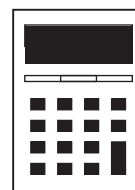# GCSE MATHEMATICS
Ratio

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

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 π button, take the value of π 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.

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

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]

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

non-calculator : 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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Answer ....   *(3 marks)*

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

Not drawn accurately

A $3x$ cm

$5x$ cm

B $2x$ cm
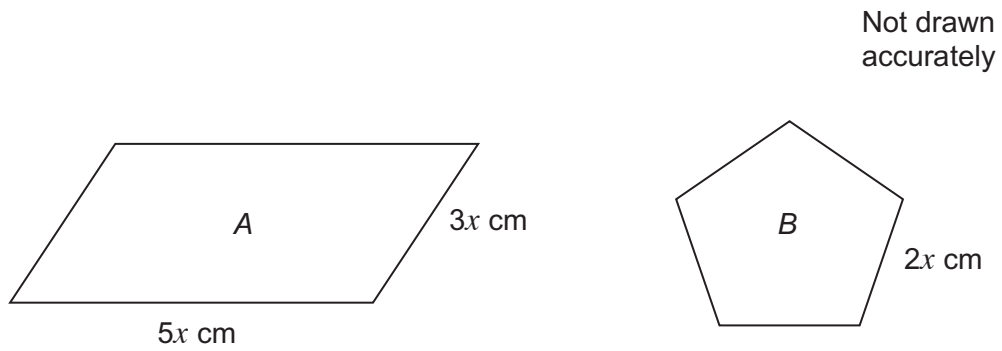
Work out the ratio   Perimeter *A* : Perimeter *B*

Simplify your answer.

[4 marks]

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Answer   .... : ....

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

Not drawn accurately

A   *B*

6 cm

10 cm

3 cm

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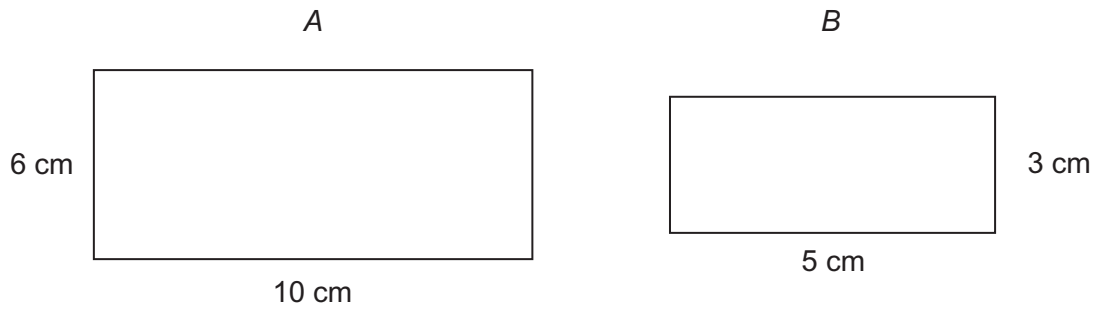
7 (a)   Write down the scale factor of the enlargement from rectangle *A* to rectangle *B*.

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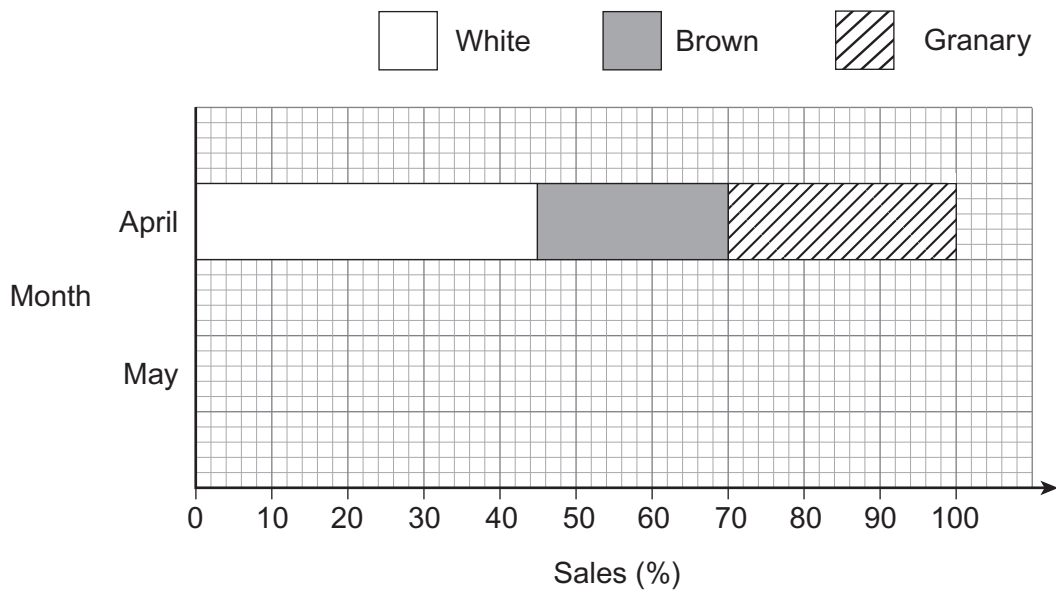
8 (a) Circle the simplest form of the ratio   white : brown : granary

[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.

Number of children choosing each activity
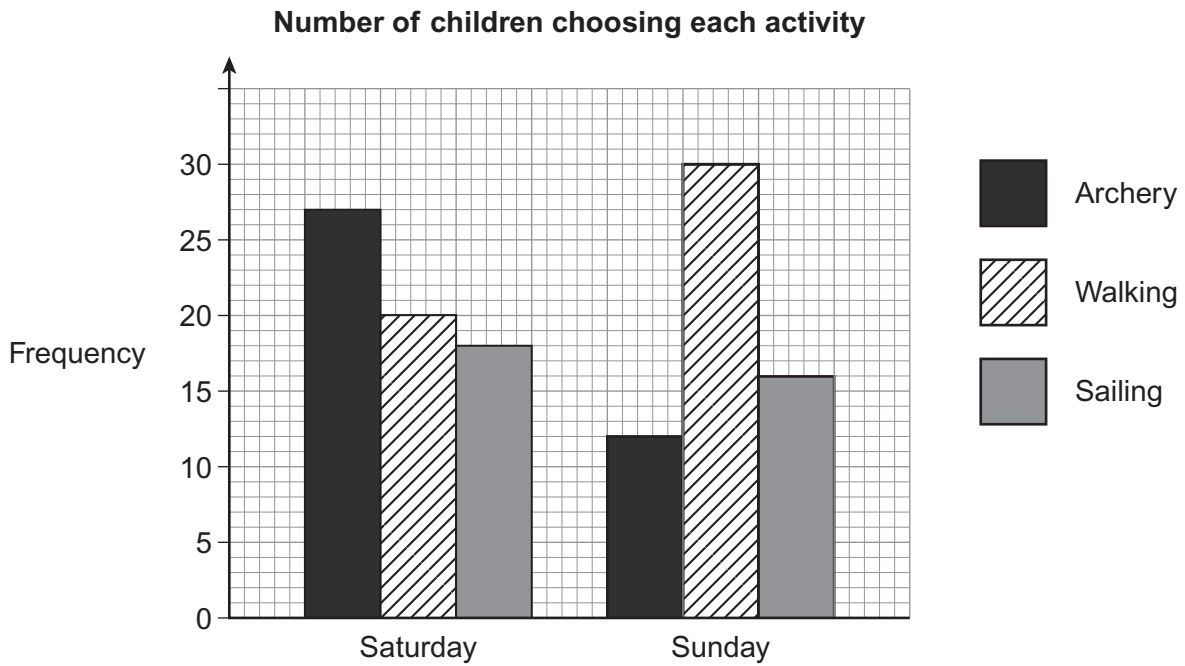
9 (a) Adults help with **walking** in the ratio

number of adults : 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

number of adults : 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.

Activity	Number of adults : number of children
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

Jack : 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 $\dfrac{3}{20}$

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

$AP : PB = 2 : 3$
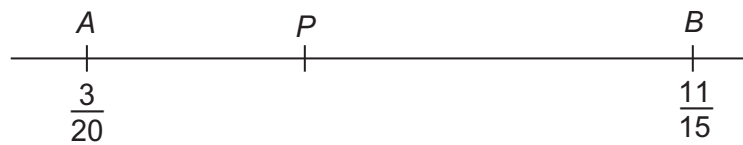
Not drawn accurately

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 $\dfrac{x}{x + 3}$

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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 60º.

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 £x in the ratio   2 : 3

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

              [1 mark]

$$£\frac{2}{3}x \qquad\qquad £\frac{2}{5}x \qquad\qquad £\frac{3}{5}x \qquad\qquad £\frac{5}{8}x$$

20 (b)   Bob gives Kai £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]

              Answer _____

21 Three of the notes on a piano keyboard are C, F and G.

Each note has a frequency, measured in Hertz (Hz)

frequency of C : frequency of F = 3 : 4

frequency of F : 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.

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Answer .... **:** ....

23   A, B and C are such that

A : B = 1 : 5

B is $\frac{3}{4}$ 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.

Necklace A

24 beads

3 times as many red beads as blue beads

Necklace B

35 beads

number of red beads : number of blue beads = 3 : 2

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.

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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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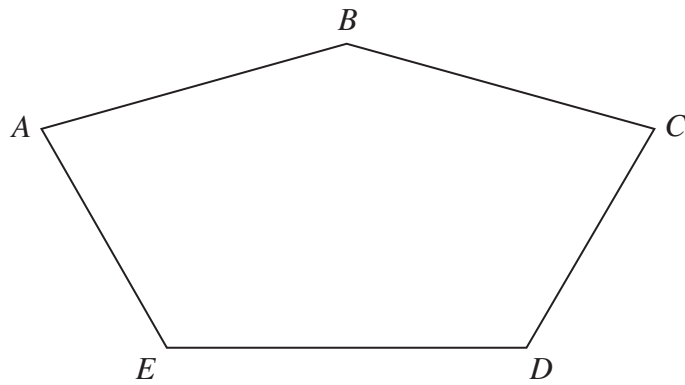Answer £ ....

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 cm

h

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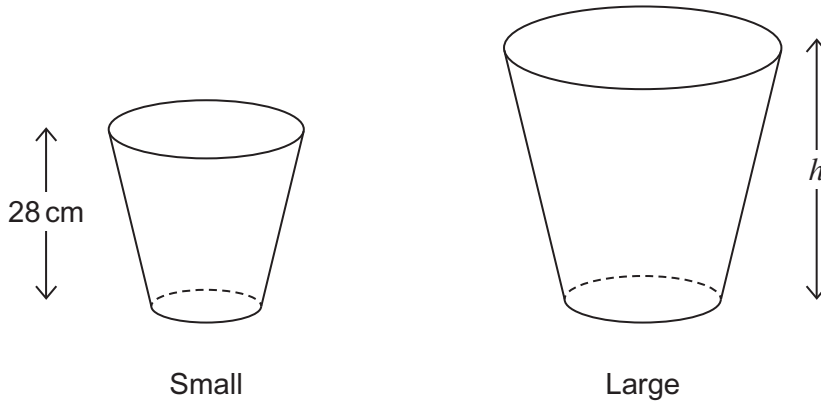
28 (a) The ratio of the **areas** of the bases of the bins is 4 : 9

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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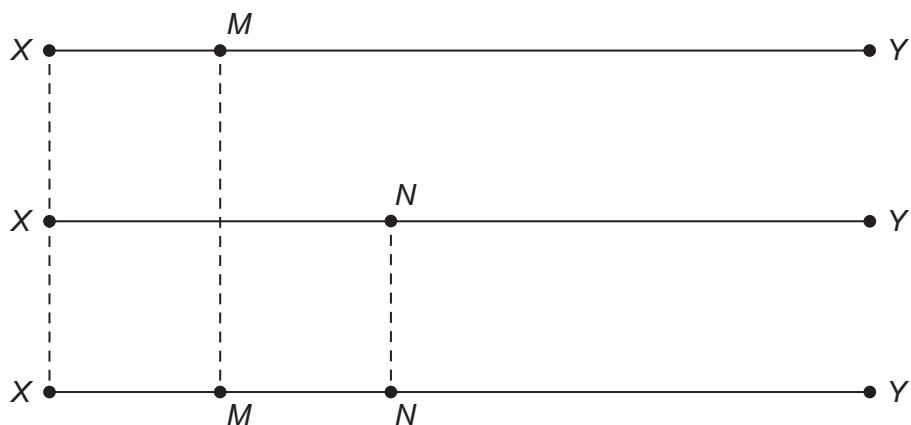
(3 marks)

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

Rye : 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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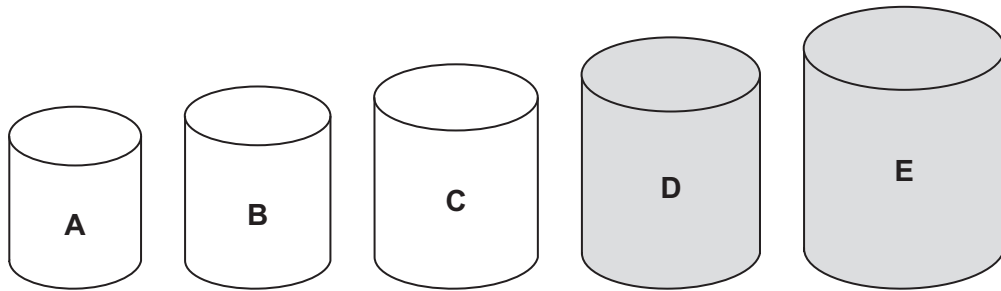Answer £ ....   *(5 marks)*

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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Answer £ ....   *(3 marks)*

31 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