

Ratio – Sharing (F)

A collection of 9-1 Maths GCSE Sample and Specimen questions from AQA, OCR, Pearson-Edexcel and WJEC Eduqas.

Name:	Worked Solutions
Total Marks:	

1. Write 40 : 2000 as a ratio in its simplest form.

$$\begin{array}{l} 40 : 2000 \\ \div 10 \rightarrow 4 : 200 \\ \div 4 \rightarrow 1 : 50 \end{array}$$

$$\dots\dots\dots 1 : 50 \dots\dots\dots [2]$$

2. Two people share £350 in the ratio 1 : 6.
Calculate each share.

$$\begin{array}{c} 1 : 6 \\ \hline 350 \div 7 = 50 \\ 50 \times 1 \quad 50 \times 6 \\ 50 \quad 300 \end{array}$$

$$\pounds \dots\dots\dots 50 \dots\dots\dots \pounds \dots\dots\dots 300 \dots\dots\dots [2]$$

3. Peter makes a large amount of pink paint by mixing red and white paint in the ratio 2 : 3.

Red paint costs £80 per 10 litres. $80 \div 10 = \pounds 8 \text{ a litre}$

White paint costs £5 per 10 litres. $5 \div 10 = \pounds 0.50 \text{ a litre.}$

Peter sells his pink paint in 10-litre tins for £60 per tin.

Calculate how much profit he makes for each tin he sells.

$$\begin{array}{rcl} R & : & W \\ 2 & : & 3 \\ 4 & : & 6 = 10 \text{ litres} = 1 \text{ tin} = \pounds 60 \\ \hline \text{Cost} & & \\ 4 \times 8 & & 6 \times 50p \\ \pounds 32 & & \pounds 3 = \pounds 35 \end{array}$$

$$\text{Profit} = 60 - 35 = 25$$

$$\pounds \dots\dots\dots 25 \dots\dots\dots [5]$$

4. Eva's camera takes photos with width and height in the ratio 3 : 2.

Photos can be printed in the following sizes.

20 cm by 16 cm, 14 cm by 10 cm, 24 cm by 16 cm, 12 cm by 8 cm

Eva says

"Only two of these sizes have the same ratio as my photos!"

Which sizes have the same ratio as her photos?

Photo \Rightarrow 3 : 2

$20 : 16$	$14 : 10$	$24 : 16$	$12 : 8$
$\div 4 \rightarrow 5 : 4$	$\div 2 \rightarrow 7 : 5$	$\div 8 \rightarrow 3 : 2$	$\div 4 \rightarrow 3 : 2$
x	x	✓	✓

24cm by 16cm and 12cm by 8cm

[2]

5. Write 45 : 15 as a ratio in its simplest form.

$45 : 15$
 $\div 5 \rightarrow 9 : 3$
 $\div 3 \rightarrow 3 : 1$

..... 3 : 1 [1]

6. Divide 32 in the ratio 5 : 3.

$5 : 3$
 $32 \div 8 = 4$
 $20 : 12$

..... 20 12 [3]

7. The angles in a triangle are in the ratio 1 : 2 : 3.

Neil says

This is a right-angled triangle.

Is Neil correct?

Show your reasoning.

$1 : 2 : 3$
 $180 \div 6 = 30$
 $30^\circ \quad 60^\circ \quad 90^\circ$

Yes its right angled.

[3]

8. Abi has a bag containing black counters and white counters.

The ratio of black to white counters is 1 : 2.

Abi takes one of these counters at random.

What is the probability that it is black?

B : W
● ○ ○

$\frac{1}{3}$ [1]

9. The table shows the ratio of teachers to children needed for two activities.

	teachers : children
Climbing	1 : 4
Walking	1 : 9

(a) There are 7 teachers to take children climbing.

What is the greatest number of children that can go climbing?

$$\begin{array}{l} 1 : 4 \\ \times 7 \quad \downarrow \\ 7 \end{array} \quad 4 \times 7 = 28$$

[1]

(b) 49 children want to go walking.

What is the smallest number of teachers needed?

6 teachers

$$\begin{array}{l} 1 : 9 \\ 3 : 27 \times \\ 5 : 45 \times \\ 6 : 54 \checkmark \end{array}$$

[1]

10. White paint costs £2.80 per litre.

Blue paint costs £3.50 per litre.

White paint and blue paint are mixed in the ratio 3 : 2

Work out the cost of 18 litres of the mixture.

assuming you don't need to buy full litres

$$\begin{array}{l} W : B \\ 3 : 2 \\ \hline 18 \div 5 = 3.6 \\ 10.8 \text{ l} \quad 7.2 \text{ l} \\ \times 2.80 \quad \times 3.50 \\ \hline \pounds 30.24 + \pounds 25.20 = \pounds 55.44 \end{array}$$

[4]

11. There are only black pens and green pens in a box.

The ratio of the number of black pens in the box to the number of green pens in the box is 2 : 5

What fraction of the pens are black?

$$\begin{array}{cc} \text{B} & \text{G} \\ 2 & 5 \\ \bullet \bullet & \circ \circ \circ \circ \circ \end{array} \quad \frac{2}{7} \quad \dots\dots\dots [1]$$

12. In a company, the ratio of the number of men to the number of women is 3:2

40% of the men are under the age of 25

10% of the women are under the age of 25

What percentage of all the people in the company are under the age of 25?

$$\begin{array}{lcl} m : w & & \\ 3 : 2 & = & 100\% \\ 60\% & 40\% & \\ \swarrow & \searrow & \\ 40\% \text{ of } 60\% & 10\% \text{ of } 40\% & \\ = 24\% & = 4\% & \dots\dots\dots 28\% \end{array} \quad \begin{array}{l} 24 + 4 \\ 28\% \end{array} \quad \dots\dots\dots \% [4]$$

13. Frank, Mary and Seth shared some sweets in the ratio 4 : 5 : 7

Seth got 18 more sweets than Frank.

Work out the total number of sweets they shared.

$$\begin{array}{cccc} F & : & M & : & S & : & M \\ 4 & & 3 & & 7 & & 5 \\ & & \underbrace{\quad} & & & & \\ & & 18 \div 3 = 6 & & & & \\ 4 \times 6 & & 7 \times 6 & & 5 \times 6 & & \\ = 24 & & 42 & & 30 & & \\ & & & & 96 & & \dots\dots\dots [3] \end{array}$$

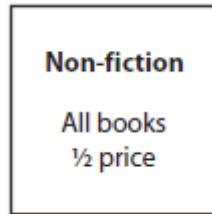
14. Helen has 80 books to sell.

Each book is Fiction or Non-fiction.

The ratio of the number of Fiction books to the number of Non-fiction books is 3:1

Each book has a normal price of £10

Helen reduces the price of all the Non-fiction books.



$$\begin{array}{l} F : NF \\ 3 : 1 \\ \hline 80 \div 4 = 20 \\ 60 \quad 20 \end{array}$$

Helen sells all 80 books.

Work out the total amount of money Helen will receive.

$$\begin{array}{l} F \quad 60 \times £10 = £600 \\ \swarrow \quad \searrow \\ 80 \quad NF \quad 20 \text{ reduced} \\ \quad \quad \times 5 = £100 \end{array}$$

$$600 + 100 = 700$$

£.....700..... [4]

15. A model plane has a length of 17cm.

The scale of the model is 1:200

Work out the length of the real plane.

Give your answer in metres.

$$\begin{array}{l} 1\text{cm} : 200\text{cm} \\ \swarrow \quad \searrow \\ 17\text{cm} : 3400\text{cm} \\ \quad \quad = 34\text{m} \end{array}$$

.....34..... metres [2]

16. There are 35 pens in a box.

15 of the pens are green.

The rest of the pens are red.

Write down the ratio of the number of green pens to the number of red pens.

Give your ratio in its simplest form.

$$\begin{array}{l} G \quad R \\ 15 \quad 20 \\ \swarrow \quad \searrow \\ 3 : 4 \end{array}$$

.....3 : 4..... [2]

17. The ratio of the number of boys to the number of girls in a school is 4:5

There are 95 girls in the school.

Work out the total number of students in the school.

$$\begin{array}{l} B : G \\ 4 : 5 \\ \swarrow \quad \searrow \\ 76 \quad 95 \end{array} \times 19$$

$$76 + 95 = 171$$

.....171..... [3]

$$\begin{array}{r} 19 \\ \times 4 \\ \hline 76 \end{array}$$

18. At a school

number of boys : number of girls = 9 : 7

There are 116 more boys than girls.

Work out the total number of students at the school.

$$\begin{array}{ccc} B & : & G \\ 9 & : & 7 \\ & \underbrace{116 \div 2 = 58} & \\ 9 \times 58 & + & 7 \times 58 = 928 \end{array}$$

[3]

19. In Scotland, squirrels are red or grey in the ratio red : grey = $1 : 2\frac{1}{2}$

In Scotland there are 120 000 red squirrels.

How many squirrels are there altogether in Scotland?

$$\begin{array}{ccc} R & : & G \\ 1 & : & 2.5 \\ 120000 & \times 120000 & = 300,000 \end{array}$$

[2]

20. Here is some information about a group of children.

	Boys	Girls
Left-handed	3	8
Right-handed	12	20

Write down the number of left-handed girls to right-handed girls as a ratio.

Give your answer in its simplest form.

$$\begin{array}{l} 8 : 20 \\ 4 : 10 \\ \underline{2 : 5} \end{array}$$

[1]

21. A drink is mixed in the ratio

lemonade : orange : cranberry = $6 : \underline{3} : 2$ = 11

What fraction is orange?

Circle your answer.

$$\frac{3}{11}$$

$$\frac{3}{8}$$

$$\frac{2}{11}$$

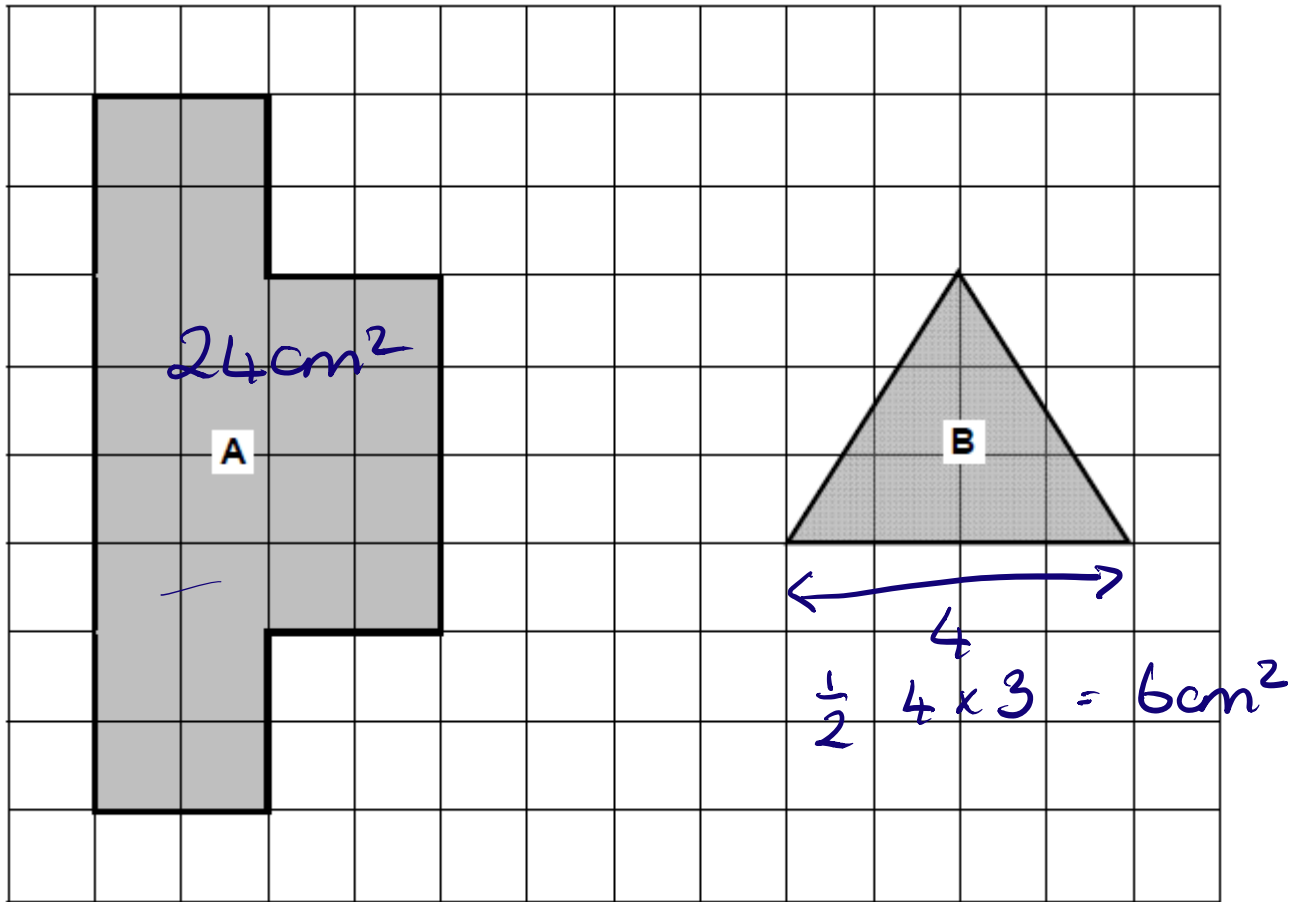
$$\frac{3}{11}$$

$$\frac{6}{11}$$

[1]

22. Work out

area of shape A : area of shape B



Give your answer in its simplest form.

$$\begin{array}{rcl} 24 & : & 6 \\ 4 & : & 1 \end{array}$$

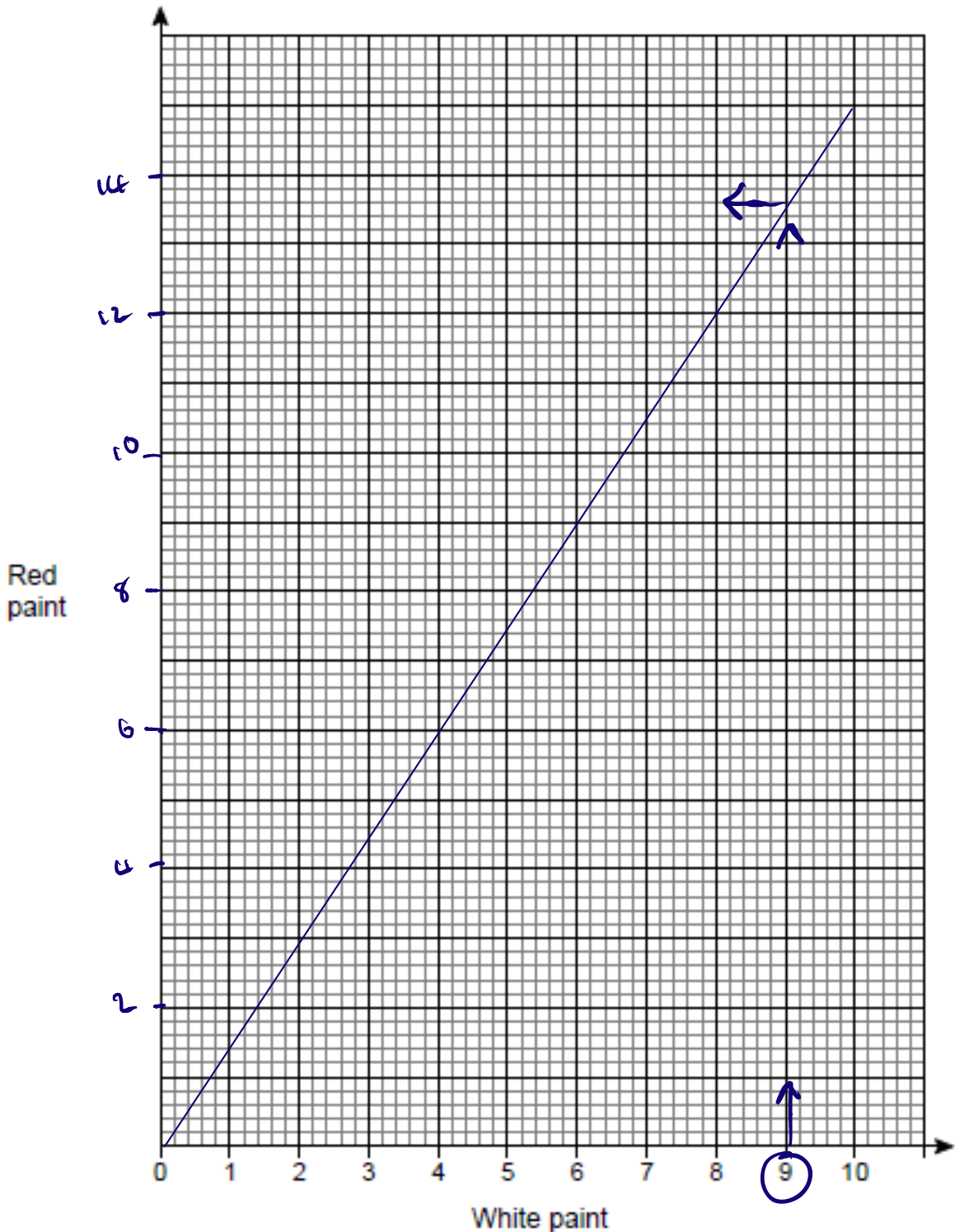
[3]

23. White paint and red paint are mixed together in the ratio 2 : 3

(a) Draw a graph that can be used to work out the amount of red paint needed given the amount of white paint.

Your graph must show up to 10 litres of white paint.

W : R
2 : 3
10 : 15



[3]

(b) How much red paint needs to be mixed with 9 litres of white paint?

13.5 litres

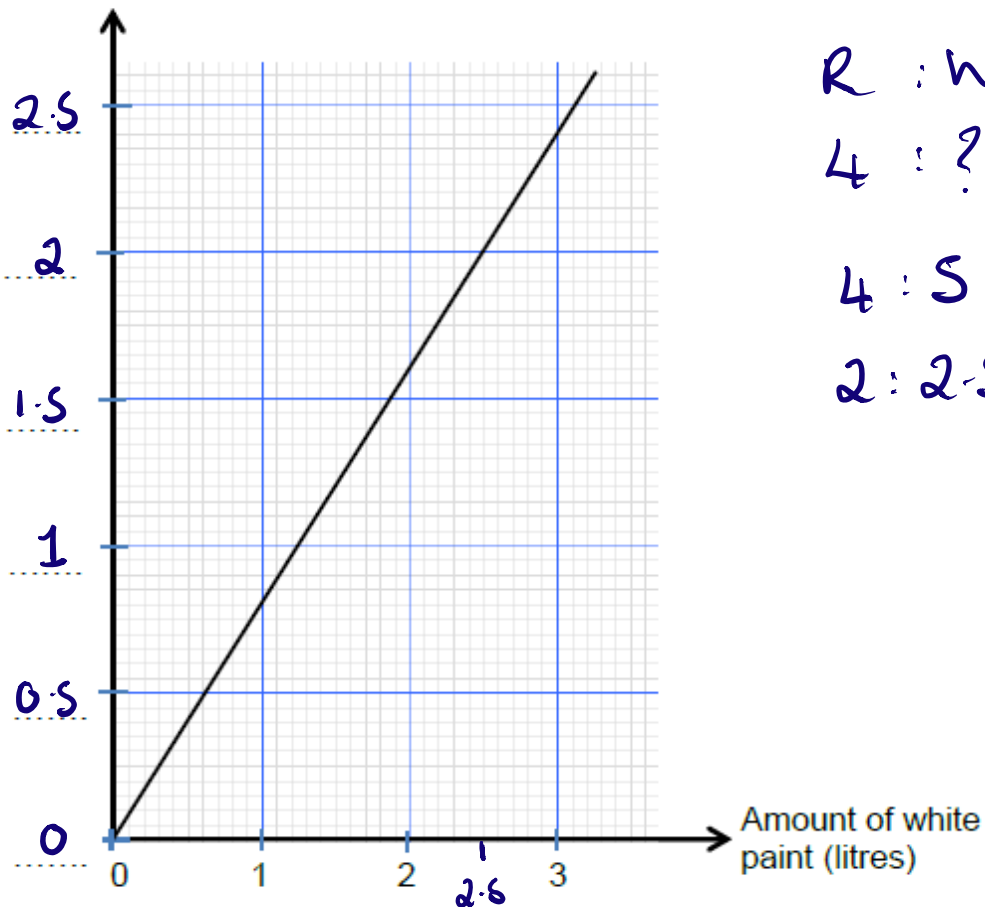
[1]

24. Cherry Blossom paint is made by mixing red and white paint in a certain ratio.

4 litres of red paint is used to make 9 litres of Cherry Blossom paint.

The diagram below shows the relationship between the amount of red paint and the amount of white paint needed to make Cherry Blossom paint.

Amount of red paint (litres)



$$\begin{aligned} R : W \\ 4 : ? &= 9 \\ 4 : 5 \\ 2 : 2.5 \end{aligned}$$

Write down the correct scale on the 'Amount of red paint (litres)' axis. ✓

You must put a value on each of the dotted lines on the axis. ✓

You must show all your working to support your answer.

[4]

25. There are 64 cards in a pack.

Each card is either red or black.

The ratio of the number of red cards to the number of black cards is 1 : 1

8 red cards are removed from the pack.

Find the ratio of the number of red cards now in the pack to the number of black cards now in the pack.

Give your answer in its simplest form.

$$\begin{array}{l} R : B \\ 1 : 1 \\ 32 : 32 \\ 24 : 32 \end{array}$$

$$\begin{array}{l} 24 : 32 \\ \div 8 \downarrow \\ 3 : 4 \end{array}$$

[3]

26. On a farm

the number of cows and the number of sheep are in the ratio 6 : 5

the number of sheep and the number of pigs are in the ratio 2 : 1

The total number of cows, sheep and pigs on the farm is 189

How many sheep are there on the farm?

$$\begin{array}{l} C : S \quad S : P \\ 6 : 5 \quad 2 : 1 \\ 12 : 10 \quad 10 : 5 \end{array}$$

$$\begin{array}{l} C : S : P \\ 12 : 10 : 5 \\ \div 7 \downarrow \\ 18 : 14 : 7 \end{array}$$

$$\begin{array}{l} C = 12 \times 7 = 84 \\ S = 10 \times 7 = 70 \\ P = 5 \times 7 = 35 \end{array}$$

[3]

$$\underline{70}$$

27. There are 28 red pens and 84 black pens in a bag.

Write down the ratio of the number of red pens to the number of black pens.

Give your ratio in its simplest form.

$$\begin{array}{l} 28 : 84 \\ \div 2 \downarrow \\ 14 : 42 \\ \div 7 \downarrow \\ 2 : 6 \\ \div 2 \downarrow \\ 1 : 3 \end{array}$$

[2]

28. In a breakfast cereal, 40% of the weight is fruit.

The rest of the cereal is oats.

(a) Write down the ratio of the weight of fruit to the weight of oats.

Give your answer in the form 1 : n.

$$\begin{array}{l} F : O \\ 40 : 60 \\ 2 : 3 \end{array}$$

$$1 : 1.5$$

$$\dots\dots\dots 1 : 1.5 \dots\dots\dots [2]$$

A different breakfast cereal is made using only fruit and bran.

The ratio of the weight of fruit to the weight of bran is 1 : 3

(b) What fraction of the weight of this cereal is bran?

$$\begin{array}{l} F : B \\ 1 : 3 \\ \text{O} \quad \text{O O O} \end{array} \quad \dots\dots\dots \frac{3}{4} \dots\dots\dots [1]$$

29. A bag contains red counters and blue counters in the ratio 3 : 5

What fraction of the counters are red? Circle your answer.

[1]

$$\frac{1}{3}$$

$$\frac{3}{5}$$

$$\frac{3}{8}$$

$$\frac{5}{8}$$

30. There are between 25 and 35 students in a class.

The ratio of boys to girls is 4 : 7

How many students are in the class? 33

$$\begin{array}{l} B : G \\ 4 : 7 = 11 \\ 22 \times \\ 12 : 21 \quad 33 \checkmark \end{array}$$

[2]

31. Here are two piles of the same type of paper.

Each sheet of paper is $\frac{7}{1000}$ cm thick.

The taller pile is $10\frac{1}{2}$ cm high.



height of taller pile : height of shorter pile = 3 : 2

Work out the number of sheets of paper in the shorter pile.

$$7 \div \frac{7}{1000} = \cancel{7} \times \frac{1000}{\cancel{7}} = 1000 \text{ sheets}$$

[3]