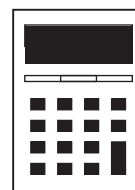


# GCSE MATHEMATICS

# Ratio



These questions have been taken or modified from previous AQA GCSE Mathematics Papers.

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## Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer all questions.
- You must answer the questions in the spaces provided.
- If your calculator does not have a  $\pi$  button, take the value of  $\pi$  to be 3.14 unless another value is given in the question.

## Information

- The marks for questions are shown in brackets.
- The quality of your written communication is specifically assessed in questions that are indicated with an asterisk (\*).

## Advice

- Read each question carefully before you start to answer it.
- In all calculations, show clearly how you work out your answer.
- Use the number of marks for the question as a guide to the amount of time you need to spend.
- Look at previous parts of the question, e.g. a), b), c) i) as there may be information there you need to answer later parts.
- Check your answer is realistic and appropriate.
- For calculator decimal numbers always write your full calculator display in the working out area and then, if you need to, round the answer on the answer line.

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This booklet was curated and modified using AQA examination papers between 2010-2016, for [thecalculatorguide.com](http://thecalculatorguide.com), where you can find many more booklets on further topics. All questions used are reproduced for educational purposes only.



[www.thecalculatorguide.com](http://www.thecalculatorguide.com)

1 Divide 270 in the ratio 3 : 2 : 1

[3 marks]

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Answer ..... : ..... : .....

2 180 counters are red or blue.  
The ratio of red to blue is 4 : 1

2 (a) How many of the counters are red?

[2 marks]

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Answer .....

2 (b) What percentage of the counters are red?

[2 marks]

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Answer ..... %

**3 (a)** A box contains only red pens and blue pens.

The ratio red : blue = 3 : 2

There are 24 **red** pens.

Work out the number of pens in the box.

**[2 marks]**

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Answer .....

**3 (b)** Another box contains only green pens and black pens.

$\frac{3}{4}$  of the pens are **green**.

What is the ratio of green pens to black pens?

**[1 mark]**

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Answer ..... : .....

**4 (a)** Anil and Bev share some money.

Anil gets  $\frac{15}{80}$  of the money.

Work out the ratio Anil's money : Bev's money

Give your answer in its simplest form.

**[2 marks]**

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Answer ..... : .....

**4 (b)** Jon and Nik share some money in the ratio 5 : 2  
Jon gets £150 more than Nik.

How much money do they share altogether?

**[3 marks]**

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Answer £ \_\_\_\_\_

**5** A subject has two examination papers.  
There is a non-calculator paper and a calculator paper.

The ratio of the number of marks on the papers is

$$\text{non-calculator} : \text{calculator} = 9 : 11$$

The total number of marks for the two papers is 120

Work out the number of marks on the calculator paper.

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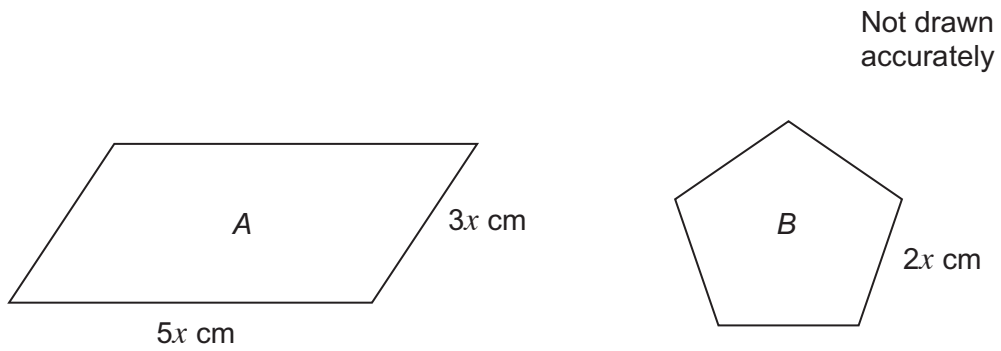
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Answer ..... (3 marks)

6

The diagram shows parallelogram *A* and regular pentagon *B*.



Work out the ratio      Perimeter *A* : Perimeter *B*

Simplify your answer.

**[4 marks]**

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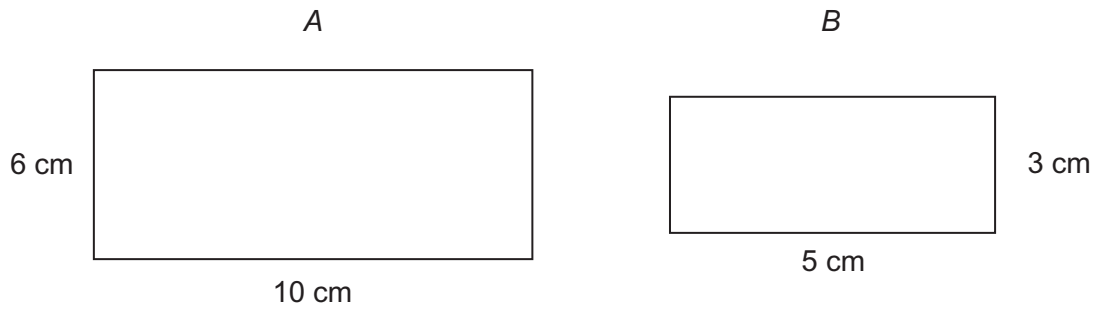
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Answer ..... : .....

7 Rectangle *B* is an enlargement of rectangle *A*.

Not drawn accurately



7 (a) Write down the scale factor of the enlargement from rectangle *A* to rectangle *B*.

[1 mark]

Answer .....

7 (b) Work out the ratio area of rectangle *A* : area of rectangle *B*

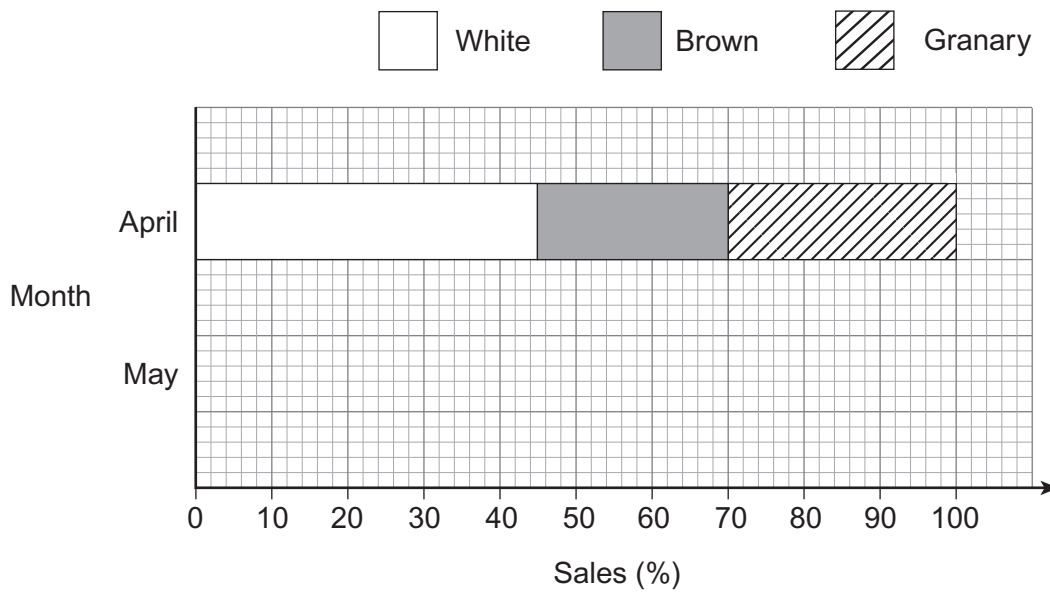
Give your answer in its simplest form.

[3 marks]

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Answer ..... : .....

8 The chart shows information about sales of loaves of bread at a bakery.



8 (a) Circle the simplest form of the ratio white : brown : granary

[1 mark]

9 : 14 : 20

4.5 : 2.5 : 3

9 : 5 : 6

45 : 70 : 100

8 (b) The table shows the sales for May.

White	Brown	Granary	
3000	1800	1200	Total = 6000

Show this information on the chart.

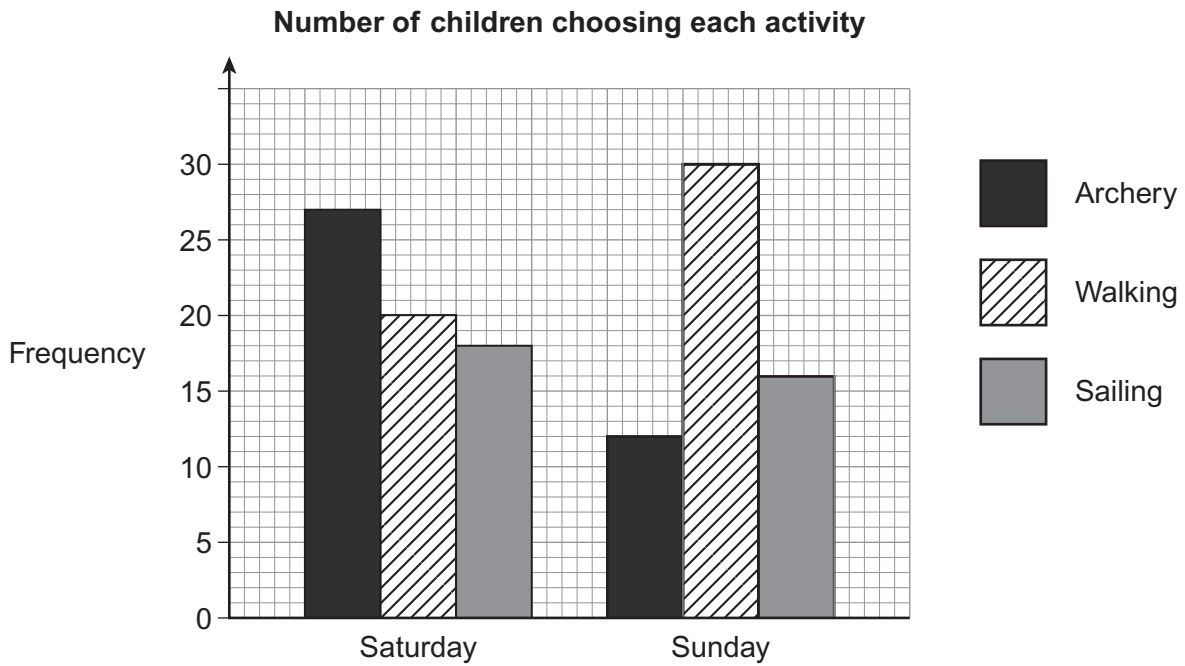
[3 marks]

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9 An outdoor centre has activities for children.



9 (a) Adults help with **walking** in the ratio

$$\text{number of adults} : \text{number of children} = 1 : 5$$

3 adults can help with walking on **Saturday**.

Is this enough?

You **must** show your working.

[2 marks]

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**9 (b)** A group of people go **sailing** in the ratio

$$\text{number of adults} : \text{number of children} = 1 : 2$$

What fraction of the group are adults?

**[1 mark]**

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Answer .....

**9 (c)** On **Sunday** all the children do the activity they choose.

The ratios for each activity are shown in the table.

<b>Activity</b>	<b>Number of adults : number of children</b>
Archery	1 : 3
Walking	1 : 5
Sailing	1 : 2

Work out the total number of adults needed for Sunday.

**[3 marks]**

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Answer .....

**10** A smoothie recipe uses banana, kiwi and yoghurt in the ratio 4 : 1 : 3 by weight.

**10 (a)** A smoothie is made using 280 g of banana.

How much kiwi and yoghurt are needed?

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Kiwi ..... g

Yoghurt ..... g

*(3 marks)*

**10 (b)** Express the weight of kiwi as a percentage of the weight of the smoothie.

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Answer ..... %

*(2 marks)*

**\*10 (c)** Each smoothie costs 72p to make.

**10 (c) (i)** The smoothies are sold at the school fayre.  
The school wants to make at least 30% profit on each smoothie.

Work out the cheapest selling price to do this.

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Answer .....

*(4 marks)*

**10 (c) (ii)** The cost of banana for one smoothie is 15p.  
The price of bananas increases by 40%.

Work out the percentage increase in the cost of making a smoothie.

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Answer ..... % (4 marks)

**11** Jack works eight hours each day.  
He is paid £6.50 per hour.  
He shares his wages with Kim in the ratio

$$\text{Jack} : \text{Kim} = 4 : 1$$

Jack saves his share.

How many working days will it take Jack to save £1040?

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Answer ..... (5 marks)

12 (a) Divide £720 in the ratio 5 : 1

[2 marks]

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Answer £ ..... and £ .....

12 (b) Sarah has £135  
Gemma has £70  
Beth has £35

Sarah gives some money to Gemma and Beth.

The ratio of the amount of money Sarah, Gemma and Beth have **now** is 3 : 2 : 1

How much money did Sarah give to Gemma?

[4 marks]

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Answer £ .....

13 (a) Circle the least common multiple (LCM) of 15 and 20

[1 mark]

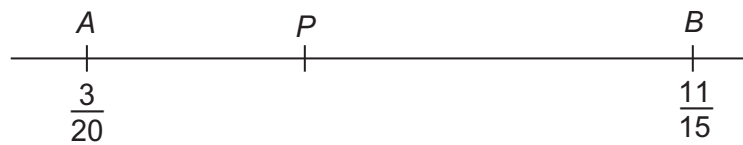
5                      10                      60                      120                      300

13 (b) Part of a number line is shown.

A is the fraction  $\frac{3}{20}$

B is the fraction  $\frac{11}{15}$

$AP : PB = 2 : 3$



Not drawn accurately

Work out the value of the fraction  $P$ .

[4 marks]

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Answer .....

14

The ratio of men to women in a running club is 5 : 3

After a group of 6 women join the club the percentage of women in the club goes up to 40%.

How many people were in the club before the women joined?

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Answer ..... (4 marks)

15

Adam, Ben and Chris receive pocket money each week.

Adam and Ben receive pocket money in the ratio 10 : 9

Ben and Chris receive pocket money in the ratio 5 : 4

Work out the ratio for Adam : Chris  
Give your answer in its simplest form.

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Answer ..... : ..... (3 marks)

**16** Ali, Beth and Clare take a test.

The ratio of Ali's score to Beth's score is 5 : 3  
Ali scored 10 more marks than Beth.

Clare scored 7 more marks than Ali.

Work out each of their scores.

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Answer Ali ..... marks

Beth ..... marks

Clare ..... marks

*(3 marks)*

**17** Work out the value of  $x$  when

$x - 20 : x + 280$  simplifies to

**[4 marks]**

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Answer .....

**18** A tin contains red beads, white beads and blue beads in the ratio

$$\text{red : white : blue} = x : 2x : x^2$$

**18 (a)** Show that the fraction of blue beads in the tin is  $\frac{x}{x+3}$

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*(2 marks)*

**18 (b)** The percentage of blue beads is 90%

Work out the value of  $x$ .

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Answer ..... *(3 marks)*



**19 (a)** Three angles are in the ratio 2 : 3 : 7  
The smallest angle is  $60^\circ$ .

Show that these three angles will fit together at a point with no gaps.

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*(3 marks)*

**19 (b)** Two angles form a straight line.  
One of the angles is  $(x + 30)$  degrees.

Write down an expression for the size of the other angle.  
Give your answer in its simplest form.

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Answer ..... degrees *(2 marks)*

**20** Bob and Kai share  $\pounds x$  in the ratio  $2 : 3$

**20 (a)** How much money does Kai receive?  
Circle the correct expression.

**[1 mark]**

$$\pounds \frac{2}{3}x$$

$$\pounds \frac{2}{5}x$$

$$\pounds \frac{3}{5}x$$

$$\pounds \frac{5}{8}x$$

**20 (b)** Bob gives Kai  $\pounds 8$  from his share.  
The amount of money they each have now is in the ratio  $2 : 5$

Work out the value of  $x$ .  
You **must** show your working.  
Do **not** use Trial and Improvement.

**[4 marks]**

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Answer \_\_\_\_\_

**21** Three of the notes on a piano keyboard are C, F and G.  
Each note has a frequency, measured in Hertz (Hz)

$$\text{frequency of C} : \text{frequency of F} = 3 : 4$$

$$\text{frequency of F} : \text{frequency of G} = 8 : 9$$

**21 (a)** Show that frequency of C : frequency of G = 2 : 3

**[2 marks]**

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**21 (b)** The frequency of C is 261.6 Hz  
Work out the frequency of G.

**[2 marks]**

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Answer \_\_\_\_\_ Hz

22

$$0.4a = 0.75b$$

Work out the ratio  $a : b$

Give your answer in its simplest form.

[3 marks]

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Answer ..... : .....

23

A, B and C are such that

$$A : B = 1 : 5$$

$$B \text{ is } \frac{3}{4} \text{ of } C$$

Work out the ratio  $A : C$

[3 marks]

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Answer ..... : .....

24

Amy has some red beads and some blue beads.  
She uses the beads to make two necklaces, A and B.

<p style="text-align: center;"><b>Necklace A</b> 24 beads 3 times as many red beads as blue beads</p>
<p style="text-align: center;"><b>Necklace B</b> 35 beads number of red beads : number of blue beads = 3 : 2</p>

How many **more** red beads than blue beads does she use?

**[4 marks]**

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Answer .....

25

There are 60 balls in a bag.  
The balls are either blue, red or yellow.

The ratio of blue balls to red balls is        5 : 3

The ratio of red balls to yellow balls is        1 : 4

Work out how many **red** balls are in the bag.

**[3 marks]**

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Answer .....

26

Jack sells packs of envelopes.

There are three types of pack, Economy (E), Standard (S) and Luxury (L).

One week he sells 270 packs in the ratio

$$E : S : L = 5 : 3 : 2$$

He makes a profit of

12p a pack on Economy packs

15p a pack on Standard packs

20p a pack on Luxury packs.

Work out the **total** profit he makes selling envelopes.

[3 marks]

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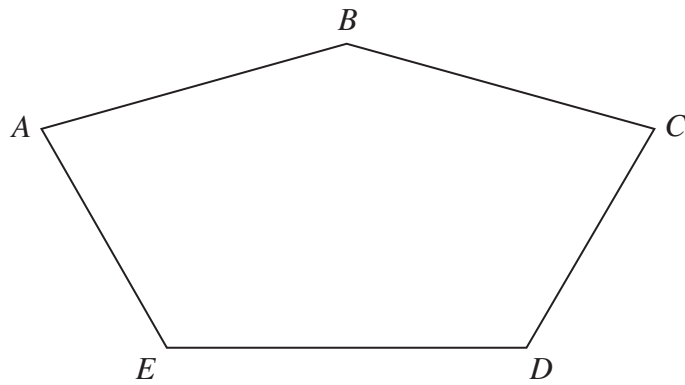
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Answer £ .....

27

This pentagon has a **vertical** line of symmetry.

The ratio of angles  $B : C : D = 6 : 3 : 4$



Not drawn accurately

Work out the size of angle  $B$ .

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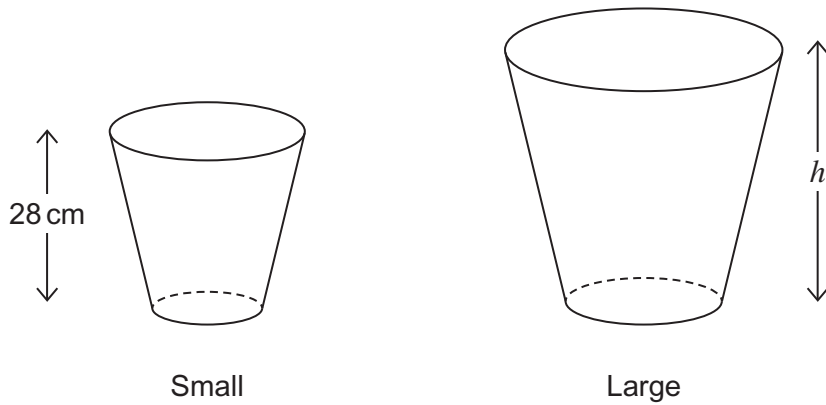
Answer ..... degrees (5 marks)



28

Jim makes two sizes of bin.

They are similar shapes.



28 (a) The ratio of the **areas** of the bases of the bins is 4 : 9

Work out the height,  $h$ , of the large bin.

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Answer ..... cm (3 marks)

\*28 (b) Jim says,

“The volume of the large bin is more than 3 times the volume of the small bin.”

Is he correct?  
You **must** show your working.

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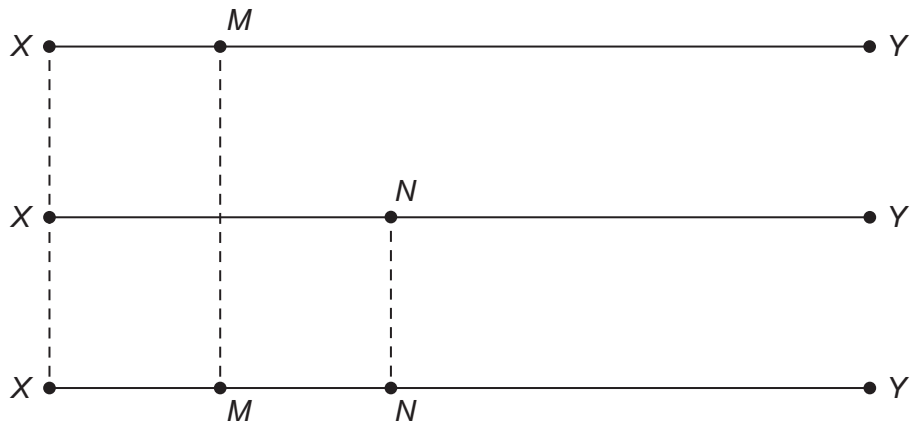
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(3 marks)

29

$M$  divides the line  $XY$  in the ratio  $1 : 5$

$N$  divides the line  $XY$  in the ratio  $7 : 11$



Not drawn accurately

Work out the ratio  $XM : MN : NY$

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Answer ..... : ..... : ..... (3 marks)

**30** A box of mixed grass seed contains Rye seed and Fescue seed in the ratio

$$\text{Rye} : \text{Fescue} = 1 : 3$$

**30 (a)** Rye seed is £3.80 per kg.  
Fescue seed is £5.20 per kg.

Work out the cost of a 5 kg box of mixed grass seed.

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Answer £ ..... (5 marks)

**30 (b)** VAT is charged at 20%.  
A large box of grass seed costs £5.64 including VAT.

What was the cost before VAT was added?

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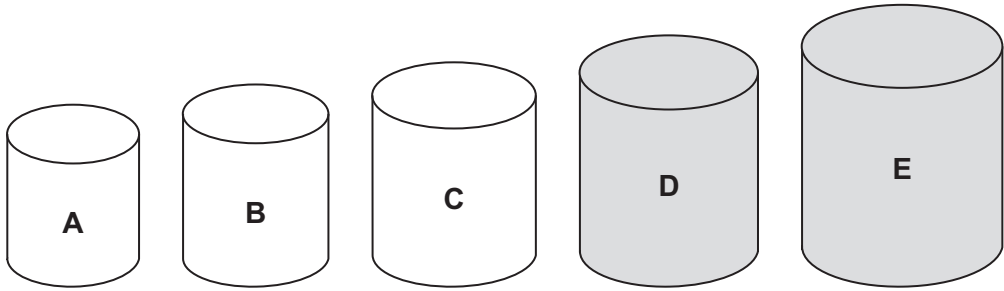
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Answer £ ..... (3 marks)

Five containers have volumes in the ratio 1 : 2 : 3 : 4 : 5



D and E are full of water.  
A, B and C are empty.

You can pour water from one container into another one.  
You can fill one container from another one.

You need the water in the containers A, B, C, D and E to be in the ratio 1 : 1 : 3 : 2 : 2

Show how this can be done with the least number of pours.

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From container	Into container	New ratio				
		A :	B :	C :	D :	E
-	-	0	0	0	4	5