

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

**Pearson Edexcel**  
**Level 1/Level 2 GCSE (9–1)**

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**Thursday 8 November 2018**

Morning (Time: 1 hour 30 minutes)

Paper Reference **1MA1/2H**

**Mathematics**

**Paper 2 (Calculator)**

**Higher Tier**

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

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.*
- You must **show all your working.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may be used.**
- If your calculator does not have a  $\pi$  button, take the value of  $\pi$  to be 3.142 unless the question instructs otherwise.



## Information

- The total mark for this paper is 80
- 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.

Turn over ►

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Pearson

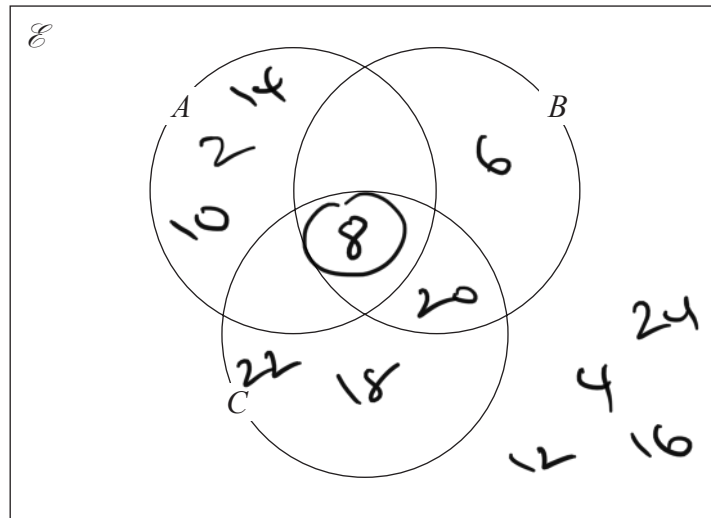
Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1  $\mathcal{E} = \{\text{even numbers between 1 and 25}\}$   
 $A = \{2, 8, 10, 14\}$   
 $B = \{6, 8, 20\}$   
 $C = \{8, 18, 20, 22\}$

(a) Complete the Venn diagram for this information.



(4)

A number is chosen at random from  $\mathcal{E}$ .

(b) Find the probability that the number is a member of  $A \cap B$ .

$\frac{1}{12}$

(2)

(Total for Question 1 is 6 marks)

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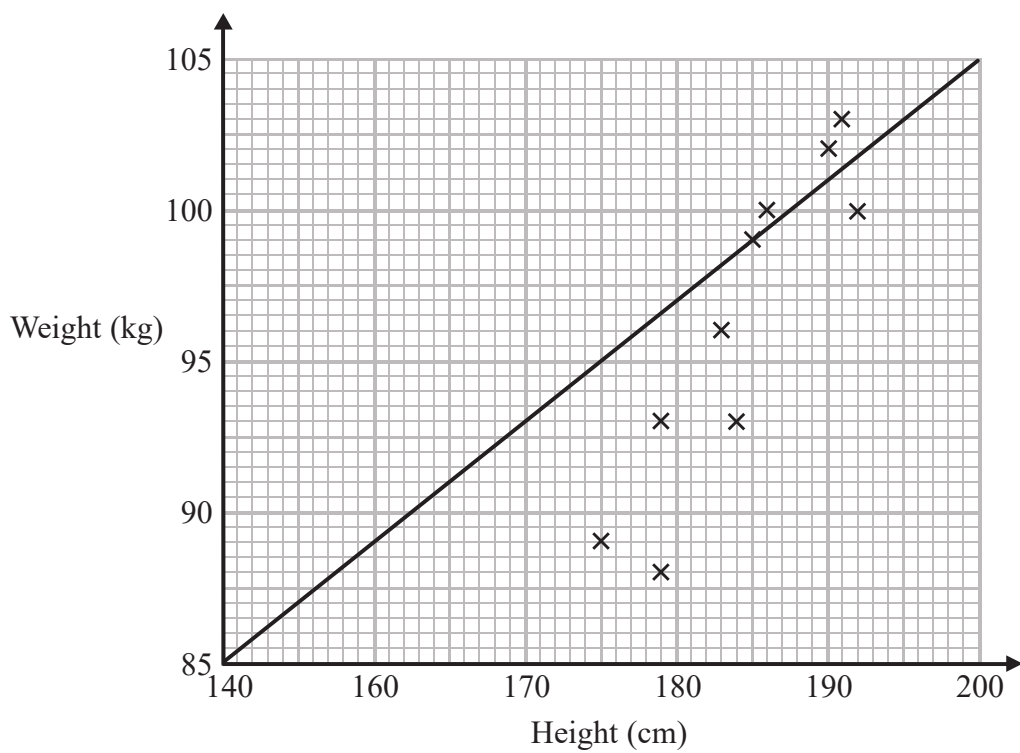


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2 Sean has information about the height, in cm, and the weight, in kg, of each of ten rugby players. He is asked to draw a scatter graph and a line of best fit for this information. Here is his answer.



Sean has plotted the points accurately.

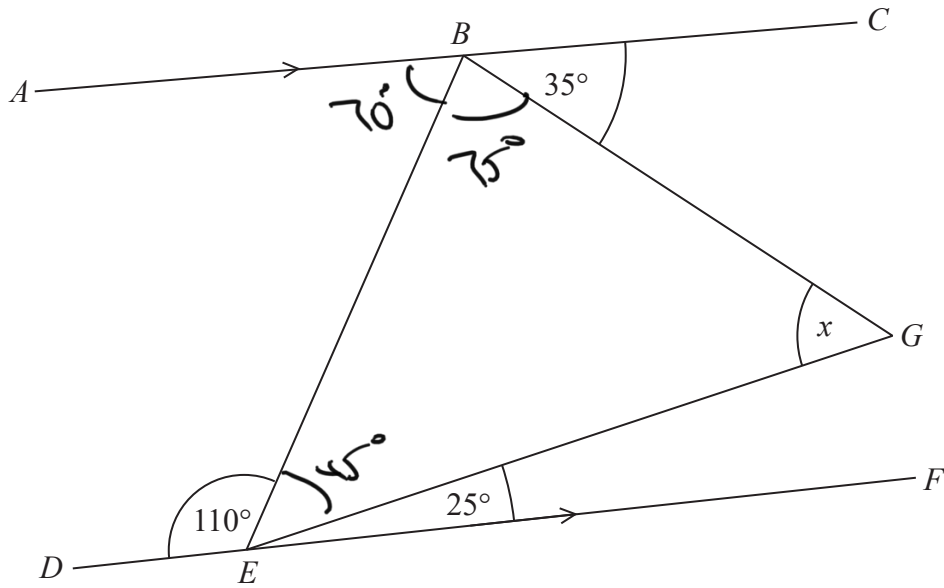
Write down two things that are wrong with his answer.

- 1 *line of best fit incorrectly drawn* ✓
- 2 *150 incorrectly placed on weight (y) axis* ✓

(Total for Question 2 is 2 marks)



3  $BEG$  is a triangle.



$ABC$  and  $DEF$  are parallel lines.

Work out the size of angle  $x$ .

Give a reason for each stage of your working.

$$\angle BEG = 180 - 135 = 45^\circ \quad (\text{Angles on a straight line add to } 180^\circ)$$

$$\angle ABE = 70^\circ \quad (\text{Alternate angle to } \angle BEF)$$

$$\angle BEG = 180 - 70 - 35 = 75^\circ \quad (\text{Angles on a straight line})$$

$$\angle EGB (x) = 180 - 75 - 45 = 60^\circ \quad (\text{Angles in a triangle add to } 180^\circ)$$



60°

(Total for Question 3 is 4 marks)



- 4 Northern Bank has two types of account.  
Both accounts pay compound interest.

**Cash savings account**

Interest  
2.5% per annum

**Shares account**

Interest  
3.5% per annum

Ali invests £2000 in the cash savings account.  
Ben invests £1600 in the shares account.

- (a) Work out who will get the most interest by the end of 3 years.  
You must show all your working.

Ali:

$$2000 \times 1.025^3 = 2153.78 -$$

$$\frac{2000.00}{153.78} \text{ interest.}$$

Ben:

$$1600 \times 1.035^3 = 1773.95 -$$

$$= \frac{1600.00}{173.95} \text{ interest}$$

Ben achieves more interest

(4)

In the 3rd year the rate of interest for the shares account is changed to 4% per annum.

- (b) Does this affect who will get the most interest by the end of 3 years?  
Give a reason for your answer.

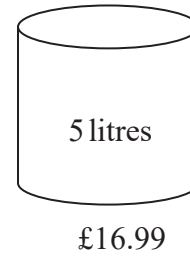
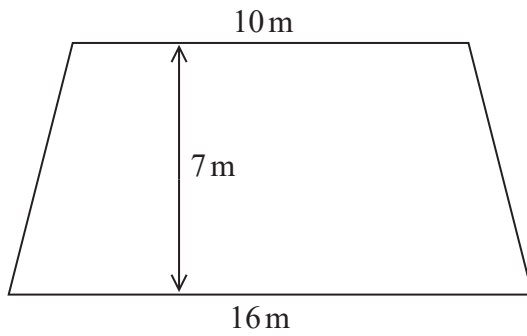
No Ben will get an increase from  
3.5%  $\rightarrow$  4.0%, he will still get  
more than Ali.

(1)

(Total for Question 4 is 5 marks)



- 5 The diagram shows a floor in the shape of a trapezium.



John is going to paint the floor.

Each 5 litre tin of paint costs £16.99

1 litre of paint covers an area of  $2 \text{ m}^2$

$$\Rightarrow 5 \text{ litres} = 10 \text{ m}^2$$

John has £160 to spend on paint.

Has John got enough money to buy all the paint he needs?

You must show how you get your answer.

$$\begin{aligned} \text{Area of trapezium} &= \frac{1}{2}(a+b)h \\ &= \frac{1}{2}(10+16)7 \\ &= 91 \text{ m}^2 \end{aligned}$$

$$\text{No. of } \overset{\text{litres}}{\text{tins}} = \frac{91}{2} = \underline{45.5 \text{ litres}} \quad (\text{10 tins})$$

$$\text{Total cost required} = 10 \times 16.99 = \underline{\underline{£169.90}}$$

John doesn't have enough money.

(Total for Question 5 is 5 marks)



- 6  $A$  is the point with coordinates  $(5, 9)$   
 $B$  is the point with coordinates  $(d, 15)$

The gradient of the line  $AB$  is 3

Work out the value of  $d$ .

when  $(5, 9)$

$$y = mx + c.$$

$$9 = 3(5) + c.$$

$$9 = 15 + c.$$

$$-6 = c$$

Equation of line

$$y = 3x - 6$$

when  $(d, 15)$

$$15 = 3(d) - 6$$

$$15 = 3d - 6$$

$$21 = 3d$$

$$7 = d$$

$$d = 7$$

(Total for Question 6 is 3 marks)



7 (a) Write the number 0.00008623 in standard form.

$$\frac{8.623 \times 10^{-5}}{(1)}$$

(b) Work out  $\frac{3.2 \times 10^3 + 5.1 \times 10^{-2}}{4.3 \times 10^{-4}}$

Give your answer in standard form, correct to 3 significant figures.

$$7441979.07$$

$$7440000$$

$$\frac{7.44 \times 10^6}{(2)}$$

(Total for Question 7 is 3 marks)

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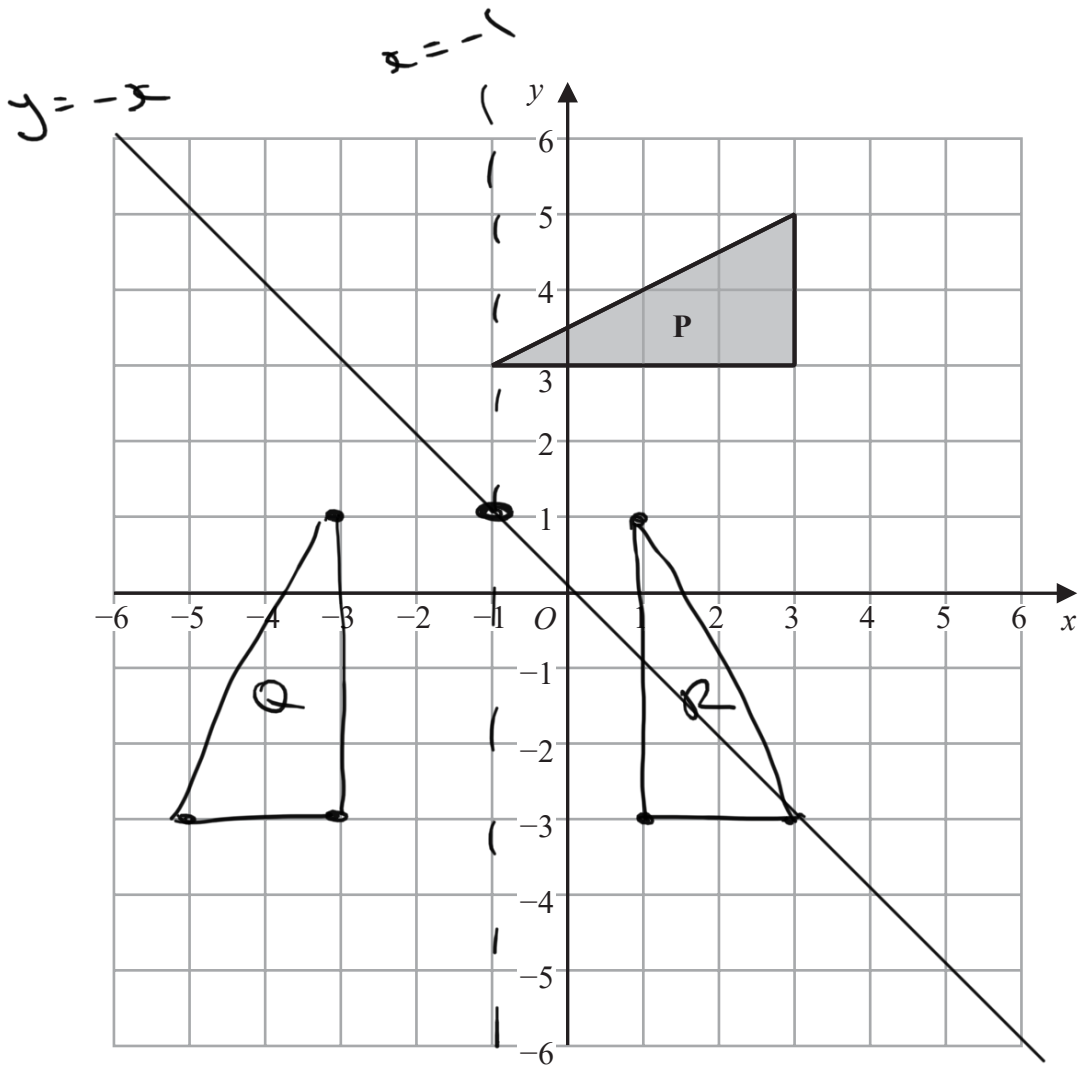


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8



Triangle **P** is reflected in the line  $y = -x$  to give triangle **Q**.  
 Triangle **Q** is reflected in the line  $x = -1$  to give triangle **R**.

Describe fully the single transformation that maps triangle **R** to triangle **P**.

Rotation  $90^\circ$  anticlockwise  $(-1, 1)$

\* Use tracing paper.

(Total for Question 8 is 3 marks)

9 Martin truncates the number  $N$  to 1 digit.  
 The result is 7

Write down the error interval for  $N$ .

$7 \leq N < 8$

(Total for Question 9 is 2 marks)



- 10 Robert makes 50 litres of green paint by mixing litres of yellow paint and litres of blue paint in the ratio 2:3

Yellow paint is sold in 5 litre tins.  
Each tin of yellow paint costs £26

Blue paint is sold in 10 litre tins.  
Each tin of blue paint costs £48

Robert sells all the green paint he makes in 10 litre tins.  
He sells each tin of green paint for £66.96

Work out Robert's percentage profit on each tin of green paint he sells.

$$\begin{array}{l}
 2 : 3 \\
 2 : 3 \quad 5 \\
 20 : 30 \quad 50 \text{ litres green.}
 \end{array}$$

$$\begin{array}{l}
 4 \text{ tins} \quad 3 \text{ tins} \\
 \text{£104} \quad \text{£144} = \text{£248 total cost.}
 \end{array}$$

$$\begin{aligned}
 \text{Sale} &= 66.96 \times 5 \\
 &= 334.80
 \end{aligned}$$

$$\begin{aligned}
 \% \text{ Profit} &= \frac{\text{Profit}}{\text{Cost}} \\
 &= \frac{334.80 - 248}{248} \\
 &= 0.35 = \underline{\underline{35\%}}
 \end{aligned}$$

35% ✓

(Total for Question 10 is 5 marks)



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11 In a restaurant there are

- 9 starter dishes
- 15 main dishes
- 8 dessert dishes

Janet is going to choose one of the following combinations for her meal.

- a starter dish and a main dish
- or a main dish and a dessert dish
- or a starter dish, a main dish and a dessert dish

Show that there are 1335 different ways to choose the meal.

$$\begin{array}{l}
 \begin{array}{r}
 S \\
 9 + 15 \\
 \hline
 24
 \end{array} = 135 \\
 \\
 \begin{array}{r}
 M \\
 15 + 8 \\
 \hline
 23
 \end{array} = 120 \\
 \\
 \begin{array}{r}
 S + M + D \\
 9 \times 15 + 8 \\
 \hline
 1335
 \end{array} = 1080 + 8 = 1335 \checkmark
 \end{array}$$

(Total for Question 11 is 3 marks)

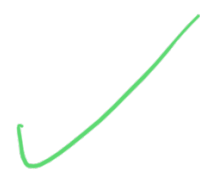


12 (a) Write  $\frac{4x^2 - 9}{6x + 9} \times \frac{2x}{x^2 - 3x}$  in the form  $\frac{ax + b}{cx + d}$  where  $a, b, c$  and  $d$  are integers.

$$\frac{\cancel{(2x+3)}(2x-3)}{3\cancel{(2x+3)}} \times \frac{2x}{x(x-3)}$$

$$\frac{\cancel{2x}(2x-3)}{3\cancel{x}(x-3)}$$

$$\frac{4x-6}{3x-9}$$



$$\frac{4x-6}{3x-9}$$

(3)

(b) Express  $\frac{3}{x+1} + \frac{1}{x-2} - \frac{4}{x}$  as a single fraction in its simplest form.

$$\frac{3(x)(x-2)}{x(x+1)(x-2)} + \frac{1(x)(x+1)}{x(x+1)(x-2)} - \left[ \frac{4(x+1)(x-2)}{x(x+1)(x-2)} \right]$$

$$\frac{3(x^2 - 2x) + x^2 + x - [4(x^2 - x - 2)]}{x(x+1)(x-2)}$$

$$\frac{3x^2 - 6x + x^2 + x - [4x^2 - 4x - 8]}{x(x+1)(x-2)}$$

$$\frac{\cancel{4x^2} - 5x - \cancel{4x^2} + 4x + 8}{x(x+1)(x-2)} = \frac{-x + 8}{x(x+1)(x-2)}$$

$$= \frac{8-x}{x(x+1)(x-2)} \quad (3)$$

(Total for Question 12 is 6 marks)



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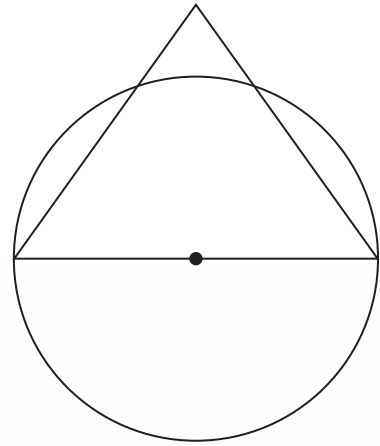
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13 The diagram shows a circle and an equilateral triangle.

One side of the equilateral triangle is a diameter of the circle.  
The circle has a circumference of 44 cm.

Work out the area of the triangle.  
Give your answer correct to 3 significant figures.



Circumference =  $\pi D$   
 $44 = \pi D$   
 $\frac{44}{\pi} = D$

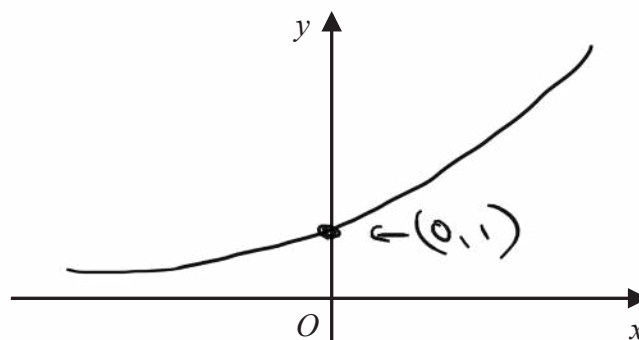
Area =  $\frac{1}{2} ab \sin C$   
 $= \frac{1}{2} \times \frac{44}{\pi} \times \frac{44}{\pi} \times \sin 60^\circ$   
 $= 84.94 \text{ cm}^2$



(3.52)      84.9 .....cm<sup>2</sup>

(Total for Question 13 is 3 marks)

14 On the grid, sketch the curve with equation  $y = 2^x$   
Give the coordinates of any points of intersection with the axes.



Intersects y axis at (0, 1)  
Doesn't cross x axis!  
'asymptote'



(Total for Question 14 is 2 marks)



15 The equation of a circle is  $x^2 + y^2 = 42.25$

Find the radius of the circle.

$$x^2 + y^2 = r^2$$

$$r = \sqrt{42.25} = \frac{13}{2}$$

6.5 ✓

(Total for Question 15 is 1 mark)

16 There are only red counters and blue counters in a bag.

Joe takes at random a counter from the bag.

The probability that the counter is red is 0.65

Joe puts the counter back into the bag.

Mary takes at random a counter from the bag.

She puts the counter back into the bag.

(a) What is the probability that Joe and Mary take counters of different colours?

$$\text{Joe } R \times B \\ 0.65 \times 0.35 = \frac{9}{80}$$

$$\text{Mary } R \times B \\ 0.65 \times 0.35 = \frac{9}{80}$$

$$\frac{9}{80} + \frac{9}{80} = \frac{18}{80} = \frac{9}{40}$$

$\frac{9}{40}$  ✓

(2)

There are 78 red counters in the bag.

(b) How many blue counters are there in the bag?

$$78 = 78 = 65\% \text{ of Total}$$

$$78 = 0.65T$$

$$100 = T$$

$$\text{Blue} = 100 - 78$$

$$= 42$$

42 Blue ✓

(2)

(Total for Question 16 is 4 marks)



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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.

$$\frac{p-5}{5} : \frac{q-5}{1}$$

$$\frac{p-5}{5} = \frac{q-5}{1}$$

$$\frac{p-5}{5} = 5(q-5) \Rightarrow p-5 = 5q-25$$
  
$$p = 5q - 20$$

$$\frac{p+20}{5} : \frac{q+20}{2}$$

$$\frac{p+20}{5} = \frac{q+20}{2}$$

$$2(p+20) = 5(q+20)$$

$$2p + 40 = 5q + 100$$

$$2(5q - 20) + 40 = 5q + 100$$

$$10q - 40 + 40 = 5q + 100$$

$$5q = 100$$

$$q = 20$$

$$\therefore p : q$$

$$80 : 20$$

$$4 : 1$$

$$p = 5q - 20$$

$$p = 5(20) - 20$$
  
$$= 100 - 20$$

$$p = 80$$

$$4 : 1$$



(Total for Question 17 is 5 marks)







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19 Solve  $22 < \frac{m^2 + 7}{4} < 32$

Show all your working.

$$88 < m^2 + 7$$

$$81 < m^2$$


$$\pm 9 < m$$

$$9 < m < 11$$


$$m^2 + 7 < 128$$

$$m^2 < 121$$

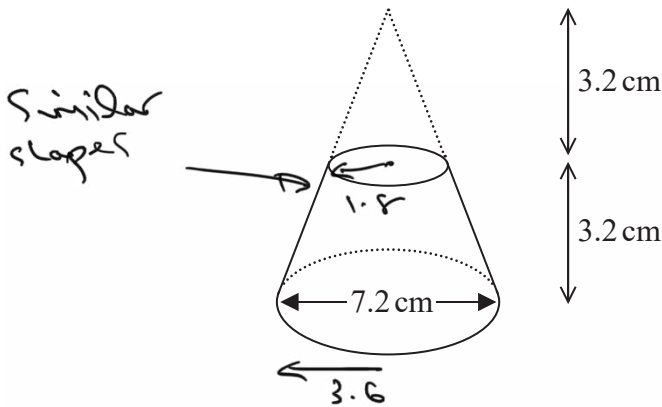
$$m < \pm 11$$

$$-11 < m < 11$$


(Total for Question 19 is 5 marks)



20 Here is a frustum of a cone.

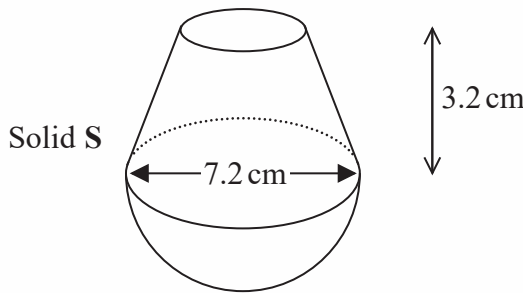


Volume of sphere =  $\frac{4}{3}\pi r^3$

Volume of cone =  $\frac{1}{3}\pi r^2 h$

The diagram shows that the frustum is made by removing a cone with height 3.2 cm from a solid cone with height 6.4 cm and base diameter 7.2 cm.

The frustum is joined to a solid hemisphere of diameter 7.2 cm to form the solid S shown below.



FRUSTUM

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$2.4 \text{ g/cm}^3 = \frac{\text{Mass}}{\text{Volume}}$$

$$\begin{aligned} \text{Volume} &= \text{Big cone} - \text{Little cone} \\ &= \frac{1}{3}\pi 3.6^2 6.4 - \frac{1}{3}\pi 1.8^2 3.2 \\ &= 76.00140948 \text{ cm}^3 \end{aligned}$$

The density of the frustum is  $2.4 \text{ g/cm}^3$   
 The density of the hemisphere is  $4.8 \text{ g/cm}^3$

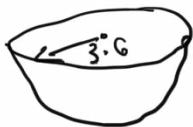
Calculate the average density of solid S.

FRUSTUM

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$2.4 = \frac{\text{Mass}}{76.00140948}$$

$$\text{FRUSTUM} \rightarrow 182.403327 = \text{Mass grams}$$



HEMISPHERE

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$4.8 = \frac{\text{Mass}}{\left(\frac{4}{3} \times \pi \times 3.6^3\right)}$$

$$97.7160979 = \frac{1}{2}$$



HEMISPHERE

$$469.0372699 \dots = \text{mass grams}$$

AVERAGE DENSITY OF SOLID S

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$
$$= \frac{182.4033827 + 469.0372699}{76.00140948 + 97.7160979}$$

*Four digits* *Hemisphere*

$$\text{Average density} = \underline{\underline{3.75 \text{ g/cm}^3}}$$

.....g/cm<sup>3</sup>

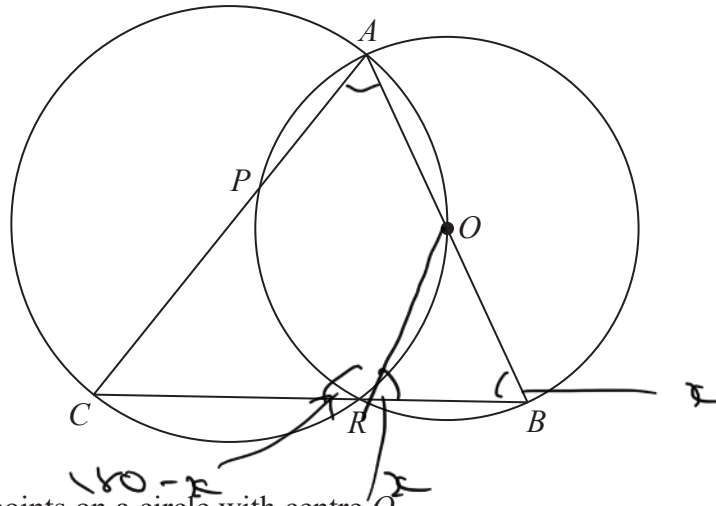
(Total for Question 20 is 5 marks)

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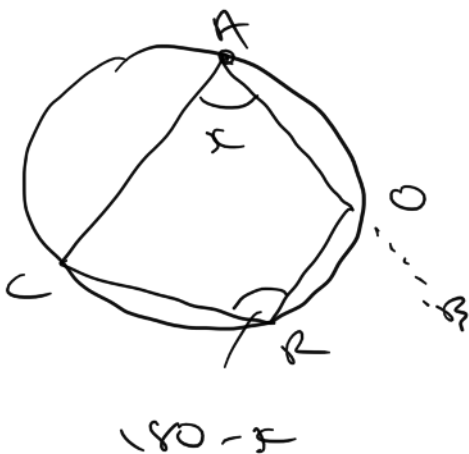
$A, B, R$  and  $P$  are four points on a circle with centre  $O$ .  
 $A, O, R$  and  $C$  are four points on a different circle.  
 The two circles intersect at the points  $A$  and  $R$ .

$CPA, CRB$  and  $AOB$  are straight lines.

Prove that angle  $CAB =$  angle  $ABC$ .

$\angle ABC = x$   
 $OR = OB = r$  (as both radii)  
 $\triangle ORB$  is isosceles

$\angle ROA = 180 - x$



$\angle CAB = x$  as opp. angles in a cyclic quadrilateral add to  $180^\circ$

So  $\angle CAB = \angle ABC$   
 $x = x$

(Total for Question 21 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

