

ANSWERS

Chapter I EXPONENTIAL NOTATION AND PRIME FACTORIZATION

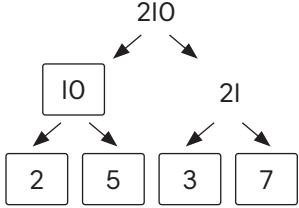
Exercise IA Exponential Notation

1. (a) $13 \times 13 = 169$
(b) $11 \times 11 \times 11 = 1,331$
2. $10 \times 10 \times 10 = 10^3$ unit cubes
3. (a) Number of unit cubes of this solid
 $= 2 + 5 + 9 = 16 = 4^2$ unit cubes
 (b) Each side of the solid is 3 unit cubes.
 The cubical glass tank is a 3^3 unit cube.
 The number of unit cubes needed $= 3^3 - 4^2$
4. (a) Number of unit cubes of this solid $= 4 \times 11$
 $= 2^2 \times 11$ unit cubes
 (b) The most number of unit cubes on a side of the solid is 5 unit cubes.
 The bigger cube should be 5^3 unit cube.
 The least number of unit cubes to be added $= 5^3 - 2^2 \times 11$
5. (a) 15^2 (b) 22^3
 (c) 14^2 (d) 39^3
 (e) $2 \times 2 \times 5 \times 7 \times 7 \times 5 = (2 \times 5 \times 7) \times (2 \times 5 \times 7)$
 $= (2 \times 5 \times 7)^2$
 $= 70^2$
 (f) $25 \times 9 \times 49 = 5 \times 5 \times 3 \times 3 \times 7 \times 7$
 $= (5 \times 3 \times 7)^2$
 $= 105^2$
 (g) $8 \times 7 \times 9 \times 49 \times 3$
 $= 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 7 \times 7 \times 7$
 $= (2 \times 3 \times 7) \times (2 \times 3 \times 7) \times (2 \times 3 \times 7)$
 $= (2 \times 3 \times 7)^3$
 $= 42^3$

Exercise IB Prime Factorization

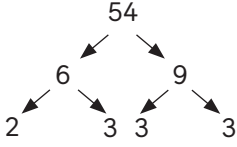
1. 2, 3, 5, 7, 11, 13, 17, 19,
 23, 29, 31, 37, 41, 43, 47, 53, 59,
 61, 67, 71, 73, 79, 83, 89, 97
2.

2	210
3	105
5	35
7	7
	1



$$210 = 2 \times 3 \times 5 \times 7$$
3. (a)

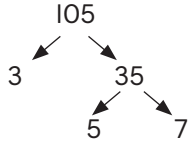
2	54
3	27
3	9
3	3
	1



$$2 \times 3^3 \text{ OR } 2 \times 3 \times 3 \times 3$$

 (b)

3	105
5	35
7	7
	1



$$3 \times 5 \times 7$$
4. (a) $2 \times 3 \times 13$
 (b) $2^2 \times 23$ OR $2 \times 2 \times 23$
 (c) $2^2 \times 5 \times 7$
 (d) $2^3 \times 3 \times 5$
5. Yes.
 Answers may vary.
 An odd number is the sum of an even and an odd number.
 e.g.
 2 and 5 are prime numbers. $2 + 5 = 7$
 The sum of two prime numbers can be odd.

Exercise IC Greatest Common Factor

- Factors of 45: 1, 3, 5, 9, 15, 45
Factors of 63: 1, 3, 7, 9, 21, 63
The greatest common factor of 45 and 63 is 9.
- $36 = 2^2 \times 3^2$ OR $2 \times 2 \times 3 \times 3$
 $60 = 2^2 \times 3 \times 5$ OR $2 \times 2 \times 3 \times 5$
The greatest common factor of 36 and 60 = $2 \times 2 \times 3 = 12$
- Factors of 56: 1, 2, 4, 7, 8, 14, 28, 56
Factors of 70: 1, 2, 5, 7, 10, 14, 35, 70
 $56 = 2^3 \times 7$ OR $2 \times 2 \times 2 \times 7$
 $70 = 2 \times 5 \times 7$
The greatest common factor of 56 and 70 = $2 \times 7 = 14$
- $40 = 2^3 \times 5$ OR $2 \times 2 \times 2 \times 5$
 $72 = 2^3 \times 3^2$ OR $2 \times 2 \times 2 \times 3 \times 3$
Greatest common factor of 40 and 72 = $2^3 = 8$
 - $30 = 2 \times 3 \times 5$
 $75 = 3 \times 5^2$ OR $3 \times 5 \times 5$
Greatest common factor of 30 and 75 = $3 \times 5 = 15$
 - $42 = 2 \times 3 \times 7$
 $70 = 2 \times 5 \times 7$
Greatest common factor of 42 and 70 = $2 \times 7 = 14$
 - $40 = 2^3 \times 5$ OR $2 \times 2 \times 2 \times 5$
 $50 = 2 \times 5^2$ OR $2 \times 5 \times 5$
Greatest common factor of 40 and 50 = $2 \times 5 = 10$
- $42 = 2 \times 3 \times 7 = 2 \times 21$
 $105 = 3 \times 5 \times 7 = 5 \times 21$
The greatest common factor of 42 and 105 is 21.
So, $42 + 105 = 21 \times (2 + 5)$
 - $54 = 2 \times 3 \times 3 \times 3 = 18 \times 3$
 $90 = 2 \times 3 \times 3 \times 5 = 18 \times 5$
The greatest common factor of 54 and 90 is 18.
So, $54 + 90 = 18 \times (3 + 5)$
- Red balloons: $36 = 2 \times 2 \times 3 \times 3$
 $= 2^2 \times 3^2$
Blue balloons: $54 = 2 \times 3 \times 3 \times 3$
 $= 2 \times 3^3$
Yellow balloons: $72 = 2 \times 2 \times 2 \times 3 \times 3$
 $= 2^3 \times 3^2$
Greatest common factor = $2 \times 3^2 = 18$
Marc can pack a maximum of 18 packs.

- There are 2 red balloons, 3 blue balloons and 4 yellow balloons in each pack.

Exercise ID Least Common Multiple

- Multiples of 16: 16, 32, 48, 64, 80, 96
Multiples of 24: 24, 48, 96
 - Common multiples of 16 and 24 are 48 and 96.
Least common multiple of 16 and 24 = 48
 - 48, 96, ...
The multiples of 48 are all common multiples of 16 and 24.
- 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, ...
3, 6, 9, 12, 15, 18, 21, 24, 27, 30, ...
9, 18, 27, ...
Least common multiple of 2, 3, and 9 = 18
- Least common multiple = $3 \times 5 \times 7 = 105$
 $1,050 = 10 \times 105 = 2 \times 3 \times 5 \times 5 \times 7$
 $= 2 \times 3 \times 5^2 \times 7$
- $15 = 3 \times 5$
 $24 = 2^3 \times 3$
LCM = $2^3 \times 3 \times 5$
 $= 120$
 - $18 = 2 \times 3^2$
 $30 = 2 \times 3 \times 5$
LCM = $2 \times 3^2 \times 5$
 $= 90$
 - $25 = 5^2$
 $20 = 4 \times 5$
LCM = 4×5^2
 $= 100$
 - LCM = $4 \times 9 = 36$
- $12 = 2^2 \times 3$
 $20 = 2^2 \times 5$
 $24 = 2^3 \times 3$
LCM = $2^3 \times 3 \times 5$
 $= 120$
 - $24 = 2^3 \times 3$
 $36 = 2^2 \times 3^2$
 $54 = 2 \times 3^3$
LCM = $2^3 \times 3^3 = 216$
- $10 = 2 \times 5$
 $25 = 5^2$
 $35 = 5 \times 7$
GCF = 5
LCM = $2 \times 5^2 \times 7$
 $= 350$
 - $18 = 2 \times 3^2$
 $24 = 2^3 \times 3$
 $30 = 2 \times 3 \times 5$
GCF = $2 \times 3 = 6$
LCM = $2^3 \times 3^2 \times 5$
 $= 360$
- $6 = 2 \times 3$
 $7 = 1 \times 7$
 $8 = 2^3$
The least common multiple of 6, 7 and 8
 $= 2^3 \times 3 \times 7 = 168$
The least possible number of marbles in the box is 168.

8. 1st light: 2, 4, 6, 8, 10, 12, **14**, ...
 2nd light: 3.5, 7, 10.5, **14**, ...
 1st light and 2nd light flash together every 14 min.
 1st light and 2nd light: 14, **28**, ...
 3rd light: 4, 8, 12, 16, 20, 24, **28**, ...
 The 3 lights will flash 28 min after 8 p.m. at
 8:28 p.m.

Chapter Practice

1. D
2. D
3. C
4. B
5. (a) 24, 48, 72
 (b) 63, 126, 189
6. (a) $28 = 2^2 \times 7$ (b) $56 = 2^3 \times 7$
 (c) $200 = 2^3 \times 5^2$ (d) $216 = 2^3 \times 3^3$
7. (a) $48 = 2^4 \times 3$
 $72 = 2^3 \times 3^2$
 (b) $\text{GCF} = 2^3 \times 3$
8. (a) $96 = 2^4 \times 3$
 $108 = 2^2 \times 3^3$
 (b) $\text{LCM} = 2^4 \times 3^3$

9.

$\times 4$	24	28	32	36	40	44	48	52
$\times 5$	25	30	35	40	45	50	55	
$+ 3$	28	33	38	43	48	53	58	

The number is 48.

10. (a) Lollipops: $28 = 2 \times 14$
 Chocolate bars: $70 = 5 \times 14$
 Sweets: $84 = 6 \times 14$
 Laila can pack a maximum of
 14 goodie bags.
- (b) There are 2 lollipops, 5 chocolate bars
 and 6 sweets in each goodie bag.

Chapter 2 FRACTIONS AND DECIMALS

Exercise 2A Divide by a Fraction (I)

1. $4 \div \frac{2}{3} = \frac{12}{3} \div \frac{2}{3}$
 $= 12 \div 2$
 $= 6$

There are 6 pieces.

2. (a) 15 (b) 28
(c) $5\frac{1}{3}$ (d) $17\frac{1}{2}$

3. (a) $18 \div \frac{2}{3} = 18 \times \frac{3}{2}$
 $= 27$

(b) $21 \div \frac{3}{5} = 21 \times \frac{5}{3}$
 $= 35$

(c) $30 \div \frac{5}{7} = 30 \times \frac{7}{5}$
 $= 42$

(d) $42 \div \frac{3}{4} = 42 \times \frac{4}{3}$
 $= 56$

(e) $13 \div \frac{4}{5} = 13 \times \frac{5}{4}$
 $= 16\frac{1}{4}$

(f) $17 \div \frac{2}{3} = 17 \times \frac{3}{2}$
 $= 25\frac{1}{2}$

(g) $3 \div \frac{2}{9} = 3 \times \frac{9}{2}$
 $= 13\frac{1}{2}$

(h) $7 \div \frac{5}{6} = 7 \times \frac{6}{5}$
 $= 8\frac{2}{5}$

(i) $9 \div \frac{4}{7} = 9 \times \frac{7}{4}$
 $= 15\frac{3}{4}$

(j) $5 \div \frac{3}{10} = 5 \times \frac{10}{3}$
 $= 16\frac{2}{3}$

(k) $7 \div \frac{5}{8} = 7 \times \frac{8}{5}$
 $= 11\frac{1}{5}$

(l) $9 \div \frac{4}{9} = 9 \times \frac{9}{4}$
 $= 20\frac{1}{4}$

Exercise 2A Divide by a Fraction (2)

$$\begin{aligned} 1. \quad 2\frac{5}{12} \div \frac{3}{8} &= \frac{29}{12} \div \frac{3}{8} \\ &= \frac{29}{12} \times \frac{8}{3} \\ &= \frac{58}{9} \\ &= 6\frac{4}{9} \end{aligned}$$

$$\begin{aligned} 2. \quad (a) \quad &3 & (b) \quad &2\frac{1}{4} \\ (c) \quad &\frac{1}{4} & (d) \quad &4 \end{aligned}$$

$$\begin{aligned} 3. \quad (a) \quad \frac{14}{15} \div \frac{2}{3} &= \frac{14}{15} \times \frac{3}{2} \\ &= 1\frac{2}{5} \end{aligned}$$

$$\begin{aligned} (b) \quad \frac{21}{20} \div \frac{3}{5} &= \frac{21}{20} \times \frac{5}{3} \\ &= 1\frac{3}{4} \end{aligned}$$

$$\begin{aligned} (c) \quad \frac{10}{3} \div \frac{5}{7} &= \frac{10}{3} \times \frac{7}{5} \\ &= 4\frac{2}{3} \end{aligned}$$

$$\begin{aligned} (d) \quad \frac{15}{16} \div \frac{3}{4} &= \frac{15}{16} \times \frac{4}{3} \\ &= 1\frac{1}{4} \end{aligned}$$

$$\begin{aligned} (e) \quad 1\frac{1}{15} \div \frac{4}{5} &= \frac{16}{15} \times \frac{5}{4} \\ &= 1\frac{1}{3} \end{aligned}$$

$$\begin{aligned} (f) \quad 2\frac{2}{9} \div \frac{2}{3} &= \frac{20}{9} \times \frac{3}{2} \\ &= 3\frac{1}{3} \end{aligned}$$

$$\begin{aligned} (g) \quad 5\frac{1}{2} \div 1\frac{1}{3} &= \frac{11}{2} \times \frac{3}{4} \\ &= 4\frac{1}{8} \end{aligned}$$

$$\begin{aligned} (h) \quad 4\frac{5}{6} \div 2\frac{1}{4} &= \frac{29}{6} \times \frac{4}{9} \\ &= 2\frac{4}{27} \end{aligned}$$

$$\begin{aligned} (i) \quad 4\frac{2}{9} \div 3\frac{1}{6} &= \frac{38}{9} \times \frac{6}{19} \\ &= 1\frac{1}{3} \end{aligned}$$

$$\begin{aligned} (j) \quad 3\frac{3}{4} \div 2\frac{5}{8} &= \frac{13}{4} \times \frac{8}{21} \\ &= 1\frac{3}{7} \end{aligned}$$

Exercise 2A Divide by a Fraction (3)

$$1. \quad 6 \div \frac{3}{4} = 8$$

Gina has 8 pieces of ribbon.

$$2. \quad 3 \div \frac{3}{16} = 16$$

It will take Eve 16 days to drink 3 gallons of milk.

$$3. \quad 1 \text{ sheet: } 12 \div \frac{1}{3} = 36$$

3 sheets: $36 \times 3 = 108$
There are 108 pieces altogether.

$$4. \quad 11\frac{1}{2} \div \frac{1}{2} = 23$$

There are 23 children in the group.

$$5. \quad \frac{4}{5} \div \frac{1}{10} = 8$$

The fish fillet will last 8 days.

$$6. \quad \frac{1}{4} \text{ h} = 15 \text{ min}$$

$$15 \div \frac{5}{6} = 18$$

He covers 18 rounds.

Exercise 2B Real-World Problems: Four Operations with Fractions

$$1. \quad 1 - \frac{1}{4} = \frac{3}{4}$$

$$\frac{3}{4} \div \frac{1}{8} = 6$$

She has 6 children.

$$2. \quad 8\frac{1}{2} - 2\frac{1}{2} = 6$$

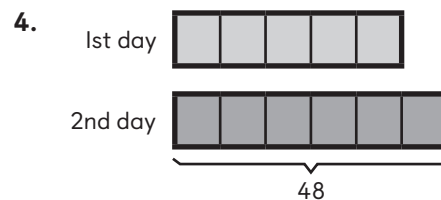
$$6 \div \frac{2}{5} = 15$$

She has 15 small storage bags.

$$3. \quad \frac{2}{3} \times 21 = 14 \text{ (cans left)}$$

$$14 \div \frac{4}{7} = 24\frac{1}{2}$$

Jasmine has enough cat food for her kitten for 24 days.
(You will need to round down $24\frac{1}{2}$ to 24 because $\frac{1}{2}$ can is not enough to feed her kitten since $\frac{4}{7}$ is greater than $\frac{1}{2}$).

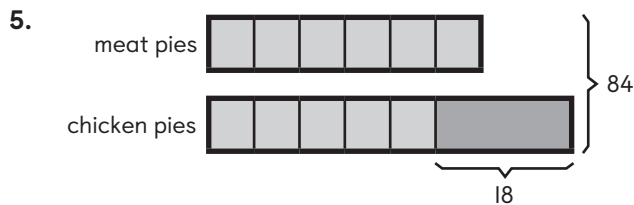


$$6 \text{ units} = 48$$

$$5 \text{ units} = 48 \div 6 \times 5 = 40 \quad (1\text{st day})$$

$$40 \div \frac{1}{6} = 240$$

Miley made a total of 240 coupon books.



11 units = $84 - 18 = 66$
 5 units = $66 \div 11 \times 5 = 30$
 $30 + 18 = 48$
 Jolene bakes 48 chicken pies.

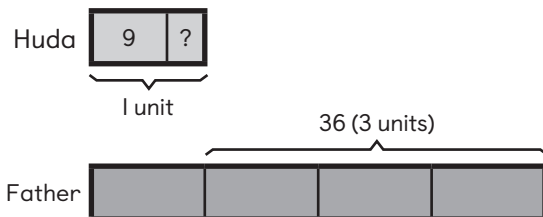
6. $1 - \frac{1}{5} = \frac{4}{5}$
 $\frac{4}{5} \div 2 = \frac{2}{5}$
 $18 \div \frac{2}{5} = 45$

Coach Ruiz orders 45 T-shirts.

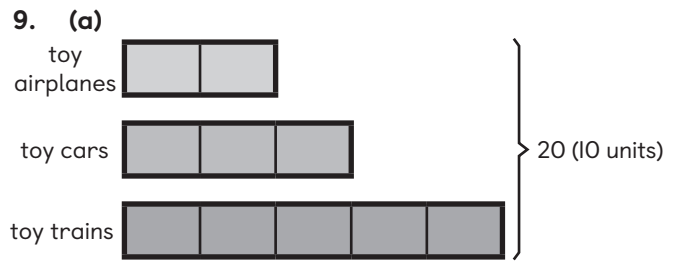
7. (a) $\frac{3}{4} \div 2 = \frac{3}{8}$
 $5\frac{1}{2} \div \frac{3}{8} = 14\frac{2}{3}$
 $14 + 1 = 15$ (as $\frac{2}{3}$ gallon of paint can paint 1 more room)
 Wyatt can paint 15 rooms in all.

(b) $\frac{2}{3} - \frac{3}{8} = \frac{7}{24}$
 Wyatt will have $\frac{7}{24}$ gallon of paint left over.

8. Huda's age: $\frac{1}{5} \times 45 = 9$
 Difference in ages: $45 - 9 = 36$



3 units = 36
 1 unit = $36 \div 3 = 12$
 $12 - 9 = 3$
 Huda's age will be $\frac{1}{4}$ of her father's age in 3 years.

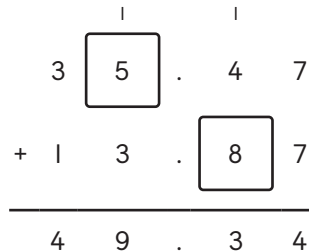


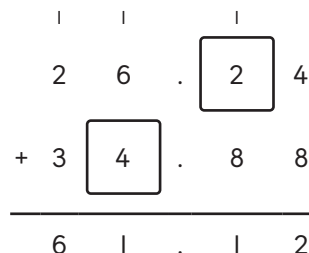
Number of toy cars = $20 \div 10 \times 3 = 2 \times 3 = 6$
 Jacky buys 6 toy cars.

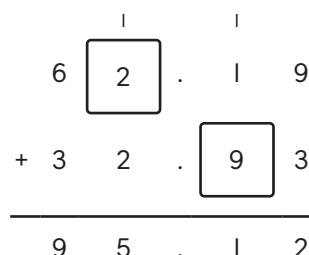
(b) Number of toy airplanes = $2 \times 2 = 4$
 Number of toy trains = $2 \times 5 = 10$
 Total amount = $\$12 \times 4 + \$8 \times 6 + \$6 \times 10$
 $= \$156$
 Jacky spends \$156 for the toys.

Exercise 2C Four Operations With Multi-Digit Decimals (I)

1. (a) 55.49 (b) 41.05
 (c) 40.22 (d) 62.03
 (e) 5.12 (f) 8.065
2. (a) 15.91 (b) 39.29
 (c) 30.87 (d) 33.74
 (e) 20.562 (f) 43.648

3. (a) 

(b) 

(c) 

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & | & & | & & | & \\
 & 5 & & 2 & & . & 4 & 6 \\
 + & 2 & \boxed{7} & & . & \boxed{7} & & 6 \\
 \hline
 & 8 & 0 & & . & 2 & & 2
 \end{array}
 \end{array}$$

4. (a)

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & 4 & & \overset{11}{\cancel{11}} & & & \overset{13}{\cancel{13}} \\
 & \cancel{5} & \boxed{2} & & . & \cancel{5} & 8 \\
 - & 2 & 6 & & . & \boxed{7} & 1 \\
 \hline
 & 2 & 5 & & . & 6 & 7
 \end{array}
 \end{array}$$

(b)

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & 6 & & \overset{12}{\cancel{12}} & & & \overset{4}{\cancel{4}} & \overset{16}{\cancel{16}} \\
 & \cancel{7} & \cancel{2} & & . & \boxed{5} & \cancel{5} \\
 - & 3 & \boxed{9} & & . & 3 & 8 \\
 \hline
 & 3 & 3 & & . & 1 & 8
 \end{array}
 \end{array}$$

(c)

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & 5 & & \overset{9}{\cancel{9}} & & & \overset{11}{\cancel{11}} & \overset{13}{\cancel{13}} \\
 & \cancel{8} & \boxed{0} & & . & \cancel{2} & \cancel{5} \\
 - & 2 & 3 & & . & \boxed{7} & 6 \\
 \hline
 & 3 & 6 & & . & 4 & 7
 \end{array}
 \end{array}$$

(d)

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & 7 & & \overset{11}{\cancel{11}} & & & \overset{13}{\cancel{13}} \\
 & \cancel{8} & \boxed{2} & & . & \cancel{5} & 8 \\
 - & 4 & 3 & & . & \boxed{7} & 3 \\
 \hline
 & 3 & 8 & & . & 6 & 5
 \end{array}
 \end{array}$$

Exercise 2C Four Operations With Multi-Digit Decimals (2)

1. (a)

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & & & 1 & & & 4 \\
 & & & \boxed{3} & & 2 & \boxed{7} \\
 \times & & & 0 & & . & 6 \\
 \hline
 & 1 & 9 & 6 & & . & 2
 \end{array}
 \end{array}$$

(b)

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & & 8 & 7 & & & & 2 \\
 & & 2 & 9 & & . & \boxed{8} & 3 \\
 \times & & & & & 0 & & . & 9 \\
 \hline
 & 2 & 6 & & . & \boxed{8} & 4 & 7
 \end{array}
 \end{array}$$

2. (a)

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & & 7 & 8 \\
 \times & & & 3 & & . & 6 \\
 \hline
 & & & 4 & 6 & & 8 \\
 & 2 & 3 & 4 & & & \\
 \hline
 & 2 & 8 & 0 & & . & 8
 \end{array}
 \end{array}$$

(b)

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & & & & & 5 & 7 \\
 \times & & & 0 & & . & 4 & 9 \\
 \hline
 & & & 5 & & 1 & 3 \\
 & 2 & 2 & 8 & & & \\
 \hline
 & 2 & 7 & & . & 9 & 3
 \end{array}
 \end{array}$$

(c)

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & & 2 & & . & 8 \\
 \times & & 8 & & . & 4 \\
 \hline
 & & 1 & & 1 & 2 \\
 & 2 & 2 & & 4 & & \\
 \hline
 & 2 & 3 & & . & 5 & 2
 \end{array}
 \end{array}$$

(d)

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & & 0 & & . & 6 & 8 \\
 \times & & 6 & & . & 5 \\
 \hline
 & & & 3 & 4 & 0 \\
 & 4 & & 0 & 8 & & \\
 \hline
 & 4 & & . & 4 & 2
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(e)} \quad \begin{array}{r} 1 \quad 9 \quad . \quad 3 \\ \times \quad \quad 2 \quad . \quad 4 \\ \hline 7 \quad 7 \quad 2 \\ 3 \quad 8 \quad 6 \\ \hline 4 \quad 6 \quad . \quad 3 \quad 2 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(f)} \quad \begin{array}{r} \quad \quad 3 \quad . \quad 7 \\ \times \quad \quad 4 \quad . \quad 8 \\ \hline 2 \quad 9 \quad 6 \\ 1 \quad 4 \quad 8 \\ \hline 1 \quad 7 \quad . \quad 7 \quad 6 \end{array}
 \end{array}$$

3. Greatest product: $8.72 \times 9.4 = 81.968$
Least product: $4.89 \times 2.7 = 13.203$

4. $7 \xrightarrow{\times 0.5} 3.5 \xrightarrow{\times 1.25} 4.375 \xrightarrow{\times 3.2} 14$

$13 \xrightarrow{\times 0.5} 6.5 \xrightarrow{\times 1.25} 8.125 \xrightarrow{\times 3.2} 26$

$0.5 \times 1.25 \times 3.2 = 2$. The final answer on the right is 2 times the number you started with.

Exercise 2C Four Operations With Multi-Digit Decimals (3)

- I. (a) $243 \div 0.27 = 24,300 \div 27 = 900$
(b) $345 \div 0.75 = 34,500 \div 75 = 460$
(c) $336 \div 0.96 = 33,600 \div 96 = 350$
(d) $264 \div 0.48 = 26,400 \div 48 = 550$
(e) $0.35 \div 0.25 = 35 \div 25 = 1.4$
(f) $0.96 \div 0.15 = 96 \div 15 = 6.4$
(g) $11.76 \div 0.48 = 1,176 \div 48 = 24.5$
(h) $0.774 \div 0.86 = 774 \div 860 = 0.9$
(i) $2.175 \div 0.75 = 2,175 \div 750 = 2.9$
(j) $2.304 \div 0.64 = 2,304 \div 640 = 3.6$

2. (a) $7.8 \xrightarrow{\times 0.17} 1.326 \xrightarrow{+ 0.074} 1.4 \xrightarrow{\times 2.8} 3.92$

$7.8 \xleftarrow{\div 0.17} 1.326 \xleftarrow{- 0.074} 1.4 \xleftarrow{\div 2.8} 3.92$

The number is 7.8.

(b) $7.38 \xleftarrow{\div 2.9} 21.402 \xleftarrow{+ 1.352} 20.05 \xleftarrow{\div 3.6} 72.18$

The number is 7.38.

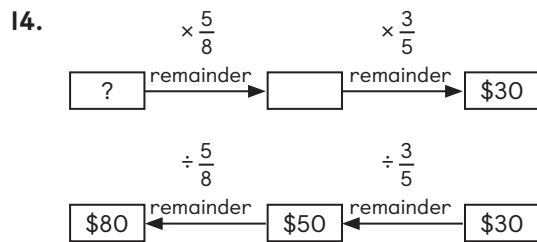
3. $30.00 \div 6.25 = 4.8$
 $4.8 \div 1.6 = 3$
 $3 \div 0.25 = 12$
 $12 \div 0.4 = 30$
4. Because $6.25 \times 1.6 \times 0.25 \times 0.4 = 1$, the flowchart is true no matter what number is used to start the computation.

Chapter Practice

- I. B
2. A
3. D
4. C
5. $4\frac{1}{8}$
6. 9.25
7. 7.8
8. 0.469
9. $\frac{8}{10} \div \frac{1}{5} = 4$
The beef fillet can last for 4 days.
10. $7\frac{1}{2} \div \frac{5}{8} = 12$
Joyce has 12 small packets of sugar.
II. $4\frac{1}{2} \div \frac{3}{4} = 6$
The chef can prepare 6 casseroles in all.
12. $\frac{9}{10} \div 6 = \frac{3}{20}$
 $\frac{3}{20} \div 3 = \frac{1}{20}$
Each sibling receives $\frac{1}{20}$ square meters of land.

13. $\frac{3}{8}$ of the juice: $2\frac{1}{12} - 1\frac{7}{12} = \frac{6}{12} = \frac{1}{2}$
 $\frac{5}{8}$ of the juice: $\frac{1}{2} \div 3 \times 5 = \frac{5}{6}$
 $1\frac{7}{12} - \frac{5}{6} = \frac{3}{4}$

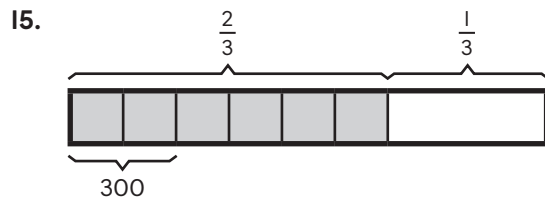
The mass of the empty bottle is $\frac{3}{4}$ kilogram.



$$\$30 \div \frac{3}{5} = \$50$$

$$\$50 \div \frac{5}{8} = \$80$$

Chloe has \$80 at first.



$$2 \text{ units} = 300$$

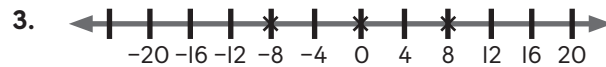
$$6 \text{ units} = 300 \times 3 = 900$$

$$\frac{2}{3} \text{ of the milk} \rightarrow 900$$

$$\frac{1}{3} \text{ of the milk} \rightarrow 900 \div 2 = 450$$

$$\text{Bottle of the milk} \rightarrow 450 \times 3 = 1,350$$

1,350 millilitres of milk were in the bottle at first.



(a) In blue: -16, -4, 12, 20

(b) In red: -20, -12, 4, 16

4. (a) -900 ft could be the submarine in the sea.

(b) 35,000 ft could be the height of the aeroplane in the sky.

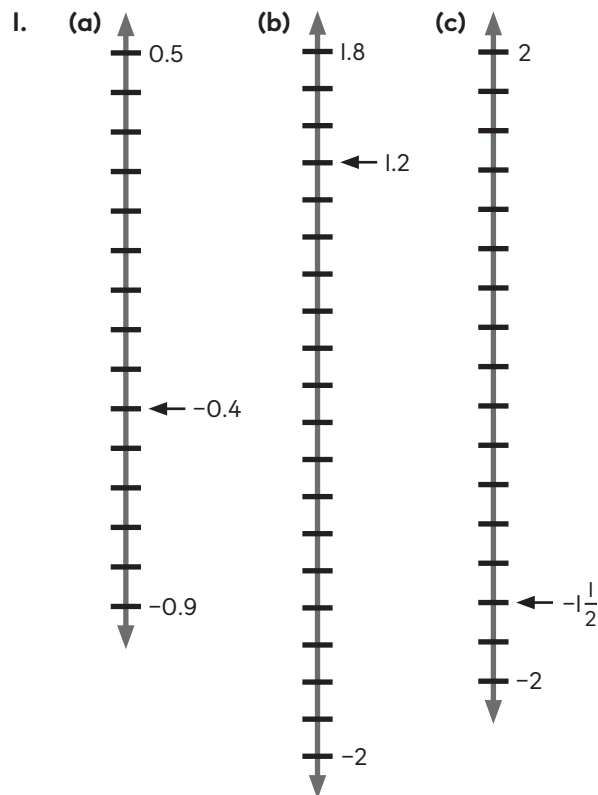
(c) 0 ft represents the ground level.

5. Eddie: -20 points

Laura: 10 points



Exercise 3A Rational Numbers on a Number Line (2)

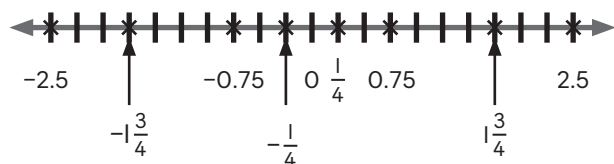


Chapter 3 RATIONAL NUMBERS

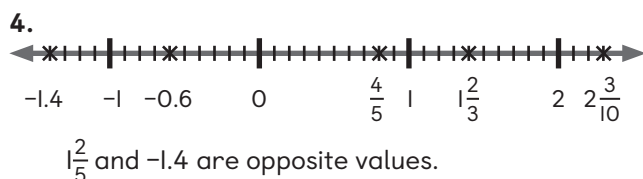
Exercise 3A Rational Numbers on a Number Line (1)

1. (a) 74°F (b) -103°F
 (c) 130°F (d) -74°F
 (e) 74°F and -74°F are opposite in value.
2. (a) -6, -4, -2, 3
 (b) -25, -10, 5, 20
 (c) -10, -6, 0, 6
 (d) -70, -50, -20, 0

2. The opposite values are $-\frac{1}{4}$, -0.75 , $-\frac{3}{4}$, -1.8 .



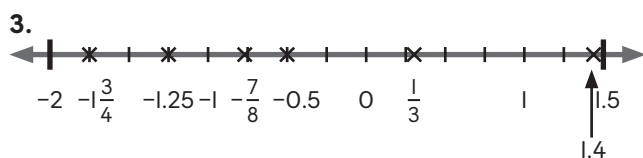
3. (a) $-4\frac{2}{5}$ (b) 7.57
(c) $10\frac{1}{3}$ (d) -38.777
(e) -20.15



Exercise 3B Compare and Order Rational Numbers

1. (a) $<$ (b) $>$
(c) $>$ (d) $>$
(e) $<$ (f) $<$
(g) $>$ (h) $<$

2. -10°C , -4°C , -3°C , 2°C , 4°C , 12°C



1.4 , $\frac{1}{3}$, -0.5 , $-\frac{7}{8}$, -1.25 , $-\frac{3}{4}$

4. -18.95 , $-18\frac{4}{5}$, $-18\frac{5}{9}$, -18.25 , $-18\frac{1}{8}$

5. -49.09 , $-49\frac{3}{10}$, $-49\frac{3}{5}$, $-49\frac{5}{8}$, -49.77

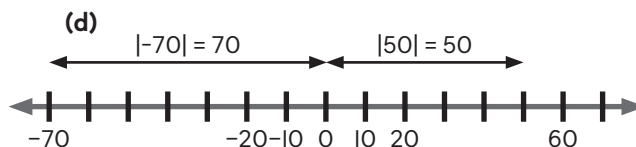
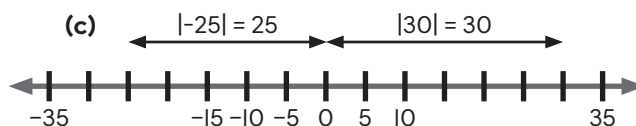
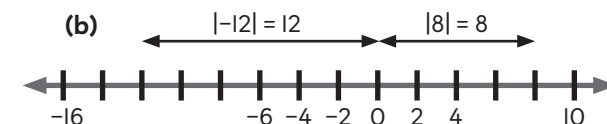
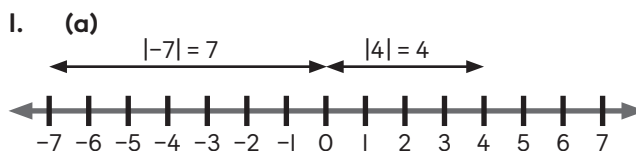
6. Answers may vary.

- (a) -6.4 (b) -1.75
(c) $-3\frac{4}{5}$ (d) $-4\frac{3}{8}$
(e) -2.77 (f) -1.95

7. Jose: $50 - 120 = -70$
Saad: $50 - 80 = -30$
 $-70 < -30$

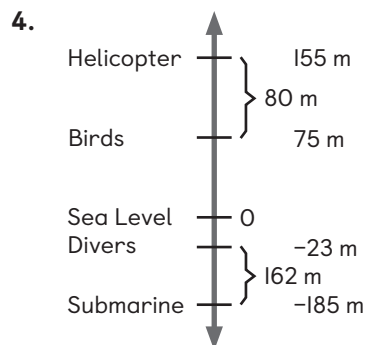
Jose has 40 fewer points than Saad.

Exercise 3C Absolute Values



2. (a) 7.5 (b) 10.95
(c) $13\frac{1}{2}$ (d) $4\frac{3}{4}$
(e) $8\frac{2}{9}$ (f) $5\frac{3}{7}$
(g) $4\frac{3}{7}$ (h) $7\frac{4}{9}$
(i) 9.08 (j) 2.48
(k) 10 (l) 20
(m) 28.65 (n) 35.25

3. (a) < (b) <
 (c) = (d) >
 (e) > (f) =

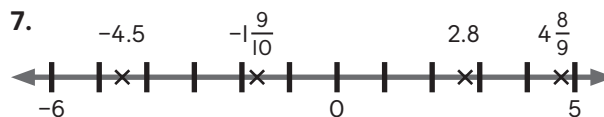


- (a) $155 + |-185| = 340$
 The vertical distance between the helicopter and the submarine is 340 meters.
- (b) $|-185| - 162 = 23$
 The divers are 23 meters below sea level.
- (c) $155 - 80 = 75$
 $|-23| + 75 = 98$
 The flock of birds is 98 meters above the divers.
- (d) $75 - |-23| = 52$
 The divers are closer to sea level by 52 meters.
- (e) Helicopter to divers $\rightarrow 155 + |-23| = 178$ meters
 Submarine to divers $\rightarrow 162$ meters
 $178 - 162 = 16$
 The submarine is closer to the divers by 16 meters.
- (f) Divers, birds, helicopter, submarine

Chapter Practice

1. D
 2. C
 3. D
 4. C
 5. (a) -200 feet (b) 4°F

6. -3.6 and 3.6

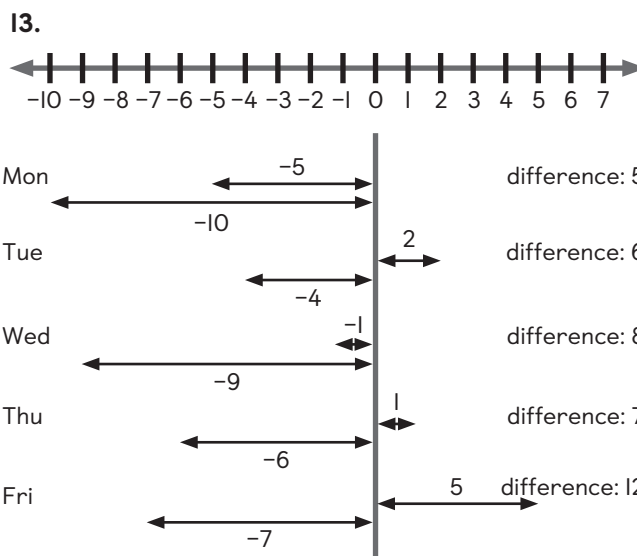


8. $-40\frac{3}{4}$, -25.46, -20.75, 0, $11\frac{5}{8}$
9. 90.25, 45.85, $-45\frac{5}{7}$, $-92\frac{3}{8}$, -120.72
10. (a) > (b) >
 (c) < (d) <
 (e) = (f) >

11. -37



- (a) Aisha has the greatest number of game cards after the game. She has 80 game cards.
- (b) Sonya lost the greatest number of game cards. She lost 250 game cards.
- (c) $|-190| + 80 = 270$
 Aisha has 270 more game cards than Keith.
- (d) $|-250| - |-190| = 60$
 Sonya has 60 fewer game cards than Keith.



- (a) Friday has the greatest temperature difference of 12°C .
- (b) Monday has the least temperature difference of 5°C .

Chapter 4 RATIO

Exercise 4A Introducing Ratio (1)

1. There are 8 tentacles for every octopus.
The ratio of the number of tentacles to the number of octopus is 8 : 1.

2. There are 4 chairs for every table.
The ratio of the number of chairs to the number of tables is 4 : 1.

3. (a) There are 8 horses, 7 ducks, and 3 cows on a farm.

(b) The ratio of cows to horses is 3 : 8.

(c) The ratio of ducks to horses is 7 : 8.

(d) The ratio of cows to ducks is 3 : 7.

4. (a) The ratio of toy cars to toy planes is 7 : 4.

(b) The ratio of toy planes to toy cars is 4 : 7.

(c)

toy cars



toy planes



5. (a) 3



(b) 3 : 2

(c) 1 : 3

Exercise 4A Introducing Ratio (2)

1. (a) The ratio of key chains to keys is 7 : 9.
The ratio of keys to key chains is 9 : 7.

- (b) The ratio of sunflowers to roses is 11 : 15.

The ratio of roses to sunflowers is 15 : 11.

- (c) The ratio of the length of Rope A to the length of Rope B is 4 : 5.

The ratio of the length of Rope B to the total length of two ropes is 5 : 9.

2. (a) 38 ounces

(b) 17 : 21

(c) 21 : 38

3. (a) $16 + 23 + 11 + 10 = 60$ g

(b)

The ratio of:	Ratio
The mass of walnuts to the mass of corn flakes	23 : 10
The mass of rolled oats to the total mass of cereal	11 : 60
The mass of dried fruit to the mass of walnuts	16 : 23
The total mass of cereal to the mass of walnuts	60 : 23
The mass of dried fruit to the mass of rolled oats	16 : 11

4. $2 \text{ lb} = 16 \times 2$
 $= 32 \text{ oz}$

$1 \text{ lb } 5 \text{ oz} = 16 + 5$
 $= 21 \text{ oz}$

Ratio of the mass of the lobster to the mass of shrimps = 32 : 21

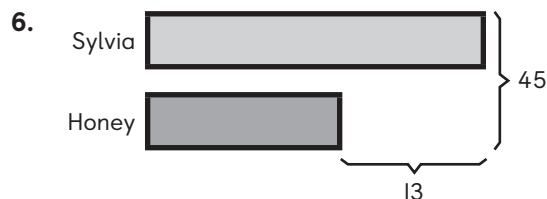
5. (a) 1 gal = 8 pt
Orange juice : apple juice = 8 : 5

(b) $3 \text{ qt} = 3 \times 2 = 6 \text{ pt}$
Cranberry juice : apple juice = 6 : 5

(c) $5 \text{ pt} = 5 \times 16 = 80 \text{ oz}$
Apple juice : lemon juice = 80 : 7

(d) 1 gal = 4 qt
Cranberry juice : orange juice = 3 : 4

(e) 1 gal = 8 pt
1 pt = 16 oz
 $1 \text{ gal} = 8 \times 16 = 128 \text{ oz}$
Lemon juice : orange juice = 7 : 128



Number of oatmeal bars Honey baked
 $= (45 - 13) \div 2$
 $= 16$
 Number of oatmeal bars Sylvia baked $= 16 + 13$
 $= 29$

Ratio of oatmeal bars Sylvia baked to
 oatmeal bars Honey baked $= 29 : 16$

7. (a) $480 \div 3 = 160$ yd
 Ratio of the distance Brandon runs to
 the distance Sheldon runs $= 320 : 160$

- (b) $\frac{1}{4}$ mi $= \frac{1}{4} \times 1,760 = 440$ yd
 Ratio of the distance Joel runs to the
 distance Brandon runs $= 440 : 320$

Exercise 4B Equivalent Ratios (I)

1. (a) $9 : 5$ (b) $3 : 8$
 (c) $1 : 2$ (d) $3 : 5$
 (e) $11 : 13$ (f) $7 : 4$
 (g) $2 : 1$ (h) $10 : 7$
 (i) $4 : 1$ (j) $7 : 25$

2. $\div 2 \left(\begin{array}{l} 56 : 24 \\ 28 : 12 \end{array} \right) \div 2$ $\div 4 \left(\begin{array}{l} 56 : 24 \\ 14 : 6 \end{array} \right) \div 4$
 $\div 8 \left(\begin{array}{l} 56 : 24 \\ 7 : 3 \end{array} \right) \div 8$

3. $\times 2 \left(\begin{array}{l} 5 : 11 \\ 10 : 22 \end{array} \right) \times 2$ $\times 3 \left(\begin{array}{l} 5 : 11 \\ 15 : 33 \end{array} \right) \times 3$
 $\times 4 \left(\begin{array}{l} 5 : 11 \\ 20 : 44 \end{array} \right) \times 4$

4. (a)

Length (inches)	3	36	60	78	96
Breadth (inches)	2	24	40	52	64

- (b) $\frac{1.8}{3} \times 2 = 1.2$
 The width is 1.2 yards.

5. (a) Amount of mushrooms : amount of cream
 $= 5 : 4$

- (b) Amount of cream : amount of butter
 $= 4 : 2 = 2 : 1$

- (c) Amount of mushrooms : amount of cream
 $= 5 : 4$

$$\times 5 \left(\begin{array}{l} 5 : 4 \\ 25 : 20 \end{array} \right) \times 5$$

She will need 20 ounces of cream.

- (d) Amount of cream : amount of butter
 $= 2 : 1$

$$\times 8 \left(\begin{array}{l} 2 : 1 \\ 16 : 8 \end{array} \right) \times 8$$

She will need 8 ounces of butter.

Exercise 4B Equivalent Ratios (2)

1. (a) 39 (b) 77

- (c) 96 (d) 27

- (e) 68 (f) 84

- (g) 7 (h) 17

- (i) 7 (j) 19

- (k) 5 (l) 13

- (m) 153 (n) 8

2. (a) Ratio of the amount of yogurt : amount
 of fruit juice $= 50 : 100 = 1 : 2$

- (b) Ratio of the amount of yogurt : amount
 of milk $= 50 : 250 = 1 : 5$

- (c) Ratio of the amount of milk : amount of
 fruit juice $= 5 : 2$

$$\times 200 \left(\begin{array}{l} 5 : 2 \\ 1,000 : 400 \end{array} \right) \times 200$$

She needs 400 milliliters of fruit juice.

- (d) $1 \text{ l} = 1,000 \text{ ml}$
 Ratio of the amount of yogurt : amount
 of milk $= 50 : 250 = 1 : 5$

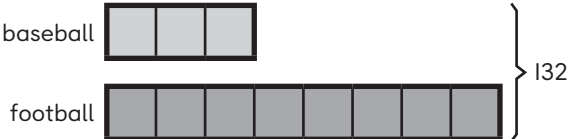
$$\times 200 \left(\begin{array}{l} 1 : 5 \\ 200 : 1,000 \end{array} \right) \times 200$$

She needs 200 milliliters of yogurt.

- (e) With 1 liter of milk, Asha can make
4 regular smoothies.

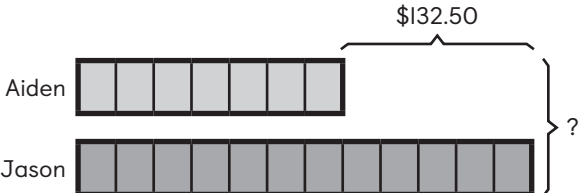
3. Yogurt: $3.5 \times 50 = 175$ milliliters
 Fruit juice: $3.5 \times 100 = 350$ milliliters
 Milk: $3.5 \times 250 = 875$ milliliters
 Asha will need 175 milliliters of yogurt, 350 milliliters of fruit juice, and 875 milliliters of milk.

Exercise 4C Real-World Problems: Ratios Involving Two Quantities

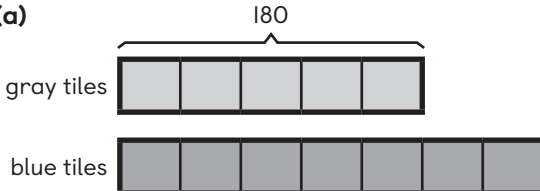
1. (a)
- 

11 units = 132
 1 unit = $132 \div 11 = 12$
 8 units = $12 \times 8 = 96$
 96 students chose football as their favorite sport.

- (b) 5 units = $12 \times 5 = 60$
 60 fewer students chose baseball than football.

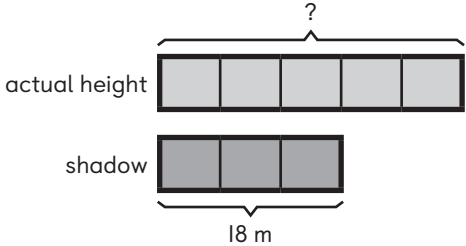
- 2.
- 

5 units = \$132.50
 1 unit = $\$132.50 \div 5 = \26.50
 19 units = $\$26.50 \times 19 = \503.50
 The total amount of money collected was \$503.50.

3. (a)
- 

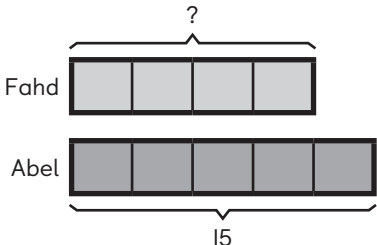
5 units = 180
 1 unit = $180 \div 5 = 36$
 7 units = $36 \times 7 = 252$
 He uses 252 blue tiles.

- (b) 12 units = 540
 1 unit = $540 \div 12 = 45$
 5 units = $45 \times 5 = 225$
 He uses 225 gray tiles.

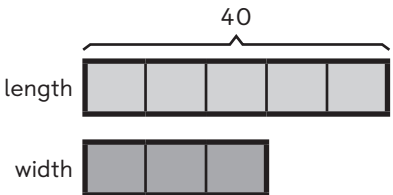
4. (a)
- 

3 units = 18
 1 unit = $18 \div 3 = 6$
 5 units = $6 \times 5 = 30$
 The building is 30 meters tall.

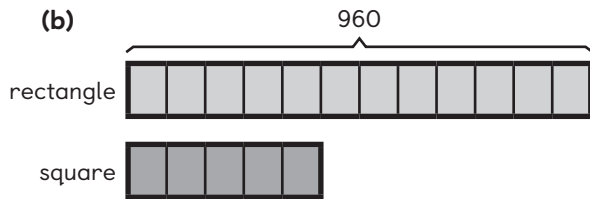
- (b) 5 units = 45
 1 unit = $45 \div 5 = 9$
 3 units = $9 \times 3 = 27$
 The shadow of a 45-m building will be 27 meters.

- 5.
- 

5 units = 15
 1 unit = $15 \div 5 = 3$
 4 units = $3 \times 4 = 12$ (Fahd's age now)
 In 9 years' time,
 Fahd's age: $12 + 9 = 21$
 Abel's age: $15 + 9 = 24$
 Fahd's age : Abel's age = $21 : 24 = 7 : 8$
 The ratio is 7 : 8.

6. (a)
- 

5 units = 40
 1 unit = $40 \div 5 = 8$
 Width: $8 \times 3 = 24$
 $40 \times 24 = 960$
 The area of the rectangle is 960 square centimeters.



$$12 \text{ units} = 960$$

$$1 \text{ unit} = 960 \div 12 = 80$$

$$5 \text{ units} = 80 \times 5 = 400$$

The area of the square is 400 square centimeters.

7. I agree with David that the ratio is 1 : 8.
 Volume of Cube A = $3 \times 3 \times 3$
 Volume of Cube B = $6 \times 6 \times 6$
 $= 2 \times 3 \times 2 \times 3 \times 2 \times 3$
 $= 2 \times 2 \times 2 \times 3 \times 3 \times 3$
 $= 8 \times \text{Volume of Cube A}$
 Hence, volume of Cube A : volume of Cube B = 1 : 8.

Exercise 4D Comparing Three Quantities

1. (a) $\underline{3} : \underline{2} : \underline{5}$

(b) $\underline{6} : \underline{3} : \underline{5}$

(c) $\underline{3} : \underline{5} : \underline{8}$

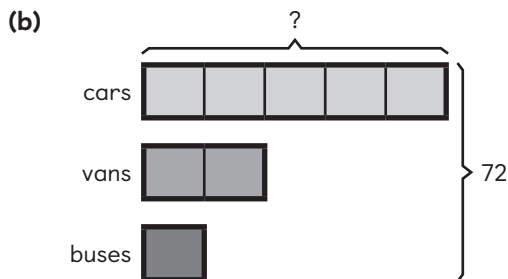
2. (a) $10 : \underline{35} : \underline{20}$

(b) $\underline{9} : 24 : \underline{18}$

(c) $\underline{28} : \underline{36} : 48$

3. (a)

Cars	Vans	Buses
5	2	1
15	6	3
25	10	5
35	14	7



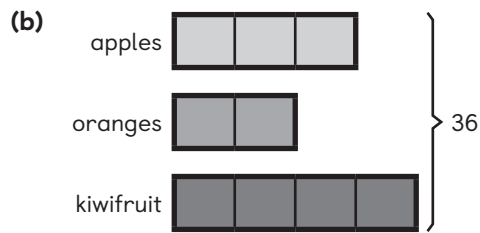
$$8 \text{ units} = 72$$

$$1 \text{ unit} = 72 \div 8 = 9$$

$$5 \text{ units} = 9 \times 5 = 45$$

There are 45 cars.

4. (a) Apples : oranges : kiwifruit = $6 : 4 : 8$
 $= 3 : 2 : 4$

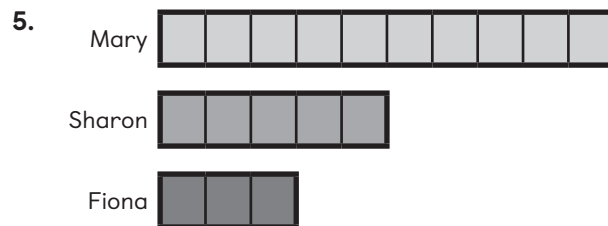


$$9 \text{ units} = 36$$

$$1 \text{ unit} = 36 \div 9 = 4$$

$$4 \times 4 = 16$$

She uses 16 kiwifruit.



Number of stickers that each girl has in the end
 $= (10 + 5 + 3) \div 3 = 6 \text{ units}$

Hence, Mary gives away $10 - 6 = 4 \text{ units}$.

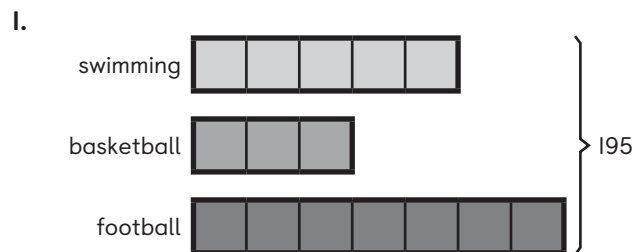
$$4 \text{ units} = 68$$

$$1 \text{ unit} = 68 \div 4 = 17$$

$$18 \text{ units} = 17 \times 18 = 306$$

The total number of stickers the three girls have is 306 stickers.

Exercise 4E Real-World Problems: Ratios Involving Three Quantities



$$\text{Total units} = 5 + 3 + 7 = 15$$

$$15 \text{ units} = 195$$

$$1 \text{ unit} = 195 \div 15 = 13$$

Number of students who chose swimming

$$= 13 \times 5 = 65$$

Number of students who chose basketball

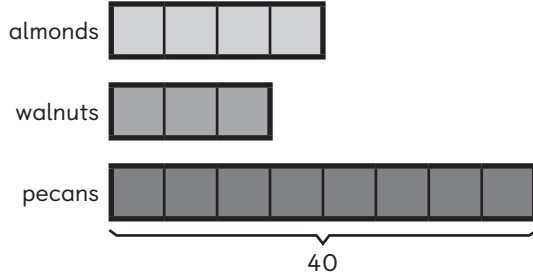
$$= 13 \times 3 = 39$$

Number of students who chose football

$$= 13 \times 7 = 91$$

65 students chose swimming, 39 students chose basketball, and 91 students chose football.

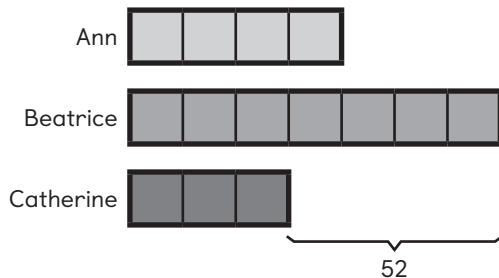
2. (a)



8 units = 40
 1 unit = $40 \div 8 = 5$
 3 units = $5 \times 3 = 15$
 The mass of the walnuts used is 15 ounces.

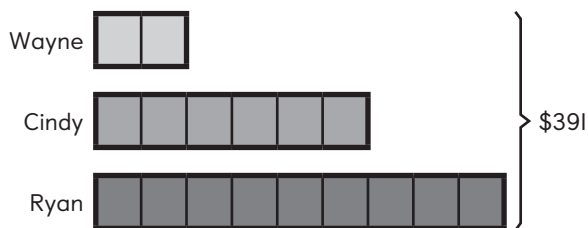
(b) Total units = $4 + 3 + 8 = 15$
 15 units = $5 \times 15 = 75$
 The total mass of the granola is 75 ounces.

3.



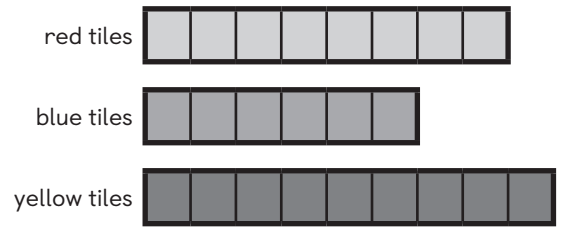
Total units = $4 + 7 + 3 = 14$
 4 units = 52
 1 unit = $52 \div 4 = 13$
 14 units = $13 \times 14 = 182$
 They sell 182 sandwiches in all.

4.



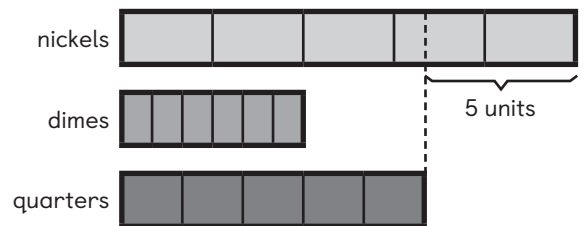
17 units = \$391
 1 unit = $\$391 \div 17 = \23
 7 units = $\$23 \times 7 = \161
 Ryan collected \$161 more than Wayne.

5. The number of blue tiles should have the least number of units. Since the lowest common multiple of 2 and 3 is 6, let the number of blue tiles be 6 units.



Number of yellow tiles : number of red tiles = 9 : 8
 1 unit = 59
 6 units = $59 \times 6 = 354$
 Lena has 354 blue tiles.

6. (a) Gina has the least number of dimes. Since the lowest common multiple of 2 and 3 is 6, let the number of dimes be 6 units.

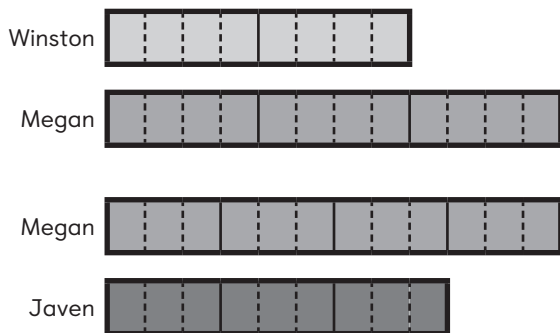


Number of nickels : number of dimes
 = 5 : 2 = 15 : 6
 Number of dimes : number of quarters
 = 3 : 5 = 6 : 10
 Number of nickels : number of dimes :
 number of quarters = 15 : 6 : 10
 The ratio of nickels to dimes to quarters
 is 15 : 6 : 10.

(b) Total units = $15 + 6 + 10 = 31$
 5 units = 20
 1 unit = $20 \div 5 = 4$
 31 units = $31 \times 4 = 124$
 There are 124 coins in the box.

Exercise 4F Ratios and Fractions (I)

1. (a) Ratio of the number of goldfish to the number of guppies = 15 : 40
= 3 : 8
- (b) $\frac{3}{8}$
- (c) $15 + 40 = 55$
There are 55 fishes in all.
 $\frac{15}{55} = \frac{3}{11}$ of the fishes are goldfish.
2. (a) $20 + 12 = 32$
Mike bakes 32 pies.
Ratio of the number of pies Jane bakes to the number of pies Mike bakes = 20 : 32
= 5 : 8
- (b) $\frac{5}{8}$
- (c) $20 + 32 = 52$
Jane and Mike bake 52 pies in all.
Mike bakes $\frac{32}{52} = \frac{8}{13}$ of the pies.
3. (a) Ratio of the number of Declan's storybooks to the number of Sophia's storybooks
= 56 : 63
= 8 : 9
- (b) $\frac{9}{8}$
- (c) $56 + 63 = 119$
Declan and Sophia have 119 storybooks in all.
 $\frac{63}{119} = \frac{9}{17}$ of the storybooks belong to Sophia.
4. (a) The number of units representing the number of Megan's shirts should be the same.
The lowest common multiple of 3 and 4 is 12.



The ratio of the number of Winston's shirts to the number of Megan's shirts to the number of Javen's shirts is 8 : 12 : 9.
OR

Ratio of the number of Winston's shirts to the number of Megan's shirts
= 2 : 3
= 8 : 12

Ratio of the number of Megan's shirts to the number of Javen's shirts
= 4 : 3
= 12 : 9

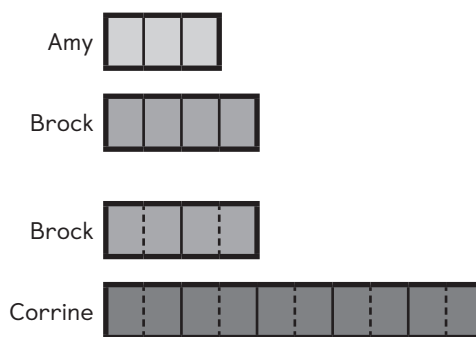
The ratio of the number of Winston's shirts to the number of Megan's shirts to the number of Javen's shirts is 8 : 12 : 9.

- (b) $8 + 12 = 20$

The total number of units is 20.

The fraction is $\frac{9}{20}$.

5. (a) The ratio of the number of Amy's figurines to Brock's figurines is 3 : 4.
The ratio of the number of Brock's figurines to Corrine's figurines is 2 : 5.
The number of units representing the number of Brock's figurines should be the same.
The lowest common multiple of 4 and 2 is 4.



The ratio of Amy's figurines to Brock's figurines to Corrine's figurines is 3 : 4 : 10.
OR

Ratio of the number of Amy's figurines to the number of Brock's figurines = 3 : 4
Ratio of the number of Brock's figurines to the number of Corrine's figurines = 2 : 5
= 4 : 10

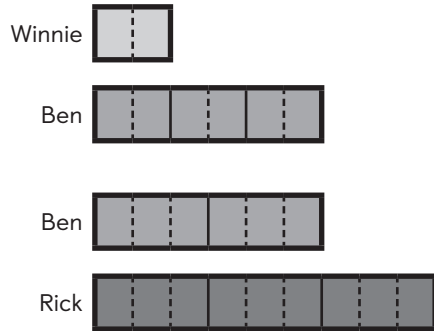
The ratio of Amy's figurines to Brock's figurines to Corrine's figurines is 3 : 4 : 10.

- (b) $3 + 4 + 10 = 17$

The total number of units is 17.

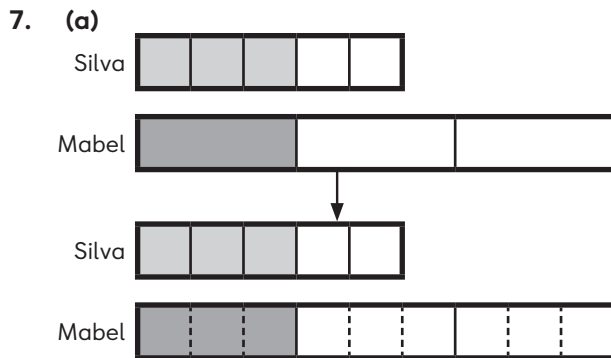
$\frac{4}{17}$ of the figurines are Brock's.

6. (a) The ratio of the amount Winnie raised to the amount Ben raised is 1 : 3.
The number of units representing the amount Ben raised should be the same.
The lowest common multiple of 3 and 2 is 6.



$2 + 6 + 9 = 17$
The total number of units is 17.
Winnie raised $\frac{2}{17}$ of the total amount.

(b) $\frac{2}{9}$



3 units of Silva's cookies is the same as 1 unit of Mabel's cookies.
The ratio of Mabel's cookies to Silva's cookies is 9 : 5.

(b) $5 + 9 = 14$
The total number of units is 14.
 $\frac{5}{14}$ of the cookies are Mabel's cookies.

(c) $\frac{5}{14} \times 182 = 65$
Mabel baked 65 cookies.

Exercise 4F Ratios and Fractions (2)

1. (a)

Number of Chocolate Muffins	Number of Walnut Muffins	Number of Blueberry Muffins
5	2	3
70	28	42
65	26	39
80	32	48

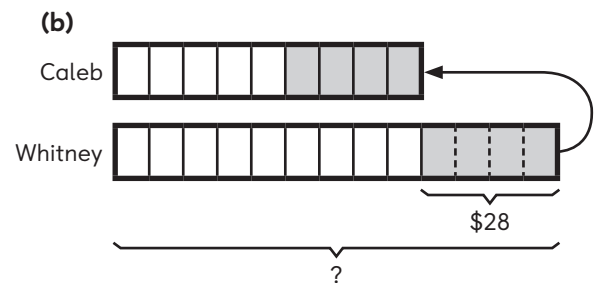
(b) $5 + 2 + 3 = 10$
10 units = 150
1 unit = $150 \div 10 = 15$
3 units = $3 \times 15 = 45$
The baker bakes 45 blueberry muffins.

(c) 3 units = 45
1 unit = $45 \div 3 = 15$
5 units = $5 \times 15 = 75$
The baker bakes 75 chocolate muffins.

2. (a) 3 units = 9
1 unit = $9 \div 3 = 3$
16 units = $16 \times 3 = 48$
Noah made 48 cups of drink.

(b) 5 units = 30
1 unit = $30 \div 5 = 6$
16 units = $16 \times 6 = 96$
Noah made 96 cups of drink.

3. (a) $2\frac{3}{5} = \frac{13}{5}$
The ratio of Caleb's allowance to Whitney's allowance is 5 : 13.



4 units = \$28
1 unit = $\$28 \div 4 = \7
13 units = $13 \times \$7 = \91
Whitney's allowance is \$91.

4. (a) Accept all correct explanations. Example:

$$120 = 1 \times 120$$

$$120 = 2 \times 60$$

$$120 = 3 \times 40$$

$$120 = 4 \times 30$$

$$120 = 5 \times 24$$

$$120 = 6 \times 20$$

$$120 = 8 \times 15$$

None of the factors of 120 are in the ratio of 3 : 2.

Thus, I do not agree with Harold.

- (b) $6 \text{ ft} = 6 \times 12 \text{ in.}$
 $= 72 \text{ in.}$

$$2 \text{ units} = 72 \text{ in.}$$

$$1 \text{ unit} = 72 \div 2 = 36 \text{ in.}$$

$$3 \text{ units} = 3 \times 36 = 108 \text{ in.}$$

Number of squares pieces along the length $= 108 \div 2 = 54$

Number of squares pieces along the width $= 72 \div 2 = 36$

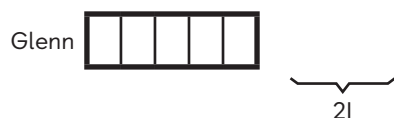
Number of square pieces used $= 54 \times 36 = 1,944$

1,944 square pieces of art are needed to make the collage.

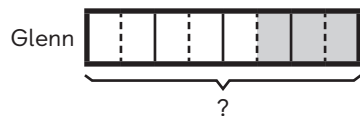
Exercise 4G Changing Ratios (I)

- I. The total number of crayons (14 units) remains unchanged.

Before:



After:



$$3 \text{ units} = 21$$

$$1 \text{ unit} = 21 \div 3 = 7$$

$$8 \text{ units} = 8 \times 7 = 56$$

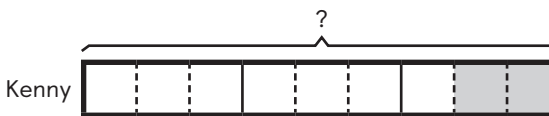
Glenn had 56 crayons in the end.

2. The total number of beads (12 units) remains unchanged.

Before:



After:



$$2 \text{ units} = 48$$

$$1 \text{ unit} = 48 \div 2 = 24$$

$$9 \text{ units} = 9 \times 24 = 216$$

Kenny had 216 beads in the end.

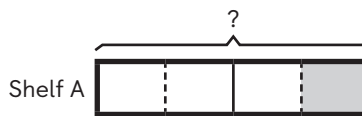
3. The total number of books remains unchanged.
 The lowest common multiple of 2 and 3 is 6.

Before:



$$\begin{aligned} \text{Ratio of books on Shelf A to Shelf B} &= 1 : 1 \\ &= 3 : 3 \end{aligned}$$

After:



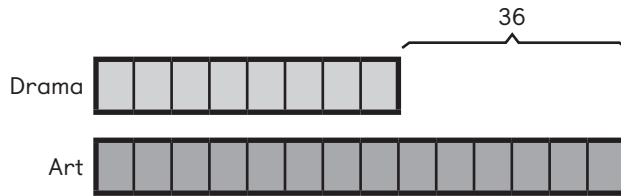
$$\begin{aligned} \text{Ratio of books on Shelf A to Shelf B} &= 2 : 1 \\ &= 4 : 2 \end{aligned}$$

$$1 \text{ unit} = 28$$

$$4 \text{ units} = 4 \times 28 = 112$$

112 books were on Shelf A in the end.

4. After the change, there should be 8 units of members in the Drama Club.
Ratio of Drama Club members to Art Club members = 4 : 7
= 8 : 14
Thus, the ratio of Drama Club members to Art Club members at first = 8 + 1 : 14 - 1
= 9 : 13



$$6 \text{ units} = 36$$

$$1 \text{ unit} = 36 \div 6 = 6$$

$$9 \text{ units} = 9 \times 6 = 54$$

There were 54 members in the Drama Club at first.

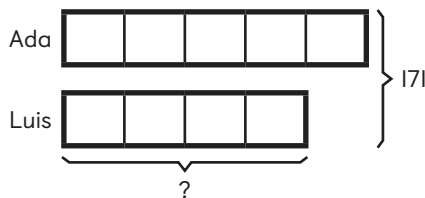
Exercise 4G Changing Ratios (2)

1. The number of cookies Luis baked remains unchanged. So, the number of units representing Luis's cookies should be the same.
The lowest common multiple of 2 and 6 is 6.

Before:



After:



$$9 \text{ units} = 171$$

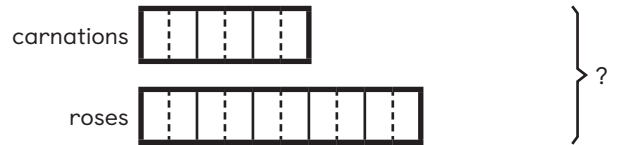
$$1 \text{ unit} = 171 \div 9 = 19$$

$$4 \text{ units} = 4 \times 19 = 76$$

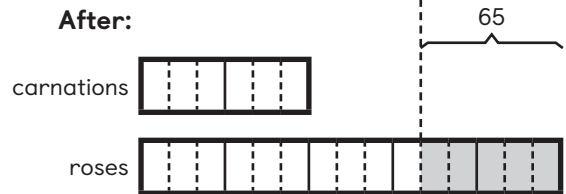
Luis baked 76 cookies.

2. The number of carnations remains unchanged. So, the number of units representing the carnations should be the same.
The lowest common multiple of 2 and 3 is 6.

Before:



After:



$$5 \text{ units} = 65$$

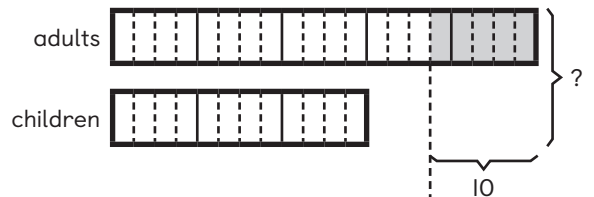
$$1 \text{ unit} = 65 \div 5 = 13$$

$$21 \text{ units} = 21 \times 13 = 273$$

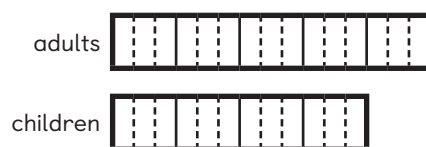
There were 273 carnations and roses altogether at first.

3. The number of children remains the same. So, the number of units representing the children should be the same.
The lowest common multiple of 3 and 4 is 12.

Before:



After:



$$5 \text{ units} = 10$$

$$1 \text{ unit} = 10 \div 5 = 2$$

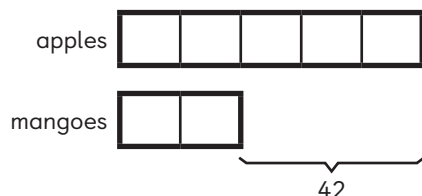
$$32 \text{ units} = 32 \times 2 = 64$$

64 people were at the party at first.

4. The difference between the number of apples and mangoes remains the same. So, the number of units representing this difference should be the same.

$$90 - 48 = 42$$

There were 42 more apples than mangoes.



$$3 \text{ units} = 42$$

$$1 \text{ unit} = 42 \div 3 = 14$$

$$2 \text{ units} = 2 \times 14 = 28$$

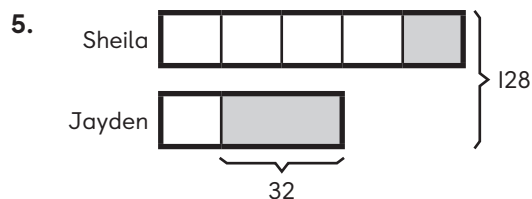
There were 28 mangoes left.

$$48 - 28 = 20$$

20 mangoes were sold.

$$20 + 20 = 40$$

40 apples and mangoes were sold in all.



$$6 \text{ units} = 128 - 32 = 96$$

$$1 \text{ unit} = 96 \div 6 = 16$$

$$5 \text{ units} = 5 \times 16 = 80$$

Sheila had 80 beads at first.

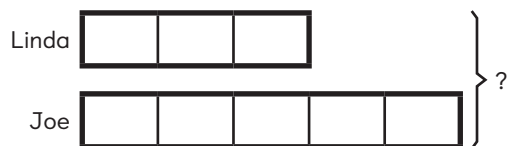
$$16 + 32 = 48$$

Jayden had 48 beads at first.

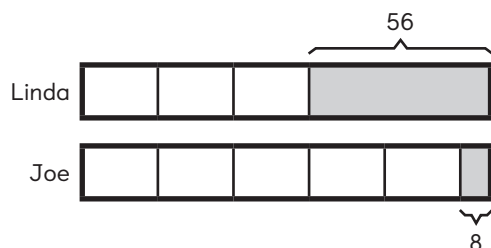
$$80 - 48 = 32$$

Sheila had 32 more beads than Jayden at first.

6. **Before:**



After:



$$2 \text{ units} = 56 - 8 = 48$$

$$1 \text{ unit} = 48 \div 2 = 24$$

$$8 \text{ units} = 8 \times 24 = 192$$

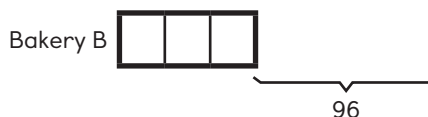
Linda and Joe scored 192 points in round I in all.

7. Ratio of the number of bread buns in Bakery A to Bakery B at first = 2 : 1
= 10 : 5

Before:



After:



$$4 \text{ units} = 96$$

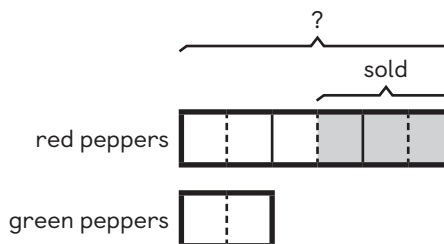
$$1 \text{ unit} = 96 \div 4 = 24$$

$$3 \text{ units} = 3 \times 24 = 72$$

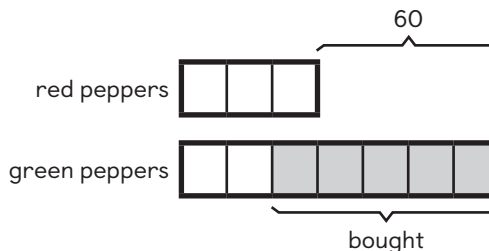
Bakery A sold 72 bread buns.

8. Ratio of the number of red to green peppers in the end = 7 : 3

Before:



After:



$$4 \text{ units} = 60$$

$$1 \text{ unit} = 60 \div 4 = 15$$

$$6 \text{ units} = 6 \times 15 = 90$$


The grocer had 90 red peppers at first.

Chapter Practice


1. D
2. B
3. B
4. C
5. C
6. 182
7. 80
8. Number of children = $250 - 150$
 $= 100$
 Ratio of adults : children = $150 : 100$
 $= 3 : 2$
9. Area of the figure = 4×3
 $= 12$ square units
 Ratio of the area of Square C to the total area of the figure = $1 : 12$
10. Area of the square = 8×8
 $= 64 \text{ cm}^2$
 Fraction of unshaded parts = $\frac{1}{4}$
 Area of the unshaded parts = $\frac{1}{4} \times 64$
 $= 16 \text{ cm}^2$
 The total area of the unshaded parts is 16 cm^2 .
11. The number of units representing Diane's beads should be the same.
 The lowest common multiple of 3 and 5 is 15.
 Ratio of Joyce's beads to Diane's beads = $2 : 3$
 $= 10 : 15$
 Ratio of Diane's beads to Elijah's beads = $5 : 4$
 $= 15 : 12$
 Ratio of Joyce's beads to Diane's beads to Elijah's beads = $10 : 15 : 12$
 2 units = 36
 1 unit = $36 \div 2 = 18$
 15 units = $15 \times 18 = 270$
 Diane has 270 beads.

12. Number of blue and yellow balls = $180 - 36$
 $= 144$
 $8 \text{ units} = 144$
 $1 \text{ unit} = 144 \div 8 = 18$
 $3 \text{ units} = 3 \times 18 = 54$
 $5 \text{ units} = 5 \times 18 = 90$
 Ratio of red balls to blue balls to yellow balls = $36 : 54 : 90$
 $= 2 : 3 : 5$
 The ratio of red balls to blue balls to yellow balls is $2 : 3 : 5$.
13. 2 units = $1,190 \div 2 = 595$
 7 units = $7 \times 595 = 4,165$
 Number of children who did not wear caps = $\frac{4}{5} \times 4,165$
 $= 3,332$
 3,332 children did not wear caps.
14. 12 units = 132
 1 unit = $132 \div 12 = 11$
 3 units = $3 \times 11 = 33$
 There are 33 small-sized T-shirts.
 9 units = $9 \times 11 = 99$
 Number of large-sized T-shirts = $\frac{5}{9} \times 99$
 $= 55$
 $55 - 33 = 22$
 There are 22 more small-sized T-shirts than large-sized T-shirts.
15.

pears

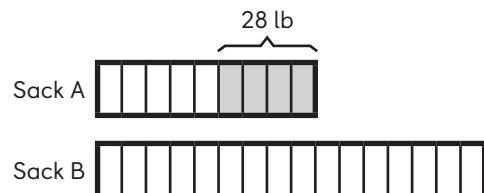


apples

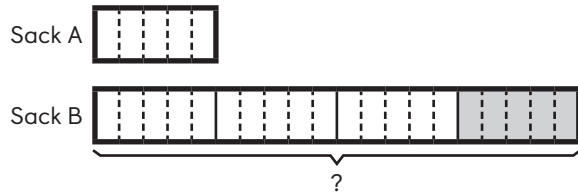


The shaded parts show the pears and apples sold.
 11 units = 143
 1 unit = $143 \div 11 = 13$
 17 units = $17 \times 13 = 221$
 221 pears and apples were left in all.
16. The total mass of rice (25 units) remains unchanged.

Before:



After:



$$4 \text{ units} = 28 \text{ lb}$$

$$1 \text{ unit} = 28 \div 4 = 7 \text{ lb}$$

$$20 \text{ units} = 20 \times 7 = 140 \text{ lb}$$

There were 140 pounds of rice in Sack B in the end.

Chapter 5 RATES AND CONSTANT SPEED

Exercise 5A Rates and Unit Rates (I)

- $30 \div 8 = 3.75$
The rate of water flowing out from the tap is 3.75 litres per minute.
- $735 \div 7 = 105$
The rate of printing is 105 copies per minute.
- $195 \div 15 = 13$
The car will travel 13 kilometers per liter.
- $216 \div 9 = 24$
The rate of the car is 24 miles per gallon of gas.
- $285 \div 3 = 95$
Mike can paint 95 square feet in 1 hour.
- 1 tank $\rightarrow 3 \times 4 = 12$ minutes
6 tanks $\rightarrow 12 \times 6 = 72$ minutes = 1 hour
12 minutes
It will take 1 hour 12 minutes to fill 6 similar tanks.
- (a) $432 \div 4 = 108$
The machine can print 108 pages per minute.
(b) $108 \times 60 = 6,480$
The machine can print 6,480 pages in 1 hour.
- (a) $60 \div 5 = 12$
 $12 \times 11 = 132$
The car will travel 132 km.
(b) $216 \div 12 = 18$ liters
The car used 18 liters of petrol.

Exercise 5A Rates and Unit Rates (2)

- $\$969.50 \div 7 = \138.50
The room rate is \$138.50 per day.
- $\$11.40 \div 3 = \3.80
He pays \$3.80 per hour.
- $\$132 \div 8 = \16.50
Shannon is paid \$16.50 per hour.
- $\$27 \times 12 = \324
12 kilograms of fish fillets would cost \$324.
- 1 pair: $\$11.20 \div 2 = \5.60
1 hour: $\$5.60 \div 2 = \2.80
Adman paid \$2.80 for a pair of rollerblades per hour.
- 2 adults: $\$13.80 \times 2 = \27.60
3 children: $(\$13.80 - \$8) \times 3 = \$17.40$
Total = $\$27.60 + \$17.40 = \$45$
They pay \$45.
- (a) Paul's stall: $\$2.15 \times 10 = \21.50 /kg
Sam's stall: $\$12 \times 2 = \24 /kg
Paul's stall sells the prawns at the cheapest price.
(b) $(\$24 - \$21.50) \times 2.5 = \$6.25$
Mrs. Behan will save \$6.25.

Exercise 5B Real-World Problems: Rates and Unit Rates (I)

- (a) $2 \times 12 = 24$ kilograms
The machine can dispense 24 kilograms of sugar in 1 minute.
(b) $24 \times 60 = 1,440$ kilograms
The machine can dispense 1,440 kilograms of sugar in 1 hour.
- 160 revolutions $\rightarrow 4$ minutes
1 revolution $\rightarrow \frac{4}{160} = \frac{1}{40}$ minutes
 $600 \text{ revolutions} \rightarrow = \frac{1}{40} \times 600 = 15$ minutes
It takes the wheel 15 minutes to make 600 revolutions.
- Cereal A: $\$4.20 \rightarrow 14$ ounces
 $\$1 \rightarrow \frac{14}{4.20} = 3.33$ ounces
Cereal B: $\$3.90 \rightarrow 12$ ounces
 $\$1 \rightarrow \frac{12}{3.90} = 3.08$ ounces
Because $3.33 > 3.08$, Cereal B is a better buy.

4. (a) Machine A: 1 minute $\rightarrow 48 \div 6 = 8$
Machine B: 1 minute $\rightarrow 96 \div 8 = 12$
 $12 - 8 = 4$
Machine B can transmit 4 more pages in 1 minute.
- (b) $12 \times 4 = 48$
Machine B can transmit 48 more pages than Machine A in 12 minutes.
5. (a) Jeff:
1 house $\rightarrow \frac{5}{6}$ days
48 houses $\rightarrow \frac{5}{6} \times 48 = 40$ days
Edgar:
1 house $\rightarrow \frac{3}{4}$ days
48 houses $\rightarrow \frac{3}{4} \times 48 = 36$ days
Edgar is the faster painter.
- (b) $40 - 36 = 4$ days fewer.

Exercise 5B Real-World Problems: Rates and Unit Rates (2)

I.

Number of Hours	Amount Earned
1	\$9.50
2	\$19.00
3	\$28.50
4	\$38.00
5	\$47.50

- (a) $\$9.50 \times 7 = \66.50
Samia will earn \$66.50 if she works 7 hours.
- (b) $76 \div 9.50 = 8$
Samia will have to work for 8 hours to earn \$76.
2. (a) 1 U.S. dollar $\rightarrow 0.882$ Euros
 $2,500 \text{ U.S. dollars} \rightarrow 2,500 \times 0.882 = 2,205 \text{ Euros}$
2,205 Euros can be exchanged for 2,500 U.S. dollars.
- (b) 1.39 Australian dollars $\rightarrow 0.752$ British pound
1 Australian dollar $\rightarrow \frac{0.752}{1.39}$ British pound
 $4,000 \text{ Australian dollars} \rightarrow \frac{0.752}{1.39} \times 4,000 = 2,164 \text{ British pounds}$
2,164 British pounds can be exchanged for 4,000 Australian dollars.

3.

Fruit	Amount Paid	Amount Purchased	Cost Per Pound
Grapefruit	\$11.70	15 lb	\$0.78
Rhubarb	\$14.97	3 lb	\$4.99
Cherry	\$11.98	2 lb	\$5.99

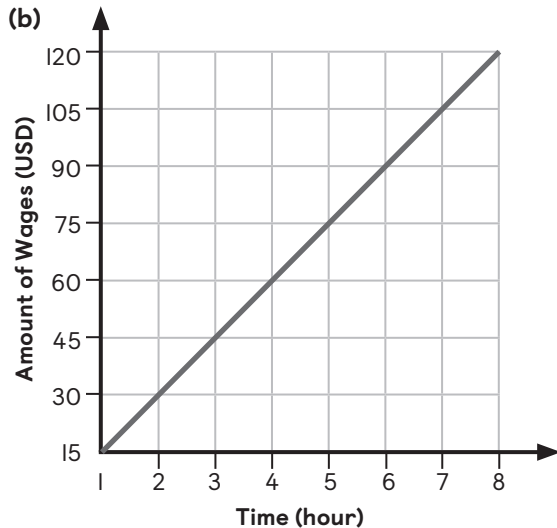
- (a) Cherry costs the most. It is \$5.99 per pound.
- (b) $\$5.99 - \$0.78 = \$5.21$
The price difference is \$5.21 per pound between cherry and grapefruit.
4. (a) $\$65 + \$35 \times 2 = \$135$
It costs \$135 to rent a car for 3 weekdays.
- (b) 1st day $\rightarrow \$65$
Next 4 days $\rightarrow \$35 \times 4 = \140
2 weekend days $\rightarrow \$45 \times 2 = \90
Total $= \$65 + \$140 + \$90 = \295
It costs \$295 to rent a car for an entire week.
- (c) $\$45 \times 7 - \$295 = \$20$
SHINE Car Rental Company charges \$315 per week while the local rental company charges \$295 per week. If Mr William wants to rent a car for one week, the local rental company is a better deal because it costs \$20 less.

Exercise 5B Real-World Problems: Rates and Unit Rates (3)

- I. (a) 140 Australian dollars
- (b) 1.40 Australian dollars
- (c) 50 U.S. dollars
- (d) $1.40 \times 30 = 42$ Australian dollars
2. (a) His maximum heart rate is 170.
- (b) Her advised heart rate should be less than 150.
- (c) His advised heart rate is between 190 to 195.
OR
His advised heart rate is less than 195.

3. (a)

Time (hour)	1	2	3	4	5	6	7	8
Amount of Wages (USD)	15	30	45	60	75	90	105	120

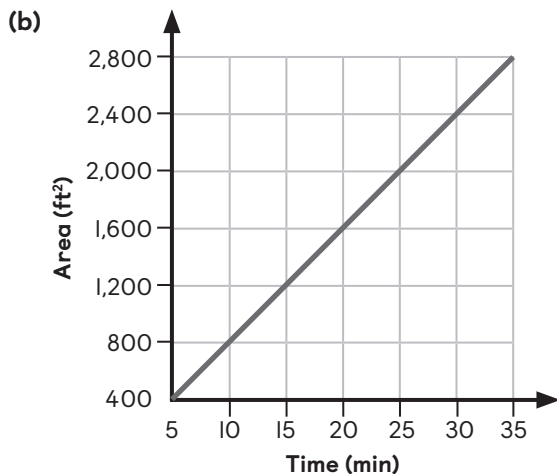


(c) From the graph, Jill will receive \$90.

(d) Jill works 8 hours on Saturday.

4. (a)

Time (min)	5	10	15	20	25	30	35
Area (ft ²)	400	800	1,200	1,600	2,000	2,400	2,800



(c) 5 minutes → 400 square feet
1 minute → $400 \div 5 = 80$ square feet

(d) $4,800 \div 80 = 60$
The worker takes 60 minutes to mow an area of 4,800 square feet.

Exercise 5C Distance, Time, and Speed (1)

1. $192 \div 3 = 64$
The average speed of the car is 64 kilometers per hour.

2. $232 \div 4 = 58$
The average speed of the coach is 58 miles per hour.

3. $12,000 \div 1,000 = 12$ kilometers
15 minutes = $\frac{1}{4}$ hour
 $12 \div \frac{1}{4} = 48$
Its average speed is 48 kilometers per hour.

4. $720 \div 1\frac{3}{5} = 450$
Her average speed is 450 meters per minute.

5. $165.744 \div 6 = 27.624$
The average speed of the ship is 27.624 miles per hour.
 $27.624 \div 1.151 = 24$
The average speed of the ship is 24 knots.

6. 25 minutes = $\frac{25}{60}$ hour = $\frac{5}{12}$ hour
35 minutes = $\frac{35}{60}$ hour = $\frac{7}{12}$ hour

The car's speed: $35 \div \frac{5}{12} = 84$ kilometers per hour

The truck's speed: $35 \div \frac{7}{12} = 60$ kilometers per hour

$84 - 60 = 24$

The car traveled faster. The car traveled 24 kilometers per hour faster than the truck.

Exercise 5C Distance, Time, and Speed (2)

1. Average speed = $108 \div 1\frac{1}{2} = 72$ km/h
Distance traveled in $2\frac{1}{2}$ hours = $72 \text{ km} \times 2\frac{1}{2} = 180 \text{ km}$
Karen travels 180 km in $2\frac{1}{2}$ hours.

2. (a) $40 \text{ min} = \frac{2}{3} \text{ h}$
 $48 \div \frac{2}{3} = 72$
His average speed is 72 kilometers per hour.

(b) $102 \div 72 = 1\frac{5}{12} \text{ h} = 1 \text{ h } 25 \text{ min}$
Anwar would take 1 hour 25 minutes.

3. $45 \text{ min} = \frac{3}{4} \text{ h}$
 Distance = $64 \times \frac{3}{4} = 48 \text{ km}$
 Return home speed = $64 + 16 = 80 \text{ km/h}$
 Time = $48 \div 80 = \frac{3}{5} \text{ h} = 36 \text{ min}$
 36 minutes after 4:20 p.m. was 4:56 p.m.
 She reached home at 4:56 p.m.

4. Running distance $\rightarrow 8 \times \frac{3}{4} = 6 \text{ km}$
 Cycling distance $\rightarrow 7 \times 2 = 14 \text{ km}$
 Total distance $\rightarrow 6 + 14 = 20 \text{ km}$
 Alan travels 20 kilometers.

5. $90 \times 2 = 180$
 $72 \times \frac{1}{2} = 36$
 Total distance = $180 + 36 = 216$
 The train travels 216 miles.

6. $2.5 \text{ km} = 2,500 \text{ m}$
 Time taken by Ethan = $2,500 \div 50 = 50 \text{ min}$
 Distance ran by Jamal in 50 min
 $= 2,500 - 400 = 2,100 \text{ m}$
 Jamal's speed = $2,100 \div 50 = 42 \text{ m/min}$
 Jamal's speed is 42 meters per minute.

Exercise 5D Real-World Problems: Distance, Time, and Speed

1. $6 \times 1\frac{1}{2} = 9$
 $12 - 9 = 3$
 $3 \div 4 = \frac{3}{4} \text{ hour} = 45 \text{ minutes}$
 Leon took 45 minutes for the remaining part of the journey.
2. Distance traveled in 1st 2 hours $\rightarrow 60 \times 2$
 $= 120 \text{ miles}$
 $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$ of the total distance
 $\frac{3}{4}$ of the distance = 120 miles
 Total distance = $120 \div \frac{3}{4} = 160 \text{ miles}$
 Average speed $\rightarrow 160 \div 3 = 53\frac{1}{3} \text{ miles per hour}$
 His average speed was $53\frac{1}{3}$ miles per hour for the whole journey.

3. (a) $48 \times 12 = 576$
 The distance between their house and school is 576 meters.
- (b) $576 \div 64 = 9$
 Diane takes 9 minutes to walk to school.

4. $\frac{2}{5}$ of the journey $\rightarrow 30 \text{ km}$
 $\frac{3}{5}$ of the journey $\rightarrow \frac{30}{2} \times 3 = 45 \text{ km}$
 Total distance = $30 + 45 = 75 \text{ km}$
 Total time = $45 \div 60 + 30 \div (60 - 20) = 1\frac{1}{2} \text{ h}$
 Average speed = $75 \div 1\frac{1}{2} = 50 \text{ km/h}$
 His average speed for the whole journey was 50 kilometers per hour.

5. (a) Distance by Lester in $1\frac{1}{2} \text{ h} = 8 \times 1\frac{1}{2} + 3$
 $= 15 \text{ km}$
 Lester's speed = $15 \div 1\frac{1}{2} = 10 \text{ km/h}$
 Lester's average speed was 10 km/h.
- (b) Distance by Eric in 45 min = $8 \times \frac{3}{4} = 6 \text{ km}$
 Time taken by Lester at point of overtake = $6 \div 10 = \frac{3}{5} \text{ h} = 36 \text{ min}$
 36 min before 4:45 p.m. was 4:09 p.m.
 Lester started jogging from home at 4:09 p.m.

6. (a) $500 \times 2 = 1,000 \text{ m}$
 David traveled 1,000 meters further than Edmund.
- (b) Difference in speed = $150 - 100 = 50 \text{ m/h}$
 Time taken = $1,000 \div 50 = 20 \text{ min}$
 They took 20 minutes to cycle from their house to the library.
7. (a) $(4 \times 2) \div (36 - 32) = 2 \text{ h}$
 They took 2 hours to meet each other.
- (b) $36 \times 2 - 4 = 68 \text{ km}$
 North Point is 68 kilometers from the halfway mark.

Chapter Practice

1. B
2. A
3. C
4. $48 \times 2\frac{1}{2} = 120$ miles
5. $91 \div 14 = 6.5$ liters per minute
6. $15 \text{ s} = \frac{15}{60} \text{ min} = \frac{1}{4} \text{ min}$
 $500 \div 5\frac{1}{4} = 95 \text{ yd/min}$
His swimming speed is 95 yards per minute.
7. $\$180 \times 2 + \$115 \times 3 = \$705$
The total rental fee is \$705.
8. Distance = $400 \times 17 = 6,800 \text{ m}$
Number of rounds = $6,800 \div 850 = 8$ rounds
Agnes completed 8 rounds.
9. (a) Kenneth: $27 \div 9 = 3 \text{ ft/min}$
Mahesh: $14 \div 4 = 3.5 \text{ ft/min}$

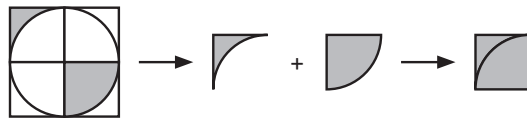
(b) Mahesh painted more. Mahesh painted 0.5 feet more in 1 minute.
10. $15 \times 1,000 = 15,000 \text{ mL}$
 $1 \text{ min} \rightarrow 140 + 100 = 240 \text{ mL}$
 $\frac{15,000}{240} = 62.5 \text{ min}$
It took 62.5 minutes to fill the water tank completely.
11. $4.8 \times 1,000 = 4,800 \text{ mL}$
Water flowing out of the tank in 1 min \rightarrow
 $270 - 150 = 120 \text{ mL}$
 $4,800 \div 120 = 40 \text{ min}$
It will take 40 minutes to empty the tank.
12. 1 weekday $\rightarrow \$15 \times 5 = \75
1 weekend $\rightarrow \$18 \times 5 = \90
1 week $\rightarrow \$75 \times 5 + \$90 = \$465$
4 weeks $\rightarrow \$465 \times 4 = \$1,860$
She gets \$1,860.
13. (a) Distance traveled by the two vehicles in
1 hour = $48 + 60 = 108$ kilometers
Time taken = $216 \div 108 = 2$ hours
2 hours from 11:50 a.m. is 1:50 p.m.
The two vehicles will meet at 1:50 p.m.

(b) $48 \times 2 = 96$
The van would have traveled
96 kilometers when they meet.

Chapter 6 PERCENT

Exercise 6A Percent, Fractions and Decimals (1)

1. (a) 25%, 75% (b) 68%, 32%
2. (a) 36% (b) 28%
(c) 45% (d) 72%
(e) 84% (f) 96%
(g) 7% (h) 53%
(i) 87% (j) 100%
3. $\frac{48}{100} = 48\%$
48% of the cookies are chocolate chip cookies.
4. (a) $\frac{38}{100} = 38\%$
38% of the fruits are mangoes.
(b) $100\% - 38\% = 62\%$
62% of the fruits are peaches.
5. I can divide this figure into 4 equal parts.
Each part has 4 smaller squares, one quarter circle and a smaller shaded piece.



Hence, 4 out of 16 smaller squares are shaded.

$$\text{Shaded area} = \frac{4}{16} = \frac{1}{4} = \frac{25}{100} = 25\%$$

$$100\% - 25\% = 75\%$$

75% of the figure is unshaded.

Exercise 6A Percent, Fractions and Decimals (2)

1. (a) $\frac{33}{100}$ (b) $\frac{41}{100}$
(c) $\frac{55}{100} = \frac{11}{20}$ (d) $\frac{96}{100} = \frac{24}{25}$
(e) $\frac{6}{25}$ (f) $\frac{9}{20}$
(g) $\frac{37}{50}$ (h) $\frac{9}{25}$
(i) $\frac{1}{2}$ (j) $\frac{2}{5}$

2. (a) 50% (b) 25%
 (c) 75% (d) 60%
 (e) 64% (f) 35%
 (g) 80% (h) 90%
 (i) 74% (j) 48%

3. $\frac{96}{400} = \frac{24}{100} = 24\%$

24% of the vehicles that passed the intersection were buses.

4. Boys: $200 - 90 = 110$

$\frac{110}{200} = \frac{55}{100} = 55\%$

55% of the students are boys.

5. Correct = $30 - 12 = 18$

$\frac{18}{30} = \frac{6}{10} = \frac{60}{100} = 60\%$

He answered 60% of the questions correctly.

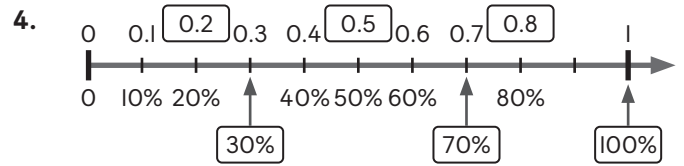
6. Total = $12 + 20 + 8 = 40$

$\frac{12}{40} = \frac{3}{10} = \frac{30}{100} = 30\%$

30% of the muffins are blueberry muffins.

Exercise 6A Percent, Fractions and Decimals (3)

1. (a) 0.25, 25% (b) 0.68, 68%
 2. (a) 50% (b) 25%
 (c) 75% (d) 6%
 (e) 8% (f) 56%
 (g) 90% (h) 7.3%
 (i) 175% (j) 255%
 3. (a) 0.05 (b) 0.08
 (c) 0.09 (d) 0.02
 (e) 0.76 (f) 0.95
 (g) 0.32 (h) 0.85
 (i) 1.05 (j) 1.8



5.

Percent	Fraction (in simplest form)	Decimal
18%	$\frac{9}{50}$	0.18
45%	$\frac{9}{20}$	0.45
72%	$\frac{18}{25}$	0.72
80%	$\frac{4}{5}$	0.8

6. $\frac{2}{5} = 40\%$

$100\% - 40\% = 60\%$

60% of the pupils in the hall are boys.

7. Total amount = $5.75 \text{ kg} + 4.25 \text{ kg} = 10 \text{ kg}$

$\frac{5.75}{10} = \frac{57.5}{100} = 57.5\%$

57.5% of the mixture is brown rice.

8. Total amount = $3.5 + 6.5 = 10 \text{ liters}$

$\frac{6.5}{10} = \frac{65}{100} = 65\%$

65% of the mixture is apple juice.

Exercise 6A Percent, Fractions and Decimals (4)

1. (a) 46% (b) 85%
 (c) 25% (d) 64%
 (e) 72.5% (f) 37.5%
 (g) 30% (h) 15%
 2. (a) $\frac{24}{60} \times 100\% = 40\%$
 (b) $\frac{64}{80} \times 100\% = 80\%$
 (c) $\frac{6}{30} \times 100\% = 20\%$
 (d) $\frac{135}{300} \times 100\% = 45\%$

3. $\frac{84}{100} = 84\%$
 $100\% - 84\% = 16\%$
 16% of the questions were not answered by Jerry.
4. (a) $\frac{56}{100} = 56\%$
 56% of the colored papers are yellow.
- (b) $100\% - 56\% = 44\%$
 44% of the colored papers are green.
5. $\frac{45}{300} = \frac{15}{100} = 15\%$
 15% of the animals in the zoo are birds.
6. Total = $24 + 40 + 28 + 52 + 56 = 200$
 $\frac{56}{200} = \frac{28}{100} = 28\%$
 28% of the total books sold were sold on Friday.

Exercise 6B Real-World Problems: Percent (I)

1. (a) 60% (b) 45%
- (c) 40% (d) $62\frac{1}{2}\%$ OR 62.5%
- (e) $41\frac{2}{3}\%$ (f) 30%
- (g) 75% (h) $52\frac{7}{9}\%$
2. (a) $\frac{4}{12} \times 100\% = 33\frac{1}{3}\%$
- (b) $\frac{3}{12} \times 100\% = 25\%$
- (c) $\frac{14}{24} \times 100\% = 58\frac{1}{3}\%$
- (d) $\frac{8}{12} \times 100\% = 66\frac{2}{3}\%$
3. $75\% = \frac{3}{4}$
 $\frac{3}{4} \times 24 = 18$
 $18 - 4 = 14$
 14 more rectangles must be shaded to show 75%.
4. $300 - 240 = 60$
 $\frac{60}{300} = 20\%$
 20% of the participants did not submit their drawings.
5. (a) Total number of fruit
 $= 30 + 15 + 40 + 25 + 10 = 120$
 $\frac{30}{120} \times 100\% = 25\%$
 25% of the students surveyed prefer apples.
- (b) Least favorite fruit: peaches
 $\frac{10}{120} \times 100\% = 8\frac{1}{3}\%$
 $8\frac{1}{3}\%$ of the students surveyed prefer the least favorite fruit.
- (c) $\frac{40 + 25}{120} \times 100\% = 54\frac{1}{6}\%$
 $54\frac{1}{6}\%$ of the students surveyed prefer strawberries or pears.

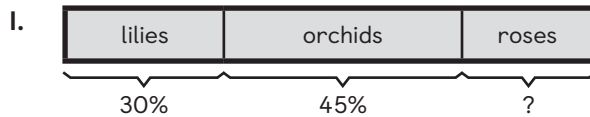
Exercise 6B Real-World Problems: Percent (2)

1. $325 - 208 = 117$
 $\frac{117}{325} \times 100\% = 36\%$
 36% of the children at the zoo are girls.
2. $240 \times 20\% = 48$
 $240 - 48 - 108 = 84$
 $\frac{84}{240} \times 100\% = 35\%$
 35% of the sandwiches are egg salad sandwiches.
3. $820 \times 50\% = 410$
 $820 - 410 - 287 = 123$
 $\frac{123}{820} \times 100\% = 15\%$
 15% of the students come by car.
4. $160 - 48 = 112$
 Number of pears = $112 \times 25\% = 28$
 Number of oranges = $112 - 28 = 84$
 $\frac{84}{160} \times 100\% = 52.5\%$
 52.5% of the fruit in the box are oranges.
5. $\$450 \times 30\% = \135 (dress)
 $\$450 - \$135 = \$315$ (remainder)
 $\$315 \times 40\% = \126 (shoes)
 $\$315 - \$126 = \$189$
 $\frac{189}{450} \times 100\% = 42\%$
 42% of her savings is left.

6. Number of students = $400 \times 85\% = 340$
 Number of teachers = $400 - 340 = 60$
 Number of female teachers = $60 - 24 = 36$
 $\frac{36}{400} \times 100\% = 9\%$
 9% of the people at the carnival are female teachers.

7. 4 identical right triangles are formed into 2 identical squares.
 Area of each shaded square = $200 \div 2 = 100$
 Side of each shaded square = $\sqrt{100} = 10$
 Side of unshaded square = $10 - 5 = 5$
 Area of unshaded square = $5 \times 5 = 25$
 $\frac{25}{200 + 25} \times 100\% = 11\frac{1}{9}\%$
 $11\frac{1}{9}\%$ of the figure is unshaded.

Exercise 6B Real-World Problems: Percent (3)



$$100\% - 30\% - 45\% = 25\%$$

$$25\% \times 480 = 120$$

There are 120 roses in the shop.

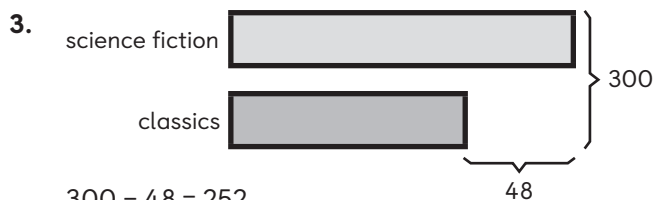


$$\$1.80 \times 19.25 \text{ liters} = \$34.65$$

$$\text{Total amount: } \$34.65 + \$55.35 = \$90$$

$$\frac{34.65}{90} \times 100\% = 38.5\%$$

38.5% of the total spending is spent on gasoline.



$$300 - 48 = 252$$

$$252 \div 2 = 126$$

$$\frac{126}{300} = 42\%$$

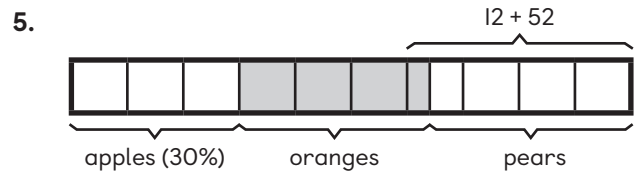
42% of the books are classics books.

4. $\frac{30}{100} \times \$250 = \75 (discount)
 $\$250 - \$75 = \$175$

OR

$$\frac{70}{100} \times \$250 = \$175$$

The sale price of the digital camera is \$175.



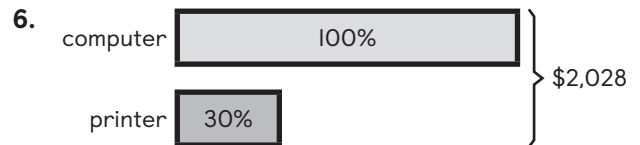
$$40\% \text{ of the fruits} = 12 + 52 = 64$$

$$10\% \text{ of the fruits} = 64 \div 4 = 16$$

$$30\% \text{ of the fruits} = 16 \times 3 = 48$$

$$48 + 12 = 60$$

There are 60 oranges in the box.



$$130\% \text{ of the amount} \rightarrow \$2,028$$

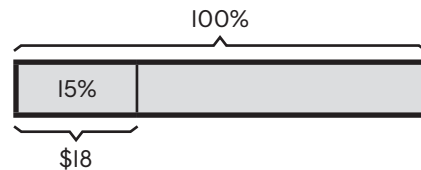
$$100\% \text{ of the amount} \rightarrow \frac{2,028}{130} \times 100 = 1,560$$

The computer costs \$1,560.

Exercise 6B Real-World Problems: Percent (4)

1. 60% of the balls $\rightarrow 720$
 10% of the balls $\rightarrow 720 \div 6 = 120$
 100% of the balls $\rightarrow 120 \times 10 = 1,200$
 There are 1,200 balls in the ball pit.

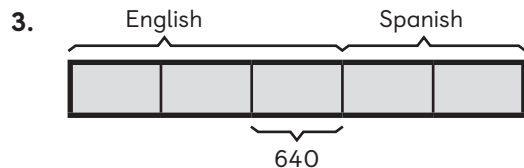
2. Savings per month $\rightarrow 216 \div 12 = \18



$$15\% \text{ of his allowance} \rightarrow \$18$$

$$100\% \text{ of his allowance} \rightarrow \frac{18}{15} \times 100 = \$120$$

His monthly allowance is \$120.



20% of the books $\rightarrow 640$

10% of the books $\rightarrow 640 \div 2 = 320$

100% of the books $\rightarrow 320 \times 10 = 3,200$

There are 3,200 books in the library.

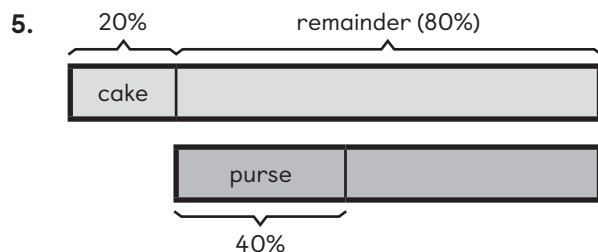
4. $100\% - 62\% = 38\%$

38% of the pages $\rightarrow 114$

1% of the pages $\rightarrow 114 \div 38 = 3$

62% of the pages $\rightarrow 3 \times 62 = 186$

186 pages in the books have pictures.



Purse $\rightarrow \frac{40}{100} \times 80\% = 32\%$

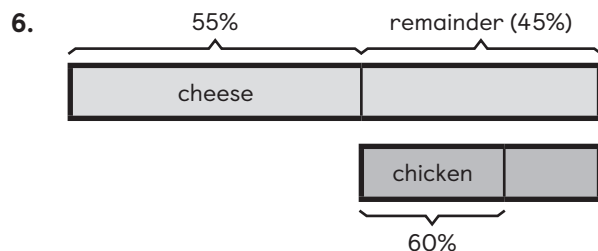
Difference $\rightarrow 32\% - 20\% = 12\%$

12% of her savings $\rightarrow \$48$

1% of her savings $\rightarrow \$48 \div 12 = \4

100% of her savings $\rightarrow \$4 \times 100 = \400

Stacey's savings are \$400.



$\frac{60}{100} \times 45\% = 27\%$

27% of sandwiches $\rightarrow 81$

1% of sandwiches $\rightarrow 81 \div 27 = 3$

100% of sandwiches $\rightarrow 3 \times 100 = 300$

300 sandwiches were made altogether.

Chapter Practice

I. C

2. A

3. C

4. A

5. (a) 87.5% (b) 54%

6. (a) $\frac{19}{25}$ (b) $\frac{7}{20}$

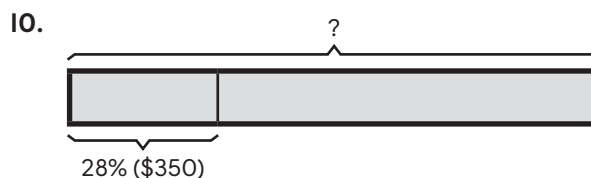
7. $\frac{4}{6} \times 100\% = 66\frac{2}{3}\%$

8. (a) $\frac{35}{100} \times 125 \text{ mi} = 43.75 \text{ mi}$

(b) $\frac{65}{100} \times 180 \text{ lb} = 117 \text{ lb}$

9. (a) 18% $\rightarrow 99$
 1% $\rightarrow \frac{99}{18}$
 100% $\rightarrow \frac{99}{18} \times 100 = 550$

(b) 47% $\rightarrow 141$
 1% $\rightarrow \frac{141}{47}$
 100% $\rightarrow \frac{141}{47} \times 100 = 300$



28% of his savings $\rightarrow \$350$

1% of his savings $\rightarrow \$350 \div 28 = \12.50

100% of his savings $\rightarrow 12.50 \times 100 = \$1,250$

Keith's savings is \$1,250.

II. Number of girls at first $= 350 \times 20\% = 70$

Number of girls now $= 70 + 50 = 120$

Total $= 350 + 50 = 400$

$\frac{120}{400} \times 100\% = 30\%$

30% of the students are girls now.

12. $20\% = \frac{1}{5}$



11 units $\rightarrow 84 - 18 = 66$

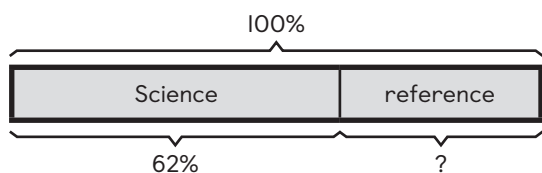
1 unit $\rightarrow 66 \div 11 = 6$

5 units $\rightarrow 6 \times 5 = 30$

$30 + 18 = 48$

Ms. Smith bakes 48 cupcakes.

13.



$100\% - 62\% = 38\%$

$62\% - 38\% = 24\%$

24% of the books $\rightarrow 120$

1% of the books $\rightarrow 120 \div 24 = 5$

38% of the books $\rightarrow 5 \times 38 = 190$

There are 190 reference books on the bookshelf.

14. (a) Number of girls $= 55\% \times 1,800 = 990$

$30\% \times 990 = 297$

297 girls take the bus to school.

(b) Number of boys $= 1,800 - 990 = 810$

$70\% \times 810 = 567$

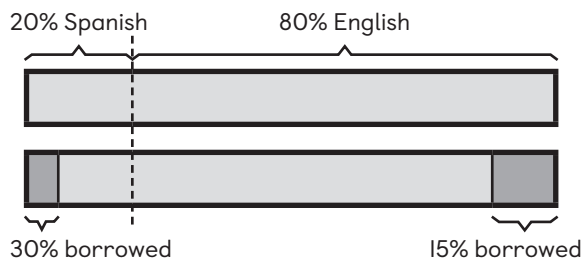
567 boys take the bus to school.

(c) $297 + 567 = 864$

$\frac{864}{1,800} \times 100\% = 48\%$

48% of the students take the bus to school.

15. (a)



Spanish $\rightarrow \frac{30}{100} \times 20\% = 6\%$

English $\rightarrow \frac{15}{100} \times 80\% = 12\%$

Total percent of books borrowed
 $= 6\% + 12\% = 18\%$

(b) $100\% - 18\% = 82\%$

82% of the library books $\rightarrow 1,312$

1% of the library books $\rightarrow 1,312 \div 82 = 16$

100% of the library books $\rightarrow 16 \times 100$
 $= 1,600$

1,600 books were in the library at first.