

Ratios and Proportional Relationships: practice solutions, Grade 7 – download the PDF

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

1 Price per ounce



- a) $4.20 \div 15 = 0.28$. The unit price is \$0.28 per ounce.
 b) $22 \times 0.28 = 6.16$. The 22-ounce box would cost \$6.16.

2 Swimming speed



$$\frac{1/4}{1/5} = \frac{1}{4} \times 5 = \frac{5}{4} = 1.25.$$

Cara swims 1.25 miles per hour.

3 A proportional table



Compute $\frac{y}{x}$: $\frac{7.5}{3} = 2.5$, $\frac{15}{6} = 2.5$, $\frac{22.5}{9} = 2.5$, $\frac{30}{12} = 2.5$.

All the quotients are equal, so the relationship is proportional with $k = 2.5$.

4 Not proportional



$\frac{4}{1} = 4$ but $\frac{7}{2} = 3.5$. The quotients are not the same, so the relationship is not proportional. (The values go up by 3 each time, but that is not enough.)

5 Printer speed



- a) $k = 18 \div 3 = 6$ pages per minute.
- b) $y = 6x$.
- c) $6x = 42$, so $x = 7$. It takes 7 minutes.

6 True or false?



- a) True. A straight line through the origin has a constant ratio $\frac{y}{x}$.
- b) False. A proportional graph must also be a straight line.
- c) False. The line does not pass through $(0, 0)$. (It would give $y = 2x + 2$.)

7 The point (1, r)



- a) $r = 14 \div 4 = 3.5$, so the point is $(1, 3.5)$.
- b) One pound of apples costs \$3.50.
- c) $10 \times 3.5 = 35$. Ten pounds cost \$35.

8 A slow snail



- a) $\frac{2/3}{1/4} = \frac{2}{3} \times 4 = \frac{8}{3}$ feet per hour, about 2.67 ft/h.
- b) $\frac{8}{3} \times \frac{3}{2} = 4$. The snail crawls 4 feet.

9 Scaling a recipe



a) $\frac{9/4}{3/4} = \frac{9}{4} \times \frac{4}{3} = 3$. One batch takes 3 cups.

b) $3 \times 2.5 = 7.5$. He needs 7.5 cups of flour.

10 Fill in the table



$k = \frac{14}{4} = 3.5$, and $\frac{24.5}{7} = 3.5$, $\frac{35}{10} = 3.5$ confirm it.

The equation is $y = 3.5x$. For $x = 16$: $y = 3.5 \times 16 = 56$.

11 Gas mileage



a) $k = 96 \div 3 = 32$, so $y = 32x$.

b) $32 \times 7.5 = 240$ miles.

c) $32x = 400$, so $x = 12.5$ gallons.

12 Better buy



Store A: $13.50 \div 5 = 2.70$ dollars per pound. Store B: $20.80 \div 8 = 2.60$ dollars per pound.

Store B has the lower unit price.

13 Two runners



a) Ana: $30 \div 10 = 3$ meters per second. Ben: $45 \div 10 = 4.5$ meters per second.

b) Ana: $y = 3x$. Ben: $y = 4.5x$.

c) At 12 seconds, Ana has run 36 m and Ben 54 m. Ben is $54 - 36 = 18$ meters ahead.

14 Mixing paint



There are $3 + 5 = 8$ parts, and each part is $24 \div 8 = 3$ liters.

Blue: $3 \times 3 = 9$ liters. White: $5 \times 3 = 15$ liters. Check: $9 + 15 = 24$.

15 Jacket on sale



Sale price: $64 \times 0.85 = 54.40$ dollars.

With tax: $54.40 \times 1.05 = 57.12$ dollars.

The final cost is \$57.12.

16 Fractions in a table



a) $\frac{3/4}{1/2} = \frac{3}{2}$, $\frac{9/4}{3/2} = \frac{9}{4} \times \frac{2}{3} = \frac{3}{2}$, $\frac{15/4}{5/2} = \frac{15}{4} \times \frac{2}{5} = \frac{3}{2}$. Every quotient equals $\frac{3}{2}$, so the relationship is proportional.

b) $y = \frac{3}{2}x$. For $x = 4$: $y = \frac{3}{2} \times 4 = 6$.

17 Find the error



a) The quotients are $\frac{5}{2} = 2.5$, $\frac{8}{4} = 2$ and $\frac{11}{6} \approx 1.83$. They are not equal, so the relationship is not proportional. A constant difference does not make a relationship proportional.

b) With $k = 2.5$ we need $y = 2.5 \times 4 = 10$ and $y = 2.5 \times 6 = 15$.

18 Two pumps

Pump A: $\frac{3/4}{1/2} = \frac{3}{2}$ tanks per hour. Pump B: $\frac{5/8}{1/4} = \frac{5}{2}$ tanks per hour.

Together: $\frac{3}{2} + \frac{5}{2} = 4$ tanks per hour. One tank takes $\frac{1}{4}$ hour, which is 15 minutes.

19 Markup then discount

a) Marked price: $40 \times 1.35 = 54$ dollars. Final price: $54 \times 0.80 = 43.20$ dollars.

b) $43.20 - 40 = 3.20$, and $\frac{3.20}{40} = 0.08$. The final price is 8% more than the store paid.

20 Reading a map

a) $\frac{3/4}{3/2} = \frac{3}{4} \times \frac{2}{3} = \frac{1}{2}$. One mile is $\frac{1}{2}$ inch.

b) $y = \frac{1}{2}x$.

c) $\frac{1}{2}x = 4.375$, so $x = 8.75$. The towns are 8.75 miles apart.

21 Rebuild from one point

a) $k = 15 \div 6 = 2.5$, so $y = 2.5x$.

b) $2.5x = 40$, so $x = 16$.

c) For $x = 10$ we get $y = 25$, not 26. The point is not on the graph.

22

Cyclist units

a) $\frac{5/6}{1/18} = \frac{5}{6} \times 18 = 15$ miles per hour.

b) $15 \times 5280 = 79,200$ feet per hour, and $79200 \div 3600 = 22$. She rides 22 feet per second.

c) $15 \times 1.609 \approx 24.1$. Her speed is about 24.1 kilometers per hour.

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