

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

GCSE METHODS IN MATHEMATICS (LINKED PAIR)

H

Higher Tier Unit 2 Geometry and Algebra

Tuesday 14 June 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 that 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 4 and 17. 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.

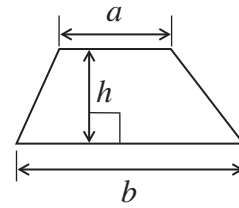
Advice

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

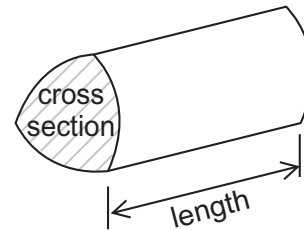


Formulae Sheet: Higher Tier

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

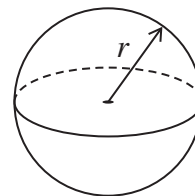


Volume of prism = area of cross section \times length



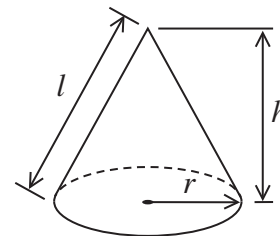
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

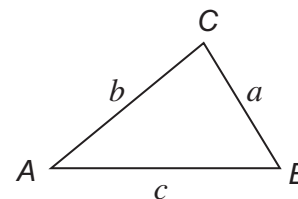


In any triangle ABC

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 Decrease 352 by 45%

[3 marks]

Answer _____

Turn over for the next question



2 (a) Use your calculator to work out $\frac{4.23 + 6.17}{3.45 - 1.82}$ **[1 mark]**

Answer _____

2 (b) Round 150 to 1 significant figure. **[1 mark]**

Answer _____

2 (c) Round 17.99 to 1 decimal place. **[1 mark]**

Answer _____



3 (a) Factorise $15x - 10y + 20$

[1 mark]

Answer _____

3 (b) Solve $7x + 9 = 3x - 1$

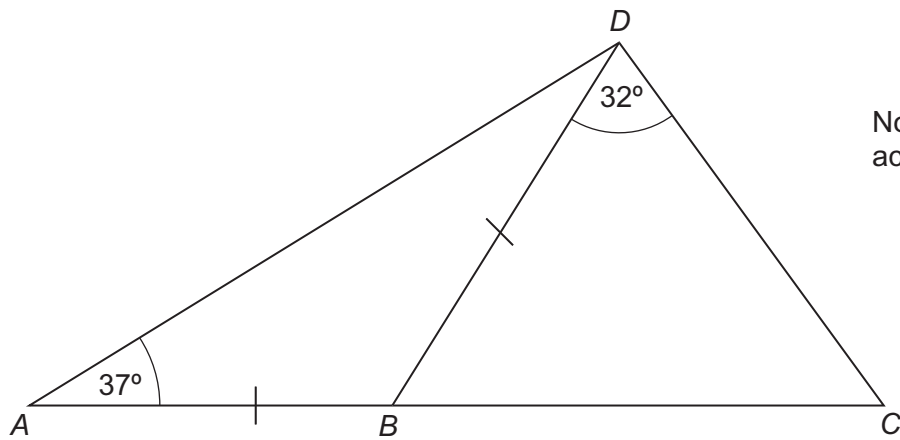
[3 marks]

$x =$ _____

Turn over for the next question



- *4 ABC is a straight line.
 $AB = BD$

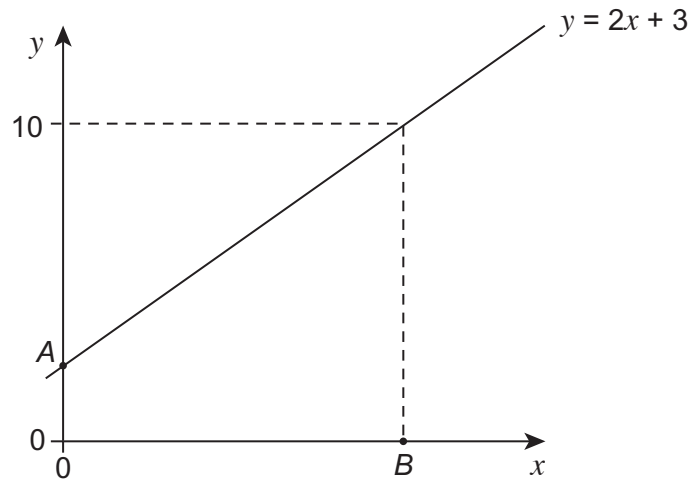


Show that DBC is an isosceles triangle.
You **must** show your working, which may be on the diagram.

[3 marks]



- 5 This is a sketch of the graph of $y = 2x + 3$



- 5 (a) Write down the coordinates of the point A.

[1 mark]

Answer (_____ , _____)

- 5 (b) Work out the x -coordinate of the point B.

[1 mark]

Answer _____

- 5 (c) Does the point $(7.5, 20)$ lie on the line $y = 2x + 3$?

Tick a box.

Yes

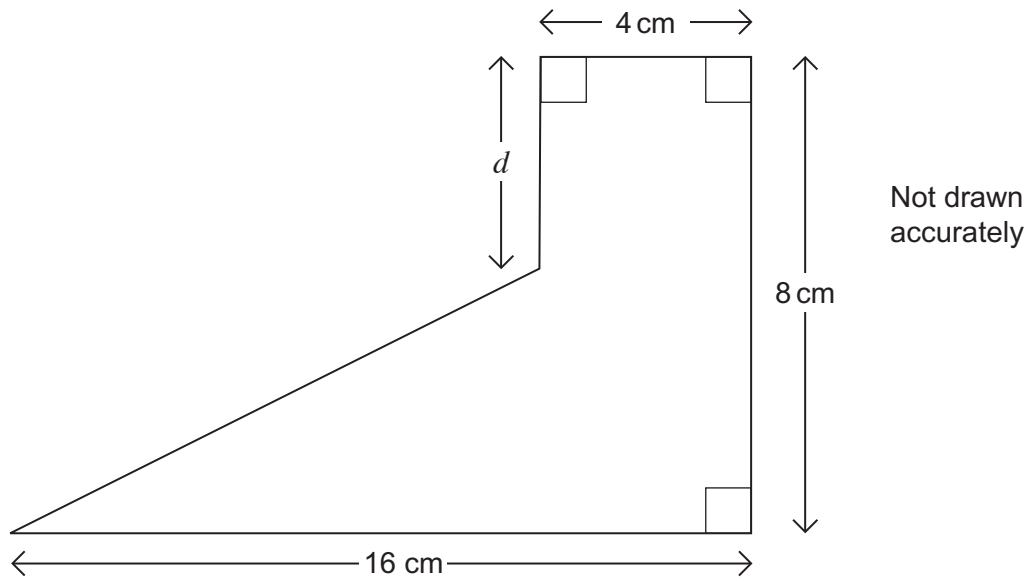
No

[1 mark]

Give a reason for your answer.



6



The area of the shape is 65 cm^2

Work out the length d .

[5 marks]

Answer _____ cm

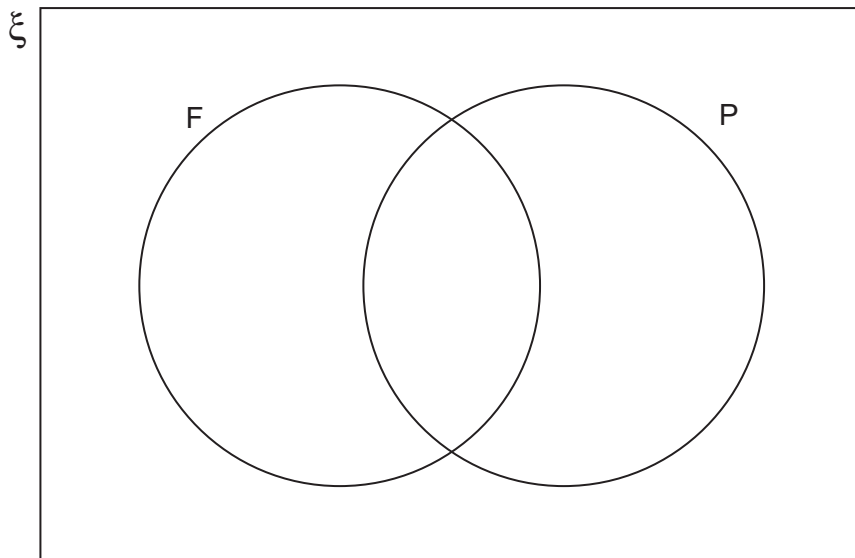


7 Write the numbers from 1 to 15 in this Venn Diagram. [2 marks]

$$\xi = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}$$

Set F = Factors of 15

Set P = Prime numbers



Turn over for the next question



- 8** A square and a circle have the same area.
The radius of the circle is 10 cm

Work out the length of the side of the square.
Give your answer to 1 decimal place.

[3 marks]

Answer _____ cm

- 9** Work out the Least Common Multiple of 21 and 24

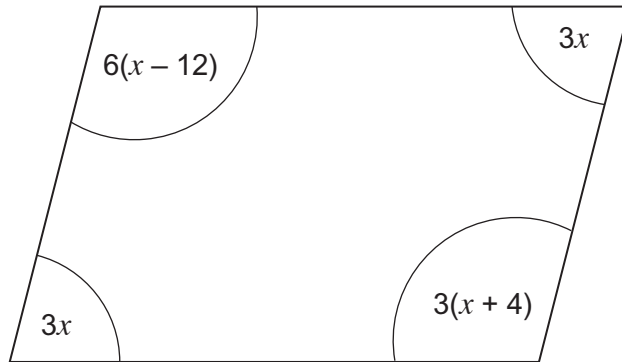
[2 marks]

Answer _____



10

Here is a parallelogram.
All angles shown are in degrees.



Not drawn
accurately

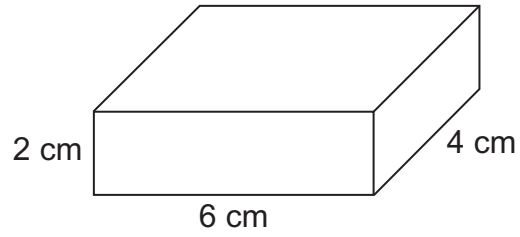
Work out the value of x .

[4 marks]

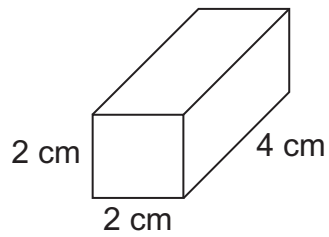
Answer _____



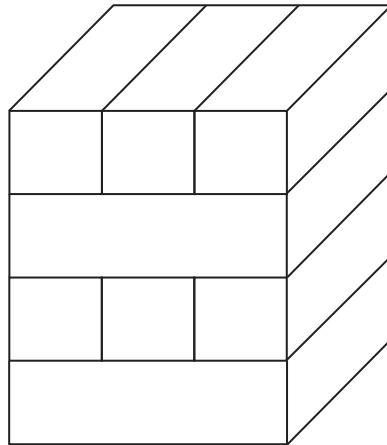
11 Large cuboids are 6 cm by 4 cm by 2 cm



Small cuboids are 2 cm by 4 cm by 2 cm



The large and small cuboids are stacked in alternate layers.
The bottom layer is one large cuboid.
The next layer is made from **three** small cuboids.
Here is a stack of four layers.



Work out how many **small** cuboids will be used when the stack has a total volume of 816 cm^3

You **must** show your working.

[4 marks]

Answer _____

Turn over for the next question



12 Solve $\frac{2x+1}{3} + 2x = 1$

[3 marks]

$x =$ _____

- 13 The 20th term of a linear sequence is 40
The 22nd term of the same sequence is 34

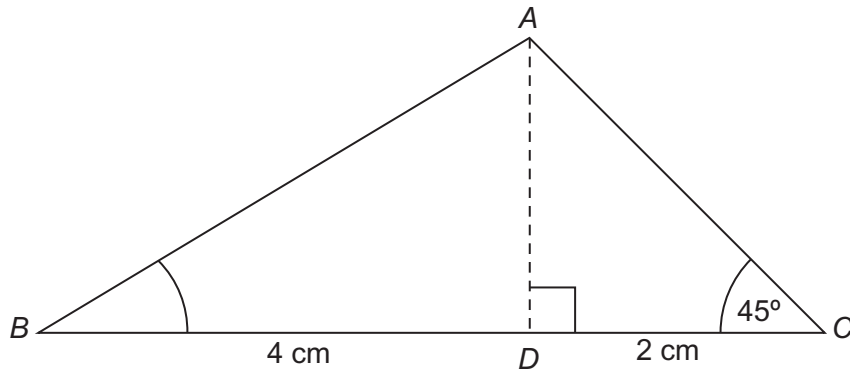
Work out an expression for the n th term of the sequence.

[4 marks]

Answer _____



14

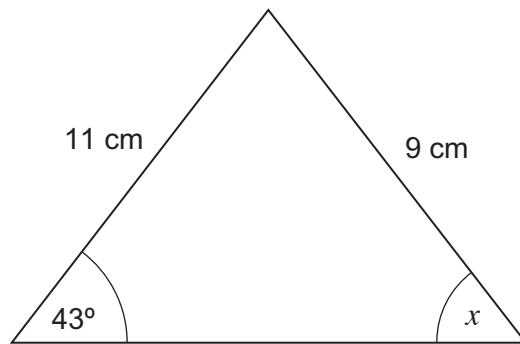
 ABC is a triangle. D is the base of the perpendicular from A to BC . $BD = 4$ cm, $DC = 2$ cmAngle $ACD = 45^\circ$ Not drawn
accuratelyWork out the size of angle ABD .**[4 marks]**

Answer _____ degrees

Turn over for the next question



15 (a) In the triangle x is an acute angle.



Not drawn
accurately

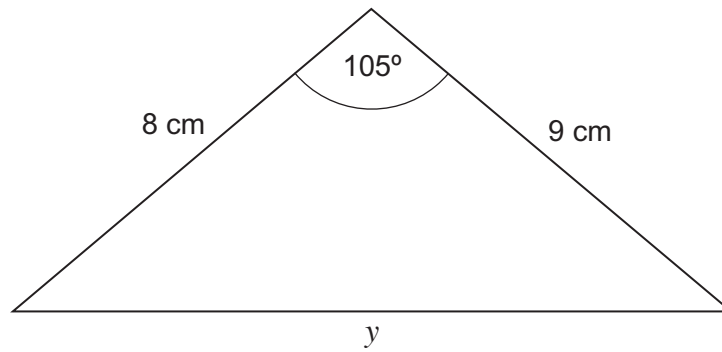
Work out the size of angle x .

[3 marks]

Answer _____ degrees



15 (b) Work out the length y .



Not drawn
accurately

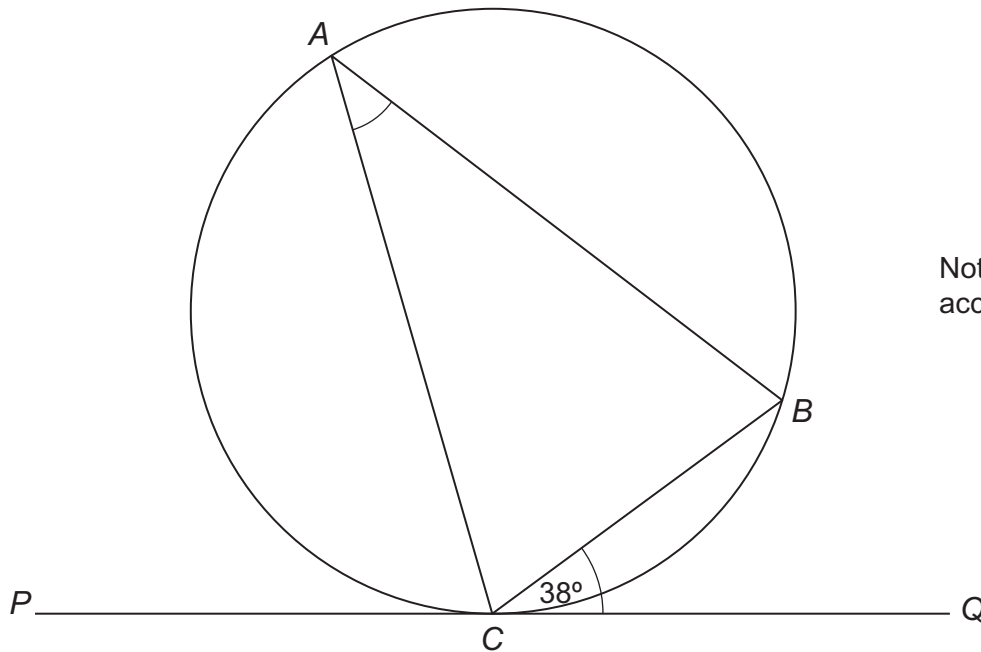
[3 marks]

Answer _____ cm

Turn over for the next question



- 16 (a)** PQ is a tangent to the circle at C .
Angle $BCQ = 38^\circ$



Not drawn
accurately

Write down the size of angle CAB .
Give a reason for your answer.

[2 marks]

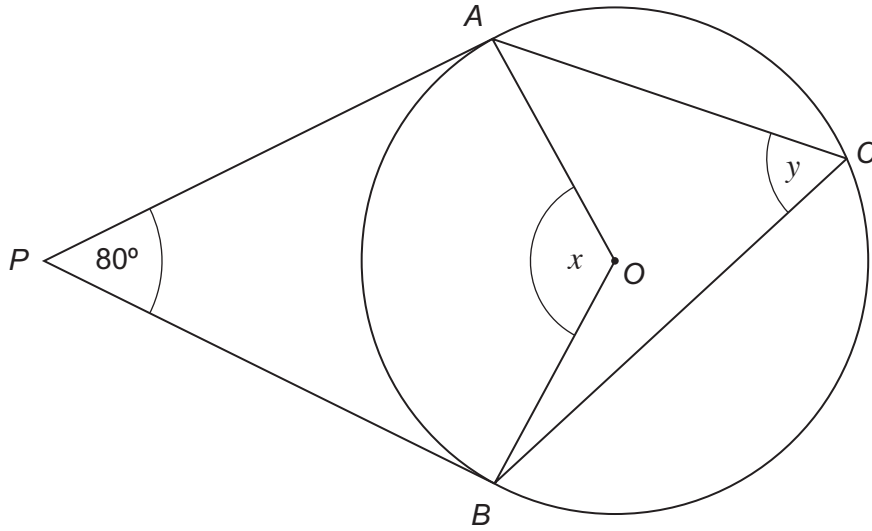
Answer _____ degrees

Reason _____



Points A , B and C lie on the circumference of a circle, centre O .
 PA and PB are tangents to the circle.

Angle $APB = 80^\circ$



Not drawn
accurately

16 (b) Work out the size of angle x .

[3 marks]

Answer _____ degrees

16 (c) Work out the size of angle y .

[1 mark]

Answer _____ degrees

6

Turn over ►

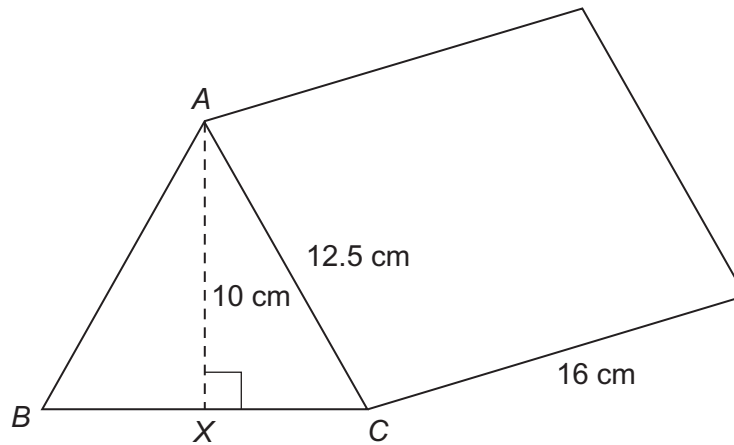


***17 (a)** A triangle has sides 7.5 cm, 10 cm and 12.5 cm

Show that the triangle is right-angled.

[2 marks]

***17 (b)** A triangular prism has dimensions as shown.



The volume of the prism is 1200 cm^3

Prove that X is the midpoint of BC .

[4 marks]



18 The base of a hemisphere is a circle with an area of $121\pi \text{ cm}^2$

Calculate the volume of the hemisphere.

[3 marks]

Answer _____ cm^3

Turn over for the next question



19 Simplify fully $\frac{4x^2 - 25}{6x^2 - x - 35}$

[4 marks]

Answer _____

20 Solve $x^2 + 9x - 3 = 0$

Give your answer to 2 decimal places.

[3 marks]

Answer _____



21 Bob and Kai share £x in the ratio 2 : 3

21 (a) How much money does Kai receive?
Circle the correct expression.

[1 mark]

$\pounds \frac{2}{3}x$

$\pounds \frac{2}{5}x$

$\pounds \frac{3}{5}x$

$\pounds \frac{5}{8}x$

21 (b) Bob gives Kai £8 from his share.
The amount of money they each have now is in the ratio 2 : 5

Work out the value of x.
You **must** show your working.
Do **not** use Trial and Improvement.

[4 marks]

Answer _____

END OF QUESTIONS



There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED**

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