

Financial Mathematics

Review of percentages

Which option should Jamie choose?

Jamie currently earns \$38 460 p.a. (per year) and is given a choice of two different pay rises. Which should she choose and why?

Choice A	Choice B
Increase of \$20 a week	Increase of 2% on p.a. salary

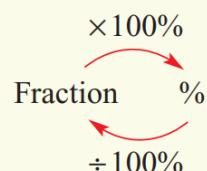
- A **percentage** means ‘out of 100’. It can be written using the symbol %, or as a fraction or a decimal.

For example: 75 per cent = $75\% = \frac{75}{100}$ or $\frac{3}{4} = 0.75$

- To convert a fraction or a decimal to a percentage, multiply by 100%, or $\frac{100\%}{1}$.

- To convert a percentage to a fraction, write it with a **denominator** of 100 and simplify.

For example: $15\% = \frac{15}{100} = \frac{3}{20}$

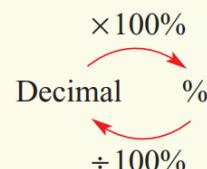


- To convert a percentage to a decimal, divide by 100%.

For example: $15\% = 15 \div 100 = 0.15$

- To find a percentage of a quantity, write the percentage as a fraction or a decimal, then multiply by the quantity.

$$x\% \text{ of } P = \frac{x}{100} \times P$$



Percentage

A convenient way of writing fractions with denominators of 100

Denominator

The part of a fraction that sits below the dividing line

1 Write the following with denominators of 100.

a $\frac{2}{5}$

b $\frac{17}{20}$

c $\frac{49}{50}$

d $\frac{7}{25}$

e $\frac{9}{10}$

2 Complete the following.

a $7\% = \frac{7}{\square}$

b $0.9 = \square\%$

c $\frac{3}{5} = \square\%$

3 Use mental strategies to find:

a 10% of \$7.50

b 20% of \$400

c 50% of \$98

d 75% of \$668

e 25% of \$412

f 2% of \$60

g 5% of \$750

h $33\frac{1}{3}\%$ of \$1200

i 30% of \$15

Example 1 Converting to a percentage

Write each of the following as a percentage.

a $\frac{19}{20}$

b $\frac{3}{8}$

c 0.07

4 Convert each fraction to a percentage.

a $\frac{1}{2}$

b $\frac{1}{5}$

c $\frac{1}{4}$

d $\frac{1}{10}$

e $\frac{1}{100}$

f $\frac{7}{25}$

g $\frac{15}{50}$

h $\frac{3}{4}$

i $\frac{5}{8}$

j $\frac{19}{25}$

k $\frac{99}{100}$

l $\frac{47}{50}$

5 Write these decimals as percentages.

a 0.17

b 0.73

c 0.48

d 0.09

e 0.06

f 0.13

g 1.13

h 1.01

i 0.8

j 0.9

k 0.99

l 0.175

Example 2 Writing percentages as simple fractions

Write each of the following percentages as a simple fraction.

a 37%

b 58%

c $6\frac{1}{2}\%$

6 Write each percentage as a simple fraction.

a 71%

b 80%

c 25%

d 55%

e 40%

f 88%

g 15%

h $16\frac{1}{2}\%$

i $17\frac{1}{2}\%$

j $2\frac{1}{4}\%$

k $5\frac{1}{4}\%$

l $52\frac{1}{2}\%$

Example 3 Writing a percentage as a decimal

Convert these percentages to decimals.

a 93%

b 7%

c 30%

7 Convert to decimals.

a 61%

b 83%

c 75%

d 45%

e 9%

f 90%

g 50%

h 16.5%

i 7.3%

j 200%

k 430%

l 0.5%

Example 4 Finding a percentage of a quantity

Find 42% of $\$1800$.

8 Use a calculator to find:

a 10% of $\$250$

b 50% of $\$300$

c 75% of $\$80$

d 12% of $\$750$

e 9% of $\$240$

f 43% of 800 grams

g 90% of $\$56$

h 110% of $\$98$

i $17\frac{1}{2}\%$ of 2000 m

- 9** A 300 g pie contains 15 g of saturated fat.
- What fraction of the pie is saturated fat?
 - What percentage of the pie is saturated fat?
- 10** About 80% of the mass of a human body is water. If Hugo is 85 kg, how many kilograms of water are in his body?
- 11** Rema spends 12% of the 6.6 hour school day in Maths. How many minutes are spent in the Maths classroom?
- 12** In a cricket match, Brett spent 35 minutes bowling. His team's total fielding time was $3\frac{1}{2}$ hours. What percentage of the fielding time, correct to 2 decimal places, did Brett spend bowling?
- 
- 13** Malcolm lost 8 kg, and now weighs 64 kg. What percentage of his original weight did he lose?
- 14** 47.9% of a local council's budget is spent on garbage collection. If a rate payer pays \$107.50 per quarter in total rate charges, how much do they contribute in a year to garbage collection?

Answers

1 a $\frac{40}{100}$ b $\frac{85}{100}$ c $\frac{98}{100}$

d $\frac{28}{100}$ e $\frac{90}{100}$

2 a 100 b 90 c 60

3 a \$0.75 b \$80 c \$49 d \$501 e \$103
f \$1.20 g \$37.50 h \$400 i \$4.50

4 a 50% b 20% c 25% d 10%
e 1% f 28% g 30% h 75%
i $62\frac{1}{2}\%$ j 76% k 99% l 94%

5 a 17% b 73% c 48% d 9%
e 6% f 13% g 113% h 101%
i 80% j 90% k 99% l 17.5%

6 a $\frac{71}{100}$ b $\frac{4}{5}$ c $\frac{1}{4}$ d $\frac{11}{20}$
e $\frac{2}{5}$ f $\frac{22}{25}$ g $\frac{3}{20}$ h $\frac{33}{200}$

i $\frac{7}{40}$ j $\frac{9}{400}$ k $\frac{21}{400}$ l $\frac{21}{40}$

7 a 0.61 b 0.83 c 0.75 d 0.45
e 0.09 f 0.9 g 0.5 h 0.165
i 0.073 j 2 k 4.3 l 0.005

8 a \$25 b \$150 c \$60 d \$90 e \$21.60
f 344 grams g \$50.40 h \$107.80 i 350 m

9 a $\frac{15}{300} = \frac{1}{20}$ b 5%

10 68 kg

11 47.52 minutes

12 16.67%

13 $11\frac{1}{9}\%$

14 \$205.97

Applying percentages

- To increase by a given percentage, multiply by the sum of 100% and the given percentage.

For example: To increase by 12%, multiply by 112% or 1.12.

- To decrease by a given percentage, multiply by 100% minus the given percentage.

For example: To decrease by 20%, multiply by 80% or 0.8.

- Profits and discounts

- The normal price of the goods recommended by the manufacturer is called the retail price.

- If there is a sale and the goods are less than the retail price, they are said to be **discounted**.

- Profit** = selling price – cost price

- Percentage profit = $\frac{\text{profit}}{\text{cost price}} \times 100\%$

- Percentage discount = $\frac{\text{discount}}{\text{cost price}} \times 100\%$

Discount

An amount subtracted from a price

Profit The amount of money made by selling an item or service for more than its cost

- By what percentage do you multiply to increase an amount by:

- a 10%?
- b 20%?
- c 50%?
- d 2%?
- e 18%?

- By what percentage do you multiply to decrease an amount by:

- a 5%?
- b 30%?
- c 15%?
- d 50%?
- e 17%?

- Decide how much profit or loss is made in each of the following situations.

- | | |
|------------------------|------------------------|
| a cost price = \$15 | selling price = \$20 |
| b cost price = \$17.50 | selling price = \$20 |
| c cost price = \$250 | selling price = \$234 |
| d cost price = \$147 | selling price = \$158 |
| e cost price = \$3.40 | selling price = \$1.20 |

Example 5 Increasing by a given percentage

Increase \$370 by 8%.

- 4 a Increase \$90 by 5%.
b Increase \$400 by 10%.
c Increase \$55 by 20%.
d Increase \$490 by 8%.

Example 6 Decreasing by a given percentage

Decrease \$8900 by 7%.

- 5 a Decrease \$1500 by 5%.
b Decrease \$400 by 10%.
c Decrease \$470 by 20%.
d Decrease \$80 by 15%.

Example 7 Calculating profits and percentage profit

The cost price for a new car is \$24 780 and it is sold for \$27 600.

- a Calculate the profit.
b Calculate the percentage profit to 2 decimal places.

$$\text{Percentage profit} = \frac{\text{profit}}{\text{cost price}} \times 100\%$$

- 6 Copy and complete the table on profits and percentage profit.

Cost price	Selling price	Profit	Percentage profit
a \$10	\$16		
b \$240	\$300		
c \$15	\$18		
d \$250	\$257.50		
e \$3100	\$5425		
f \$5.50	\$6.49		

Example 8 Finding the selling price

A retailer buys some calico material for \$43.60 a roll. He wishes to make a 35% profit.

- a What will be the selling price per roll?
- b If he sells 13 rolls, what profit will he make?

- 7 A retailer buys some snow globes for \$41.80 each. He wishes to make a 25% profit.

- a What will be the selling price per snow globe?
 - b If he sells a box of 25 snow globes, what profit will he make?
-

Example 9 Finding the discounted price

A shirt worth \$25 is discounted by 15%.

- a What is the selling price?
- b How much is the saving?

- 10 Samantha buys a wetsuit from the sports store where she works. Its original price was \$79.95. If employees receive a 15% discount:

- a What is the selling price?
- b How much will Samantha save?

- 4** **a** Increase \$90 by 5%.
c Increase \$55 by 20%.
e Increase \$50 by 12%.
g Increase \$49.50 by 14%.
- b** Increase \$400 by 10%.
d Increase \$490 by 8%.
f Increase \$7000 by 3%.
h Increase \$1.50 by 140%.
- 5** **a** Decrease \$1500 by 5%.
c Decrease \$470 by 20%.
e Decrease \$550 by 25%.
g Decrease \$119.50 by 15%.
- b** Decrease \$400 by 10%.
d Decrease \$80 by 15%.
f Decrease \$49.50 by 5%.
h Decrease \$47.10 by 24%.
- 7** A retailer buys some snow globes for \$41.80 each. He wishes to make a 25% profit.
a What will be the selling price per snow globe?
b If he sells a box of 25 snow globes, what profit will he make?
- 8** Ski jackets are delivered to a shop in packs of 50 for \$3500. If the shop owner wishes to make a 35% profit:
a What will be the total profit made on a pack?
b What is the profit on each jacket?
- 9** A second-hand car dealer bought a trade-in car for \$1200 and wishes to resell it for a 28% profit. What is the resale price?
- 11** A travel agent offers a 12.5% discount on airfares if you travel during May or June. If the normal fare to London (return trip) is \$2446:
a What is the selling price?
b How much is the saving?
- 12** A store sells second-hand goods at 40% off the recommended retail price. For a lawn mower valued at \$369:
a What is the selling price?
b How much do you save?
- 
- 

13 A pair of sports shoes is discounted by 47%. If the recommended price was \$179:

- a** What is the amount of the discount?
- b** What will be the discounted price?



14 Jeans are priced at a May sale for \$89. If this is a saving of 15% off the selling price, what do the jeans normally sell for?

15 Discounted tyres are reduced in price by 35%.

They now sell for \$69 each. Determine:

- a** the normal price of one tyre
- b** the saving if you buy one tyre

16 The local shop purchases a carton of containers for \$54. Each container is sold for \$4. If the carton has 30 containers, determine:

- a** the profit per container
- b** the percentage profit per container, to 2 decimal places
- c** the overall profit per carton
- d** the overall percentage profit, to 2 decimal places

Answers

- 1 a 110% b 120% c 150% d 102% e 118%
- 2 a 95% b 70% c 85% d 50% e 83%
- 3 a $P:\$5$ b $P:\$2.50$ c Loss: \$16
d $P:\$11$ e Loss: \$2.20
- 4 a \$94.50 b \$440 c \$66 d \$529.20
e \$56 f \$7210 g \$56.43 h \$3.60
- 5 a \$1425 b \$360 c \$376 d \$68
e \$412.50 f \$47.03 g \$101.58 h \$35.80

6	a	\$6	60%
	b	\$60	25%
	c	\$3	20%
	d	\$7.50	3%
	e	\$2325	75%
	f	\$0.99	18%

- 7 a \$52.25 b \$261.25
- 8 a \$1225 b \$24.50
- 9 \$1536
- 10 a \$67.96 b \$11.99
- 11 a \$2140.25 b \$305.75
- 12 a \$221.40 b \$147.60
- 13 a \$84.13 b \$94.87
- 14 \$104.71
- 15 a \$106.15 b \$37.15
- 16 a \$2.20 b 122.22% c \$66 d 122.22%

Income

Methods of payment

- Hourly **wages**: You are paid a certain amount per hour worked.
- **Commission**: You are paid a percentage of the total amount of sales.
- **Salary**: You are paid a set amount per year, regardless of how many hours you work.
- **Fees**: You are paid according to the **charges** you set; e.g. doctors, lawyers, contractors.
- Some terms you should be familiar with include:
 - **Gross income**: The total amount of money you earn before taxes and other deductions
 - **Deductions**: Money taken from your income before you are paid; e.g. taxation, union fees, superannuation
 - **Net income**: The amount of money you actually receive after the deductions are taken from your gross income

Net income = gross income – deductions

Payments by hourly rate

- If you are paid by the hour you will be paid an amount per hour for your normal working time. Usually, normal working time is 38 hours per week. If you work overtime the rates may be different.

Normal: $1.0 \times$ normal rate

Time and a half: $1.5 \times$ normal rate

Double time: $2.0 \times$ normal rate

- If you work shift work the hourly rates may differ from shift to shift.

For example:

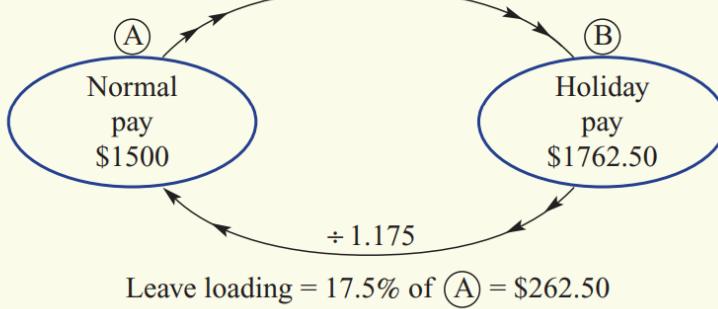
6 a.m.–2 p.m.	\$12.00/hour	(regular rate)
2 p.m.–10 p.m.	\$14.30/hour	(afternoon shift rate)
10 p.m.–6 a.m.	\$16.80/hour	(night shift rate)

Leave loading

- Some wage and salary earners are paid leave loading. When they are on holidays, they earn their normal pay plus a bonus called leave loading. This is usually 17.5% of their normal pay.

$$100\% + 17.5\% = 117.5\% \\ = 1.175$$

$\times 1.175$



- If Tao earns \$570 for 38 hours' work, calculate his:
 - hourly rate of pay
 - time and a half rate
 - double time rate
 - annual income, given that he works 52 weeks a year, 38 hours a week
- Which is better: \$5600 a month or \$67 000 a year?
- Callum earns \$1090 a week and has annual deductions of \$19 838. What is Callum's net income for the year?

Example 10 Finding gross and net income (including overtime)

Pauline is paid \$13.20 per hour at the local stockyard to muck out the stalls. Her normal hours of work are 38 hours per week. She receives time and a half for the next 4 hours worked and double time after that.

- What will be Pauline's gross income if she works 50 hours?
- If Pauline pays \$220 per week in taxation and \$4.75 in union fees, what will be her weekly net income?

4 Copy and complete this table.

	Hourly rate	Normal hours worked	Time and a half hours	Double time hours	Gross income	Deductions	Net income
a	\$15	38	0	0		\$155	
b	\$24	38	2	0		\$220	
c	\$13.15	38	4	1		\$300	
d	\$70	40	2	3		\$510	
e	\$17.55	35	4	6		\$184	

Example 11 Calculating shift work

Michael is a shift worker and is paid \$10.60 per hour for the morning shift, \$12.34 per hour for the afternoon shift and \$16.78 per hour for the night shift. Each shift is 8 hours. In a given fortnight he works four morning, two afternoon and three night shifts. Calculate his gross income.

- 5** Greg works shifts at a processing plant. In a given rostered fortnight he works:
- three day shifts (\$10.60 per hour)
 - four afternoon shifts (\$12.34 per hour)
 - four night shifts (\$16.78 per hour)
- a** If each shift is 8 hours long, determine his gross income for the fortnight.
- b** If the answer to part **a** was his average fortnightly income, what would be his gross income for a year (52 weeks)?
- c** If he is to be paid monthly, what would be his gross income for a month?

Example 12 Calculating income involving commission

Jeff sells memberships to a gym and receives \$225 per week plus 5.5% commission on his sales. Calculate his gross income after a 5-day week.

Day	1	2	3	4	5
Sales (\$)	680	450	925	1200	1375

- 6** A real estate agent receives 2.75% commission on the sale of a house valued at \$125 000. Find the commission earned.
- 7** A car salesman earns \$500 a month plus 3.5% commission on all sales. In the month of January his sales total \$56 000. Calculate:
- a** his commission for January **b** his gross income for January
- 8** Portia earns an annual salary of \$27 000 plus 2% commission on all sales. Find:
- a** her weekly base salary before sales
b her commission for a week where her sales totalled \$7500
c her gross weekly income for the week mentioned in part **b**.
d her annual gross income if over the year her sales totalled \$571 250

Example 13 Calculating holiday pay

Rachel is normally paid \$1200 per week. When she is on holidays she is paid 17.5% p.a. leave loading.

- a How much is her holiday pay for 1 week?
- b How much is her leave loading for 1 week?

-
- 9 Ashton is normally paid \$900 per week. When he is on holidays he is paid leave loading.
 - a Calculate Ashton's holiday pay for 1 week.
 - b Calculate Ashton's leave loading for 1 week.
 - 10 Mary earns \$800 per week. Calculate her holiday pay for 4 weeks, including leave loading.
-
- 11 If Simone received \$2874 on the sale of a property worth \$95 800, calculate her rate of commission.
 - 12 Jonah earns a commission on his sales of fashion items. For goods to the value of \$2000 he receives 6% and for sales over \$2000 he receives 9% on the amount in excess of \$2000. In a given week he sold \$4730 worth of goods. Find the commission earned.
 - 13 Mel is taking her holidays. She received \$2937.50. This includes her normal pay and her leave loading. How much was the leave loading?
 - 14 Toby earns 1.75% commission on all sales at the electrical goods store where he works. If Toby earns \$35 in commission on the sale of one television, how much did the TV sell for?

- 15** Refer to the payslip below to answer the following questions. During 2013, Elmo received 26 of these payslips.

Kuger Incorporated			
Employee ID: 75403A		Page: 1	
Name: Elmo Clowner		Pay Period: 21/05/2013	
Pay Method: EFT	Tax Status: Gen Exempt		
Bank account name: E. Clowner			
Bank: Mathsville Credit Union			
BSB: 102-196 Account No: 00754031			
Payment Details this pay:			
Amount	Days	Payment description	Rate/Frequency
2777.16	14.00	Normal time	\$72 454/annum
Before tax deductions:			
This pay	Description		
170	Salary sacrifice: car pre-tax deduction		
Miscellaneous deductions:			
This pay	Description		
52.90	Health fund		
23.10	Union fees		
<u>76.00</u>			
Reconciliation details:			
This pay	YTD	Description	
2607.15	62 571.60	Taxable gross pay	
616.00	14 784.00	Less income tax	
<u>76.00</u>	<u>1 824.00</u>	Less miscellaneous deductions	
<u>1915.15</u>	<u>45 693.60</u>		

- a** For what company does Elmo work?
- b** What is the name of Elmo's bank and what is his account number?
- c** How much gross pay does Elmo earn in 1 year?
- d** How often does Elmo get paid?
- e** How much, per year, does Elmo salary sacrifice?
- f** How much each week is Elmo's health fund contributions?
- g** Calculate the union fees for 1 year.
- h** Using the information on this payslip, calculate Elmo's annual tax and also his annual net income.

Answers

1 a \$15 b \$22.50 c \$30 d \$29 640

2 \$5600 a month by \$200

3 \$36 842

4

	Gross income	Net income
a	\$570	\$415
b	\$984	\$764
c	\$604.90	\$304.90
d	\$3430	\$2920
e	\$930.15	\$746.15

5 a \$1186.24 b \$30 842.24 c \$2570.19

6 \$3437.50

7 a \$1960 b \$2460

8 a \$519.23 b \$150 c \$669.23 d \$38 425

9 a \$1057.50 b \$157.50

10 \$3760

11 3%

12 \$365.70

13 \$437.50

14 \$2000

15 a Kuger Incorporated

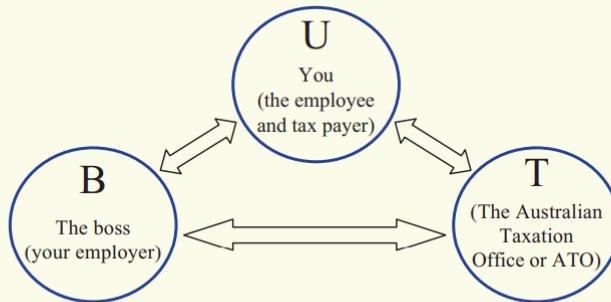
 b Mathsiville Credit Union, 00754031

 c \$72 454 d fortnightly

 e \$4420 f \$26.45

 g \$600.60 h \$16 016 tax, net = \$49 793.90

1D The PAYG income tax system



- The PAYG tax system works in the following way.
 - U works for and gets paid by B every week, fortnight or month.
 - B calculates the tax that U should pay for the amount earned by U.
 - B sends that tax to T every time U gets paid.
 - T passes the income tax to the federal government.
 - On June 30, B gives U a **payment summary** to confirm the amount of tax that has been paid to T on behalf of U.
 - Between July 1 and October 31, U completes a **tax return** and sends it to T. Some people pay a registered tax agent to do this return for them.
 - On this tax return, U lists the following.
 - All forms of income, including interest from investments.
 - Legitimate deductions shown on receipts and invoices, such as work-related expenses and donations.
 - **Taxable income** is calculated using the formula:
$$\text{Taxable income} = \text{gross income} - \text{deductions}$$
- There are tables and calculators on the ATO website, such as the following.

Taxable income	Tax on this income
0 – \$18 200	Nil
\$18 201 – \$37 000	19c for each \$1 over \$18 200
\$37 001 – \$80 000	\$3572 plus 32.5c for each \$1 over \$37 000
\$80 001 – \$180 000	\$17 547 plus 37c for each \$1 over \$80 000
\$180 001 and over	\$54 547 plus 45c for each \$1 over \$180 000

This table can be used to calculate the amount of tax U *should have paid* (i.e. the **tax payable**), as opposed to the tax U *did pay* during the year (i.e. the tax withheld). Each row in the table is called a tax bracket.

- U may also need to pay the Medicare levy. This is a scheme in which all Australian taxpayers share in the cost of running the medical system. For many people this is currently 1.5% of their taxable income.
- It is possible that U may have paid too much tax during the year and will receive a **tax refund**.
- It is also possible that U may have paid too little tax and will receive a letter from T asking for the **tax liability** to be paid.

1 Complete this statement: Taxable income = _____ income minus _____.

Example 14 Calculating income tax payable

During the 2012/2013 financial year, Richard earned \$1050 per week (\$54 600 dollars per annum) from his employer and other sources, such as interest on investments. He has receipts for \$375 for work-related expenses and donations.

- Calculate Richard's taxable income.
- Use this tax table to calculate Richard's tax payable amount.

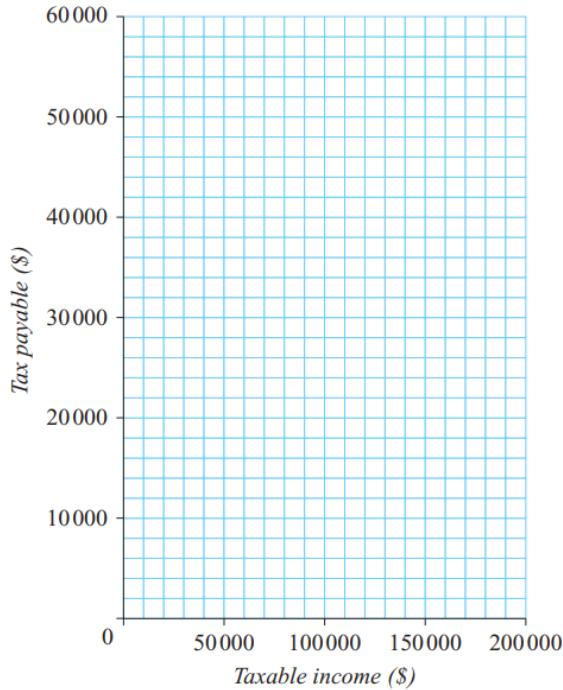
Taxable income	Tax on this income
0 – \$18 200	Nil
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\$80 001 – \$180 000	\$17 547 plus 37c for each \$1 over \$80 000
\$180 001 and over	\$54 547 plus 45c for each \$1 over \$180 000

- Richard must also pay the Medicare levy of 1.5% of his taxable income. How much is the Medicare levy?
- Add the tax payable and the Medicare levy amounts.
- Express the total tax in part **d** as a percentage of Richard's taxable income, to 1 decimal place.
- During the financial year, Richard's employer sent a total of \$7797 in tax to the ATO. Has Richard paid too much tax or not enough? Calculate his refund or liability.

Consider the amount of tax payable for these six people.

Taxable income	\$0	\$18 200	\$37 000	\$80 000	\$180 000	\$200 000
Tax payable	\$0	\$0	\$3572	\$17 457	\$54 547	\$63 547

Make a copy of this set of axes, plot the points, then join the dots with straight-line segments.



- 8** Lee has come to the end of her first financial year employed as a website developer. On June 30 she made the following notes about the financial year.

Gross income from employer	\$58 725
Gross income from casual job	\$7500
Interest on investments	\$75
Donations	\$250
Work-related expenses	\$425
Tax paid during the financial year	\$13 070

Taxable income
= all incomes – deductions



- a** Calculate Lee's taxable income.
- b** Use the tax table shown in **Example 14** to calculate Lee's tax payable amount.
- c** Lee must also pay the Medicare levy of 1.5% of her taxable income. How much is the Medicare levy?
- d** Add the tax payable and the Medicare levy.
- e** Express the total tax in part **d** as a percentage of Lee's taxable income, to 1 decimal place.
- f** Has Lee paid too much tax or not enough? Calculate her refund or liability.
- 9** Alec's Medicare levy is \$1312.50. This is 1.5% of his taxable income. What is his taxable income?
- 10** Tara is saving for an overseas trip. Her taxable income is usually about \$20 000. She estimates that she will need \$5000 for the trip, so she is going to do some extra work to raise the money. How much extra will Tara need to earn in order to save the extra \$5000 after tax?
- 11** When Saled used the tax table to calculate his income tax payable, it turned out to be \$23 097. What is his taxable income?
- Use the tax table given in Example 14 to determine in which tax bracket Saled falls.
- 12** Explain the difference between gross income and taxable income.
- 13** Explain the difference between a tax refund and a tax liability.
- 14** Gordana looked at the last row of the tax table and said, "It is so unfair that people in that tax bracket must pay 45 cents in every dollar in tax." Explain why Gordana is incorrect.

- 12** Explain the difference between gross income and taxable income.
- 13** Explain the difference between a tax refund and a tax liability.
- 14** Gordana looked at the last row of the tax table and said, “It is so unfair that people in that tax bracket must pay 45 cents in every dollar in tax.” Explain why Gordana is incorrect.
- 15** Consider the tax tables for the two consecutive financial years. Note that the amounts listed first in each table is often called the tax-free threshold (i.e. the amount that a person can earn before they must pay tax).

2011/2012	
Taxable income	Tax on this income
0 – \$6000	Nil
\$6001 – \$37 000	15c for each \$1 over \$6000
\$37 001 – \$80 000	\$4650 plus 30c for each \$1 over \$37 000
\$80 001 – \$180 000	\$17 550 plus 37c for each \$1 over \$80 000
\$180 001 and over	\$54 550 plus 45c for each \$1 over \$180 000
2012/2013	
Taxable income	Tax on this income
0 – \$18 200	Nil
\$18 201 – \$37 000	19c for each \$1 over \$18 200
\$37 001 – \$80 000	\$3572 plus 32.5c for each \$1 over \$37 000
\$80 001 – \$180 000	\$17 547 plus 37c for each \$1 over \$80 000
\$180 001 and over	\$54 547 plus 45c for each \$1 over \$180 000

- a** There are some significant changes between the financial years 2011/2012 and 2012/2013. Describe three of them.
- b** The following people had the same taxable income during both financial years. Find the difference and state whether they were advantaged or disadvantaged by the changes, or not affected at all?
- i** Ali: Taxable income = \$5000
 - ii** Xi: Taxable income = \$15 000
 - iii** Charlotte: Taxable income = \$30 000
 - iv** Diego: Taxable income = \$50 000

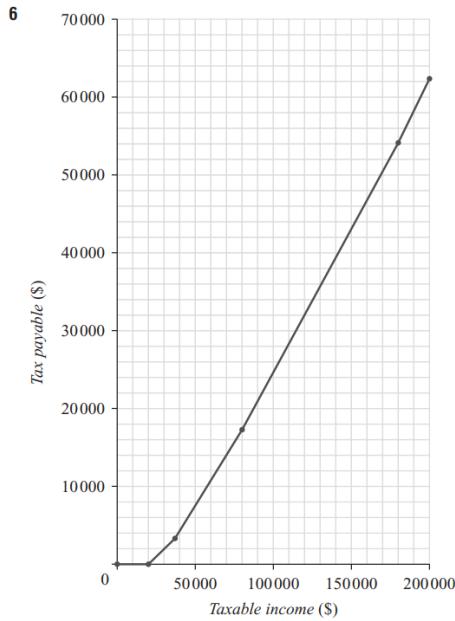
- 16** Below is the 2012/2013 tax table for people who are not residents of Australia but are working in Australia.

Taxable income	Tax on this income
0 – \$80 000	32.5c for each \$1
\$80 001 – \$180 000	\$26 000 plus 37c for each \$1 over \$80 000
\$180 001 and over	\$63 000 plus 45c for each \$1 over \$180 000

- Compare this table to the one in the example for Australian residents. What difference would it make to the tax paid by these people in 2012/2013 if they were non-residents rather than residents?
- a** Ali: Taxable income = \$5000
 - b** Xi: Taxable income = \$15 000
 - c** Charlotte: Taxable income = \$30 000
 - d** Diego: Taxable income = \$50 000

Answer

- 1** Taxable income = gross income minus deductions



- 8 a \$65 625 b \$12 875.13 c \$984.38
 d \$13 859.51 e 21.1% (to 1 d.p.)
 f Not enough paid; owes \$789.51
- 9 \$87 500
- 10 \$6172.84
- 11 \$95 000
- 12 Gross income is the total income earned before tax is deducted. Taxable income is found by subtracting tax deductions from gross income.
- 13 If a person pays too much tax during the year they will receive a tax refund. If they do not pay enough tax during the year they will have a tax liability to pay.
- 14 They only pay 45 cents for every dollar over \$180 000.
- 15 a The tax-free threshold has been increased from \$6000 to \$18 200. In the second tax bracket, the rate has changed from 15c to 19c. In the third tax bracket, the rate has changed from 30c to 32.5c.

b

	2011/ 2012	2012/ 2013	
Ali	\$0	\$0	No change
Xi	\$1350	\$0	\$1350 less tax to pay
Charlotte	\$3600	\$2242	\$1358 less tax to pay
Diego	\$8550	\$7797	\$753 less tax to pay

16

	Resident	Non-resident	
Ali	\$0	\$1625	
Xi	\$0	\$4875	
Charlotte	\$2242	\$9750	
Diego	\$7797	\$16 250	Non-residents pay a lot more tax than residents.

1F Simple interest

- The terms needed to understand **simple interest** are:
 - **principal (P)**: The amount of money borrowed or invested
 - **rate of interest (R)**: The annual (yearly) percentage rate of interest (e.g. 3% p.a.)
 - time periods (N): This is usually the number of years
 - interest (I): The amount of interest accrued over a given time.
- The formula for calculating simple interest is:
$$I = PRN$$

I = amount of interest
 P = principal (the initial amount borrowed or invested)
 R = interest rate per period, expressed as a decimal
 N = number of periods
- Total repaid = amount borrowed + interest

Simple interest

A type of interest that is paid on a loan or earned on an investment, which is always calculated on the principal amount loaned or invested

Principal (P) An amount of money invested in a financial institution or loaned to a person/business

Rate of interest (R)
The annual percentage rate of interest paid or earned on a loan or investment

Example 18 Using the simple interest formula

Use the simple interest formula, $I = PRN$, to find:

- a the interest (I) when \$600 is invested at 8% p.a. for 18 months
- b the annual interest rate (R) when \$5000 earns \$150 interest in 2 years

4.

Copy and complete this table of values for I , P , R and N .

	P	R	N	I
a	\$700	5% p.a.	4 years	
b	\$2000	7% p.a.	3 years	
c	\$3500	3% p.a.	22 months	
d	\$750	$2\frac{1}{2}\%$ p.a.	30 months	
e	\$22 500		3 years	\$2025
f	\$1770		5 years	\$354

Example 19 Calculating repayments with simple interest

\$3000 is borrowed at 12% p.a. simple interest for 2 years.

- a What is the total amount owed over the 2 years?
- b If repayments of the loan are made monthly, how much would each payment need to be?

- 5** \$5000 is borrowed at 11% p.a. simple interest for 3 years.
- What is the total amount owed over the 3 years?
 - If repayments of the loan are made monthly, how much would each payment need to be?
- 6** Under hire purchase, John bought a new car for \$11 500. He paid no deposit and decided to pay the loan off in 7 years. If the simple interest was at 6.45%, determine:
- the total interest paid
 - the total amount of the repayment
 - the payments per month
- 7** \$10 000 is borrowed to buy a second-hand BMW. The interest is calculated at a simple interest rate of 19% p.a. over 4 years.
- What is the total interest on the loan?
 - How much is to be repaid?
 - What is the monthly repayment on this loan?
- 8** Rebecca invests \$4000 for 3 years at 5.7% p.a. simple interest paid yearly.
- How much interest will she receive in the first year?
 - What is the total amount of interest Rebecca will receive over the 3 years?
 - How much money will Rebecca have after the 3-year investment?
- 9** How much interest will Giorgio receive if he invests \$7000 in stocks at 3.6% p.a. simple interest for 4 years?
- 10** An investment of \$15 000 receives an interest payment over 3 years of \$7200. What was the rate of simple interest per annum?
- 11** Jonathon wishes to invest \$3000 at 8% per annum. How long will he need to invest for his total investment to double?
- 12** Jakob wishes to invest some money for 5 years at 4.5% p.a. paid yearly. If he wishes to receive \$3000 in interest payments per year, how much should he invest? Round to the nearest dollar.
- 13** Gretta's interest payment on her loan totalled \$1875. If the interest rate was 5% p.a. and the loan had a life of 5 years, what amount did she borrow?

Calculate the interest first.

Substitute into the formula $I = PRN$ and solve the remaining equation.

Answer

4 a \$140

d \$46.88

5 a \$6650

6 a \$5192.25

7 a \$7600

8 a \$228

9 \$1008

10 16%

11 12.5 years

b \$420

e 3% p.a.

b \$184.72 per month

b \$16 692.25

b \$17 600

b \$684

c \$192.50

f 4% p.a.

c \$198.72

c \$366.67

c \$4684

12 \$66 667

13 \$7500