1 There are two drama groups in a school.

In one group there are 36 boys and 48 girls.

In the other group, $\frac{3}{7}$ of the students are boys and the rest of the students are girls.

Ann says,

"The ratio of the number of boys to the number of girls is the same for both groups."

Is Ann correct?
You must show how you get your answer.

Group 1 : 36 boys + 48 girls

: 84

Boy ratio : $\frac{36}{84} \overset{\div 12}{=} \frac{3}{7}$ (1) (1)

simplify the ratio by dividing them with the highest common multiple

Girl ratio : $\frac{48}{84} \overset{\div 12}{=} \frac{4}{7}$

Group 2 : Boy ratio : $\frac{3}{7}$

Girl ratio : $\frac{7}{7} - \frac{3}{7} = \frac{4}{7}$

} same as group 1

total of a fraction = 1

∴ Yes, Ann is correct (1)

(Total for Question 1 is 3 marks)

2 Rosie, Matilda and Ibrahim collect stickers.

$$\underset{\text{Rosie has}}{\text{number of stickers}} : \underset{\text{Matilda has}}{\text{number of stickers}} : \underset{\text{Ibrahim has}}{\text{number of stickers}} = 4:7:15$$

Ibrahim has 24 more stickers than Matilda.

Ibrahim has more stickers than Rosie.
How many more?

Difference between Ibrahim's part and Matilda's part : $15 - 7 = 8$ (1)

1 part $= \frac{24}{8} = 3$ stickers

Difference between Ibrahim and Rosie : $15 - 4 = 11$ (1)

11×3 stickers

$= 33$ stickers (1)

33

(Total for Question 2 is 3 marks)

3 In the Northern hemisphere the ratio of the area of land to the area of water is 2 : 3

(a) Work out what percentage of the area of the Northern hemisphere is land.

$\frac{\text{Area of land}}{\text{Area of water}} = \frac{2}{3}$

area of land

Percentage of land $= \frac{2}{5} \times 100\%$ (1)

Total area $= 2 + 3 = 5$

$= 40\%$ (1)

40 ..... %

(2)

20% of the area of the Southern hemisphere is land.

(b) Work out the ratio of the area of land to the area of water in the Southern hemisphere.

$\frac{\text{Area of land}}{\text{Area of water}} = \frac{20}{80}$ (1) $= 20 : 80$ (1)

$100\% - 20\% = 80\%$

20 : 80 .....

(2)

(Total for Question 3 is 4 marks)

4 A delivery company has a total of 160 cars and vans.

the number of cars : the number of vans = 3 : 7

Each car and each van uses electricity or diesel or petrol.

$\frac{1}{8}$ of the cars use electricity.
25% of the cars use diesel.
The rest of the cars use petrol.

Work out the number of cars that use petrol.
You must show all your working.

cars : vans
3 : 7
×16 ↓ ↓ ×16
48 : _

3 + 7 = 10
160 ÷ 10 = 16 (1)

1
16
3
48 (1)

So there are 48 cars.

Number of cars using electricity:
$\frac{1}{8} \times 48 = \frac{48}{8} = 6$ (1)

Number of cars using diesel:
25% of 48 = $\frac{1}{4} \times 48 = 12$ (1)

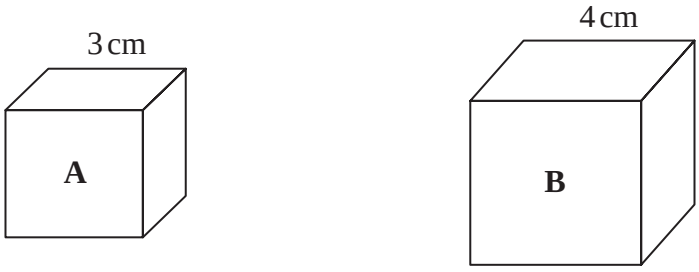
Number of cars using petrol
= 48 − 6 − 12 = 30 (1)

↑ from electricity
↖ from diesel

30

(Total for Question 4 is 5 marks)

5 Here are two cubes, **A** and **B**.



Cube **A** has a mass of 81 g.

Cube **B** has a mass of 128 g.

Work out

the density of cube **A** : the density of cube **B**

Give your answer in the form $a : b$, where a and b are integers.

density = $\frac{\text{mass}}{\text{volume}}$

Find volumes of both cubes

A: vol = $3 \times 3 \times 3 = 27$

B: vol = $4 \times 4 \times 4 = 64$ (1)

Find densities of both cubes

A: density = $\frac{81}{27} = 3$

B: density = $\frac{128}{64} = 2$ (1)

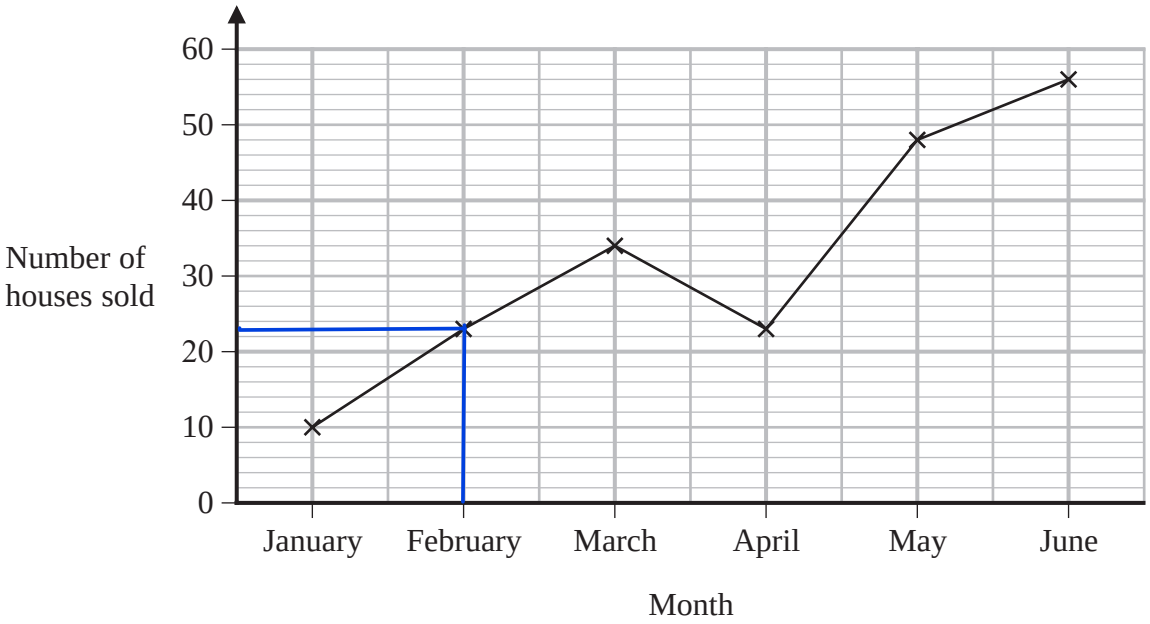
Ratio A : B

3 : 2 (1)

3 : 2

(Total for Question 5 is 3 marks)

6 The graph shows information about the number of houses sold by an estate agent in each of six months last year.



(b) For this estate agent, write down the ratio of the number of houses sold in January to the number of houses sold in June.

Houses sold in January: 10 (1)
Houses sold in June: 56

Jan : Jun
10 : 56

10 : 56 (1)

.....

(2)

(Total for Question 6 is 2 marks)

7 Rick, Selma and Tony are playing a game with counters.

Rick has some counters. n
Selma has twice as many counters as Rick. $2n$
Tony has 6 counters less than Selma. $2n - 6$

In total they have 54 counters.

the number of counters Rick has : the number of counters Tony has = 1 : p

Work out the value of p.

Counters : Rick = n
Selma = $2n$
Tony = $2n - 6$ (1)

Finding value of n :

$n + 2n + 2n - 6 = 54$ counters (1)
$5n - 6 = 54$
$5n = 54 + 6$
$5n = 60$
$n = 12$ counters (1)

∴ Rick has 12 counters
∴ Selma has 24 counters
∴ Tony has 18 counters

Number of counter Rick has : Number of counter Tony has = 1 : p

$12 : 18 = 1 : p$ (1)

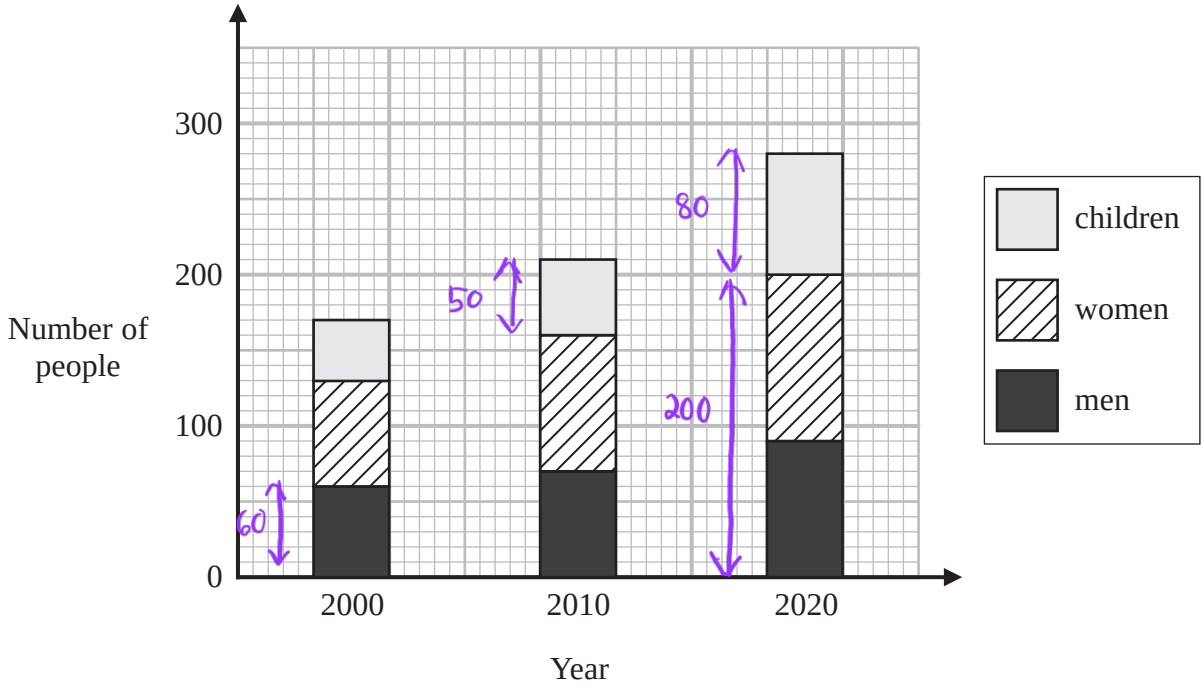
$\frac{18}{12} = p$

$p = 1.5$ (1)

$p =$ 1.5

(Total for Question 7 is 5 marks)

8 The composite bar chart shows information about the number of people living in a village.



(a) Write down the number of men living in the village in the year 2000

(1) 60

(1)

(b) Find the number of children living in the village in the year 2010

210 − 160 = 50

(1) 50

(1)

For the people living in the village in the year 2020

(c) find the ratio of the number of children to the **total** number of men and women.

men + woman = 200

children = 80 (1)

children : men + woman

80 : 200

80 : 200 (1)

(2)

(Total for Question 8 is 4 marks)

9 There are only blue counters, green counters, red counters and yellow counters in a bag.

The table shows the number of blue counters in the bag.

Colour	blue	green	red	yellow
Number of counters	30	45		

There is a total of 100 counters in the bag.

Ashin takes at random a counter from the bag.

(a) Find the probability that the counter is **not** blue.

Total counters that is not blue:

100 - 30 = 70 (1)

Probability = $\frac{\text{counter that is not blue}}{\text{total counters}} = \frac{70}{100}$ (1)

$\frac{70}{100}$

(2)

The ratio of the number of blue counters to the number of green counters is 2 : 3

(b) Work out the number of green counters in the bag.

	Blue counter		Green Counter
Ratio	2	:	3
	× 15 (1)		× 15
Number	30	:	45

45 (1)

(2)

Bradley says,

"The number of red counters in the bag is the same as the number of yellow counters in the bag."

(c) Can Bradley be correct?
Give a reason for your answer.

Number of red + yellow = (100 - 30 - 45) : 25.

No, 25 cannot be divided by 2 to give a whole number. (1)

(1)

(Total for Question 9 is 5 marks)

10 Rizwan writes down three numbers a, b and c

$a : b = 1 : 3$ — (1)
$b : c = 6 : 5$ — (2)

(a) (i) Find $a : b : c$

Method to find common multiples of b

a : b	b : c
1 : 3	6 : 5
2 : 6 (×2)	6 : 5 (×2)

(1)

2 : 6 : 5

.....

(2)

(ii) Express a as a fraction of the total of the three numbers a, b and c

Total of a, b and c

2 + 6 + 5 = 13 (1)

$a = \frac{2}{13}$ (1)

$\frac{2}{13}$

.....

(2)

Emma writes down three numbers m, n and p

$n = 2m$ — (1)
$p = 5n$ — (2)

(b) Find $m : p$

Substitute (1) into (2)

$p = 5(2m) = 10m$ (1)

$p = 10m$

$\frac{p}{10} = \frac{m}{1}$

Ratio of $m : p = 1 : 10$ (1)

1 : 10

.....

(2)

(Total for Question 10 is 6 marks)

11 Amol, Gemma and Harry each have a number of sweets.

The number of sweets that Gemma has is 6 times the number of sweets that Amol has.
The number of sweets that Harry has is half the number of sweets that Gemma has.

Write down the ratio

the number of sweets that Amol has	:	the number of sweets that Gemma has	:	the number of sweets that Harry has

Ending ratio of sweet of Gemma to Amol and Harry :

Gemma : Amol : Harry

6 : 1 : $\frac{6}{2} = 3$ (1)

Amol : Gemma : Harry

1 : 6 : 3 (1)

1 : 6 : 3

(Total for Question 11 is 2 marks)

12 Rob has been asked to divide 120 in the ratio 3 : 5

Here is his working.

$120 \div 3 = 40$ $120 \div 5 = 24$

Rob's working is not correct.

Describe what Rob has done wrong.

Rob should divide by 8 as 3+5 = 8. (1)

.....

.....

.....

(Total for Question 12 is 1 mark)

13 (b) Write down the ratio of the second term to the fourth term.
Give your ratio in its simplest form.

2nd term = 8

4th term = 18

$\frac{\text{2nd}}{\text{4th}} = \frac{8 \div 2}{18 \div 2}$ (1)

$= \frac{4}{9}$

$\therefore$ 2nd term : 4th term = 4 : 9 (1)

4 : 9

(2)

(Total for Question 13 is 2 marks)

14 There are 48 counters in a bag.
There are only red counters and blue counters in the bag.

number of red counters : number of blue counters = 1 : 2

Helen has to work out how many red counters are in the bag.

She says,

"There are 24 red counters in the bag because 1 is half of 2 and 24 is half of 48"

Is Helen correct?
You must give a reason for your answer.

$48 \div 3 = 16$

Helen is incorrect because there are 16 red counters. (1)

(Total for Question 14 is 1 mark)

15 Last year a family recycled 800 kg of household waste.
57% of this waste was paper and glass.

weight of paper recycled : weight of glass recycled = 12 : 7

Calculate the weight of glass the family recycled.

$\frac{57}{100} \times 800 = 456$ kg (1)

ratio of glass

weight of glass recycled : $\frac{456}{19} \times 7 = 168$ kg (1) (1)

total ratio : $12 + 7 = 19$

168 kg

(Total for Question 15 is 3 marks)