

Grade 7 · Proportional Relationships · Worksheet Answer Key

Common Core 7.RP.A.2a, 7.RP.A.2b, 7.RP.A.2d · mathovore.fr

Use this answer key to check each solution. Every answer shows the ratios of y to x, the conclusion about proportionality, and the constant of proportionality with its units. Compare your own steps with these to find any slips.

Grade 7 Common Core: 7.RP.A.2a · 7.RP.A.2b · 7.RP.A.2d

Problem 1: Table check

$\frac{6}{2} = 3$, $\frac{12}{4} = 3$, $\frac{18}{6} = 3$, $\frac{24}{8} = 3$. All ratios are equal.

Proportional, with $k = 3$.

x	2	4	6	8
y	6	12	18	24
y/x	3	3	3	3

All four ratios equal 3.

Problem 2: Table of wages

$\frac{31}{2} = 15.5$, $\frac{62}{4} = 15.5$, $\frac{93}{6} = 15.5$, $\frac{124}{8} = 15.5$. All the ratios are equal.

Proportional, with $k = 15.50$ dollars per hour.

Problem 3: Not constant

$\frac{4}{1} = 4$, $\frac{7}{2} = 3.5$, $\frac{10}{3} \approx 3.33$, $\frac{13}{4} = 3.25$. The ratios are different.

Not proportional.

x	1	2	3	4
y/x	4	3.5	3.33	3.25

The ratios keep changing.

Problem 4: Ratios that differ

$\frac{8}{3} \approx 2.67$, $\frac{15}{6} = 2.5$, $\frac{22}{9} \approx 2.44$, $\frac{29}{12} \approx 2.42$. The ratios are different.

Not proportional. The y -values rise by 7 each time, but a constant difference does not make a relationship proportional.

Problem 5: Cost of gasoline

$\frac{7.00}{2} = 3.50$, $\frac{14.00}{4} = 3.50$, $\frac{21.00}{6} = 3.50$. All ratios are equal, so the cost is proportional to the gallons.

$k = \$3.50$ **per gallon.** It is the price of 1 gallon of gasoline.

Problem 6: Reading speed graph

The graph is a straight line through the origin, and $\frac{6}{4} = \frac{12}{8} = \frac{18}{12} = 1.5$.

Minutes	4	8	12
Pages	6	12	18
Pages / minutes	1.5	1.5	1.5

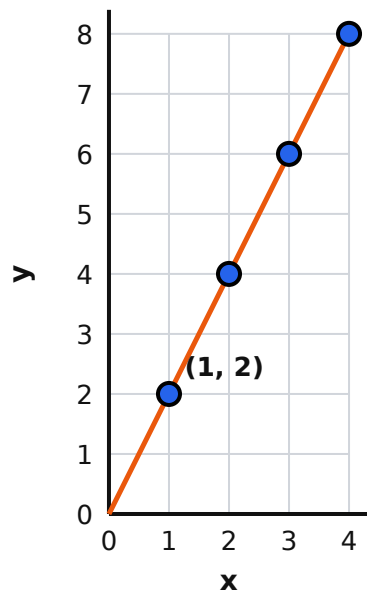
Every ratio equals 1.5.

Proportional, with $k = 1.5$ pages per minute.

Problem 7: Graph through the origin

The line passes through the origin, and $\frac{2}{1} = \frac{4}{2} = \frac{6}{3} = \frac{8}{4} = 2$.

Proportional, with $k = 2$. The point (1,2) shows the unit rate.



The point (1, 2) shows $k = 2$.

Problem 8: Graph that misses the origin

The line crosses the y -axis at $(0,3)$, not at the origin $(0,0)$. The ratios are also different: $\frac{5}{1} = 5$, $\frac{7}{2} = 3.5$, $\frac{9}{3} = 3$.

It is not proportional because the line does not pass through $(0,0)$.

Problem 9: Miles per gallon

$\frac{150}{6} = 25$ and $\frac{225}{9} = 25$. The ratios are equal, so the distance is proportional to the gas used.

$k = 25$ miles per gallon.

Problem 10: Earnings number line

$\frac{26}{2} = 13$, $\frac{52}{4} = 13$, $\frac{78}{6} = 13$. The ratios are equal, so the earnings are proportional to the hours, with $k = 13$ dollars per hour.

For 10 hours: $13 \times 10 = 130$.

Proportional; $k = 13$ dollars per hour; \$130 for 10 hours.

Problem 11: Notebook bar model

$k = \frac{24}{4} = 6$. One notebook costs \$6.

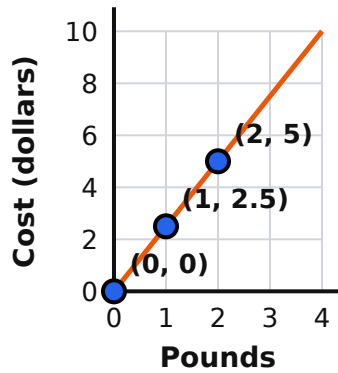
For 7 notebooks: $6 \times 7 = 42$. **$k = \$6$ per notebook; 7 notebooks cost \$42.**

Problem 12: Meaning of the points

(a) $k = \frac{5}{2} = 2.5$. $k = 2.50$ **dollars per pound**

(b) (1,2.50): 1 pound of grapes costs \$2.50.

(c) (0,0): 0 pounds of grapes cost \$0.



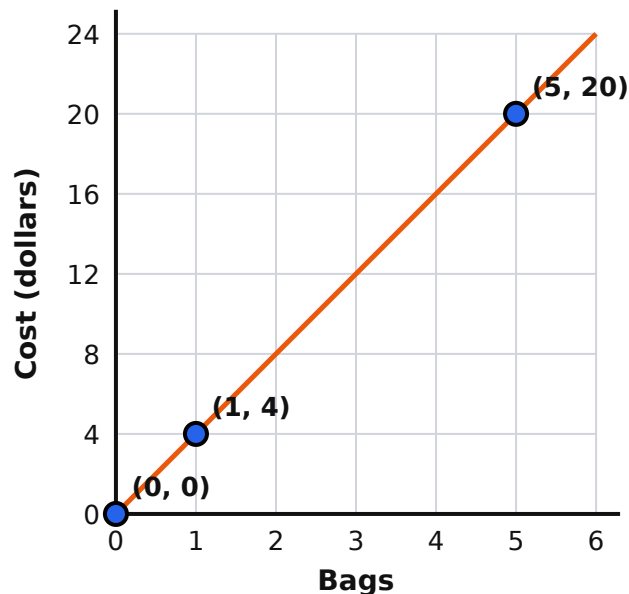
The three important points.

Problem 13: Points on a graph

(a) $k = \frac{12}{3} = 4$. $k = 4$ **dollars per bag.**

(b) (1,4): 1 bag of oranges costs \$4. This is the unit rate.

(c) $y = 4 \times 5 = 20$, so the point is (5,20): 5 bags cost \$20.



Three important points on the line.

Problem 14: Missing table values

$k = \frac{9}{2} = 4.5$. Check with the other known pair: $\frac{27}{6} = 4.5$.

For $x = 4$: $y = 4.5 \times 4 = 18$. For $x = 10$: $y = 4.5 \times 10 = 45$.

$k = 4.5$; the missing values are **18 and 45**.

Problem 15: Two gym plans

Gym A: $\frac{60}{1} = 60$, $\frac{120}{2} = 60$, $\frac{180}{3} = 60$, $\frac{240}{4} = 60$. The ratios are equal, so Gym A is proportional with $k = 60$ dollars per month.

Gym B: $\frac{85}{1} = 85$, $\frac{110}{2} = 55$, $\frac{135}{3} = 45$, $\frac{160}{4} = 40$. The ratios are different, so Gym B is not proportional.

Gym B costs \$25 per month plus a \$60 sign-up fee, so zero months would still cost \$60, not \$0.

Gym A is proportional; Gym B is not.

Problem 16: Three riders

- a. Liam: $\frac{5}{1} = \frac{10}{2} = \frac{15}{3} = 5$, proportional. Sofia: $\frac{6}{1} = 6$, $\frac{11}{2} = 5.5$, $\frac{16}{3} \approx 5.33$, not proportional. Noah: $\frac{4.5}{1} = \frac{9}{2} = \frac{13.5}{3} = 4.5$, proportional.
- b. Liam: $k = 5$ miles per hour. Noah: $k = 4.5$ miles per hour.
- c. Liam is faster by $5 - 4.5 = 0.5$ miles per hour.

Answers: **(a) Liam and Noah; (b) 5 and 4.5 miles per hour; (c) Liam, by 0.5 miles per hour.**

Problem 17: Bake sale table

(a) $\frac{7.50}{3} = 2.50$, $\frac{12.50}{5} = 2.50$, $\frac{20.00}{8} = 2.50$, $\frac{30.00}{12} = 2.50$. All ratios equal, so it is proportional. $k = 2.50$

(b) $2.50 \times 20 = 50$. **\$50.00**



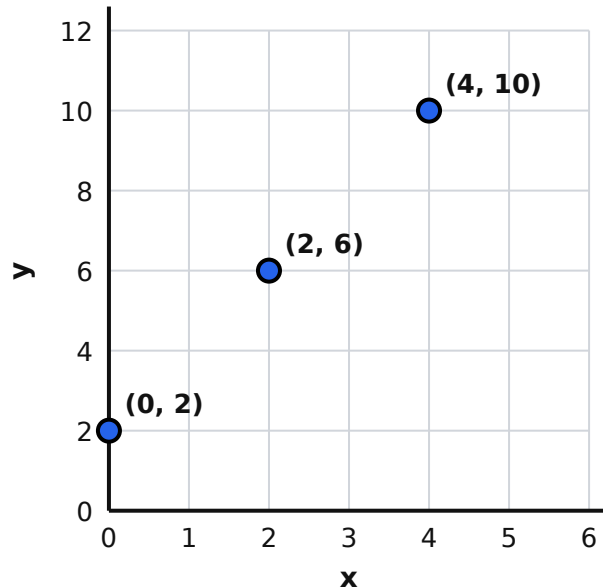
From the ratio to the answer.

Problem 18: Straight line error

A proportional relationship needs equal ratios and a graph that passes through the origin.

Compare the ratios: $\frac{6}{2}=3$ and $\frac{10}{4}=2.5$. They are not equal.

The line through the two points rises 4 for every 2 across, so each step of 1 in x adds 2 to y . Going back from $(2,6)$ by 2 steps gives $(0,2)$, so the line crosses the y -axis at 2, not at the origin.



The pattern reaches $(0, 2)$, not $(0, 0)$.

Ethan is incorrect: a straight line is proportional only when it passes through $(0, 0)$.

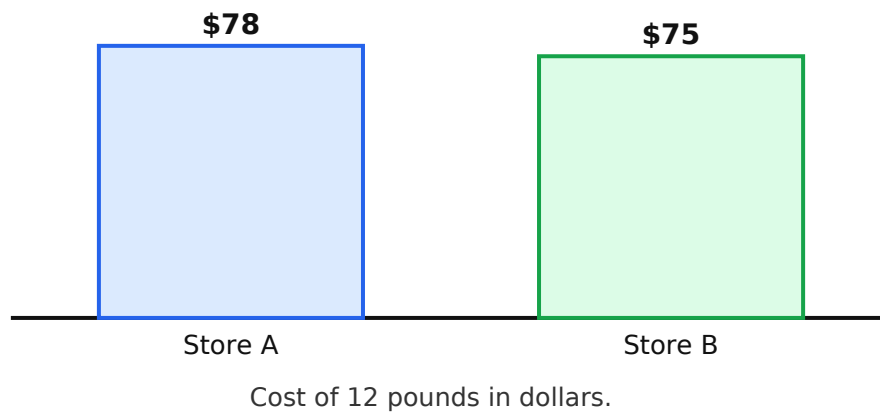
Problem 19: Find the error

Liam is not correct. A constant difference does not make a relationship proportional. The ratios are: for $x=2$, $\frac{9}{2}=4.5$; for $x=4$, $\frac{13}{4}=3.25$; for $x=6$, $\frac{17}{6}\approx 2.83$. They are not equal.

Also, $x=0$ goes with $y=5$, not $y=0$. **The relationship is not proportional.**

Problem 20: Cheese at two stores

- Store A: $k=\frac{26}{4}=6.5$ dollars per pound. Store B: $k=\frac{31.25}{5}=6.25$ dollars per pound.
- Store B is cheaper by $6.5-6.25=0.25$ dollars per pound.
- $0.25\times 12=3$, or check: Store A $6.5\times 12=78$ and Store B $6.25\times 12=75$, a difference of \$3.



Answers: **(a) \$6.50 and \$6.25 per pound; (b) Store B, by \$0.25 per pound; (c) \$3.00.**