

Write your name here

Surname	Other names
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**Pearson Edexcel  
International GCSE**

Centre Number

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Candidate Number

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# Mathematics B

## Paper 1R



Thursday 24 May 2018 – Morning  
**Time: 1 hour 30 minutes**

Paper Reference  
**4MB0/01R**

**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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Answer ALL TWENTY EIGHT questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 When it is 9.42 am in London, it is 2.12 pm the same day in Delhi.

It is 10.15 am in Delhi.

Find the time in London.

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

2 Find the Highest Common Factor (HCF) of 180 and 324

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



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3 Given that  $y = 3x^2 - x^{-5}$   
find  $\frac{dy}{dx}$

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

(Total for Question 3 is 2 marks)

4 Here are the first 4 terms of a sequence

-729      243      -81      27

Write down the next 2 terms of the sequence.

..... , .....

(Total for Question 4 is 2 marks)

5 Here is a list of 5 numbers

$(\sqrt{2} + 3)$        $2\frac{1}{4}$        $1.23 \times 10^2$        $\frac{9\pi}{3\pi}$        $(\sqrt{3} \times \sqrt{27})$

Write down all the numbers in the list that are natural numbers.

.....

(Total for Question 5 is 2 marks)



6

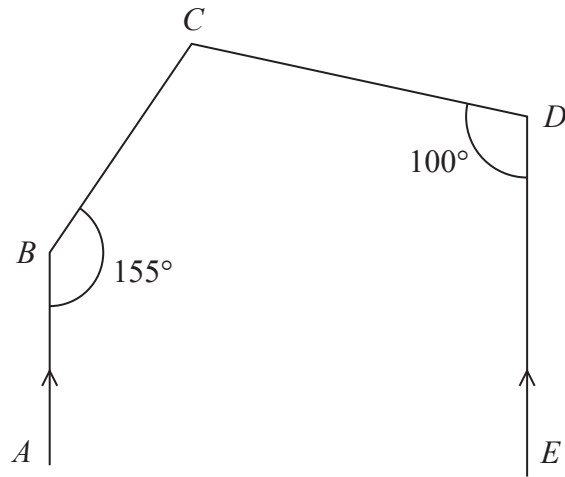


Diagram **NOT** accurately drawn

In the diagram,  $AB$  is parallel to  $ED$ ,  $\angle ABC = 155^\circ$  and  $\angle CDE = 100^\circ$   
Find the size, in degrees, of  $\angle BCD$ .

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

(Total for Question 6 is 2 marks)

7 Given that  $A = \begin{pmatrix} 4 & -2 \\ 8 & 6 \end{pmatrix}$

find the inverse of  $A$

.....

(Total for Question 7 is 2 marks)



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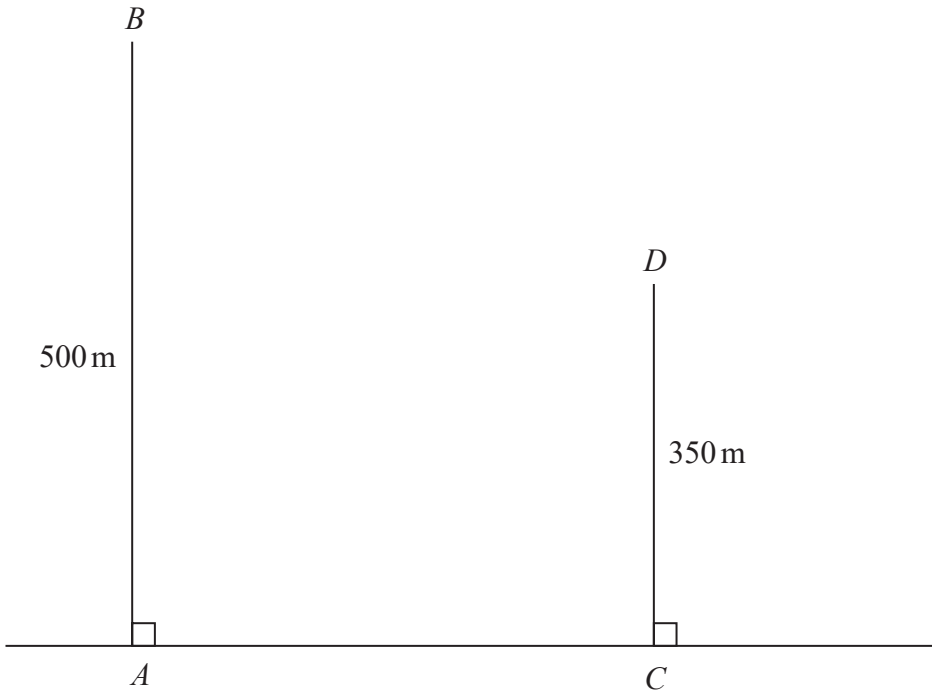


Diagram NOT accurately drawn

The diagram shows two vertical masts,  $AB$  and  $CD$ , on horizontal ground.

The height of  $AB$  is 500 m and the height of  $CD$  is 350 m.

The angle of elevation of  $B$  from  $D$  is  $30^\circ$

Calculate, to the nearest m, the distance  $AC$ .

.....m

(Total for Question 8 is 2 marks)



9 Simplify fully  $\frac{64a^3b^{-1}}{4a^{-2}b}$

.....

(Total for Question 9 is 2 marks)

10 Given that  $m$  and  $n$  are positive integers, and  $m$  is odd, express  $\frac{2^{20} + 2^{25}}{2^{-15}}$  in the form  $m \times 2^n$   
Show your working clearly.

.....

(Total for Question 10 is 2 marks)

11 A pyramid has a rectangular base.

The rectangular base has two sides of length 8 m and a perimeter of 28 m.  
The perpendicular height of the pyramid is 15 m.

Calculate the volume, in  $m^3$ , of the pyramid.

..... $m^3$

(Total for Question 11 is 3 marks)



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12 Make  $x$  the subject of the formula  $y = 2 + \frac{1+x}{1-2x}$

.....  
(Total for Question 12 is 3 marks)

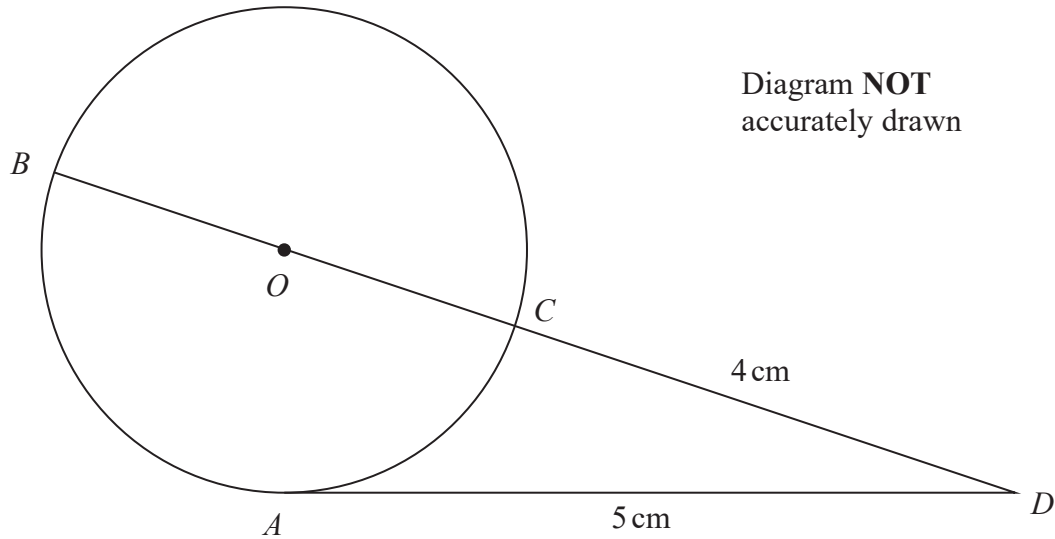
13 Given that  $a:b = 3:8$  and that  $a:c = 6:11$   
find, in its simplest form,  $b:c$

$b:c =$  .....

(Total for Question 13 is 3 marks)



14



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$A$ ,  $B$  and  $C$  are three points on a circle, with centre  $O$ , as shown in the diagram.

$BC$  is a diameter of the circle.

The point  $D$  is such that  $BOCD$  is a straight line and  $AD$  is the tangent to the circle at  $A$ .

$AD = 5$  cm and  $CD = 4$  cm.

Calculate the radius, in cm, of the circle.

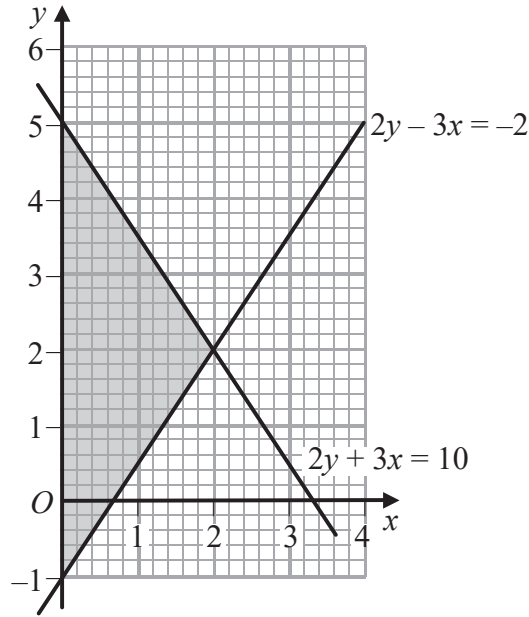
.....cm

(Total for Question 14 is 3 marks)





15



Write down the three inequalities that define the shaded region shown in the above diagram.

.....  
 .....  
 .....

(Total for Question 15 is 3 marks)

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16  $\mathcal{E} = \{\text{integers } x : 1 \leq x \leq 14\}$

$A = \{1, 5, 9, 11, 13\}$

$B = \{2, 4, 8, 12\}$

$C = \{6, 10, 13, 14\}$

(a) List the members of the set  $(A \cup B)'$

.....  
(1)

(b) List the members of the set  $A' \cap B' \cap C$

.....  
(2)

(Total for Question 16 is 3 marks)

17 Here are 6 numbers

25     $x$     5    10    40    8

The median of the numbers is 15

(a) Find the value of  $x$ .

.....  
(1)

(b) Find the mean value of the 6 numbers.

.....  
(2)

(Total for Question 17 is 3 marks)



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18 Given that  $6x^3 - 19x^2 + x + 6 = (2x + 1)(3x^2 + cx + d)$  for all values of  $x$   
find the value of  $c$  and the value of  $d$ .

$c =$  .....

$d =$  .....

(Total for Question 18 is 3 marks)



19 A particle travels a distance of  $s$  metres in time  $t$  seconds, where  $s$  varies directly as  $t^3$   
The particle travels a distance of 10 metres in 2 seconds.  
Calculate the time, in seconds, that the particle takes to travel 2160 metres.

.....seconds

(Total for Question 19 is 4 marks)

20  $x$  is an integer such that  $-3 < 4x + 5 \leq 13$   
Find the possible values of  $x$ .  
Show your working clearly.

.....

(Total for Question 20 is 4 marks)



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21 The coordinates of point  $A$  are  $(1, 8)$  and the coordinates of point  $B$  are  $(10, -4)$ .

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

$$\vec{AB} = \begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix}$$

(1)

The point  $P$  lies on the line  $AB$  so that  $AP:PB = 1:2$

(b) Find  $\vec{OP}$  as a column vector.

$$\vec{OP} = \begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix}$$

(2)

(c) Calculate the modulus of  $\vec{AP}$ .

.....

(2)

**(Total for Question 21 is 5 marks)**





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The diagram shows the position of a ship *A*.

Ship *B* is 30 km due west of ship *A*.

Using a scale of 1 cm to represent 5 km,

- (a) find and label with a cross (×) the position of ship *B* on the diagram.

Label the cross *B*.

(1)



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A third ship, ship  $C$ , is also 30km away from ship  $A$ .

The bearing of ship  $C$  from ship  $A$  is  $345^\circ$

Using the same scale,

(b) find and label with a cross ( $\times$ ) the position of ship  $C$  on the diagram.

Label the cross  $C$ .

(2)

Ship  $A$  moves so that it passes between ship  $B$  and ship  $C$  on a course so that ship  $A$  is always equidistant from ship  $B$  and ship  $C$ .

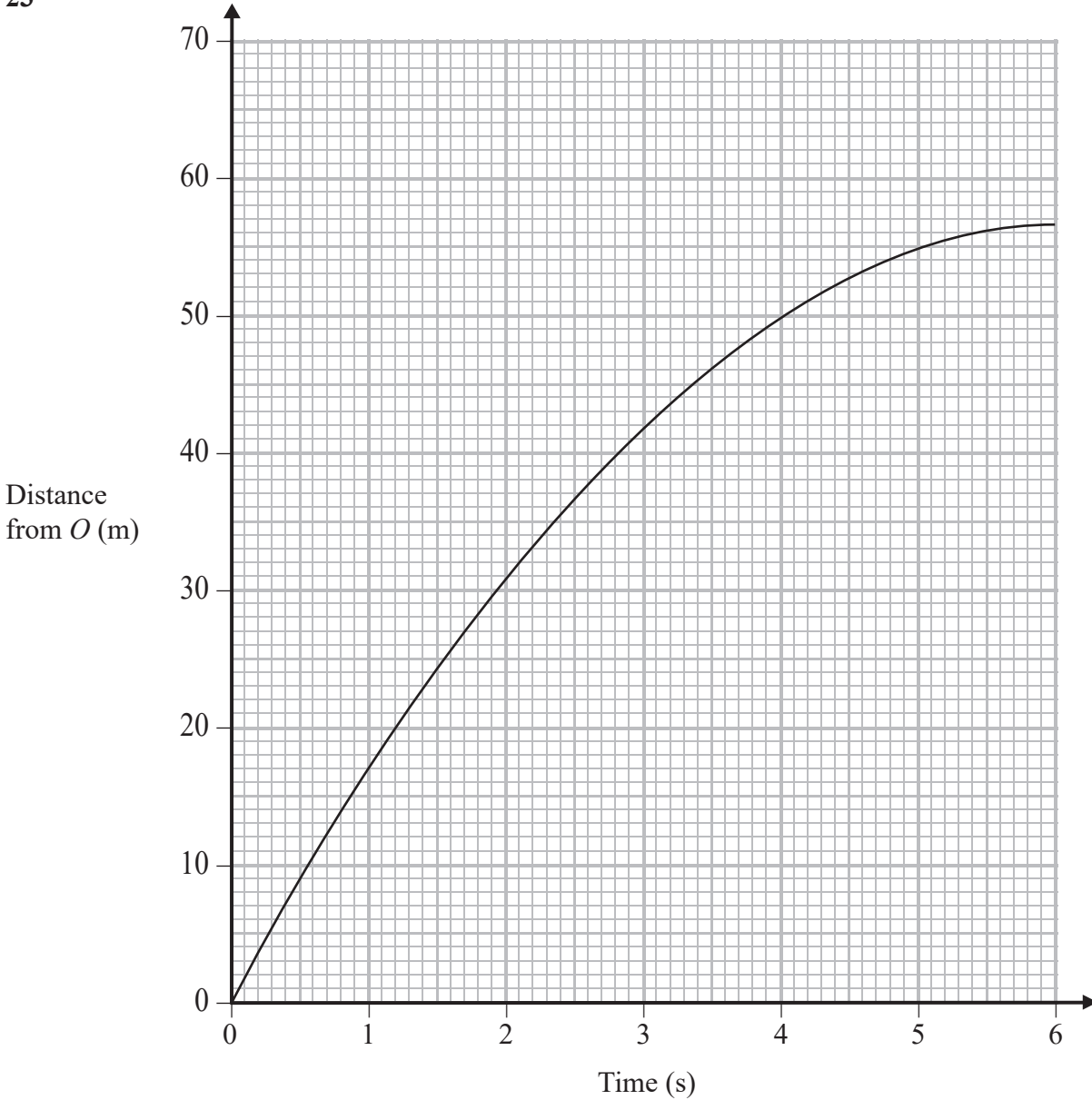
**Showing all your construction lines,**

(c) construct on the diagram the course taken by ship  $A$ .

(2)

(Total for Question 22 is 5 marks)





The point  $O$  lies on a wide straight road.

The distance-time graph for the first 6 seconds of the motion of a car  $A$  along the road from the point  $O$  is shown on the grid above.

(a) Describe in what way the speed of car  $A$  changes as the car moves along the road.

.....

.....

(1)

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The point  $P$  on the road is 5 m from  $O$  so that car  $A$  passes  $P$  after leaving  $O$ .

A car  $B$  is on the road at  $P$ .

At the same time that car  $A$  leaves  $O$ , car  $B$  leaves  $P$  and travels along the road at a constant speed of 10 m/s in the same direction as car  $A$ .

- (b) Represent the motion of car  $B$ , for the first 6 seconds of its motion, as a distance-time graph on the grid. (2)

Car  $A$  and car  $B$  are the same distance from  $O$  when car  $A$  is at the point  $X$  and at the point  $Y$ .

Car  $A$  is at  $X$  before it is at  $Y$ .

- (c) At which of the two points,  $X$  or  $Y$ , does car  $A$  overtake car  $B$ ?

You must give a reason for your answer.

.....  
..... (1)

- (d) When car  $A$  is at the point  $Y$ , which car,  $A$  or  $B$ , is travelling the faster?

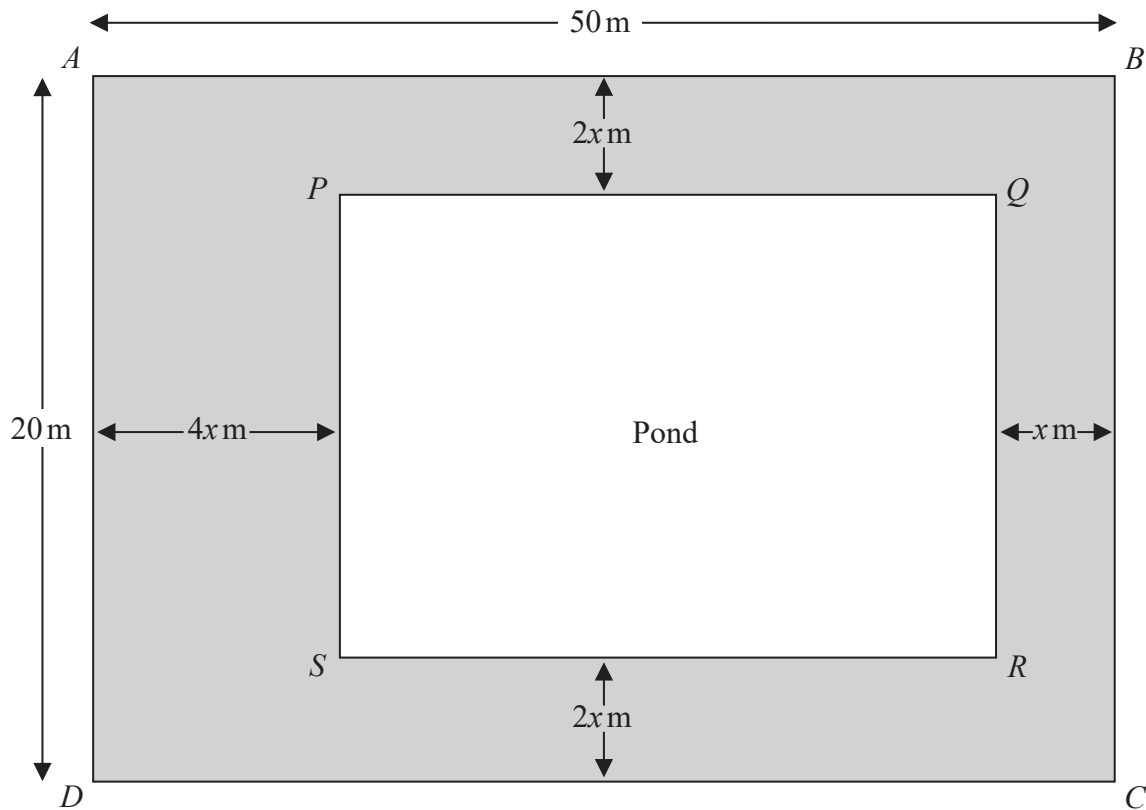
You must give a reason for your answer.

.....  
..... (1)

(Total for Question 23 is 5 marks)



Diagram NOT accurately drawn



The diagram shows a rectangular region,  $ABCD$ , in a garden, where  $AB = DC = 50\text{ m}$  and  $AD = BC = 20\text{ m}$ .

Inside this region is a rectangular pond,  $PQRS$ .

The rest of the region, shown shaded in the diagram, is tiled to form a path.

Along the edges  $PQ$  and  $SR$  of the pond, the path is  $2x$  metres wide.

Along the edge  $PS$  of the pond, the path is  $4x$  metres wide.

Along the edge  $QR$  of the pond, the path is  $x$  metres wide.

The area of the path is  $A\text{ m}^2$

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(a) (i) Write down, in terms of  $x$ , the dimensions, in metres, of the pond.

$PQ = \dots\dots\dots$  m

$PS = \dots\dots\dots$  m

(ii) Show that  $A = 20x(15 - x)$

(4)

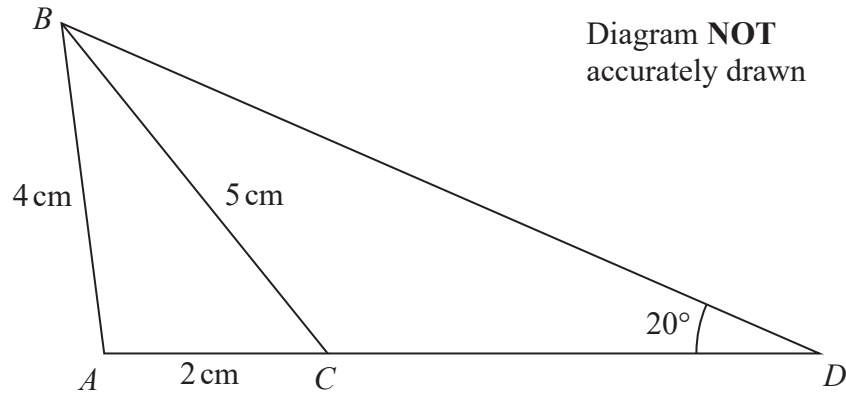
(b) Find the range of possible values of  $x$ .

.....  
(2)

(Total for Question 24 is 6 marks)



25



The diagram shows triangle  $ABC$  in which  $AB = 4$  cm,  $AC = 2$  cm and  $BC = 5$  cm.

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

$$\angle ACB = \dots\dots\dots^\circ$$

(3)

As shown in the diagram, the line  $AC$  is extended to the point  $D$  so that  $\angle ADB = 20^\circ$

(b) Calculate the length, in cm to 3 significant figures, of  $BD$ .

$$BD = \dots\dots\dots \text{ cm}$$

(3)

(Total for Question 25 is 6 marks)

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26 The function  $f$  is defined as  $f : x \mapsto \frac{x}{2x-3} \quad x \neq \frac{3}{2}$

(a) Find  $f\left(\frac{1}{2}\right)$

.....  
(1)

(b) Express the inverse function  $f^{-1}$  in the form  $f^{-1} : x \mapsto \dots$

$f^{-1} : x \mapsto$  .....  
(2)

The function  $g$  is defined as  $g : x \mapsto \frac{x-1}{x} \quad x \neq 0$

The composite function  $h$  is such that  $h = fg$

(c) (i) Express the function  $h$  in the form  $h : x \mapsto \dots$

Write your answer as a simplified single algebraic fraction.

$h : x \mapsto$  .....

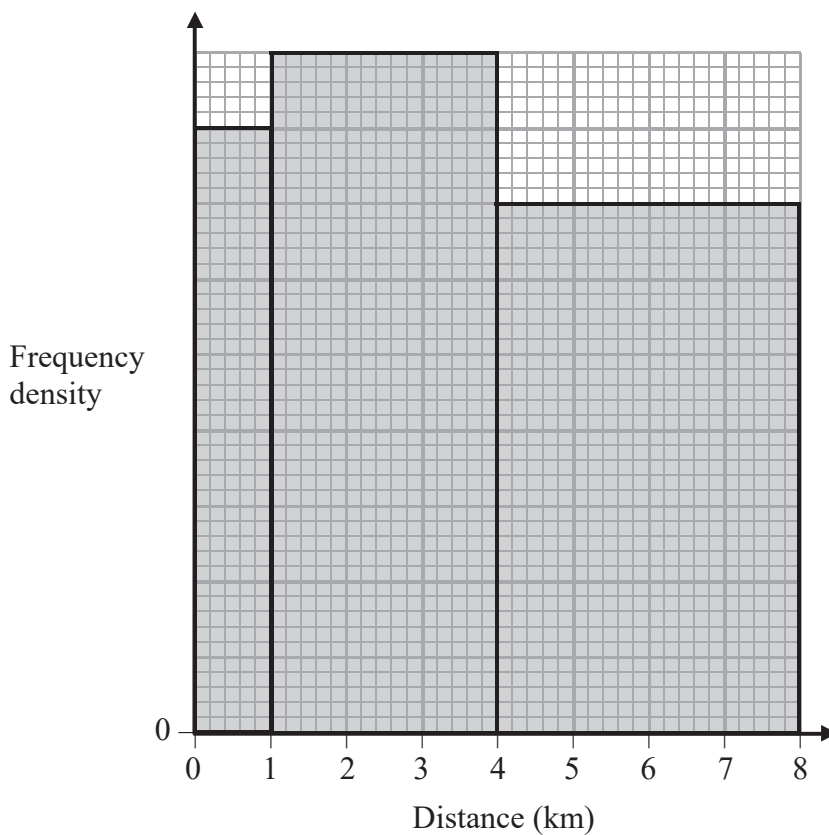
(ii) Write down the value of  $x$  (apart from  $x = 0$ ) that must be excluded from any domain of  $h$

.....  
(4)

(Total for Question 26 is 7 marks)



27 The histogram below shows information about the results of a survey into the distances, in km, of some shops from a train station.



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In the survey, the distances from the train station of 54 shops were between 1 km and 4 km.

(a) Using the histogram,

(i) calculate the number of shops in the survey whose distances from the train station were less than 1 km,

(i) .....

(ii) calculate an estimate of the number of shops in the survey whose distances from the train station were between 4 km and 6 km.

(ii) .....

(4)



(b) Calculate an estimate, to one decimal place, of the mean distance, in km, of all the shops from the train station.

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..... km  
(3)

(Total for Question 27 is 7 marks)



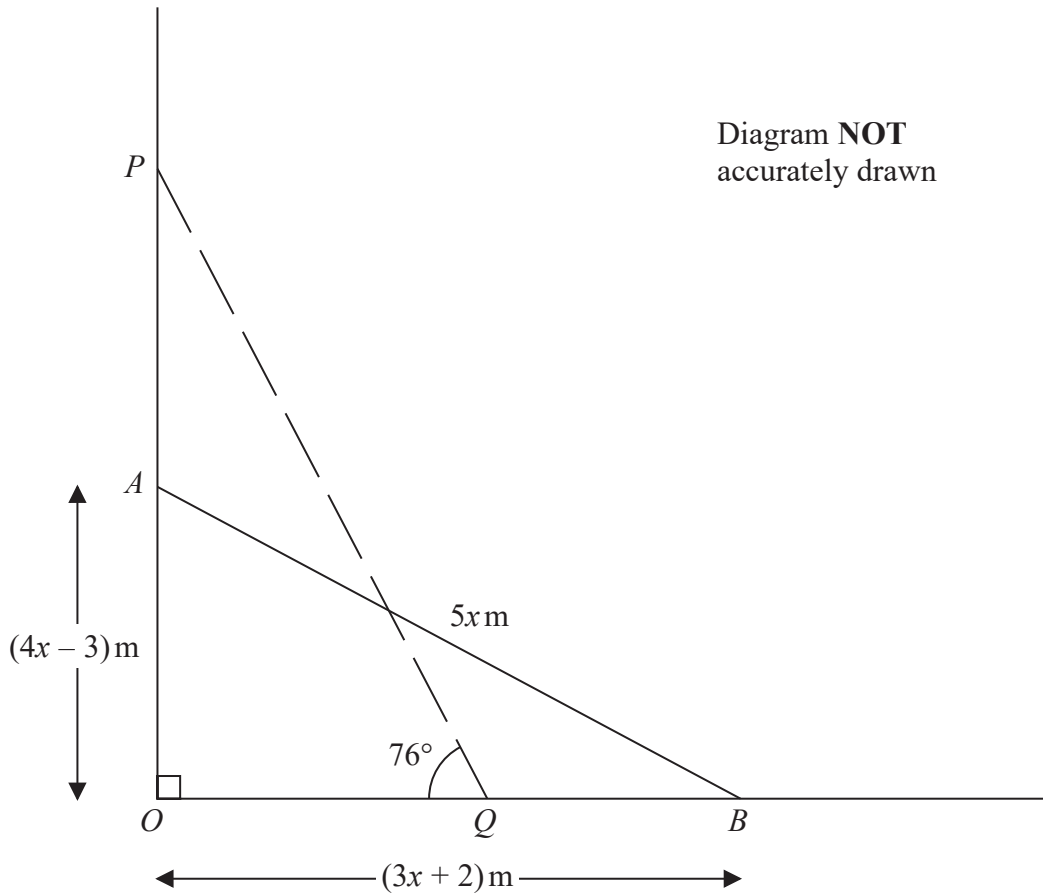


Diagram NOT accurately drawn

The diagram shows a ladder of length  $5x$  metres with one end resting on horizontal ground,  $OQB$ , and the other end resting against a vertical wall,  $OAP$ .

Initially the two ends of the ladder are at  $A$  and at  $B$ , where  $OA = (4x - 3)$  metres and  $OB = (3x + 2)$  metres, and the ladder is shown in the diagram as a solid line.

(a) Find the length, in metres, of the ladder.

.....m  
(5)

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For safety reasons the ladder is moved so that the two ends of the ladder are now at  $P$  and at  $Q$  and the ladder is shown in the diagram as a dashed line.

The ladder now makes an angle of  $76^\circ$  with the ground, as shown in the diagram.

(b) Calculate the length, in metres to 3 significant figures, of  $OP$ .

.....m

(2)

(Total for Question 28 is 7 marks)

**TOTAL FOR PAPER IS 100 MARKS**



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