Exercise Solutions

Exercise 1.1

a) $0.28 = 28\%$ b) $\frac{7}{9} = 77.78\%$ c) $0.536 = 53.6\%$

Exercise 1.2

a) $34\% = 0.34$ b) $63.91\% = 0.6391$ c) $125\% = 1.25$

Exercise 2.1

$$\frac{52-34}{34} = \frac{17}{34} = 0.5 = 50\%$$

Exercise 2.2

Joey: $\frac{30-24}{24} = \frac{6}{24} = 0.25 = 25\%$ Steve: $\frac{18-12}{12} = \frac{6}{12} = 0.5 = 50\%$

$\therefore$ Joey will be buying pizza.

Exercise 2.3

In total, the bakery is using $150 \times 2 = 300$ chocolate chips. 20% of $300 = 0.2 \times 300 = 60$
$\therefore$ The new amount of chocolate chips needed is $300 + 60 = 360$.

Exercise 3.1

$$(25\text{mL})(0.45) + (75\text{mL})(0.37) = 39\text{mL} \implies \frac{39\text{mL}}{100\text{mL}} = 0.39 = 39\% \text{ acidic solution}$$

Exercise 3.2

Let c be the concentration of the orange juice.

$$\begin{aligned}(2050)(0.88) &= (1000)(0.84) + (1050)c \\ 1804 &= 840 + (1050)c \\ 964 &= (1050)c \\ c &= \frac{964}{1050} \\ c &= 0.9181 = 90.81\%\end{aligned}$$

The concentration of the orange juice is about 90.81%.

Exercise 4.1

a) $3 \times (6:5) = 18:15$ $\therefore$ this ratio is proportional
b) $2 \times (7:15) = 21:30$ $\therefore$ this ratio is not proportional
c) $\frac{6}{6} \times \frac{3}{8} = \frac{18}{48}$ $\therefore$ this ratio is proportional
d) $7 \times (9:11) = 63:77$ $\therefore$ this ratio is proportional

Exercise 4.2

a)
$$\frac{3}{4} = \frac{x}{28}$$
$$\frac{3}{4} \times 28 = x$$
$$\frac{3}{1} \times 4 = x$$
$$x = 12$$

b)
$$\frac{11}{12} = \frac{121}{x}$$
$$11x = (121)(12)$$
$$x = \frac{(121)(12)}{11}$$
$$x = (11)(12)$$
$$x = 132$$

c)
$$\frac{x}{9} = \frac{15}{27}$$
$$x = \frac{15}{27} \times 9$$
$$x = \frac{15}{3}$$
$$x = 5$$

Exerise 4.3

April: $18 : 21 = 6 : 7$
May: $12 : 14 = 6 : 7$ $\therefore$ the two ratios are proportional

Exercise 4.4

12 year olds: $24 : 32 = 3 : 4$
13 year olds: $18 : 36 = 1 : 2$
Since $\frac{1}{2} < \frac{3}{4}$, the 13 year old group has a lower ratio of green belts to blue belts.

Problem Set Solutions

1. Splitting the square into 8 congruent pieces, we have  . By counting the triangles, we see that the shaded area is $\frac{2}{8} = \frac{1}{4}$ of the square.

2. $25.95 + (0.13)(25.95) = \$29.32$

3. $\frac{9}{10} = 0.90$ $\frac{46}{50} = 0.92$ $\frac{21}{25} = 0.84$ $\frac{4}{5} = 0.80$ $96\% = 0.96$
   The best score is 96%.

4. $6000 - (0.03)(6000) = 5820$ cans were collected this year.

5. $\$2.50 - (\$2.50)(0.4) = \$1.50$

6. $\frac{(25)(30) - (20)(25)}{(20)(25)} = 50\%$

7. $\$750 - (\$750)(0.2) = \$600$
   $\$600 + (\$600)(0.2) = \$720$ $\therefore$ The final price is \$720

8. $24 \div \frac{3}{4} \times \frac{4}{5} = 25.6$

9. $(0.6)(20 + 25 + 30) - 20 = 25$ games

10. $600 \times (1 - 0.22 - 0.16 - 0.30) = 192$ people

11. $\frac{4 \times 6}{1 + 2} - 5 = 3$

12. $\left(\frac{3}{2+3}\right)(25) + 3 = 18 \Rightarrow 18 : 10 = 9 : 5$

13. Area of recatangle: $2 \times 4 = 8\text{cm}^2$; Area of square: $3 \times 3 = 9\text{cm}^2 \Rightarrow 8 : 9$

14. Let h, c and p be the number of troughs occupied by horses, cows and pigs respectively. We have $2h = 3c \Rightarrow h = \frac{3}{2}c$. Similarly, $p = \frac{3}{8}c$.
$69 = h + c + p = \frac{3}{2}c + c + \frac{3}{8}c = \frac{23}{8}$
$\Rightarrow 3c = \frac{(69)(8)}{23} \times 3 = 72 \Rightarrow 3 \times 72 = 216$ animals

15. $\frac{a}{b} = \frac{3}{4} \Rightarrow b = \frac{4}{3}a \qquad \frac{a}{b+c} = \frac{2}{5} \Rightarrow b = \frac{5}{2}a - c$
$\frac{4}{3}a = \frac{5}{2}a - c \Rightarrow c = \frac{7}{6}a$
$a : c = a : \frac{7}{6}a = 6 : 7$

16. Gabe saves 40%, so his expenses are 60% of his income, or $(60\%) \times \frac{5}{8} = 37.5\%$ of Heidi's income. This is one-half of Heidi's expenses, so we know Heidi's expenses are $2 \times 37.5\% = 75\%$ of her income, which means she saves 25% of her income.