

Write your name here

Surname

Other names

**Pearson Edexcel**  
**International GCSE**

Centre Number

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Candidate Number

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# Mathematics B

## Paper 1



Thursday 26 May 2016 – Morning  
**Time: 1 hour 30 minutes**

Paper Reference  
**4MB0/01**

**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.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators may be used.**

### 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.
- Without sufficient working, correct answers may be awarded no marks.

Turn over ►

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**PEARSON**

**Answer ALL TWENTY EIGHT questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

- 1 Calculate the gradient of the line joining the points with coordinates  $(-3, -4)$  and  $(6, -1)$ .

.....  
**(Total for Question 1 is 2 marks)**

- 2 Factorise completely  $18x^2 - 2y^2$

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

- 3 In 1964 the high jump world record for women was 1.91 metres.  
In 1987 it was 2.09 metres.

Calculate, to 3 significant figures, the percentage increase in this world record between 1964 and 1987.

.....%  
**(Total for Question 3 is 2 marks)**

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4 Simplify  $\frac{36a^2b^5}{4a^3b^2}$

.....  
**(Total for Question 4 is 2 marks)**

5 The bearing of Nashik from Surat is  $142^\circ$   
Find the bearing of Surat from Nashik.

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

6 Given that  $f(x) = 3 - 2x$   
find  $ff(x)$  in terms of  $x$ . Simplify your answer.

$ff(x) =$  .....  
**(Total for Question 6 is 2 marks)**

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7  $\mathcal{E} = \{a, b, c, d, e, f, g, h, i, j\}$

$A = \{a, b, c, d, e\}$

$B = \{a, c, e, g, i\}$

Find  $(A \cup B)'$

(Total for Question 7 is 2 marks)

8

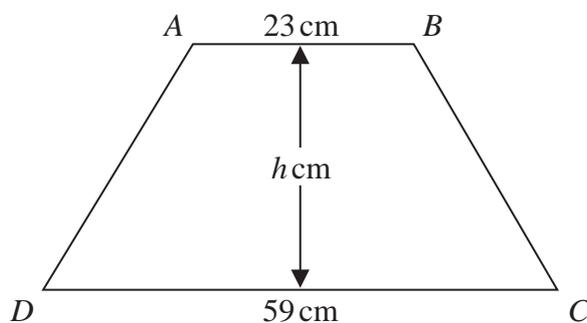


Diagram NOT accurately drawn

$ABCD$  is a trapezium with  $AB$  parallel to  $DC$ .

$AB = 23$  cm,  $DC = 59$  cm and the area of  $ABCD$  is  $574$  cm<sup>2</sup>

Given that  $h$  cm is the height of the trapezium, find the value of  $h$ .

$h =$  .....

(Total for Question 8 is 2 marks)

9 Write  $\frac{3}{x} - \frac{5}{2x}$  as a single fraction. Simplify your answer.

(Total for Question 9 is 2 marks)



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10  $p^2 = 3x - 1$

Simplify  $2p^2 - 6x + 7$

.....

(Total for Question 10 is 2 marks)

11 The mass  $M_e$  of the Earth is  $5.9722 \times 10^{24}$  kg  
The mass  $M_j$  of the planet Jupiter is  $1.8981 \times 10^{27}$  kg

(a) Find the value of  $\frac{M_j}{M_e}$  to the nearest integer.

.....

(1)

(b) Express your answer to part (a) in standard form.

.....

(2)

(Total for Question 11 is 3 marks)

12 Solve the equation  $2(3x - 4) - 4(1 - 3x) = 3(x + 4)$   
Show clear algebraic working.

$x =$  .....

(Total for Question 12 is 3 marks)



13 Given that  $x:y = 5:8$  and that  $y:z = 6:7$ , find  $x:z$

Give your answer in its simplest form.

$x:z = \dots\dots\dots$

(Total for Question 13 is 3 marks)

14

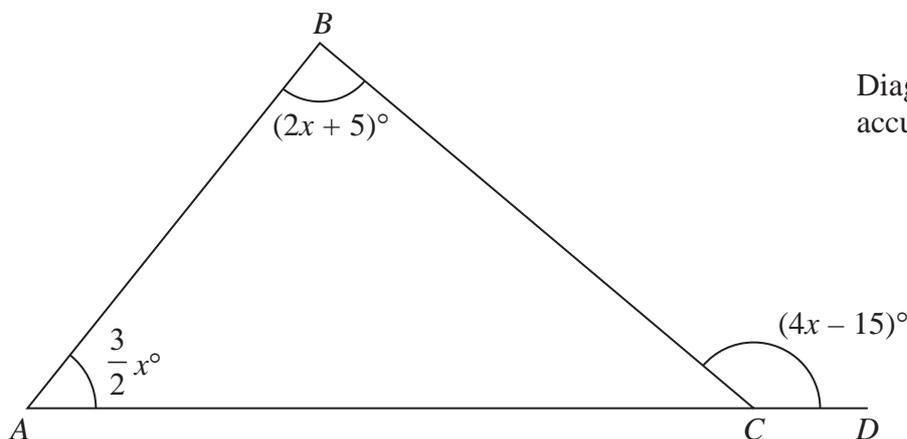


Diagram NOT accurately drawn

$ABC$  is a triangle and  $ACD$  is a straight line.

$$\angle BAC = \frac{3}{2}x^\circ, \angle ABC = (2x + 5)^\circ \text{ and } \angle BCD = (4x - 15)^\circ$$

Find the value of  $x$ .

$x = \dots\dots\dots$

(Total for Question 14 is 3 marks)



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15 Two non-zero vectors  $\mathbf{a}$  and  $\mathbf{b}$  are not parallel.

Given that  $n\mathbf{a} + m\mathbf{b} = \mathbf{b} + 2m(\mathbf{a} - \mathbf{b})$ , where  $m$  and  $n$  are scalars, find the value of  $m$  and the value of  $n$ .

$$m = \dots\dots\dots$$

$$n = \dots\dots\dots$$

(Total for Question 15 is 3 marks)

16 Find the largest integer,  $x$ , such that  $\frac{1}{2}(2x + 1) > 3x - 5$

.....

(Total for Question 16 is 3 marks)



17 Given that  $\sqrt{(x^2 + 9)} = x + y$

find  $x$  in terms of  $y$

$x = \dots\dots\dots$

(Total for Question 17 is 4 marks)

18 Here are 8 numbers

- 5.9      6.3      6.7      6.9      7.5      8.1      8.1      8.9

(a) Find the median of the 8 numbers.

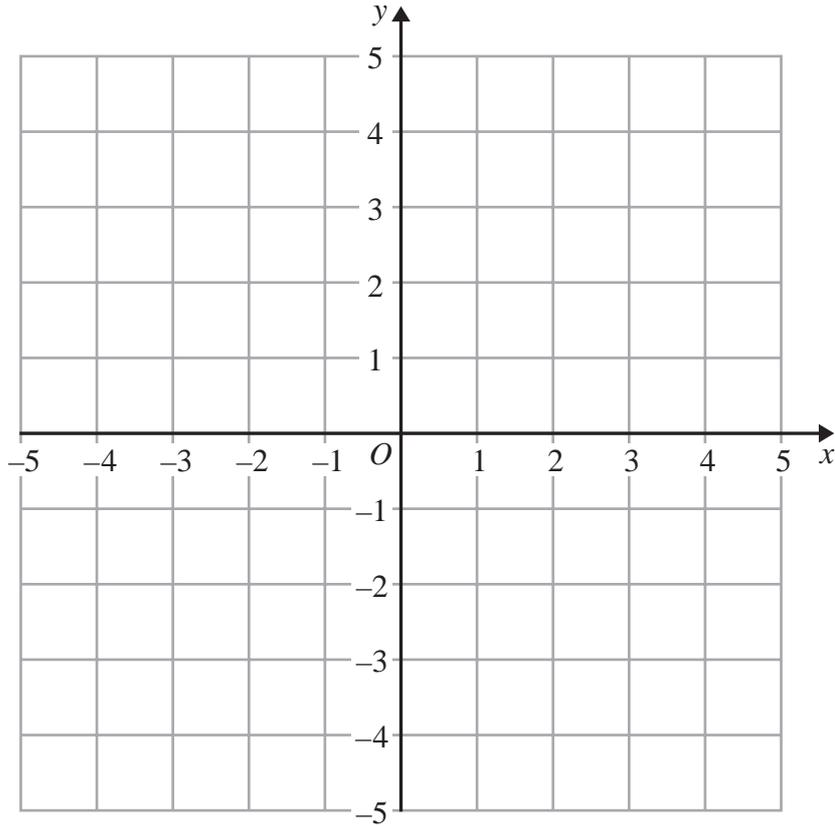
$\dots\dots\dots$   
(2)

(b) Calculate the mean of the 8 numbers.

$\dots\dots\dots$   
(2)

(Total for Question 18 is 4 marks)





- (a) On the grid, draw and label
- (i) the line with equation  $y = -x$
  - (ii) the line with equation  $y = x + 2$

(2)

$ABCDE$  is a pentagon. The pentagon has the line with equation  $y = -x$  as its axis of symmetry. The point  $A$  has coordinates  $(3, 0)$ , the point  $D$  has coordinates  $(-4, 4)$  and the point  $E$  has coordinates  $(1, 3)$ .

- (b) Find the coordinates of  $B$  and the coordinates of  $C$ .

$B$  (....., .....) )

$C$  (....., .....) )

(2)

(Total for Question 19 is 4 marks)

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20  $y$  varies inversely as the cube of  $x$

$$y = 256 \text{ when } x = \frac{1}{2}$$

Find the value of  $x$  when  $y = \frac{4}{27}$

$$x = \dots\dots\dots$$

(Total for Question 20 is 4 marks)

21 The  $n$ th term of a sequence is given by  $u_n = 2^n$  where  $n = 1, 2, 3, 4, \dots$

(a) Write down the first four terms of this sequence.

$$\dots\dots\dots (2)$$

(b) Find the value of  $\frac{u_{500}}{u_{488}}$  giving your answer as a power of 8

$$\dots\dots\dots (3)$$

(Total for Question 21 is 5 marks)



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22 A particle  $P$  is moving along a straight line. At time  $t$  seconds ( $t \geq 0$ ), the displacement,  $s$  metres, of  $P$  from a fixed point  $O$  of the line is given by

$$s = \frac{5}{3}t^3 - \frac{9}{2}t^2 - 2t$$

At time  $t$  seconds, the velocity of  $P$  is  $v$  m/s.

(a) Find an expression for  $v$  in terms of  $t$ .

$$v = \dots\dots\dots$$

(2)

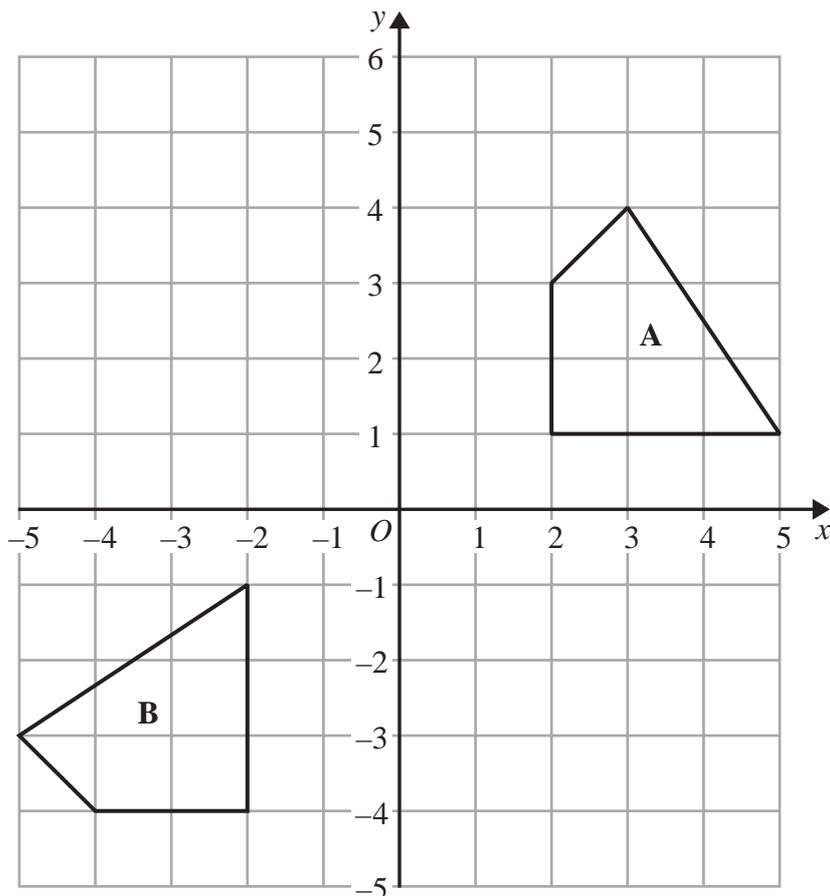
(b) Find the value of  $t$  when  $P$  is instantaneously at rest.

$$t = \dots\dots\dots$$

(3)

(Total for Question 22 is 5 marks)





Quadrilateral **A** is transformed to quadrilateral **B** by an anticlockwise rotation about the origin followed by a translation.

(a) Write down the angle of rotation.

..... (1)

(b) Find the  $2 \times 2$  matrix which represents this rotation.

$\left( \begin{array}{cc} & \\ & \end{array} \right)$   
(2)

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(c) Find the column vector which represents the translation.

$$\begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix}$$

(2)

(Total for Question 23 is 5 marks)

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24 Given that for all values of  $x$ ,

$$6x^3 - 19x^2 - 26x + 24 = (6x^2 + kx - 6)(x - 4) \quad \text{where } k \text{ is a constant,}$$

(a) show that  $k = 5$

(2)

(b) Hence factorise completely  $6x^3 - 19x^2 - 26x + 24$

.....  
(3)

(Total for Question 24 is 5 marks)

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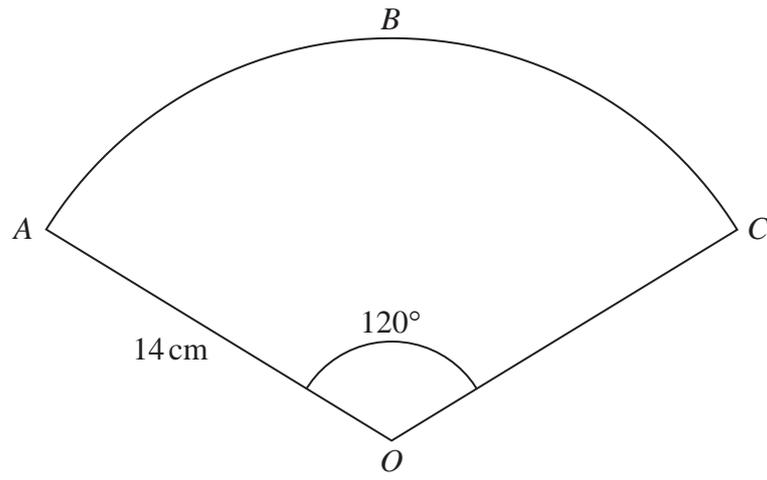


Diagram NOT accurately drawn

The diagram shows a piece of card in the shape of a sector,  $OABC$ , of a circle of radius  $14\text{ cm}$  and centre  $O$ . The arc  $ABC$  subtends an angle of  $120^\circ$  at the centre of the circle.

(a) Calculate the length, in  $\text{cm}$  to 3 significant figures, of the arc  $ABC$ .

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

A hollow right circular cone is formed by joining  $OA$  and  $OC$  together.

Calculate, in  $\text{cm}$  to 3 significant figures,

(b) the radius of the cone,

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

(c) the height of the cone.

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

(Total for Question 25 is 6 marks)

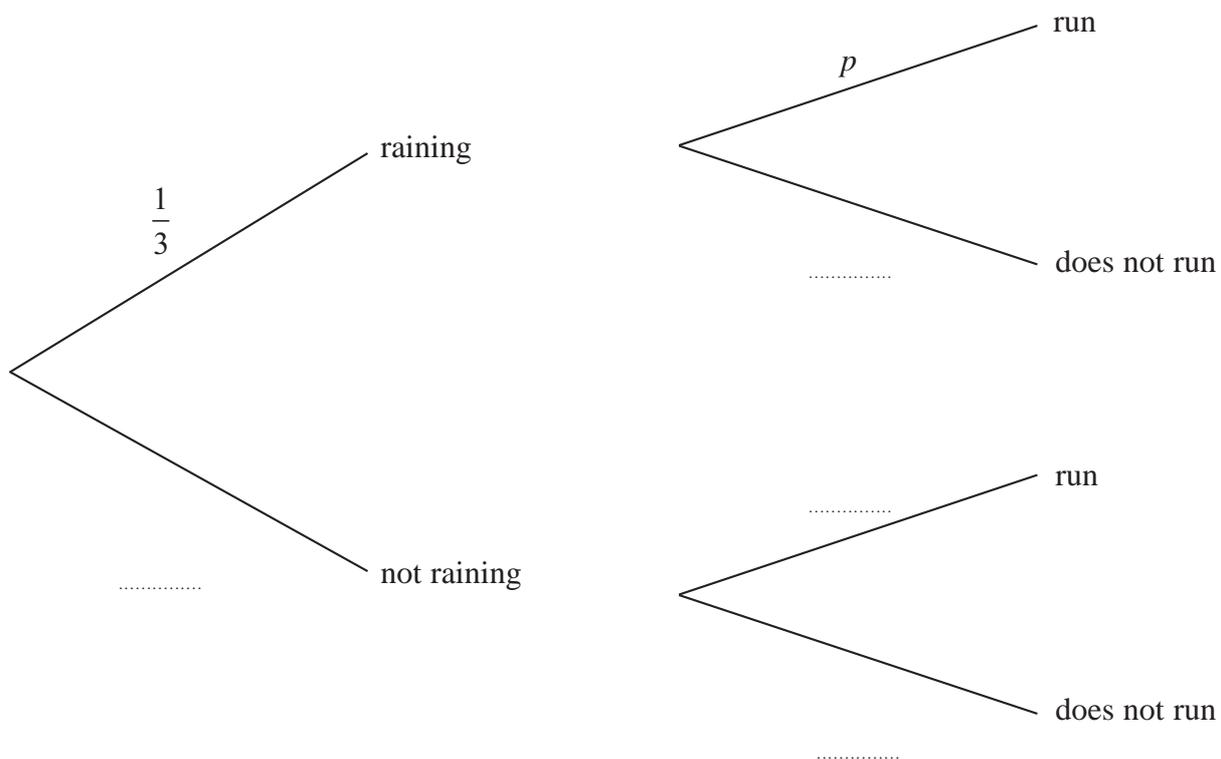


26 The probability that it rains on any morning in the town of *Lloviendo* is  $\frac{1}{3}$

If it is raining on a morning, the probability that Maria goes for a run is  $p$

If it is not raining on a morning, the probability that Maria goes for a run is  $\frac{4}{5}$

(a) Complete the probability tree diagram.



(3)

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The probability that Maria goes for a run on any morning is  $\frac{37}{60}$

(b) Using your tree diagram and this information, form an equation in  $p$

.....  
(2)

(c) Find the value of  $p$

$p =$  .....  
(2)

**(Total for Question 26 is 7 marks)**

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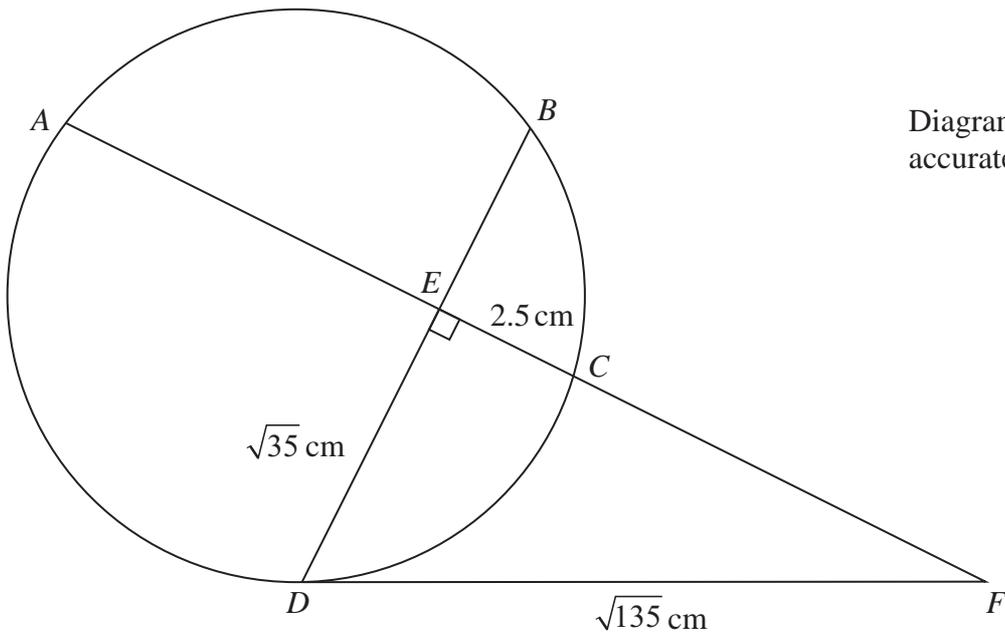


Diagram NOT accurately drawn

$ABCD$  is a circle. The chords  $AC$  and  $DB$  intersect at right angles at the point  $E$ . The point  $F$  is such that  $AECF$  is a straight line and  $FD$  is the tangent to the circle at  $D$ .

$EC = 2.5$  cm,  $DE = \sqrt{35}$  cm and  $DF = \sqrt{135}$  cm.

(a) Calculate the length, in cm, of  $EF$ .

..... cm  
(2)

(b) Show that  $AE = 8$  cm.

(3)

(c) Calculate the length, in cm to 3 significant figures, of  $EB$ .

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..... cm

(2)

**(Total for Question 27 is 7 marks)**

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**Turn over for Question 28**



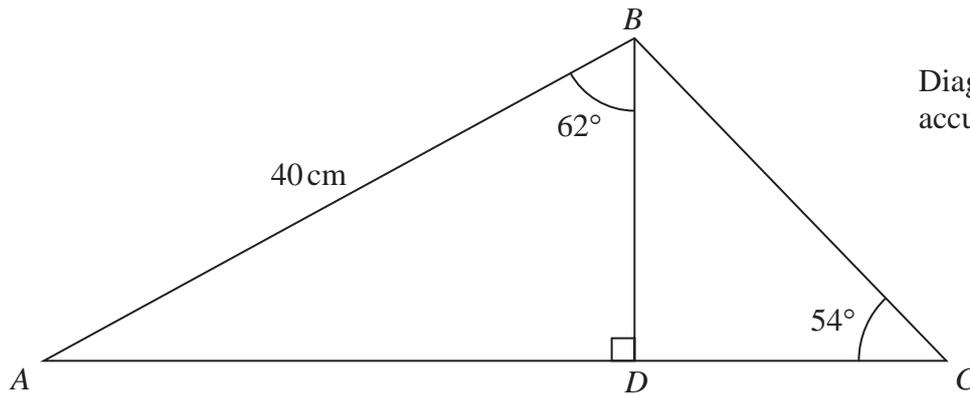


Diagram **NOT**  
accurately drawn

$ABC$  is a triangle.

$D$  is the point on  $AC$  such that  $BD$  is perpendicular to  $AC$ .

$AB = 40$  cm,  $\angle ABD = 62^\circ$  and  $\angle BCD = 54^\circ$

Calculate the area, in  $\text{cm}^2$ , of triangle  $ABC$ . Give your answer to 3 significant figures.

.....  $\text{cm}^2$

(Total for Question 28 is 6 marks)

**TOTAL FOR PAPER IS 100 MARKS**

