RATIO AND PROPORTION

Pearson Edexcel - Tuesday 19 May 2020 - Paper 1 (Non-Calculator) Higher Tier

1.

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)

Pearson Edexcel – Thursday 4 June 2020 - Paper 2 (Calculator) Higher Tier

2.

3   Carlo puts tins into small boxes and into large boxes.

He puts 6 tins into each small box.
He puts 20 tins into each large box.

Carlo puts a total of 3000 tins into the boxes so that

number of tins in small boxes : number of tins in large boxes = 2 : 3

Carlo says that less than 30% of the boxes filled with tins are large boxes.

Is Carlo correct?
You must show all your working.

(Total for Question 3 is 5 marks)

Pearson Edexcel – Monday 8 June 2020 - Paper 3 (Calculator) Higher Tier

3.

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)

Pearson Edexcel - Tuesday 21 May 2019 - Paper 1 (Non-Calculator) Higher Tier

4.

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,

$$\text{number of packs of black pens sold} : \text{number of packs of red pens sold} : \text{number of packs of green pens sold} = 7:3:4$$

A total of 212 pens were sold.

Work out the number of green pens sold.

....

(Total for Question 6 is 4 marks)

Pearson Edexcel - Tuesday 21 May 2019 - Paper 1 (Non-Calculator) Higher Tier

5.

17 Given that

$$x^2 : (3x + 5) = 1 : 2$$

find the possible values of x.

....

(Total for Question 17 is 4 marks)

Pearson Edexcel - Thursday 6 June 2019 - Paper 2 (Calculator) Higher Tier

6.

3 Hannah is planning a day trip for 195 students.

She asks a sample of 30 students where they want to go.
Each student chooses one place.

The table shows information about her results.

Place	Number of students
Theme Park	10
Theatre	5
Sports Centre	8
Seaside	7

(i) Work out how many of the 195 students you think will want to go to the Theme Park.

....

(2)

(ii) State any assumption you made **and** explain how this may affect your answer.

....

....

....

(1)

(Total for Question 3 is 3 marks)

Pearson Edexcel - Thursday 6 June 2019 - Paper 2 (Calculator) Higher Tier

7.

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)

Pearson Edexcel - Thursday 6 June 2019 - Paper 2 (Calculator) Higher Tier

8.

9 The circumference of circle **B** is 90% of the circumference of circle **A**.

(a) Find the ratio of the area of circle **A** to the area of circle **B**.

....

(2)

Square **E** has sides of length *e* cm.
Square **F** has sides of length *f* cm.

The area of square **E** is 44% greater than the area of square **F**.
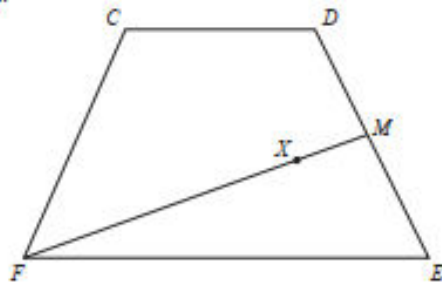
(b) Work out the ratio *e* : *f*

....

(2)

(Total for Question 9 is 4 marks)

Pearson Edexcel - Thursday 6 June 2019 - Paper 2 (Calculator) Higher Tier

9.

20 *CDEF* is a quadrilateral.

$\vec{CD} = \mathbf{a}$, $\vec{DE} = \mathbf{b}$ and $\vec{FC} = \mathbf{a} - \mathbf{b}$.

(a) Express $\vec{FE}$ in terms of a and/or b.
Give your answer in its simplest form.

....
(2)

M is the midpoint of *DE*.
X is the point on *FM* such that $FX : XM = n : 1$
CXE is a straight line.

(b) Work out the value of *n*.

$n = $ ....
(4)

(Total for Question 20 is 6 marks)

Pearson Edexcel - Tuesday 6 November 2018 - Paper 1 (Non-Calculator) Higher Tier

10.

15 Three solid shapes **A**, **B** and **C** are similar.

The surface area of shape **A** is 4 cm²
The surface area of shape **B** is 25 cm²

The ratio of the volume of shape **B** to the volume of shape **C** is 27 : 64

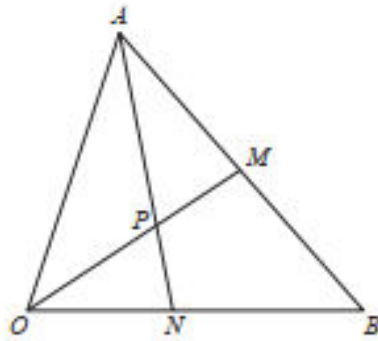Work out the ratio of the height of shape **A** to the height of shape **C**.
Give your answer in its simplest form.

....

(Total for Question 15 is 4 marks)

Pearson Edexcel - Tuesday 6 November 2018 - Paper 1 (Non-Calculator) Higher Tier

11.

21

OAB is a triangle.
OPM and APN are straight lines.
M is the midpoint of AB.

$\overrightarrow{OA} = \mathbf{a}$ $\overrightarrow{OB} = \mathbf{b}$

$OP:PM = 3:2$

Work out the ratio $ON:NB$

....

(Total for Question 21 is 5 marks)

12.

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)

Pearson Edexcel - Thursday 24 May 2018 - Paper 1 (Non-Calculator) Higher Tier

13.

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?

....

Pearson Edexcel - Thursday 7 June 2018 - Paper 2 (Calculator) Higher Tier

14.

4   Raya buys a van for £8500 plus VAT at 20%

Raya pays a deposit for the van.
She then pays the rest of the cost in 12 equal payments of £531.25 each month.

Find the ratio of the deposit Raya pays to the total of the 12 equal payments.
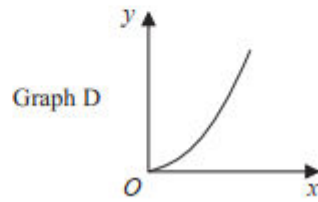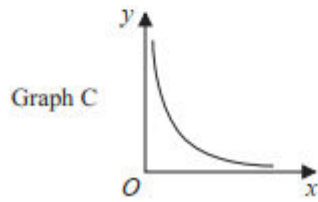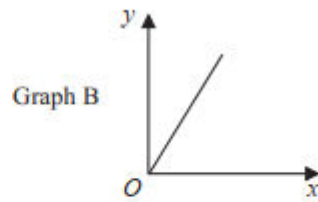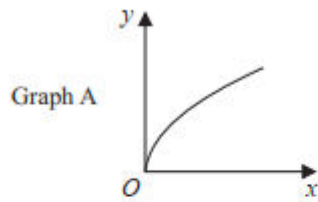Give your answer in its simplest form.

....

(Total for Question 4 is 5 marks)

Pearson Edexcel - Thursday 7 June 2018 - Paper 2 (Calculator) Higher Tier

15.

12

Graph A

Graph B

Graph C

Graph D

The graphs of y against x represent four different types of proportionality.

Match each type of proportionality in the table to the correct graph.

Type of proportionality	Graph letter
$y \propto x$	
$y \propto x^2$	
$y \propto \sqrt{x}$	
$y \propto \dfrac{1}{x}$	

(Total for Question 12 is 2 marks)

Pearson Edexcel - Thursday 2 November 2017 - Paper 1 (Non-Calculator) Higher Tier

16.

2 Kiaria is 7 years older than Jay.
Martha is twice as old as Kiaria.
The sum of their three ages is 77

Find the ratio of Jay's age to Kiaria's age to Martha's age.

....

(Total for Question 2 is 4 marks)

Pearson Edexcel - Thursday 2 November 2017 - Paper 1 (Non-Calculator) Higher Tier

17.

14 The ratio $(y + x) : (y - x)$ is equivalent to $k : 1$

Show that $y = \dfrac{x(k + 1)}{k - 1}$

_____(Total for Question 14 is 3 marks)_____

Pearson Edexcel - Wednesday 8 November 2017 - Paper 3 (Calculator) Higher Tier

18.

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)

Pearson Edexcel - Wednesday 8 November 2017 - Paper 3 (Calculator) Higher Tier

19.

14 Cone **A** and cone **B** are mathematically similar.
The ratio of the volume of cone **A** to the volume of cone **B** is 27 : 8

The surface area of cone **A** is 297 cm²

Show that the surface area of cone **B** is 132 cm²

(Total for Question 14 is 3 marks)

Pearson Edexcel - Thursday 25 May 2017 - Paper 1 (Non-Calculator) Higher Tier

20.

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.
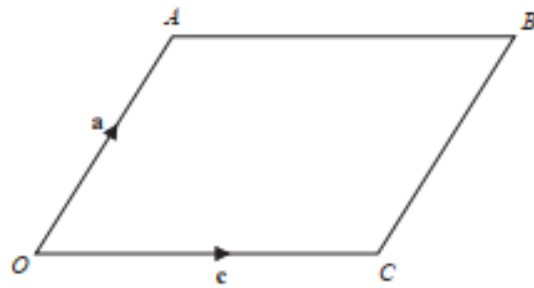
    ....

                                    (Total for Question 14 is 4 marks)

Pearson Edexcel - Thursday 25 May 2017 - Paper 1 (Non-Calculator) Higher Tier

21.

19

OABC is a parallelogram.

$\vec{OA} = \mathbf{a}$ and $\vec{OC} = \mathbf{c}$

X is the midpoint of the line *AC*.
OCD is a straight line so that $OC : CD = k : 1$

Given that $\vec{XD} = 3\mathbf{c} - \dfrac{1}{2}\mathbf{a}$

find the value of *k*.

$k = \text{...}$

(Total for Question 19 is 4 marks)

Pearson Edexcel - Tuesday 13 June 2017 - Paper 3 (Calculator) Higher Tier

22.

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)

Pearson Edexcel - Specimen Papers Set 2 - Paper 2 (Calculator) Higher Tier

23.

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)

Pearson Edexcel - Specimen Papers Set 2 - Paper 2 (Calculator) Higher Tier

24.

21 Given that

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

find the possible values of x.

Pearson Edexcel - Specimen Papers Set 2 - Paper 3 (Calculator) Higher Tier

25.

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.

....

(Total for Question 1 is 3 marks)

Pearson Edexcel - Specimen Papers Set 2 - Paper 3 (Calculator) Higher Tier

26.

10 The surface gravity of a planet can be worked out using the formula

$$g = \frac{6.67 \times 10^{-11} \, m}{r^2}$$

where

    m kilograms is the mass of the planet
    r metres is the radius of the planet

For the Earth and Jupiter here are the values of m and r.

Earth
$m = 5.98 \times 10^{24}$
$r = 6.378 \times 10^{6}$

Jupiter
$m = 1.90 \times 10^{27}$
$r = 7.149 \times 10^{7}$

Work out the ratio of the surface gravity of Earth to the surface gravity of Jupiter.
Write your answer in the form $1 : n$

....

(Total for Question 10 is 3 marks)

Pearson Edexcel - Specimen Papers Set 1 - Paper 1 (Non-Calculator) Higher Tier

27.

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)

Pearson Edexcel - Sample Paper 2 - (Calculator) Higher Tier

28.

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.

....

(Total for Question 1 is 3 marks)

Pearson Edexcel - Sample Paper 2 - (Calculator) Higher Tier

29.

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)

Pearson Edexcel - Thursday 9 June 2016 - Paper 2 (Calculator) Higher Tier
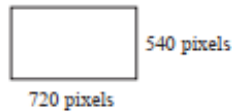
30.

8 Emma has a digital photo.

540 pixels

Diagram **NOT**
accurately drawn

720 pixels

The photo has a width of 720 pixels.
The photo has a height of 540 pixels.

(a) Write down the ratio of the width of the photo to the height of the photo.
    Give your ratio in its simplest form.

....
(2)

Emma wants the ratio of the width of the photo to the height of the photo to be $3:2$
She reduces the number of pixels in the height of the photo.
The width of the photo is still 720 pixels.

The ratio of the width of the photo to the new height of the photo is $3:2$

(b) Work out the new height of the photo.

.... pixels
(2)

(Total for Question 8 is 4 marks)

Pearson Edexcel - Wednesday 4 November 2015 - Paper 1 (Non-Calculator) Higher Tier

31.

5   Here are the ingredients needed to make **8** shortbread biscuits.

> Shortbread biscuits
> makes **8** biscuits
>
> 120 g butter
> 60 g caster sugar
> 180 g flour

Tariq is going to make some shortbread biscuits.
He has the following ingredients

330 g butter   200 g caster sugar   450 g flour

Work out the greatest number of shortbread biscuits that Tariq can make with
his ingredients.
You must show all your working.

.... biscuits

(Total for Question 5 is 3 marks)

Pearson Edexcel - Friday 6 November 2015 - Paper 2 (Calculator) Higher Tier

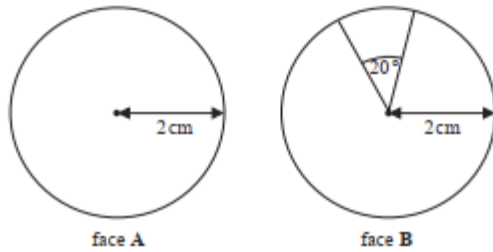**32.**

20 Here are two watch faces, **A** and **B**.

Diagram **NOT** accurately drawn

face **A**   face **B**

Both watch faces are circular with radius 2 cm.

The materials used to make both watch faces have the same thickness.

    A is made entirely of plastic.
    B has a 20° sector of metal and a 340° sector of plastic.

The ratio of the cost per cm² of the metal to the cost per cm² of the plastic is 3 : 2

Work out the ratio of the cost of the materials for **A** to the cost of the materials for **B**.
Give your answer in its simplest form.
You must show all your working.

(Total for Question 20 is 4 marks)

Pearson Edexcel - Monday 8 June 2015 - Paper 2 (Calculator) Higher Tier

33.

8 Sandra has a piece of string 153 cm long.
She cuts the string into three lengths in the ratio 4 : 2 : 3

Work out the length, in centimetres, of each piece of string.

.... cm

.... cm

.... cm

(Total for Question 8 is 3 marks)

Pearson Edexcel - Friday 8 November 2013 - Paper 2 (Calculator) Higher Tier

34.

2 Pavel and Katie share some sweets in the ratio 3 : 8
Katie gets 32 sweets.

(a) How many sweets does Pavel get?

....

(2)

Katie also has a tin of chocolates.
There are 80 chocolates in the tin.
45% of the chocolates have toffee in the middle.

(b) Work out the number of chocolates that have toffee in the middle.

....

(2)

(Total for Question 2 is 4 marks)

Pearson Edexcel - Friday 14 June 2013 - Paper 2 (Calculator) Higher Tier

35.

7   Colin, Dave and Emma share some money.

Colin gets $\frac{3}{10}$ of the money.

Emma and Dave share the rest of the money in the ratio 3 : 2

What is Dave's share of the money?

....

(Total for Question 7 is 4 marks)

Pearson Edexcel - Thursday 28 February 2013 - Paper 1 (Non-Calculator) Higher Tier

36.

12 5 schools sent some students to a conference.

One of the schools sent both boys and girls.
This school sent 16 boys.
The ratio of the number of boys it sent to the number of girls it sent was 1 : 2

The other 4 schools sent only girls.
Each of the 5 schools sent the same number of students.

Work out the total number of students sent to the conference by these 5 schools.

(Total for Question 12 is 4 marks)

Pearson Edexcel - Tuesday 6 November 2012 - Paper 1 (Non-Calculator) Higher Tier

37.

*13 Talil is going to make some concrete mix.
He needs to mix cement, sand and gravel in the ratio 1 : 3 : 5 by weight.

Talil wants to make 180 kg of concrete mix.

Talil has

       15 kg of cement
       85 kg of sand
     100 kg of gravel

Does Talil have enough cement, sand and gravel to make the concrete mix?

(Total for Question 13 is 4 marks)

Pearson Edexcel - Thursday 8 November 2012 - Paper 2 (Calculator) Higher Tier

38.

19 Rob is learning about the planets.

Rob makes a model of the Sun.
He also makes a model of the planet Jupiter.

Rob is going to hang the two models in the school hall.

Rob wants a distance of 16 m between the two models.
The real distance between the planet Jupiter and the Sun is 8×10^8 km.

Work out the scale Rob should use.
Give your answer in the form $1 : n$

....

(Total for Question 19 is 3 marks)

Pearson Edexcel - Friday 2 March 2012 - Paper 3 (Non-Calculator) Higher Tier

39.

10. Jim has only 5p coins and 10p coins.

The ratio of the number of 5p coins to the number of 10p coins is 2 : 3

Work out the ratio of

the total value of the 5p coins : the total value of the 10p coins.

Give your answer in its simplest form.

....

(Total 2 marks)

Pearson Edexcel - Monday 5 March 2012 - Paper 4 (Calculator) Higher Tier

40.

12. Sylvie shares £45 between Ann, Bob and Cath in the ratio 2 : 3 : 4

   Work out the amount each person gets.

   Ann ....

   Bob ....

   Cath ....

   (Total 3 marks)

Pearson Edexcel - Tuesday 9 November 2010 - Paper 3 (Non-Calculator) Higher Tier

41.

1. A box contains milk chocolates and dark chocolates only.
   The number of milk chocolates to the number of dark chocolates is in the ratio 2 : 1

   There are 24 milk chocolates.

   Work out the total number of chocolates.

   ....

   (Total 2 marks)

Pearson Edexcel - Tuesday 10 November 2009 - Paper 4 (Calculator) Higher Tier

42.

13. A piece of wood is 180 cm long.
    Tom cuts it into three pieces in the ratio 2 : 3 : 4

    Work out the length of the longest piece.

    .... cm

    (Total 3 marks)

OCR GSCE – Tuesday 3 November 2020 – Paper 4 (Calculator) Higher Tier

43.

3 Three people take $2\frac{1}{2}$ hours to deliver leaflets to 270 houses.

Assuming all people deliver leaflets at the same rate, how long will it take five people to deliver leaflets to 405 houses?
Give your answer in hours and minutes.

.... hours .... minutes **[4]**

44.

16 y is inversely proportional to the square of x.
$y = 2$ when $x = 5$.

Find a formula linking x and y.

.... **[3]**

45.

3 (a) The ratio 45 minutes to 3 hours 45 minutes can be written in the form $1 : n$.

Find the value of n.

(a) $n =$ .... [2]

(b) Reece and Sarah share some money in the ratio $9 : 16$.

Reece says that Sarah gets more than 60% of this money.

Show that Reece is correct.

.... [3]

46.

9 x is directly proportional to y.
   y is directly proportional to z.

   When $x = 10$, $y = 60$.
   When $y = 8$, $z = 1.6$.

   Find a formula for z in terms of x.

.... **[4]**

47.

1   Carol makes birthday cards.
Each card takes the same amount of time to make.

She makes 3 cards in 48 minutes.
She has an order for 80 cards.

Can she complete this order in 3 days if she works 8 hours each day?
Show how you decide.

.... because ....

.... **[5]**

4 Bob makes dry concrete by mixing cement, sand and stone in the ratio 1 : 2 : 3 by weight.
He buys the cement, sand and stone in bags as shown in this table.

	Weight of bag (kg)	Cost per bag (£)
Cement	25	5.50
Sand	20	2.00
Stone	15	3.90

He packs the dry concrete into 30 kg bags.

Bob buys just enough cement, sand and stone to make 50 bags of dry concrete.

(a) Show that Bob buys 500 kg of sand. [3]

(b) Bob sells the 50 bags of dry concrete for a total of £396.

Calculate Bob's percentage profit.

(b) .... % [5]

6   A bag of sweets contains only mints, sherberts and toffees.

The ratio of the number of mints to sherberts is 2 : 3.
The ratio of the number of sherberts to toffees is 7 : 5.

What fraction of the sweets are sherberts?

.... [3]

7   Sundip and Emma have some money.
     The ratio of Sundip's money to Emma's money is 3 : 5.
     Emma spends £450 of her money.
     The ratio of Sundip's money to Emma's money is now 2 : 3.

     Find how much money Sundip has.

£ .... **[4]**

51.

14 y is inversely proportional to the square root of x.
$y = 7$ when $x = 25$.

Find the value of y when $x = 100$.

$y =$ .... **[3]**

2 The ratio 50 grams to 1 kilogram can be written in the form $1 : n$.

Find the value of n.

$n =$ .... [2]

3 **(a)** Anne, Barry and Colin share a prize in the ratio $3 : 4 : 5$.
Colin gives $\frac{1}{3}$ of his share to a charity.

What fraction of the whole prize does Colin give to the charity?

(a) .... [3]

(b) Delia, Edwin and Freya share some money in the ratio $5 : 7 : 8$.
Freya's share is £1600.

How much money did they share?

(b) £ .... [2]

54.

16 (a) The table shows values of x and y.

x	4	16	36
y	6	3	2

Show that these values fit the relationship that y is inversely proportional to $\sqrt{x}$.　[2]

(b) a is inversely proportional to b^2 and $a = 3.75$ when $b = 4$.

Find a formula linking a and b.

(b) .... **[3]**

OCR GSCE – Thursday 6 June 2019 – Paper 5 (Non-Calculator) Higher Tier

55.

4   (a)   A sunflower grows at a rate of 4 cm each day.

How many days does it take to grow from a height of 80 cm to more than 1.06 m?

(a) .... [3]

(b)   If the sunflower grows at a faster rate, how would this affect your answer to part (a)?

.... [1]

OCR GSCE – Tuesday 6 November 2018 – Paper 4 (Calculator) Higher Tier

56.

2 Hector can run 400 metres in 66 seconds.

(a) Use this information to show that he could run 5 kilometres in less than 14 minutes. [4]

(b) Hector tries to run 5 kilometres in less than 14 minutes.

Give one reason why he might not achieve this.

....

.... [1]

57.

14 y is inversely proportional to the square root of x.
y is 40 when x is 9.

Find a formula linking x and y.

.... **[3]**

OCR GSCE – Tuesday 6 November 2018 – Paper 4 (Calculator) Higher Tier

58.

22 In a village the ratio of males to females is $2:1$.

40% of the people in the village are right-handed males.
25% of the people in the village are right-handed females.

Show that the proportion of females who are right-handed is greater than the proportion of males who are right-handed. **[6]**

OCR GSCE – Thursday 8 November 2018 – Paper 5 (Non-Calculator) Higher Tier

59.

6 Sally has 30 feet of ribbon.

She cuts strips each of length $2\frac{2}{5}$ feet from the ribbon.

Sally says

> I can cut 13 of these strips from this ribbon.

Is she correct?
Show how you decide.

.... **[4]**

17 The diagram consists of three mathematically similar shapes.
    The heights of the shapes are in the ratio 1 : 4 : 5.

Not to scale

Find the ratio

total shaded area : total unshaded area.

Give your answer in its simplest form.

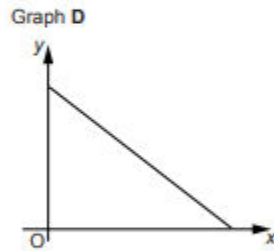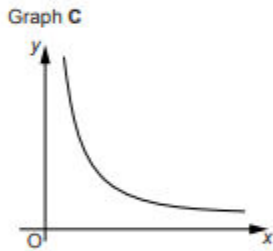total shaded area : total unshaded area .... : .... [4]
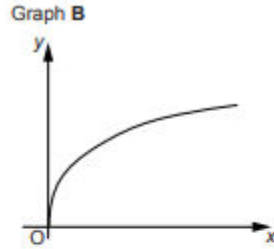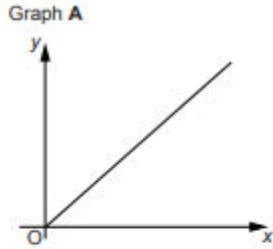
61.

6   In a box of mixed nuts, the total number of almonds, cashews and peanuts is 1025.
     The ratio of almonds to cashews is 1 : 3.
     The ratio of cashews to peanuts is 5 : 7.

     Calculate the number of cashews in the box.

     .... **[4]**

62.

9   These graphs show different relationships between the variables x and y.

Graph **A**

Graph **B**

Graph **C**

Graph **D**

Identify the graph which shows the following.

(a) y is directly proportional to x.

        (a)   Graph .... [1]

(b) y is inversely proportional to x.

        (b)   Graph .... [1]

63.

1 (a) The ratio 2 centimetres to 5 metres can be written in the form 1 : *n*.

Find the value of *n*.

(a) *n* = ... [2]

(b) Jay, Sheila and Harry share £7200 in the ratio 1 : 2 : 5.

How much does Harry receive?

(b) £ .... [2]

11 y is directly proportional to the square of x.

Find the percentage increase in y when x is increased by 15%.

.... % **[4]**

65.

10 Ifsaw noticed this information on her car's dashboard at the end of her journey.
She started her journey with a full tank of fuel and her miles travelled set to zero.

MILES TRAVELLED 165

FUEL

empty   full
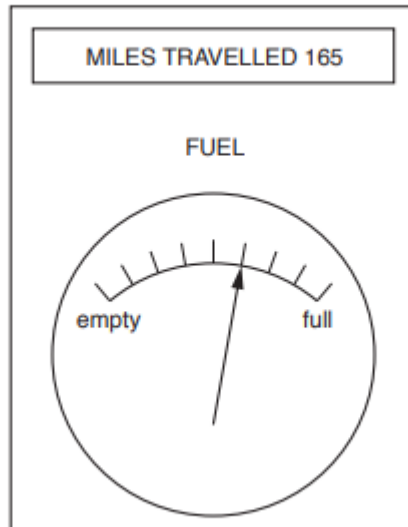
(a) Work out how far Ifsaw's car can travel on a full tank of fuel.

(a) .... miles **[3]**

(b) What assumption have you made when answering part **(a)**?

....

.... **[1]**

66.

14 The diagram shows a cylinder and a cone.
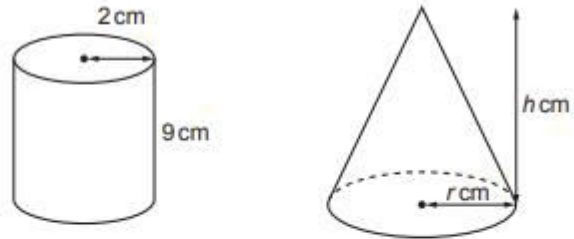
The cylinder has radius 2 cm and height 9 cm.
The cone has radius r cm and height h cm.

The ratio $r : h$ is $1 : 4$.
The volume of the cone is **equal to** the volume of the cylinder.

Work out the value of r.

[The volume V of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

.... [5]

67.

2   A box contains only red, blue and green pens.
The ratio of red pens to blue pens is 5 : 9.
The ratio of blue pens to green pens is 1 : 4.

Calculate the percentage of pens that are blue.

.... % **[4]**

68.

6   *y* is inversely proportional to *x*.
     y = 0.04 when *x* = 80.

     Find the value of *y* when *x* = 32.

                                                        y = ... [3]

14 (a) Standard bricks have dimensions 21.5 cm by 10.3 cm by 6.5 cm, correct to 1 decimal place.

A house is built using 4663 standard bricks.

Joslin says

Placed end to end, the bricks from the house would definitely reach over 1 km.

Show that Joslin's statement is correct. **[4]**

(b) A standard brick should weigh 2.8 kg, correct to 1 decimal place.
A truck can carry a maximum load of 20 tonnes.

(i) Calculate the maximum number of standard bricks that the truck should be able to carry.

(b)(i) .... **[3]**

(ii) Explain why your answer to **(b)(i)** may not be possible to achieve.

....

.... **[1]**

1   Donald swims 3 lengths of a swimming pool in 93 seconds.

    (a)   Use this information to show that he could swim 100 lengths in under 55 minutes.   **[4]**

    (b)   What assumption did you make in part **(a)**?

        ....

        .... **[1]**

    (c)   Donald tries to swim the 100 lengths in under 55 minutes.

        Suggest one reason why he might not achieve this.

        ....

        .... **[1]**

71.

6   Maria mixes white paint and red paint in the ratio 2 : 3.
     She makes a total of 15 litres of paint.

     How much more red paint does she need to add to the mixture so that the ratio of white paint to
     red paint becomes 1 : 5?

                                                          .... litres **[4]**

OCR GSCE – Tuesday 2 November 2017 – Paper 4 (Calculator) Higher Tier

72.

11 y is inversely proportional to x^2 and $y = 5$ when $x = 4$.

Find a formula linking x and y.

.... **[3]**

OCR GSCE – Tuesday 6 November 2017 – Paper 5 (Non - Calculator) Higher Tier

73.

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

   (a) Show that the triangle is a right-angled triangle.   **[2]**

   (b) The hypotenuse of the triangle is 15 cm long.

        Calculate the length of the shortest side in the triangle.

                                         (b) .... cm **[4]**

74.

7

9   There is a total of 250 men, women and children on a train.
     The ratio of men to women is 4 : 5.
     The ratio of women to children is 10 : 7.

     How many men are on the train?

     .... **[4]**

6   (a)   Two bags each contain only red counters and yellow counters.

In Bag A, the ratio of red counters to yellow counters is 1 : 4.

In Bag B, $\frac{1}{4}$ of the counters are red.

(i)   Sharon says

The proportion of the counters that are red is the same in both bags.

Explain why Sharon is not correct.

....

....

.... [1]

(ii)   The number of counters in the two bags is the same.

Complete the table below to show how many counters of each colour could be in the bags.

	Red counters	Yellow counters
Bag A		
Bag B		

[3]

(b) In another bag, Bag C, the ratio of red counters to yellow counters is 3 : 4.
If 3 of the red counters are removed from Bag C, the ratio of red counters to yellow counters
is 3 : 5.

How many **yellow** counters are in Bag C?

(b) .... **[3]**

13 A model railway is built using the scale 1 : 87.

(a) On the model railway, the distance between the rails is 16.5 mm.

distance between the rails

Calculate, in metres, the distance between the rails for a full-size train.

(a) .... metres **[2]**

(b) The volume of a full-size train carriage is 220 m³.
Trevor calculates the volume of a model train carriage to be 334 cm³ correct to 3 significant figures.

Is Trevor's calculation correct?
Show how you decide.

.... **[3]**

77.

3 Last year, Katie earned £16 200.
Her total loan repayments were £6400.

Katie estimates that the ratio of her loan repayments to her earnings is approximately 3 : 8.

Is she correct?
Show your reasoning.

.... **[3]**

78.

7 The population of a village is in the following ratios.

- men : children = 11 : 3
- women : children = 5 : 2

(a) Find the ratio men : women.
Give your answer in its simplest form.

(a) .... : .... **[2]**

(b) There are 36 children in the village.

Find the total population of the village.

(b) .... **[3]**

79.

4 In a school, $\frac{2}{3}$ of the students study a language.

Of those students who study a language, $\frac{2}{5}$ study Spanish.

Find the ratio of students who study Spanish to students who do not study Spanish.

.... : .... [3]

80.

12 y is inversely proportional to the square of x.

Complete the table.

x	10	6	
y	9		4

[4]

81.

4   (a)   (i)   Sketch a graph on the axes below that shows that y is directly proportional to x.
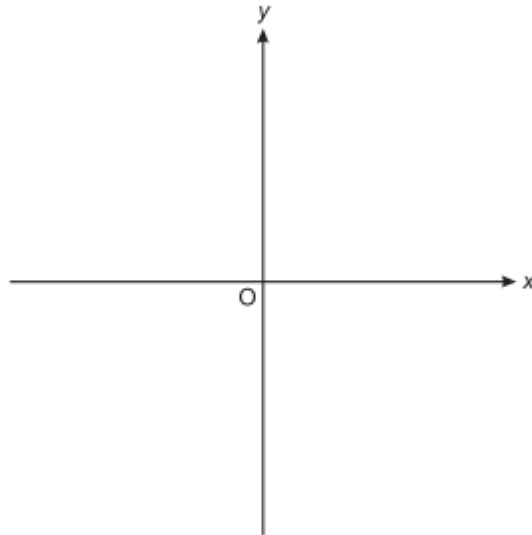
[2]

(ii)   Sketch a graph on the axes below that shows $y = x^3$.
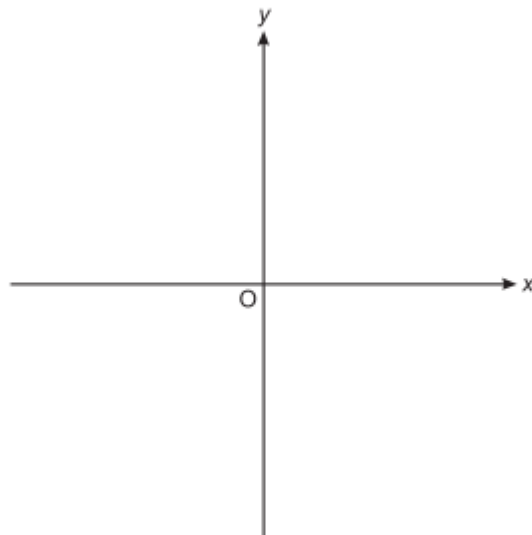
[2]

(b) It is possible to draw many rectangles that have area 24 cm². Here are two of them.

2 cm

12 cm

3 cm

8 cm

Not to scale
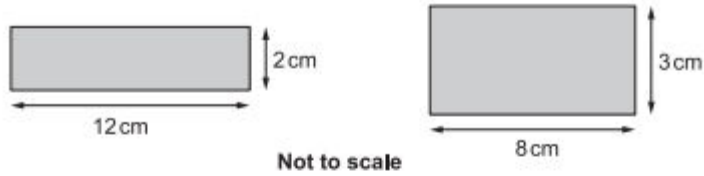
(i) Plot the dimensions of these two rectangles on the grid below. [1]

(ii) Complete the graph to show the relationship between length and width for rectangles with area 24 cm². [3]

Length (cm)

Width (cm)
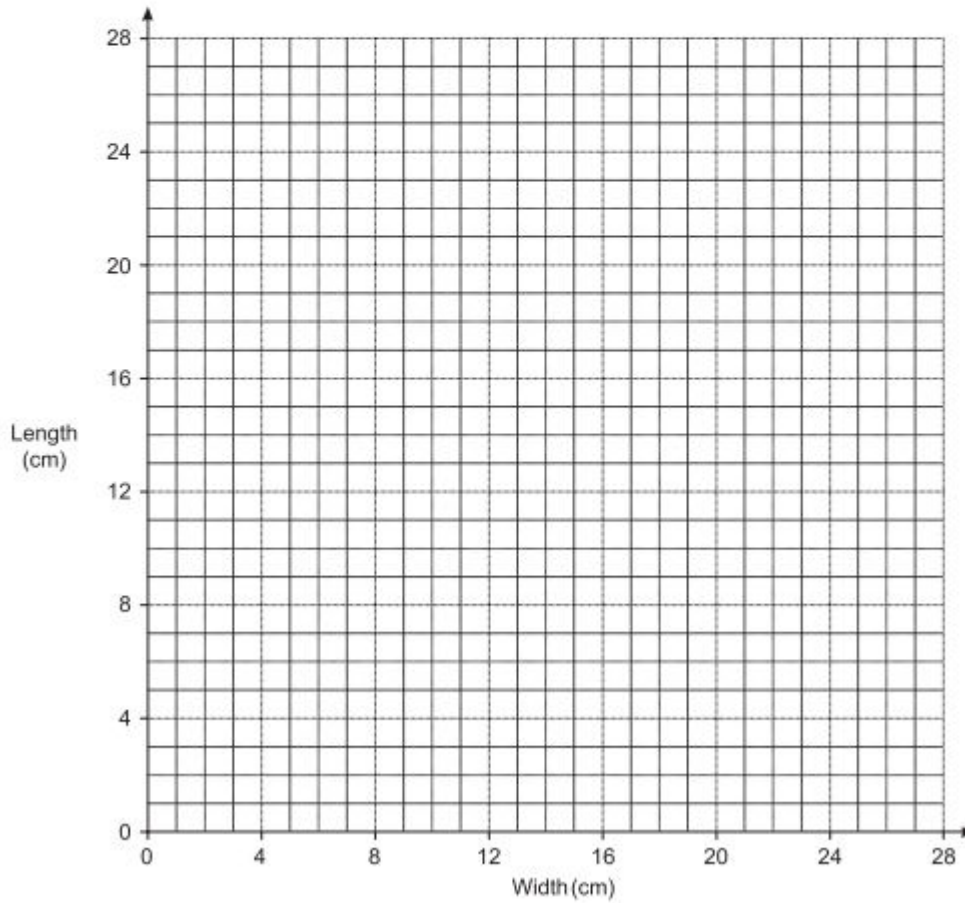
81.

1   18 rice cakes weigh a total of 130g.
     There are 329 calories in 100g of rice cakes.

     How many calories are there in one rice cake?

                                                                    .... calories **[3]**

82.

4 John is going to make chocolate squares to sell.

There are just three ingredients, chocolate, peanut butter and crisped rice, mixed in the ratio
4 : 2 : 3 respectively.

(a) How much of each ingredient will he need to make 900 g of mixture?

(a) chocolate .... g

peanut butter .... g

crisped rice .... g

[2]

(b) A bar of chocolate weighs 200 g and costs £2.50.
A jar of peanut butter contains 250 g and costs £1.70.
A packet of crisped rice contains 300 g and costs £2.00.

John makes 4.5 kg of mixture, from which he can cut 100 chocolate squares.
He charges 60p for each square and sells all 100 squares.

How much **profit** does he make?

(b) £ .... [5]

83.

19   The prices of two phones are in the ratio $x : y$.

When the prices are both increased by £20, the ratio becomes 5 : 2.
When the prices are both reduced by £5, the ratio becomes 5 : 1.

Express the ratio $x : y$ in its lowest terms.

.... : .... **[6]**

84.

10   The cost of a holiday is £2400

Rana pays a deposit followed by monthly payments, in the ratio

deposit : total of the monthly payments = 3 : 5

She makes 6 equal monthly payments.

Work out her monthly payment.

[4 marks]

Answer £ _____

85.

15      $3x = \dfrac{1}{2}y$

Circle the ratio $x : y$

[1 mark]

6 : 1   1 : 6   3 : 2   2 : 3

86.

22 (a) y is directly proportional to x^3

$y = 17$ when $x = 4$

Work out an equation connecting y and x.

[3 marks]

_____

_____

_____

_____

_____

_____

Answer _____

22 (b) m is inversely proportional to $\sqrt{r}$

The value of r is multiplied by 4

Circle what happens to the value of m.

[1 mark]

× 2   × 16   ÷ 2   ÷ 16

8 At a party there are 90 people.

48 are women and 42 are men.

Some women leave.

Some men arrive.

The ratio of women to men is now   10 : 11

Are there now more than 90 people at the party?
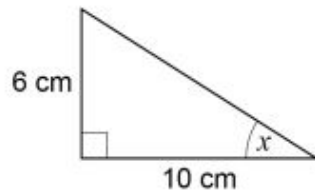
Tick **one** box.

☐ Yes   ☐ No   ☐ Cannot tell

Show working to support your answer.

[2 marks]

88.

1   Here are two right-angled triangles.

Not drawn
accurately

6 cm

10 cm

y cm

15 cm

x

x
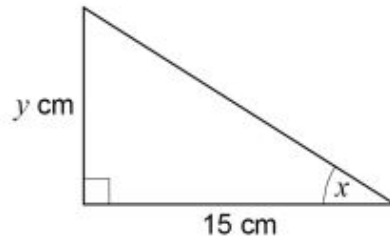
Circle the value of y.

[1 mark]

11   7.5   9   4

89.

11   Ed and Fay shared £330 in the ratio   7 : 4
          Ed gives Fay some of his money.
          Fay now has the same amount as Ed.

How much does Ed give Fay?

[3 marks]

Answer £_____

3 $2a$ is five times bigger than b.

Circle the ratio $a : b$

[1 mark]

10 : 1   1 : 10   5 : 2   2 : 5

11 Joe and Kyle share an amount of money in the ratio $7 : n$

Joe gets 35% of the money.

Work out the value of n.

[2 marks]

Answer _____

11   Here are two sets of numbers, A and B.

	Set A	
200	160
104	100

	Set B	
270	400	483
	300	x

mean of Set A : mean of Set B = 3 : 8

Work out the value of x.

[4 marks]

_____

_____

_____

_____

_____

_____

_____

_____

Answer _____

14   For Class X,   number of boys : number of girls = 7 : 8
        For Class Y,   number of boys : number of girls = 3 : 4

Which statement **must** be true?

Tick **one** box.

[1 mark]

☐   Class X has more boys than class Y

☐   Class X has twice as many girls as class Y

☐   Class X has a greater proportion of boys than class Y

☐   Class X has the same proportion of boys as class Y

94.

20 d is directly proportional to the square of v.

$d = 6$ when $v = 20$

20 (a)   Work out an equation connecting d and v.

[3 marks]

_____

_____

_____

_____

_____

Answer _____

20 (b)   Work out the value of d when $v = 30$

[2 marks]

_____

_____

_____

Answer _____

13 $e:f = 2:3$ and $f:g = 5:4$

Work out $e:g$

Give your answer in its simplest form.

[3 marks]

_____

_____

_____

_____
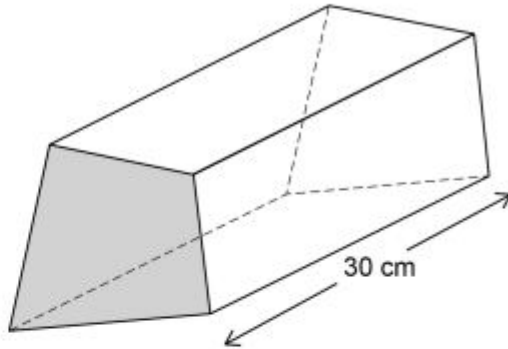
_____

_____

Answer _____ : _____

23 Prisms A and B are similar.

The cross sections are shaded.

Prism A

volume = 480 cm^3
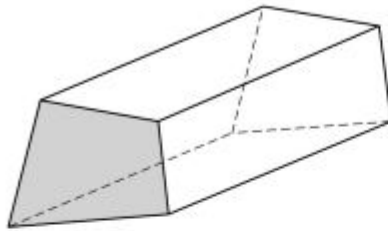
Prism B

length = 30 cm

30 cm

area of the cross section of A : area of the cross section of B = 4 : 9

Work out the area of the cross section of B.

[5 marks]

Answer _____ cm^2

15   The volume of a medal is 45 cm^3

The medal is made from copper and tin.

> volume of copper : volume of tin = 22 : 3

The density of copper is 8.96 g/cm^3

The density of tin is 7.31 g/cm^3

Work out the mass of the medal.

[4 marks]

Answer _____ grams

21   y is inversely proportional to $\sqrt{x}$

             $y = 4$ when $x = 9$

21 (a)   Work out an equation connecting y and x.

                                                              [3 marks]

                         Answer _____

21 (b)   Work out the value of y when $x = 25$

                                                               [2 marks]
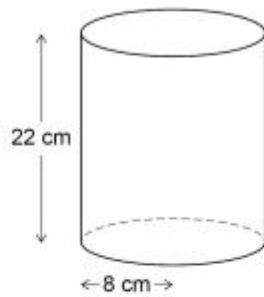
                         Answer _____

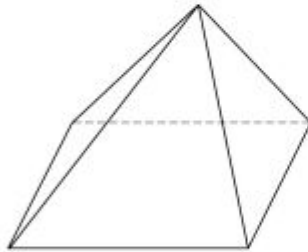**15**   A company makes two types of lampshade using fabric on wire frames.

Lampshade A

Fabric is used to make the curved surface of a cylinder.

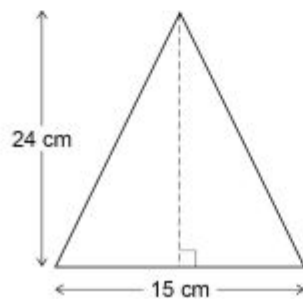The cylinder has radius 8 cm and height 22 cm

22 cm

←8 cm→

Lampshade B

Fabric is used to make the four triangular faces of a pyramid.

Each triangular face has base 15 cm and perpendicular height 24 cm

Not drawn
accurately

24 cm

15 cm

Cost of fabric	£400 per square metre
Other costs for A	£3.50 per lampshade
Other costs for B	£7.50 per lampshade

Work out the ratio   cost of one lampshade A : cost of one lampshade B

Give your answer in the form $n : 1$

[5 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Answer _____ : _____

100.

10 y is inversely proportional to x.

Complete the table.

[2 marks]

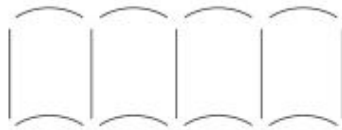| x	12	6	
y		4	8

101.

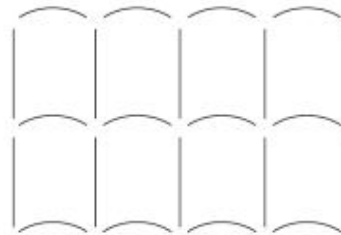**14**   Patterns are made using straight lines and arcs.

14 (a)   **Pattern A (one row)**   **Pattern B (two rows)**

More rows are added to **Pattern B** so that

number of straight lines : number of arcs = 10 : 9

How many rows are added?

[2 marks]

14 (b) A different pattern is made using 20 straight lines and 16 arcs.

The straight lines and arcs are made from metal.

20 straight lines cost £12

cost of one straight line : cost of one arc = 2 : 3

Work out the **total** cost of the metal in the pattern.

[3 marks]

_____

_____

_____

_____

_____

_____

_____

Answer £_____

AQA GSCE – Monday 24 May 2018 – Paper 1 (Non - Calculator) Higher Tier

102.

16 The value of y is 20% more than the value of x.

Circle the ratio $x : y$

[1 mark]

5 : 6   6 : 5   4 : 5   5 : 4

26 b is two thirds of c.

$5a = 4c$

Work out the ratio $a : b : c$

Give your answer in its simplest form where a, b and c are integers.

[3 marks]

Answer _____ : _____ : _____

3 y is $1\frac{1}{2}$ times x.

Circle the ratio that is equivalent to $y:x$

[1 mark]

$2:5$ $5:2$ $3:2$ $2:3$

8   Theo starts with savings of £18
James starts with no savings.

Each week from now,

Theo will save £4.50   and   James will save £4

In how many weeks will Theo and James have savings in the ratio 15 : 8 ?

[3 marks]

_____

_____

_____

_____

_____

_____

_____

_____

Answer _____

106.

4 $y = \dfrac{10}{x}$

If the value of x doubles, what happens to the value of y?

Circle your answer.

[1 mark]

$\div 2$ $\times 2$ $\div 5$ $\times 5$

107.

13 $x : y = 7 : 4$

$x + y = 88$

Work out the value of $x - y$

[3 marks]

_____

_____

_____

_____

_____

_____

Answer _____

108.

20   A stone is thrown upwards with a speed of v metres per second.

The stone reaches a maximum height of h metres.

h is directly proportional to v^2

When $v = 10$, $h = 5$

Work out the maximum height reached when $v = 24$

[4 marks]

_____

_____

_____

_____

_____

_____

_____

_____

Answer _____ m

109.

2 y is 100% **more** than x.

Circle the ratio $x : y$

[1 mark]

1 : 100   100 : 1   1 : 2   2 : 1

110.

17   At a football game

number of men : number of women : number of children = 13 : 5 : 7

There are 4152 **more** men than women.

Work out the number of children at the game.

[3 marks]

_____

_____

_____

_____

_____

_____

Answer _____

AQA GSCE – Wednesday 8 November 2017 – Paper 3 (Calculator) Higher Tier

111.

24 $a : b = 9 : 4$ and $10b = 7c$

Work out $a : c$ in its simplest form.

[3 marks]

_____

_____

_____

_____

_____

_____

_____

Answer   _____ : _____

AQA GSCE – Wednesday 25 May 2017 – Paper 1 (Non - Calculator) Higher Tier

112.

4 $a : b = 4 : 3$

Circle the correct statement.

[1 mark]

b is $\dfrac{4}{7}$ of a b is $\dfrac{3}{7}$ of a b is $\dfrac{4}{3}$ of a b is $\dfrac{3}{4}$ of a

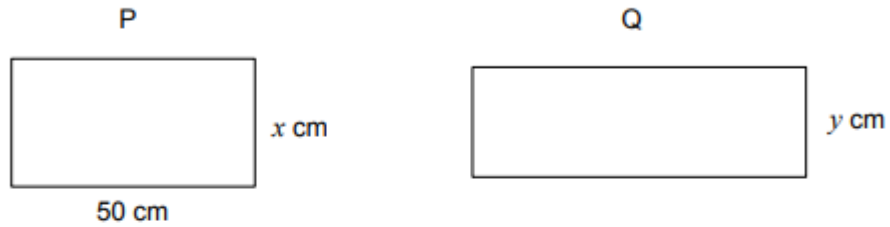**AQA GSCE – Thursday 8 June 2017 – Paper 2 (Calculator) Higher Tier**

113.

17   P is a rectangle with length 50 cm and width x cm

Q is a rectangle with width y cm

Not drawn
accurately

P

Q

x cm

y cm

50 cm

The length of Q is 20% **more** than the length of P.

The area of Q is 10% **less** than the area of P.

Work out the ratio $x : y$

Give your answer in its simplest form.

[4 marks]

_____

_____

_____

_____

_____

_____

_____

Answer _____ : _____

114.

22   A ball, dropped vertically, falls d metres in t seconds.

   d is directly proportional to the square of t.

   The ball drops 45 metres in the first 3 seconds.

   How far does the ball drop in the **next** 7 seconds?

   [4 marks]

Answer _____ metres

115.

11 Purple paint is made by mixing red paint and blue paint in the ratio 5 : 2

Yan has 30 litres of red paint and 9 litres of blue paint.

What is the **maximum** amount of purple paint he can make?

[3 marks]

_____

_____

_____

_____

_____

_____

Answer _____ litres

116.

14 $xy = c$ where c is a constant.

Circle the correct statement.

[1 mark]

y is directly proportional to x $\qquad$ y is directly proportional to $\dfrac{1}{x}$

y is inversely proportional to $\dfrac{1}{x}$ $\qquad$ x is directly proportional to y

117.

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.

[4 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Answer £ _____

119.

10   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.

[3 marks]

Answer _____

AQA GSCE – Sample Paper 2 (Calculator) Higher Tier

120.

13   Two spheres have radii in the ratio 5 : 3

Circle the ratio of their volumes.

[1 mark]

5 : 3   15 : 9   25 : 9   125 : 27

AQA GSCE – Sample Paper 2 (Calculator) Higher Tier

121.

20 y is directly proportional to $\sqrt{x}$

x	36	a
y	2	5

Work out the value of a.

[4 marks]

_____

_____

_____

_____

_____

_____

_____

_____

Answer _____

122.

16   During a game, players can win and lose counters.

At the start of the game

    Rob, Tim and Zak share the counters in the ratio 5 : 6 : 7

At the end of the game

    Rob, Tim and Zak share the **same number** of counters in the ratio 7 : 9 : 8

Show that Rob ends the game with more counters than he started with.

[3 marks]