

Proportional Relationships and Slope: practice solutions, Grade 8 – download the PDF

Written solutions to the chapter problems. Check each step, then correct yourself.

1 Typing speed



a. $\frac{135}{3} = 45$ words per minute.

b. $y = 45x$, so in 8 minutes: $45 \times 8 = 360$ words.

Answer: 45 words per minute, and 360 words in 8 minutes.

2 Smoothie prices



Price per cup: $\frac{10}{4} = 2.50$ dollars, so $y = 2.5x$.

Cups x	1	2	5	8
Cost y (\$)	2.50	5.00	12.50	20.00

Check: $2.5 \times 8 = 20$.

3 Proportional or not?



a. The ratios $\frac{6}{2}$, $\frac{12}{4}$, $\frac{15}{5}$ all equal 3. **Yes**, proportional, with $y = 3x$.

b. The ratios are $\frac{3}{1} = 3$, $\frac{5}{2} = 2.5$, $\frac{7}{3} \approx 2.33$. They are not equal, so **no**, not proportional.

4 Reading a slope



From A to B : run = $6 - 2 = 4$, rise = $9 - 3 = 6$.

$$m = \frac{6}{4} = \frac{3}{2} = 1.5.$$

Answer: the slope is 1.5.

5 Two points



$$m = \frac{11 - 2}{4 - 1} = \frac{9}{3} = 3.$$

Answer: the slope is 3.

6 Highway speed



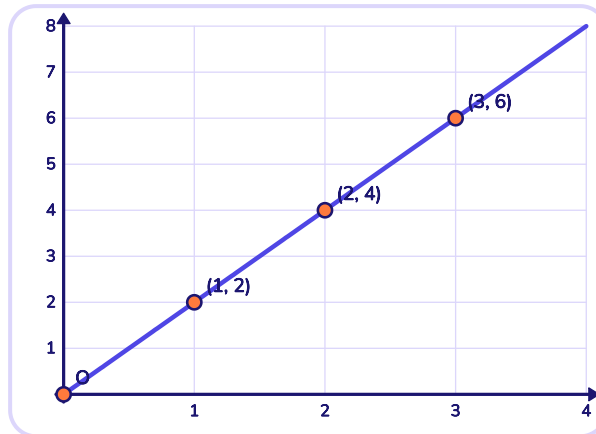
$$\frac{150}{2.5} = 60 \text{ miles per hour.}$$

$60 \times 1.609 \approx 96.5$, so about 96.5 kilometers per hour.

7 Plotting $y = 2x$



The pairs are $(0, 0)$, $(1, 2)$, $(2, 4)$, $(3, 6)$.



The points line up on a line through the origin. Each step of 1 to the right raises y by 2, so the slope is 2, equal to the coefficient of x .

8 A steep negative slope



$$m = \frac{-8 - 4}{5 - (-3)} = \frac{-12}{8} = -\frac{3}{2}.$$

The slope is negative, so the line **falls** from left to right: -1.5 units in y for each unit in x .

9 Horizontal and vertical



a. $m = \frac{5 - 5}{7 - 2} = \frac{0}{5} = 0$: a horizontal line.

b. $m = \frac{6 - (-1)}{3 - 3} = \frac{7}{0}$: division by zero, so the slope is **undefined** (a vertical line).

10 Apple prices



- a. Store A: $\frac{9}{5} = 1.80$ dollars per pound. Store B: 1.95 dollars per pound. Since $1.80 < 1.95$, Store A is cheaper.
- b. Store A: $12 \times 1.80 = 21.60$. Store B: $12 \times 1.95 = 23.40$. Savings: $23.40 - 21.60 = 1.80$ dollars.

11 A draining tank



- a. $m = \frac{36 - 60}{8 - 0} = \frac{-24}{8} = -3$. The tank loses 3 gallons every minute.
- b. No. The line does not pass through the origin (it starts at 60), and the ratio $\frac{y}{x}$ is not constant (for example $\frac{36}{8} = 4.5$).
- c. Draining 60 gallons at 3 gallons per minute takes $\frac{60}{3} = 20$ minutes.

12 A missing coordinate



Slope: $\frac{10}{4} = 2.5$, so $y = 2.5x$.

For $x = 6$: $k = 2.5 \times 6 = 15$.

Check with the slope: $\frac{15 - 10}{6 - 4} = \frac{5}{2} = 2.5$.

13 Equation from a table



$\frac{7}{2} = 3.5$, $\frac{17.5}{5} = 3.5$, $\frac{31.5}{9} = 3.5$. The ratio is constant.

Answer: $k = 3.5$ and $y = 3.5x$.

14 Running pace

40 minutes = $\frac{2}{3}$ hour, so $\frac{6}{2/3} = 6 \times \frac{3}{2} = 9$ kilometers per hour.

$\frac{9}{1.609} \approx 5.6$ miles per hour.

15 Similar triangles on a line

a. Small: $\frac{3}{4} = 0.75$. Large: $\frac{9}{12} = \frac{3}{4} = 0.75$. The triangles are similar (same angles, sides scaled by 3), so the ratio is the same.

b. $\text{rise} = 20 \times \frac{3}{4} = 15$.

16 Wheelchair ramp

a. $m = \frac{2.5}{30} = \frac{1}{12}$.

b. $\frac{1.5}{\text{run}} = \frac{1}{12}$, so $\text{run} = 1.5 \times 12 = 18$ feet.

17 Find the unknown

$\frac{13 - k}{6 - 2} = 2.5$, so $13 - k = 10$, which gives $k = 3$.

Check: $\frac{13 - 3}{4} = 2.5$.

18 Two sprinklers

a. Sprinkler 1: $\frac{8}{5} = 1.6$. Sprinkler 2: 1.7. Since $1.7 > 1.6$, Sprinkler 2 has the steeper line and the greater rate.

b. Sprinkler 1: $1.6 \times 20 = 32$ gallons. Sprinkler 2: $1.7 \times 20 = 34$ gallons.

19 Collinear points



a. Slope of AB : $\frac{4 - (-2)}{2 - (-1)} = \frac{6}{3} = 2$. Slope of BC : $\frac{10 - 4}{5 - 2} = \frac{6}{3} = 2$. The slopes match and B is shared, so the three points are on one line, $y = 2x$.

b. Slope of CD : $\frac{15 - 10}{8 - 5} = \frac{5}{3} \neq 2$. Equivalently, $2 \times 8 = 16 \neq 15$. So D is **not** on the line.

20 Find the error



The student put the run (change in x) on top and the rise (change in y) on the bottom.
Slope is rise over run.

Correct: $m = \frac{11 - 3}{5 - 1} = \frac{8}{4} = 2$.

21 Two printers



Printer A: $\frac{90}{6} = 15$ pages per minute. Printer B: $\frac{64}{4} = 16$ pages per minute.

Together: $15 + 16 = 31$ pages per minute.

Time: $\frac{465}{31} = 15$ minutes.



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