

Please check the examination details below before entering your candidate information

Candidate surname

Other names

**Pearson Edexcel
International GCSE**

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--

Wednesday 13 January 2021

Afternoon (Time: 2 hours)

Paper Reference **4MA1/2HR**

Mathematics A

**Paper 2HR
Higher Tier**



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 ►

P66302A

©2021 Pearson Education Ltd.

1/1/1




Pearson

International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

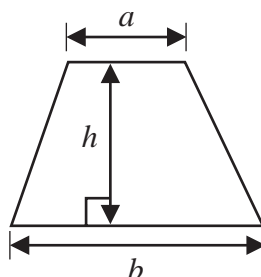
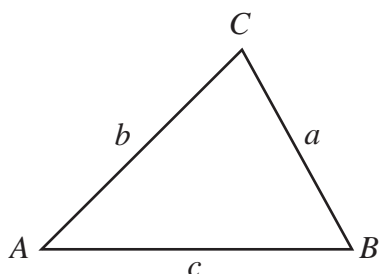
Sum to n terms, $S_n = \frac{n}{2} [2a + (n - 1)d]$

The quadratic equation

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

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

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

**Trigonometry**

In any triangle ABC

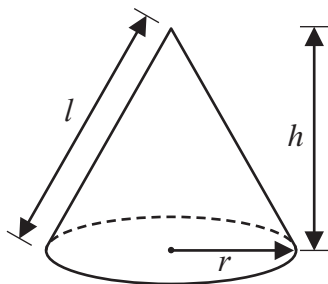
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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

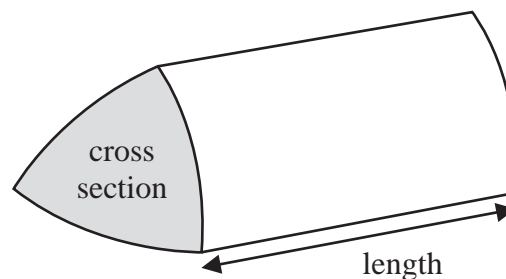
Volume of cone = $\frac{1}{3}\pi r^2 h$

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



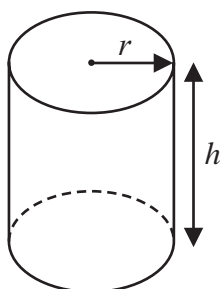
Volume of prism

= area of cross section \times length



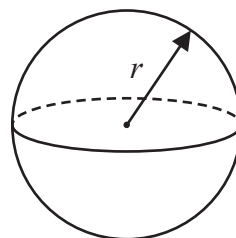
Volume of cylinder = $\pi r^2 h$

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



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

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



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 $w = 5y^2 - y^3$

(a) Work out the value of w when $y = -2$

$$w = \dots\dots\dots$$

(2)

(b) Factorise fully $8p^2 - 2p$

$$\dots\dots\dots$$

(2)

(c) Expand $4t(3t - 2)$

$$\dots\dots\dots$$

(2)

(d) Expand and simplify $(5x - 2)(x + 4)$

$$\dots\dots\dots$$

(2)

(Total for Question 1 is 8 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



- 2 The diagram shows a rectangle $ABCD$ and a semicircle with diameter AB where $AB = 12$ cm. The point E lies on DC and also on the semicircle.

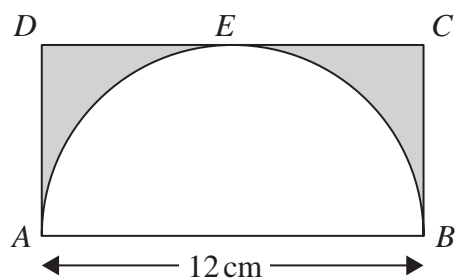


Diagram **NOT** accurately drawn

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

..... cm²

(Total for Question 2 is 3 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

3 $\mathcal{E} = \{21, 22, 23, 24, 25, 26, 27, 28, 29, 30\}$
 $A = \{22, 24, 26, 28, 30\}$
 $B = \{21, 24, 27, 30\}$

(a) List the members of the set

(i) $A \cap B$

.....

(ii) A'

.....

(2)

$C = \{23, 25, 29\}$

(b) Using set notation, find an expression for C in terms of A and B .

.....

(1)

(Total for Question 3 is 3 marks)

4 (a) Simplify $(3k^2)^4$

.....

(2)

(b) Simplify $(21m^4n) \div (3n^{-5})$

.....

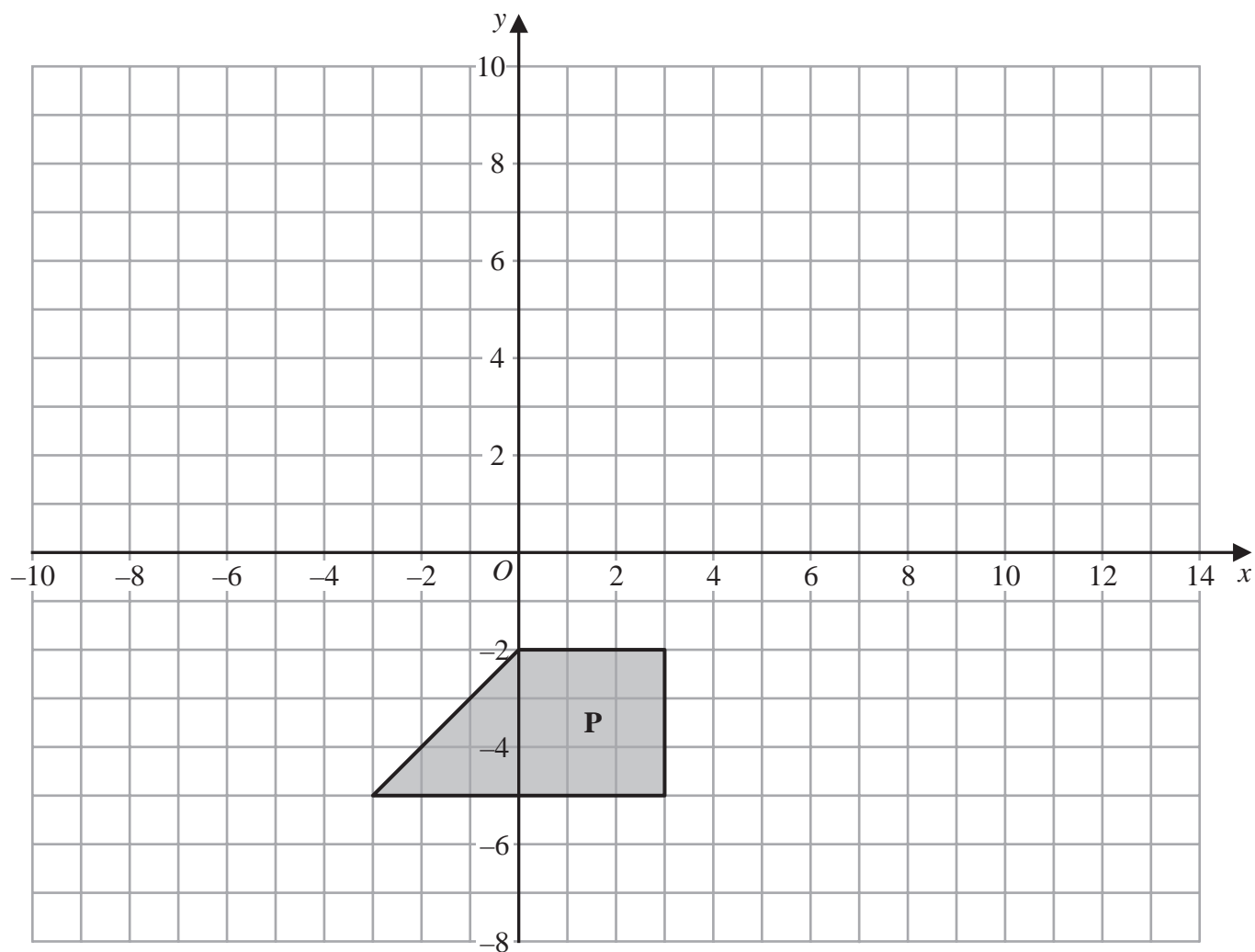
(2)

(Total for Question 4 is 4 marks)

DO NOT WRITE IN THIS AREA



5 Here is a shape **P** drawn on a grid of squares.



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

- (a) On the grid, rotate shape **P** 180° about the point $(-3, 2)$
Label the new shape **Q**.

(2)

- (b) On the grid, translate shape **P** by the vector $\begin{pmatrix} 10 \\ 8 \end{pmatrix}$

Label the new shape **R**.

(1)

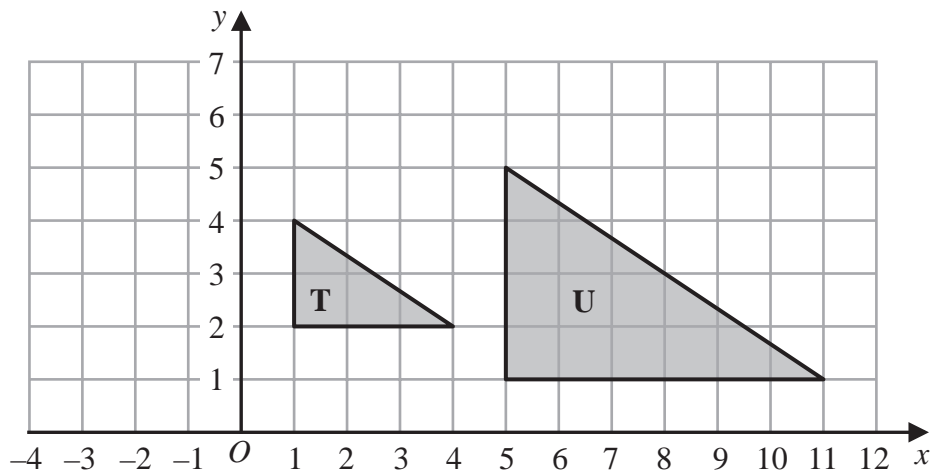


DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Here are triangle **T** and triangle **U** drawn on a grid of squares.



(c) Describe fully the single transformation that maps triangle **T** onto triangle **U**.

.....

.....

(3)

(Total for Question 5 is 6 marks)

- 6** On Wednesday, the price of 1 litre of petrol was £1.26
 The price of petrol on Wednesday was 5% more than the price of petrol on the previous Monday.

Calculate the price of 30 litres of petrol on the previous Monday.

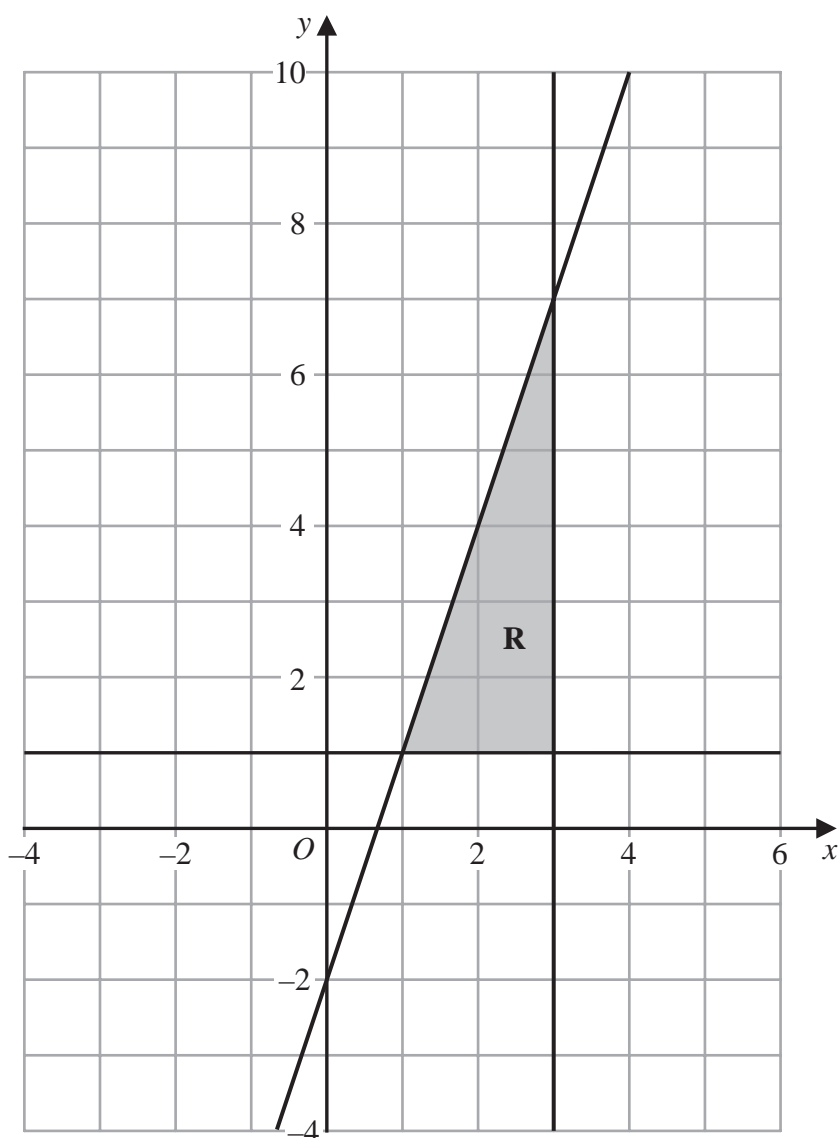
£.....

(Total for Question 6 is 3 marks)



- 7 The shaded region **R**, shown in the diagram below, is bounded by the straight line with equation $y = 3x - 2$ and by two other straight lines.

Write down the three inequalities that define region **R**.



.....

(Total for Question 7 is 3 marks)



- 8 The table gives the length of the coastline, in kilometres, of each of five oceans.

Ocean	Length of coastline (km)
Arctic	4.539×10^4
Atlantic	1.119×10^5
Pacific	1.357×10^5
Indian	6.653×10^4
Southern	1.797×10^4

- (a) Which ocean has the greatest length of coastline?

.....
(1)

- (b) Calculate the difference between the length of the Atlantic Ocean's coastline and the length of the Southern Ocean's coastline.
Give your answer in standard form.

..... km
(2)

(Total for Question 8 is 3 marks)

- 9 Solve $x^2 - 21x + 20 = 0$
Show your working clearly.

.....
(Total for Question 9 is 3 marks)



- 10 A mathematics teacher at a school asked a group of students how far, in kilometres, each student had travelled to get to school that day.

The table gives information about their answers.

Distance travelled (d km)	Number of students
$0 < d \leq 2$	x
$2 < d \leq 4$	11
$4 < d \leq 6$	8
$6 < d \leq 8$	6
$8 < d \leq 10$	5

The teacher calculated that an estimate for the mean distance travelled by the whole group of students was 4.25 km.

Work out the value of x .
Show your working clearly.

$x = \dots\dots\dots$

(Total for Question 10 is 4 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



- 11 A circle centre O has radius 9 cm.

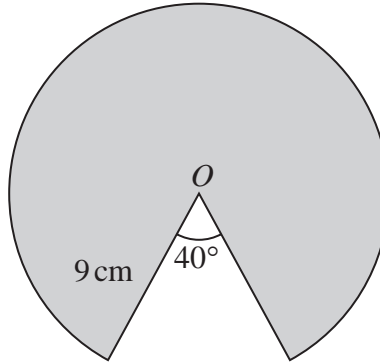


Diagram **NOT**
accurately drawn

Calculate the perimeter of the shaded sector of the circle.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 11 is 4 marks)

- 12 Solve the simultaneous equations $2x + 7y = 17$
 $5x + 3y = -1$

Show clear algebraic working.

$x =$

$y =$

(Total for Question 12 is 4 marks)



- 13 The diagram shows two hot air balloons.
 A is a point on the base of one of the balloons and B is a point on the base of the other balloon.

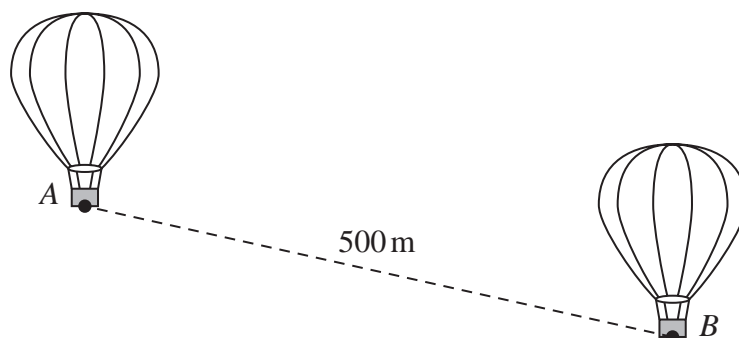


Diagram **NOT**
accurately drawn

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

The distance between A and B is 500 metres.
 The angle of depression of B from A is 23°

Calculate the vertical height of A above B .
 Give your answer correct to one decimal place.

..... metres

(Total for Question 13 is 3 marks)



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

14 Simon bought a house at the beginning of 2018

The value of Simon's house had decreased by 15% by the end of 2018

The house increased in value during both 2019 and 2020

The percentage increases in the value of the house during 2019 and 2020 were the same.

The value of Simon's house at the end of 2020 was 2.85% greater than the amount he paid for his house at the beginning of 2018

Calculate the percentage increase in the value of the house during 2019

.....%

(Total for Question 14 is 4 marks)



P 6 6 3 0 2 A 0 1 3 2 4

15 Prove algebraically that the product of any two odd numbers is always an odd number.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total for Question 15 is 4 marks)



DO NOT WRITE IN THIS AREA

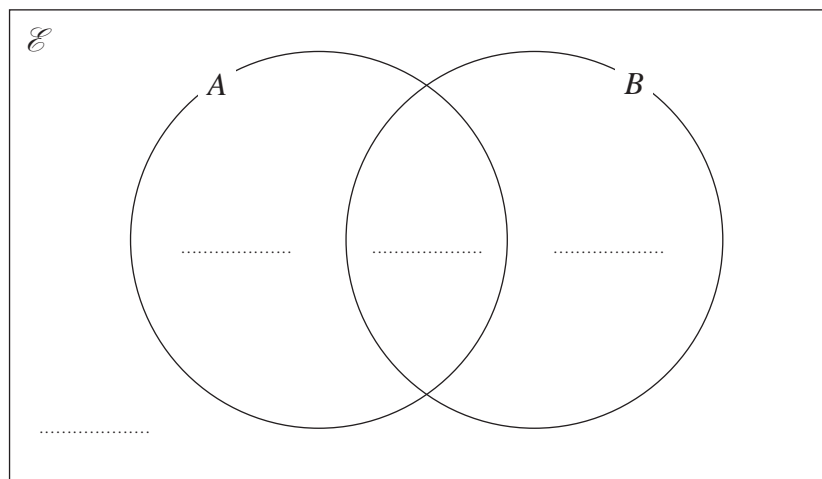
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

16 Two events A and B are such that $n(A) = 62$ $n(B) = 30$ and $n(A \cup B) = 68$

Given that $n(\mathcal{E}) = 80$

(a) complete the Venn diagram to show the number of elements in each region.



(2)

An element is chosen at random from \mathcal{E} .

(b) Using the Venn diagram, find the probability that this element is in

(i) $A \cap B$

.....

(1)

(ii) $A \cup B'$

.....

(2)

(Total for Question 16 is 5 marks)



17 The functions f and g are defined as

$$f(x) = x^2 + 6$$

$$g(x) = x - 10$$

(a) Find $fg(3)$

.....
(2)

(b) Solve the equation $fg(x) = f(x)$
Show clear algebraic working.

.....
(3)

The function h is defined as

$$h(x) = \frac{2x - 4}{x}$$

(c) State the value of x that cannot be included in the domain of h

.....
(1)

(d) Express the inverse function h^{-1} in the form $h^{-1}(x) = \dots$

$$h^{-1}(x) = \dots$$

(3)

(Total for Question 17 is 9 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



18 Solve the equation

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

Show clear algebraic working.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

.....
(Total for Question 18 is 5 marks)



- 19 (a) Simplify $8^2 \times \sqrt[3]{4^6}$
Give your answer in the form 2^a where a is an integer.
Show each stage of your working clearly.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

.....
(3)

Given that $n^{\left(-\frac{4}{5}\right)} = \left(\frac{1}{2}\right)^4$ where $n > 0$

- (b) find the value of n .

$n =$
(4)

(Total for Question 19 is 7 marks)



20 A , B and C are points on a circle with centre O .

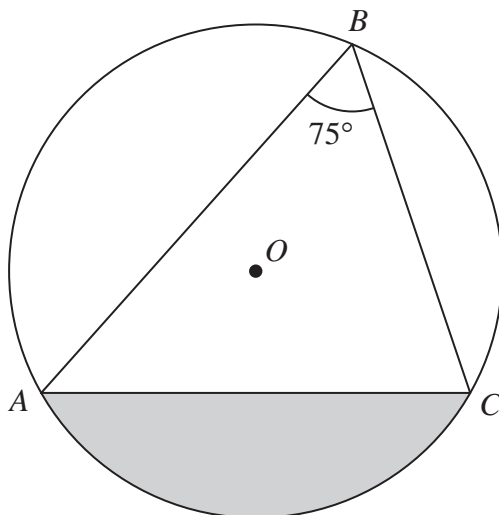


Diagram **NOT** accurately drawn

Angle $ABC = 75^\circ$

The area of the shaded segment is 200 cm^2

Calculate the radius of the circle.

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 20 is 5 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



- 21 A bag contains n beads.
6 of the beads are red and the rest are blue.

Ravi is going to take at random 2 beads from the bag.

The probability that the 2 beads will be of the same colour is $\frac{9}{17}$

Using algebra, and showing each stage of your working, calculate the value of n .

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

$n = \dots\dots\dots$

(Total for Question 21 is 6 marks)

Turn over for Question 22



- 22 ABC is an isosceles triangle in a horizontal plane.
The point T is vertically above B .

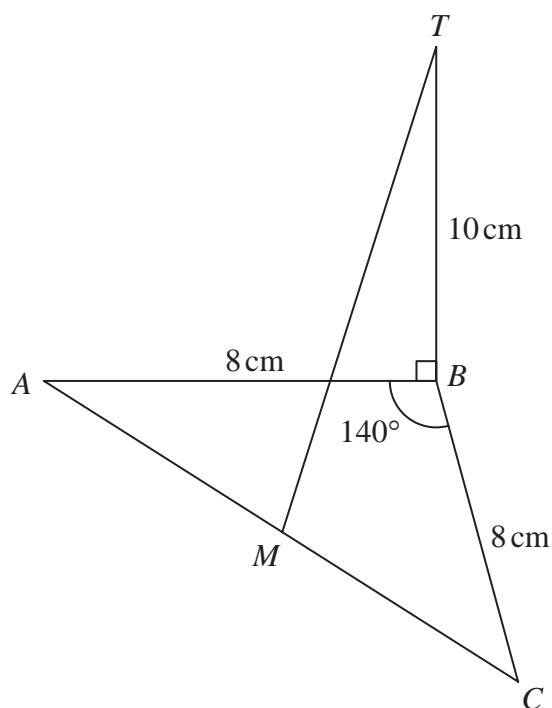


Diagram **NOT**
accurately drawn

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Angle $ABC = 140^\circ$

$AB = BC = 8 \text{ cm}$

$TB = 10 \text{ cm}$

M is the midpoint of AC .

Calculate the size of the angle between MT and the horizontal plane ABC .
Give your answer correct to one decimal place.



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total for Question 22 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

