

Please check the examination details below before entering your candidate information.

Candidate surname	Other names
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Centre Number	Candidate Number
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Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

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.

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Turn over ►



2

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

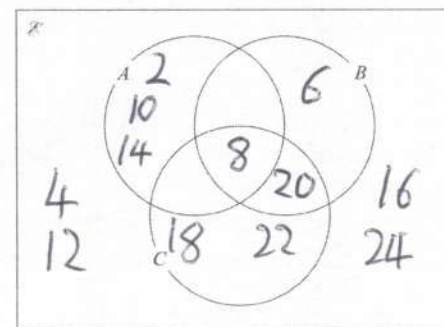
1 $\mathcal{E}$ = {even numbers between 1 and 25}

A = {2, 8, 10, 14}

B = {6, 8, 20}

C = {8, 18, 20, 22}

(a) Complete the Venn diagram for this information.



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

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

$$\frac{1}{12}$$

(4)

(2)

(Total for Question 1 is 6 marks)



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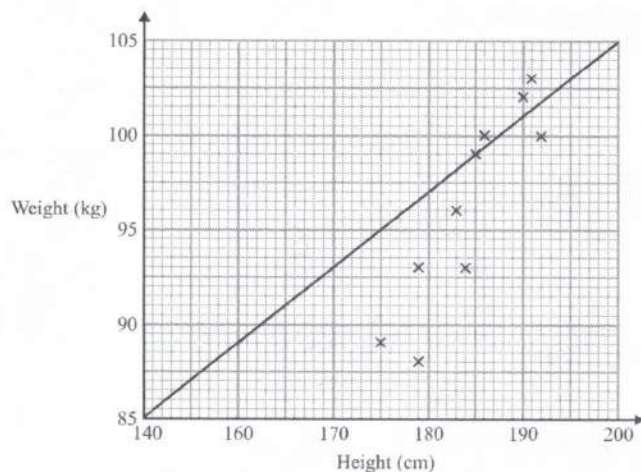
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- 2 Sean has information about the height, in cm, and the weight, in kg, of each of ten rugby players.

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.

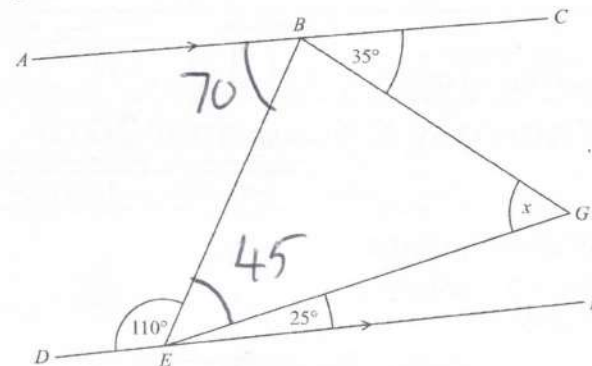
Write down two things that are wrong with his answer.

- 1 x -axis is non-linear
- 2 L_{BF} doesn't suit the pts/data

(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.

$$\angle BEG = 45 \quad (\text{angles on a straight line} = 180)$$

$$\angle ABE \text{ is co-interior with } \angle DEB \text{ hence } = 70$$

$$\angle EBG = 75 \quad (\text{straight line})$$

$$x = 180 - 75 - 45 = 60$$

(angles in a $\triangle = 180$)

(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.

$$\textcircled{A} \quad 2000 \times 1.025^3 = 2153.78125$$

$$= \text{£}153.78 \text{ int.}$$

$$\textcircled{B} \quad 1600 \times 1.035^3 = 1773.9486$$

$$= \text{£}173.95 \text{ int}$$

so Ben

(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, just mean Ben receives even more

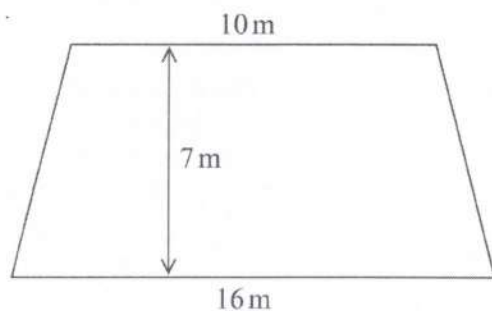
(1)

(Total for Question 4 is 5 marks)



P 5 5 5 8 8 A 0 5 2 0

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



£16.99

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.

$$\text{Area} = \frac{1}{2}(10+16) \times 7 = 91\text{ m}^2$$

$$160 \div 16.99 = 9.4...$$

= 9 tins bought

$$9 \times 5 \times 2 = 90\text{ m}^2 \text{ can be covered}$$

so No

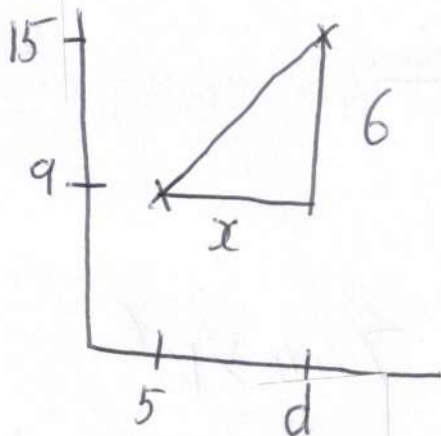
(Total for Question 5 is 5 marks)



- 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 .



$$m = \frac{6}{x} = 3$$
$$x = 2$$

$$\text{so } d = 7$$

(Total for Question 6 is 3 marks)



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

$$8.623 \times 10^{-5}$$

(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.

$$\text{Calc} = \underline{7441979.07}$$

$$= 7.44 \times 10^6$$

(2)

(Total for Question 7 is 3 marks)

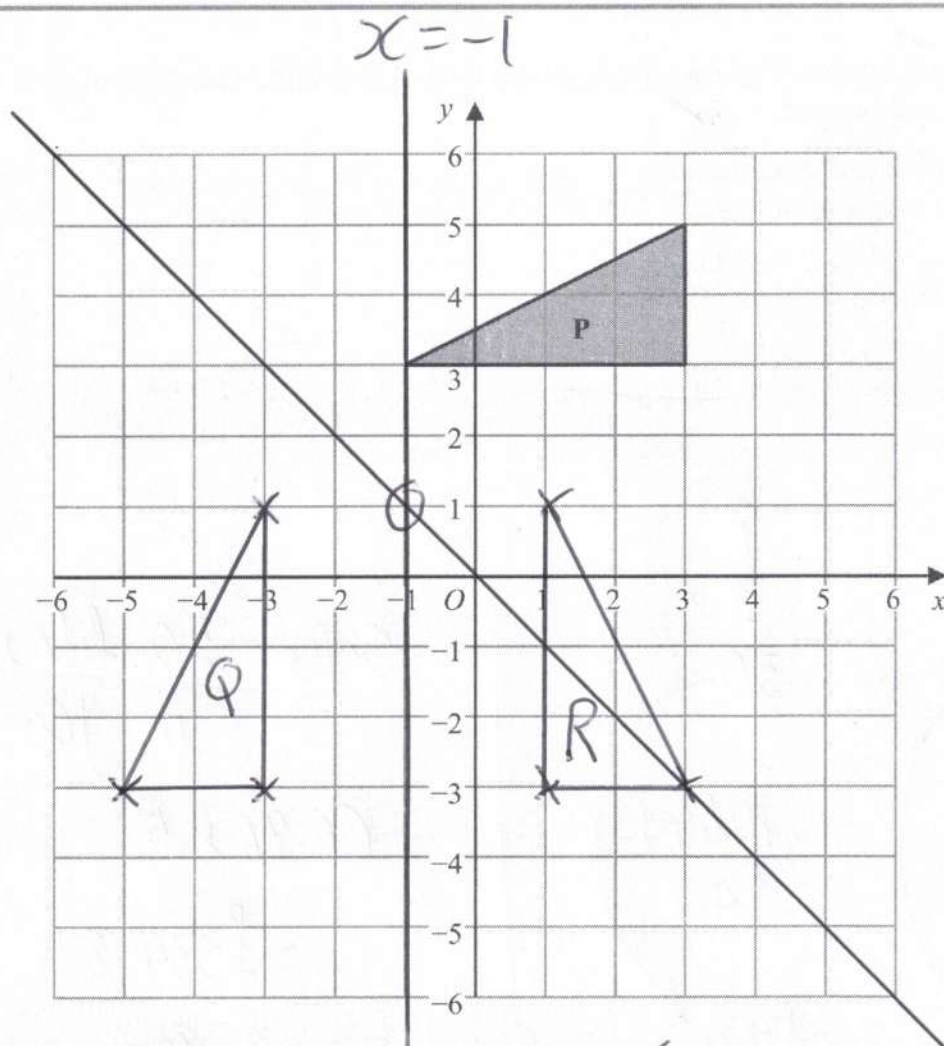
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8



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**.

Rotation anticlockwise 90° about $(-1, 1)$

(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)



P 5 5 5 8 8 A 0 9 2 0

- 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

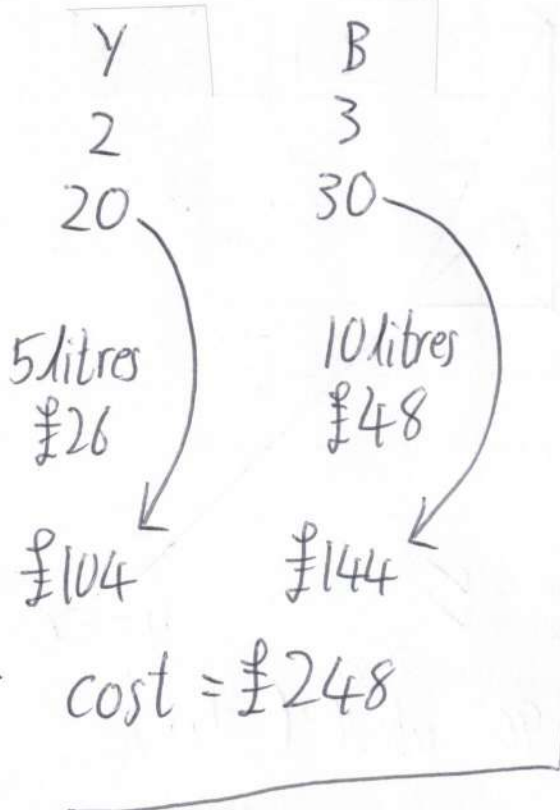
Blue paint is sold in 10 litre tins.

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.



Sells 50 litres
in 10s

$$66.96 \times 5 = £334.8$$

$$\text{profit} = £86.80$$

$$\% \text{ profit} = \frac{86.80}{248} \times 100 = 35\%$$

(Total for Question 10 is 5 marks)



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.

$$\begin{aligned} SM &= 9 \times 15 = 135 \\ MD &= 15 \times 8 = 120 \\ SMD &= 9 \times 15 \times 8 = 1080 \\ \hline &1335 \end{aligned}$$

(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.

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

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

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

(3)

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

$$= \frac{3(x-2)x + 1(x)(x+1) - 4(x+1)(x-2)}{x(x+1)(x-2)}$$

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

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

(3)

(Total for Question 12 is 6 marks)



- 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.

$$C = 2\pi r = 44$$

$$r = \frac{44}{2\pi} = 7.0028...$$

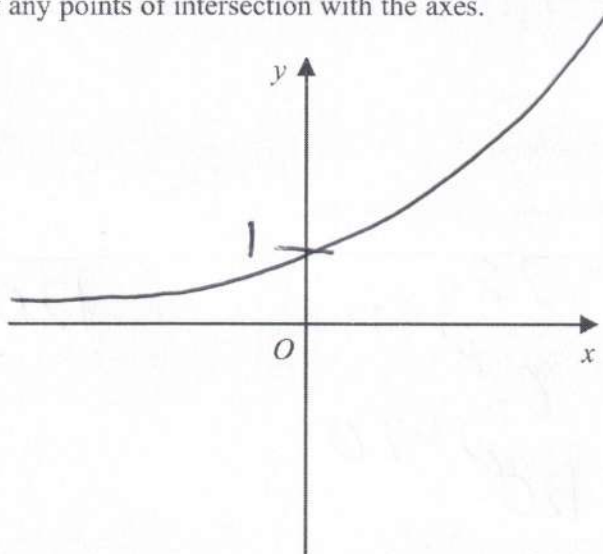
$$\begin{aligned} \text{Area} &= \frac{1}{2}ab\sin C = \frac{1}{2} \times 14.0^2 \times \sin 60 \\ &= 84.87... \end{aligned}$$

84.9

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.



(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.

$$\sqrt{42.25}$$

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?

R
0.65

B
0.35

$$0.65 \times 0.35 \times 2$$

0.455

(2)

There are 78 red counters in the bag.

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

$$\begin{aligned} \div 13 \quad 0.65 &= 78 \quad \div 13 \\ 0.05 &= 6 \quad \times 20 \\ \times 20 \quad 1 &= 120 \quad \times 20 \end{aligned}$$

$$120 - 78$$

42

(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.

$$\begin{array}{l} p-5 : q-5 \\ 5 : 1 \end{array}$$

$$\begin{array}{l} p+20 : q+20 \\ 5 : 2 \end{array}$$

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

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

$$p-5 = 5q-25$$

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

$$p = 5q-20 \quad \textcircled{1}$$

$$2p = 5q+60 \quad \textcircled{2}$$

① into ② $\Rightarrow$

$$2(5q-20) = 5q+60$$

$$10q-40 = 5q+60$$

$$5q = 100$$

$$q = 20$$

and $p = 5 \times 20 - 20 = 80$

$$p:q = 80:20 = 4:1$$

(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 .

$$m_{L_1} = \frac{-4}{8} = -\frac{1}{2}$$

$$L_1: \text{ use } y = mx + c$$

$$6 = -\frac{1}{2} \times 4 + c$$

$$c = 8$$

$$L_1 = y = -\frac{1}{2}x + 8$$

$$L_2 = y = -3x$$

$$\text{equate } -3x = -\frac{1}{2}x + 8$$

$$x = -\frac{16}{5}$$

$$y = -3x - \frac{16}{5}$$

$$\left(-\frac{16}{5}, \frac{48}{5}\right)$$

(Total for Question 18 is 4 marks)



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

Show all your working.

$$88 < m^2 + 7 < 128$$

$$81 < m^2 < 121$$

$$\sqrt{81} = 9, -9$$

$$\sqrt{121} = 11, -11$$

can only be "between" when

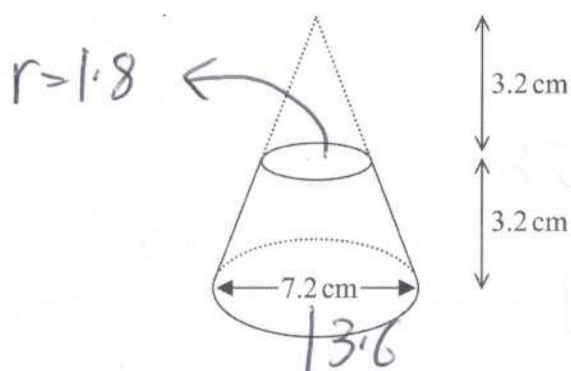
$$9 < m < 11$$

$$-11 < m < -9$$

(Total for Question 19 is 5 marks)

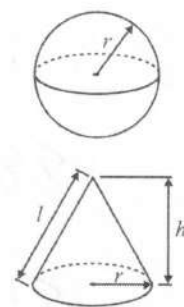


20 Here is a frustum of a cone.



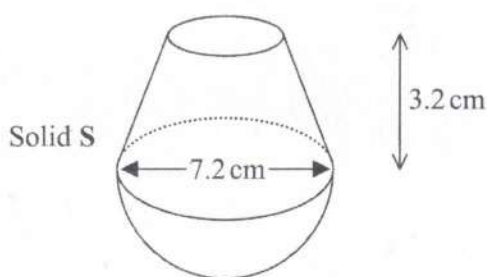
$$\text{Volume of sphere} = \frac{4}{3} \pi r^3$$

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



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.

$$\text{Hemisphere} = \frac{2}{3} \times \pi \times 3.6^3 = 97.716 \dots$$

$$\begin{aligned} \text{Frustum} &= \frac{1}{3} \pi \times 3.6^2 \times 6.4 - \frac{1}{3} \pi \times 1.8^2 \times 3.2 \\ &= 76.0014 \dots \end{aligned}$$





$$H_{\text{Mass}} = 4.8 \times 97.716 = 469.03$$

$$F_{\text{Mass}} = 2.4 \times 76.0014 = 182.4$$

$$\text{Density of S} = \frac{469.03 + 182.4}{97.716 + 76.0014}$$

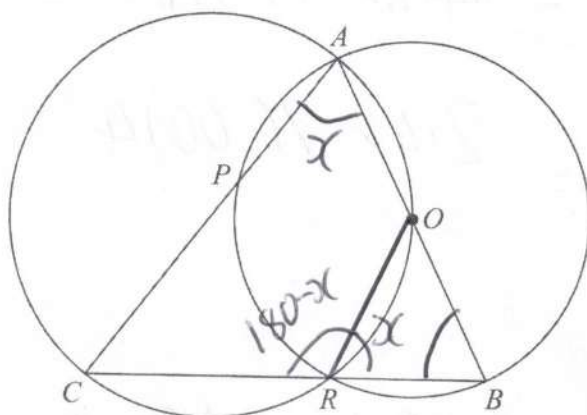
$$= 3.74994$$

$$= 3.75$$

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.

Let $\angle CAB = x$

Prove that angle $CAB =$ angle ABC .

$$\angle CRO = 180 - x \quad (\text{opposite angles in a cyclic quadrilateral} = 180)$$

$$\angle ORB = x \quad (\text{angles on straight line} = 180)$$

$OR = OB$ as both are radii



so $\angle OBR (= \angle ABC)$
must equal ' x ' as they
are base angles in an
isosceles triangle

(Total for Question 21 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

