7

Percentages

This chapter deals with percentages.

At the end of this chapter you should be able to:

- solve problems involving percentages
- determine a percentage of an amount
- increase and decrease by a percentage
- calculate the percentage increase and decrease
- express loss/profit as a percentage of the cost price
- solve problems involving profit and loss
- perform calculations involving GST.

NSW Syllabus references: S4 N&A Fractions, decimals and percentages, S4 N&A Financial mathematics
Outcomes: MA4-1WM, MA4-2WM, MA4-3WM, MA4-5NA, MA4-6NA
NUMBER & ALGEBRA – ACMNA187, ACMNA189

Diagnostic test

1 Convert $\frac{87}{10}$ to a decimal.

A 0.87 **B** 0.087
C 8.7 **D** 0.807

2 Convert 0.061 to a fraction.

A $\frac{61}{60\,000}$ **B** $\frac{61}{1000}$
C $\frac{61}{100}$ **D** $\frac{61}{10}$

3 Which statement below is correct?

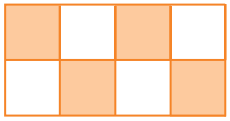
A $0.8 < 0.08$ **B** $0.8 = \frac{8}{100}$
C $0.8 > 0.88$ **D** $0.8 = \frac{8}{10}$

4 Round 0.998 71 correct to 2 decimal places.

A 1.00 **B** 0.99
C 0.10 **D** 9.9

5 What percentage of the shape is shaded?

A $\frac{1}{2}$ **B** 50%
C 0.5 **D** $\frac{4}{8}$ %



6 Express 41% as a fraction.

A $4\frac{1}{10}$ **B** 0.41 **C** 0.041 **D** $\frac{41}{100}$

7 Express 125% as a simplified fraction.

A $1\frac{1}{4}$ **B** $\frac{125}{100}$ **C** $1\frac{25}{100}$ **D** $\frac{25}{20}$

8 Express $8\frac{1}{5}$% as a decimal.

A 0.0082 **B** 0.082
C 0.82 **D** 8.2

9 Express $\frac{4}{5}$ as a percentage.

A 20% **B** 40% **C** 60% **D** 80%

10 Express 3.56 as a percentage.

A 356% **B** 35.6%
C 3.56% **D** 0.356%

11 Arrange 0.927, $\frac{24}{25}$ and $91\frac{1}{4}$% in ascending order.

A $91\frac{1}{4}$%, 0.927, $\frac{24}{25}$ **B** 0.927, $\frac{24}{25}$, $91\frac{1}{4}$%
C 0.927, $91\frac{1}{4}$%, $\frac{24}{25}$ **D** $\frac{24}{25}$, $91\frac{1}{4}$%, 0.927

12 Arrange 0.0621, 64% and $\frac{3}{5}$ in descending order.

A 0.0621, 64%, $\frac{3}{5}$ **B** 64%, $\frac{3}{5}$, 0.0621
C $\frac{3}{5}$, 0.0621, 64% **D** 64%, 0.0621, $\frac{3}{5}$

13 Express \$270 as a percentage of \$300.

A 90% **B** 111.1%
C 11.1% **D** 10%

14 Express 330 mL as a percentage of 2 L.

A 16 500% **B** 1650%
C 165% **D** 16.5%

15 Find 12% of 90 km.

A 10.8 km **B** 12.2 km
C 14.6 km **D** 18.3 km

16 Find $12\frac{1}{2}$% of 400 m.

A 0.05 m **B** 0.5 m
C 5 m **D** 50 m

The Diagnostic test questions refer to the Year 7 outcomes from ACMNA157 and ACMNA158.

Investigation 1 Working out percentages

This investigation revises the calculation of percentages without the use of a calculator.

1 This is a method used to find 5% of $300.

a To find 5% means 5 for every 100 or $5 for every $100. This can be shown in a table.

	Amount ($)	Percentage amount ($)
	100	5
	100	5
	100	5
Total	300	15

$300 = $100 + $100 + $100 so 5% of $300 is $5 + $5 + $5 = $15

So 5% of $300 is $15.

b Use this method to find:

i 2% of $300 **ii** 5% of $200 **iii** 6% of $400 **iv** 3% of $1000

2 A similar method is used to find 4% of $350.

a To find 4% means 4 for every 100 or $4 for every $100.

If there is $4 for every $100, there must be $2 for every $50. This can be shown in a table.

	Amount ($)	Percentage amount ($)
	100	4
	100	4
	100	4
	50	2
Total	350	14

$350 = $100 + $100 + $100 + $50 so 4% of $350 is $4 + $4 + $4 + $2 = $14

So 4% of $350 is $14.

b Use this method to find:

i 3% of $350 **ii** 4% of $250 **iii** 6% of $450 **iv** 3% of $1050

3 A similar method is used to find 2.5% of $300.

a To find 2.5% means 2.5 for every 100 or $2.50 for every $100. This can be shown in a table.

	Amount ($)	Percentage amount ($)
	100	2.5
	100	2.5
	100	2.5
Total	300	7.5

$300 = $100 + $100 + $100 so 2.5% of $300 is $2.50 + $2.50 + $2.50 = $7.50

So 2.5% of $300 is $7.50.

b Use this method to find:

i 2.5% of $300 **ii** 5.5% of $200 **iii** 6.5% of $400 **iv** 3.5% of $1000

4 The methods in questions **1**, **2** and **3** are combined to find 3.5% of $450.

a To find 3.5% means 3.50 for every 100 or $3.50 for every $100.
If there is $3.50 for every $100, there must be $1.75 for every $50. This can be shown in a table.

	Amount ($)	Percentage amount ($)
	100	3.50
	100	3.50
	100	3.50
	100	3.50
	50	1.75
Total	450	15.75

$450 = $100 + $100 + $100 + $100 + $50 so 3.5% of $450 is
$3.50 + $3.50 + $3.50 + $3.50 + $1.75 = $15.75
So 3.5% of $450 is $15.75.

b Use this method to find:

i 3.5% of $150 **ii** 4.5% of $250 **iii** 6.5% of $350 **iv** 3.5% of $950

5 This method can be used to find the percentage of any amount. Find 5.2% of $340.

a To find 5.2% means 5.2 for every 100 or $5.20 for every $100.
If there is $5.20 for every $100, there must be $0.52 for every $10, so $4 \times 0.52 = $2.08 for $40. This can be shown in a table.

	Amount ($)	Percentage amount ($)
	100	5.20
	100	5.20
	100	5.20
	40	2.08
Total	450	17.68

$340 = $100 + $100 + $100 + $40 so 5.2% of $340 is $5.20 + $5.20 + $5.20 + $2.08 = $17.68
So 5.2% of $340 is $17.68.

b Use this method to find:

i 3.6% of $120 **ii** 4.1% of $280 **iii** 6.3% of $310 **iv** 7.8% of $980

07012_Photo of some sort of shop sale or display where things are marked such as 5% off $300 or off everything or lots of different markdowns

A Review of percentages

Percentages are used every day. A percentage is a way of writing a fraction with a denominator of 100.
For example $13\% = \frac{13}{100}$.

EXAMPLE 1

Express each percentage as a fraction in simplest form.

a 23% **b** 65% **c** 190% **d** $7\frac{1}{2}\%$

a $23\% = \frac{23}{100}$

b $65\% = \frac{65}{100} = \frac{13}{20}$

c $190\% = \frac{190}{100} = 1\frac{90}{100} = 1\frac{9}{10}$

d $7\frac{1}{2} = \frac{(2 \times 7) + 1}{200}$

$= \frac{15}{200} = \frac{3}{40}$

Remember how to change to improper fractions.

Exercise 7A

1 Express each percentage as a fraction in simplest form.

a 51% **b** 89% **c** 47% **d** 61% **e** 97%
f 42% **g** 65% **h** 75% **i** 18% **j** 45%
k 50% **l** 36% **m** 54% **n** 98% **o** 66%

2 Express each percentage as a whole or mixed numeral in simplest form.

a 100% **b** 400% **c** 250% **d** 375% **e** 190%
f 620% **g** 554% **h** 236% **i** 708% **j** 1230%

3 Express each percentage as a fraction in simplest form.

a $9\frac{1}{3}\%$ **b** $15\frac{1}{4}\%$ **c** $10\frac{4}{5}\%$ **d** $5\frac{1}{6}\%$ **e** $8\frac{2}{3}\%$

EXAMPLE 2

Express each percentage as a decimal.

a 16% **b** 225%

a $16\% = \frac{16}{100} = 16 \div 100 = 0.\overset{\frown}{16}$

b $225\% = \frac{225}{100} = 225 \div 100 = 2.\overset{\frown}{25}$

When ÷ by 100, move the decimal point 2 places to the left. Fill empty places with zeros.

4 Express each percentage as a decimal.

a 8% **b** 9% **c** 46% **d** 65% **e** 58%
f 2% **g** 26% **h** 4% **i** 77% **j** 84%

5 Express each percentage as a decimal.

a 306% **b** 154% **c** 263% **d** 856% **e** 287%
f 742% **g** 733% **h** 113% **i** 922% **j** 569%

EXAMPLE 3

Express each number as a percentage.

a $\frac{2}{5}$ **b** $7\frac{1}{4}$ **c** 2 **d** 8.5

a $\frac{2}{5} \times \frac{100}{1} = 40\%$

b $7\frac{1}{4} \times \frac{100}{1}$

$= \frac{29}{4} \times \frac{100}{1}$

$= \frac{2900}{4} = 725\%$

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

d $8.5 \times \frac{100}{1} = 850\%$

When × by 100, move the decimal point 2 places to the right.

6 Express the following as a percentage.

a $\frac{1}{4}$ **b** $5\frac{1}{2}$ **c** 8 **d** 6.3 **e** $\frac{3}{20}$

f $9\frac{1}{2}$ **g** 0.05 **h** $2\frac{1}{2}$ **i** 7.2 **j** $\frac{4}{50}$

k 1.6 **l** 17 **m** 0.8 **n** 0.4 **o** $\frac{9}{10}$

p 0.86 **q** $5\frac{3}{4}$ **r** 0.001 **s** 6 **t** 15

7 Express each fraction as a percentage correct to 2 decimal places. (Use your calculator.)

a $\frac{6}{11}$ **b** $\frac{12}{13}$ **c** $\frac{7}{8}$ **d** $\frac{5}{9}$ **e** $\frac{15}{16}$ **f** $\frac{17}{19}$

8 Complete the table by writing equivalent fractions, decimals and percentages on each line.

	Fraction	Decimal	Percentage
a		0.4	
b	$\frac{7}{10}$		
c			20%
d		0.05	
e	$\frac{4}{5}$		
f			37%
g		7.08	
h	$1\frac{3}{5}$		
i		0.6%	
j			82%
k		11.002	
l	$\frac{3}{8}$		

9 Arrange each set in ascending order.

a 72%, $\frac{1}{4}$, 0.92 **b** $\frac{1}{5}$, 86%, 0.09 **c** $\frac{7}{8}$, 0.17, 23% **d** $\frac{3}{5}$, 0.582, $62\frac{1}{2}$%

e $\frac{5}{6}$, 70%, 0.44 **f** 35%, 0.36, $\frac{2}{5}$ **g** 0.74, 52%, $\frac{18}{20}$ **h** $\frac{3}{8}$, 62%, 0.37

Investigation 2 Percentage symbol

07013_Photo of percentage symbols over history

Investigate the history of the percentage symbol.

How has it changed over time to become the symbol that it is now?

B Percentages of quantities

To express one quantity as a percentage of another:

- change both quantities to the same unit (if necessary)
- write $\frac{\text{first quantity}}{\text{second quantity}} \times 100\%$.

EXAMPLE 1

Express the first quantity as a percentage of the second quantity.

a 38 cm, 40 cm **b** 42 cm, 1.2 m **c** 2 weeks, 20 days

Use $\frac{\text{first quantity}}{\text{second quantity}} \times 100\%$

a So $\frac{38}{40} \times \frac{100}{1}\% = 95\%$

$\therefore$ 38 cm is 95% of 40 cm.

b Convert to cm: that is, 42 cm, 120 cm.

So $\frac{42}{120} \times \frac{100}{1}\% = 35\%$

$\therefore$ 42 cm is 35% of 1.2 m.

c Convert to days: that is, 14 days, 20 days.

So, $\frac{14}{20} \times \frac{100}{1}\% = 70\%$

$\therefore$ 2 weeks is 70% of 20 days.

Exercise 7B

1 Express the first quantity as a percentage of the second quantity.

a \$6, \$15 **b** 10 km, 50 km **c** 4 h, 25 h

d 18 min, 50 min **e** 70 m, 125 m **f** \$88, \$440

g 60 L, 200 L **h** 27 kg, 50 kg **i** 54 min, 75 min

j 25 h, 100 h **k** 32 L, 64 L **l** 45 m, 180 m

2 What percentage is the first quantity of the second?

a 28 cm : 1.4 m **b** 72 cm : $1\frac{1}{2}$ m **c** 1.8 m : 60 cm

d 810 g : 4.05 kg **e** 156 g : 0.24 kg **f** 3.62 kg : 400 g

g \$0.60 : \$2 **h** 85c : \$5 **i** 5.4 L : 600 mL

j 18 h : 1 day **k** 12 h : 2 days **l** \$2.55 : \$1.25

m 6 months : 2 years **n** 21 months : $3\frac{1}{2}$ years **o** 24 months : 5 years

To find a percentage of a quantity:

- express each percentage as a fraction in simplest form
- replace 'of' by '×' and calculate the answer.

EXAMPLE 2

Calculate the following.

a 20% of 40 m

$$\text{20\% of 40 m} = \frac{20}{100} \times \frac{40}{1} = \frac{800}{100} = 8 \text{ m}$$

b $12\frac{1}{2}\%$ of \$40

$$12\tfrac{1}{2}\% = \frac{25}{200}$$

$$12\tfrac{1}{2}\% \text{ of } \$40 = \frac{25}{200} \times \frac{40}{1} = \frac{1000}{200} = 5$$ m

3 Calculate the following.

a $62\frac{1}{2}\%$ of \$320 **b** $66\frac{2}{3}\%$ of 180 m **c** 75% of \$240

d 17% of 50 **e** 12% of 64 kg **f** 18% of 80 m

g 45% of \$260 **h** 64% of 500 L **i** 32% of 308 kg

j 72% of 210 L **k** 21% of \$544 **l** 13% of \$126

4 Convert each percentage to a decimal, then solve.

a 4% of \$120 **b** 9% of 220 L **c** 6% of 40 m

d 15% of 600 kg **e** 13% of \$160 **f** 52% of 1600 km

C Percentage change

Two methods can be used to increase or decrease an amount by a percentage.

To increase means to add to the original amount.
To decrease means to subtract from the original amount.

Method 1

To calculate the percentage of the amount:

new amount = old amount + increase

new amount = old amount − decrease

Method 2

Find the percentage of the amount once you have increased or decreased the percentage.

EXAMPLE 1

Using method 1:

a increase \$50 by 70%

First find 70% of \$50.

$0.70 \times 50 = \$35$ or $\frac{70}{100} \times 50 = \$35$

New amount = old amount + increase

= \$50 + \$35

= \$85

b decrease \$50 by 70%

Remember to find the new amount first, then add or subtract it from the original amount.

New amount = old amount − decrease

= \$50 − \$35

= \$15

Exercise 7C

1 Complete to find the increased amounts using method 1.

a $400 by 15%

$= \frac{400}{100} \times \_\_\_\% = \_\_\_$

$\therefore \$400 + \_\_\_ = \$460$

b 200 g by 40%

$= 200 \times \_\_\_\% = \_\_\_$

$\therefore 200 \text{ g} + \_\_\_ = \_\_\_ \text{ g}$

2 Increase the following amounts using method 1.

a $300 by 15%
b 100 g by 40%
c 100 L by 8%
d $90 by 70%
e 68 by 20%
f 380 by 50%

3 Decrease the following amounts using method 1.

a $24 by 50%
b 60 by 70%
c 50 kg by 40%
d 90 m by 30%
e 150 km by 8%
f 80 L by 70%

EXAMPLE 2

Using method 2:

a increase $50 by 70%
b decrease $50 by 70%

a $100\% + 70\% = 170\%$

$170\% \text{ of } \$50 = \frac{170}{100} \times 50$

$= \$85$

b $100\% - 70\% = 30\%$

$30\% \text{ of } \$50 = \frac{30}{100} \times 50$

$= \$15$

4 Complete to find the increased amounts using method 2.

a 70 km by 10%

$100\% + 10\% = \_\_\_\%$

Find 110% of 70 km.

$\therefore 1.1 \times 70 = \_\_\_ \text{ km}$

b 20 t by 80%

$100\% + 80\% = \_\_\_\%$

Find 180% of 20 t.

$\therefore 1.8 \times 20 = \_\_\_ \text{ t}$

5 Increase the following using method 2.

a 70 km by 10%
b 60 L by 80%
c $1200 by 60%
d 9 L by 70%
e 28 km by 50%
f 15 m by 5%

6 Decrease the following using method 2.

a 20 t by 80%
b 40 km by 70%
c 55 L by 60%
d $900 by 50%
e 60 g by 40%
f 70 m by 10%

EXAMPLE 3

a Find the percentage of an amount that is needed to increase the amount by 88%.
b Find the percentage of an amount that is needed to decrease the amount by 14%.

a $100\% + 88\% = 188\%$

b $100\% - 14\% = 86\%$

7 Find the percentage of an amount that is needed to increase the amount by:

a 11%
b 38%
c 55%
d 92%
e 68%
f 86%
g 39%
h 107%
i 156%
j 213%

8 Find the percentage of an amount that is needed to decrease the amount by:

a 9%	**b** 15%	**c** 18%	**d** 23%	**e** 32%
f 47%	**g** 66%	**h** 51%	**i** 95%	**j** 78%

9 Read the following problems. Decide whether it is an increase or a decrease then solve.

a A baker increased the price of chocolate mud cakes sold to restaurants by 70%. What is the new selling price of a chocolate mud cake if the original price was $5.00?

b Kayla's home in Mountain View Estate was purchased for $160 000. Its value has increased by 62%. Calculate its present value.

c A sound system priced at $980 is reduced by 15%. during a sale. Calculate the sale price of the sound system.

d Al's Cars has discounted all cars by 10% for the weekend. Calculate the discounted price of a car valued at $22 000.

e Jessica purchased watches for $5.50 and marked them up by 80% before selling them in her jewellery store. Calculate the selling price of the watches to the nearest dollar.

07014_Photo of a largish chocolate mud cake(s) or another photo relating to other parts of q 9 Exercise 7C

10 In an analysis of the Rugby League grand final the following statistics were gathered.

Aspect	Winning team	Losing team
Time in possession (min)	48	32
Line breaks	15	11
Completed sets	18	12
Tackles	235	303

a Calculate the percentage time in possession for the winning team.

b Calculate the percentage of total tackles for each team.

c Compare the percentage time in possession with the percentage of tackles. What comment can be made?

07015_Photo of a rugby league game, maybe playing the grand final

Investigation 3 Comparing percentages

This table is taken from a breakfast cereal package.

Guideline daily intake for adults

	Guideline daily intake	Per serving	% DI
Energy	8700 kJ	640 kJ	
Total fat	70 g	3.5 g	5%
Saturated fat	24 g	0.7 g	
Sugars	90 g	0.4 g	<1%
Sodium	2300 mg	5 mg	<1%
Fibre	30 g	3.9 g	

1. Calculate the missing % DI (daily intake) values.
2. Compare the guidelines for your favourite breakfast cereal with the values for this cereal.
3. Another cereal has 8 g of sugar per serving. Calculate the % DI of sugar from one serve of this other cereal. How does this compare with the guidelines above?
4. Compare the % DI for sugar, sodium and fat of other packaged foods.

D Calculating percentage change

To calculate a percentage increase or decrease, the following formula is used:

$$\%\text{ increase} = \frac{\text{increase}}{\text{original amount}} \times 100\%$$

$$\%\text{ decrease} = \frac{\text{decrease}}{\text{original amount}} \times 100\%$$

We always compare with the original amount, so this becomes the denominator.

EXAMPLE 1

Find the percentage increase.

a \$120 to \$150

b \$48 to \$216

a Increase $= \$150 - \$120$
$= \$30$

$$\%\text{ increase} = \frac{\text{increase}}{\text{original amount}} \times 100\%$$
$$= \frac{{}^{1}\cancel{30}}{{}^{4}\cancel{120}} \times 100\%$$
$$= \frac{100}{4}$$
$$= 25\%$$

$\therefore$ \$120 to \$150 is a 25% increase.

b Increase $= \$216 - \$48$
$= \$168$

$$\%\text{ increase} = \frac{\text{increase}}{\text{original amount}} \times 100\%$$
$$= \frac{{}^{7}\cancel{168}}{{}^{2}\cancel{48}} \times 100\%$$
$$= \frac{700}{2}$$
$$= 350\%$$

$\therefore$ \$48 to \$216 is a 350% increase.

Exercise 7D

1 Complete to find the percentage increase.

a 48 g to 60 g

Increase $= 60 - 48$

$= \_\_\_$ g

% increase $= \frac{12}{48} \times 100\%$

$= \_\_\_\%$

$\therefore$ 48 g to 60 g is a ___% increase.

b 30 L to 45 L

Increase $= 45 - \_\_\_$

$= \_\_\_$ L

% increase $= \frac{15}{\square} \times 100\%$

$= \_\_\_\%$

$\therefore$ 30 L to 45 L is a ___% increase.

2 Calculate the percentage increase.

a 50 g to 80 g
b 30 L to 75 L
c 12 min to 1 h
d \$120 to \$228
e 16 m to 20 m
f 20 g to 52 g
g 120 L to 180 L
h 150 kg to 210 kg
i 30 km to 150 km

EXAMPLE 2

Find the percentage decrease.

a 80 L to 60 L

a Decrease $= 80 - 60$

$= 20$

$\%\ \text{decrease} = \frac{\text{decrease}}{\text{original amount}} \times 100\%$

$= \frac{{}^{1}\cancel{20}}{{}^{4}\cancel{80}} \times 100\%$

$= \frac{100}{4}$

$= 25\%$

$\therefore$ 80 L to 60 L is a 25% decrease.

b 72 kg to 36 kg

b Decrease $= 72 - 36$

$= 36$

$\%\ \text{decrease} = \frac{\text{decrease}}{\text{original amount}} \times 100\%$

$= \frac{{}^{1}\cancel{36}}{{}^{2}\cancel{72}} \times 100\%$

$= \frac{100}{2}$

$= 50\%$

$\therefore$ 72 kg to 36 kg is a 50% decrease.

3 Complete to find the percentage decrease.

a 70 L to 42 L

Decrease $= 70 - 42$

$= \_\_\_$ L

% decrease $= \frac{28}{70} \times 100\%$

$= \_\_\_\%$

$\therefore$ 70 L to 42 L is a ___% decrease.

b 200 m to 50 m

Decrease $= 200 - \_\_\_$

$= \_\_\_$ m

% decrease $= \frac{\square}{200} \times 100\%$

$= \_\_\_\%$

$\therefore$ 200 m to 50 m is a ___% decrease.

4 Calculate the percentage decrease.

a 80 L to 32 L
b 200 m to 120 m
c 90 km to 27 km
d \$105 to \$63
e 16 t to 4 t
f \$560 to \$420
g 800 km to 200 km
h 54 m to 27 m
i 35 t to 7 t

5 This table shows the approximate cost of using various size TVs. The annual cost is based on 7 hours of viewing per day with electricity charged at 25 cents/kWh.

TV screen size	Energy/Star rating	Annual cost ($)
138 cm/54 inch	★★½	$217
	★★★★★★	$67
106 cm/42 inch	★★½	$139
	★★★★★★	$43
80 cm/32 inch	★★½	$83
	★★★★★★	$27

a For each size TV, calculate the percentage saving per year if the 6-star rating TV is used rather than the $2\frac{1}{2}$ star rating TV.

b Calculate the percentage saving from the most costly to the least costly TV.

6 The table shows the cost of various forms of lighting. The annual cost is based on 3 hours per day with electricity charged at 25 cents/kWh.

Lighting	Annual cost ($)
Compact fluoro globe: 15 W	$3.92
Compact fluoro globe: 20 W	$5.22
Fluorescent tube: 18 W	$6.81
Fluorescent tube: 25 W	$11.36
12-volt halogen downlight: 50 W	$14.77
Incandescent globe: 75 W	$19.31
Incandescent globe: 100 W	$26.13

Calculate the percentage saving in making a change from:

a a 100 W incandescent globe to a 75 W globe

b an 18 W fluorescent tube to a 15 W compact fluoro globe

c a 75 W incandescent globe to a 20 W compact fluoro globe.

07016_Photo of a store with different size TVs or photo of different light globes

E The unitary method

Here we are given some information about a quantity and its percentage of an unknown total quantity. We could then be asked to find the total quantity or another percentage of it.

Remember, the total unknown quantity is 100%. If we find the value of 1%, then we only need to multiply by 100 to find 100%.

For example, if 12 g is 10% of the weight then 10% is 12 g

so 1% is $\frac{12}{10}$ g

$\therefore 100\% = \frac{12}{10}\text{ g} \times 100 = 120\text{ g}$

So $\frac{\text{quantity}}{\text{percentage given}} \times 100 = \text{total unknown quantity}$

It is called the unitary method because we find 1% first.

EXAMPLE 1

Find 100% of a quantity if:

a 23% is \$78.20 **b** 46.5% is 186 kg

a 23% is \$78.20

1% is $\frac{\$78.20}{23}$

100% is $\frac{\$78.20}{23} \times 100 = \$340$

$\therefore$ 100% is \$340.

Calculator:

78.20 × 100 ÷ 23 =

b 46.5% is 186 kg

1% is $\frac{186}{46.5}$ kg

100% is $\frac{186}{46.5} \times 100\text{ kg} = 400\text{ kg}$

$\therefore$ 100% is 400 kg.

186 × 100 ÷ 46.5 =

Exercise 7E

1 Find 100% of a quantity if:

a 10% is 82 m **b** 23% is 483 g **c** 78% is 733.2 km

d 49% is 110.25 **e** 12.9% is 29.67 g **f** 5.08% is \$2.54

g $2\frac{1}{2}$% is 125 mL **h** $38\frac{1}{4}$% is 19 125 kg **i** 125% is \$3.40

2 34% of students at a school using public transport. If 204 students use public transport, how many students attend the school?

3 Darko scored 81% for a test. If his actual score was $121\frac{1}{2}$, what was the maximum possible mark for the test?

07017_Photo of a newspaper stand

4 A newspaper saves \$26 860 in printing costs per year by purchasing recycled paper. If printing costs have been reduced by 31.6%, calculate the original printing costs.

5 Find the original price of items with these tags.

a

b

c

EXAMPLE 2

a The original price of a TV is increased by 30% to $323.70. Calculate the original price.

b A car is reduced by 30% to $7000. Calculate the original price.

a 130% is $323.70

1% is $\frac{323.70}{130}$

100% is $\frac{323.70}{130} \times 100 = \$249$

$\therefore$ The original price was $249.

b 30% reduction so $7000 is 70% of original price.

1% is $\frac{7000}{70}$

100% is $\frac{7000}{70} \times 100 = \$10\,000$

$\therefore$ The original price was $10 000.

6 Find the original price for each of these items.

a A phone is increased by 25% to $640.

b A tablet is increased by 30% to $179.40.

c A suit is increased by 45% to $578.55.

d A formal dress is increased by 55% to $744.

e A computer game is increased by 60% to $136.

07018_Photo of one or two items from questions 6 from Exercise 7E. Maybe a tablet, suit and formal dress.

7 Find the original price for each of these items.

a A car is reduced by 30% to $2800.

b A game is reduced by 70% to $28.50.

c A dress is reduced by 60% to $180.

d A motor cycle is reduced by 15% to $2125.

07019_Photo of one or two items from questions 7 from Exercise 7E. Maybe a dress or motorcycle.

EXAMPLE 3

a Find 35% of a quantity if 20% of the quantity is 110 L.
b Find 87% of a quantity if 32% of the quantity is 108.8 m.

a 20% = 110 L

1% is $\frac{110}{20}$

35% is $\frac{110}{20} \times 35 = 192.5$ L

∴ 35% of the quantity is 192.5 L.

Calculator:

110 ÷ 20 × 35 =

b 32% = 108.8 m

1% is $\frac{108.8}{32}$ m

87% is $\frac{108.8}{32} \times 87 = 295.8$ m

∴ 87% of the quantity is 295.8 m.

108.8 ÷ 32 × 87 =

8 **a** Find 8% of a quantity if 15% of the quantity is $34.50.
b Find 42% of a quantity if 6% of the quantity is 53.4 kg.
c Find 58% of a quantity if 13.4% of the quantity is 294.8 L.
d Find 93% of a quantity if 0.6% of the quantity is 9 km.
e Find 61.2% of a quantity if 151/4% of the quantity is 109.8 m.
f Find $18\frac{1}{4}$% of a quantity if 72% of the quantity is $3288.96.

F Profit and loss

Profit is the difference between the cost of an item and its selling price.

Profit = selling price − cost price

For example, a painting is purchased for $2000 and later sold for $3000. The profit is $3000 − $2000 = $1000.

Loss occurs if the selling price of an item is lower than the cost price.

Loss = cost price − selling price

Exercise 7F

1 Define the following terms.
a cost price
b selling price
c profit
d loss

2 Calculate the profit on each item when:

a	selling price = $700	cost price = $500	profit = 700 − 500 = ____
b	selling price = $520	cost price = $380	profit = ____ − 380 = ____
c	selling price = $975	cost price = $482	profit = ____ − ____ = ____

3 Calculate the loss on each item when:

a	cost price = $800	selling price = $530	loss = 800 − 530 = ____
b	cost price = $945	selling price = $645	loss = ____ − 645 = ____
c	cost price = $1050	selling price = $822	loss = ____ − ____ = ____

4 Read each statement below.

i State whether a profit or a loss has been made.

ii Calculate the profit or loss.

a Sarah purchased a car for $8600. She later sold it for $5200.

b Kyle paid $754 for a painting. He later sold it for $2550.

c A house purchased in 1984 for $183 000 was sold in 2003 for $367 000.

d Dianna purchased shares worth $56 400 in 2007. In 2013 the value of the shares was $38 140.

07020_Photo of someone admiring a painting

EXAMPLE 1

A television purchased for $1000 was later sold for $650.

a Calculate the loss.

b Express the loss as a percentage of the cost price.

a Loss = cost price − selling price
= $1000 − $650 = $350

b Loss as a % of cost $= \frac{\text{loss}}{\text{cost price}} \times 100$

$= \frac{350}{1000} \times 100 = 35\%$

5 A computer purchased for $4000 is later sold for $2500.

a Calculate the loss.

b Express the loss as a percentage of the cost price correct to 1 decimal place.

6 A car purchased for $60 000 is later sold for $45 000.

a Calculate the loss.

b Express the loss as a percentage of the cost price correct to 1 decimal place.

7 A motorcycle was purchased for $24 000. If it was sold for $16 000, calculate the loss as a percentage of the cost price.

EXAMPLE 2

A vase purchased for $80 was later sold for $480.

a Calculate the profit.

b Express the profit as a percentage of the cost price.

07021_Photo of an antique vase of around retail price $450.

a Profit = selling price − cost price
= $480 − $80 = $400

b Profit as a % of cost price $= \frac{\text{profit}}{\text{cost price}} \times 100$

$= \frac{400}{80} \times 100$

$= 500\%$

8 An antique dresser purchased for $5000 was later sold for $12 000.

a Calculate the profit.

b Express the profit as a percentage of the cost price.

07022_Photo of an antique dresser worth around $8000

9 A diamond ring valued at $8000 is later sold for $10 000. Calculate the profit as a percentage of the cost price.

10 A painting purchased for $650 is sold for $1000. Calculate the profit as a percentage of the cost price correct to 1 decimal place.

EXAMPLE 3

a A car with a cost price of $5200 is sold at a profit of 15%. Calculate the selling price.

b A computer with a cost price of $715 is sold at a loss of 27%. Calculate the selling price.

a Percentage $= 100\% + 15\% = 115\%$

Selling price $= \frac{115}{100} \times 5200 = \$5980$

b Percentage $= 100\% - 27\% = 73\%$

Selling price $= \frac{73}{100} \times 715 = \$521.95$

11 Calculate the selling price of each item.

a A computer with a cost price of $740 is sold at a profit of 15%.

b A phone with a cost price of $420 is sold at a profit of 35%.

c A car with a cost price of $6500 is sold at a loss of 30%.

d A dress with a cost price of $350 is sold at a loss of 45%.

e A computer game with a cost price of $120 is sold at a loss of 25%.

f A holiday with a cost price of $899 is sold at a profit of 140%.

EXAMPLE 4

A chair is sold for $319. This is a profit of 45%.
Calculate the cost price of the chair.

07023_Photo of a fancy chair costing around $300.

Selling percentage $= 100\% + 45\%$
$= 145\%$

145% is $319

1% is $\frac{319}{145}$

100% is $\frac{319}{145} \times 100 = \$220$

$\therefore$ The cost price was $220.

12 Calculate the cost price of these items.

a selling price is $169 for a profit of 30%
b selling price is $318.60 for a profit of 18%
c selling price is $111.54 for a profit of 43%
d selling price is $110 for a profit of 120%
e selling price is $245 for a profit of 75%
f selling price is $1320 for a profit of 340%

EXAMPLE 5

A video game console was sold for $132. This was a loss of 40%. Calculate the cost price.

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

60% is $132

1% is $\frac{132}{60}$

100% is $\frac{132}{60} \times 100 = \$220$

$\therefore$ The cost price was $220.

13 Calculate the cost price of these items.

a selling price is $144 for a loss of 60%
b selling price is $297.50 for a loss of 15%
c selling price is $923 for a loss of 35%
d selling price is $48.40 for a loss of 45%
e selling price is $15 for a loss of 80%
f selling price is $39.95 for a loss of 47%

14 **a** A car was purchased for $8000 and later sold for $8400.
i Calculate the profit. **ii** Express the profit as a percentage of the cost price.
b A motorcycle was purchased for $22 000 and later sold for $17 500.
i Calculate the loss. **ii** Express the loss as a percentage of the cost price.
c A boat with cost price of $3800 is sold at a profit of 12%.
i Calculate the profit. **ii** Calculate the selling price.
d A computer with a cost price of $1200 is sold at a loss of 35%.
i Calculate the loss. **ii** Calculate the selling price.
e A clock is sold for $276. This is a profit of 32%.
i Calculate the cost price of the clock. **ii** Calculate the profit.
f A smart phone was sold for $210. This was a loss of 45%.
i Calculate the cost price. **ii** Calculate the loss.

07024_Photo of somethings from Exercise 7F questions 14: such as a boat for $3800,, motorbike for $20 000 ish, clock for $275, ...

15 **a** A car with cost price of $45800 is sold at a profit of 26%.
- **i** Calculate the profit.
- **ii** Calculate the selling price.

b A tablet computer was sold for $430. This was a loss of 23%.
- **i** Calculate the cost price.
- **ii** Calculate the loss.

c A motorcycle is sold for $6310. This is a profit of 11%.
- **i** Calculate the cost price of the motorcycle.
- **ii** Calculate the profit.

d An antique table was purchased for $16 500 and later sold for $9250.
- **i** Calculate the loss.
- **ii** Express the loss as a percentage of the cost price.

e A painting was purchased for $860 and later sold for $1100.
- **i** Calculate the profit.
- **ii** Express the profit as a percentage of the cost price.

f A gold necklace with a cost price of $3840 is sold at a loss of 47%.
- **i** Calculate the loss.
- **ii** Calculate the selling price.

07025_Photo of somethings from Exercise 7F question 15. I can out price tags on a couple of items to match question

16 A car is purchased for $5200 and later sold for a profit of 28%. The person who sold the car wants to buy it back and is told the price to buy it back must give the new seller a profit of 15%. How much does it cost to buy the car back?

G Goods and services tax (GST)

The GST is a federal tax applied to most goods and services in Australia. It is calculated at the rate of 10% of the purchase price of the goods or services.

The price excluding the GST (that is the price before the GST is added) is written 'price excluding GST'.

The price including the GST (that is the price after the GST is added) is written 'price including GST'.

EXAMPLE 1

a Calculate the GST and the price including GST of a camera with a listed price excluding GST of $710.
b Calculate the price including GST of a mobile phone with a listed price excluding GST of $299.

a GST $= 10\%$ of $710
$= 0.1 \times \$710$
$= \$71$
Price including GST $= \$710 + \$71$
$= \$781$

b Price including GST = list price + 10% of the list price
= 110% of the list price
$= 1.10 \times \$299$
= $328.90

Exercise 7G

1 Calculate the GST and the price including GST of the following items with listed prices that exclude GST.

a microwave oven $440
b computer $3690
c TV repairs $258
d DVD player $397
e plumber's bill for services $1800

07026_Photo of something from Exercise 7G question 1 or 2

2 Calculate the price including GST on the following items with listed prices that exclude GST.

a car battery $95
b ticket to Rugby Final $225
c bottle of wine $17
d printer repairs $336
e electrician's bill $457

EXAMPLE 2

A TV is advertised with a listed price of $899, price including GST.
a Calculate the GST included on the price.
b Calculate the pre-GST price.

The simple method for calculating the GST in these situations is called the 'GST rule of thumb':
GST = price including GST ÷ 11

a $\text{GST} = \frac{\$899}{11}$
$= \$81.73$ to the nearest cent

b Pre-GST price = $899 − $81.73
= $817.27

3 For the following items with listed prices that include GST, use the GST rule of thumb to calculate:
i the GST included in the price of each item
ii the pre-GST price.

a TV $1189
b lounge suite $4970
c BBQ chicken $10.89
d perfume $148
e dress $124
f tablet computer $499

07027_Photo of a barbecue chicken

4 Find the amounts missing from the following invoices.

a *Tax invoice*
Services rendered = $850
GST = ____
Total including GST = ____

b *Tax invoice*
Services rendered = ____
GST = $48.80
Total including GST = $536.80

c *Tax invoice*
Taxable items
Shirt $69.95
Tie $29.95
Total including GST = $99.90
GST included in total = ____

d *Tax invoice*
Taxable items
5 CDs @ $32.90 including GST = ____
GST included in total = ____

07028_Photo of a shirt and tie and/or a bundle of modern CDs

5 A docking station is valued at $100 before adding the GST. After the GST is added the sale price is $110.

a Explain how the sale price of $110 was achieved.

b John concluded that the price of the docking station before the addition of GST is really equivalent to $110 × 0.90 or $110 × 90%. He calculates that the price before GST was added was $99. Is John correct? Explain your answer.

07029_Photo of a docking station of around $100

6 Complete the following to find the values of these amounts when they are increased by 10%.

a $150: $150 × 110% = $150 × 1.1 = $165

b $220: $220 × 110% = $220 × ___ = $___

c $370: $370 × 110% = $___ × ___ = $___

d $400: $400 × 110% = $___ × ___ = $___

7 Use the answers from question **6** and decrease each amount by 10%.

a $165 × 90% = $165 × 0.9 = $___

b $___ × 90% = $___ × 0.9 = $___

c $___ × 90% = $___ × 0.9 = $___

d $___ × 90% = $___ × 0.9 = $___

8 **a** What do you notice about the amounts obtained in the last column of questions **6** and **7**?

b Is the following statement true or false?
When an amount is increased by a percentage, and the new amount is then decreased by the same percentage, the result is the original amount.

c Explain the reasoning for your findings.

Investigation 4 Comparing percentages

Australia has a GST of 10%. Other countries have similar taxes, sometimes called a VAT or value added tax, of different percentage amounts. The 10% used in Australia means the calculations are simpler than for the percentages used in other countries. The rule of thumb that can be used for 10% cannot be used for any other amount.

This investigation examines the VAT of some other countries, which are listed in the table.

Country	Percentage rate
Belgium	21.0%
Luxemburg	15.0%
Germany	19.0%
France	20%
Ireland	23%

Country	Percentage rate
Italy	22.0%
Netherlands	21.0%
South Africa	14.0%
Switzerland	8%
New Zealand	13%

Complete the following calculations in Australian dollars. For example, to find the VAT on sports bag priced at $A75 in France, calculate 20% of $75 as the VAT rate in France is 20%. The answer is $A15.

1 Calculate the VAT on a watch listed at $A650 in these countries.
a Italy **b** Luxemburg **c** South Africa **d** New Zealand

2 Calculate the VAT on a box of chocolates listed at $A15 in these countries.
a New Zealand **b** France **c** Switzerland **d** Netherlands

3 Calculate the VAT on a camera listed at $A230 in these countries.
a Belgium **b** Germany **c** Ireland **d** Italy

To calculate the amount of VAT included in the cost of a mobile phone priced at $A199 in South Africa, the unitary method must be used, as the VAT is not 10% and the rule of thumb only works for tax rates of 10%. The VAT rate in South Africa is 14% so:

114% is $A199

So 1% is $\frac{199}{114 \times 14}$

Then 14% is $\frac{199}{114 \times 14}$ as the VAT rate is 14%.

The VAT amount is $A24.44.

4 Use the unitary method to find the amount of VAT included in the cost of a smart phone priced at $A625 in these countries.
a Belgium **b** Germany **c** South Africa **d** New Zealand

5 Use the unitary method to find the amount of VAT included in a plane fare quoted at $A322 in these countries:
a Italy **b** Cyprus **c** Ireland **d** Switzerland

6 Use the unitary method to find the amount of VAT included in the cost of a tablet computer quoted at $A299 in these countries.
a New Zealand **b** France **c** Switzerland **d** Netherlands

7 A camera is priced at $A347 in Germany. The price includes VAT. Calculate the cost of the same camera including VAT if purchased in:
a Italy **b** Cyprus **c** Ireland **d** New Zealand.

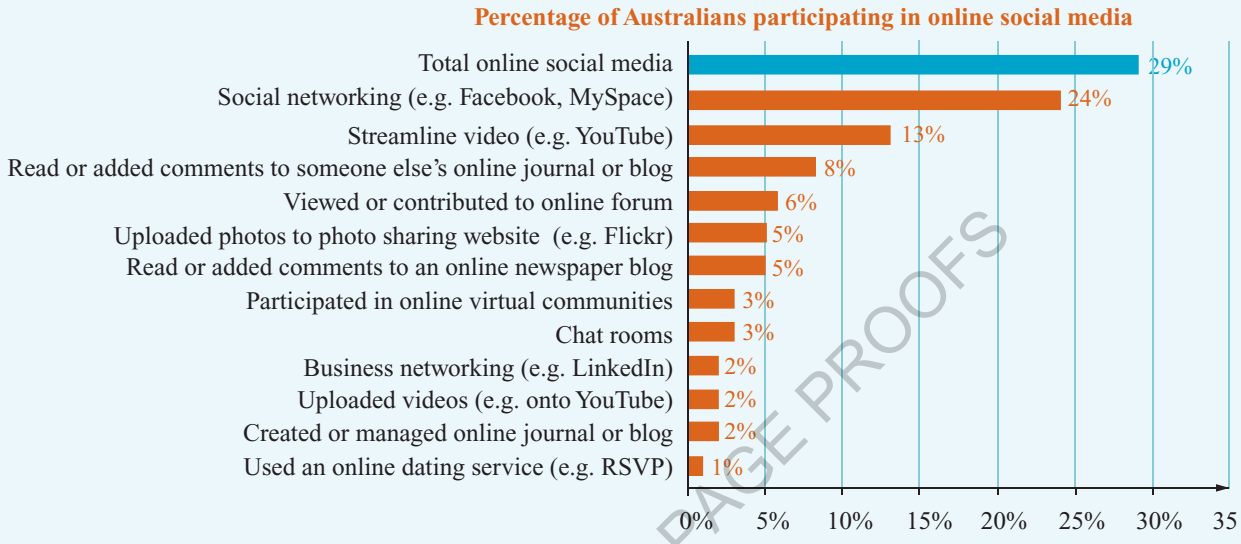
8 A carry-on airline bag is priced at $A99 in Ireland. The price -includes VAT. Calculate the cost of the same carry-on airline bag including VAT if purchased in:
a Belgium **b** Germany **c** South Africa **d** Italy.

Language in mathematics

Online social media

An estimated 29% of Australians (5.2 million) participated in some type of online social media activity in an average 4-week period, according to Roy Morgan Research data for the year ended March 2010.

The most popular social media activity was visiting social networking sites such as Facebook and MySpace, with 24% of Australians 14+ years of age using them in an average 4-week period. Streamed videos, such as YouTube, were used by 13%; online journals and blogs by 8%; and online forums by 6%.



Source: http://www.roymorganonlinestore.com/News/1118---Over-a-quarter-of-Australians-participate-i.aspx

Jane Ianniello, Roy Morgan Research International Director of Tourism, Travel & Leisure, stated:

> 'An increasing percentage of Australians are participating in online social media. The good news for the Australian tourism industry is that people participating in online social media are more likely than the average Australian to take holidays, both domestic and overseas. They are also more likely to provide advice to their friends and family about holiday and travel, so they are potentially useful advocates for a tourism destination. To this end social media represents a real opportunity to the tourism industry.'

This information highlights the positive impacts that social media can have for the tourism industry.

1 Do you think that the statistical information is sufficient to support the claims that social media positively impacts upon the tourism industry? Explain your answer.

2 Why do you think social media has become such a powerful force in today's modern economy? It may be helpful to ask your classmates what types of social media they access, when, how often and for what purpose. How do you think the figures above would have changed since 2010?

3 Research a holiday destination of your choice online.

- **a** Is there sufficient information online to make an informed decision?
- **b** Is there evidence of social media to assist you in making your choices regarding this destination?
- **c** Do you find the use of social media helpful or a deterrent?

4 In class debate that: *Social media enables us as consumers to make informed choices*. Run a series of debates regarding the impact of social media in our lives. Tourism is only one area. Undoubtedly you will be able to look at the many areas of our everyday life that are impacted both positively and negatively by the forces of social media.

Terms

ascending	compare	conversion	convert	cost price
decrease	decimal	descending	discount	estimate
equivalent	fraction	increase	improper fraction	loss
mixed numeral	percentage	place value	profit	proper fraction
rounding	selling price	simplify		

Check your skills

1 Express 0.08% as a decimal.

A 0.0008 **B** 0.008 **C** 0.08 **D** 0.8

2 Express $5\frac{5}{6}$ as a percentage.

A 58.3 **B** 5.83 **C** 58.33 **D** 583.3

3 Express 82 L as a percentage of 90 L.

A 0.91% **B** 9.1% **C** 91.1% **D** 911.1%

4 Express 32 min as a percentage of $1\frac{1}{4}$ h.

A 0.426% **B** 4.26% **C** 42.6% **D** 426.6%

5 Find $52\frac{1}{2}$% of $7500.

A $3937.50 **B** $3562.50 **C** $3973.50 **D** $3937.50

6 Increase 620 kg by 12%.

A 74.4 kg **B** 545.6 kg **C** 694.4 kg **D** 644.4 kg

7 Decrease $230 by 56%.

A $358.80 **B** $101.20 **C** $149.50 **D** $105.80

8 Calculate the percentage increase from 36 kg to 65 kg to the nearest per cent.

A 55% **B** 80% **C** 45% **D** 81%

9 What is 100% of a quantity if 27% is 189?

A 1.89 **B** 7 **C** 51.03 **D** 700

10 The original price of a laptop is increased by 35% to $1146.15. What was the original price?

A $3274.71 **B** $1146.15 **C** $849 **D** $401.15

11 If 65% of a quantity is 572 what is 42% of the quantity?

A $371.80 **B** $369.60 **C** $240.24 **D** $156.16

12 Brendan and Tiarne purchased a house in 2007 for $430 000. They sold it in 2013 for $572 000. Express the profit as a percentage of the purchase price.

A 33% **B** 25% **C** 30% **D** 75%

13 A car with cost price of $6000 is sold at a loss of 45%. What is the selling price?

A $2700 **B** $3300 **C** $8700 **D** $9300

14 A ring is sold for $840. This is a profit of 40%. What was the cost price of the ring?

A $2100 **B** $504 **C** $600 **D** $336

15 An item valued at $675 needs to have 10% GST added. What is the selling price inclusive of GST?

A $607.50 **B** $668.25 **C** $742.50 **D** $67.50

16 A watch is advertised at $199 including GST. What was the pre-GST cost of the watch?

A $19.90 **B** $179.10 **C** $18.09 **D** 180.91

If you have any difficulty with these questions, refer to the examples and questions in the section listed in the table.

Question	1, 2	3–5	6, 7	8	9–11	12–14	15, 16
Section	A	B	C	D	E	F	G

7A Review set

1 Find 15% of 200 kg.

2 Express 26 kg as a percentage of 78 kg, correct to 2 decimal places.

3 Increase 100 by 40%.

4 Decrease 280 by 25%.

5 The amount of water in a tank increases from 80 L to 135 L. What is the percentage increase?

6 Find the percentage decrease from 85 kg to 68 kg.

7 Find 100% of a quantity if 37% is $155.40.

8 The price of a bicycle is increased by 60% to $638.40. Calculate the original price.

9 An antique gun purchased for $1200 was later sold for $2900.

a Calculate the profit.

b Express the profit as a percentage of the cost price.

10 A necklace with a cost price of $149 is sold at a loss of 12%. Calculate the selling price.

11 A skateboard was sold for $76.50. This was a loss of 15%. Calculate the cost price.

07030_Photo of a skateboard for sale (or something else from questions 9 to 12 Review set 7A

12 A microwave oven is listed at $189 including GST.

a Calculate the GST.

b Calculate the pre-GST price.

7B Review set

1 Robyn scored 73 out of 100 in a Science exam. Express her result as a percentage.

2 Write 55 g as a percentage of 250 g.

3 Write $0.24 as a percentage of $2.40.

4 Find 53% of $400.

5 Find $5\frac{1}{4}$% of 200 kg.

6 Daniel earns $720 per week. He spends 46% of his income on rent and household expenditure, 22% on entertainment and the remainder is placed in a savings account. Calculate the amount of money Daniel allocates each week to:

a rent and household expenditure **b** entertainment **c** savings

7 Express 45 cm as a percentage of 1.2 m.

8 Decrease 14 m by 8%.

9 Joe purchases bananas for 20c each. If he sells them at an increased price of 160%, what is the selling price of a banana?

10 Find 100% of a quantity if 62% is $264.12.

11 A tennis racquet was sold for $135. This was a profit of 43%. Calculate the cost price.

12 Calculate the GST on a DVD player listed at $89 excluding GST.

7C Review set

1 Express 4.2 kg as a percentage of 800 g.

2 Express 64 L as a percentage of 80 L.

3 Find 42% of 5000 km.

4 Increase 84 m by 6%.

5 Find the percentage decrease from 135 L to 61 L.

6 Find 100% of a quantity if 135% is $75.60.

7 The price of a concert ticket is increased by 140% to $124.60. Calculate the original price.

8 A signed West Tigers jumper purchased for $800 was sold for $2000.
- **a** Calculate the profit.
- **b** Express the profit as a percentage of the cost price.

9 An Eels jumper was sold for $35. This was a loss of 76%. Calculate the cost price.

10 Craig purchased a mountain bike for $1800. He later sold it for $1332. Express the loss as a percentage of the cost price.

11 Calculate the GST on a dinner set listed at $385 excluding GST.

12 Calculate the pre-GST price of a tracksuit listed at $99 including GST.

7D Review set

1 Express 4.5 m as a percentage of 120 cm.

2 Express 660 g as a percentage of 1.2 kg.

3 Find 72% of $80.

4 Decrease $6500 by 28%.

5 Over a period of time the value of a house increased by 15% to $564 000. Find the original value of the house, to the nearest dollar.

6 Calculate the percentage increase from 48 kg to 91 kg.

7 Calculate the percentage decrease from 112 m to 78 m.

8 Find 100% of a quantity if 38% is 29.64 kg.

9 A brochure advertises jackets for 30% off the original price. Calculate the original cost if the sale price is $455.

10 The price of a concert ticket is increased by 74% to $374.10. Calculate the original price.

11 A radio-controlled plane with a cost price of $349 is sold at a loss of 23%. Calculate the selling price.

12 A collector card was sold for $475. This was a profit of 35%. Calculate the cost price.

13 Find the GST on an item marked at $1980 including 10% GST.

14 Calculate the selling price of an item valued at $95 if 10% GST must be added.