# RATIO

**1** **(a)** **(i)** In a camera magazine, 63 pages are used for adverts.
The ratio    number of pages of adverts : number of pages of reviews $= 7:5$ .

Calculate the number of pages used for reviews.

*Answer(a)*(i) ............................................. [2]

**(ii)** In another copy of the magazine, 56 pages are used for reviews and for photographs.
The ratio    number of pages of reviews : number of pages of photographs $= 9:5$ .

Calculate the number of pages used for photographs.

*Answer(a)*(ii) ............................................. [2]

**(iii)** One copy of the magazine costs $4.90 .
An annual subscription costs $48.80 for 13 copies.

Calculate the percentage discount by having an annual subscription.

*Answer(a)*(iii) .......................................... % [3]

**(b)** In a car magazine,  25% of the pages are used for selling second-hand cars,
$62\frac{1}{2}\%$ of the **remaining** pages are used for features,
and the other 36 pages are used for reviews.

Work out the total number of pages in the magazine.

*Answer(b)* ............................................... [4]

**MARKING SCHEME:**

| | | | | |
|---|---|---|---|---|
| **(a)** | **(i)** | 45 | 2 | **M1** for $5 \times 63 \div 7$ |
| | **(ii)** | 20 | 2 | **M1** for $5 \times 56 \div 14$ |
| | **(iii)** | 23.4 or 23.38 to 23.41 | 3 | **M2** for $\dfrac{13 \times 4.9 - 48.8}{13 \times 4.9} \times 100$ <br> or $\dfrac{4.9 - 48.8 \div 13}{4.9} \times 100$ <br> Or <br> **M1** for $\dfrac{13 \times 4.9 - 48.8}{13 \times 4.9}$ or $\dfrac{48.8}{13 \times 4.9} \times 100$ or $76.6[\ldots]$ |
| **(b)** | | 128 | 4 | Using fractions (percentages / decimals): <br> **M1** for $\dfrac{3}{4} \times \dfrac{3}{8} \left[ = \dfrac{9}{32} \right]$ or $\dfrac{75}{100} \times 37.5$ [$= 28.125\%$] <br> **A1** for $\dfrac{9}{32}$ or $28.125[\%]$ <br> **M1** for $36 \div \dfrac{9}{32}$ oe <br> or $36 \times \dfrac{100}{28.125}$ oe <br><br> Partial percentages <br> **M1** for (Remaining) $\dfrac{100 \times 36}{37.5}$ [$= 96$] <br> **A1** for 96 <br> **M1** for $96 \div \dfrac{75}{100}$ oe <br> **SC1** for 288 |

**2** **(a)** A company makes compost by mixing loam, sand and coir in the following ratio.

$$\text{loam} : \text{sand} : \text{coir} \ = \ 7 : 2 : 3$$

**(i)** How much loam is there in a 72 litre bag of the compost?

*Answer(a)*(i) ...................................... litres [2]

**(ii)** In a small bag of the compost there are 13.5 litres of coir.

How much compost is in a small bag?

*Answer(a)*(ii) ...................................... litres [2]
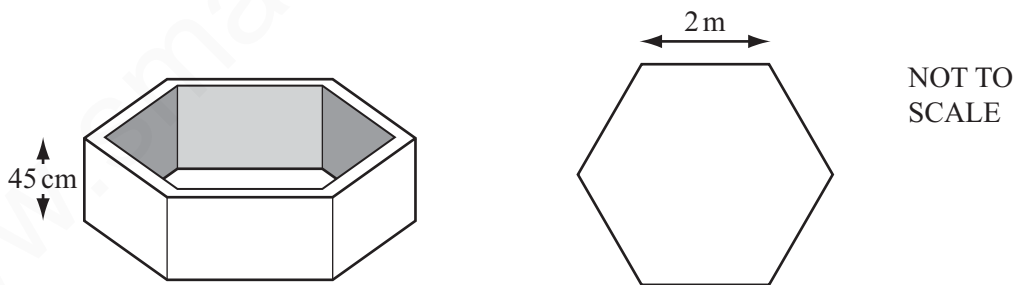
**(iii)** The price of a large bag of compost is $8.40 .
This is an increase of 12% on the price last year.

Calculate the price last year.

*Answer(a)*(iii) $ ............................................... [3]

**(b)** Teresa builds a raised garden bed in the shape of a hexagonal prism.



The garden bed has a height of 45 cm.
The cross section of the inside of the garden bed is a regular hexagon of side 2 m.

**(i)** Show that the area of the cross section of the inside of the garden bed is $10.4\,\text{m}^2$, correct to 3 significant figures.

*Answer(b)*(i)

[3]

**(ii)** Calculate the volume of soil needed to fill the garden bed.

*Answer(b)*(ii) .......................................... m³ [2]

**(iii)** Teresa wants to fill the garden bed with organic top soil.
She sees this advertisement in the local garden centre.

| ORGANIC TOP SOIL | Number of tonnes purchased | | |
|---|---|---|---|
| | 1 to 5 | 6 to 10 | Over 10 |
| Cost per tonne | $47.00 | $45.50 | $44.00 |

Organic top soil is sold in one tonne bags.
$1\,\text{m}^3$ of organic top soil has a mass of 1250 kg.

Calculate the cost of the organic top soil needed to fill the garden bed completely.
[1 tonne = 1000 kg]

*Answer(b)*(iii) $ ................................................ [4]

**MARKING SCHEME:**

| | | | | |
|---|---|---|---|---|
| **(a)** | **(i)** | | 2 | **M1** for $72 \div (7 + 2 + 3)$ |
| | **(ii)** | | 2 | **M1** for $13.5 \div 3 \times (7 + 2 + 3)$ oe |
| | **(iii)** | | 3 | **M2** for $8.4[0] \div 1.12$ oe <br> or **M1** for 112[%] associated with [\$]8.4[0] oe |
| **(b)** | **(i)** | $6 \times 0.5 \times 2 \times 2 \times \sin 60$ oe | **M2** | **M1** for a correct relevant area inside the hexagon <br> e.g. $0.5 \times 2 \times 2 \sin 60$ oe |
| | | 10.38 to 10.39[…] [= 10.4] | **A1** | Must see 10.38 to 10.39[…] |
| | **(ii)** | 4.67 to 4.68 | 2 | **M1** for $10.4 \times$ figs 45 [figs 467 to 468] |
| | **(iii)** | 273 | 4 | **M1** for *their* **(b)(ii)** $\times 1250 \div 1000$ <br> **A1 FT** for *their* **(b)(ii)** $\times 1250 \div 1000$ evaluated to at least 3 sf <br><br> **M1dep** on previous **M1** for *their* mass in tonnes (rounded up) $\times 45.5[0]$ if between 6 and 10 <br> or for *their* mass in tonnes (rounded up) $\times 47[.00]$ if between 1 and 5 <br> or for *their* mass in tonnes (rounded up) $\times 44[.00]$ if over 10 |

**3** **(a)** Alfonso has $75 to spend on the internet.
He spends some of the money on music, films and books.

**(i)** The money he spends on music, films and books is in the ratio

$$\text{music} : \text{films} : \text{books} = 5 : 3 : 7.$$

He spends $16.50 on music.

Calculate the **total** amount he spends on music, films and books.

*Answer(a)*(i) $ .............................................. [3]

**(ii)** Find this total amount as a percentage of the $75.

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

**(b)** The download times for the music, films and books are in the ratio

$$\text{music} : \text{films} : \text{books} = 2 : 9 : 1.$$

The **total** download time is 3 hours and 33 minutes.

Calculate the download time for the films.
Give your answer in hours, minutes and seconds.

*Answer(b)* ............... hours ............... minutes ............... seconds [3]

**(c)** The cost of $16.50 for the music was a reduction of 12% on the original cost.

Calculate the original cost of the music.

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

**MARKING SCHEME:**

| | | | | |
|---|---|---|---|---|
| (a) | (i) | 49.5[0] | 3 | **M2** for $16.5[0] \div 5 \times (5 + 3 + 7)$ <br> or **M1** for $16.5[0] \div 5$ |
| | (ii) | 66 | 1FT | **FT** *their* **(a)(i)** $\div 75 \times 100$ to 3 sf or better |
| (b) | | 2 hours 39 mins 45 secs | 3 | **B2** for 159.75 oe, e.g. 2.6625 [h] 9585 [s] <br> or **M1** for 3 hrs 33 mins oe / $(2 + 9 + 1)$ oe |
| (c) | | 18.75 **final answer** | 3 | **M2** for $16.5[0] \div 0.88$ oe <br> or **M1** for $16.5[0]$ associated with 88[%] |

**4** There are three different areas, A, B and C, for seating in a theatre.
The numbers of seats in each area are in the ratio $A:B:C = 11:8:7$.
There are 920 seats in area B.

**(a) (i)** Show that there are 805 seats in area C.

*Answer(a)*(i)

[1]

**(ii)** Write the number of seats in area B as a percentage of the total number of seats.

*Answer(a)*(ii) ........................................... % [2]

**(b)** The cost of a ticket for a seat in each area of the theatre is shown in the table.

| Area A | $11.50 |
|--------|--------|
| Area B | $15 |
| Area C | $22.50 |

For a concert 80% of area B tickets were sold and $\frac{3}{5}$ of area C tickets were sold.
The total amount of money taken from ticket sales was $35 834.

Calculate the number of area A tickets that were sold.

*Answer(b)* ................................................ [5]

**(c)** The total ticket sales of $35 834 was 5% less than the ticket sales at the previous concert.

Calculate the ticket sales at the previous concert.

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

**MARKIGN SCHEME:**

| | | | | | |
|---|---|---|---|---|---|
| **(a)** | **(i)** | $\dfrac{920}{8} \times 7$ [=805] oe | 1 | $\dfrac{2990}{26} \times 7$ [= 805] | |
| | **(ii)** | 30.8 or 30.76 to 30.77 | 2 | **M1** for $\dfrac{8}{(11+8+7)}$ [× 100] | |
| **(b)** | | 1211 final answer | 5 | **B4** for 13 926.5[0] [area A total sales]<br>or<br>**B3** for 11 040 [area B] **and** 10 867.50 [area C] or 21 907.5 [area B + area C]<br>or<br>**B2** for 11 040 [area B] **or** 10 867.50 [area C]<br>or<br>**M1** for 736 [B tickets] and **M1** for 483 [C tickets]<br><br>After 0 scored<br>**SC2** for answer of 1196<br>or<br>**SC1** for 13754 (A total sales) | |
| **(c)** | | 37 720 | 3 | **M2** for $\dfrac{35834}{0.95}$ oe<br>or<br>**M1** for 35834 associated with 95[%] | |

**5** A film company uses 512 actors in a film.
The actors are in the ratio   men : women : children  =  7 : 11 : 14.

**(a) (i)** Show that there are 224 children in the film.

*Answer(a)*(i)

[2]

**(ii)** Find the number of men in the film.

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

**(b)** Every working day, each child is given $1 to spend.
Each child works for 45 days.

Calculate the total amount that the film company gives the children to spend.
Give your answer correct to the nearest $100.

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

**(c)** The children have lessons every day in groups of no more than 12.

Calculate the smallest possible number of groups.

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

**(d)** The film costs four million and ninety three thousand dollars to make.

**(i)** Write this number in figures.

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

**(ii)** Write your answer to **part (d)(i)** in standard form.

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

**(e)** A DVD copy of the film costs $2.75 to make.
The selling price is $8.20 .

Calculate the percentage profit.

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

**MARKING SCHEME:**

| | | | | |
|---|---|---|---|---|
| (a) | (i) | $\dfrac{512}{7+11+14} \times 14$ | **M2** | or **M1** for $\dfrac{512}{7+11+14}$ |
| | (ii) | 112 | 1 | |
| (b) | | 10 100 | 2 | **M1** for $224 \times 45$ soi by 10080 |
| (c) | | 19 | 2 | **M1** for $224 \div 12$ soi by 18.66 to 18.67 or 18.7 or $18\dfrac{2}{3}$ |
| (d) | (i) | 4093000 | 1 | |
| | (ii) | $4.093 \times 10^6$ | 1FT | **FT** *their* **(d)(i)** |
| (e) | | 198 or 198.1 to 198.2 | 3 | **M2** for $\dfrac{8.2-2.75}{2.75} \times 100$ oe <br> or **M1** for $\dfrac{8.2}{2.75} \times 100$ or $\dfrac{8.2-2.75}{2.75}$ |