Name	Class

☗ MATHS TEACHER HUB

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Ratio

(9 – 1) Topic booklet

HIGHER

These questions have been collated from previous years GCSE Mathematics papers.

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

Instructions
•Use **black** ink or ball-point pen.
•**Fill in the boxes** at the top of this page with your name, centre number and candidate number.
•Answer **all** questions.
•Answer the questions in the spaces provided
 – *there may be more space than you need*.
•Diagrams are NOT accurately drawn, unless otherwise indicated.
•You must **show all your working out.**
•If the question is a **1F** question you are not allowed to use a calculator.
•If the question is a **2F** or a **3F** question, you may use a calculator to help you answer.

Information
•The marks for **each** question are shown in brackets
 – *use this as a guide as to how much time to spend on each question*.

Advice
•Read each question carefully before you start to answer it.
•Keep an eye on the time.
•Try to answer every question.
•Check your answers if you have time at the end.

Answer ALL questions
Write your answers in the space provided.
You must write down all the stages in your working.

1   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.

    ....

Specimen 2 – Paper 3H   **(Total for Question 1 is 3 marks)**

1   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.

    ....

Sample 1 – Paper 2H   **(Total for Question 1 is 3 marks)**

2 Natalie makes potato cakes in a restaurant.

She mixes potato, cheese and onion so that

$$\text{weight of potato}:\text{weight of cheese}:\text{weight of onion} = 9:2:1$$

Natalie needs to make $6000\,g$ of potato cakes.

Cheese costs £2.25 for $175\,g$.

Work out the cost of the cheese needed to make $6000\,g$ of potato cakes.

£...

(Total for Question 2 is 4 marks)

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

Here is his working.

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

Rob's working is not correct.

Describe what Rob has done wrong.

....

....

....

(Total for Question 2 is 1 mark)

2 There are 60 people in a choir.
Half of the people in the choir are women.

The number of women in the choir is 3 times the number of men in the choir.
The rest of the people in the choir are children.

the number of children in the choir : the number of men in the choir $= n : 1$

Work out the value of n.
You must show how you get your answer.

$n =$ ....

(Total for Question 2 is 4 marks)

2   In a village

the number of houses and the number of flats are in the ratio 7 : 4
the number of flats and the number of bungalows are in the ratio 8 : 5

There are 50 bungalows in the village.

How many houses are there in the village?

....

(Total for Question 2 is 3 marks)

2 On Saturday, some adults and some children were in a theatre.
The ratio of the number of adults to the number of children was 5 : 2

Each person had a seat in the Circle or had a seat in the Stalls.

$\frac{3}{4}$ of the children had seats in the Stalls.

117 children had seats in the Circle.

There are exactly 2600 seats in the theatre.

On this Saturday, were there people on more than 60% of the seats?
You must show how you get your answer.

(Total for Question 2 is 5 marks)

3 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.

(Total for Question 3 is 5 marks)

3 Tom and Adam have a total of 240 stamps.
The ratio of the number of Tom's stamps to the number of Adam's stamps is $3:7$

Tom buys some stamps from Adam.
The ratio of the number of Tom's stamps to the number of Adam's stamps is now $3:5$

How many stamps does Tom buy from Adam?
You must show all your working.

(Total for Question 3 is 4 marks)

4 There are only blue pens, green pens and red pens in a box.

The ratio of the number of blue pens to the number of green pens is 2 : 5
The ratio of the number of green pens to the number of red pens is 4 : 1

There are less than 100 pens in the box.

What is the greatest possible number of red pens in the box?

....

(Total for Question 4 is 3 marks)

4 Daniel bakes 420 cakes.

He bakes only vanilla cakes, banana cakes, lemon cakes and chocolate cakes.

$\frac{2}{7}$ of the cakes are vanilla cakes.

35% of the cakes are banana cakes.

The ratio of the number of lemon cakes to the number of chocolate cakes is 4 : 5

Work out the number of lemon cakes Daniel bakes.

....

(Total for Question 4 is 5 marks)

5   Rosie, Matilda and Ibrahim collect stickers.

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

Ibrahim has 24 more stickers than Matilda.

Ibrahim has more stickers than Rosie.
How many more?

....

(Total for Question 5 is 3 marks)

5 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?

....%

(Total for Question 5 is 4 marks)

6 Rizwan writes down three numbers a, b and c

$$a:b = 1:3$$
$$b:c = 6:5$$

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

....

(2)

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

....

(2)

Emma writes down three numbers m, n and p

$$n = 2m$$
$$p = 5n$$

(b) Find $m:p$

....

(2)

(Total for Question 6 is 6 marks)

6 A shop sells packs of black pens, packs of red pens and packs of green pens.

There are
  2 pens in each pack of black pens
  5 pens in each pack of red pens
  6 pens in each pack of green pens

On Monday,

number of packs of black pens sold : number of packs of red pens sold : number of packs of green pens sold $= 7:3:4$

A total of 212 pens were sold.

Work out the number of green pens sold.

....

(Total for Question 6 is 4 marks)

6 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?

....

(Total for Question 6 is 3 marks)

7   £360 is shared between Abby, Ben, Chloe and Denesh.

The ratio of the amount Abby gets to the amount Ben gets is $2:7$

Chloe and Denesh each get 1.5 times the amount Abby gets.

Work out the amount of money that Ben gets.

£...

(Total for Question 7 is 4 marks)

8 The perimeter of a right-angled triangle is 72 cm.
The lengths of its sides are in the ratio 3 : 4 : 5

Work out the area of the triangle.

....cm^2

(Total for Question 8 is 4 marks)

8 In a box of pens, there are

three times as many red pens as green pens
and two times as many green pens as blue pens.

For the pens in the box, write down
the ratio of the number of red pens to the number of green pens to the number of blue pens.

....

(Total for Question 8 is 2 marks)

10 There are some red counters and some yellow counters in a bag.
There are 30 yellow counters in the bag.
The ratio of the number of red counters to the number of yellow counters is $1:6$

(a) Work out the number of red counters in the bag.

....
(2)

Riza puts some more red counters into the bag.
The ratio of the number of red counters to the number of yellow counters is now $1:2$

(b) How many red counters does Riza put into the bag?

....
(2)

(Total for Question 10 is 4 marks)

10 Given that $\dfrac{a}{b} = \dfrac{2}{5}$ and $\dfrac{b}{c} = \dfrac{3}{4}$

    find $a:b:c$

(Total for Question 10 is 3 marks)

11 Cormac has some sweets in a bag.
The sweets are lime flavoured or strawberry flavoured or orange flavoured.

In the bag

$$\frac{\text{number of lime}}{\text{flavoured sweets}} : \frac{\text{number of strawberry}}{\text{flavoured sweets}} : \frac{\text{number of orange}}{\text{flavoured sweets}} = 9 : 4 : x$$
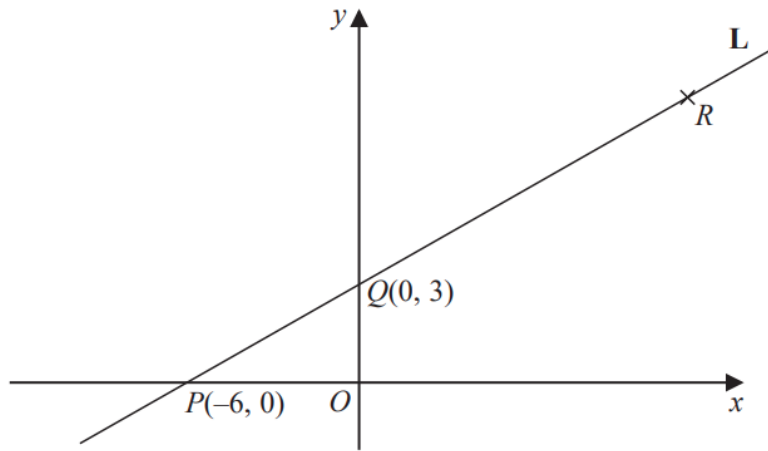
Cormac is going to take at random a sweet from the bag.

The probability that he takes a lime flavoured sweet is $\dfrac{3}{7}$

Work out the value of x.

$x = $ ....

(Total for Question 11 is 3 marks)

11 Here is a sketch of the line **L**.

The points $P(-6, 0)$ and $Q(0, 3)$ are points on the line **L**.

The point R is such that PQR is a straight line and $PQ:QR = 2:3$

(a) Find the coordinates of R.

(...................... , ...)

(2)

(b) Find an equation of the line that is perpendicular to **L** and passes through Q.

....

(3)

(Total for Question 11 is 5 marks)

12 The points A, B, C and D lie in order on a straight line.

$$AB:BD = 1:5$$
$$AC:CD = 7:11$$

Work out $AB:BC:CD$

.... : .... : ....

(Total for Question 12 is 3 marks)

14 Olivia and Jessica have in total half as many sweets as Fran and Gary have in total.

Fran and Gary share their sweets in the ratio $2:3$
Olivia and Jessica share their sweets in the ratio $9:1$

Fran got w sweets.
Gary got x sweets.
Olivia got y sweets.
Jessica got z sweets.

Find, in its simplest form, $w:x:y:z$

(Total for Question 14 is 4 marks)

14 A group of people went to a restaurant.
    Each person chose one starter and one main course.

starter	main course
soup	lasagne
prawns	curry

the number of people who chose soup : the number of people who chose prawns = 2 : 3

Of those who chose soup,
the number of people who chose lasagne : the number of people who chose curry = 5 : 3

Of those who chose prawns,
the number of people who chose lasagne : the number of people who chose curry = 1 : 5

What fraction of the people chose curry?
You must show how you get your answer.

....

(Total for Question 14 is 4 marks)

14 White shapes and black shapes are used in a game.
Some of the shapes are circles.
All the other shapes are squares.

The ratio of the number of white shapes to the number of black shapes is $3:7$

The ratio of the number of white circles to the number of white squares is $4:5$

The ratio of the number of black circles to the number of black squares is $2:5$

Work out what fraction of all the shapes are circles.

(Total for Question 14 is 4 marks)

15 The ratio of Marta's hourly pay to Khalid's hourly pay is 6 : 5

Both Marta and Khalid get an increase of £1.50 in their hourly pay.
The ratio of Marta's hourly pay to Khalid's hourly pay after this increase is 13 : 11

Work out the hourly pay before the increase for Marta and for Khalid.

Marta £..

Khalid £..

(Total for Question 15 is 4 marks)

17 There are four boxes on a shelf, **A**, **B**, **C** and **D**.

The total weight of **A** and **B** is 3 times the total weight of **C** and **D**.

The weight of **A** is $\frac{2}{3}$ of the weight of **B**.

The weight of **C** is 75% of the weight of **D**.

Find the ratio

weight of **A** : weight of **B** : weight of **C** : weight of **D**

(Total for Question 17 is 4 marks)

17 There are some small cubes and some large cubes in a bag.
The cubes are red or the cubes are yellow.

The ratio of the number of small cubes to the number of large cubes is 4 : 7

The ratio of the number of red cubes to the number of yellow cubes is 3 : 5

(a) Explain why the least possible number of cubes in the bag is 88

....

....

....

(1)

All the small cubes are yellow.

(b) Work out the least possible number of large yellow cubes in the bag.

....

(3)

(Total for Question 17 is 4 marks)

17 p and q are two numbers such that $p > q$

When you subtract 5 from p and subtract 5 from q the answers are in the ratio $5:1$
When you add 20 to p and add 20 to q the answers are in the ratio $5:2$

Find the ratio $p:q$
Give your answer in its simplest form.

(Total for Question 17 is 5 marks)

21 $5c + d = c + 4d$

(a) Find the ratio $c : d$

....

(2)

$6x^2 = 7xy + 20y^2$ where $x > 0$ and $y > 0$

(b) Find the ratio $x : y$

....

(3)

(Total for Question 21 is 5 marks)

21 Given that

$$2x - 1 : x - 4 = 16x + 1 : 2x - 1$$

find the possible values of x.

(Total for Question 21 is 5 marks)

23 There are four types of cards in a game.

Each card has a black circle or a white circle or a black triangle or a white triangle.

$$\text{number of cards with a black shape} : \text{number of cards with a white shape} = 3:5$$

$$\text{number of cards with a circle} : \text{number of cards with a triangle} = 2:7$$

Express the total number of cards with a black shape as a fraction of the total number of cards with a triangle.

....

(Total for Question 23 is 3 marks)