

Write your name here

Surname

Other names

**Pearson Edexcel  
International GCSE**

Centre Number

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Candidate Number

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# Mathematics A

## Paper 4HR


**Higher Tier**

 Tuesday 17 January 2017 – Morning  
**Time: 2 hours**

Paper Reference

**4MA0/4HR**
**You must have:**

Ruler graduated in centimetres and millimetres, protractor, 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.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.  
Anything you write on the formulae page will gain NO credit.

### Information

- The total mark for this paper is 100.
- 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.
- Check your answers if you have time at the end.

Turn over ►

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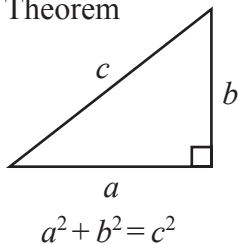
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**International GCSE MATHEMATICS  
FORMULAE SHEET – HIGHER TIER**

Pythagoras' Theorem

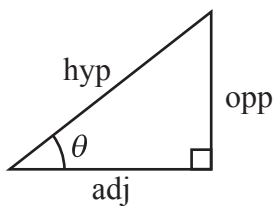
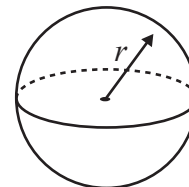
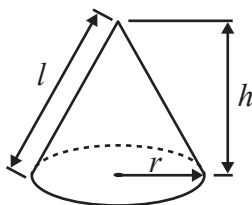


Volume of cone =  $\frac{1}{3} \pi r^2 h$

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

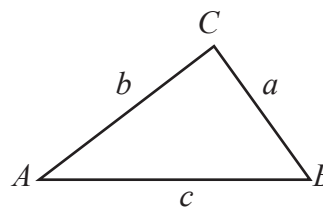
Curved surface area of cone =  $\pi r l$

Surface area of sphere =  $4 \pi r^2$



adj = hyp  $\times$  cos  $\theta$   
opp = hyp  $\times$  sin  $\theta$   
opp = adj  $\times$  tan  $\theta$

In any triangle ABC



or  $\sin \theta = \frac{\text{opp}}{\text{hyp}}$

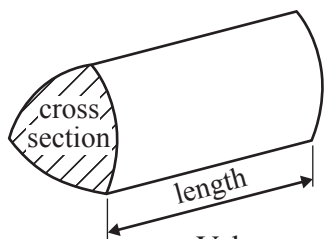
$\cos \theta = \frac{\text{adj}}{\text{hyp}}$

$\tan \theta = \frac{\text{opp}}{\text{adj}}$

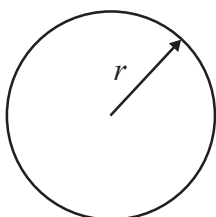
Sine rule:  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule:  $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle =  $\frac{1}{2} ab \sin C$



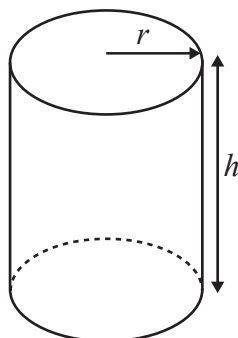
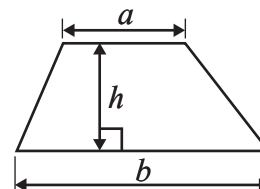
Volume of prism = area of cross section  $\times$  length



Circumference of circle =  $2 \pi r$

Area of circle =  $\pi r^2$

Area of a trapezium =  $\frac{1}{2}(a + b)h$



Volume of cylinder =  $\pi r^2 h$

Curved surface area of cylinder =  $2 \pi r h$

The Quadratic Equation  
The solutions of  $ax^2 + bx + c = 0$ ,  
where  $a \neq 0$ , are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 Here is a list of ingredients for making 24 Rocky Road Crunchy Bars.

**Rocky Road Crunchy Bars**

Ingredients for 24 bars

|               |              |
|---------------|--------------|
| 125 grams     | butter       |
| 300 grams     | chocolate    |
| 3 tablespoons | syrup        |
| 200 grams     | biscuits     |
| 100 grams     | marshmallows |
| 2 teaspoons   | icing sugar  |

Silvester wants to make 30 Rocky Road Crunchy Bars.

- (a) Work out the amount of marshmallows he needs.

..... grams  
(2)

Nigella makes some Rocky Road Crunchy Bars.  
She uses 850 grams of chocolate.

- (b) Work out the number of Rocky Road Crunchy Bars she makes.

.....  
(2)

(Total for Question 1 is 4 marks)

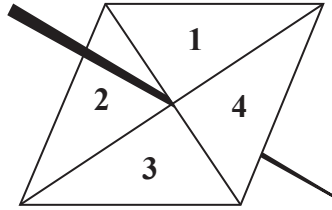
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2 Here is a biased 4-sided spinner.



The spinner is spun.

The table shows the probability that the spinner lands on 1 and the probability that it lands on 2

|                    |      |     |   |   |
|--------------------|------|-----|---|---|
| <b>Number</b>      | 1    | 2   | 3 | 4 |
| <b>Probability</b> | 0.15 | 0.4 |   |   |

(a) Work out the probability that the spinner will land on 1 or on 2

.....  
(1)

The probability that the spinner will land on 3 is twice the probability that the spinner will land on 4

(b) Work out the probability that the spinner will land on 3

.....  
(2)

Daljit is going to spin the spinner 160 times.

(c) Work out an estimate for the number of times the spinner will land on 2

.....  
(2)

**(Total for Question 2 is 5 marks)**

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- 3 In a sale, normal prices are reduced by 35%  
 The normal price of a bed is \$1200  
 Work out the sale price of the bed.

\$ .....

(Total for Question 3 is 3 marks)

- 4 The diagram shows a rectangle and a circle.

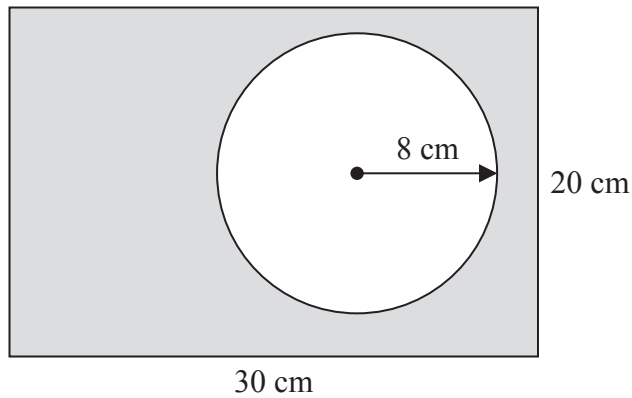


Diagram NOT accurately drawn

The rectangle has length 30 cm and width 20 cm.  
 The circle has radius 8 cm.

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

..... cm<sup>2</sup>

(Total for Question 4 is 4 marks)



5  $\mathcal{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$   
 $A = \{2, 3, 5, 7\}$   
 $B = \{1, 3, 5, 7, 9\}$

(a) List the members of the set

(i)  $A \cap B$

.....

(ii)  $A \cup B$

.....

(2)

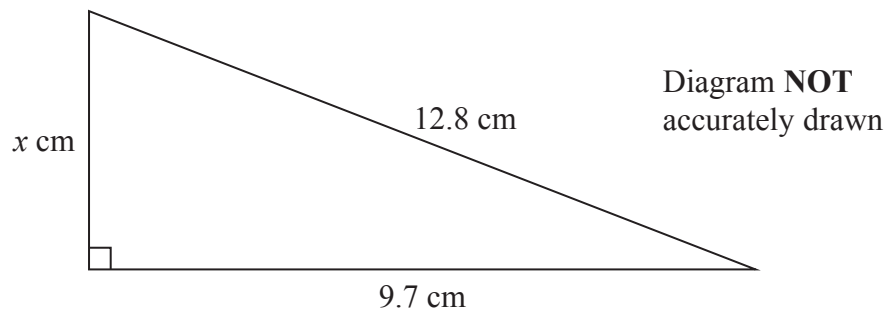
(b) Find  $n(A')$

.....

(1)

(Total for Question 5 is 3 marks)

6



Work out the value of  $x$ .  
 Give your answer correct to 3 significant figures.

.....

(Total for Question 6 is 3 marks)



7 (a) Expand  $3(4p + 5)$

.....  
(1)

(b) Factorise  $6r + 14$

.....  
(1)

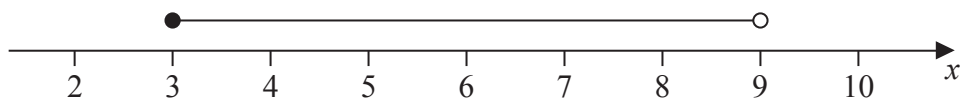
(c) Work out the value of  $y^2 - 3y$  when  $y = -5$

.....  
(2)

(d) Simplify  $\frac{w^5 \times w^8}{w^4}$

.....  
(2)

(e) Write down the inequality shown on the number line.



.....  
(2)

(Total for Question 7 is 8 marks)



- 8 The diagram shows a parallelogram  $ABCD$ .

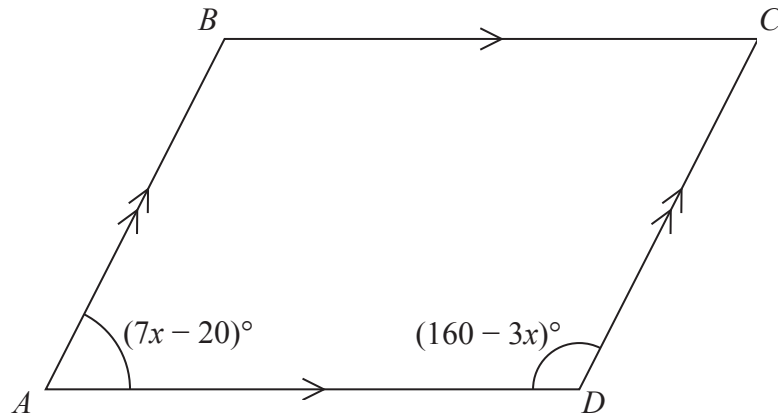


Diagram **NOT**  
accurately drawn

Angle  $BAD = (7x - 20)^\circ$   
 Angle  $ADC = (160 - 3x)^\circ$

Work out the value of  $x$ .  
 Show clear algebraic working.

$x = \dots\dots\dots$

(Total for Question 8 is 3 marks)

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9 The diagram shows the positions of two towns,  $A$  and  $B$ .

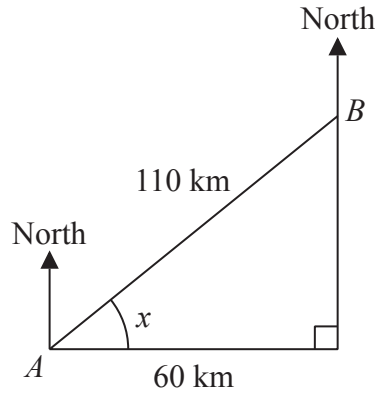


Diagram **NOT** accurately drawn

The distance from  $A$  to  $B$  is 110 km.  
 $B$  is 60 km east of  $A$ .

- (a) Work out the size of angle  $x$ .  
 Give your answer correct to 1 decimal place.

.....  
 (3)

- (b) Work out the bearing of  $B$  from  $A$ .  
 Give your answer correct to the nearest degree.

.....  
 (2)

The distance from  $A$  to  $B$  is 110 km correct to 2 significant figures.

- (c) (i) Write down the lower bound for the distance from  $A$  to  $B$ .

..... km

- (ii) Write down the upper bound for the distance from  $A$  to  $B$ .

..... km  
 (2)

**(Total for Question 9 is 7 marks)**



**10**  $m = 3^4 \times 5^3$   
 $n = 3^3 \times 5^2 \times 11$

(a) Find the Lowest Common Multiple (LCM) of  $m$  and  $n$ .

.....  
(2)

(b) Find the Highest Common Factor (HCF) of  $5m$  and  $3n$ .

.....  
(2)

**(Total for Question 10 is 4 marks)**

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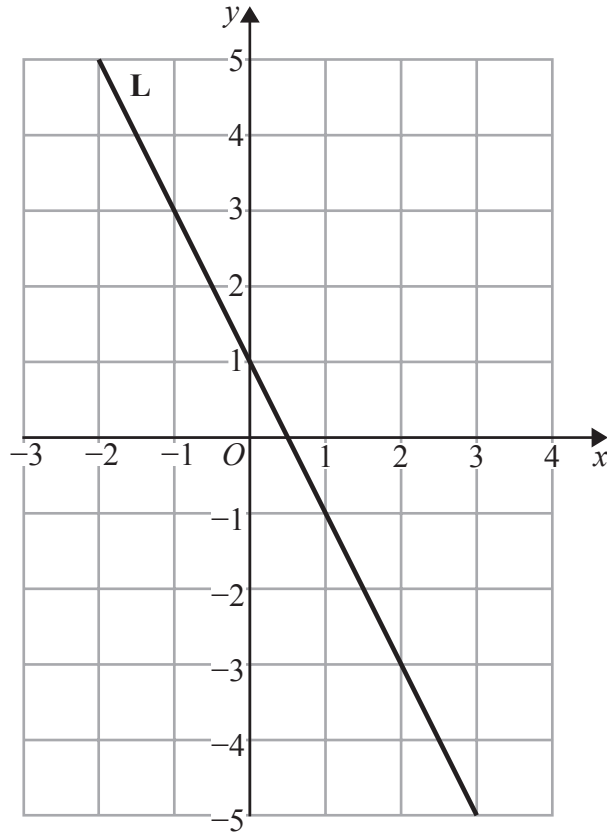
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11 Here is the straight line **L** drawn on a grid.



Find an equation for **L**.

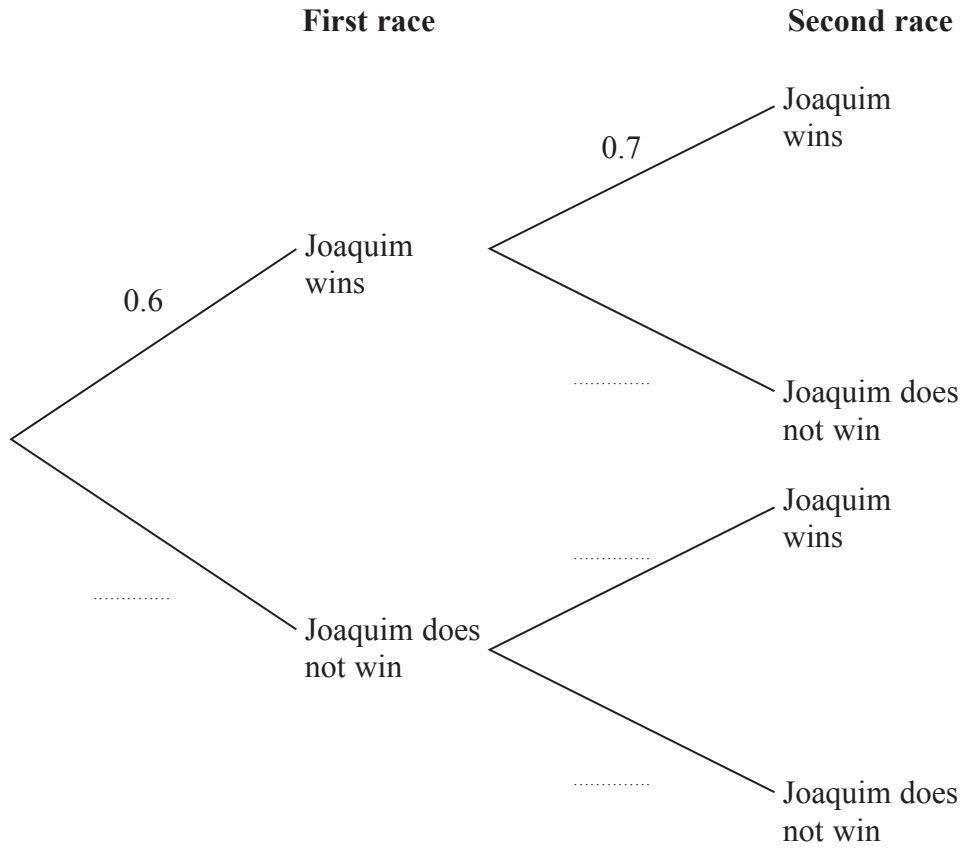
.....  
(Total for Question 11 is 2 marks)



12 Joaquim takes part in two cycle races.

The probability that he wins the first race is 0.6  
The probability that he wins the second race is 0.7

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Joaquim wins both races.

.....  
(2)

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Joaquim takes part in a third cycle race.  
The probability that Joaquim wins the third race is 0.2

(c) Work out the probability that he wins exactly one of the three races.

.....  
(3)

**(Total for Question 12 is 7 marks)**

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13  $P$  is inversely proportional to the square of  $q$ .  
When  $q = 2$ ,  $P = 12.8$

(a) Find a formula for  $P$  in terms of  $q$ .

.....  
(3)

(b) Find the value of  $P$  when  $q = 8$

.....  
(1)

**(Total for Question 13 is 4 marks)**

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14  $ABCDE$  and  $AWXYZ$  are two mathematically similar pentagons.

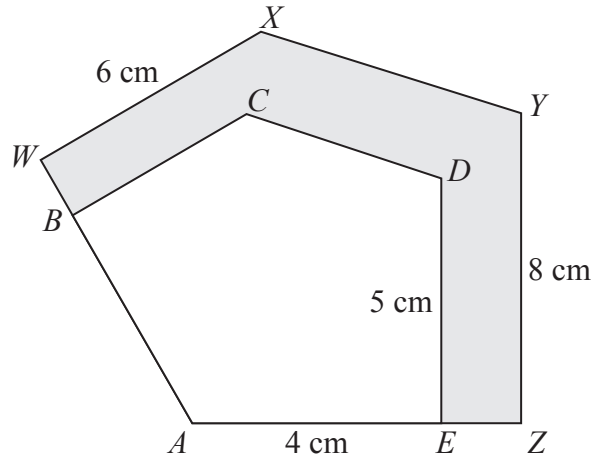


Diagram NOT accurately drawn

$AE = 4 \text{ cm}$     $WX = 6 \text{ cm}$     $DE = 5 \text{ cm}$     $YZ = 8 \text{ cm}$

(a) Calculate the length of  $AZ$ .

..... cm  
(2)

(b) Calculate the length of  $BC$ .

..... cm  
(2)

The area of pentagon  $AWXYZ$  is  $52.48 \text{ cm}^2$

(c) Calculate the area of the shaded region.

.....  $\text{cm}^2$   
(3)

(Total for Question 14 is 7 marks)



15 (a) Factorise  $y^2 - 2y - 48$

.....  
(2)

(b) Solve  $\frac{4}{e-3} = 5$

$e =$  .....  
(2)

(c) Simplify fully  $\frac{3}{x+1} - \frac{2}{x-1}$

.....  
(3)

**(Total for Question 15 is 7 marks)**

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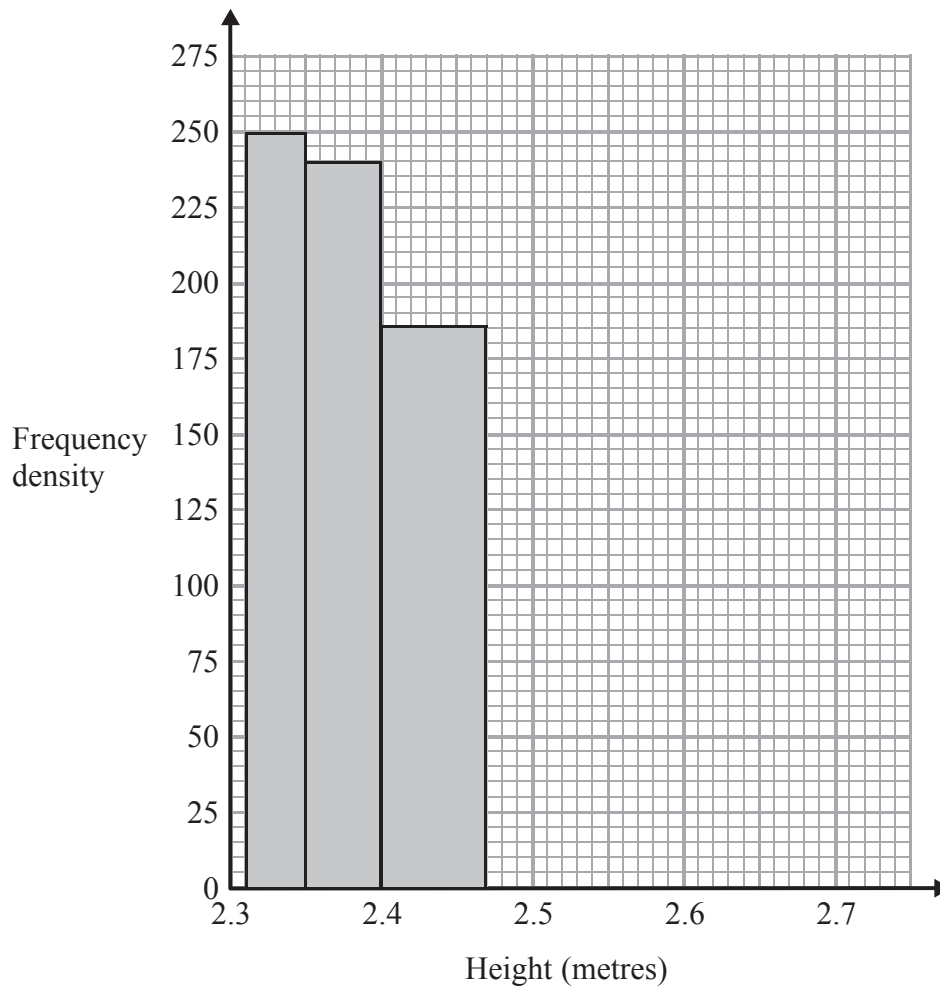




16 The table shows information about the heights, in metres, of 45 of the world's tallest men.

| Height ( $h$ metres) | Number of men |
|----------------------|---------------|
| $2.31 < h \leq 2.35$ | 10            |
| $2.35 < h \leq 2.40$ | 12            |
| $2.40 < h \leq 2.47$ | 13            |
| $2.47 < h \leq 2.72$ | 10            |

(a) Use the information in the table to complete the histogram.



(2)

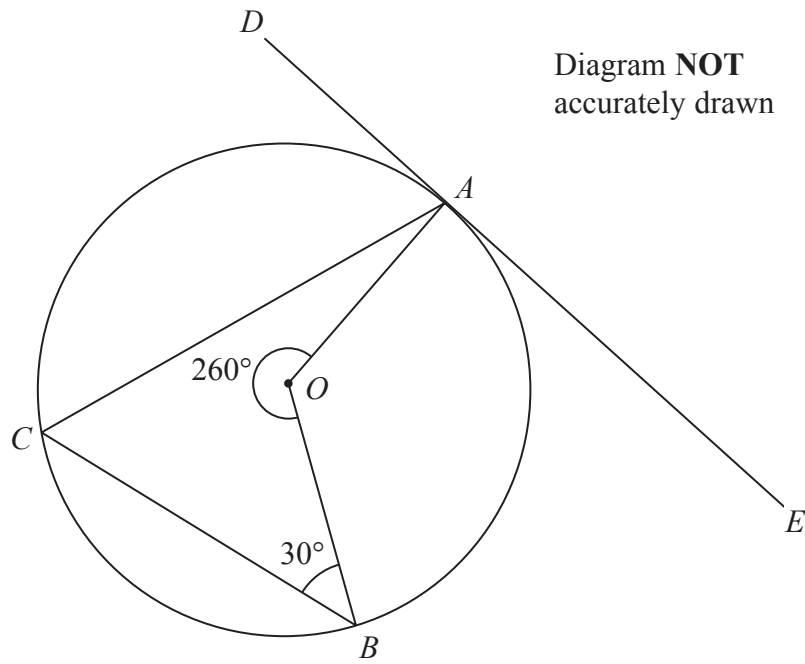
(b) Find an estimate for the number of these men with height between 2.32 metres and 2.34 metres.

(1)

(Total for Question 16 is 3 marks)



17



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$A$ ,  $B$ , and  $C$  are points on the circumference of a circle, centre  $O$ .  
 $DAE$  is a tangent to the circle.

(a) Work out the size of angle  $ACB$ .

.....  
 (2)

(b) Work out the size of angle  $CAD$ .

.....  
 (2)

**(Total for Question 17 is 4 marks)**

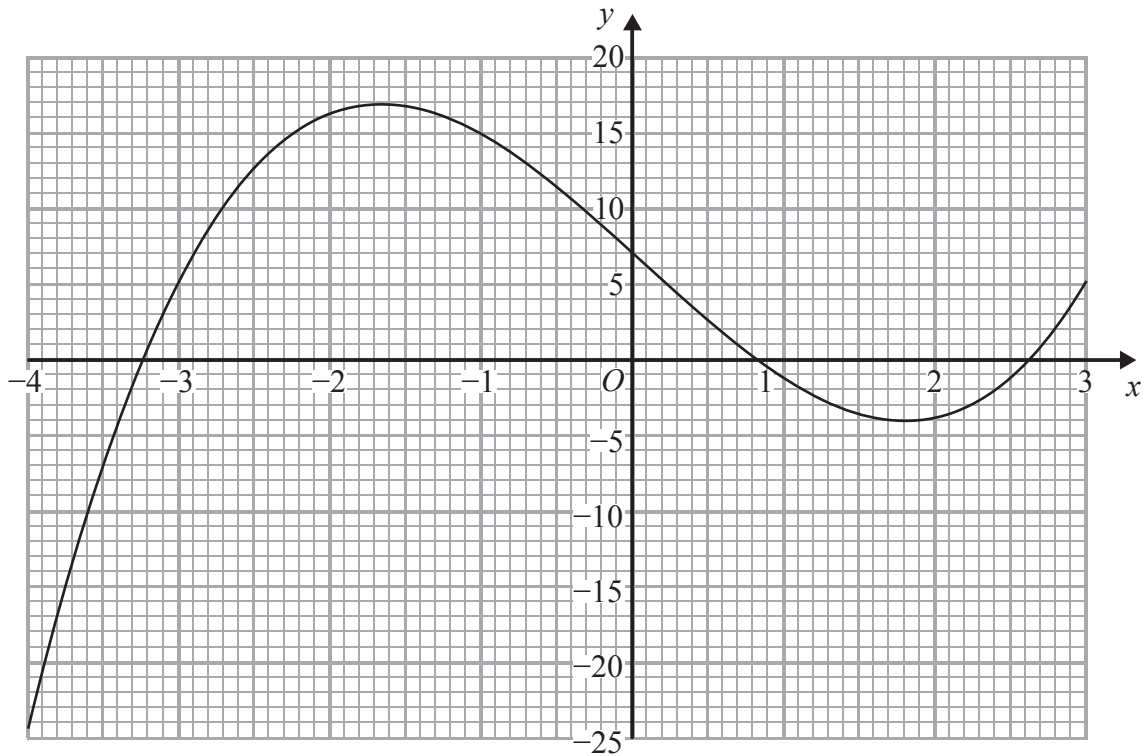


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18 Here is the graph of  $y = x^3 - 0.2x^2 - 9x + 7$  for  $-4 \leq x \leq 3$



(a) Use the graph to find an estimate for the solution of the equation  $x^3 - 0.2x^2 - 9x + 7 = -5$

.....

(2)

(b) By drawing a suitable straight line on the grid, find an estimate for the solution of the equation  $x^3 - 0.2x^2 - 4x + 7 = 0$

.....

(3)

(Total for Question 18 is 5 marks)



19 The diagram shows a solid cone.

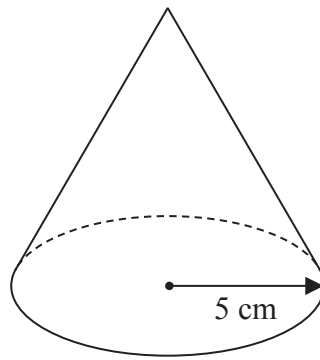


Diagram **NOT**  
accurately drawn

The radius of the base of the cone is 5 cm.  
The total surface area of the cone is  $90\pi \text{ cm}^2$

Work out the volume of the cone.  
Give your answer as a multiple of  $\pi$ .

..... $\text{cm}^3$

(Total for Question 19 is 5 marks)

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20  $(3 + \sqrt{c})(2\sqrt{c} - 3) = 1 + k\sqrt{c}$   
 where  $c$  and  $k$  are prime numbers.

(a) Find the value of  $c$  and the value of  $k$ .

$$c = \dots\dots\dots k = \dots\dots\dots \quad (3)$$

$$p^m = \frac{1}{p \times \sqrt[3]{p^2}}$$

(b) Find the value of  $m$ .

$$m = \dots\dots\dots \quad (3)$$

(Total for Question 20 is 6 marks)

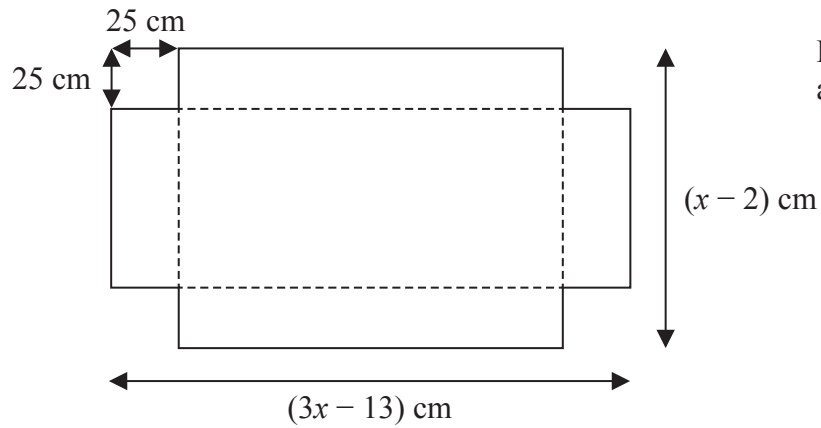
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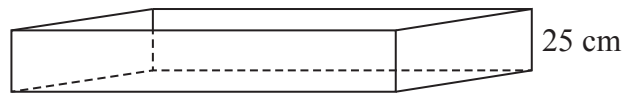
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- 21 A rectangular piece of card has length  $(3x - 13)$  cm and width  $(x - 2)$  cm.  
A square, with sides of length 25 cm, is removed from each corner of the card.



The card is then folded along the dashed lines to make an open box with height 25 cm as shown below.



- (a) Show that the length of the open box is  $(3x - 63)$  cm.

(1)

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The volume of the open box is  $81\,900\text{ cm}^3$

- (b) Find the value of  $x$ .  
Show clear algebraic working.

$$x = \dots\dots\dots (5)$$

(Total for Question 21 is 6 marks)

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**TOTAL FOR PAPER IS 100 MARKS**

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