

Please write clearly in block capitals.

Centre number

--	--	--	--	--

Candidate number

--	--	--	--

Surname

Forename(s)

Candidate signature

GCSE METHODS IN MATHEMATICS (LINKED PAIR)

H

Higher Tier Unit 2 Geometry and Algebra

Tuesday 8 November 2016

Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- If your calculator does not have a π button, take the value of π to be 3.14 unless another value is given in the question.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80
- The quality of your written communication is specifically assessed in Questions 6 and 16. These questions are indicated with an asterisk (*).
- You may ask for more answer paper, tracing paper and graph paper. These must be tagged securely to this answer book.
- You are expected to use a calculator where appropriate.

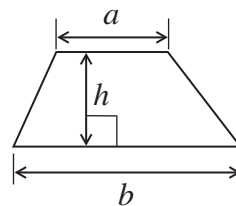
Advice

- In all calculations, show clearly how you work out your answer.

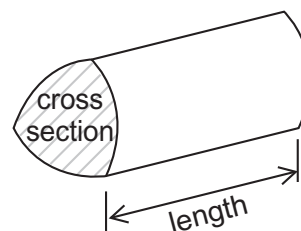


Formulae Sheet: Higher Tier

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

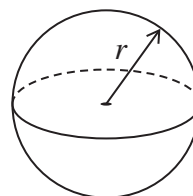


Volume of prism = area of cross section \times length



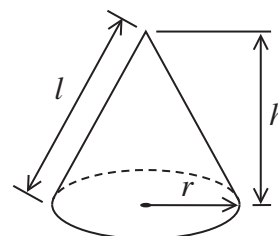
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

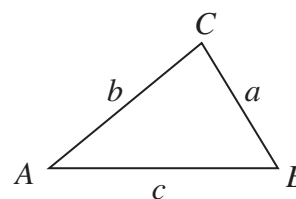


In any triangle ABC

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

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

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



The Quadratic Equation

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

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



Answer **all** questions in the spaces provided.

1 A circle has a radius of 6 millimetres.

Calculate the area of the circle.
Give the units of your answer.

[3 marks]

Answer _____

2 Increase 460 by 37%

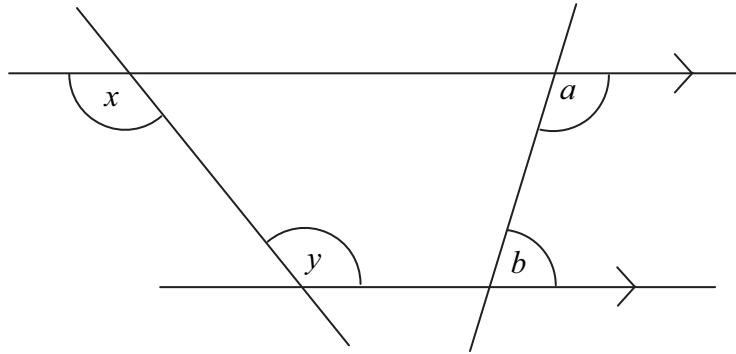
[3 marks]

Answer _____

Turn over for the next question



- 3 Here are four straight lines, two of which are parallel.



- 3 (a) Tick the correct reason why angle x is equal to angle y .

[1 mark]

They are alternate angles.

They are vertically opposite angles.

They are corresponding angles.

- 3 (b) Circle the correct statement for the angles shown.

[1 mark]

$x = a$

$x + b = 180^\circ$

$a + b = 180^\circ$

$a = b$



- 4 (a)** Which of the following is **not** a factor of 2310?
Circle your answer.

[1 mark]

15

21

55

60

- 4 (b)** Work out 210 as a product of its prime factors.

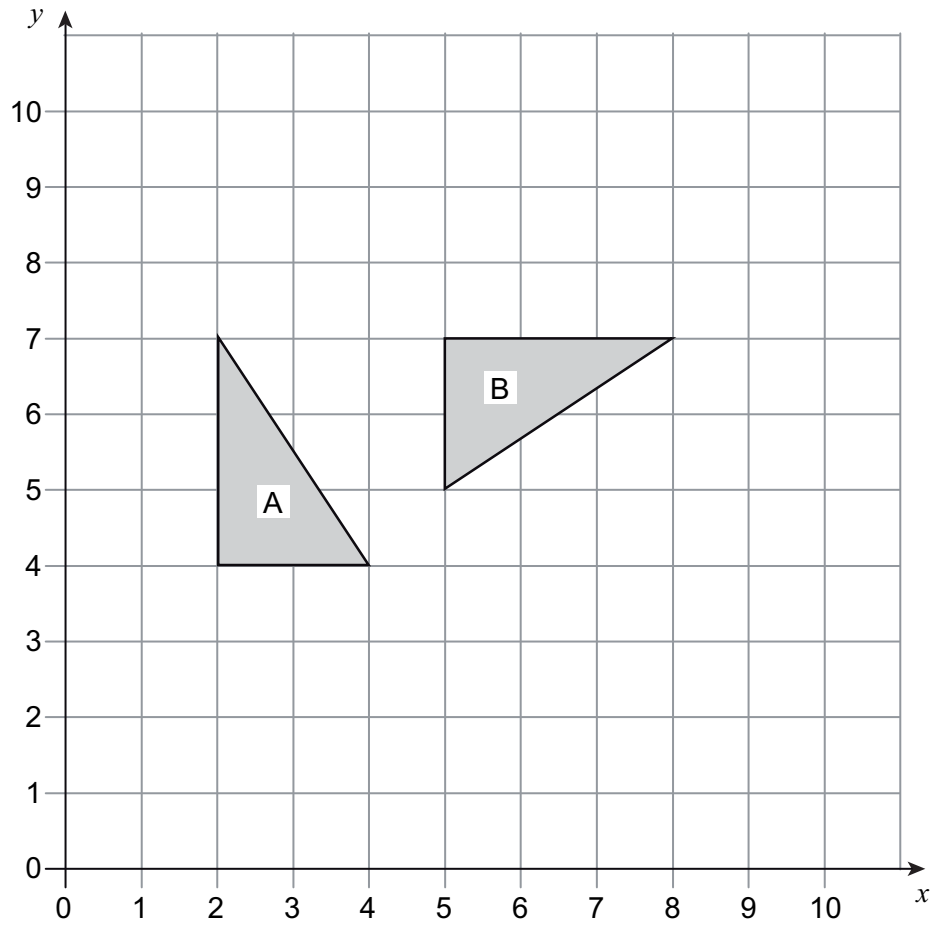
[2 marks]

Answer _____

Turn over for the next question



5 (a) Describe the **single** transformation that maps triangle A to triangle B.



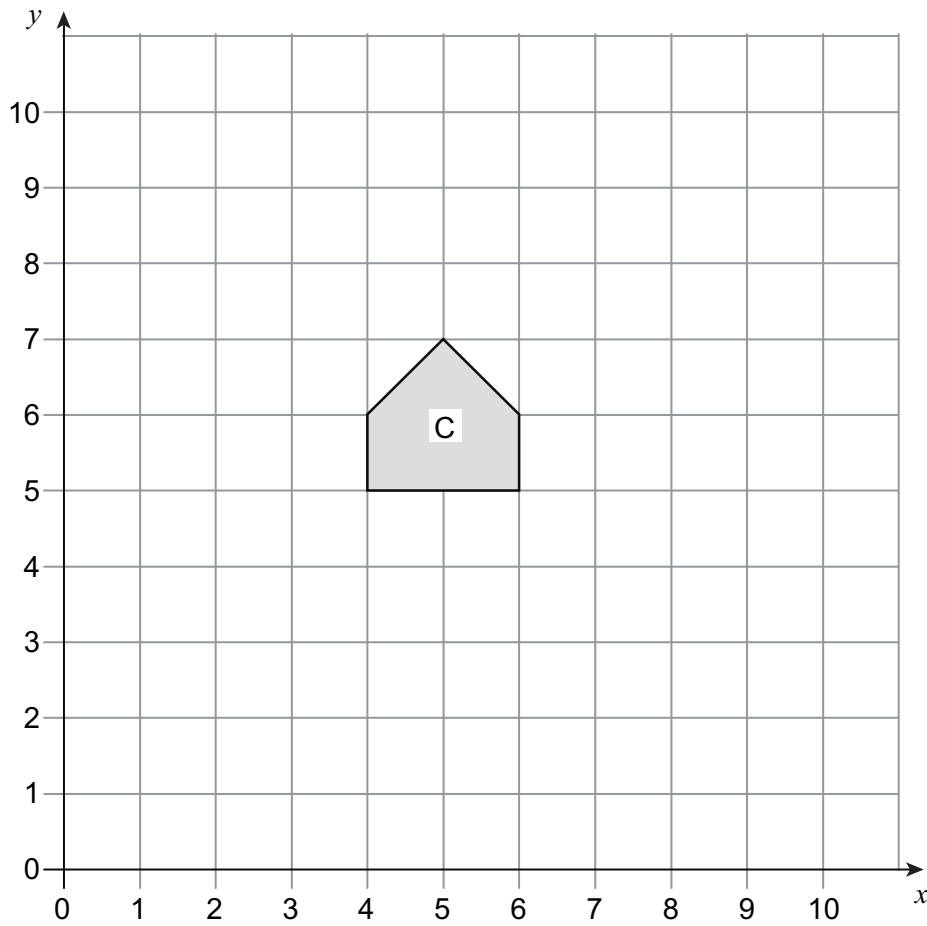
[3 marks]

Answer _____



5 (b) Translate shape C by the vector $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$

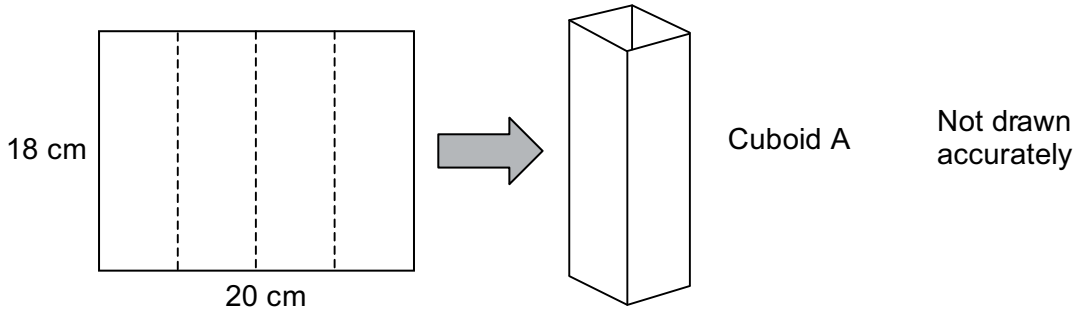
[2 marks]



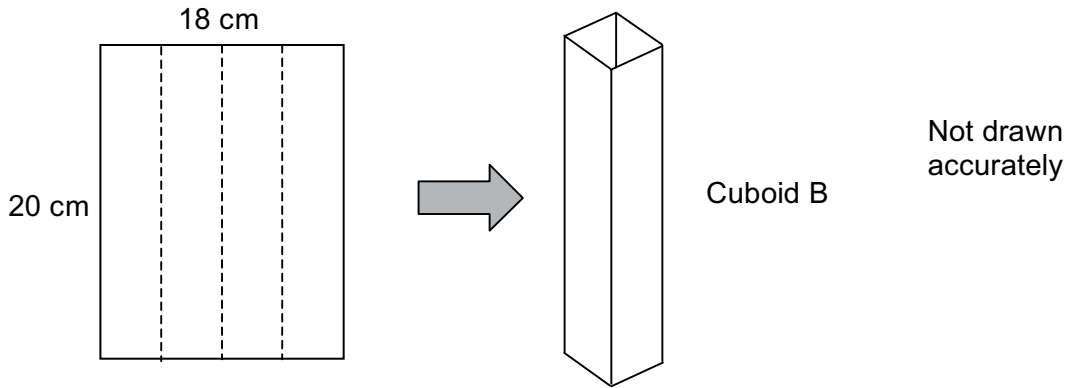
Turn over for the next question



*6 A rectangle of paper is 20 cm by 18 cm
The rectangle is folded along the 20 cm side to make an open cuboid A with a square cross section.



Another 20 cm by 18 cm rectangle of paper is folded along the 18 cm side to make open cuboid B with a square cross section.



Which cuboid has the greater volume?
You **must** show your working.

[4 marks]



7 Solve $\frac{x}{2} + 5 = 4$

[2 marks]

$x =$ _____

8 Work out the n th term of this linear sequence.

9 14 19 24 29 ...

[2 marks]

Answer _____

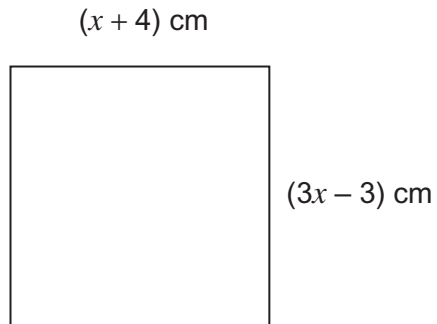
9 Expand and simplify $(2x + 5)(3x - 2)$

[2 marks]

Answer _____



10 Here is a square.



Not drawn
accurately

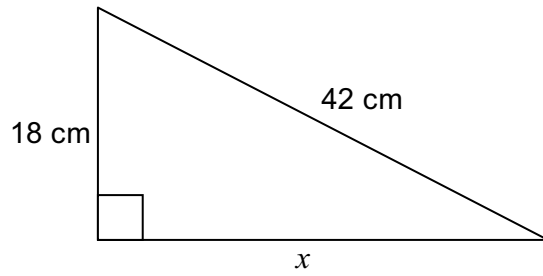
Work out the area.
Give your answer to the nearest whole number.

[5 marks]

Answer _____ cm^2



11 (a) Work out the length x .

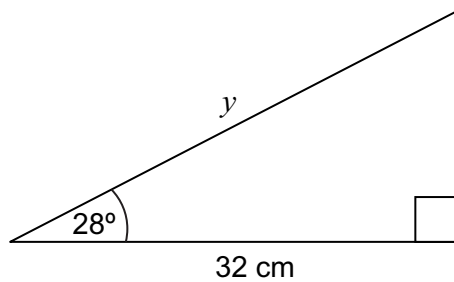


Not drawn
accurately

[3 marks]

Answer _____ cm

11 (b) Work out the length y .



Not drawn
accurately

[3 marks]

Answer _____ cm



- 12 (a)** Which of the following is **not** a condition for two triangles being congruent?
Circle your answer.

[1 mark]

SSS

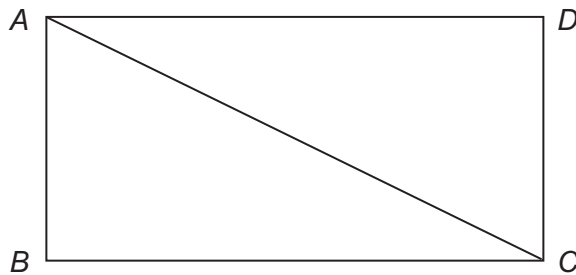
AAA

RHS

SAS

ASA

- 12 (b)** $ABCD$ is a rectangle.
 AC is a diagonal of the rectangle.



Prove that triangles ABC and CDA are congruent.

[3 marks]



- 13** Two numbers have
a Highest Common Factor (HCF) of 21
and
a Least Common Multiple (LCM) of 126
A possible pair of numbers is 21 and 126
Work out the other possible pair of numbers.
You **must** show your working.

[3 marks]

Answer _____ and _____

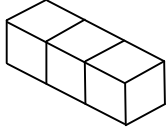
7

Turn over ►

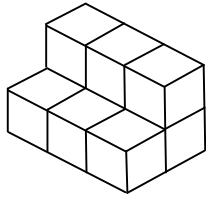


14

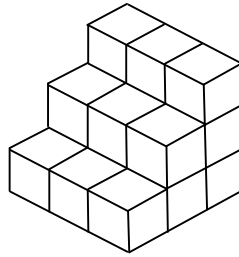
Step patterns are made from centimetre cubes.



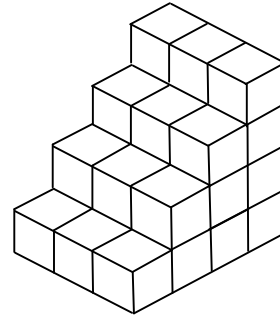
1 step



2 steps



3 steps

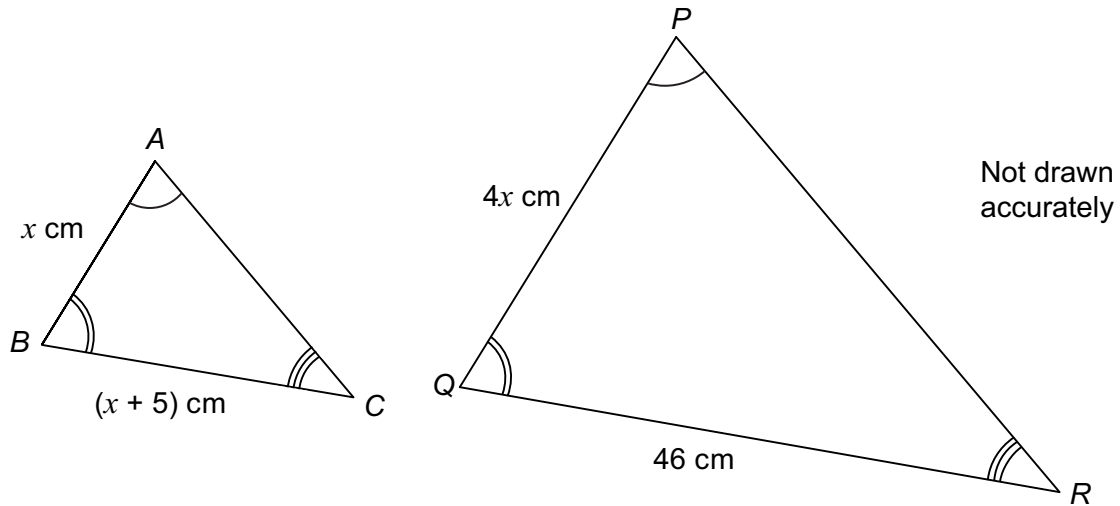


4 steps

Work out a formula for the number of cubes, c , needed to make n steps.**[4 marks]**

Answer $c =$ _____

- 15 Triangles ABC and PQR are similar.



Work out the value of x .

[3 marks]

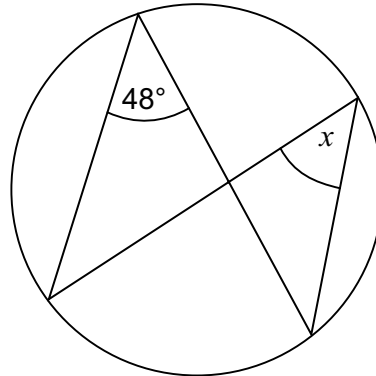
Answer _____ cm

Turn over for the next question



- *16(a)** Write down the size of angle x .
Give a reason for your answer.

[2 marks]



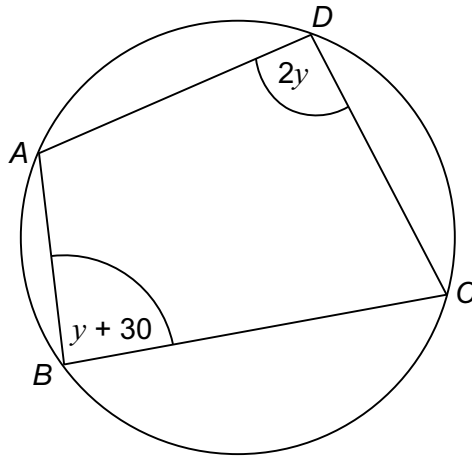
Not drawn
accurately

Answer _____ degrees

Reason _____



16 (b) $ABCD$ is a cyclic quadrilateral.



Not drawn
accurately

Calculate the value of y .

[2 marks]

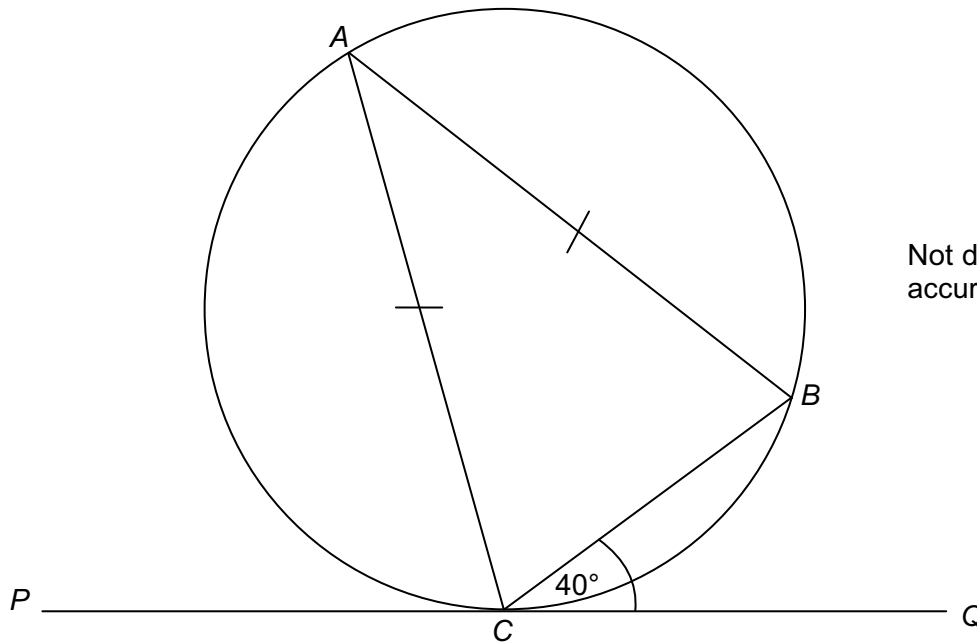
Answer _____ degrees

Question 16 continues on the next page



***16(c)**

A , B and C are points on a circle.
 PQ is a tangent to the circle at C .
 Angle $BCQ = 40^\circ$
 $AC = AB$



Not drawn
accurately

Prove that AC bisects the angle PCB .
 Give reasons for any angles you write down or calculate.

[3 marks]



17 Solve $5x^2 - 7x - 3 = 0$

Give your answers to 2 decimal places.

[3 marks]

Answer _____

Turn over for the next question



- 18** Three numbers A, B and C are shown on the number line.
The midpoint of A and B is 45
The midpoint of B and C is 105
 $A + B + C = 222$



Work out the value of B.

[3 marks]

Answer _____



19

Simplify fully

$$\frac{25x^2 - 9}{10x^2 - x - 3}$$

[4 marks]

Answer _____

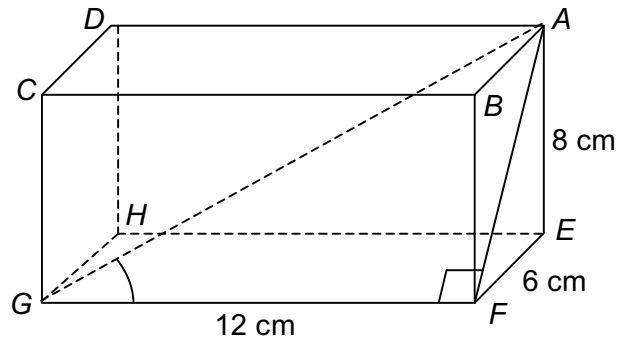
Turn over for the next question

7

Turn over ►

20

$ABCDEFGH$ is a cuboid with dimensions of 6 cm, 8 cm and 12 cm as shown.



Calculate the size of angle AGF .

[4 marks]

Answer _____ degrees



- 21 The area of an equilateral triangle is 90 cm^2
Calculate the perimeter of the triangle.

[4 marks]

Answer _____ cm

Turn over for the next question



22

All lengths are in centimetres.

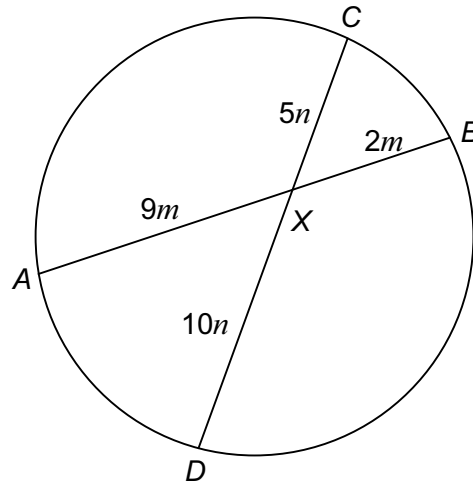
AB and CD are chords of a circle.
They intersect at X .

$$AX = 9m$$

$$BX = 2m$$

$$CX = 5n$$

$$DX = 10n$$



Not drawn
accurately

Show that $m : n = 5 : 3$

[4 marks]

END OF QUESTIONS

4



There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

Copyright Information

For confidentiality purposes, from the November 2015 examination series, acknowledgements of third party copyright material will be published in a separate booklet rather than including them on the examination paper or support materials. This booklet is published after each examination series and is available for free download from www.aqa.org.uk after the live examination series.

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team, AQA, Stag Hill House, Guildford, GU2 7XJ.

Copyright © 2016 AQA and its licensors. All rights reserved.

