

Proportional Relationships

Ratios and Proportions

1. $8 + 11 = 19$

$3 + 19 = 22$

$\frac{19}{22}$ or 19 to 22 or 19:22

2. $\frac{19}{3}$ or 19 to 3 or 19:3

3. $8 + 11 = 19$

$\frac{8}{19}$ or 8 to 19 or 8:19

4. $\frac{\text{number of stars}}{\text{number of stripes}} = \frac{6}{9}$

Possible answer:

$\frac{6}{9} = \frac{6 \div 3}{9 \div 3} = \frac{2}{3}$

$\frac{6}{9} = \frac{6 \cdot 2}{9 \cdot 2} = \frac{12}{18}$

5. $\frac{\$28}{3 \text{ hours}} = \frac{\$28 \div 3}{3 \text{ hours} \div 3} \approx \frac{\$9.33}{1 \text{ hour}}$

$\frac{\$18}{2 \text{ hours}} = \frac{\$18 \div 2}{2 \text{ hours} \div 2} \approx \frac{\$9}{1 \text{ hour}}$

Hector offers a better deal.

6. $\frac{\$12.36}{12 \text{ pounds}} = \frac{\$12.36 \div 12}{12 \text{ pounds} \div 12} = \frac{\$1.03}{1 \text{ pound}}$

$\frac{\$15.30}{15 \text{ pounds}} = \frac{\$15.30 \div 15}{15 \text{ pounds} \div 15} = \frac{\$1.02}{1 \text{ pound}}$

The 15-pound bag is the better deal.

7. Possible answer:

200	$200 \cdot 2 = 400$	$200 \cdot 3 = 600$	$200 \cdot 4 = 800$
2	$2 \cdot 2 = 4$	$2 \cdot 3 = 6$	$2 \cdot 4 = 8$

 $\frac{400 \text{ meters}}{4 \text{ minutes}}$, $\frac{600 \text{ meters}}{6 \text{ minutes}}$, $\frac{800 \text{ meters}}{8 \text{ minutes}}$

8. Possible answer:

8	$8 \cdot 2 = 16$	$8 \cdot 3 = 24$	$8 \cdot 4 = 32$
15	$15 \cdot 2 = 30$	$15 \cdot 3 = 45$	$15 \cdot 4 = 60$

16 to 30, 24 to 45, 32 to 60

9. Possible answer:

12	$12 \cdot 2 = 24$	$12 \cdot 3 = 36$	$12 \cdot 4 = 48$
4	$4 \cdot 2 = 8$	$4 \cdot 3 = 12$	$4 \cdot 4 = 16$

 $\frac{24}{8}$, $\frac{36}{12}$, $\frac{48}{16}$

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10. Possible answer:

6	$6 \cdot 2 = 12$	$6 \cdot 3 = 18$	$6 \cdot 8 = 48$
7	$7 \cdot 2 = 14$	$7 \cdot 3 = 21$	$7 \cdot 8 = 56$

12 to 14, 18 to 21, 48 to 56

11. Possible answer:

13	$13 \cdot 2 = 26$	$13 \cdot 3 = 39$	$13 \cdot 4 = 52$
20	$20 \cdot 2 = 40$	$20 \cdot 3 = 60$	$20 \cdot 4 = 80$

$$\frac{26}{40}, \frac{39}{60}, \frac{52}{80}$$

12. Possible answer:

11	$11 \cdot 2 = 22$	$11 \cdot 3 = 33$	$11 \cdot 4 = 44$
25	$25 \cdot 2 = 50$	$25 \cdot 3 = 75$	$25 \cdot 4 = 100$

22:50, 33:75, 44:100

13. Possible answer:

\$2,400	$2,400 \cdot 2 =$ 4,800	$2,400 \cdot 3 =$ 7,200	$2,400 \cdot 4 =$ 9,600
1	$1 \cdot 2 = 2$	$1 \cdot 3 = 3$	$1 \cdot 4 = 4$

$$\frac{\$4,800}{2 \text{ months}}, \frac{\$7,200}{3 \text{ months}}, \frac{\$9,600}{4 \text{ months}}$$

14. Possible answer:

51	$51 \cdot 2 = 102$	$51 \cdot 3 = 153$	$51 \cdot 4 = 204$
75	$75 \cdot 2 = 150$	$75 \cdot 3 = 225$	$75 \cdot 4 = 300$

$$\frac{102}{150}, \frac{153}{225}, \frac{204}{300}$$
15. Donnette: $\frac{128 \text{ beats}}{1 \text{ minute}}$

Nate: $\frac{272 \div 2}{2 \div 2} = \frac{136 \text{ beats}}{1 \text{ minute}}$

Leslin: $\frac{384 \div 3}{3 \div 3} = \frac{128 \text{ beats}}{1 \text{ minute}}$

Leslin's heart rate is the same as Donnette's.

16. The ratio of students to textbooks is 12:15.

$12 \cdot 6 = 72$

$15 \cdot 6 = 90$

90 textbooks

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$$\begin{aligned}17. \quad \frac{3}{\$18} &= \frac{12}{m} \\ 3 \cdot m &= 12 \cdot 18 \\ 3m &= 216 \\ \frac{3m}{3} &= \frac{216}{3} \\ m &= \$72\end{aligned}$$

$$\begin{aligned}18. \quad \frac{3}{\$27} &= \frac{c}{\$54} \\ 3 \cdot 54 &= 27 \cdot c \\ 162 &= 27c \\ \frac{162}{27} &= \frac{27c}{27} \\ 6 \text{ lbs} &= c\end{aligned}$$

$$\begin{aligned}19. \quad \frac{3}{2} &= \frac{24}{d} \\ 3 \cdot d &= 2 \cdot 24 \\ 3d &= 48 \\ \frac{3d}{3} &= \frac{48}{3} \\ d &= 16\end{aligned}$$

$$\begin{aligned}20. \quad \frac{p}{40} &= \frac{3}{8} \\ 8 \cdot p &= 40 \cdot 3 \\ 8p &= 120 \\ \frac{8p}{8} &= \frac{120}{8} \\ p &= 15\end{aligned}$$

$$\begin{aligned}21. \quad \frac{6}{14} &= \frac{x}{7} \\ 14 \cdot x &= 6 \cdot 7 \\ 14x &= 42 \\ \frac{14x}{14} &= \frac{42}{14} \\ x &= 3\end{aligned}$$

$$\begin{aligned}22. \quad \frac{5}{p} &= \frac{7}{77} \\ 7 \cdot p &= 5 \cdot 77 \\ 7p &= 385 \\ \frac{7p}{7} &= \frac{385}{7} \\ p &= 55\end{aligned}$$

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$$23. \frac{20 \text{ min of study}}{60 \text{ min of class}} = \frac{x \text{ min of study}}{90 \text{ min of class}}$$

$$60 \cdot x = 20 \cdot 90$$

$$60x = 1,800$$

$$\frac{60x}{60} = \frac{1,800}{60}$$

$$x = 30$$

30 min