

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



Friday 10 January 2014 – 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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P 4 2 9 3 6 A 0 1 2 4

**PEARSON**

**Answer ALL THIRTY questions.**

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

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

- 1** John is travelling from London to Hong Kong.  
12.35 Hong Kong dollars are worth 1 UK pound (£).  
He wants to buy 50 Hong Kong dollars.  
Calculate how much 50 Hong Kong dollars are worth in UK pounds.

£ .....

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

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- 2** Solve the equation  $4(x - 3) = 32$

$x =$  .....

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

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- 3** The sales tax for a radio is 16% of the cost price.  
The sales tax is to be increased from 16% to 20% of the cost price.  
Calculate the percentage increase in the sales tax.

.....%

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

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4

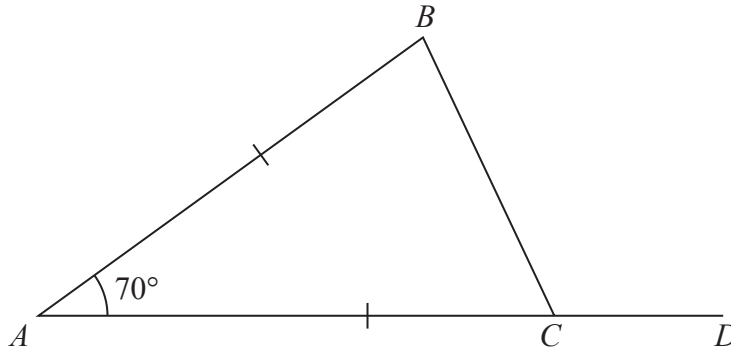


Diagram NOT accurately drawn

In the diagram,  $\triangle ABC$  is an isosceles triangle with  $AB = AC$  and  $\angle BAC = 70^\circ$

Given that  $ACD$  is a straight line, calculate the size, in degrees, of  $\angle BCD$ .

$\angle BCD = \dots\dots\dots^\circ$

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

5

$$p = \frac{1}{16}$$

(a) Write down the value of  $p$  to 3 decimal places.

$p = \dots\dots\dots$   
(1)

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

$\dots\dots\dots$   
(1)

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



6

$\mathcal{E} = \{\text{positive integers} < 15\}$

$A = \{\text{prime numbers}\}$

$B = \{\text{even numbers}\}$

Find

(a)  $B'$

.....  
(1)

(b)  $A \cap B$

.....  
(1)

**(Total for Question 6 is 2 marks)**

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7 Show that  $x - 3$  is a factor of  $2x^3 - 11x^2 + 16x - 3$

**(Total for Question 7 is 2 marks)**

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8

$$(a^6)^{-\frac{2}{3}} = \frac{1}{a^m}$$

Given that  $a \neq 0$  and  $a \neq 1$ , find the value of  $m$ .

$m = \dots\dots\dots$

**(Total for Question 8 is 2 marks)**

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9 Expand and simplify  $(5x - 2y)(4x - 3y)$

(Total for Question 9 is 2 marks)

10

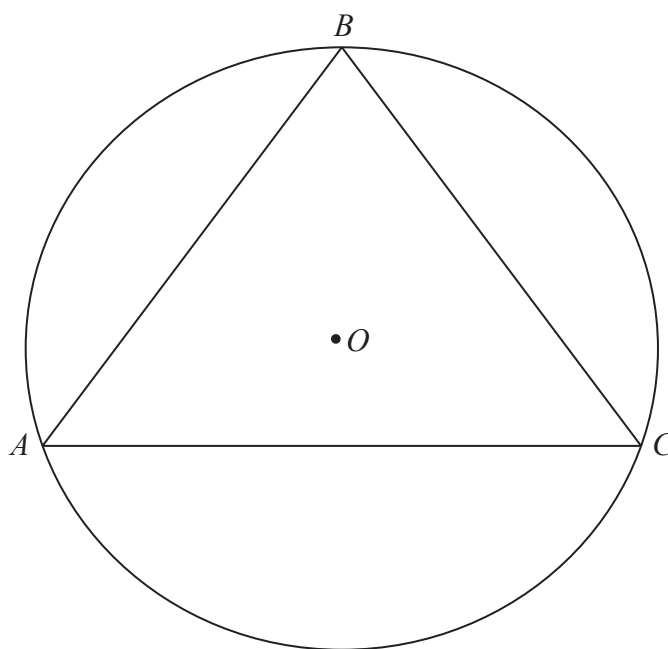


Diagram NOT  
accurately drawn

$ABC$  is a circle with centre  $O$ .  $\triangle ABC$  is an equilateral triangle.  
Find the size, in degrees, of  $\angle OAB$ .

$\angle OAB = \dots\dots\dots^\circ$

(Total for Question 10 is 2 marks)



- 11 The equation of a straight line is  $y = mx + 2$   
The straight line passes through the point  $(2, -8)$ .  
Calculate the value of  $m$ .

$m = \dots\dots\dots$

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

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- 12 A recipe requires the weight of sugar and the weight of flour to be in the ratio 2 : 5  
When 420 g of flour are to be used, work out the weight, in g, of sugar that is needed.

$\dots\dots\dots$ g

**(Total for Question 12 is 2 marks)**

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13

Item	Cost
Bottle of milk	£1.25
Can of beans	39p
Loaf of bread	£1.69

Ann buys 5 bottles of milk, 3 cans of beans and a loaf of bread.  
She pays with a £10 note.  
Calculate how much change she should receive.

(Total for Question 13 is 3 marks)

14

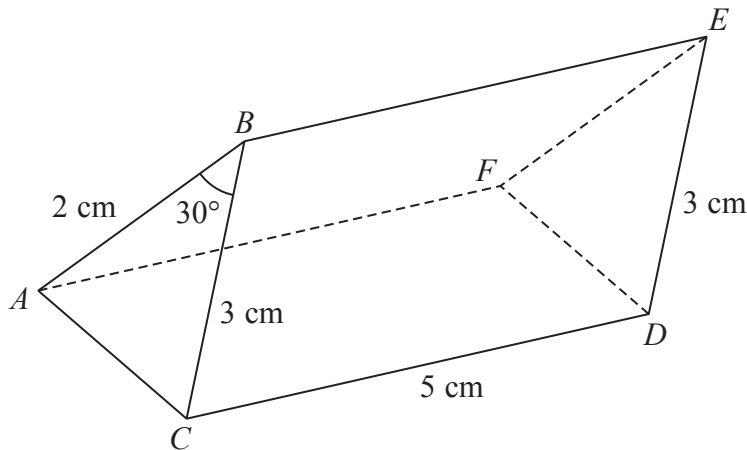


Diagram NOT accurately drawn

The diagram shows a triangular prism  $ABCDEF$  of length 5 cm.  
 $AB = FE = 2$  cm,  $BC = ED = 3$  cm and  $\angle ABC = \angle FED = 30^\circ$

Calculate the volume, in  $\text{cm}^3$ , of the prism.

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

(Total for Question 14 is 3 marks)



15 A box contains balls of different colours. The box is opened and a ball is selected at random. The probability that the ball is white is 0.9 and the probability that the ball is black is 0.04

(a) Write down the probability that the ball is either white or black.

.....  
(1)

(b) Find the probability that the ball is neither white nor black.

.....  
(2)

(Total for Question 15 is 3 marks)

16

$$\frac{1}{a} = \frac{1}{b} - \frac{c}{a}$$

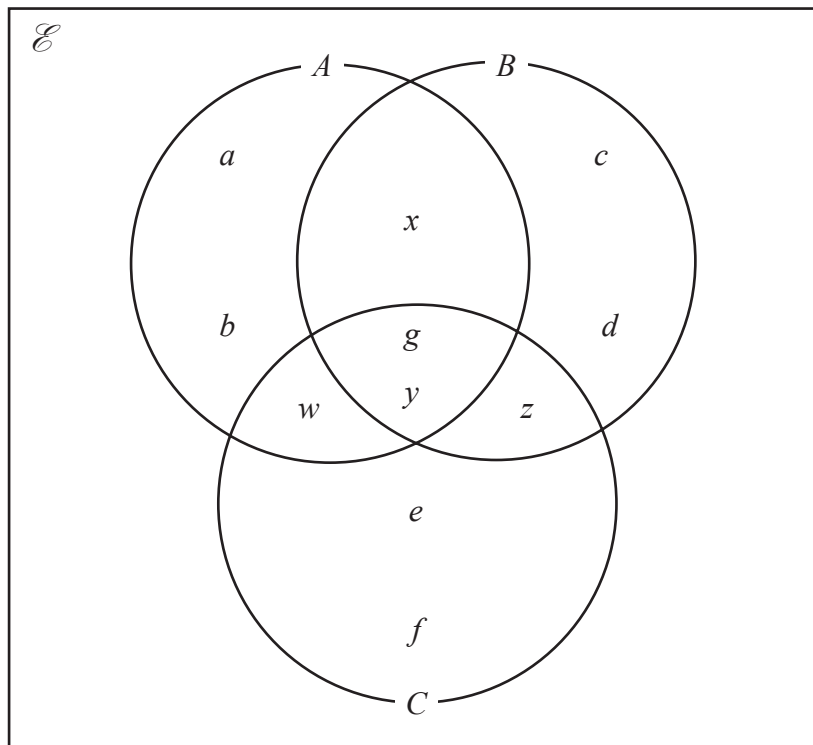
Find  $c$  in terms of  $a$  and  $b$ . Simplify your answer.

.....  
(Total for Question 16 is 3 marks)





17 The Venn diagram below shows information about the elements in the three sets  $A$ ,  $B$  and  $C$ .



Write down the elements in

(a)  $A \cap B \cap C$

.....  
(1)

(b)  $(A \cup B) \cap C$

.....  
(1)

Find

(c)  $n[A \cup (B \cap C)]$

.....  
(1)

**(Total for Question 17 is 3 marks)**



18 In one week, a company made four types of telephone call: selling calls, purchasing calls, financial calls and delivery calls.

In the week, the company made 420 selling calls, 160 purchasing calls and 64 financial calls.

A pie chart was drawn to show this information.

The angle on the pie chart for selling calls was  $210^\circ$

(a) Calculate the total number of calls made that week.

.....  
(2)

(b) Hence calculate the number of delivery calls made in the week.

.....  
(2)

**(Total for Question 18 is 4 marks)**

19

$$\mathbf{A} = \begin{pmatrix} 1 & x \\ -3x & 2 \end{pmatrix}, \quad \mathbf{B} = \begin{pmatrix} -2 & 2x \\ -1 & 5 \end{pmatrix}.$$

(a) Write down and simplify the matrix  $4\mathbf{A} - 3\mathbf{B}$ .

$$\begin{pmatrix} & \\ & \end{pmatrix}$$

(2)

Given that  $4\mathbf{A} - 3\mathbf{B} = \begin{pmatrix} 10 & 4 \\ 27 & -7 \end{pmatrix}$ ,

(b) calculate the value of  $x$ .

$x =$  .....

(2)

**(Total for Question 19 is 4 marks)**



- 20  $F$  varies inversely as the square of  $r$ .  
When  $r = 2$ ,  $F = 20$   
Given that  $r > 0$ , find the value of  $r$  when  $F = 5$

$r = \dots\dots\dots$

(Total for Question 20 is 4 marks)

- 21 (a) Express  $5\sqrt{60}$  in the form  $m\sqrt{15}$

(1)

- (b) Hence show that  $\frac{4\sqrt{3} + 5\sqrt{60}}{2\sqrt{3}}$  can be written in the form  $a + b\sqrt{b}$ , where  $a$  and  $b$  are integers. Show all your working and give the values of  $a$  and  $b$ .

$a = \dots\dots\dots$   $b = \dots\dots\dots$   
(3)

(Total for Question 21 is 4 marks)



22 The coordinates of point  $A$  are  $(2, 4)$  and the coordinates of point  $B$  are  $(6, 1)$ .

(a) Express  $\vec{AB}$  as a column vector.

$\begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix}$   
(2)

(b) Calculate the modulus of  $\vec{AB}$ .

.....  
(2)

**(Total for Question 22 is 4 marks)**

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23 The diagram shows a port  $P$ .

A ship  $S$  is 5 km from the port  $P$  on a bearing  $020^\circ$  from  $P$ .

Using a scale of 1 cm to represent 2 km,

(a) find and mark the position of the ship on the diagram and label it  $S$ .

(1)

A second ship,  $T$ , is 12 km from ship  $S$  on a bearing of  $150^\circ$  from  $S$ .

Using the same scale,

(b) find and mark the position on the diagram of ship  $T$  and label it  $T$ .

(1)

Using your diagram, find by measurement,

(c) (i) the bearing, to the nearest degree, of port  $P$  from the ship  $T$ ,

(ii) the distance, to the nearest km, of port  $P$  from the ship  $T$ .



(c) (i).....<sup>o</sup>

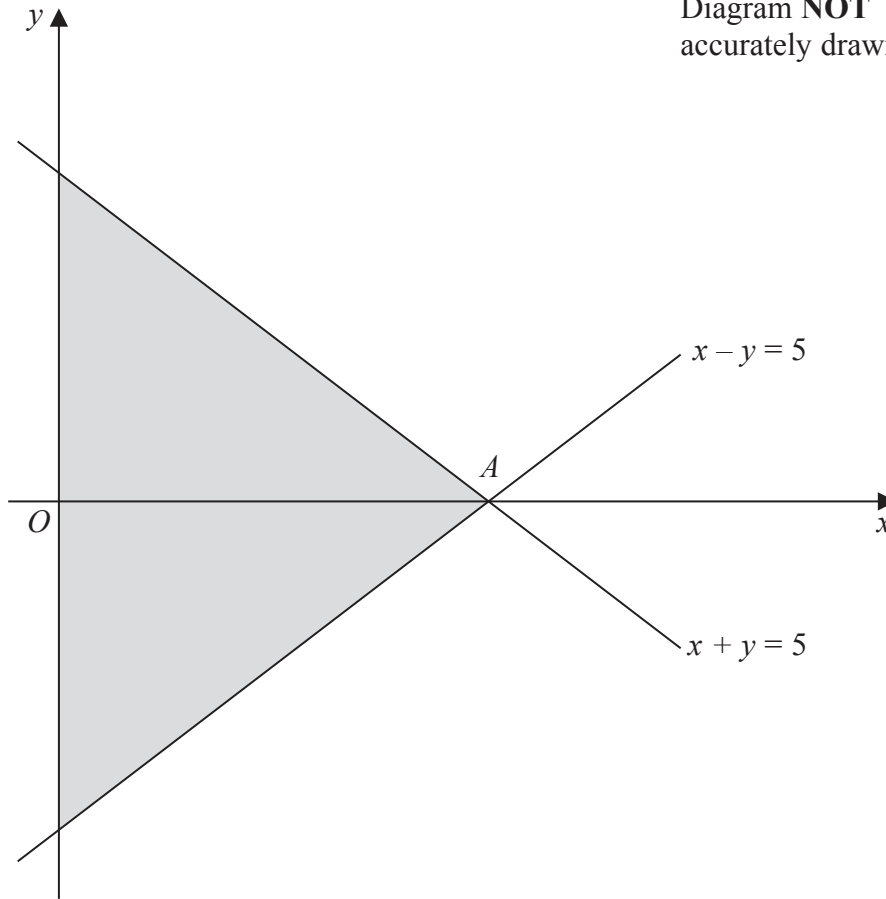
(ii)..... km

(2)

(Total for Question 23 is 4 marks)



Diagram **NOT**  
accurately drawn



The diagram shows the straight lines  $x + y = 5$  and  $x - y = 5$ , which intersect at the point  $A$ .

(a) Write down the coordinates of the point  $A$ .

.....  
(1)

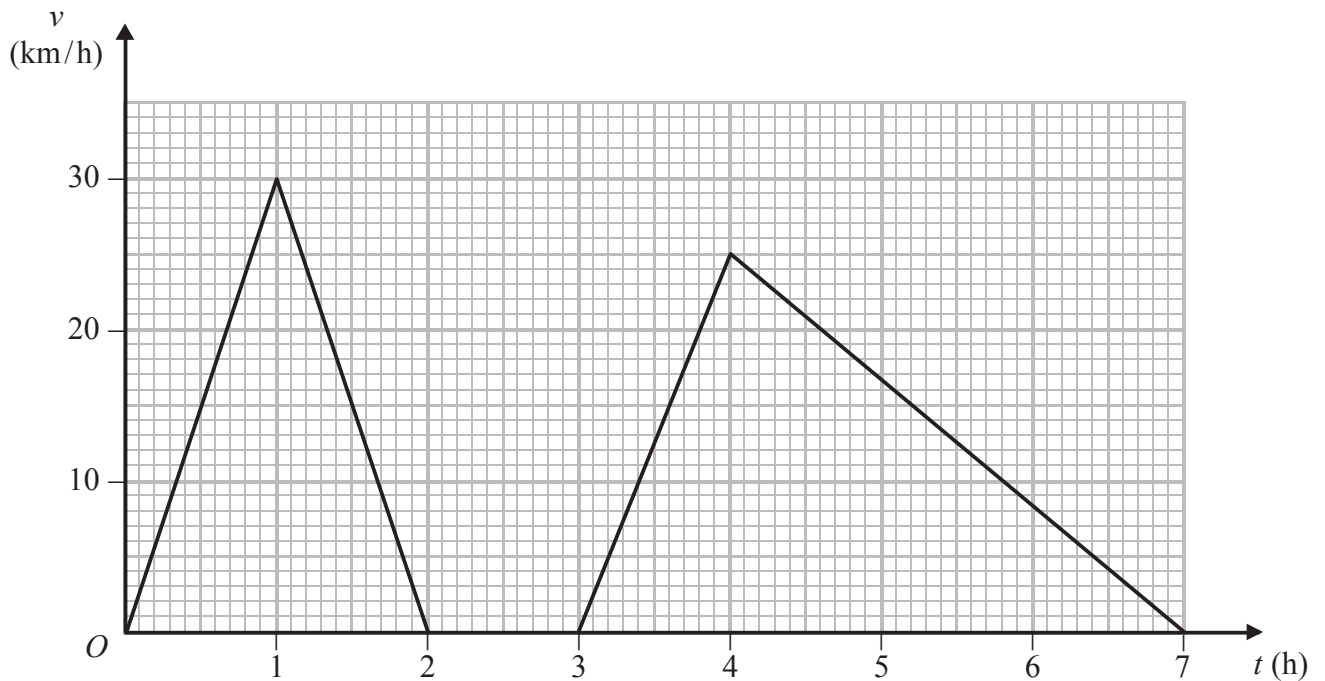
(b) Write down the three inequalities which define the shaded region in the diagram.

.....  
.....  
.....  
(3)

(Total for Question 24 is 4 marks)



25



The speed-time graph shows information about the motion of a particle in a 7 hour period.

(a) Describe what the graph shows about the motion of the particle between  $t = 2$  and  $t = 3$

(1)

(b) Calculate the total distance, in km, travelled by the particle in the 7 hours.

..... km

(3)

(Total for Question 25 is 4 marks)



26 The table below gives information about the number of goals scored in each match for 20 football matches.

Number of goals scored	Number of matches
0	1
1	1
2	5
3	2
4	4
5	4
6	3

(a) Find the modal number of goals scored.

.....  
(1)

(b) Find the median number of goals scored.

.....  
(1)

(c) Calculate the mean number of goals scored.

.....  
(3)

(Total for Question 26 is 5 marks)





27 The height of cone  $A$  is 6 cm and the height of a similar cone  $B$  is 10 cm.  
The surface area of cone  $B$  is  $550 \text{ cm}^2$

(a) Calculate the surface area, in  $\text{cm}^2$ , of cone  $A$ .

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

The volume of cone  $A$  is  $189 \text{ cm}^3$

(b) Calculate the volume, in  $\text{cm}^3$ , of cone  $B$ .

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

**(Total for Question 27 is 6 marks)**

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28

$$y = x^3 + \frac{5}{2}x^2 - 2x + 13$$

(a) Find  $\frac{dy}{dx}$

$$\frac{dy}{dx} = \dots\dots\dots (3)$$

(b) Hence find the  $x$  coordinates of the two stationary points of

$$y = x^3 + \frac{5}{2}x^2 - 2x + 13$$

$$x = \dots\dots\dots (4)$$

**(Total for Question 28 is 7 marks)**



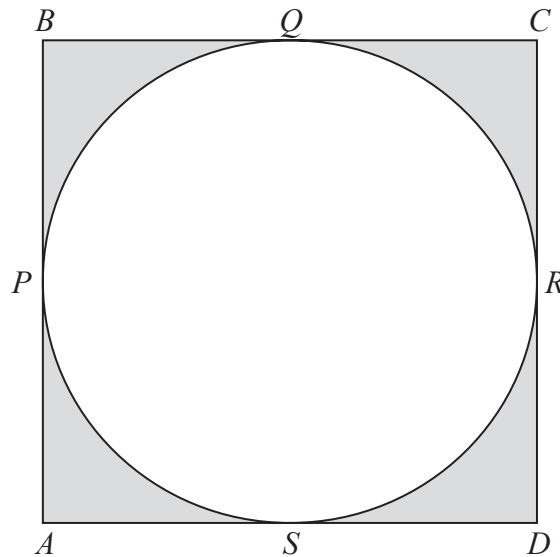


Diagram **NOT** accurately drawn

$ABCD$  is a square of side 12 cm. The circle  $PQRS$  touches the sides of the square at  $P$ ,  $Q$ ,  $R$  and  $S$  as shown in the diagram.

(a) Write down the length of a radius of the circle  $PQRS$ .

.....cm  
(1)

(b) Find, in terms of  $\pi$ , the total area, in  $\text{cm}^2$ , of the shaded region in the diagram.

..... $\text{cm}^2$   
(1)

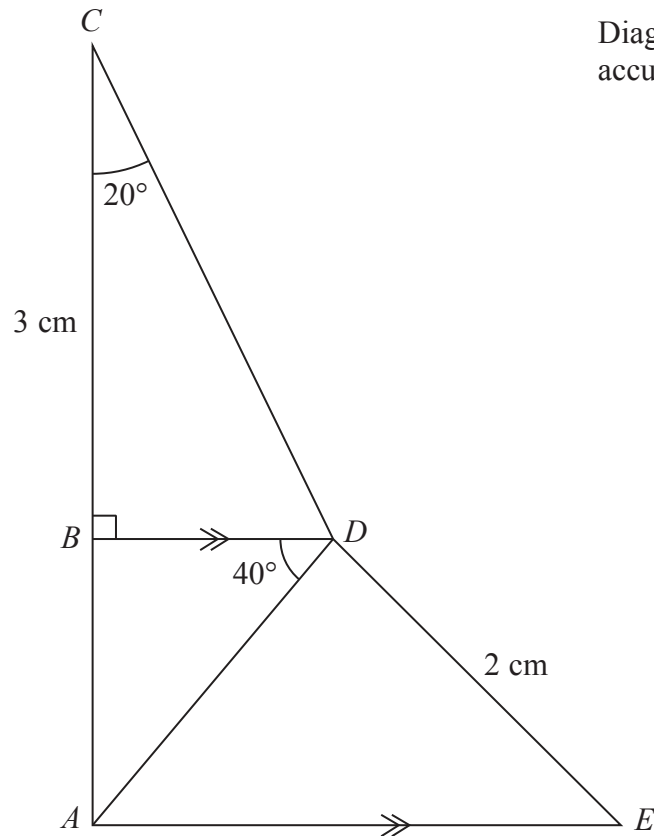
(c) Express your answer to part (b) as a percentage of the area of the square  $ABCD$ .  
Give your answer to 3 significant figures.

.....%  
(2)

(Total for Question 29 is 4 marks)



Diagram **NOT**  
accurately drawn



$ACD$  is a triangle in which  $\angle ACD = 20^\circ$

The point  $B$  on  $AC$  is such that  $BD$  is perpendicular to  $CA$ ,  $\angle BDA = 40^\circ$  and  $CB = 3$  cm.  
The point  $E$  is such that  $AE$  is parallel to  $BD$  and  $DE = 2$  cm.

Calculate the length, in cm to 3 significant figures, of

(a)  $BD$ ,

..... cm  
(2)

(b)  $AD$ .

..... cm  
(2)



**Question 30 continued**

(c) Calculate the size, in degrees to 3 significant figures, of  $\angle AED$ .

$$\angle AED = \text{.....}^\circ$$

(3)

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**(Total for Question 30 is 7 marks)**

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**TOTAL FOR PAPER IS 100 MARKS**

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