Write your name here

Surname	Other names

Edexcel
International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics B

Paper 1

Wednesday 11 January 2012 – 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 ▶

P40614A

6/6/6/6/6/4

P 4 0 6 1 4 A 0 1 2 0

PEARSON

Answer ALL TWENTY SEVEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Express $\frac{7}{8}$

(a) to 2 decimal places,

.....

(1)

(b) as a percentage.

.....

(1)

(Total for Question 1 is 2 marks)

2 *OAB* is a sector of a circle with centre *O* and radius 9 cm and $\angle AOB = 40°$.

Calculate the area, in cm^2 to 3 significant figures, of the sector *OAB*.

..... cm^2

(Total for Question 2 is 2 marks)

3 Find the size of the exterior angle of a regular 12-sided polygon.

..... °

(Total for Question 3 is 2 marks)

4 Factorise $3x^2 + 29x - 44$

.....

(Total for Question 4 is 2 marks)

5 Given that **p** and **q** are non-zero vectors that are not parallel and that

$3\mathbf{p} + (x - 2)\mathbf{q} = 2y\mathbf{p} - 5\mathbf{q}$, find the value of x and the value of y.

$x =$ .....

$y =$ .....

(Total for Question 5 is 2 marks)

6 Differentiate with respect to x, $y = 3x^2 - \frac{2}{x}$

$\frac{dy}{dx} =$ .....

(Total for Question 6 is 2 marks)

7 Here are the marks scored by 14 children in a test,

1, 3, 2, 1, 8, 9, 7, 6, 6, 4, 3, 4, 6, 7

For the above set of numbers write down

(a) the median,

.....

(2)

(b) the mode.

.....

(1)

(Total for Question 7 is 3 marks)

8 Find the size, in degrees to 3 significant figures, of the angle θ which satisfies the equation

$$\cos\theta + \sin 30° = \tan 40°$$

for $0° \leqslant \theta \leqslant 90°$.

$\theta =$ ..... °

(Total for Question 8 is 3 marks)

9 Cube A has edges of 4 cm.

Cube B has edges of length 30% less than that of cube A.

Express the difference in the volumes of the two cubes as a percentage of the volume of cube A.

..... %

(Total for Question 9 is 3 marks)

10 Simplify fully $\dfrac{3x^2 - 9x}{x^2 - 9}$

.....

(Total for Question 10 is 3 marks)

11 $\mathscr{E} = \{x: x \text{ is a positive integer}\}$
$A = \{x: x > 4\}$
$B = \{x: x \leqslant 10\}$

(a) List the elements of the set $A \cap B$

.....

(2)

(b) Write down the value of $\text{n}(A')$.

.....

(1)

(Total for Question 11 is 3 marks)

---

12 A and B are two similar solids. The length of one side of A is 3 cm and the length of the corresponding side of B is 5 cm.
The volume of A is 38 cm^3.

Calculate the volume, in cm^3 to 3 significant figures, of B.

..... cm^3

(Total for Question 12 is 3 marks)

---

13 Show that $\sqrt{125} + \sqrt{80}$ can be written in the form $m\sqrt{5}$ and hence state the value of m.

$m =$ .....

(Total for Question 13 is 4 marks)

---

14 y varies inversely as the cube of x. When $x = 2$, $y = 10$

Find the value of x when $y = 1.25$

$x =$ .....

(Total for Question 14 is 4 marks)

15

$$\mathbf{A} = \begin{pmatrix} 3 & -1 \\ 1 & 2 \end{pmatrix} \qquad \mathbf{B} = \begin{pmatrix} -4 & 2 \\ -3 & -1 \end{pmatrix}$$

Find

(a) $3\mathbf{A} - 2\mathbf{B}$

( )

(2)

(b) **AB**

( )

(2)

(Total for Question 15 is 4 marks)

16

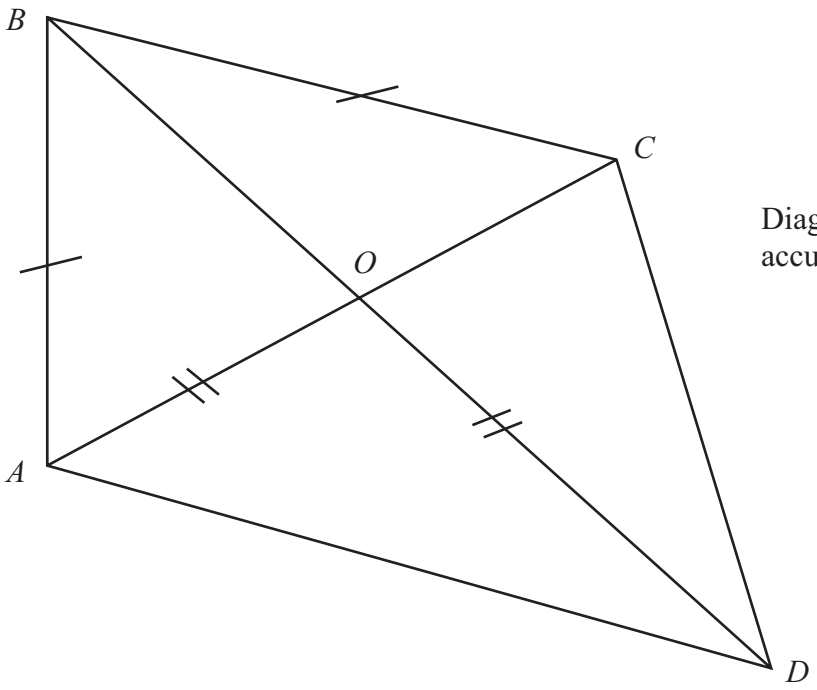


Diagram **NOT** accurately drawn

ABCD is a quadrilateral in which $AB = BC$. The diagonals AC and BD intersect at the point O and $OA = OD$.

Given that $\angle ABO = 34°$ and $\angle CBO = 30°$, find $\angle BAD$.

$\angle BAD =$ ..... °

(Total for Question 16 is 4 marks)

17 The scale of a map is 1: 30 000

The length of a road on the map is 4 cm.

(a) Calculate the actual length, in km, of the road.

..... km

(2)

The actual area of a field is 1.08 km^2.

(b) Calculate the area, in cm^2, of the field on the map.

..... cm^2

(2)

(Total for Question 17 is 4 marks)

18 Today, my house is 4 times as old as my neighbour's house.

My neighbour's house is x years old today.

(a) Find, in terms of x, an expression for the age of my house, in years, in 18 years' time.

.....

(2)

In 18 years' time, my house will then be twice as old as my neighbour's house will be then.

(b) Use this information and your answer to part (a) to write down an equation in x and hence find the age, x, of my neighbour's house today.

.....

$x =$ .....

(2)

(Total for Question 18 is 4 marks)

19

$$\text{f: } x \mapsto 3x - 1$$

$$\text{g: } x \mapsto 3 - 5x$$

(a) Write down the simplified form of fg(x).

.....

(1)

(b) Find $(\text{fg})^{-1}$.

Give your answer in the form $(\text{fg})^{-1}$: $x \mapsto$

$(\text{fg})^{-1}$: $x \mapsto$ .....

(2)

(c) Solve the equation $\text{fg}(x) = 3$

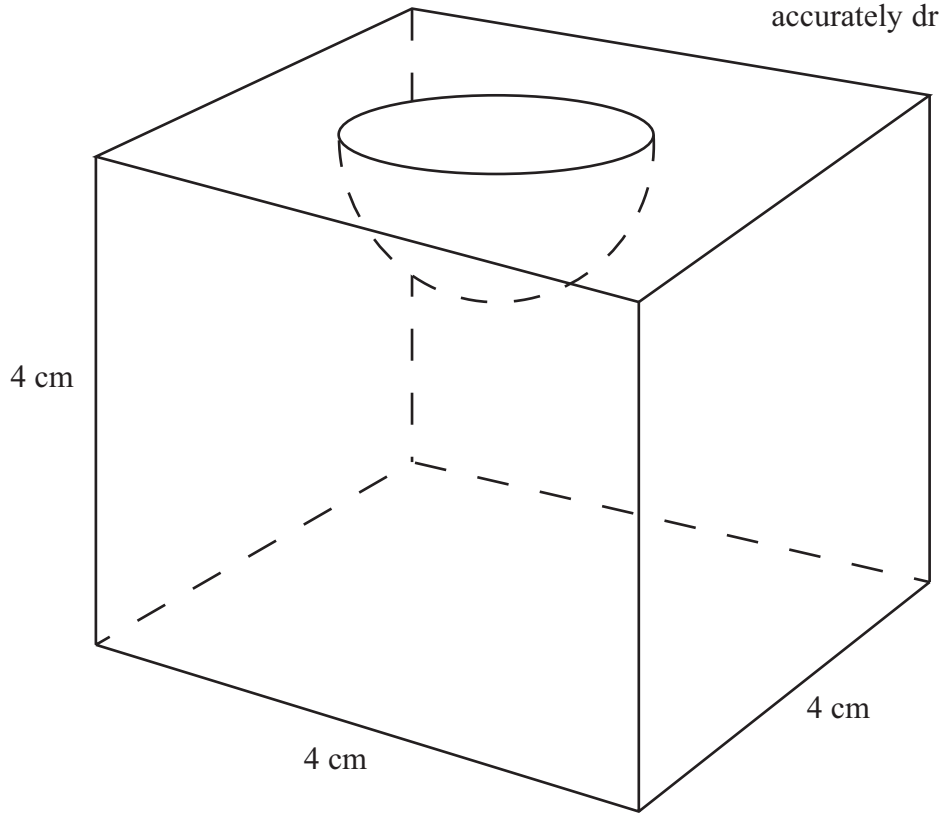
.....

(1)

(Total for Question 19 is 4 marks)

20

Diagram **NOT** accurately drawn



A solid cube has sides of length 4 cm.

A hemisphere of radius 1.5 cm is removed from the cube as shown in the figure.

Calculate the total surface area, in cm^2 to 3 significant figures, of the remaining solid.

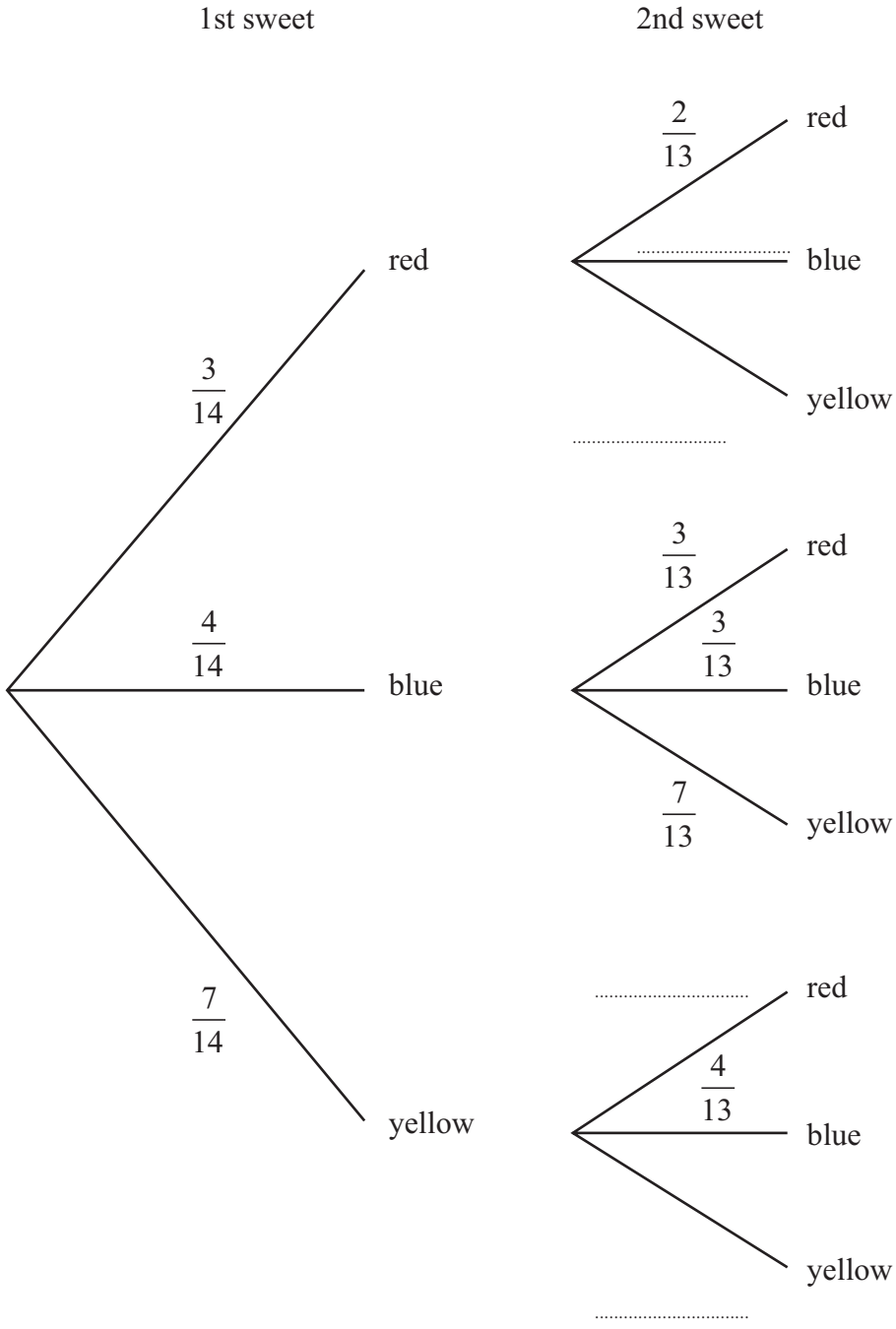
..... cm^2

(Total for Question 20 is 4 marks)

21 A jar contains 3 red sweets, 4 blue sweets and 7 yellow sweets.

One sweet is taken, at random, from the jar and **not** replaced.
Another sweet is then taken, at random, from the jar.

A tree diagram representing these two events is shown below.



(a) Complete the tree diagram representing these two events.

(2)

(b) Find the probability that both sweets are red. Give your answer as a simplified fraction.

.....

(2)

(Total for Question 21 is 4 marks)

22 Solve the simultaneous equations

$3x + y = 2$

$2x - 2y = 3$

$x =$ .....

$y =$ .....

(Total for Question 22 is 4 marks)

23 John asked 30 students how they travelled to school one day. The table shows his results.

Method of transport	Number of pupils
Bus	12
Cycle	5
Train	3
Walk	10

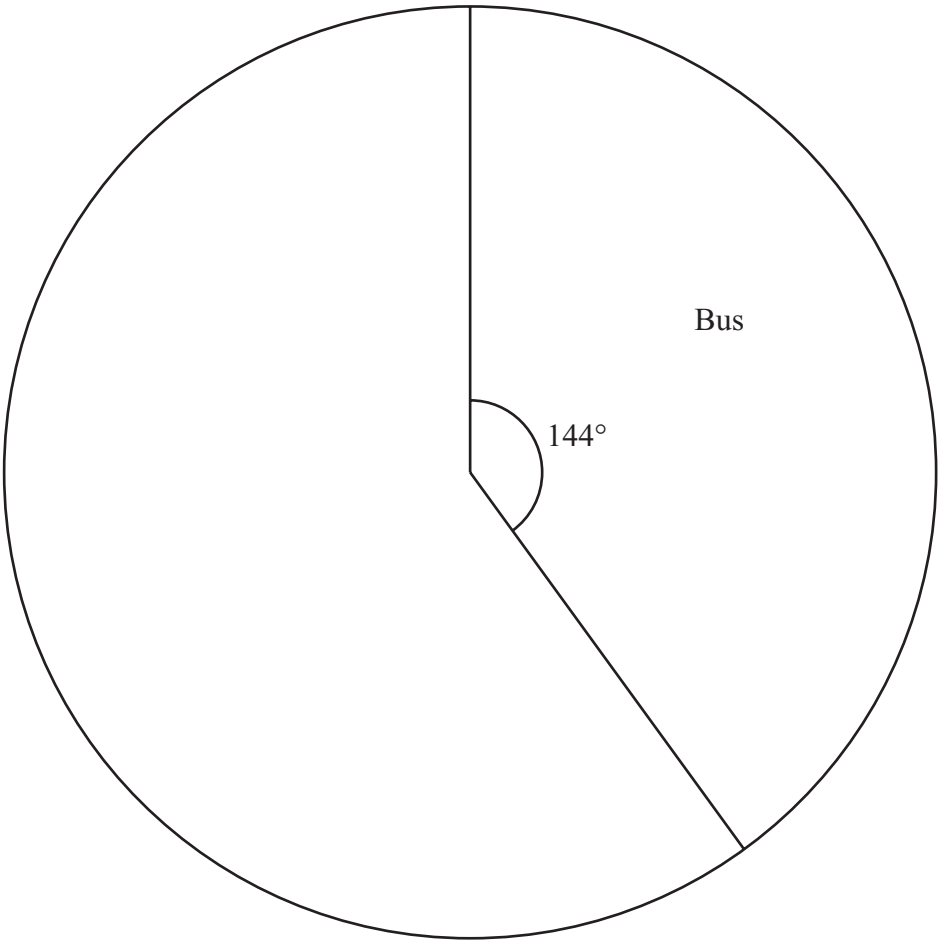
John wants to draw a pie chart for his results.

(a) Calculate the size, in degrees, of the angle of the sector representing the number of pupils who cycled to school.

.....°

(2)

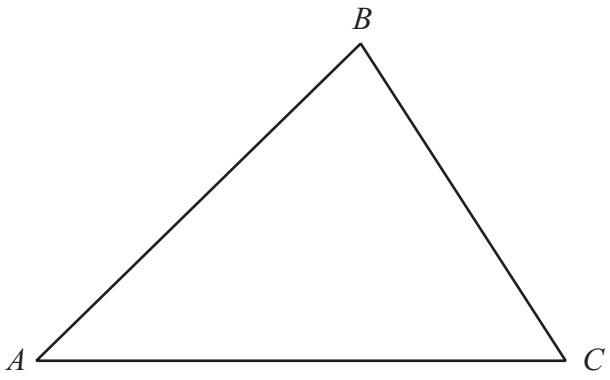
(b) Using the circle, complete an accurate pie chart for John's results. On the pie chart, state clearly the size, in degrees, of the angle of each sector and label the sector.



(3)

(Total for Question 23 is 5 marks)

24



On the diagram

(a) draw the locus of points which are equidistant from AC and BC in ΔABC,

(2)

(b) draw the locus of points which are 5 cm away from A in ΔABC,

(2)

(c) shade the region of points in ΔABC which is less than 5 cm away from A and closer to BC than to AC.

(1)

(Total for Question 24 is 5 marks)

25 Point A has the coordinates (4, 2) with respect to the origin O.

(a) Calculate the angle, in degrees to 1 decimal place, that OA makes with the positive x-axis.

.....°

(2)

Point B has the coordinates (3, 3) with respect to the origin O and OB makes an angle of 45° with the x-axis.

(b) Calculate the area of ΔOAB.

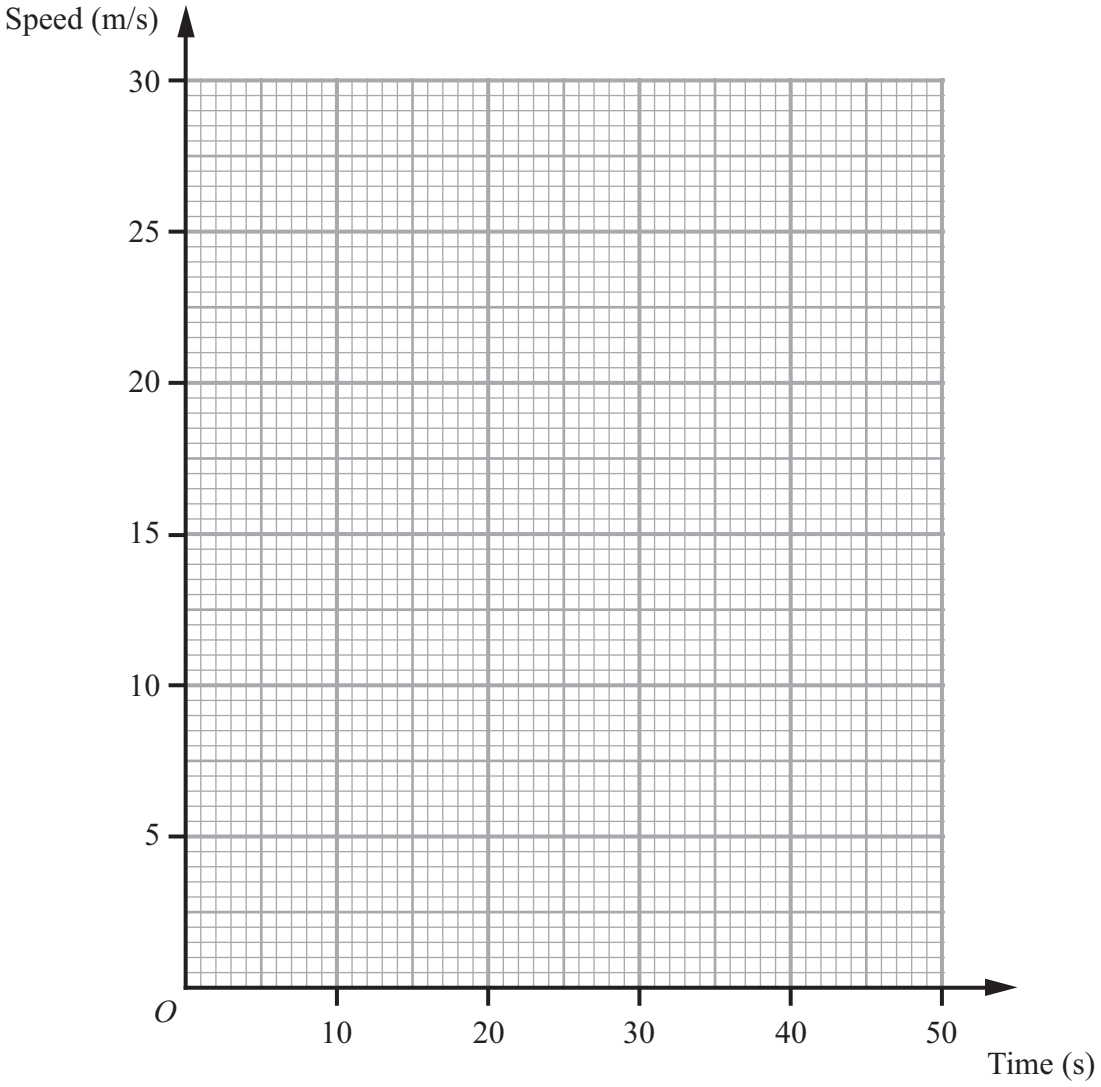
.....

(4)

(Total for Question 25 is 6 marks)

26 A car, starting from rest, accelerates at a constant rate and attains a speed of 25 m/s after 5 seconds.
The car then travels at this speed for 20 seconds.
The car then slows down at a constant rate and comes to rest in 10 seconds.

(a) Represent this information on the speed-time graph.



(2)

Find, in m/s^2,

(b) (i) the acceleration,

..... m/s^2

(ii) the rate at which the car slows down.

..... m/s^2

(2)

(c) Find the total distance, in m, that the car has travelled.

..... m

(2)

(Total for Question 26 is 6 marks)

27

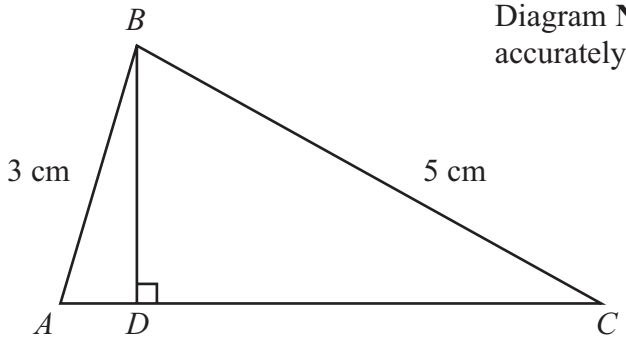


Diagram **NOT** accurately drawn

In ΔABC, $AB = 3$ cm, $BC = 5$ cm.

Given that $\angle ABC = 68°$,

(a) show that $AC = 4.77$ cm, to 3 significant figures.

..... cm

(3)

(b) Calculate the size, in degrees to 1 decimal place, of $\angle BCA$.

$\angle BCA =$ ..... °

(3)

In ΔABC, BD is perpendicular to AC,

(c) calculate the length, in cm to 3 significant figures, of CD.

..... cm

(2)

(Total for Question 27 is 8 marks)

TOTAL FOR PAPER IS 100 MARKS

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