Table of Contents

Questions from AQA, OCR, Edexcel, JustMaths, CorbettMaths and MrBartonMaths.

Product of primes

    a. Express 36 as a product of its prime factors
    b. Express 100 as a product of its prime factors.
    c. Write 42 as a product of its prime factors.
    d. Write 24 as the product of its prime factors. Give your answer in index form.
    e. Write 360 as a product of its prime factors.
    f. A number is written as a product of its prime factors as $2 \times 3^2 \times 5$. Work out the number.
    g. $3x^2 = 75$
        a. Find the value of x
        b. Express 75 as a product of its prime factors
    h. You are given that $3x^3 = 375$.
    Find the value of x.
    i. Write 48 as a product of its prime factors.

Highest Common Factor / Least Common Multiple

    a. Find the Highest Common Factor (HCF) of 48 and 56.
    b.
        i. Write 60 as a product of its prime factors.
        ii. Find the Lowest Common Multiple (LCM) of 60 and 75
    c.
        i. Write 132 as a product of its prime factors.
        ii. Find the Highest Common Factor (HCF) of 88 and 132
    d. Find the least common multiple (LCM) of 28 and 63
    e. Find the least common multiple (LCM) of 36 and 54.
    f. You are given that $45 = 3^2 \times 5$
        i. (Write each of the following as the product of prime factors in index form.
            1. 90
            2. 135
            3. 450
        ii. What is the least common multiple (LCM) of 36 and 45.
        iii. What is the highest common factor (HCF) of 36 and 45.
    g.
        i. Express 108 as a product of its prime factors.
        Give your answer in index form.
        ii. Find the Highest Common Factor (HCF) of 108 and 72.
    h.
        i. Write 1008 as a product of prime factors.
        Express your answer in index form.
        ii. Hence find the least number by which 1008 would need to be multiplied by to give a square number.
    i. Find the lowest common multiple of 19 and 34.

Mixed number

Write $1\frac{2}{3}$ as a top heavy fraction.

....

(1)

Write $2\frac{1}{2}$ as a top heavy fraction.

....

(1)

Write $5\frac{3}{5}$ as a top heavy fraction.

....

(1)

Write $\dfrac{5}{2}$ as a mixed number.

....
(1)

Write $\dfrac{21}{5}$ as a mixed number.

....
(1)

Write $\dfrac{10}{7}$ as a mixed number.

....
(1)

Write $\dfrac{11}{3}$ as a mixed number.

....
(1)

Write $\dfrac{19}{10}$ as a mixed number.

....
(1)

Time

1.

Davos is a cleaner.

The table shows information about the time it will take him to clean each of four rooms in a house.

Room	Time
Kitchen	2 hours
Sitting room	1 hour 40 minutes
Bedroom	$1\frac{1}{2}$ hours
Bathroom	45 minutes

Davos wants to clean all four rooms in one day.
He will have breaks for a total time of 75 minutes.

Davos is going to start cleaning at 9 am.

Will he finish cleaning by 4 pm?
You must show all your working.

(Total for Question 9 is 3 marks)

2.

This is part of a bus timetable between Bury and Manchester.

Bury	08 25	08 55	09 15	09 30	09 45	10 05
Whitefield	08 34	09 04	09 24	09 39	09 54	10 14
Heaton Park	08 46	09 16	09 36	09 51	10 06	10 27
Cheetham	08 56	09 26	09 46	10 01	10 16	10 37
Manchester	09 05	09 35	09 55	10 10	10 25	10 48

(a) How many minutes should the 08 25 bus take to go from Bury to Manchester?

.... minutes

(1)

Daniel goes from Whitefield to Manchester by bus.

Daniel takes 17 minutes to get from his house to the bus stop in Whitefield.
He takes 15 minutes to get from the bus stop in Manchester to work.

Daniel has to get to work by 10 am.
He leaves his house at 8.45 am.

(b) Does Daniel get to work by 10 am?
You must show all your working.

(3)

(Total for Question 9 is 4 marks)

3.

Work out the difference, in minutes, between 1 hour 25 minutes and $1\frac{1}{4}$ hours.

.... minutes

(Total for Question 7 is 2 marks)

4.

Here is part of a train timetable.

Southville	07 04
Leek	07 09
Jamestown	07 38
Lincoln	08 01
Gold City	08 39

(a) How long is the journey from Southville to Jamestown?

...........................minutes

(1)

(b) How long is the journey from Leek to Lincoln?

...........................minutes

(1)

The train leaves Gold City at 08 45.
It takes 33 minutes to travel to Washington.

(c) At what time does the train arrive in Washington?

....

(1)

Lenny lives in Jamestown and works in Lincoln.
He works Monday to Friday.
Lenny travels to work and back each day by train.

(c) How long does Lenny spend on the train each week?
Give your answer in hours and minutes.

.......................hours ....minutes

(3)

5. This timetable shows the times (GMT) of trains between London and Paris.

London	04 21	05 19	06 39	07 59
Paris	07 11	08 09	09 29	10 49

Paris	14 40	15 28	17 00	18 49
London	17 30	18 18	19 50	21 39

(a) At what time does the 05:19 from London arrive in Paris?

....
(1)

(b) How long does each journey take?

................hours..................minutes
(1)

(c) Tom arrives in Paris at 09:29.
He spends the next 7 hours visiting tourist attractions in Paris.

What is the time of the next train he can catch back to London?

....
(1)

Percentages

1.

When water freezes into ice its volume increases by 9%.

What volume of water freezes to make 1962 cm³ of ice?

.... cm³ [3]

2.

In a sale, normal prices are reduced by 20%.

The normal price of a coat is reduced by £15

Work out the normal price of the coat.

£...

[3]

3.

In a sale, the original price of a bag was reduced by $\frac{1}{5}$

The sale price of the bag is £29.40

Work out the original price.

[3]

Reciprocal

Write down the reciprocal of 5

....

(1)

Write down the reciprocal of $\frac{2}{3}$

....

(1)

Work out the reciprocal of 0.6

....

(1)

Work out the reciprocal of 0.7

....

(1)

Write down the reciprocal of $\dfrac{10}{11}$

....
(1)

Write down the reciprocal of $\dfrac{3}{10}$

....
(1)

Find the reciprocal of $\dfrac{1}{12}$

....
(1)

Find the reciprocal of 0.5

....
(1)

Tables of values

1. (a) Complete this table for y = 2x − 3.

x	0	1	2	3	4
y	-3		1		5

[1]

(b) On the grid below, draw the graph of y = 2x − 3 for values of x from 0 to 4.
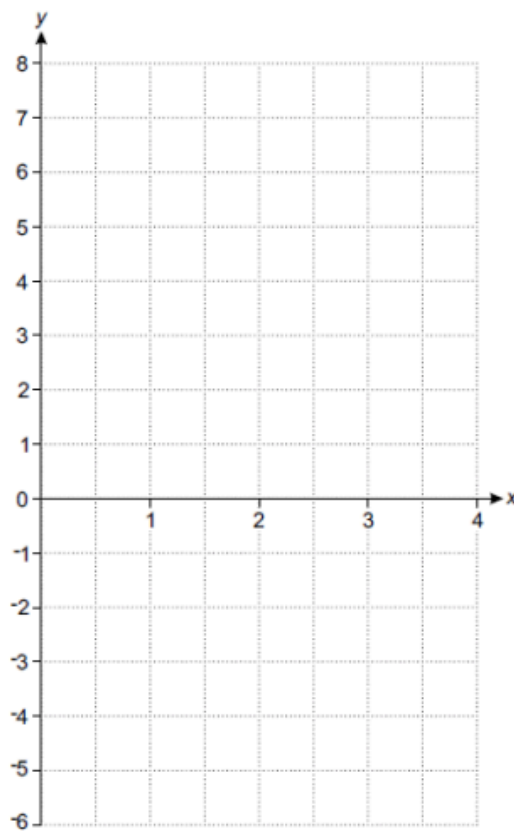
[2]

4. (a) Complete the table for y = 3x + 1

x	−3	−2	−1	0	1	2	3
y	−8		−2		4		

[2]

(b) On the grid draw the graph of y = 3x + 1 for values of x from -3 to 3
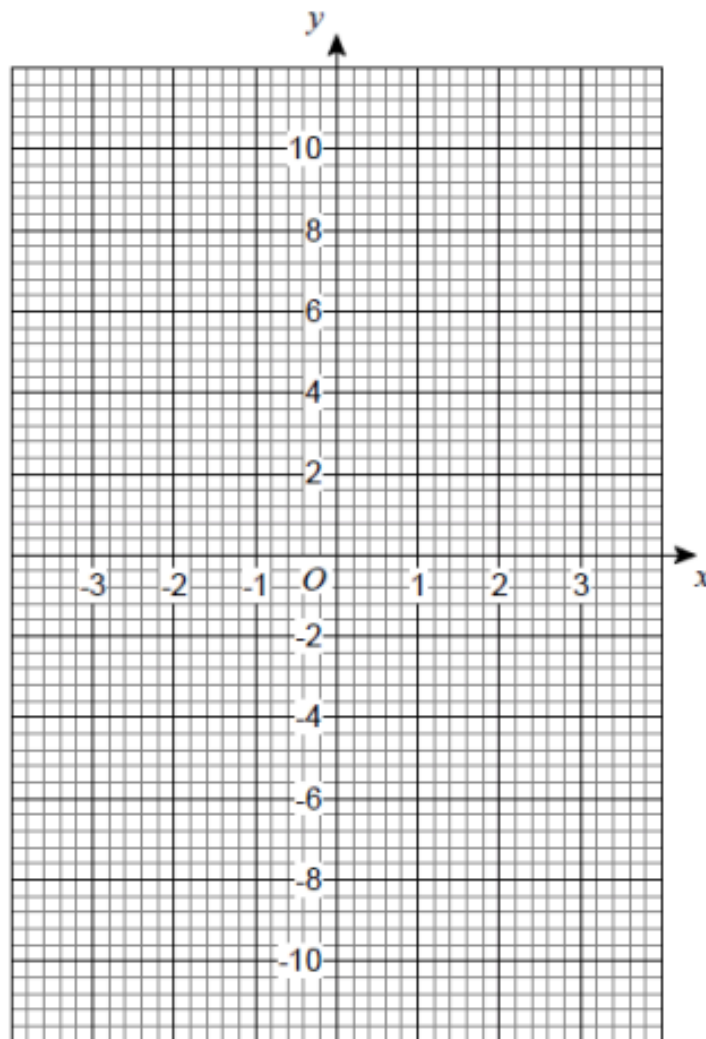
[2]

(c) Solve x = 3x + 1

[2]

Stats: list

1.

Here is a list of numbers.

$$12 \quad 15 \quad 14 \quad 17 \quad 22 \quad 19 \quad 13$$

Bridgit says,

"To work out the median you find the middle number,
so the median of these numbers is 17"

Bridgit's answer is **not** correct.

(a) What is wrong with Bridgit's method?

....

....

(1)

(b) Work out the range of the numbers in the list.

....

(2)

(c) Work out the mean of the numbers in the list.

....

(2)

(Total for Question 6 is 5 marks)

2.

Here is a list of numbers.

3   2   6   11   13

(a) Work out the mean

....

(2)

(b) Work out the range

....

(1)

3.

James has a spinner that has sections labelled 1 to 5.
He spins the spinner 10 times.

Here are his scores.

1   4   4   2   3   4   5   1   4   1

(a) Find the mode.

....

(1)

(b) Work out the mean.

....

(2)

(c) Work out the range.

....

(2)

4.

Here are the ages of 9 children at a birthday party.

10   12   13   10   11   14   15   10   12

(a) Find the mode.

....
(1)

(b) Find out the median.

....
(2)

(c) Work out the range.

....
(2)

(d) Work out the mean.

....
(2)

5.

A football team played six games.

Here are the number of goals they scored in each game:

6   0   3   2   2   5

(a) Work out the median number of goals scored.

....

(2)

(b)   Work out the mean number of goals scored.

....

(2)

The football team play one more game.
The mean number of goals scored increases to 4.

(c) Work out the number of goals scored in the seventh game.

....

(2)

Stats: groups

1.

The table shows information about the weekly earnings of 20 people who work in a shop.

Weekly earnings (£x)	Frequency
$150 < x \leqslant 250$	1
$250 < x \leqslant 350$	11
$350 < x \leqslant 450$	5
$450 < x \leqslant 550$	0
$550 < x \leqslant 650$	3

(a) Work out an estimate for the mean of the weekly earnings.

£.................................

(3)

Nadiya says,

"The mean may **not** be the best average to use to represent this information."

(b) Do you agree with Nadiya?
You must justify your answer.

....

....

(1)

(Total for Question 27 is 4 marks)

2.

The table gives information about the times taken, in seconds, by 18 students to run a race.

Time (*t* seconds)	Frequency
$5 < t \leqslant 10$	1
$10 < t \leqslant 15$	2
$15 < t \leqslant 20$	7
$20 < t \leqslant 25$	8

Work out an estimate for the mean time.
Give your answer correct to 3 significant figures.

.... seconds

(Total for Question 25 is 3 marks)

3.

1. Hardeep asks 25 people how many portions of fruit and vegetables they ate yesterday.

The results are shown in this table.

(a) Calculate the mean number of portions.

Number of portions	Frequency	
4	4	
5	6	
6	8	
7	5	
8	2	

.... [3]

(b) Hardeep ate no portions of fruit and vegetables yesterday. He decides to include this in his results.

Explain how this will affect:

(i) the mode,

[1]

(ii) the range.

[1]

4.

5. The table shows some information about the foot lengths of 40 adults.

Foot length (f cm)	Number of adults
$16 \leqslant f < 18$	3
$18 \leqslant f < 20$	6
$20 \leqslant f < 22$	10
$22 \leqslant f < 24$	12
$24 \leqslant f < 26$	9

(a) Write down the modal class interval.

.... [1]

(b) Calculate an estimate for the mean foot length.

.... cm [3]

5.

7. Rachel carried out a survey of 10 people to find out the type of fruit they like best.
The table gives information about her results.

Type of fruit	Number of people
apple	2
banana	5
orange	3

Which type of fruit is the mode?

.... [1]

6.

Alex works for the council.
He records the number of people in cars travelling down a street over one hour.

Here are his results.

Number of people in each car	Number of cars
1	41
2	54
3	32
4	20
5	3

(a) Work out the total number of cars that travelled down the street.

....

(1)

(b) Work out the total number of people that travelled in cars down the street.

....

(2)

(c) Work out the mean number of people travelling in each car.

....

(2)

Ratio: percentage increase and decrease

1.
   The price of a watch is £230.

   In a sale this price is reduced by 16%.

   Calculate the sale price.

   £ .... [3]

2.
   In 2000 the population of a country was 4,580,000
   By 2015, the population had increased by 18%

   Work out the population in 2015

   ....
   (3)

3.
   Barry earns £1300 a month. He spends 30% of this money on rent and 12% on bills.

   How much of the £1300 has he left?

   £...........................
   (3)

4.

A shop sold goods worth a total of £50 000 in January.

The value of goods sold in February was 10% lower than in January.

(a) Calculate the value of goods sold in February.

£ .... [2]

(b) Each month, the value of goods sold continued to be 10% lower than the previous month.

When the value of goods sold was less than £35 000, the shop closed at the end of that month.

Show that the store closed at the end of May.

You must show your working.

[3]

(c) The store reopens under new management and sells goods worth £100 000 in the first month.

- The value of goods sold in the second month is 20% more than the first month.
- The value of goods sold in the third month is 10% less than the second month.

Find the percentage increase in the total value of goods sold from the first month to the third month.

.... % [5]

5.

A new TV is priced at £320
In a sale it is reduced by 45%

Calculate the sale price

£...........................

(3)

Ratio: 1:n

1.

There are some chocolates in a box.

$\frac{1}{4}$ of the chocolates contain nuts.

The rest of the chocolates do not contain nuts.

Write down the ratio of the number of chocolates that contain nuts to the number of chocolates that do not contain nuts.
Give your answer in the form 1 : n

....

(Total for Question 17 is 2 marks)

2.

Write the ratio 4.5 : 2.25 in the form n : 1

....

(Total for Question 14 is 1 mark)

3.

(a) A bag contains red counters and blue counters only.

number of red counters : number of blue counters = 3 : 4

Write down the fraction of the counters that are red.

....

(1)

(b) Write the ratio 12 : 30 in the form 1 : n

....

(2)

(Total for Question 9 is 3 marks)

4.

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

.... : .... [1]

5.

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.

.... [2]

Ratio: similar shapes

1.

Here are two piles of the same type of paper.

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

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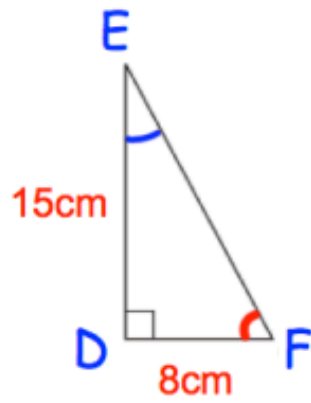

$10\dfrac{1}{2}$ cm

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

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

[3]

2.

Not drawn to scale
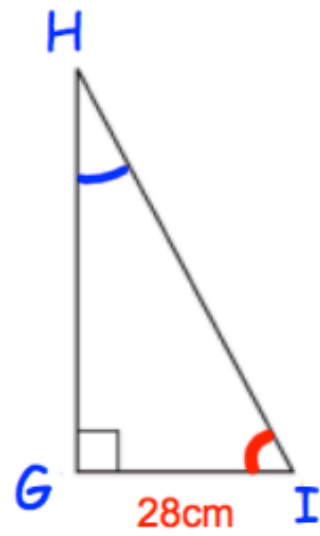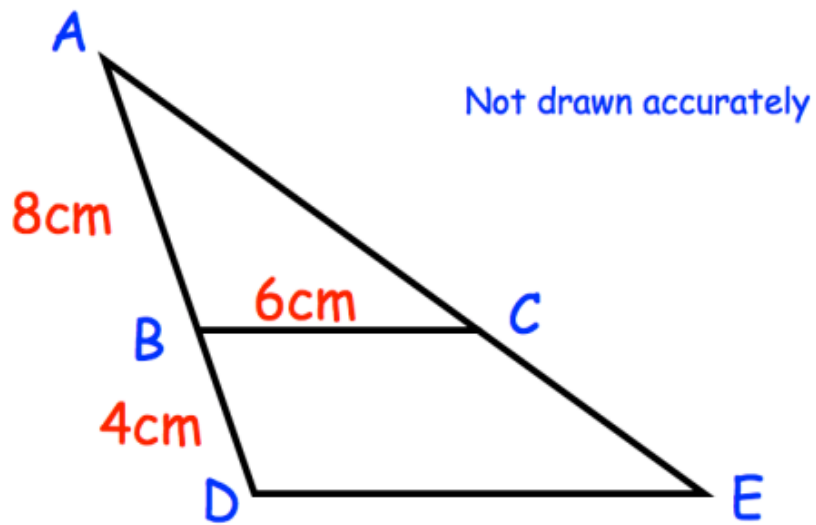

DEF and GHI are similar right angled triangles.
DE = 15cm
DF = 8cm
GI = 28cm

Work out the length of HI

3.

Not drawn accurately

Triangle *ABC* is similar to triangle *ADE*.

AB = 8cm
BC = 6cm
BD = 4cm

Work out the length of DE.

..........................cm

(3)

4.
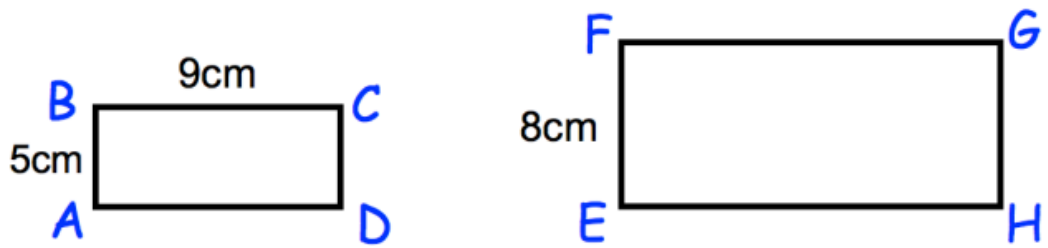
Rectangles *ABCD* and *EFGH* are similar.

AB = 5cm
BC = 9cm
EF = 8cm

Work out the length of FG.

.........................cm
(2)

5.

8cm

y

6cm

20cm

25cm

x
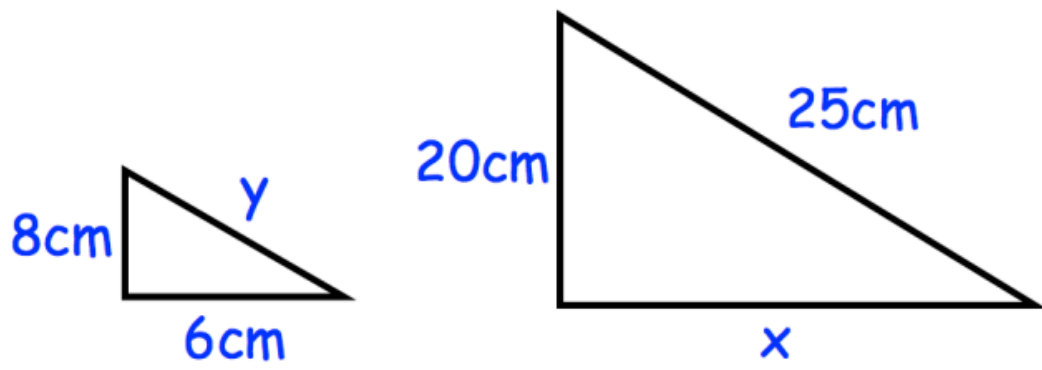
(a) Find the size of x.

.........................cm

(2)

(b) Find the size of y.

.........................cm

(2)

Ratio: fractions of an amount

1.

Jamil makes a drink by mixing
1 part of orange squash with 9 parts of water.

He uses 750 millilitres of orange squash.

Jamil is going to put the drink he has mixed into 1 litre bottles.

Work out the greatest number of 1 litre bottles that Jamil can completely fill.

....

(Total for Question 15 is 3 marks)

2.
Pens and pencils are sold in a shop.

12 pencils cost £1.80

The ratio of the cost of a pen to the cost of a pencil is 7 : 3

Work out the cost of 5 pens.

£..

(Total for Question 20 is 4 marks)

3.
Two people share £350 in the ratio 1 : 6.
Calculate each share.

£ .... £ .... **[2]**

4.
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?

[3]

5.

3. Here is a list of ingredients for making 16 mince pies.

Ingredients for 16 mince pies

240 g of butter
350 g of flour
100 g of sugar
280 g of mincemeat

Elaine wants to make 72 mince pies.

How much of each ingredient will Elaine need?

butter .... g

flour .... g

sugar .... g

mincemeat .... g

[3]

Ratio: scale

1.

. 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.

.... metres [2]

2.

4. In the diagram below, AE and BD are straight lines.

Not to scale
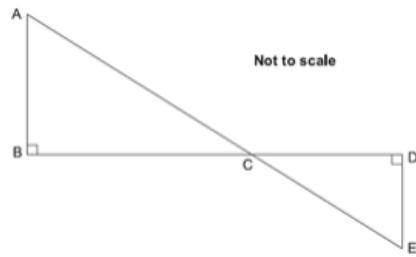
(a) Show that triangles ABC and EDC are similar.

[3]

(b) The length DE is 3.5 m.

The ratio BC : CD = 3 : 1.

Find the length AB.

.... m [2]

3.

A map has a scale of 1:4000
On the map, the distance between two houses is 9cm.

What is the actual distance between the houses?
Give your answer in metres.

..............................m
(3)

4.

A scale drawing has a scale of 1:20
In real life the length of a boat is 150m

What is the length of the boat on the scale drawing?
Give your answer in centimetres.

..............................cm
(3)

5.

A map has a scale of 8cm to 1km.

(a) Write this scale as a ratio in its simplest form.

....
(2)

The distance between two lakes is 4.5km

(b) How far will this be on the map?

.............................cm
(2)