

# RATIO

**1** Anna, Bobby and Carl receive a sum of money.  
They share it in the ratio 12 : 7 : 8.  
Anna receives \$504.

(a) Calculate the **total** amount.

Answer(a) \$ ..... [3]

(b) (i) Anna uses 7% of her \$504 to pay a bill.  
Calculate how much she has left.

Answer(b)(i) \$ ..... [3]

(ii) She buys a coat in a sale for \$64.68.  
This was 23% less than the original price.  
Calculate the original price of the coat.

Answer(b)(ii) \$ ..... [3]

(c) Bobby uses \$250 of his share to open a bank account.  
This account pays compound interest at a rate of 1.6% per year.  
Calculate the amount in the bank account after 3 years.  
Give your answer correct to 2 decimal places.

Answer(c) \$ ..... [3]

(d) Carl buys a computer for \$288 and sells it for \$324.  
Calculate his percentage profit.

Answer(d) ..... % [3]

MARKING SCHEME:

1 (a)	1134	3	<b>M2</b> for $\frac{504}{12} \times (12 + 7 + 8)$ soi by answer of 1130 or <b>B1</b> for 27 or 42 or 294 or 336 seen
(b) (i)	468.72	3	<b>M2</b> for $\frac{93}{100} \times 504$ oe soi by 468.7 or 469 or <b>M1</b> for $\frac{7}{100} \times 504$ (implied by 35.28)
(ii)	84	3	<b>M2</b> for $\frac{64.68}{77} \times 100$ or <b>M1</b> for $(100 - 23)\% = 64.68$
(c)	262.19 cao	3	<b>M2</b> for $250 \times 1.016^3$ oe implied by answer 262.2 or better or <b>M1</b> for $250 \times 1.016^n$ oe $n > 2$ seen
(d)	12.5%	3	<b>M2</b> for $\frac{324 - 288}{288} \times 100$ or <b>M1</b> for $\frac{324}{288} \times 100$ (112.5) or $\frac{36}{288}$ (0.125)

**2** A train travels from Paris to Milan.

(a) The train departs from Paris at 20:28 and the journey takes 9 hours 10 minutes.

(i) Find the time the train arrives in Milan.

*Answer(a)(i)* ..... [1]

(ii) The distance between Paris and Milan is 850 km.

Calculate the average speed of the train.

*Answer(a)(ii)* ..... km/h [2]

(b) The total number of passengers on the train is 640.

- (i) 160 passengers have tickets which cost \$255 each.
- 330 passengers have tickets which cost \$190 each.
- 150 passengers have tickets which cost \$180 each.

Calculate the mean cost of a ticket.

*Answer(b)(i)* \$ ..... [3]

(ii) There are men, women and children on the train in the ratio

$$\text{men : women : children} = 4 : 3 : 1.$$

Show that the number of women on the train is 240.

*Answer(b)(ii)*

[2]

(iii) 240 is an increase of 60% on the number of women on the train the previous day.

Calculate the number of women on the train the previous day.

*Answer(b)(iii)* ..... [3]

(c) The length of the train is 210 m.

It passes through a station of length 340 m, at a speed of 180 km/h.

Calculate the number of seconds the train takes to pass completely through the station.

*Answer(c)* ..... s [3]

MARKING SCHEME:

(a) (i)	[0]5 38 oe	1	Allow 5h 38 but not 5h 38mins
(ii)	92.7 [92.72 to 92.73] oe	2	Allow $92\frac{8}{11}$ or $\frac{1020}{11}$ <b>M1</b> for $850 \div$ their 9 h 10 min in hours oe Allow $850 \div 9.1$ for <b>M1</b>
(b) (i)	204 or 203.9[0] to 203.91	3	<b>M1</b> for $160 \times 255 + 330 \times 190 + 150 \times 180$ [130 500] <b>M1</b> dep for $\div 640$
(ii)	$640 \div (4 + 3 + 1)$ $\times 3 [= 240]$	<b>M1</b> <b>M1</b>	[Can be in either order or shown together] Accept $240 \div 3 \times (4 + 3 + 1) = 640$ for <b>M2</b>
(iii)	150 www 3	3	<b>M2</b> for $240 \div 1.6$ oe or <b>M1</b> for recognition of $240 = 100 + 60\%$
(c)	11 cao www 3	3	<b>M1</b> for figs 340 or figs $550 \div$ speed [e.g. figs 188, figs 306] – can be spoiled by further work and <b>M1</b> for correct conversion of units to give answer in seconds e.g. speed = 50 m/s <b>M's</b> independent

3

A tennis club has 560 members.

(a) The ratio men : women : children = 5 : 6 : 3.

(i) Show that the club has 240 women members.

*Answer(a)(i)*

[2]

(ii) How many members are children?

*Answer(a)(ii)* ..... [1]

(b)  $\frac{5}{8}$  of the 240 women members play in a tournament.

How many women members do **not** play in the tournament?

*Answer(b)* ..... [2]

(c) The annual membership fee in 2013 is \$198 for each adult and \$75 for each child.

(i) Calculate the total amount the 560 members pay in 2013.

*Answer(c)(i)* \$ ..... [2]

(ii) The adult fee of \$198 in 2013 is 5.6% more than the fee in 2012.

Calculate the adult fee in 2012.

*Answer(c)(ii)* \$ ..... [3]

(d) The club buys 36 tennis balls for \$9.50 and sells them to members for \$0.75 each.

Calculate the percentage profit the club makes.

Answer(d) ..... % [3]

(e) A tennis court is a rectangle with length 23.7 m and width 10.9 m, each correct to 1 decimal place.

Calculate the upper and lower bounds of the perimeter of the court.

Answer(e) Upper bound ..... m

Lower bound ..... m [3]

MARKING SCHEME:

(a) (i)	$\frac{6}{5+6+3} \times 560$ [= 240]	2	Accept 'of' used instead of $\times$ <b>M1</b> for $560 \div (5 + 6 + 3)$
(ii)	120	1	
(b)	90	2	<b>M1</b> for $\frac{3}{8} \times 240$ oe
(c) (i)	96120 final answer	2	<b>M1</b> for <i>their(a)(ii)</i> $\times 75 + (560 - \textit{their (a)(ii)}) \times 198$ oe
(ii)	187.5[0] final answer	3	<b>M2</b> for $\frac{198}{1+0.056}$ oe or <b>M1</b> for $(100 + 5.6)[\%] = 198$ oe seen
(d)	184[.2....]	3	<b>M2</b> for $\frac{36 \times 0.75 - 9.5}{9.5} \times 100$ oe or <b>M1</b> for $\frac{36 \times 0.75}{9.5} \times 100$ or $36 \times 0.75 - 9.5$ [17.5] used implied by answer 84.2 or <b>SC1</b> for final answer 284[.2..]
(e)	69.4 and 69[.0] cao	3	<b>SC2</b> for one correct or both correct but reversed <b>M1</b> for two of 10.85, 10.95, 23.65 or 23.75 seen or $2(23.7 + 10.9) + 4(0.05)$ or $2(23.7 + 10.9) - 4(0.05)$

# 4

- (a) Ali and Ben receive a sum of money.  
They share it in the ratio 5 : 1.  
Ali receives \$2345.

Calculate the total amount.

Answer(a) \$ ..... [2]

- (b) Ali uses 11% of his \$2345 to buy a television.

Calculate the cost of the television.

Answer(b) \$ ..... [2]

- (c) A different television costs \$330.

- (i) Ben buys one in a sale when this cost is reduced by 15%.

How much does Ben pay?

Answer(c)(i) \$ ..... [2]

- (ii) \$330 is 12% less than the cost last year.

Calculate the cost last year.

Answer(c)(ii) \$ ..... [3]

- (d) Ali invests \$1500 of his share in a bank account.  
The account pays compound interest at a rate of 2.3% per year.

Calculate the total amount in the account at the end of 3 years.

*Answer(d)* \$ ..... [3]

- (e) Ali also buys a computer for \$325.  
He later sells this computer for \$250.

Calculate Ali's percentage loss.

*Answer(e)* ..... % [3]

MARKING SCHEME:

(a)	2814 final answer	2	<b>M1</b> for $2345 \div 5$ soi by 469 or ans = 2810
(b)	257.95 final answer	2	<b>M1</b> for $2345 \times 0.11$ oe or ans = 258
(c) (i)	280.5[0] final answer	2	<b>M1</b> for $330 \times (1 - 0.15)$ oe or ans = 281
(ii)	375	3	<b>M2</b> for $330 \div (1 - 0.12)$ oe Or <b>M1</b> for $330 = (100 - 12)\%$ oe
(d)	1605.89 or 1605.9[0]	3	<b>M2</b> for $1500 \times (1 + 0.023)^3$ oe soi by 1605.898751 or $1500 \times 1.07(05\dots)$ Or <b>M1</b> for $1500 \times (1 + 0.023)^2$ oe
(e)	23.1 or 23.07 to 23.08	3	<b>M2</b> for $\frac{325 - 250}{325} \times 100$ oe Or <b>M1</b> for $\frac{325 - 250}{325}$ soi by 0.2307... 3sf or better or $\frac{250}{325} \times 100$ soi by 76.9...

**5** Jane and Kate share \$240 in the ratio 5 : 7 .

(a) Show that Kate receives \$140.

*Answer(a)*

[2]

(b) Jane and Kate each spend \$20.

Find the new ratio Jane's remaining money : Kate's remaining money.  
Give your answer in its simplest form.

*Answer(b)* ..... : ..... [2]

(c) Kate invests \$120 for 5 years at 4% per year simple interest.

Calculate the total amount Kate has after 5 years.

*Answer(c)* \$ ..... [3]

(d) Jane invests \$80 for 3 years at 4% per year compound interest.

Calculate the total amount Jane has after 3 years.  
Give your answer correct to the nearest cent.

*Answer(d)* \$ ..... [3]

(e) An investment of \$200 for 2 years at 4% per year compound interest is the same as an investment of \$200 for 2 years at  $r\%$  per year simple interest.

Find the value of  $r$ .

*Answer(e)*  $r =$  ..... [3]

MARKING SCHEME:

(a)	$240 \div (5 + 7) \times 7$ [=140] oe	<b>M2</b>	<b>M1</b> for $240 \div (5 + 7)$ or $240 \times 7$
(b)	2 : 3 final answer	<b>2</b>	<b>B1</b> for ratio of form $2x : 3x$ seen or <b>SC1</b> for 3 : 2
(c)	144	<b>3</b>	<b>M2</b> for $120 + \frac{120 \times 4 \times 5}{100}$ oe  or <b>M1</b> for $\frac{120 \times 4 \times 5}{100}$
(d)	89.99 cao mark final answer	<b>3</b>	<b>B2</b> for 89.9[8...] shown but not spoiled or answer 90[.0.] nfw  or <b>M1</b> for $80 \times \left(\frac{104}{100}\right)^3$ oe  If <b>M1</b> spoiled by adding 80 or subtracting 80 then <b>SC1</b> for answers 169.99 or 9.99
(e)	4.08	<b>3</b>	<b>M2</b> for $\frac{200 \times r \times 2}{100} = 200 \times 1.04^2 - 200$ oe  or <b>M1</b> for $200 \times 1.04^2$ [216.3[2]] oe  or $\frac{200 \times r \times 2}{100}$ oe