

Grade 7 · Equations of Proportional Relationships · Worksheet Answer Key

Common Core 7.RP.A.2c · mathovore.fr

Full worked solutions for the 20 problems on equations of proportional relationships. Each solution shows how the constant k is found, how the equation $y = kx$ is written, and how it is used. Compare each step with the work on the worksheet and fix any difference.

Grade 7 Common Core: 7.RP.A.2c

Problem 1: Constant from a table

Divide each y by its x : $\frac{12}{3} = 4$, $\frac{24}{6} = 4$, $\frac{36}{9} = 4$, $\frac{48}{12} = 4$. All ratios are equal, so the relationship is proportional with $k = 4$.

x	3	6	9	12
y	12	24	36	48
y/x	4	4	4	4

All four ratios equal 4.

Equation: $y = 4x$, with $k = 4$.

Problem 2: Potato prices

- Divide each cost by its weight: $\frac{6}{4} = 1.5$, $\frac{12}{8} = 1.5$, $\frac{18}{12} = 1.5$, $\frac{24}{16} = 1.5$. So $k = 1.5$.
- $c = 1.5p$.
- $c = 1.5 \times 10 = 15$.

Answers: (a) $k = 1.5$ dollars per pound; (b) $c = 1.5p$; (c) \$15.00.

Problem 3: Equation from one pair

$k = \frac{35}{5} = 7$, so the equation is $y = 7x$. When $x = 9$: $y = 7 \times 9 = 63$.

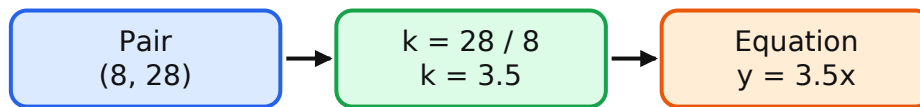
Answer: $y = 7x$; $y = 63$.

Problem 4: Equation from a pair

$k = \frac{28}{8} = 3.5$, so the equation is $y = 3.5x$.

(a) $y = 3.5 \times 12 = 42$.

(b) $49 = 3.5x$, so $x = 49 \div 3.5 = 14$. Check: $3.5 \times 14 = 49$.



From one pair to the equation.

Answers: $y = 3.5x$; **(a) 42; (b) 14.**

Problem 5: Equation from a price

Each muffin costs \$2.75, so $k = 2.75$ and $c = 2.75m$. For 8 muffins: $2.75 \times 8 = 22$.

Answer: $c = 2.75m$; **the cost is \$22.00.**

Problem 6: Trail mix price

The price per pound is the constant, so $c = 6.4p$.

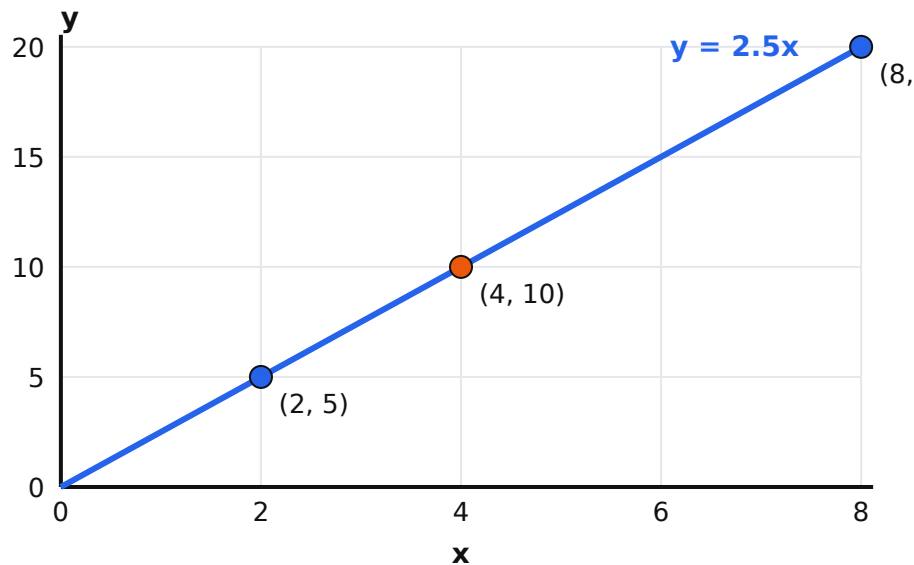
(a) $c = 6.4 \times 2.5 = 16$. The cost is \$16.00.

(b) $32 = 6.4p$, so $p = 32 \div 6.4 = 5$. Check: $6.4 \times 5 = 32$.

Answer: $c = 6.4p$; **(a) \$16.00; (b) 5 pounds.**

Problem 7: Equation from a graph

Use the point (4,10): $k = \frac{10}{4} = 2.5$. Check with (2,5): $\frac{5}{2} = 2.5$, and with (8,20): $\frac{20}{8} = 2.5$. The equation is $y = 2.5x$. When $x = 10$: $y = 2.5 \times 10 = 25$.



The line is $y = 2.5x$, so every point has $y / x = 2.5$.

Answer: $y = 2.5x$; $y = 25$.

Problem 8: Reading a line

Use the point (10,8): $k = \frac{8}{10} = 0.8$. Check with the other points: $\frac{4}{5} = 0.8$ and $\frac{12}{15} = 0.8$. The equation is $y = 0.8x$.

When $x = 25$: $y = 0.8 \times 25 = 20$.

x	5	10	15
y	4	8	12
y / x	0.8	0.8	0.8

Every ratio y / x equals 0.8.

Answer: $y = 0.8x$; $y = 20$.

Problem 9: Proportional or not?

Compute the ratios: $\frac{5}{2} = 2.5$, $\frac{9}{4} = 2.25$, $\frac{13}{6} \approx 2.17$. The ratios are not all equal.

x	2	4	6
y	5	9	13
y/x	2.5	2.25	2.17

The ratios are different.

Answer: **not proportional**, because there is no single constant k . (The table follows $y = 2x + 1$.)

Problem 10: Which equations are proportional?

A proportional relationship has the form $y = kx$, with no added or subtracted number.

- a. $y = 6x$: proportional, $k = 6$.
- b. $y = x + 6$: not proportional, because 6 is added. When $x = 0$, $y = 6$, not 0.
- c. $y = \frac{x}{5} = \frac{1}{5}x$: proportional, $k = \frac{1}{5} = 0.2$.
- d. $y = 2x + 3$: not proportional, because 3 is added.
- e. $y = 0.5x$: proportional, $k = 0.5$.

Answer: **(a), (c) and (e) are proportional, with k equal to 6, $\frac{1}{5}$ and 0.5.**

Problem 11: Using the equation

- a. $c = 4.8 \times 3.5 = 16.8$. The cost is \$16.80.
- b. $33.6 = 4.8p$, so $p = 33.6 \div 4.8 = 7$. Check: $4.8 \times 7 = 33.6$.

Answer: **(a) \$16.80; (b) 7 pounds.**

Problem 12: Hybrid car mileage

- a. $d = 48 \times 6.5 = 312$ miles.
- b. $624 = 48g$, so $g = 624 \div 48 = 13$ gallons. Check: $48 \times 13 = 624$.

Answers: **(a) 312 miles; (b) 13 gallons.**

Problem 13: Double number line

- a. $k = \frac{0.5}{10} = 0.05$ mile per minute. Check: $\frac{1}{20} = 0.05$ and $\frac{1.5}{30} = 0.05$. The equation is $d = 0.05m$.
- b. $d = 0.05 \times 45 = 2.25$.

Answer: **(a) $d = 0.05m$; (b) 2.25 miles.**

Problem 14: Water flow number line

- a. $k = \frac{6}{5} = 1.2$ gallons per minute. Check: $\frac{12}{10} = 1.2$ and $\frac{18}{15} = 1.2$. The equation is $g = 1.2m$.
- b. $g = 1.2 \times 22 = 26.4$ gallons.
- c. $45 = 1.2m$, so $m = 45 \div 1.2 = 37.5$ minutes.

Answers: **(a) $g = 1.2m$; (b) 26.4 gallons; (c) 37.5 minutes.**

Problem 15: Road trip

- a. $k = \frac{195}{3} = 65$ miles per hour, so $d = 65h$.

- b. $d = 65 \times 5.5 = 357.5$ miles.
 c. $520 = 65h$, so $h = 520 \div 65 = 8$ hours.

Answer: **(a) $d = 65h$; (b) 357.5 miles; (c) 8 hours.**

Problem 16: Smoothie recipe

- a. $k = \frac{3}{2} = 1.5$ cups of fruit per cup of yogurt, so $f = 1.5y$.
 b. $f = 1.5 \times 7 = 10.5$ cups.
 c. $12 = 1.5y$, so $y = 12 \div 1.5 = 8$ cups. Check: $1.5 \times 8 = 12$.

Answers: **(a) $f = 1.5y$; (b) 10.5 cups of fruit; (c) 8 cups of yogurt.**

Problem 17: Comparing two jobs

- a. $\frac{33}{3} = 11$, $\frac{66}{6} = 11$, $\frac{88}{8} = 11$, so $y = 11x$.
 b. Maya earns \$11.50 per hour and Jamal earns \$11 per hour. Maya earns $11.5 - 11 = 0.5$ dollars more per hour.
 c. In 40 hours: Maya $11.5 \times 40 = 460$, Jamal $11 \times 40 = 440$, a difference of \$20.

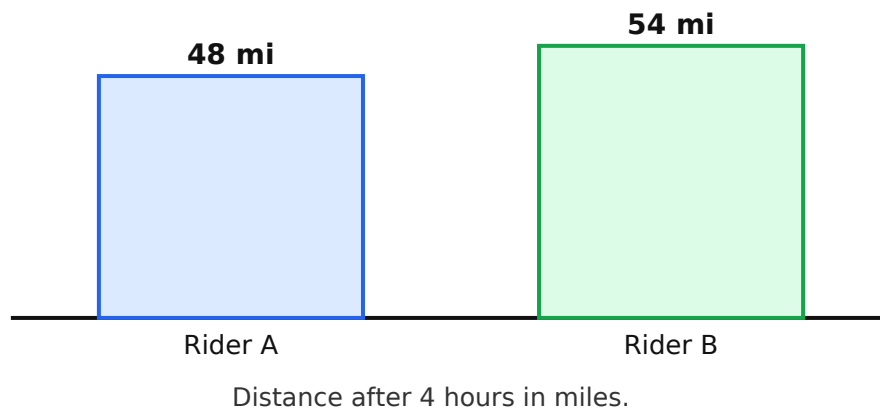
Hours x	3	6	8
Pay y (dollars)	33	66	88
y/x	11	11	11

Jamal's constant is 11.

Answer: **(a) $y = 11x$; (b) Maya, by \$0.50 per hour; (c) \$20 more.**

Problem 18: Two bike riders

- a. $\frac{27}{2} = 13.5$, $\frac{67.5}{5} = 13.5$, $\frac{81}{6} = 13.5$, so $d = 13.5t$.
 b. Rider A rides 12 miles per hour and Rider B rides 13.5 miles per hour. Rider B is faster by $13.5 - 12 = 1.5$ miles per hour.
 c. In 4 hours: Rider A $12 \times 4 = 48$ miles, Rider B $13.5 \times 4 = 54$ miles. Difference: $54 - 48 = 6$ miles.



Answers: **(a)** $d = 13.5t$; **(b)** Rider B, by 1.5 miles per hour; **(c)** 6 miles farther.

Problem 19: Peaches at two stands

- $k = \frac{75}{3} = 2.5$, so $c = 2.5p$.
- Stand A: $2.5 \times 12 = 30$. Stand B: $2.4 \times 12 = 28.8$. Costs: \$30.00 and \$28.80.
- Stand B is cheaper. Savings: $30 - 28.8 = 1.2$.

Answer: **(a)** $c = 2.5p$; **(b)** \$30.00 at A and \$28.80 at B; **(c)** \$1.20.

Problem 20: Copy shop prices

- $k = \frac{12}{150} = 0.08$, so $c = 0.08n$.
- Shop X charges \$0.08 per copy and Shop Y charges \$0.075 per copy, so Shop Y is cheaper.
- Shop X: $0.08 \times 1,200 = 96$. Shop Y: $0.075 \times 1,200 = 90$. Savings: $96 - 90 = 6$.

Answers: **(a)** $c = 0.08n$; **(b)** Shop Y; **(c)** \$6.00.