

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 π button, take the value of π 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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.CG Maths.

Hints



Pearson

Please note that these worked solutions have neither been provided nor approved by Pearson Education and may not necessarily constitute the only possible solutions. Please refer to the original mark schemes for full guidance.

Any writing in blue indicates what must be written in order to answer the questions and get the marks. The worked solutions have been designed to show the smallest amount of work which needs to be done to answer the question.

Anything written in green in a cloud doesn't have to be written in the exam.

Anything written in orange in a rectangle doesn't have to be written in the exam and is there to show what should be put into a calculator or measured using a ruler or protractor.

If you find any mistakes or have any requests or suggestions, please send an email to curtis@cgmaths.co.uk

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 $\mathcal{E} = \{\text{even numbers between 1 and 25}\}$

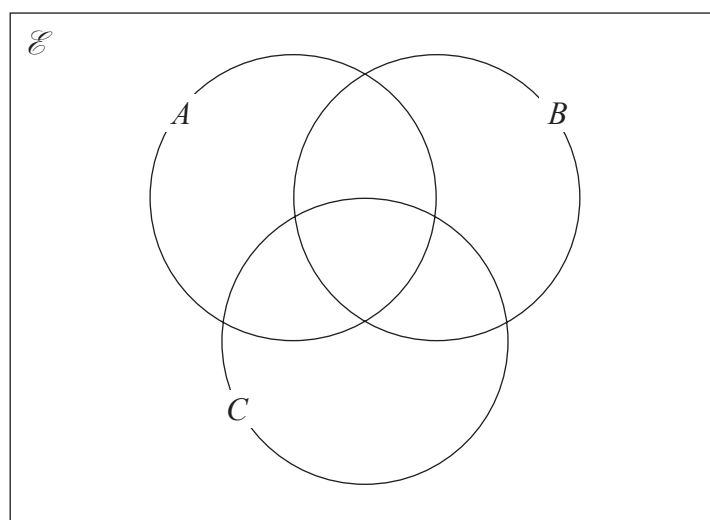
$A = \{2, 8, 10, 14\}$

$B = \{6, 8, 20\}$

$C = \{8, 18, 20, 22\}$

8 is in A, B and C. 20 is in B and C

(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 $A \cap B$.

A and B

(2)

(Total for Question 1 is 6 marks)

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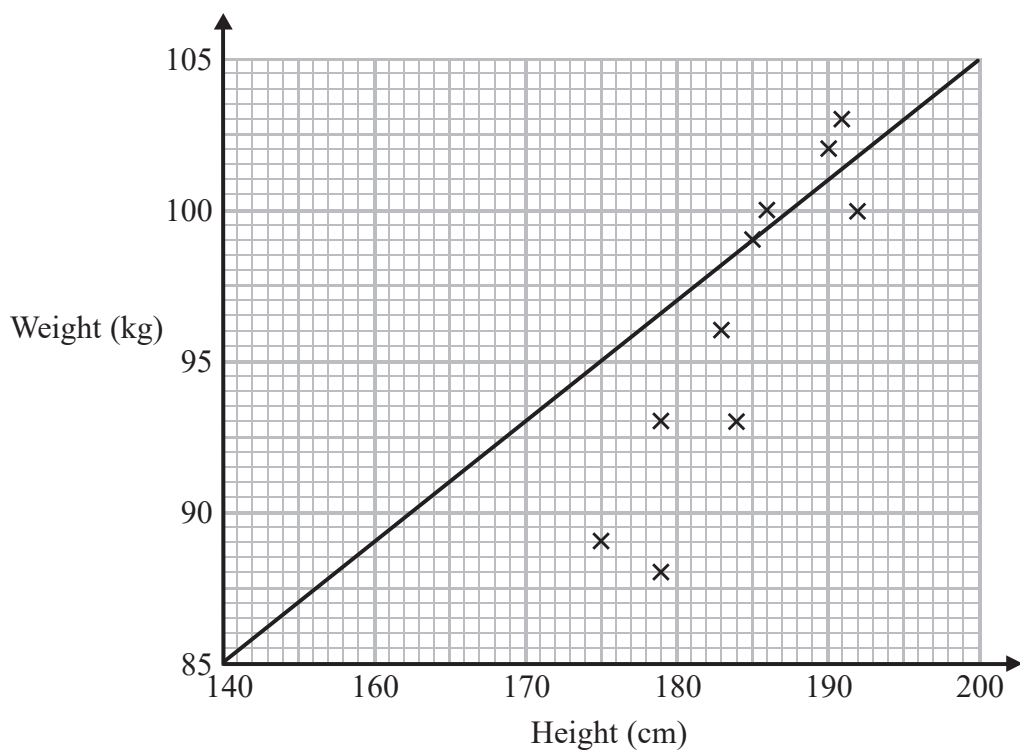
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2 Sean has information about the height, in cm, and the weight, in kg, of each of ten rugby players. He is asked to draw a scatter graph and a line of best fit for this information. Here is his answer.



Sean has plotted the points accurately.

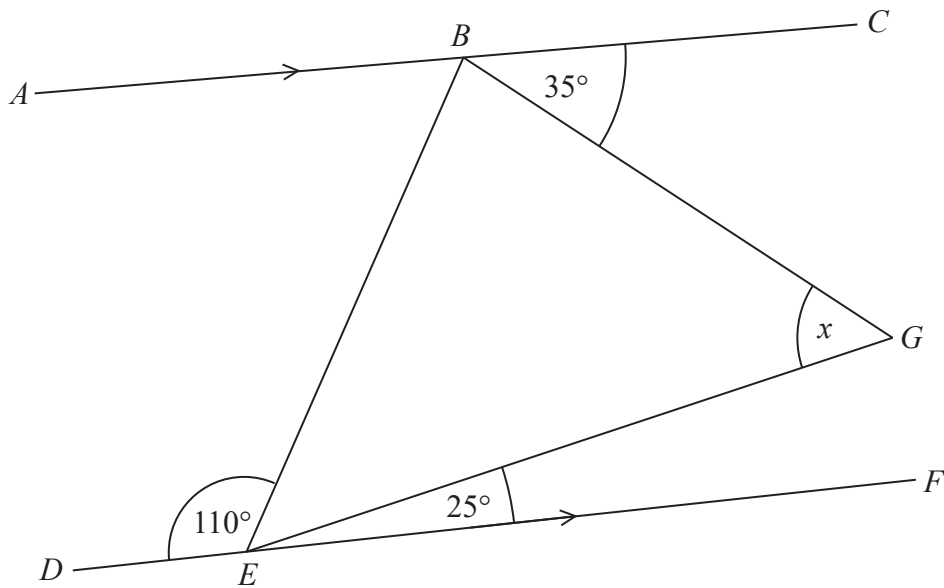
Write down two things that are wrong with his answer.

1 The line of best fit

2 The x axis numbering

(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.

The problem can be solved using the following facts:
angles on a straight line add to 180° , alternate
angles are equal and angles in a triangle add to 180°

(Total for Question 3 is 4 marks)

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- 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.

$100\% + 2.5\% = 102.5\%$
 $102.5/100 = 1.025$

2000×1.025^3

This calculates the amount of money Ali will have in 3 years

(4)

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

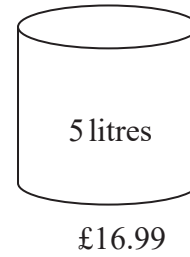
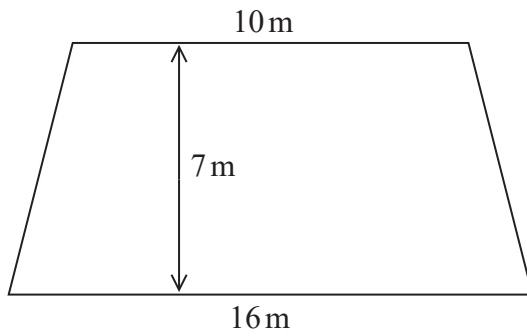
- (b) Does this affect who will get the most interest by the end of 3 years?
Give a reason for your answer.

This means Ben will get more interest

(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 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.

First calculate the area of the floor.

$\frac{1}{2} \times (a + b) \times h = \text{area of trapezium}$, where a and b are the parallel sides and h is the distance between them.

Then work out how many litres of paint are needed.

Then work out how many tins are needed. Work out the cost of the whole number of tins needed. Compare the amount to the money he has to spend to decide if he has enough

(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 .

Change in y over change in x
works out the gradient. Make
an equation involving d and the
gradient. Rearrange to find d

.....
(Total for Question 6 is 3 marks)

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

Multiply by ten 5 times to get a number between 1 and 10

.....
(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.

Type into the calculator

3 significant figures means writing only the first 3 figures and everything else is ignored after rounding the 3rd figure

.....
(2)

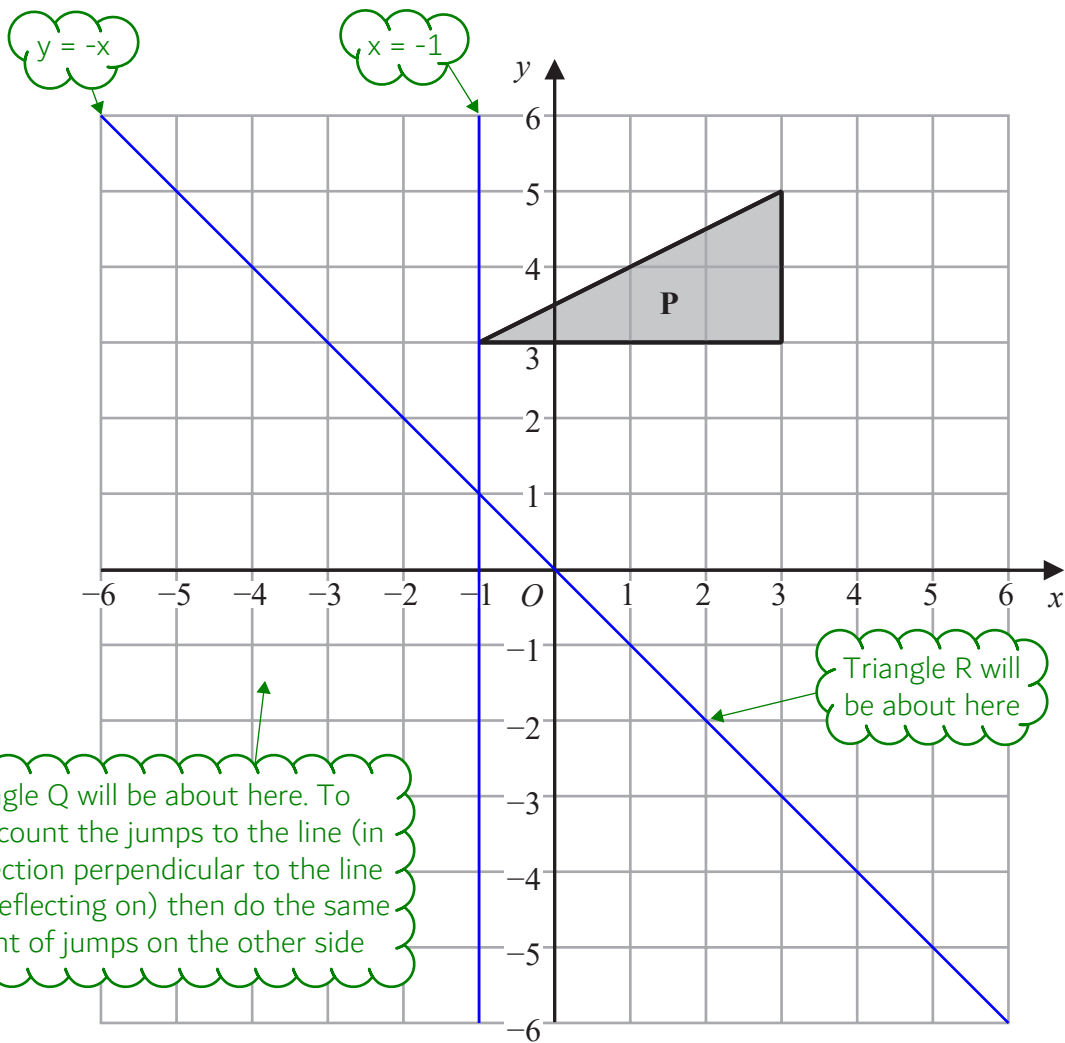
(Total for Question 7 is 3 marks)

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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**.

First we need to sketch triangle R

(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 .

Truncate to 1 digit means remove all digits after the first digit without rounding. What is the lowest it could be and truncate to 7 (it is greater than or equal to this)? What is the lowest it could be and truncate to 8 (it has to be less than this)?

(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.

1. Work out how much yellow and blue paint is needed. There are 5 parts in total in the ratio. Dividing by 5 works out 1 part.
2. Work out how many tins of each are needed and the cost of these tins.
3. Work out his income by multiplying the number of tins of green paint sold by the cost of each.
4. Work out percentage profit by using the percentage change formula:
$$\frac{\text{new} - \text{old}}{\text{old}} \times 100$$

His income is the new amount and the costs are the old amount

.....%

(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.

Use the product rule for counting by multiplying the number of dishes for each meal option. Then add together the number of outcomes for each meal option

(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.

1. Fully factorise the numerators and denominators and multiply the fractions together. Use the difference of two squares to factorise $4x^2 - 9$.
2. Cancel out the factors common to the numerator and denominator.
3. Expand the remaining brackets to get the form we are looking for

.....
(3)

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

1. Make a common denominator by multiplying the denominators together. The numerators need to be multiplied by whatever the denominators are multiplied by.
2. Expand the brackets on the numerators and combine the numerators as the denominators are the same.
3. Collect like terms and simplify the numerator. As there should be no factors common to the numerator and denominator, it cannot be simplified further

.....
(3)

(Total for Question 12 is 6 marks)

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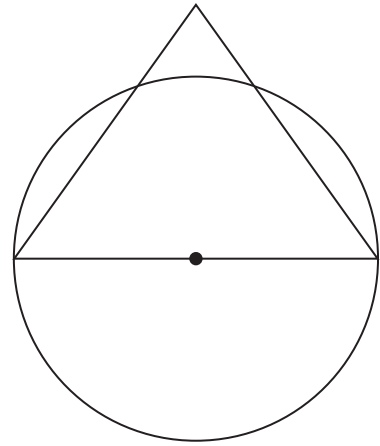
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13 The diagram shows a circle and an equilateral triangle.

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.



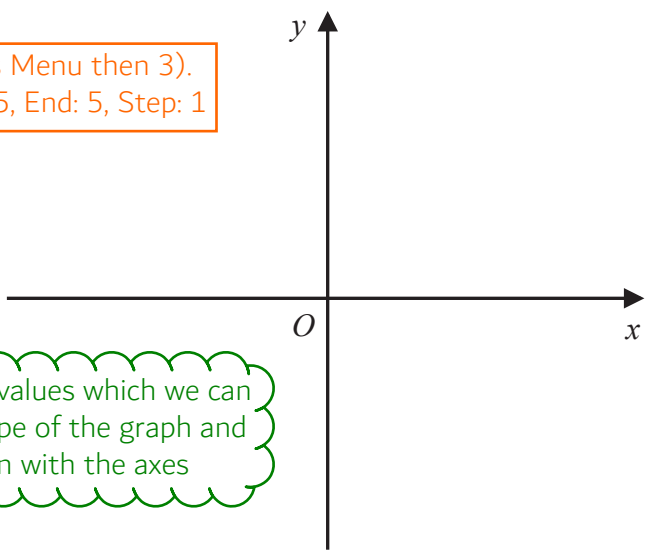
$\pi \times \text{diameter} = \text{circumference of a circle.}$
Rearrange to find the diameter, which is the same length as the sides of the triangle.
 $\frac{1}{2} \times a \times b \times \sin C = \text{area of a triangle}$

.....cm²

(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.

Use table mode (press Menu then 3).
Put in $f(x) = 2^x$. Start: -5, End: 5, Step: 1



This gives us a table of values which we can use to visualise the shape of the graph and see any intersection with the axes

(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.

The general equation of a circle is $x^2 + y^2 = r^2$

(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?

Red AND then blue OR blue AND then red. OR means add the probabilities, AND means multiply the probabilities

(2)

There are 78 red counters in the bag.

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

$$x \times 0.65 = 78$$

x is the total number of counters

(2)

(Total for Question 16 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.

$$p - 5 = 5(q - 5)$$

$p - 5$ is 5 times greater than $q - 5$ so multiplying $q - 5$ by 5 makes them equal

$$p = 5q - 20$$

Expanding the bracket and making p the subject to make the equation simpler

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

The ratio between $p + 20$ and $q + 20$ is 5:2 so multiplying $p + 20$ by 2 and $q + 20$ by 5 makes them equal

The two equations can be solved using simultaneous equations. Once p and q are found, they can be expressed as a ratio which can be simplified by dividing both sides by the same amount

(Total for Question 17 is 5 marks)

- 18 The straight line L_1 passes through the points with coordinates (4, 6) and (12, 2)
The straight line L_2 passes through the origin and has gradient -3

The lines L_1 and L_2 intersect at point P .

Find the coordinates of P .

1. Find the gradient of L_1 . Change in y /change in x .
2. Substitute the gradient into the general equation of a straight line $y = mx + c$, where m is the gradient and c is the y -intercept.
3. Rearrange to find c and substitute the x and y values of one of the points on the line L_1
4. Find the equation of the line L_2 using the general equation of a straight line $y = mx + c$, where m is the gradient and c is the y -intercept.
5. Find x and y by solving the simultaneous equations. These are the x and y coordinate of where the lines intersect

(.....,))

(Total for Question 18 is 4 marks)

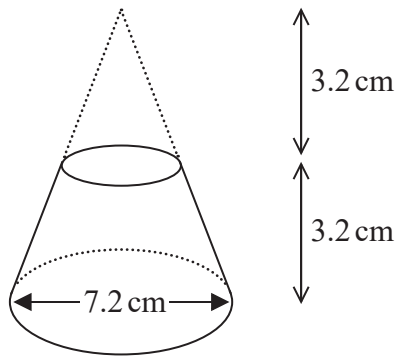
19 Solve $22 < \frac{m^2 + 7}{4} < 32$

Show all your working.

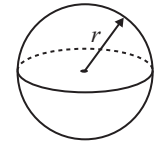
Follow BIDMAS backwards to decide what to eliminate first to get m on its own. Remember that the square root of a number has two solutions and that the inequality signs need to be flipped when square rooting and getting a negative solution

(Total for Question 19 is 5 marks)

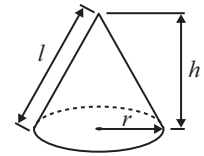
20 Here is a frustum of a cone.



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

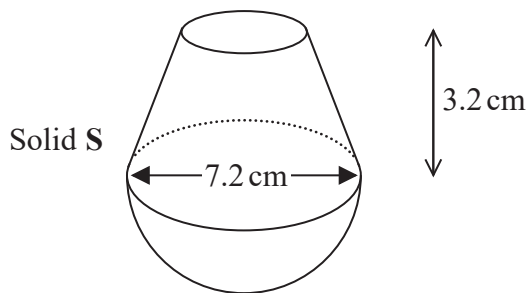


$$\text{Volume of cone} = \frac{1}{3} \pi r^2 h$$



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.



The density of the frustum is 2.4 g/cm^3

The density of the hemisphere is 4.8 g/cm^3

Calculate the average density of solid S.

$$\frac{m}{d \times V}$$

From the formula triangle,
density = mass/volume
mass = density x volume

We need to calculate the total mass of the Solid S and divide it by the total volume of Solid S to work out its average density

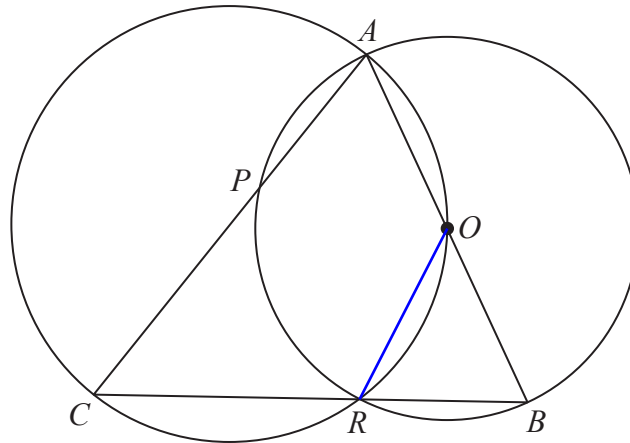
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.....g/cm³

(Total for Question 20 is 5 marks)



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 .

Let angle $CAB = x$

The problem can be solved using the following reasons: opposite angles in a cyclic quadrilateral add to 180 degrees, angles on a straight line add up to 180 degrees and the base angles of an isosceles triangle are equal

(Total for Question 21 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS