a new object, as shown below.

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

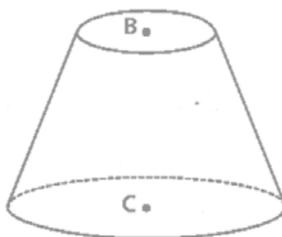
$$10^2 + b^2 = 10.8^2$$

$$100 + b^2 = 116.64$$

$$b^2 = 116.64 - 100$$

$$b^2 = 16.64$$

$$b = 4.1$$



$$V = \frac{1}{3} \pi \cdot 4.1^2 \cdot 10$$

$$V = \frac{1}{3} \pi \cdot 16.81 \cdot 10$$

$$V = \frac{1}{3} \pi \cdot 168.1$$

$$V = 56.033\pi$$

56.033

What is the volume of this new object? Round your answer to the nearest tenth.

Show your work.

Answer \_\_\_\_\_ cubic inches

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The volume of the smaller cone is calculated correctly; however, early rounding when using the Pythagorean Theorem to determine the value of  $x$  results in an incorrect value for the volume of the whole cone. The volumes are not subtracted to determine the volume of the new object. The response addresses some elements of the task correctly but provides faulty and incomplete reasoning.

# GUIDE PAPER 9

58

The circular base of the cone below has center C. Another circle, with center B, is parallel to the base. This circle is the base of a smaller cone with height AB. The measurements in the diagram are given in inches.

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

$V = \frac{1}{3}\pi 2^2 5$

$V = \frac{1}{3}\pi \cdot 4 \cdot 5$

$V = \frac{1}{3}\pi \cdot 20$

$V = 10.5 \cdot 20$

$V = 20.94$

Triangle ABD is similar to triangle ACE.

The smaller cone is removed to create a new object, as shown below.

$V = \pi r^2 h$

$V = 4\pi 2^2 5$

$V = 4\pi \cdot 4 \cdot 5$

$V = 4\pi \cdot 20$

$V = 62.83$

What is the volume of this new object? Round your answer to the nearest tenth.

Show your work.

$V = 62.8$

Answer 62.8 cubic inches

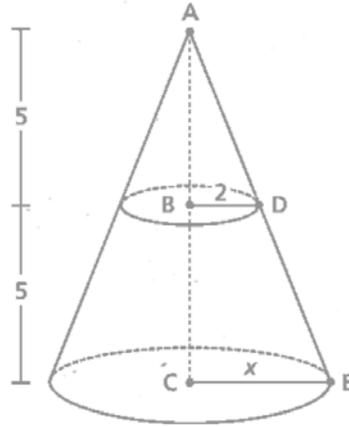
## Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The volume of the smaller cone is calculated correctly; however, the volume of the new object is calculated directly by inappropriately using the formula for the volume of a cylinder. The response addresses some elements of the task correctly but provides faulty and incomplete reasoning.

# GUIDE PAPER 10

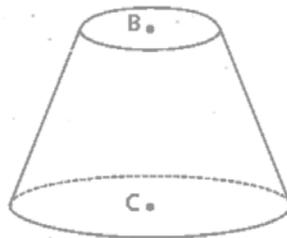
58

The circular base of the cone below has center C. Another circle, with center B, is parallel to the base. This circle is the base of a smaller cone with height AB. The measurements in the diagram are given in inches.



Triangle ABD is similar to triangle ACE.

The smaller cone is removed to create a new object, as shown below.



What is the volume of this new object? Round your answer to the nearest tenth.

**Show your work.**

$$V = \frac{1}{3}\pi r^2 h \rightarrow \frac{1}{3}\pi \cdot 16 \cdot 5 \approx 83.8$$

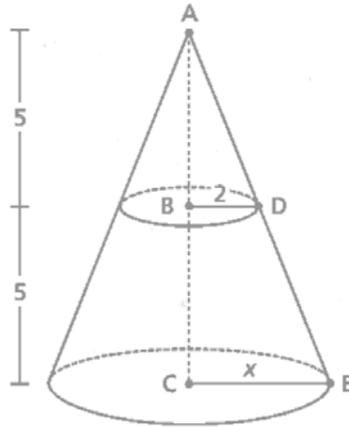
**Answer** 83.8 cubic inches

## Score Point 0 (out of 3 points)

Holistically, this response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. The volume of the whole cone is calculated using an incorrect height and the volumes of the smaller cone and the new object are not addressed.

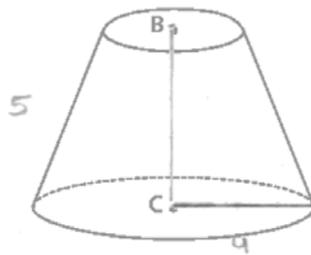
58

The circular base of the cone below has center C. Another circle, with center B, is parallel to the base. This circle is the base of a smaller cone with height AB. The measurements in the diagram are given in inches.



Triangle ABD is similar to triangle ACE.

The smaller cone is removed to create a new object, as shown below.



What is the volume of this new object? Round your answer to the nearest tenth.

Show your work.

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

$$V = 4^2 \pi \times 5$$

$$V = 16\pi \times 5$$

$$V = 80\pi$$

$$V = 251.3$$

Answer 251.3 cubic inches

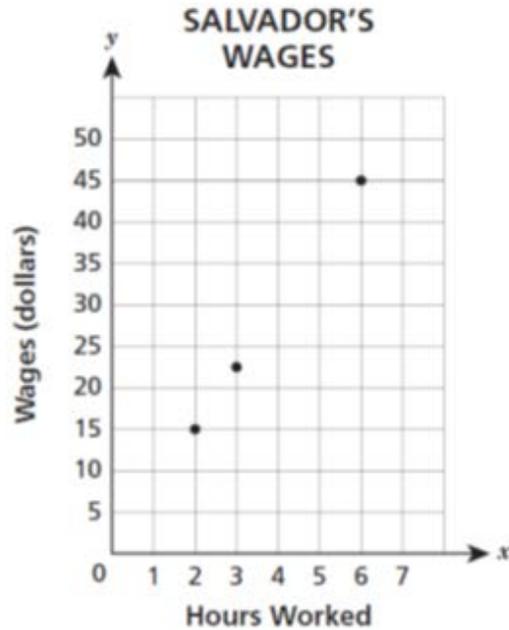
Score Point 0 (out of 3 points)

This response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. Although the value of  $x$  is correctly determined to be 4, the volume of the new object is calculated directly by inappropriately using the formula for the volume of a cylinder.

The table and the graph below show Josie's and Salvador's wages, respectively, based on the number of hours worked.

**JOSIE'S WAGES**

Hours Worked	Wages (dollars)
3	26.25
5	43.75
7	61.25



In 2010, Josie and Salvador each worked an eight-hour day for five days each week. How many weeks did it take Josie to earn \$1,000 more than Salvador?

*Show your work.*

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

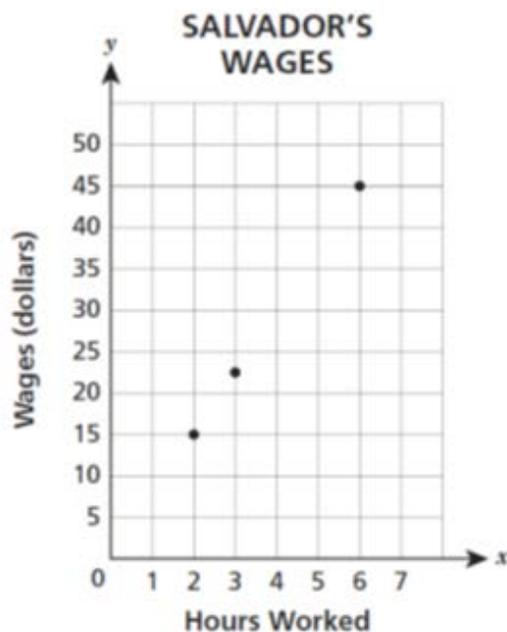
## EXEMPLARY RESPONSE

59

The table and the graph below show Josie's and Salvador's wages, respectively, based on the number of hours worked.

**JOSIE'S WAGES**

Hours Worked	Wages (dollars)
3	26.25
5	43.75
7	61.25



In 2010, Josie and Salvador each worked an eight-hour day for five days each week. How many weeks did it take Josie to earn \$1,000 more than Salvador?

**Show your work.**

$$\text{Josie: } \$26.25 \div 3 \text{ hr} = \$8.75 / \text{hr}$$

$$\$8.75 / \text{hr} \times 40 \text{ hr} / \text{week} = \$350 / \text{week}$$

$$\text{Salvador: } \$15.00 \div 2 \text{ hr} = \$7.50 / \text{hr}$$

$$\$7.50 / \text{hr} \times 40 \text{ hr} / \text{week} = \$300 / \text{week}$$

$$8 \times 5 = 40 \text{ hr/week}$$

$$8.75h = 7.50h + 1000$$

OR

$$\$350 - \$300 = \$50 / \text{week difference}$$

$$1.25h = 1000$$

$$h = \frac{1000}{1.25} = 800 \text{ hr}$$

$$\frac{\$1000}{\$50 / \text{week}} = 20 \text{ weeks}$$

$$\frac{800 \text{ hr}}{40 \text{ hr/week}} = 20 \text{ weeks}$$

or other valid process

**Answer** \_\_\_\_\_ 20 \_\_\_\_\_ weeks

59

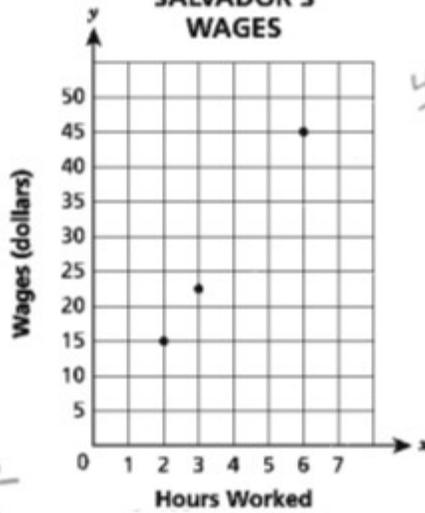
The table and the graph below show Josie's and Salvador's wages, respectively, based on the number of hours worked.

JOSIE'S WAGES

Hours Worked	Wages (dollars)
3	26.25
5	43.75
7	61.25

$$\frac{61.25 - 43.75}{7 - 5} = \frac{17.5}{2} = 8.75$$

SALVADOR'S WAGES



$$\frac{45 - 15}{6 - 2} = \frac{30}{4} = 7.5$$

$$8 \times 5 = 40$$

In 2010, Josie and Salvador each worked an eight-hour day for five days each week. How many weeks did it take Josie to earn \$1,000 more than Salvador?

Show your work.

Let  $x$  = number of weeks worked

$$40(8.75)x - 1000 = 40(7.5)x$$

$$350x - 1000 = 300x$$

$$-350x \quad -350x$$

$$\frac{-1000 = -50x}{-50 \quad -50}$$

$$20 = x$$

It will take Josie 20 weeks to earn \$1,000 more than Salvador.

Answer

20

weeks

Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The number of weeks it took Josie to earn \$1000 more than Salvador is calculated correctly using an appropriate equation.

# GUIDE PAPER 2

59

The table and the graph below show Josie's and Salvador's wages, respectively, based on the number of hours worked.

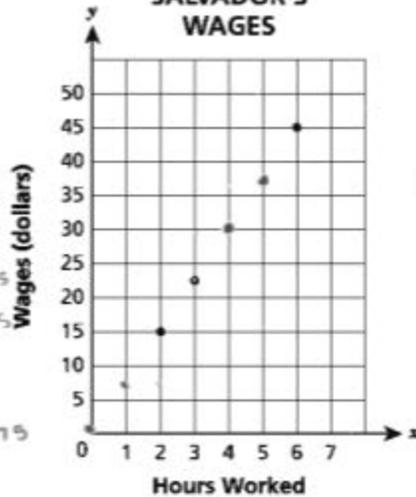
**JOSIE'S WAGES**

Hours Worked	Wages (dollars)
3	26.25
5	43.75
7	61.25

+12  
+12

$$\frac{17.5}{2} = 8.75$$

**SALVADOR'S WAGES**



\$15 every  
2 hours  
(7.5)

In 2010, Josie and Salvador each worked an eight-hour day for five days each week. How many weeks did it take Josie to earn \$1,000 more than Salvador?

**Show your work.**

10 weeks = 500 more  
20 weeks = 1000 more  
 $300(20) = 7000$   
 $300(20) = 6000$

**Answer** 20

Week	Josie	Salvador
1	\$350	\$300
2	\$700	\$600
3	\$1050	\$900
4	\$1400	\$1200
5	\$1750	\$1500
6	\$2100	\$1800
7	\$2450	\$2100
8	\$2800	\$2400
9	\$3150	\$2700
10	\$3500	\$3000

500 more

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. The number of weeks it took Josie to earn \$1000 more than Salvador is determined correctly using an appropriate table listing the cumulative earnings for a given week.

# GUIDE PAPER 3

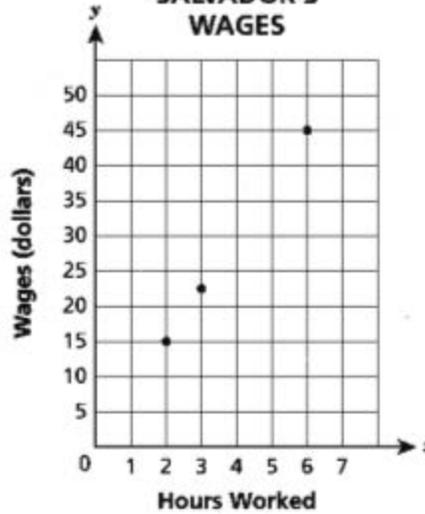
59

The table and the graph below show Josie's and Salvador's wages, respectively, based on the number of hours worked.

**JOSIE'S WAGES**

Hours Worked	Wages (dollars)
3	26.25
5	43.75
7	61.25

**SALVADOR'S WAGES**



In 2010, Josie and Salvador each worked an eight-hour day for five days each week. How many weeks did it take Josie to earn \$1,000 more than Salvador?

*Show your work.*

$$\begin{array}{l}
 8.75 \times 40 = 350 \\
 7.5 \times 40 = 300 \\
 \hline
 50
 \end{array}
 \qquad
 \frac{1,000}{50} = 20$$

**Answer**     20     weeks

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. The number of weeks it took Josie to earn \$1000 more than Salvador is calculated correctly by determining their weekly earnings and dividing \$1000 by the \$50 per week difference in the earnings.

# GUIDE PAPER 4

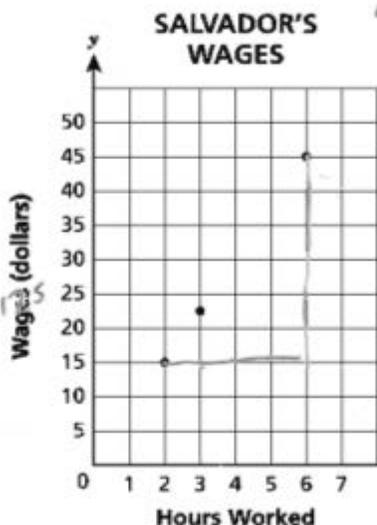
59

The table and the graph below show Josie's and Salvador's wages, respectively, based on the number of hours worked.

**JOSIE'S WAGES**

Hours Worked	Wages (dollars)
3	26.25
5	43.75
7	61.25

8.75



Handwritten notes on the graph area:  
 7350  
 6300  
 6650  
 5700  
 2200  
 2400  
 1750  
 1900  
 2100  
 1600  
 2450  
 2100  
 7200  
 6600  
 $\frac{350x}{700} = \frac{300x}{300}$

In 2010, Josie and Salvador each worked an eight-hour day for five days each week. How many weeks did it take Josie to earn \$1,000 more than Salvador?

Show your work.

Find how much Josie and Salvador earn per hour by calculating unit rates and initial values of each

$3 \rightarrow 26.25$   
 $5 \rightarrow 43.75$   
 $7 \rightarrow 61.25$   
 $17.5 \div 2 = 8.75$   
 $8.75 \times 3 = 26.25$   
 $8.75 \times 5 = 43.75$   
 $8.75 \times 7 = 61.25$

$2 \rightarrow 15$   
 $3 \rightarrow 22.5$   
 $6 \rightarrow 45$   
 $7.5 \div 2 = 3.75$   
 $3.75 \times 2 = 7.5$   
 $3.75 \times 3 = 11.25$   
 $3.75 \times 6 = 22.5$

$350x = 300x$   
 $350x - 300x = 1000$   
 $50x = 1000$   
 $x = 20$

Josie's hourly pay =  $8.75x = y$   
 Salvador's hourly pay =  $7.5x = y$   
 substitute values for x to get \$1,000 more for Josie

**Answer**      22      weeks

## Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The amount of money each person earns per week is calculated correctly and an appropriate trial-and-error process is described to determine the number of weeks it took Josie to earn \$1000 more than Salvador (*substitute values for x to get \$1,000 more for Josie than Salvador*); however, the solution is incorrect. The response appropriately addresses most, but not all aspects of the task.

# GUIDE PAPER 5

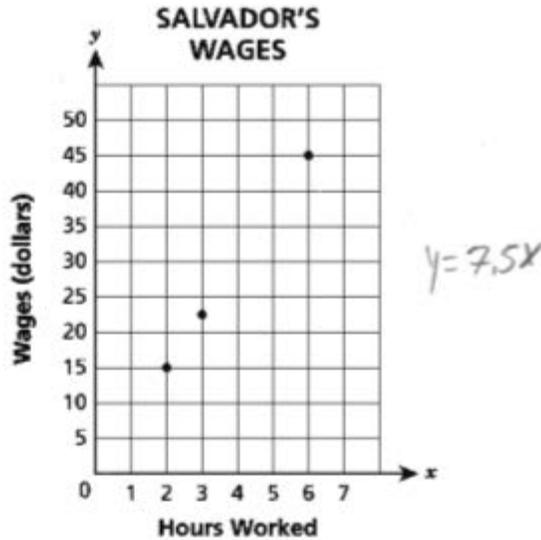
59

The table and the graph below show Josie's and Salvador's wages, respectively, based on the number of hours worked.

**JOSIE'S WAGES**

Hours Worked	Wages (dollars)
3	26.25
5	43.75
7	61.25

$$y = 8.75x$$



In 2010, Josie and Salvador each worked an eight-hour day for five days each week. How many weeks did it take Josie to earn \$1,000 more than Salvador?

*Show your work.*

$$\begin{array}{r}
 7.5x + 1000 = 8.75x \\
 \underline{-7.5x} \quad \underline{-7.5x} \\
 1000 = 1.25x \\
 \underline{1.25} \quad \underline{1.25} \\
 800 = x
 \end{array}$$

**Answer**      800      weeks

## Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The number of hours it took Josie to earn \$1000 more than Salvador is calculated correctly using an appropriate equation; however, this value is not converted into weeks. The response appropriately addresses most, but not all aspects of the task.

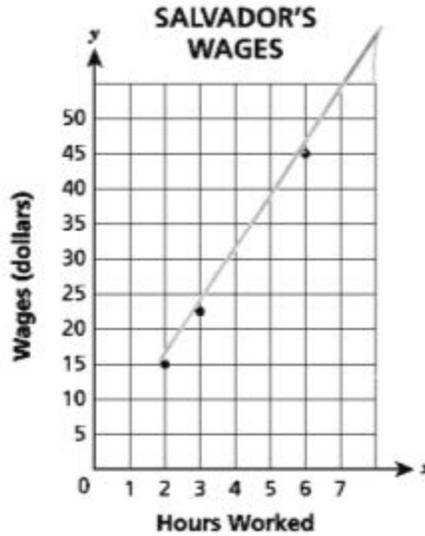
# GUIDE PAPER 6

59

The table and the graph below show Josie's and Salvador's wages, respectively, based on the number of hours worked.

**JOSIE'S WAGES**

Hours Worked	Wages (dollars)
3	26.25
5	43.75
7	61.25



In 2010, Josie and Salvador each worked an eight-hour day for five days each week. How many weeks did it take Josie to earn \$1,000 more than Salvador?

Show your work.

*Handwritten work:*

Salvador  
 $\$60$  per 8 hours  
 $(60) \times 30 = 1800$   
 $(60) \times 40 = 2400$   
 $(60) \times 50 = 3000$   
 $(60) \times 60 = 3600$   
 $(60) \times 70 = 4200$   
 $(60) \times 80 = 4800$   
 $(60) \times 90 = 5400$   
 $(60) \times 100 = 6000$

Josie  
 $\$70$  per 8 hours  
 $(70) \times 5 = 350$   
 $(70) \times 10 = 700$   
 $(70) \times 20 = 1400$   
 $(70) \times 30 = 2100$   
 $(70) \times 40 = 2800$   
 $(70) \times 50 = 3500$   
 $(70) \times 60 = 4200$   
 $(70) \times 70 = 4900$   
 $(70) \times 80 = 5600$   
 $(70) \times 90 = 6300$   
 $(70) \times 100 = 7000$

**Answer** 20 weeks      10 weeks = 100 days

## Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The number of days it took Josie to earn \$1000 more than Salvador is calculated correctly using trial-and-error; however, this value is converted into weeks incorrectly. The response appropriately addresses most, but not all aspects of the task.

# GUIDE PAPER 7

59

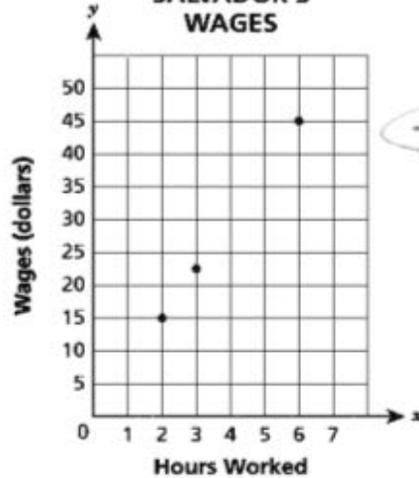
The table and the graph below show Josie's and Salvador's wages, respectively, based on the number of hours worked.

**JOSIE'S WAGES**

Hours Worked	Wages (dollars)
3	26.25
5	43.75
7	61.25

Handwritten notes for Josie's wages:  
 51750  
 350  
 7000  
 8.75 per hour  
 $\frac{17.5}{2}$

**SALVADOR'S WAGES**



Handwritten notes for Salvador's wages:  
 300  
 7.5 per hour  
 $\frac{30}{4}$   
 (2, 15)  
 (6, 45)

In 2010, Josie and Salvador each worked an eight-hour day for five days each week. How many weeks did it take Josie to earn \$1,000 more than Salvador?

Show your work.

↑  
work shown above

Answer

20

weeks

## Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The number of weeks it took Josie to earn \$1000 more than Salvador is correctly identified; however, the work only includes the hourly and weekly wages with no calculations shown to demonstrate how they or the solution were obtained. The response contains the correct solution but the required work is limited.

59

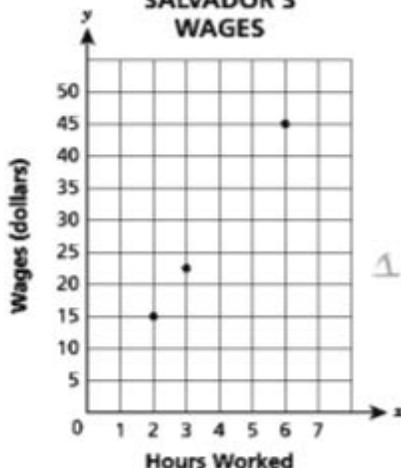
The table and the graph below show Josie's and Salvador's wages, respectively, based on the number of hours worked.

JOSIE'S WAGES

Hours Worked	Wages (dollars)
3	26.25
5	43.75
7	61.25

$1 = 8.83$

SALVADOR'S WAGES



In 2010, Josie and Salvador each worked an eight-hour day for five days each week. How many weeks did it take Josie to earn \$1,000 more than Salvador?

Show your work.

(Josie) 200 - 1766  
 (Salvador) 200 - 1500  
 (Josie) 500 - 4415.7  
 (Salvador) 500 - 3750  
 (Josie) 800 - 7064  
 (Salvador) 800 - 6000

775 (Josie)  
 $\times 8.83$   
 -----  
 6843.25  
 775  
 $\times 7.5$  (Salvador)  
 -----  
 5812.5

Answer

775

weeks

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. An appropriate trial-and-error procedure is used to determine the number of hours it took Josie to earn \$1000 more than Salvador; however, Josie's hourly wage is calculated incorrectly. This error makes trial-and-error difficult as carrying the error through causes the solution to no longer be an integer value of hours: as a result the trial-and-error process is stopped at a difference of \$1030.75 rather than \$1000 exactly. In addition, the solution in hours is not converted into weeks. The response addresses some elements of the task correctly but reaches an inadequate solution based on faulty and incomplete reasoning.

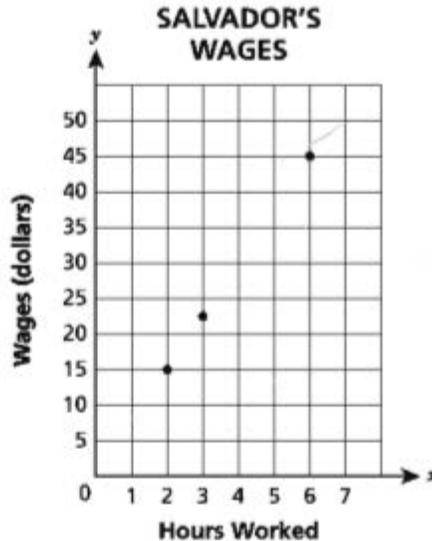
# GUIDE PAPER 9

59

The table and the graph below show Josie's and Salvador's wages, respectively, based on the number of hours worked.

**JOSIE'S WAGES**

Hours Worked	Wages (dollars)
3	26.25
5	43.75
7	61.25



In 2010, Josie and Salvador each worked an eight-hour day for five days each week. How many weeks did it take Josie to earn \$1,000 more than Salvador?

Show your work.

*Josie's*

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{43.75 - 26.25}{5 - 3} = \frac{17.5}{2} = 8.75$$

*SALVADOR'S*

$$\frac{15}{2} = 7.5 \quad \frac{7.5 \times 8}{60 \times 5} = 30 \quad \frac{1000}{30} = 33.33$$

**Answer** 2.857 or 2.86 weeks

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

This response demonstrates only a limited understanding of the mathematical concepts in the task. The amount of money each person earns per week is calculated correctly; however, these values are used incorrectly to determine the number of weeks it took each person to earn \$1000 rather than the number of weeks for Josie to earn \$1000 *more* than Salvador. The response reflects a lack of essential understanding of the underlying concepts.

# GUIDE PAPER 10

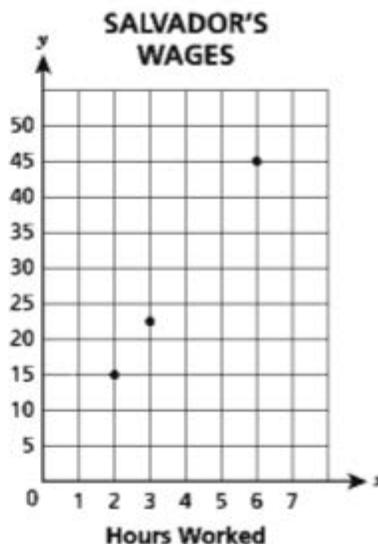
59

The table and the graph below show Josie's and Salvador's wages, respectively, based on the number of hours worked.

**JOSIE'S WAGES**

Hours Worked	Wages (dollars)
3	26.25
5	43.75
7	61.25

Wages (dollars)



In 2010, Josie and Salvador each worked an eight-hour day for five days each week. How many weeks did it take Josie to earn \$1,000 more than Salvador?

*Show your work.*

8 hours · 5 days = 40

Josie - \$17.50 for every 2 hours

$$\begin{array}{r} 17.50 \\ \times 8 \\ \hline 140.00 \end{array}$$

$$\begin{array}{r} 170 \\ \times 5 \\ \hline 850 \end{array}$$

$$\begin{array}{r} 70 \\ \times 10 \\ \hline 700 \end{array}$$

$$\begin{array}{r} 70 \\ \times 14 \\ \hline 980 \end{array}$$

$$\begin{array}{r} 70 \\ \times 15 \\ \hline 1050 \end{array}$$

14000      700      350      700      980      1050

14 1/2      About 14 1/2

**Answer**      14 1/2      weeks

## Score Point 0 (out of 3 points)

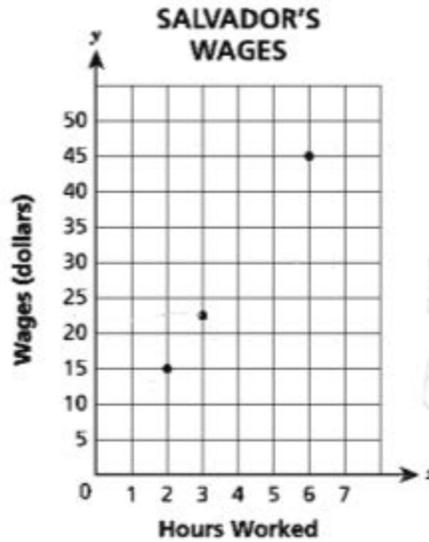
Holistically, this response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. Although Josie's daily earnings are calculated correctly, they are used incorrectly to determine the number of days it took Josie to earn \$1000 rather than the number of weeks for Josie to earn \$1000 *more* than Salvador. Salvador's earnings are not addressed.

59

The table and the graph below show Josie's and Salvador's wages, respectively, based on the number of hours worked.

**JOSIE'S WAGES**

Hours Worked	Wages (dollars)
3	26.25
5	43.75
7	61.25



In 2010, Josie and Salvador each worked an eight-hour day for five days each week. How many weeks did it take Josie to earn \$1,000 more than Salvador?

*Show your work.*

Handwritten work:

$$61.25 - 17.5 = 43.75$$

$$8 \times 5 = 40$$

$$40 \div 2 = 20$$

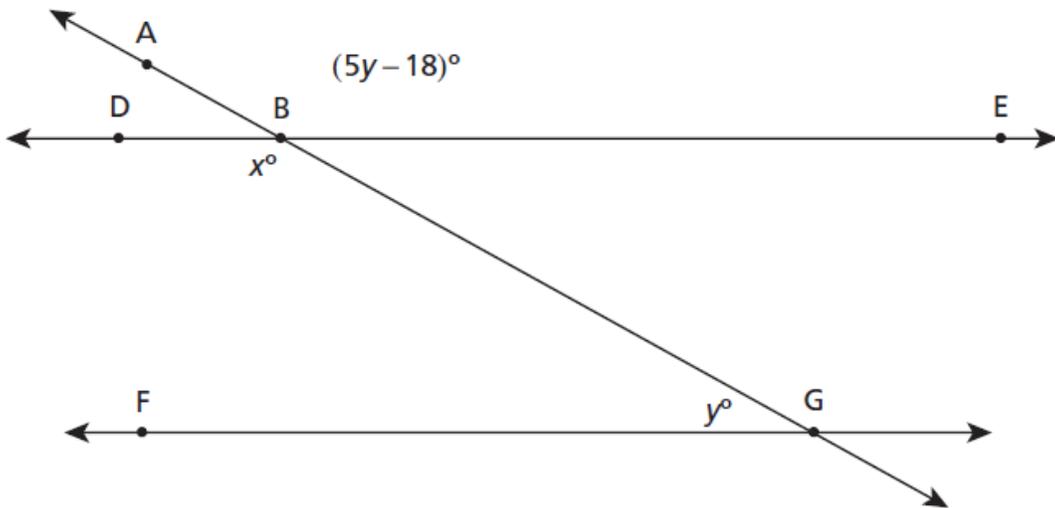
**Answer**    20    weeks

**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 correct solution is obtained using an obviously incorrect procedure.

60

In the figure below, line DE is parallel to line FG, with transversal AG.



Write and solve a system of linear equations to determine the values of  $x$  and  $y$ .

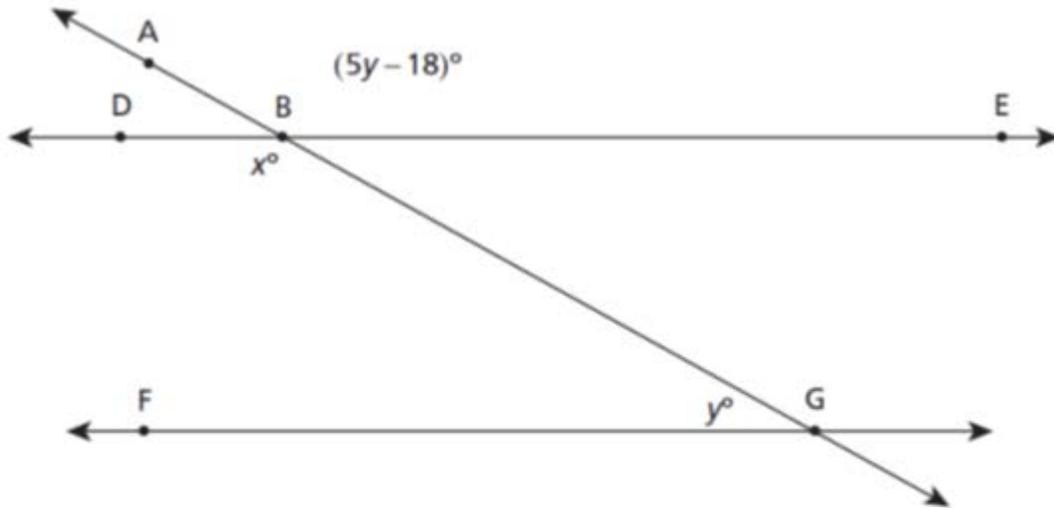
**Show your work.**

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

## EXEMPLARY RESPONSE

60

In the figure below, line DE is parallel to line FG, with transversal AG.



Write and solve a system of linear equations to determine the values of  $x$  and  $y$ .

**Show your work.**

$$x = 5y - 18$$

$$x + y = 180$$

$$(5y - 18) + y = 180$$

$$6y = 180 + 18$$

$$6y = 198$$

$$y = 33$$

$$x + (33) = 180$$

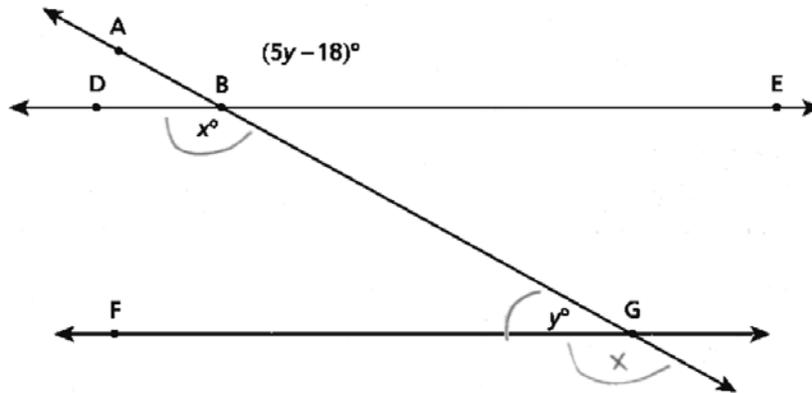
$$x = 147$$

or other valid process

**Answer**  $x =$  147 and  $y =$  33

60

In the figure below, line DE is parallel to line FG, with transversal AG.



Write and solve a system of linear equations to determine the values of  $x$  and  $y$ .

**Show your work.**

$$\begin{aligned} x &= 5y - 18 \\ x + y &= 180 \\ 5y - 18 + y &= 180 \\ 6y - 18 &= 180 \\ +18 &+18 \\ \hline 6y &= 198 \\ \frac{6y}{6} &= \frac{198}{6} \\ y &= 33 \end{aligned}$$

$$\begin{aligned} x + 33 &= 180 \\ -33 &-33 \\ \hline x &= 147 \end{aligned}$$

**Answer**  $x = 147$  and  $y = 33$

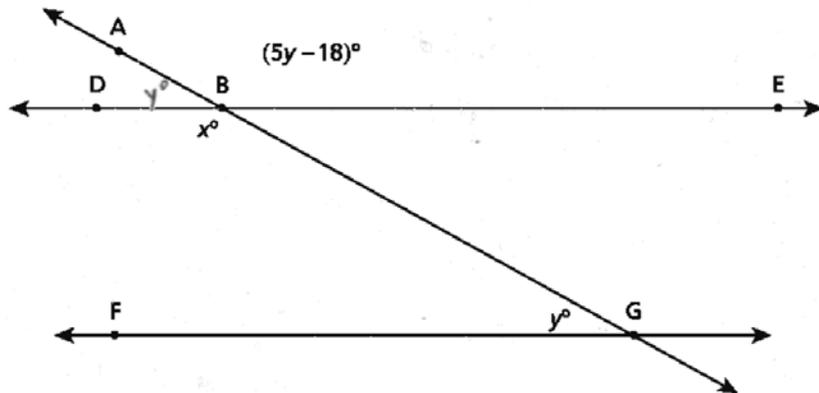
### Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. A correct system of equations is provided and it is correctly solved to determine the values of  $x$  and  $y$ .

# GUIDE PAPER 2

60

In the figure below, line DE is parallel to line FG, with transversal AG.



Write and solve a system of linear equations to determine the values of  $x$  and  $y$ .

**Show your work.**

$$\begin{array}{l}
 y + (5y - 18) = 180 \\
 y + 5y - 18 = 180 \\
 6y - 18 = 180 \\
 6y = 198 \\
 \boxed{y = 33}
 \end{array}
 \qquad
 \begin{array}{l}
 6y - 18 = 180 \\
 5y - 18 = x \\
 5(33) - 18 = x \\
 165 - 18 = x \\
 \boxed{147 = x}
 \end{array}$$

**Answer**  $x = 147^\circ$  and  $y = 33^\circ$

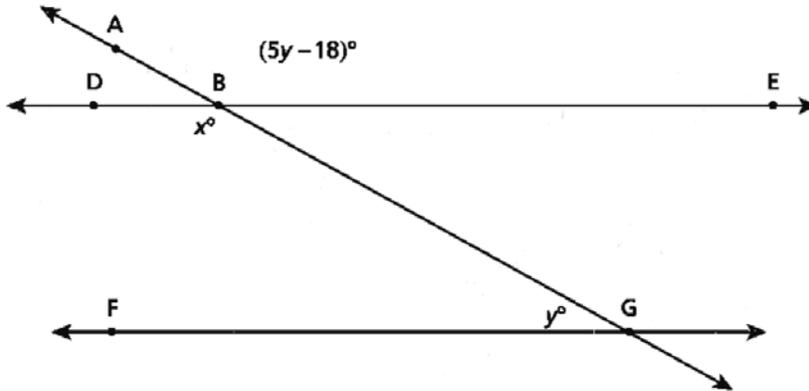
### Score Point 3 (out of 3 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. A correct system of equations is provided and it is correctly solved to determine the values of  $x$  and  $y$ .

# GUIDE PAPER 3

60

In the figure below, line DE is parallel to line FG, with transversal AG.



Write and solve a system of linear equations to determine the values of  $x$  and  $y$ .

**Show your work.**

$$x = 5y - 18$$

$$y = 180 - x$$

$$x = 5(180 - x) - 18$$

$$x = 900 - 5x - 18$$

$$x = 882 - 5x$$

$$6x = 882 \quad +5x$$

$$x = 147 \quad \text{and } y = 33^\circ$$

**Answer**  $x =$

**and**  $y =$

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

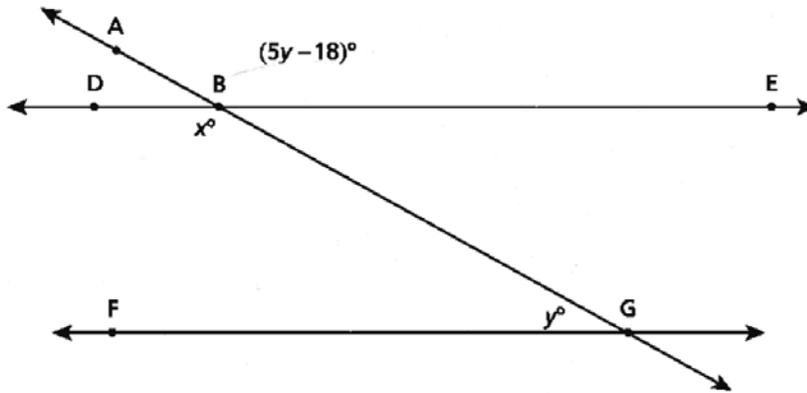
This response demonstrates a thorough understanding of the mathematical concepts in the task. A correct system of equations is provided and it is correctly solved to determine the values of  $x$  and  $y$ .



# GUIDE PAPER 5

60

In the figure below, line DE is parallel to line FG, with transversal AG.



Write and solve a system of linear equations to determine the values of  $x$  and  $y$ .

**Show your work.**

$$x = 5y - 18 \rightarrow 5y = x - 18$$

$$y = 180 - x \rightarrow y = -x + 180$$

$5y = 162$	$x = 5(27) - 18$
$y = 27$	$x = 135 - 18$
	$x = 117$

**Answer**  $x = 117$  and  $y = 27$

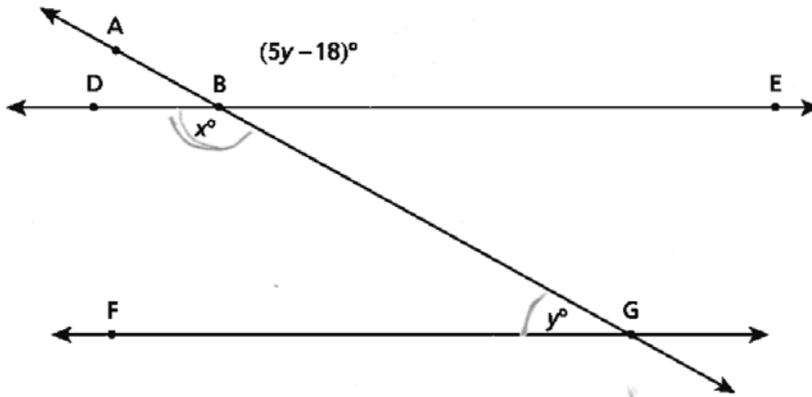
### Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. A correct system of equations is provided; however, one of the equations is rearranged incorrectly when solving the system ( $x = 5y - 18 \rightarrow 5y = x - 18$ ), resulting in an incorrect solution. The response reflects some minor misunderstanding of the underlying procedures.

# GUIDE PAPER 6

60

In the figure below, line DE is parallel to line FG, with transversal AG.



Write and solve a system of linear equations to determine the values of  $x$  and  $y$ .

**Show your work.**

$$\begin{cases} x = 5y - 18 \\ y = -2x + 360 \end{cases}$$

$$\begin{aligned} y &= -2(162) + 360 \\ y &= -324 + 360 \\ y &= 36 \end{aligned}$$

$$\begin{aligned} x &= 5(-2x + 360) - 18 \\ x &= -10x + 1800 - 18 \\ x &= -10x + 1782 \\ +10x &+10x \\ 11x &= 1782 \\ \hline x &= 162 \end{aligned}$$

**Answer**  $x = 162^\circ$  and  $y = 36^\circ$

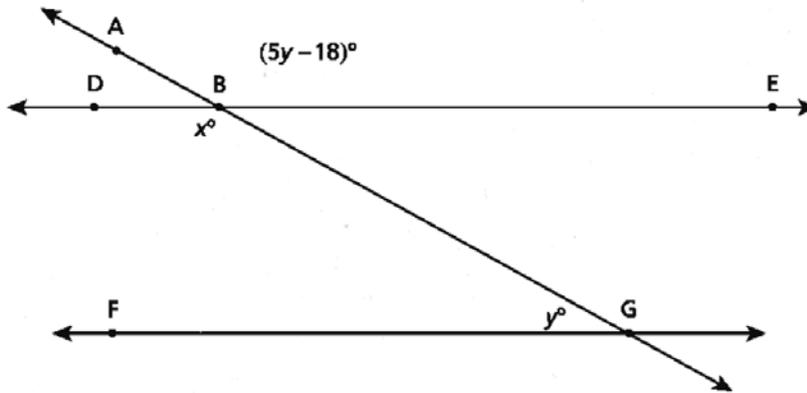
## Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The system of equations provided is partially correct: the equation  $y = -2x + 360$  is missing a coefficient of 2 for the variable  $y$ . Although the system of equations is incorrect, it is then solved correctly to determine the values of  $x$  and  $y$ . The response contains an incorrect solution but provides sound procedures.

# GUIDE PAPER 7

60

In the figure below, line DE is parallel to line FG, with transversal AG.



Write and solve a system of linear equations to determine the values of  $x$  and  $y$ .

**Show your work.**

$x - y =$

$\begin{array}{r} 2 \\ 25 \\ + 5 \\ \hline 128 \\ - 18 \\ \hline 107 \\ + 25 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 35 \\ \hline 178 \\ - 16 \\ \hline 157 \\ + 35 \\ \hline 192 \end{array}$	$\begin{array}{r} 1 \\ 33 \\ \hline 188 \\ - 18 \\ \hline 147 \end{array}$
---	--	--

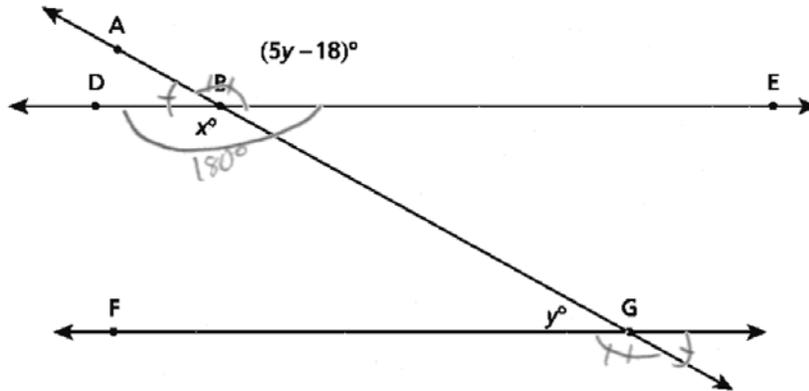
**Answer**  $x = 147$  and  $y = 33$

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

This response demonstrates only a limited understanding of the mathematical concepts in the task. The values of  $x$  and  $y$  are correctly determined using trial-and-error; however, the response does not provide a system of equations. The response reflects a lack of essential understanding of the underlying concepts.

60

In the figure below, line DE is parallel to line FG, with transversal AG.



Write and solve a system of linear equations to determine the values of  $x$  and  $y$ .

**Show your work.**

$$x = (5y - 18)$$

$$y = 180 - (5y - 18)$$

**Answer**  $x = (5y - 18)$  and  $y = 180 - (5y - 18)$

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

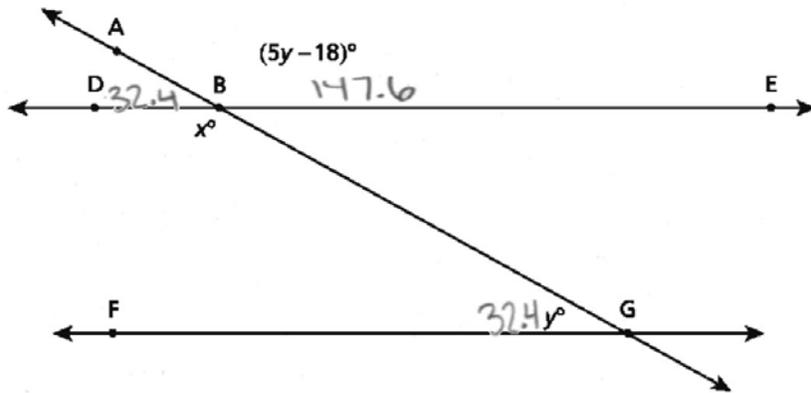
This response demonstrates only a limited understanding of the mathematical concepts in the task. A correct system of equations is provided; however, it is not solved. The response addresses some elements of the task correctly, but is incomplete.



# GUIDE PAPER 10

60

In the figure below, line DE is parallel to line FG, with transversal AG.



Write and solve a system of linear equations to determine the values of  $x$  and  $y$ .

**Show your work.**

$$\begin{aligned}
 180 &= 5y - 18 \\
 -18 & \quad -18 \\
 \hline
 162 &= 5y \\
 \frac{162}{5} &= \frac{5y}{5} \\
 y &= 32.4
 \end{aligned}$$

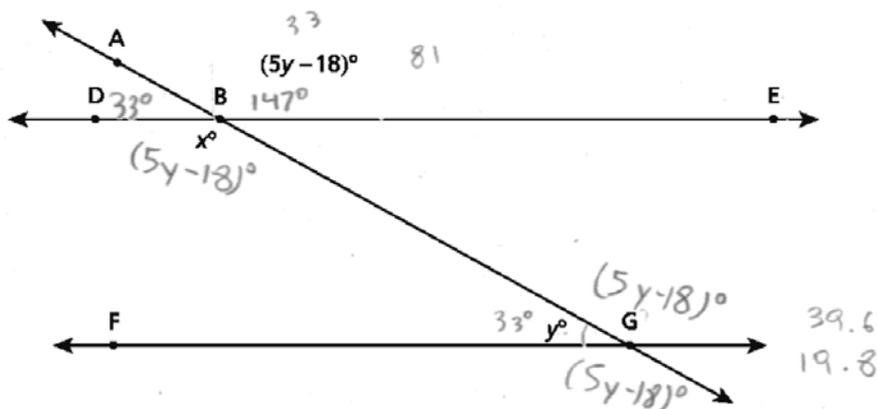
**Answer**  $x = 147.6^\circ$  and  $y = 32.4^\circ$

## Score Point 0 (out of 3 points)

Holistically, this response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. Only one equation is provided and it is incorrect. Although this equation is solved correctly for the value of  $y$  and the value of  $x$  is correct based on the incorrect value of  $y$ , no work is shown for the determination of the value of  $x$ .

60

In the figure below, line DE is parallel to line FG, with transversal AG.



Write and solve a system of linear equations to determine the values of  $x$  and  $y$ .

Show your work.

$$\begin{array}{r}
 180 > (5y-18) \\
 180 > 5y-18 \\
 +18 \quad +18 \\
 \hline
 198 > 5y \\
 \frac{198}{5} > \frac{5y}{5} \\
 39.6 = y
 \end{array}$$

$$\begin{array}{r}
 180 - (5y-18) \\
 180 - 5y + 18 \\
 198 - 5y \\
 198 = 5y \\
 \frac{198}{5} = \frac{5y}{5} \\
 39.6 = y
 \end{array}$$

$$\begin{array}{r}
 180 = (5y-18) + x \\
 180 = 5y - 18 + x \\
 +18 \quad +18 \\
 \hline
 198 = 5y + x
 \end{array}$$

$$\begin{array}{r}
 180 - (5y-18) + x = 180 \\
 180 - 5y + 18 + x = 180 \\
 198 - 5y + x = 180 \\
 -198 \quad +198 \\
 \hline
 -5y + x = -18 \\
 x = 5y - 18
 \end{array}$$

$$\begin{array}{r}
 198 = 5y + x \\
 39.6 = y + x \\
 \frac{198}{5} = \frac{5y}{5} + \frac{x}{5} \\
 39.6 = y + \frac{x}{5}
 \end{array}$$

$$\begin{array}{r}
 33(5y-18) \\
 147 \\
 + 33 \\
 \hline
 180
 \end{array}$$

**Answer**  $x = 147^\circ$  and  $y = 33^\circ$

Score Point 0 (out of 3 points)

Holistically, this response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. The work contains only one correct equation,  $x = 5y - 18$ , which is not used correctly in the rest of the work. The work does not support how the correct solution was obtained.

Four equations are shown below.

**Equation 1:**  $y = 2^x$

**Equation 2:**  $y = 2x - 5$

**Equation 3:**  $y = x^2 + 8$

**Equation 4:**  $y = \frac{x}{2}$

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

**Linear equation** \_\_\_\_\_

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**Nonlinear equation** \_\_\_\_\_

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# EXEMPLARY RESPONSE

61

Four equations are shown below.

**Equation 1:**  $y = 2^x$

**Equation 2:**  $y = 2x - 5$

**Equation 3:**  $y = x^2 + 6$

**Equation 4:**  $y = \frac{x}{2}$

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

**Linear equation** Equation 2 ( $y = 2x - 5$ ) OR Equation 4 ( $y = x/2$ )

It is linear because the exponent is either 1 or 0 OR it is

written in  $y = mx + b$  form OR when graphed it makes a

straight line OR other valid response

**Nonlinear equation** Equation 1 ( $y = 2^x$ ) OR Equation 3 ( $y = x^2 + 6$ )

It is nonlinear because the variable is an exponent (Equation 1 only)

OR the exponent is *not* either 1 or 0 OR when graphed it does

*not* make a straight line OR other valid response

61

Four equations are shown below.

Equation 1:  $y = 2^x$

Equation 2:  $y = 2x - 5$

Equation 3:  $y = x^2 + 6$

Equation 4:  $y = \frac{x}{2}$

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

*Linear equation*

Equation 2:  $y = 2x - 5$

This is a linear equation because it's written in the form  $y = mx + b$ , and it has a constant rate of change.

*Nonlinear equation*

Equation 3:  $y = x^2 + 6$

This is a nonlinear equation because it will not have a straight line when graphed, because it has an exponent, so it's not written in proper  $y = mx + b$  form.

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. Correct equations are chosen as linear and nonlinear and the choices are appropriately justified.

## GUIDE PAPER 2

61

Four equations are shown below.

**Equation 1:**  $y = 2^x$

**Equation 2:**  $y = 2x - 5$

**Equation 3:**  $y = x^2 + 6$

**Equation 4:**  $y = \frac{x}{2}$

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

**Linear equation**

Equation 2

It is linear because it is in  $y = mx + b$  format. It can be shown in a straight line on a graph. It can go up at a constant rate.

**Nonlinear equation**

Equation 3

It is nonlinear because it is squared, and cannot go up at a constant rate. It would be a parabola on a graph.

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. Correct equations are chosen as linear and nonlinear and the choices are appropriately justified.

## GUIDE PAPER 3

61

Four equations are shown below.

Equation 1:  $y = 2^x$

Equation 2:  $y = 2x - 5$

Equation 3:  $y = x^2 + 6$

Equation 4:  $y = \frac{x}{2}$

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

Linear equation  $y = 2x - 5$

It is Linear because it stays  
constant rate of change and the  
x has a exponent of 1

Nonlinear equation  $y = x^2 + 6$

It is non-linear because the exponent  
of x must be 1 in order to be  
Linear

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

This response demonstrates a thorough understanding of the mathematical concepts in the task. Correct equations are chosen as linear and nonlinear and the choices are appropriately justified.

## GUIDE PAPER 4

61

Four equations are shown below.

Equation 1:  $y = 2^x$

Equation 2:  $y = 2x - 5$

Equation 3:  $y = x^2 + 6$

Equation 4:  $y = \frac{x}{2}$

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

**Linear equation**  $y = 2x - 5$

This is a linear equation because it's  
written in the general form,  $y = mx + b$ , and  
the  $x$  value is 1.

**Nonlinear equation**  $y = x^2 + 6$

This is a nonlinear equation because the  
 $x$  value is not 1, it is 2.

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

This response demonstrates a partial understanding of the mathematical concepts in the task. Correct equations are chosen as linear and nonlinear and the choice for the linear equation is appropriately justified; however, the explanations incorrectly refer to the exponents as  $x$ -values. The response reflects some minor misunderstanding of the underlying concepts.

## GUIDE PAPER 5

61

Four equations are shown below.

Equation 1:  $y = 2^x$

Equation 2:  $y = 2x - 5$

Equation 3:  $y = x^2 + 6$

Equation 4:  $y = \frac{x}{2}$

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

Linear equation

Equation 2

Equation 2 is a linear equation because if you graphed the equation, it would evenly be a straight line down and across.

Nonlinear equation

Equation 3

Equation 3 is a non linear because if you graphed this equation, the line would not be straight.

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

This response demonstrates a partial understanding of the mathematical concepts in the task. Correct equations are chosen as linear and nonlinear and the choices are appropriately justified; however, the phrase “*down and across*” is a misstatement of the slope, which for Equation 2 is positive rather than negative. The response reflects some minor misunderstanding of the underlying concepts.

## GUIDE PAPER 6

61

Four equations are shown below.

**Equation 1:**  $y = 2^x$

**Equation 2:**  $y = 2x - 5$

**Equation 3:**  $y = x^2 + 6$

**Equation 4:**  $y = \frac{x}{2}$

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

**Linear equation**

Equation #2

#2 is a linear equation because it has all the parts needed to make an equation. In the equation, it includes a slope, x, and a y-intercept.

**Nonlinear equation**

Equation #1

#1 is a nonlinear equation because when you square a number it can never be x. This makes it a non linear equation.

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

This response demonstrates a partial understanding of the mathematical concepts in the task. Correct equations are chosen as linear and nonlinear and the choice for the linear equation is appropriately justified; however, although the explanation for the nonlinear equation is conceptually correct it does not match the chosen equation: Equation 1 does not contain a squared value. The response reflects some minor misunderstanding of the underlying concepts.

## GUIDE PAPER 7

61

Four equations are shown below.

Equation 1:  $y = 2^x$

Equation 2:  $y = 2x - 5$

Equation 3:  $y = x^2 + 6$

Equation 4:  $y = \frac{x}{2}$

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

Linear equation

$$y=2x-5$$

This is a linear equation because the equation is in a linear form

Nonlinear equation

$$y=x^2+6$$

this is nonlinear because you can't have a variable squared

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

This response demonstrates only a limited understanding of the mathematical concepts in the task. Correct equations are chosen as linear and nonlinear; however, the explanation “*the equation is in a linear form*” is not specific about what makes the form linear. As written, the explanation “*you can't have a variable squared*” implies that nonlinear equations cannot contain squared variables rather than the statement being a condition for linear equations. The response correctly addresses only some elements of the task.

61

Four equations are shown below.

Equation 1:  $y = 2^x$

Equation 2:  $y = 2x - 5$

Equation 3:  $y = x^2 + 6$

Equation 4:  $y = \frac{x}{2}$

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

Linear equation  $y = 2x - 5$

This equation is linear because when  
you plot this on a graph it is a straight  
line

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

This equation is nonlinear because  
when you plot this on a graph it is  
not a straight line

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

This response demonstrates only a limited understanding of the mathematical concepts in the task. A correct equation is chosen as linear and appropriately justified; however, although the explanation for the nonlinear equation is conceptually correct, the chosen equation is incorrect and is not accurately described by the explanation. The response reflects a lack of essential understanding of how the graphical properties of linear functions relate to their algebraic forms.

## GUIDE PAPER 9

61

Four equations are shown below.

Equation 1:  $y = 2^x$

Equation 2:  $y = 2x - 5$

Equation 3:  $y = x^2 + 6$

Equation 4:  $y = \frac{x}{2}$

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

Linear equation

$y = x/2$

a nonlinear equation is  $y = x^2 + 6$  because it has an exponent.

Nonlinear equation

(NO STUDENT RESPONSE GIVEN)

(NO STUDENT RESPONSE GIVEN)

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

This response demonstrates only a limited understanding of the mathematical concepts in the task. Correct equations are chosen as linear and nonlinear; however, the explanation for the nonlinear equation is incorrect and an explanation is not provided for the linear equation. The response correctly addresses only some elements of the task. Per Scoring Policy #1, the response should be fully considered even though some of it is not written in the designated areas.

# GUIDE PAPER 10

61

Four equations are shown below.

Equation 1:  $y = 2^x$

Equation 2:  $y = 2x - 5$

Equation 3:  $y = x^2 + 6$

Equation 4:  $y = \frac{x}{2}$

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

Linear equation  $y = 2^x$

This is linear because it's  
constant.

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

This isn't constant or a  
straight line.

## 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 equations chosen and explanations are incorrect.

61

Four equations are shown below.

Equation 1:  $y = 2^x$

Equation 2:  $y = 2x - 5$

Equation 3:  $y = x^2 + 6$

Equation 4:  $y = \frac{x}{2}$

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

Linear equation

$$y = 2x - 5$$

they don't = each other

Nonlinear equation

$$y = x \text{ over } 2$$

x can't be on top

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

Holistically, this response is not sufficient to demonstrate even a limited understanding of the mathematical concepts in the task. Although a correct equation is chosen as linear, the choice for the nonlinear equation is incorrect. The explanations are incorrect and demonstrate no overall understanding of linearity.

