Chapter 8
PERCENTAGE

EXERCISE 8A

1 There are $10 \times 10 = 100$ squares on each diagram, so each filled square represents one per cent.

a 20 squares are shaded.
So, $\frac{20}{100} = 20\%$.

b 35 squares are shaded.
So, $\frac{35}{100} = 35\%$.

c 53 squares are shaded.
So, $\frac{53}{100} = 53\%$.

d 4 squares are empty, so 96 squares are shaded.
So, $\frac{96}{100} = 96\%$.

2 **a** $\frac{17}{100} = 17\%$ **b** $\frac{38}{100} = 38\%$ **c** $\frac{90}{100} = 90\%$ **d** $\frac{125}{100} = 125\%$ **e** $\frac{1}{100} = 1\%$

3 **a**
$$\frac{30}{50} = \frac{30 \times 2}{50 \times 2} = \frac{60}{100} = 60\%$$

b
$$\frac{9}{25} = \frac{9 \times 4}{25 \times 4} = \frac{36}{100} = 36\%$$

c
$$\frac{6}{10} = \frac{6 \times 10}{10 \times 10} = \frac{60}{100} = 60\%$$

d
$$\frac{11}{20} = \frac{11 \times 5}{20 \times 5} = \frac{55}{100} = 55\%$$

e
$$\frac{1}{2} = \frac{1 \times 50}{2 \times 50} = \frac{50}{100} = 50\%$$

f
$$\frac{1}{5} = \frac{1 \times 20}{5 \times 20} = \frac{20}{100} = 20\%$$

g
$$0.26 = \frac{26}{100} = 26\%$$

h
$$0.91 = \frac{91}{100} = 91\%$$

i
$$0.4 = \frac{4 \times 10}{10 \times 10} = \frac{40}{100} = 40\%$$

j
$$0.8 = \frac{8 \times 10}{10 \times 10} = \frac{80}{100} = 80\%$$

k
$$2 = \frac{2 \times 100}{1 \times 100} = \frac{200}{100} = 200\%$$

l
$$1.6 = \frac{16 \times 10}{10 \times 10} = \frac{160}{100} = 160\%$$

m
$$\frac{1}{4} = \frac{1 \times 25}{4 \times 25} = \frac{25}{100} = 25\%$$

n
$$4\frac{1}{2} = \frac{9}{2} = \frac{9 \times 50}{2 \times 50} = \frac{450}{100} = 450\%$$

o
$$3.75 = \frac{375}{100} = 375\%$$

4 The progress bar has 20 segments.
In increasing order, the number of filled segments is: **C** 1.4, **D** 8, **B** 10, **A** 19
The percentages in increasing order are 7%, 40%, 50%, 95%.
So, **C** is 7%, **D** is 40%, **B** is 50%, and **A** is 95%.

a 50% complete is **B**. **b** 7% complete is **C**. **c** 40% complete is **D**. **d** 95% complete is **A**.

5 In increasing order, the volume of shampoo in each bottle is: Katie, Toby, Patrick, Lily.
The percentages in increasing order are 5%, 20%, 75%, 90%.

a 75% full is Patrick's **b** 20% full is Toby's **c** 5% full is Katie's **d** 90% full is Lily's

EXERCISE 8B.1

1 **a** $\frac{83}{100}$
$= \frac{83}{100} \times 100\%$
$= 83\%$

b $\frac{1}{2}$
$= \frac{1}{2} \times 100\%$
$= \frac{100}{2}\%$
$= 50\%$

c $\frac{3}{4}$
$= \frac{3}{4} \times 100\%$
$= \frac{300}{4}\%$
$= 75\%$

d $\frac{13}{25}$
$= \frac{13}{25} \times 100\%$
$= \frac{1300}{25}\%$
$= 52\%$

e $1\frac{2}{5}$
$= \frac{7}{5}$
$= \frac{7}{5} \times 100\%$
$= \frac{700}{5}\%$
$= 140\%$

f $\frac{3}{10}$
$= \frac{3}{10} \times 100\%$
$= \frac{300}{10}\%$
$= 30\%$

g $\frac{9}{50}$
$= \frac{9}{50} \times 100\%$
$= \frac{900}{50}\%$
$= 18\%$

h $\frac{3}{200}$
$= \frac{3}{200} \times 100\%$
$= \frac{300}{200}\%$
$= 1.5\%$

i $\frac{1}{6}$
$= \frac{1}{6} \times 100\%$
$= \frac{100}{6}\%$
$= 16\frac{2}{3}\%$

j $2\frac{1}{3}$
$= \frac{7}{3}$
$= \frac{7}{3} \times 100\%$
$= \frac{700}{3}\%$
$= 233\frac{1}{3}\%$

2 **a** 0.5
$= 0.\overset{\frown}{50} \times 100\%$
$= 50\%$

b 0.25
$= 0.\overset{\frown}{25} \times 100\%$
$= 25\%$

c 3.4
$= 3.\overset{\frown}{40} \times 100\%$
$= 340\%$

d 2.75
$= 2.\overset{\frown}{75} \times 100\%$
$= 275\%$

e 0.6
$= 0.\overset{\frown}{60} \times 100\%$
$= 60\%$

f 5
$= 5.\overset{\frown}{00} \times 100\%$
$= 500\%$

g 0.023
$= 0.\overset{\frown}{023} \times 100\%$
$= 2.3\%$

h 0.0041
$= 0.\overset{\frown}{0041} \times 100\%$
$= 0.41\%$

i $0.\overset{\frown}{978}$
$= 0.978 \times 100\%$
$= 97.8\%$

j $1.\overset{\frown}{04}$
$= 1.04 \times 100\%$
$= 104\%$

k $1.8\overset{\frown}{75}$
$= 1.875 \times 100\%$
$= 187.5\%$

l $0.\overset{\frown}{1625}$
$= 0.1625 \times 100\%$
$= 16.25\%$

EXERCISE 8B.2

1 **a** 75%
$= \frac{75}{100}$
$= \frac{75 \div 25}{100 \div 25}$
$= \frac{3}{4}$

b 1%
$= \frac{1}{100}$

c 15%
$= \frac{15}{100}$
$= \frac{15 \div 5}{100 \div 5}$
$= \frac{3}{20}$

d 20%
$= \frac{20}{100}$
$= \frac{20 \div 20}{100 \div 20}$
$= \frac{1}{5}$

e $100\% = \frac{100}{100} = 1$

f $55\% = \frac{55}{100} = \frac{55 \div 5}{100 \div 5} = \frac{11}{20}$

g $150\% = \frac{150}{100} = \frac{150 \div 50}{100 \div 50} = \frac{3}{2}$

h $8\% = \frac{8}{100} = \frac{8 \div 4}{100 \div 4} = \frac{2}{25}$

i $700\% = \frac{700}{100} = 7$

j $62\% = \frac{62}{100} = \frac{62 \div 2}{100 \div 2} = \frac{31}{50}$

k $245\% = \frac{245}{100} = \frac{245 \div 5}{100 \div 5} = \frac{49}{20}$

l $88\% = \frac{88}{100} = \frac{88 \div 4}{100 \div 4} = \frac{22}{25}$

2 **a** $\frac{1}{2}\% = \frac{1}{2} \div 100 = \frac{1}{2} \times \frac{1}{100} = \frac{1}{200}$

b $66\frac{2}{3}\% = \frac{200}{3}\% = \frac{200}{3} \div 100 = \frac{\overset{2}{\cancel{200}}}{3} \times \frac{1}{\underset{1}{\cancel{100}}} = \frac{2}{3}$

c $5\frac{1}{4}\% = \frac{21}{4}\% = \frac{21}{4} \div 100 = \frac{21}{4} \times \frac{1}{100} = \frac{21}{400}$

d $9\frac{2}{5}\% = \frac{47}{5}\% = \frac{47}{5} \div 100 = \frac{47}{5} \times \frac{1}{100} = \frac{47}{500}$

e $\frac{1}{8}\% = \frac{1}{8} \div 100 = \frac{1}{8} \times \frac{1}{100} = \frac{1}{800}$

f $2\frac{9}{10}\% = \frac{29}{10}\% = \frac{29}{10} \div 100 = \frac{29}{10} \times \frac{1}{100} = \frac{29}{1000}$

g $12\frac{1}{2}\% = \frac{25}{2}\% = \frac{25}{2} \div 100 = \frac{\overset{1}{\cancel{25}}}{2} \times \frac{1}{\underset{4}{\cancel{100}}} = \frac{1}{8}$

h $3\frac{1}{8}\% = \frac{25}{8}\% = \frac{25}{8} \div 100 = \frac{\overset{1}{\cancel{25}}}{8} \times \frac{1}{\underset{4}{\cancel{100}}} = \frac{1}{32}$

3 **a** $60\% = \frac{60}{100} = 0.6$

b $89\% = \frac{89}{100} = 0.89$

c $18\% = \frac{18}{100} = 0.18$

d $8\% = \frac{8}{100} = 0.08$

e $49.5\% = \frac{\overset{\frown}{49.5}}{100} = 0.495$

f $125\% = \frac{\overset{\frown}{125}}{100} = 1.25$

g $200\% = \frac{200}{100} = 2$

h $38.01\% = \frac{38.01}{100} = 0.3801$

i $37.5\% = \frac{\overset{\frown}{37.5}}{100} = 0.375$

j $0.002\% = \frac{\overset{\frown}{00.002}}{100} = 0.000\,02$

k $129.8\% = \frac{\overset{\frown}{129.8}}{100} = 1.298$

l $77.7\% = \frac{\overset{\frown}{77.7}}{100} = 0.777$

4 $33\frac{1}{3}\% = \frac{100}{3} \div 100$
$= \frac{100}{3} \times \frac{1}{100}$
$= \frac{1}{3}$

$66\frac{2}{3}\% = \frac{200}{3} \div 100$
$= \frac{\overset{2}{\cancel{200}}}{3} \times \frac{1}{\underset{1}{\cancel{100}}}$
$= \frac{2}{3}$

$12\frac{1}{2}\% = \frac{25}{2} \div 100$
$= \frac{\overset{1}{\cancel{25}}}{2} \times \frac{1}{\underset{4}{\cancel{100}}}$
$= \frac{1}{8}$

Percentage	*Fraction*	*Decimal*
100%	1	1
75%	$\frac{3}{4}$	0.75
50%	$\frac{1}{2}$	0.5
25%	$\frac{1}{4}$	0.25
20%	$\frac{1}{5}$	0.2

Percentage	*Fraction*	*Decimal*	
10%	$\frac{1}{10}$	0.1	
5%	$\frac{1}{20}$	0.05	
$33\frac{1}{3}\%$	$\frac{1}{3}$	0.333	← This can be written as $0.\overline{3}$ We say 0.3 recurring.
$66\frac{2}{3}\%$	$\frac{2}{3}$	0.666	← This can be written as $0.\overline{6}$ We say 0.6 recurring.
$12\frac{1}{2}\%$	$\frac{1}{8}$	0.125	

5 **a** There are 16 sections and 6 have lettuces.
$\therefore \quad \frac{6}{16} = \frac{6 \div 2}{16 \div 2} = \frac{3}{8}$ of the plot has lettuces.

b 4 sections have carrots.
$\therefore \quad \frac{4}{16} = \frac{4 \div 4}{16 \div 4} = \frac{1}{4}$ of the plot has carrots.
$\therefore \quad \frac{1}{4} \times 100\% = 25\%$ has carrots.

c 10 sections do *not* have beetroot.
$\therefore \quad \frac{10}{16} = \frac{10 \div 2}{16 \div 2} = \frac{5}{8}$ of the plot does not have beetroot.
$\therefore \quad \frac{5}{8} \times 100\% = \frac{500}{8}\%$
$= 62.5\%$ does *not* have beetroot.

6 **a** There are 80 seats and 50 are occupied.
$\therefore \quad \frac{50}{80} = \frac{5}{8}$ of the seats are occupied.

b $\frac{5}{8} \times 100\%$
$= \frac{500}{8}\%$
$= 62.5\%$ of the seats are occupied.

c If 62.5% of the seats are occupied, then $100\% - 62.5\% = 37.5\%$ of the seats are unoccupied.

EXERCISE 8C

1 **a** $\frac{\$3}{\$6}$
$= \frac{\overset{1}{\cancel{3}}}{\underset{2}{\cancel{6}}} \times \overset{50}{\cancel{100}}\%$
$= 50\%$

b $\frac{4 \text{ km}}{10 \text{ km}}$
$= \frac{4}{\underset{1}{\cancel{10}}} \times \overset{10}{\cancel{100}}\%$
$= 40\%$

c $\frac{6 \text{ m}}{8 \text{ m}}$
$= \frac{\overset{3}{\cancel{6}}}{\underset{4}{\cancel{8}}} \times \overset{25}{\cancel{100}}\%$
$= 75\%$

d $\frac{36 \text{ minutes}}{40 \text{ minutes}}$
$= \frac{\overset{9}{\cancel{36}}}{\underset{10}{\cancel{40}}} \times \overset{10}{\cancel{100}}\%$
$= 90\%$

e
$$\frac{250\text{ kg}}{200\text{ kg}} = \frac{\overset{125}{\cancel{250}}}{\underset{2}{\cancel{200}}} \times \overset{1}{\cancel{100}}\% = 125\%$$

f
$$\frac{75\text{ mL}}{375\text{ mL}} = \frac{\overset{1}{\cancel{75}}}{\underset{5}{\cancel{375}}} \times \overset{20}{\cancel{100}}\% = 20\%$$

g
$$\frac{24\text{ minutes}}{1\text{ hour}} = \frac{24\text{ minutes}}{60\text{ minutes}} = \frac{\overset{2}{\cancel{24}}}{\underset{5}{\cancel{60}}} \times \overset{20}{\cancel{100}}\% = 40\%$$

h
$$\frac{450\text{ g}}{1\text{ kg}} = \frac{450\text{ g}}{1000\text{ g}} = \frac{\overset{45}{\cancel{450}}}{\underset{10}{\cancel{1000}}} \times \overset{1}{\cancel{100}}\% = 45\%$$

i
$$\frac{800\text{ m}}{2\text{ km}} = \frac{800\text{ m}}{2000\text{ m}} = \frac{\overset{2}{\cancel{800}}}{\underset{5}{\cancel{2000}}} \times \overset{20}{\cancel{100}}\% = 40\%$$

j
$$\frac{3\text{ months}}{1\text{ year}} = \frac{3\text{ months}}{12\text{ months}} = \frac{\overset{1}{\cancel{3}}}{\underset{4}{\cancel{12}}} \times \overset{25}{\cancel{100}}\% = 25\%$$

k
$$\frac{0.5\text{ m}}{25\text{ cm}} = \frac{50\text{ cm}}{25\text{ cm}} = \frac{\overset{2}{\cancel{50}}}{\underset{1}{\cancel{25}}} \times 100\% = 200\%$$

l
$$\frac{4\text{ L}}{800\text{ mL}} = \frac{4000\text{ mL}}{800\text{ mL}} = \frac{\overset{5}{\cancel{4000}}}{\underset{1}{\cancel{800}}} \times 100\% = 500\%$$

m
$$\frac{1.5\text{ km}}{300\text{ m}} = \frac{1500\text{ m}}{300\text{ m}} = \frac{\overset{5}{\cancel{1500}}}{\underset{1}{\cancel{300}}} \times 100\% = 500\%$$

n
$$\frac{70\text{ cents}}{\$4.20} = \frac{70\text{ cents}}{420\text{ cents}} = \frac{\overset{1}{\cancel{70}}}{\underset{6}{\cancel{420}}} \times 100\% = \frac{100}{6}\% = 16\frac{2}{3}\%$$

o
$$\frac{3\text{ weeks}}{15\text{ days}} = \frac{21\text{ days}}{15\text{ days}} = \frac{\overset{7}{\cancel{21}}}{\underset{5}{\cancel{15}}} \times \overset{20}{\cancel{100}}\% = 140\%$$

2 **a**
$$\frac{56\text{ marks}}{80\text{ marks}} = \frac{\overset{7}{\cancel{56}} \times 10}{\underset{10}{\cancel{80}} \times 10} = \frac{70}{100} = 70\%$$

b
$$\frac{75\text{ marks}}{120\text{ marks}} = \frac{75}{120} \times 100\% = \frac{7500}{120}\% = 62.5\%$$

c
$$\frac{470\text{ bars sold}}{1000\text{ bars made}} = \frac{470 \div 10}{1000 \div 10} = \frac{47}{100} = 47\%$$

d
$$\frac{160\text{ vehicles}}{400\text{ cars}} = \frac{160 \div 4}{400 \div 4} = \frac{40}{100} = 40\%$$

e
$$\frac{135\text{ points}}{180\text{ points}} = \frac{135}{180} \times 100\% = \frac{13\,500}{180}\% = 75\%$$

3 **a**
$$\frac{49}{70} = \frac{49 \div 7}{70 \div 7} = \frac{7 \times 10}{10 \times 10} = \frac{70}{100} = 70\%$$

b
$$\frac{440\text{ mL}}{2\text{ L}} = \frac{440\text{ mL}}{2000\text{ mL}} = \frac{440}{2000} \times 100\% = \frac{44\,000}{2000}\% = 22\%$$

c
$$\frac{\$18}{\$300} = \frac{18 \div 3}{300 \div 3} = \frac{6}{100} = 6\%$$

d
$$\begin{aligned}&\frac{84\text{ cm}}{2\text{ m}}\\&=\frac{84\text{ cm}}{200\text{ cm}}\\&=\frac{84\div 2}{200\div 2}\\&=\frac{42}{100}\\&=42\%\end{aligned}$$

e
$$\begin{aligned}&\frac{550\text{ g}}{1\text{ kg}}\\&=\frac{550\text{ g}}{1000\text{ g}}\\&=\frac{550\div 10}{1000\div 10}\\&=\frac{55}{100}\\&=55\%\end{aligned}$$

f
$$\begin{aligned}&\frac{18\text{ hours}}{1\text{ day}}\\&=\frac{18\text{ hours}}{24\text{ hours}}\\&=\frac{\cancel{18}^{3}}{\cancel{24}_{4}}\times\cancel{100}^{25}\%\\&=75\%\end{aligned}$$

4 **a** There are 25 students in the class and 6 students had lost their calculators.
$$\begin{aligned}\therefore\ \frac{6}{25}&=\frac{6\times 4}{25\times 4}\\&=\frac{24}{100}\\&=24\%\ \text{ had lost their calculators.}\end{aligned}$$

b 5 students had broken their calculators.
$$\begin{aligned}\therefore\ \frac{5}{25}&=\frac{5\times 4}{25\times 4}\\&=\frac{20}{100}\\&=20\%\ \text{ had broken their calculators.}\end{aligned}$$

c 6 students had lost their calculators and 5 students had broken their calculators.
$\therefore\ 6+5=11$ students had either lost or broken their calculators.
$$\begin{aligned}\therefore\ \frac{11}{25}&=\frac{11\times 4}{25\times 4}\\&=\frac{44}{100}\\&=44\%\ \text{ had lost or broken their calculators.}\end{aligned}$$

5 There are 18 hours between 6 am and midnight.
$$\begin{aligned}\frac{10\text{ hours}}{18\text{ hours}}&=\frac{10}{18}\times 100\%\\&=\frac{1000}{18}\%\\&=55\frac{10}{18}\%\\&=55\frac{5}{9}\%\end{aligned}$$
$55\frac{5}{9}\% > 55\%$, so this station has met the requirement.

6
$$\begin{aligned}\frac{1290\text{ trains}}{1500\text{ trains}}&=\frac{1290\div 15}{1500\div 15}\\&=\frac{86}{100}\\&=86\%\end{aligned}$$
$\therefore$ 86% of the trains left within 5 minutes of the scheduled time.

7 **a** NT:
$$\text{Forest as a \% of land area}=\frac{31}{134.9}\times 100\%\approx 23.0\%$$
$$\text{\% of Australia's forest}=\frac{31}{147.4}\times 100\%\approx 21.0\%$$
QLD:
$$\text{Forest as a \% of land area}=\frac{52.6}{173.1}\times 100\%\approx 30.4\%$$
$$\text{\% of Australia's forest}=\frac{52.6}{147.4}\times 100\%\approx 35.7\%$$
SA:
$$\text{Forest as a \% of land area}=\frac{8.9}{98.3}\times 100\%\approx 9.1\%$$
$$\text{\% of Australia's forest}=\frac{8.9}{147.4}\times 100\%\approx 6.0\%$$
TAS:
$$\text{Forest as a \% of land area}=\frac{3.1}{6.8}\times 100\%\approx 45.6\%$$
$$\text{\% of Australia's forest}=\frac{3.1}{147.4}\times 100\%\approx 2.1\%$$

VIC:

$$\text{Forest as a \% of land area} = \frac{7.8}{22.7} \times 100\% \qquad \text{\% of Australia's forest} = \frac{7.8}{147.4} \times 100\%$$
$$\approx 34.4\% \qquad \approx 5.3\%$$

WA:

$$\text{Forest as a \% of land area} = \frac{17.7}{253.0} \times 100\% \qquad \text{\% of Australia's forest} = \frac{17.7}{147.4} \times 100\%$$
$$\approx 7.0\% \qquad \approx 12.0\%$$

	Native forest area ($\times$ 1 000 000 ha)	*Total land area* ($\times$ 1 000 000 ha)	*Forest as % of land area*	*% of Australia's forest*
ACT	0.1	0.2	50%	0.1%
NSW	26.2	80.1	32.7%	17.8%
NT	31.0	134.9	23.0%	21.0%
QLD	52.6	173.1	30.4%	35.7%
SA	8.9	98.3	9.1%	6.0%
TAS	3.1	6.8	45.6%	2.1%
VIC	7.8	22.7	34.4%	5.3%
WA	17.7	253.0	7.0%	12.0%
Total	147.4	769.1	19.2%	100%

b ACT has the highest percentage of its land covered by forest.

EXERCISE 8D

1 **a** 25% of 36
$= 0.25 \times 36$
$= 9$

b 10% of 70
$= 0.1 \times 70$
$= 7$

c 20% of 45
$= 0.2 \times 45$
$= 9$

d 36% of \$4200
$= 0.36 \times$ \$4200
$=$ \$1512

e 125% of \$600
$= 1.25 \times$ \$600
$=$ \$750

f 95% of 5 tonnes
$= 0.95 \times 5$ tonnes
$= 4.75$ tonnes

g 3.8% of 100 m
$= 0.038 \times 100$ m
$= 3.8$ m

h 112% of 5000 mL
$= 1.12 \times 5000$ mL
$= 5600$ mL

i 15% of 1 hour
$= 0.15 \times 60$ minutes
$= 9$ minutes

j 29% of 1 tonne
$= 0.29 \times 1000$ kg
$= 290$ kg

2 35% of 20 sweets $= 0.35 \times 20$ sweets
$= 7$ sweets

So, Carly gives her sister 7 sweets.

3 88% of 150 seeds $= 0.88 \times 150$ seeds
$= 132$ seeds

So, 132 seeds are expected to germinate.

4 90% of 60 laps $= 0.9 \times 60$ laps
$= 54$ laps

So, a driver must complete 54 laps.

5 **a** There are 20 students and 70% are boys.
70% of 20 students $= 0.7 \times 20$ students
$= 14$ students

So, 14 students in the class are boys.

b 35% catch the bus to school.
$\therefore$ $100\% - 35\% = 65\%$ do not catch the bus to school.
65% of 20 students $= 0.65 \times 20$ students
$= 13$ students

So, 13 students do not catch the bus to school.

c 85% are 12 years old.
85% of 20 students $= 0.85 \times 20$ students
$= 17$ students
So, 17 students are 12 years old.

d 85% are 12 years old and
10% are 13 years old.
$\therefore$ $85\% + 10\% = 95\%$ are either 12 or 13 years old.
95% of 20 students $= 0.95 \times 20$ students
$= 19$ students
So, 19 students are either 12 or 13 years old.

6 70% of 4.5 kg $= 0.7 \times 4.5$ kg
$= 3.15$ kg
So, the cat weighed about 3.15 kg.

7 **a** 60% of 300 mL $= 0.6 \times 300$ mL
$= 180$ mL
So, a 300 mL glass contains 180 mL of orange juice.

b 60% of 2 L $= 0.6 \times 2$ L
$= 1.2$ L
So, a 2 L bottle contains 1.2 L of orange juice.

8 **a** There are 150 tonnes of apples and 8% are unfit for sale.
8% of 150 tonnes $= 0.08 \times 150$ tonnes
$= 12$ tonnes
So, 12 tonnes are unfit for sale.

b Weight of first grade apples
$=$ total $-$ second grade $-$ unfit for sale
$= 150 - 30 - 12$
$= 108$ tonnes

c Total value of the harvest $= 108$ tonnes $\times$ \$1640 per tonne $+$ 30 tonnes $\times$ \$1250 per tonne
$=$ \$177 120 $+$ \$37 500
$=$ \$214 620

REVIEW SET 8

1 **a** 0.1
$= 0.\overset{\frown}{10} \times 100\%$
$= 10\%$

b $\frac{1}{4}$
$= \frac{1 \times 25}{4 \times 25}$
$= \frac{25}{100}$
$= 25\%$

c 0.001
$= 0.\overset{\frown}{001} \times 100\%$
$= 0.1\%$

d 3
$= \frac{3 \times 100}{1 \times 100}$
$= \frac{300}{100}$
$= 300\%$

2 **a** 209%
$= \frac{\overset{\frown}{209}}{100}$
$= 2.09$

b 96%
$= \frac{96}{100}$
$= \frac{96 \div 4}{100 \div 4}$
$= \frac{24}{25}$

c $\frac{16}{25}$
$= \frac{16 \times 4}{25 \times 4}$
$= \frac{64}{100}$
$= 64\%$

d 0.71
$= \frac{71}{100}$
$= 71\%$

e 20% of \$2000
$= 0.2 \times$ \$2000
$=$ \$400

f $\frac{6 \text{ hours}}{1 \text{ day}}$
$= \frac{6 \text{ hours}}{24 \text{ hours}}$
$= \frac{\overset{1}{\cancel{6}}}{\underset{4}{\cancel{24}}} \times \cancel{100}^{25}\%$
$= 25\%$

3 In increasing order, the amount of pie left is: **C**, **A**, **B**.

The percentages in increasing order are $20\%,\ 33\frac{1}{3}\%,\ 75\%$.

a **B** represents 75% **b** **C** represents 20% **c** **A** represents $33\frac{1}{3}\%$

4 $\dfrac{31 \text{ goals}}{47 \text{ goals}} = \dfrac{31}{47} \times 100\%$

$= \dfrac{3100}{47}\%$

$\approx 66.0\%$

5 There are 20 houses and 13 have burglar alarms.

$\therefore \quad \dfrac{13}{20} = \dfrac{13 \times 5}{20 \times 5}$

$= \dfrac{65}{100}$

$= 65\%$ have burglar alarms.

6 **a** $\%$ of fair-haired students $= 100\% - 67\% - 24\% - 2\%$

$= 7\%$

b There are 800 students and 67% have brown hair.

67% of 800 students $= 0.67 \times 800$ students

$= 536$ students

So, 536 students have brown hair.

PRACTICE TEST 8A

1 There are $10 \times 10 = 100$ squares in total, so each filled square represents 1%.

45 squares are shaded which represents 45%.

$\therefore$ the answer is **B**.

2 Each bottle has approximate height 18 mm.

35% of 18 mm $= 0.35 \times 18$ mm

$= 6.3$ mm

The height of the contents in the bottles which is closest to 6.3 mm is bottle **D**.

$\therefore$ the answer is **D**.

3 $\dfrac{17}{20} = \dfrac{17 \times 5}{20 \times 5}$

$= \dfrac{85}{100}$

$= 85\%$

$\therefore$ the answer is **C**.

4 There are 20 items on display, and 7 of them are cakes.

$\dfrac{7}{20} = \dfrac{7 \times 5}{20 \times 5}$

$= \dfrac{35}{100}$

$= 35\%$ are cakes

$\therefore$ the answer is **A**.

5 $275\% = \dfrac{\overset{\curvearrowleft}{275}}{100}$

$= 2.75$

$\therefore$ the answer is **C**.

6 $\dfrac{150 \text{ g}}{2 \text{ kg}} = \dfrac{150 \text{ g}}{2000 \text{ g}}$

$= \dfrac{150}{2000} \times 100\%$

$= \dfrac{15\,000}{2000}\%$

$= 7.5\%$

$\therefore$ the answer is **C**.

7 30% of 30 matches $= 0.3 \times 30$ matches

$= 9$ matches

$\therefore$ the answer is **B**.

8 56% of $225 = 0.56 \times 225$

$= 126$

$\therefore$ the answer is **A**.

9 125% of 2.8 kg $= 1.25 \times 2.8$ kg

$= 3.5$ kg

$\therefore$ the answer is **C**.

10 5 of the 25 employees are female, so $25 - 5 = 20$ employees are male.

$$\frac{20}{25} = \frac{20 \times 4}{25 \times 4}$$
$$= \frac{80}{100}$$
$= 80\%$ of the employees are male.

$\therefore$ the answer is **E**.

PRACTICE TEST 8B

1 **a** 0.0022
$= 0.00\overset{\frown}{22} \times 100\%$
$= 0.22\%$

b 28% of 350 m
$= 0.28 \times 350$ m
$= 98$ m

2 $\frac{7}{40} = \frac{7}{40} \times 100\%$
$= \frac{700}{40}\%$
$= 17.5\%$

3 **a** $\frac{24 \text{ cents}}{\$6} = \frac{24 \text{ cents}}{600 \text{ cents}}$
$= \frac{24 \div 6}{600 \div 6}$
$= \frac{4}{100}$
$= 4\%$

b $2.6\% = \frac{2.6}{100}$
$= \overset{\frown}{02}.6 \div 100$
$= 0.026$

4 84% of 7.5 kg $= 0.84 \times 7.5$ kg
$= 6.3$ kg
So, 6.3 kg of the potatoes are still usable.

5 $\frac{42}{96} = \frac{42}{96} \times 100\%$
$= \frac{4200}{96}\%$
$= 43.75\%$ are female

6 18% of 150 people
$= 0.18 \times 150$ people
$= 27$ people

7 15% of 81 000 people
$= 0.15 \times 81\,000$ people
$= 12\,150$ people

8 $\frac{25 \text{ students}}{40 \text{ students}} = \frac{25}{40} \times 100\%$
$= \frac{2500}{40}\%$
$= 62.5\%$
Since $62.5\% < 70\%$, the meeting will not proceed.
or 70% of 40 students is 28 students.
Since $25 < 28$, the meeting will not proceed.

9 $\frac{2}{3}\% = \frac{2}{3} \div 100$
$= \frac{\overset{1}{\cancel{2}}}{3} \times \frac{1}{\cancel{100}_{50}}$
$= \frac{1}{150}$

10 **a** The fuel gauge has 8 parts.
3 parts are full.
$\therefore$ $\frac{3}{8}$ of the tank is full.

b $\frac{3}{8} = \frac{3}{8} \times 100\%$
$= \frac{300}{8}\%$
$= 37.5\%$
So, 37.5% of the tank is full.

PRACTICE TEST 8C

1 **a** $\%$ of passionfruit pulp $= 100\% - 35\% - 25\% - 35\%$
$= 5\%$

b **i** 35% of 5 L $= 0.35 \times 5$ L
$= 1.75$ L
So, 1.75 L is soda water.

ii 25% of 5 L $= 0.25 \times 5$ L
$= 1.25$ L
So, 1.25 L is mango juice.

c There is 5% passionfruit pulp in the fruit punch (from **a**), and 35% soda water.
So, in 1 L of fruit punch, there is 5% of 1 L $= 0.05 \times 1$ L
$= 0.05$ L of passionfruit pulp
and 35% of 1 L $= 0.35 \times 1$ L
$= 0.35$ L of soda water

$$\frac{\text{amount of soda water}}{\text{amount of passionfruit pulp}} = \frac{0.35 \text{ L}}{0.05 \text{ L}}$$
$$= \frac{0.35}{0.05} \times 100\%$$
$$= \frac{35}{5} \times 100\%$$
$$= 7 \times 100\%$$
$$= 700\%$$

2 **a** 48% of 250 plants $= 0.48 \times 250$ plants
$= 120$ plants
So, there are 120 seedlings for sale.

b number of mature plants for sale
$= 250 - 40 - 120$
$= 90$ mature plants

c Total value of plants $= 40 \times \$40 \ + \ 120 \times \$4 \ + \ 90 \times \$11$
$= \$1600 + \$480 + \$990$
$= \$3070$

3 **a** **i** January 1 is a Monday, so the first weekend in January will be from January 6 to January 7.
The second weekend in January will be from January 13 to January 14.
The third weekend in January will be from January 20 to 21.
The fourth weekend in January will be from January 27 to 28.
So, the number of weekend days in January $= 4 \times 2 = 8$ days.

ii There are 31 days in January and 8 days fall on a weekend.
$\therefore \ \frac{8}{31} = \frac{8}{31} \times 100\%$
$= \frac{800}{31}\%$
$\approx 25.8\%$ of January falls on a weekend.

b **i** There are 31 days in March, 30 days in April, 31 days in May, 30 days in June, 31 days in July, and 30 days included in August.
So, there are $31 + 30 + 31 + 30 + 31 + 30 = 183$ days in total.

ii $\frac{183 \text{ days}}{365 \text{ days}} = \frac{183}{365} \times 100\%$
$\approx 50.1\%$
So, the football season is about 50.1% of the year.

4 There are 80 bananas and this is twice the number of pineapples.

$\therefore$ there are $80 \div 2 = 40$ pineapples.

$20\% = \frac{1}{5}$ of the total number of items are pineapples, so $\frac{1}{5}$ of the total number is 40.

$\therefore$ the total number of items $= 40 \times 5 = 200$.

a $\frac{80 \text{ bananas}}{200 \text{ items}} = \frac{80}{200}$

$= \frac{80 \div 2}{200 \div 2}$

$= \frac{40}{100}$

$= 40\%$

So, 40% of the items are bananas.

b There are 40 pineapples.

c % of items which are either apples or oranges

= total − % of pineapples − % of bananas

$= 100\% - 20\% - 40\%$

$= 40\%$

d There are 200 pieces of fruit on the fruit stand.

5 **a** There are 400 students and 80% are girls.

80% of $400 = 0.8 \times 400$

$= 320$

So, there are 320 girls at Fernanda East.

b 60% of the students at Fernanda West are girls. So, $100\% - 60\% = 40\%$ of the 500 students at Fernanda West are boys.

40% of $500 = 0.4 \times 500$

$= 200$

So, there are 200 boys at Fernanda West.

c There are $400 + 500 + 800 = 1700$ students in total at all of the schools.

Number of girls at all of the schools

= no. of girls at Fernanda East + no. of girls at Fernanda West + no. of girls at Fernanda Lake

$= 320 + 60\%$ of $500 + 25\%$ of 800

$= 320 + 0.6 \times 500 + 0.25 \times 800$

$= 320 + 300 + 200$

$= 820$

$\therefore$ there are $1700 - 820 = 880$ boys in total at Fernanda's schools. So there are more boys.