

Algebra 1

Direct Variation

Direct Variation | A1-U05-P15

96 problems · Four activity formats

|    |                            |              |
|----|----------------------------|--------------|
| 01 | Answer Bank Challenge      | 24 tasks     |
| 02 | Grid Rounds                | 24 tasks     |
| 03 | Match & Move               | 24 cards     |
| 04 | Error Analysis & Strategy  | 24 tasks     |
| 05 | Quick Answer Key           | 96 answers   |
| 06 | Full Worked Solutions      | 96 solutions |
| 07 | Teacher / Parent Use Guide | included     |
| 08 | Terms of Use & License     | included     |

Topic focus

Across 96 tasks this topic asks for an exact rule, value, graph description, or justified verdict.

8 PDFs and a README; 72 buyer pages.

## Algebra 1

## Direct Variation

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class: \_\_\_\_\_

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Scale the fractional proportional pair  $(21, -14)$  to the target input  $-\frac{9}{2}$ .  
Give the exact target output.

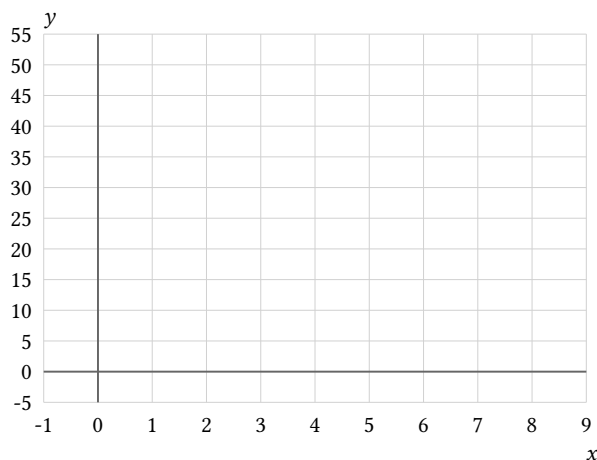
| Input $x$ | Output $y$ |
|-----------|------------|
| 21        | -14        |

Bank label: \_\_\_\_\_

A direct-variation constant is  $\frac{17}{6}$  dollars per hour. In the new units, each output number is multiplied by 100 and each input number by 3600. Find the constant in cents per second and verify an equivalent pair.

Bank label: \_\_\_\_\_

Construct the graph of  $y = 6x$  on the domain  $2 \leq x < 8$ . Use the exact sample inputs 2, 5, 7 and state whether points should be connected.



Bank label: \_\_\_\_\_

The declared domain currently includes only input 0, with output 0. Can the constant of direct variation be recovered uniquely? State the full set of possible constants.

Bank label: \_\_\_\_\_

## Algebra 1

## Direct Variation

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class: \_\_\_\_\_

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

| <p>Determine whether this exact relation is a direct variation: the relation <math>6y + 3 = 12x</math>. Explain which required invariant is decisive.</p><br><br><br><br><br><br><br><br><br><br>                                                                                                                                                                                                                                                                                                                              | <p>A declared <math>y = kx</math> relation contains the fractional pair <math>(8, 6)</math>. Compute the exact quotient and write the rule.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <tr> <th style="padding: 5px;">Input <math>x</math></th> <th style="padding: 5px;">Output <math>y</math></th> </tr> <tr> <td style="padding: 5px;">8</td> <td style="padding: 5px;">6</td> </tr> </table><br><br><br><br><br><br><br><br><br><br>                                  | Input $x$  | Output $y$ | 8               | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |            |                |                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|----------------|-----------------|
| Input $x$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Output $y$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |            |                |                 |
| 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |            |                |                 |
| <p>The fractional direct-variation pair <math>(14, -\frac{11}{2})</math> is known. Recover the input that would produce <math>y = \frac{33}{8}</math>.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <tr> <th style="padding: 5px;">Input <math>x</math></th> <th style="padding: 5px;">Output <math>y</math></th> </tr> <tr> <td style="padding: 5px;">14</td> <td style="padding: 5px;"><math>-\frac{11}{2}</math></td> </tr> </table><br><br><br><br><br><br><br><br><br><br> | Input $x$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Output $y$ | 14         | $-\frac{11}{2}$ | <p>Scale the fractional proportional pair <math>(\frac{11}{4}, -\frac{13}{6})</math> to the target input <math>-\frac{9}{5}</math>. Give the exact target output.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <tr> <th style="padding: 5px;">Input <math>x</math></th> <th style="padding: 5px;">Output <math>y</math></th> </tr> <tr> <td style="padding: 5px;"><math>\frac{11}{4}</math></td> <td style="padding: 5px;"><math>-\frac{13}{6}</math></td> </tr> </table><br><br><br><br><br><br><br><br><br><br> | Input $x$ | Output $y$ | $\frac{11}{4}$ | $-\frac{13}{6}$ |
| Input $x$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Output $y$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |            |                |                 |
| 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | $-\frac{11}{2}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |            |                |                 |
| Input $x$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Output $y$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |            |                |                 |
| $\frac{11}{4}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | $-\frac{13}{6}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |            |                |                 |
| <p>A graph marks the origin but gives no other point or slope. Can the constant of direct variation be recovered uniquely? State the full set of possible constants.</p><br><br><br><br><br><br><br><br><br><br>                                                                                                                                                                                                                                                                                                               | <p>A declared <math>y = kx</math> relation contains the fractional pair <math>(\frac{3}{2}, 9)</math>. Compute the exact quotient and write the rule.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <tr> <th style="padding: 5px;">Input <math>x</math></th> <th style="padding: 5px;">Output <math>y</math></th> </tr> <tr> <td style="padding: 5px;"><math>\frac{3}{2}</math></td> <td style="padding: 5px;">9</td> </tr> </table><br><br><br><br><br><br><br><br><br><br> | Input $x$  | Output $y$ | $\frac{3}{2}$   | 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |            |                |                 |
| Input $x$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Output $y$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |            |                |                 |
| $\frac{3}{2}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |            |                |                 |



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**Algebra 1****Direct Variation****Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_ **Class:** \_\_\_\_\_

Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

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Audit this direct-variation reasoning: From the pair  $(4, 12)$ , a student reports  $k = \frac{x}{y} = \frac{1}{3}$  in  $y = kx$ . Identify the first invalid inference and correct it.

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Audit this direct-variation reasoning: Two constraints demand  $k = \frac{5}{3}$  and  $k = \frac{10}{6}$ ; a student treats the fractions as different and rejects the model. Identify the first invalid inference and correct it.

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Audit this direct-variation reasoning: A table includes  $(0, 5), (2, 6), (4, 12)$ . A student ignores the zero row because  $\frac{y}{x}$  cannot be formed there. Identify the first invalid inference and correct it.

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Audit this direct-variation reasoning: A student calls  $y = 3x + 2$  a direct variation because its slope is constant. Identify the first invalid inference and correct it.

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## Direct Variation

### Full Worked Solutions - excerpt

#### Worked example

**Problem.** Scale the fractional proportional pair  $(21, -14)$  to the target input  $-\frac{9}{2}$ . Give the exact target output.

| Input $x$ | Output $y$ |
|-----------|------------|
| 21        | -14        |

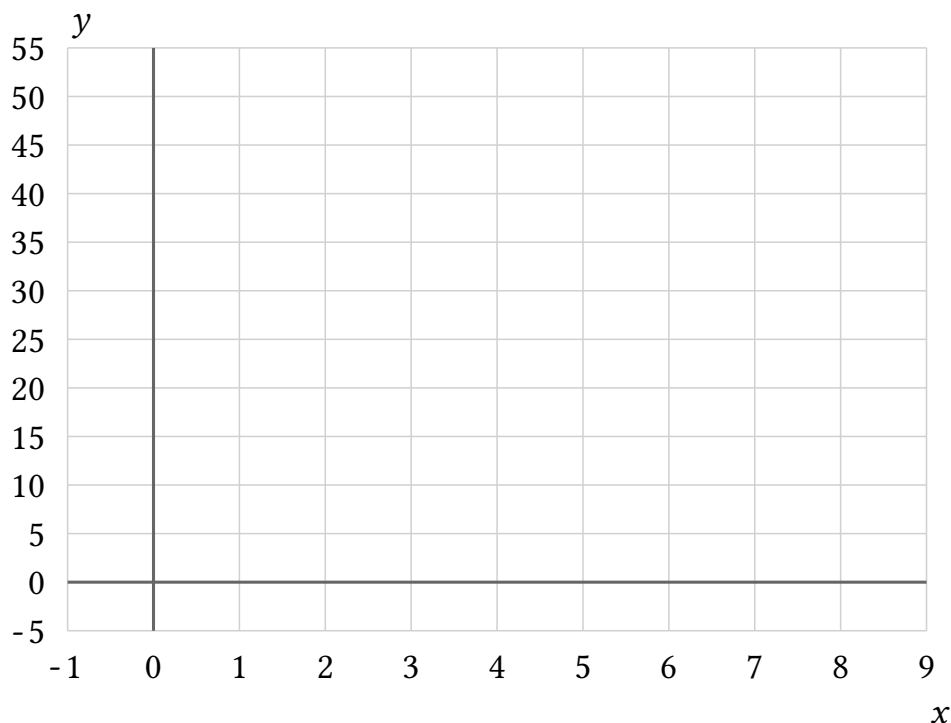
**Answer.** Using the known pair  $(21, -14)$ ,  $y = 3$  at  $x = -\frac{9}{2}$ ;  $k = -\frac{2}{3}$ .

#### Explanation and check.

The exact ratio is  $-\frac{2}{3}$ . Fraction multiplication gives  $(-\frac{2}{3})(-\frac{9}{2}) = 3$ .

#### Worked example

**Problem.** Construct the graph of  $y = 6x$  on the domain  $2 \leq x < 8$ . Use the exact sample inputs 2, 5, 7 and state whether points should be connected.



**Answer.** Plot  $(2, 12)$ ,  $(5, 30)$ ,  $(7, 42)$ . Use a continuous segment or ray only over the declared interval. The displayed domain excludes or does not sample 0, although the zero-offset rule is still proportional.

#### Explanation and check.

Each output is  $kx$  with  $k = 6$ . Use a continuous segment or ray only over the declared interval. The displayed domain excludes or does not sample 0, although the zero-offset rule is still proportional.