

# GCSE Maths

## Higher

### Booklet 2

Name: .....

Set: .....



Number, standard form, rounding etc.

I+H Maths June 2018 U1

Examiner  
only

1. (a) Circle the **best** approximate value for the following calculation. [1]

$$\frac{596.3}{38.2 + 11.5}$$

110

12

11

120

10

- (b) A number is increased by 4% of its value.  
This is done 7 times, each time increasing the previous value by 4%.  
Circle the multiplier that you would use to find the value after the 7 increases. [1]

$\times 1.04^7$

$\times 1.4^7$

$\times 0.04^7$

$\times 1.04^6$

$\times 1.28$

- (c) Calculate  $\frac{4}{5} \div \frac{1}{4}$ .

Circle the correct answer. [1]

$1\frac{3}{5}$

$\frac{1}{5}$

$\frac{5}{16}$

5

$3\frac{1}{5}$



4. (a) The highest common factor (HCF) of 30 and 75 is the square root of a number.  
What is the number?

[2]

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- (b) The cube root of 32·768 is  $33\frac{1}{3}\%$  of a number.  
What is the number?

[2]

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5. (a) Express 0.00042 in standard form.

[1]

- (b) Calculate the value of  $\frac{7.2 \times 10^6}{2 \times 10^{-2}}$ .

Give your answer in standard form.

[1]

- (c) Calculate the value of  $(4.7 \times 10^5) - (6.2 \times 10^4)$ .  
Give your answer in standard form.

[2]







5. (a) Calculate the value of  $(2 \times 10^{-4}) \times (7.8 \times 10^9)$ .  
Give your answer in standard form.

[2]

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- (b) Calculate the value of  $\frac{3.9 \times 10^8}{3000}$ .  
Give your answer in standard form.

[2]

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6. Factorise  $12x^2 + 3xy$ .

[2]

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5. In this question, you will be assessed on the quality of your organisation and communication.

A **whole** number is written on a card.

You are given three clues to help you work out the number on the card.

Clue 1 : **Double** the number is between 8 and 18 inclusive.

Clue 2 : The number is a prime number.

Clue 3 : The number is **not** a factor of 100.

What is the number on the card?

You must show all your working.

[3 + 1 OC]

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The number on the card is .....

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4. (a) Make  $m$  the subject of the formula  $y = 6m + 7$ . [2]

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- (b) Factorise  $6x^2 - 12x$ . [2]

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5. Find the value of each of the following in standard form.

(a)  $\frac{7.5 \times 10^6}{5000}$  [2]

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(b)  $(2.3 \times 10^3) + (6.4 \times 10^4)$  [2]

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13. The values  $a = 27$ ,  $b = 1.9$  and  $c = 0.81$  are each correct to 2 significant figures.

Use the formula  $d = \frac{a-b}{c}$  to calculate the **least** value of  $d$ .

You must show all your working.

[3]



# Algebra, Solving Equations, $n^{\text{th}}$ term, Inequalities

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only

2. A solution of the equation

$$x^3 + 2x = 91$$

lies between 4 and 5.

Use the method of trial and improvement to find this solution correct to 1 decimal place.  
You must show all your working.

[4]





3. In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.

A solution of the equation

$$x^3 - 7x - 51 = 0$$

lies between 4 and 5.

Use the method of trial and improvement to find this solution correct to 1 decimal place.  
You must show all your working.

[4 + 2 OCW]



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only

4. A solution to the equation

$$2x^3 - 3x - 17 = 0$$

lies between 2 and 3.

Use the method of trial and improvement to find this solution correct to 1 decimal place. You must show all your working.

[4]



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2. The  $n$ th term of a sequence is given by  $n^2 + 7$ .

Write down the first three terms of this sequence.

[2]

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1<sup>st</sup> term = ..... 2<sup>nd</sup> term = ..... 3<sup>rd</sup> term = .....

3. Circle the correct answer for each of the following.

(a)  $x^3 \times x^6 =$

[1]

$x^{36}$

$x^{0.5}$

$x^2$

$x^9$

$x^{18}$

.....

(b)  $(7x - 5y) - (3x + 2y) =$

[1]

$4x - 3y$

$4x - 7y$

$4x + 3y$

$-4x + 7y$

$-4x - 7y$

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- (c) A car travels  $x$  miles in 30 minutes.  
Its average speed in miles per hour is

[1]

$\frac{x}{2}$

$\frac{x}{30}$

$2x$

$\frac{2}{x}$

$30x$

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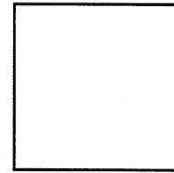
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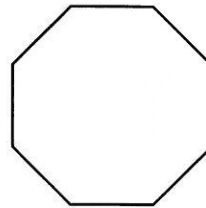
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6. *In this question you will be assessed on the quality of your organisation, communication and accuracy in writing.*

Each side of a square is of length  $(2x + 3y)$  cm.  
The perimeter of the square is 62 cm.

 $(2x + 3y) \text{ cm}$ 

Each side of a regular octagon is of length  $(x + 2y)$  cm.  
The perimeter of the octagon is 72 cm.

 $(x + 2y) \text{ cm}$ 

Use an algebraic method to find the value of  $x$  and the value of  $y$ .

[5 + 2 OCW]

[illegible]

$x =$  .....  $y =$  .....



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lies between 3 and 4.

[4]

[illegible]

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6. (a) Rearrange the following formula to make  $x$  the subject.  
Give your answer in its simplest form.

[3]

$$2(x + y) = 7y - 3$$

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- (b) Write down the  $n$ th term of the following sequence.

[2]

3,      6,      11,      18,      27,      ...

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9. Calculate the value of  $(5.41 \times 10^5) + (2.3 \times 10^4)$ .  
Give your answer in standard form.

[2]

10. *In this question, you will be assessed on the quality of your linguistic and mathematical accuracy in writing.*

Rashid owned  $n$  sheep.

Eifion had exactly 4 times as many sheep as Rashid.

Rashid buys 17 extra sheep.

Eifion sells 8 of his sheep.

Eifion still has more sheep than Rashid.

Form an inequality, in terms of  $n$ .

Solve the inequality to find the **least** value of  $n$ .

You must show all your working.

[5 + 1 W]



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8. William has  $n$  marbles.  
Lois had 4 times as many marbles as William, but she has now lost 23 of them.

Lois still has more marbles than William.

Write down an inequality in terms of  $n$  to show the above information.  
Use your inequality to find the least number of marbles that William may have.

[4]

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8. Solve the following simultaneous equations using an algebraic (not graphical) method.

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$$\begin{aligned} 3x + 4y &= 7 \\ 2x - 3y &= 16 \end{aligned}$$



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- [4]

$$6x - 5y = 1$$

8. Factorise  $x^2 - 7x - 18$ , and hence solve  $x^2 - 7x - 18 = 0$ .

[3]

Examiner  
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9. (a) Show that  $(10w + 3)(w - 1) - (2 - 3w)^2 \equiv w^2 + 5w - 7$ .

[4]

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- (b) Use the quadratic formula to solve the equation  $w^2 + 5w - 7 = 0$ .  
Give your answers correct to 2 decimal places.

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9. (a) Factorise  $x^2 - 2x - 24$ , and hence solve  $x^2 - 2x - 24 = 0$ .

[3]

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- (b) Solve the equation  $\frac{4x-3}{2} + \frac{7x+1}{6} = \frac{29}{2}$ .

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12. Express  $\frac{3x}{3x+2} - \frac{2x}{2x+7}$  as a single fraction in its simplest form.

[3]

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12. Two different squares are constructed.

The side length of the smaller square is  $x$  cm.

The side length of the larger square is 3 cm longer than the side length of the smaller square.

The combined area of the two squares is  $22.5 \text{ cm}^2$ .

(a) Show that  $4x^2 + 12x - 27 = 0$ .

[4]

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- (b) Find the dimensions of each of the squares.

Do **not** use a trial and improvement method.

You must show all your working and **justify** any decision that you make.

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Side length of smaller square = ..... cm

Side length of larger square = ..... cm



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12. (a) Factorise  $(x - 7)^2 + 2(x - 7)$ .

[2]

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(b) Factorise  $12x^2 - 27y^2$ .

[3]



13. A ball is thrown upwards from a height of 1 m above the ground.

After  $t$  seconds, its height above the ground is  $h$  metres, where  $h$  is given by

$$h = 1 + 8t - 5t^2.$$

- (a) Show that the time taken to reach a height of 4 metres satisfies the equation

$$5t^2 - 8t + 3 = 0. \quad [1]$$

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- (b) Solve the equation

$$5t^2 - 8t + 3 = 0. \quad [3]$$

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- (c) Interpret your answer to part (b) in the context of the question. [1]

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12. Make  $c$  the subject of the following formula.  
Give your answer in its simplest form.

[5]

$$c - 5 = \frac{3c - 7}{d}$$

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13. Make  $x$  the subject of the following formula.

[4]

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$$a(x - b) = x(c - d)$$

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15. Express the following as a single fraction in its simplest form.

[4]

$$\frac{2}{3x-5} - \frac{7}{11x-13}$$

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16. Use the quadratic formula to solve  $(3x - 1)^2 = x(2x + 3) + 7$ .  
Give your answers correct to 2 decimal places.

[6]

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17. Simplify  $\frac{12x+16}{9x^2-16}$ .

[4]

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17. Solve the equation  $(2x + 5)(3x - 11) = 7$ .  
Give your answers correct to 2 decimal places.

[5]



**18.** Make  $c$  the subject of the following formula.

[4]

$$\sqrt{gc^2 - v} = c$$

[illegible]

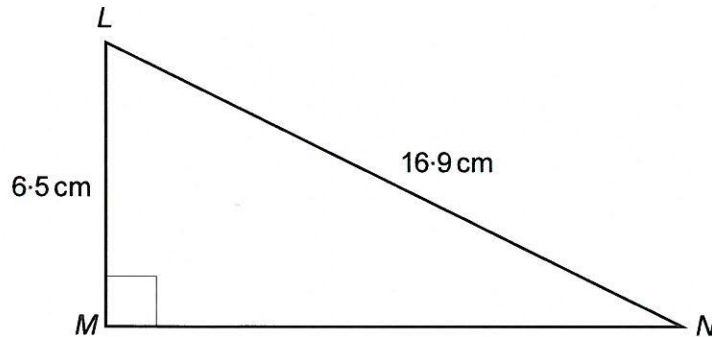
# Pythagoras' Theorem and Trigonometry

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4. A right-angled triangle  $LMN$  is shown below.  
 $LN = 16.9$  cm and  $LM = 6.5$  cm.



*Diagram not drawn to scale*

Calculate the length  $MN$ .

[3]

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6. Calculate the length of the side  $QR$  in the triangle  $PQR$  shown below.

[3]

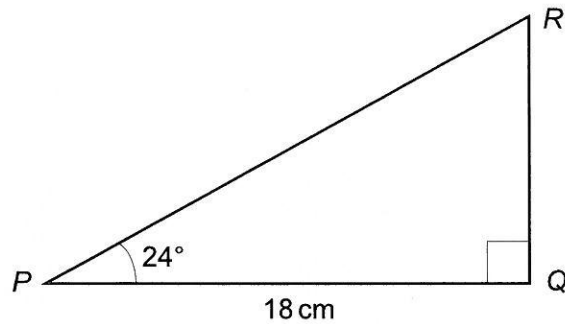


Diagram not drawn to scale

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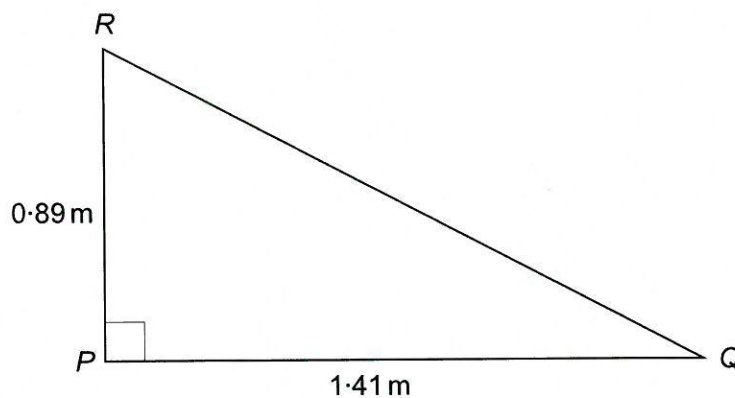
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5.  $PQR$  is a right-angled triangle, as shown below.  
 $PQ = 1.41\text{ m}$  and  $PR = 0.89\text{ m}$ .



*Diagram not drawn to scale*

Calculate the length of  $QR$ .

[3]

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7. The diagram shows two right-angled triangles, joined together along a common side.

$\hat{SPQ} = 90^\circ$ ,  $\hat{SQR} = 90^\circ$ ,  $\hat{SQP} = 38^\circ$ ,  $PS = 8\text{ cm}$  and  $QR = 15\text{ cm}$ .

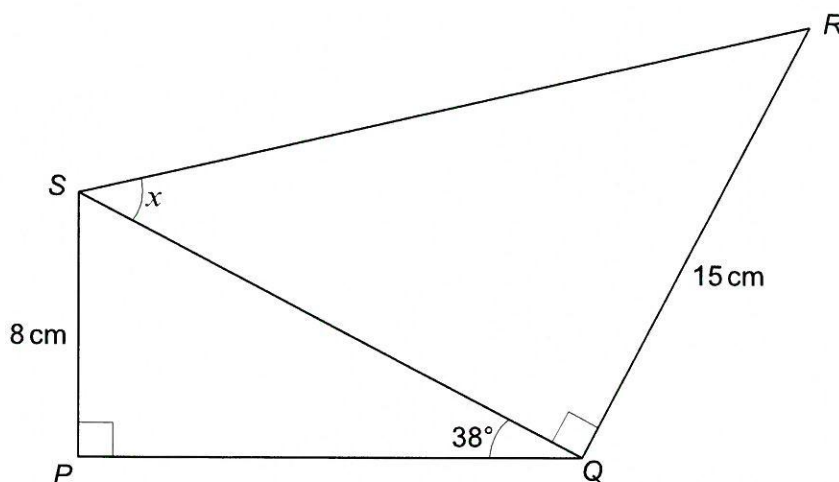


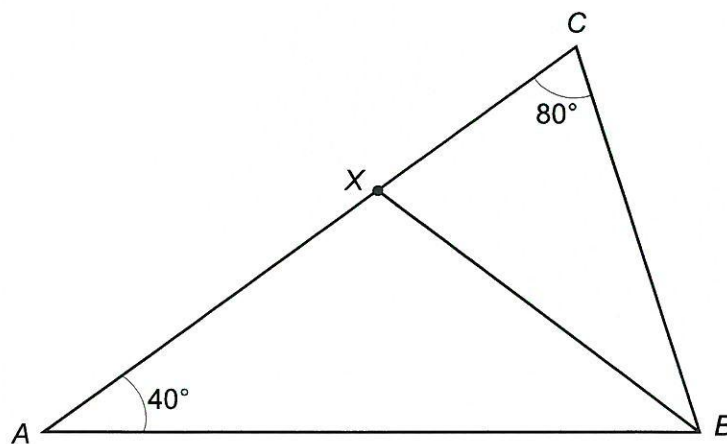
Diagram not drawn to scale

Calculate the size of angle  $x$ .

[6]



- In the triangle  $ABC$  shown below,  $\hat{BAC} = 40^\circ$  and  $\hat{ACB} = 80^\circ$ .  
 $X$  is a point on side  $AC$  such that  $BX = BC$ .



Prove that  $AX = BX$ .  
Give reasons for each step of your proof.  
You must show all your working.

[5 + 2 OCW]

[illegible]

9.  $ABC$  and  $CDE$  are two right-angled triangles.

In triangle  $ABC$ ,  $AB = 6.5$  cm and  $BC = 10.4$  cm.

In triangle  $CDE$ ,  $CE = 9.4$  cm.

$$\widehat{BCE} = 22^\circ.$$

$$\widehat{ACB} = x^\circ.$$

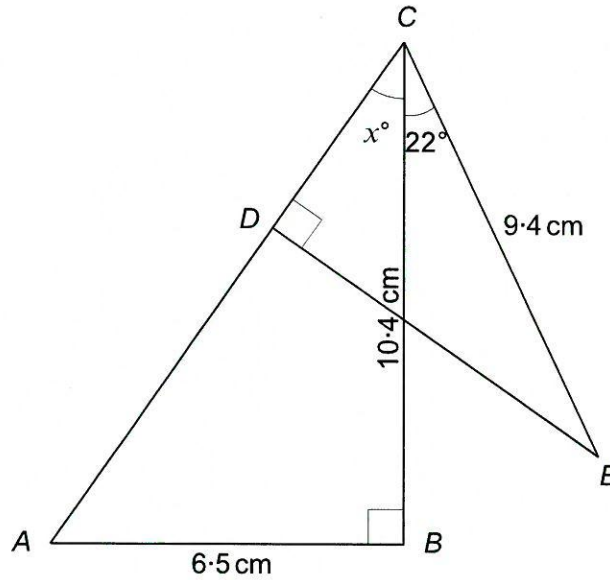


Diagram not drawn to scale

- (a) Calculate the value of  $x$ .

[3]

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(b) Hence find the length of  $DE$ .

[3]

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11. In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.

$AD = 5$  cm and  $BC = 32$  cm.

$D$  is on the line  $AC$ , and  $BD$  is perpendicular to  $AC$ .

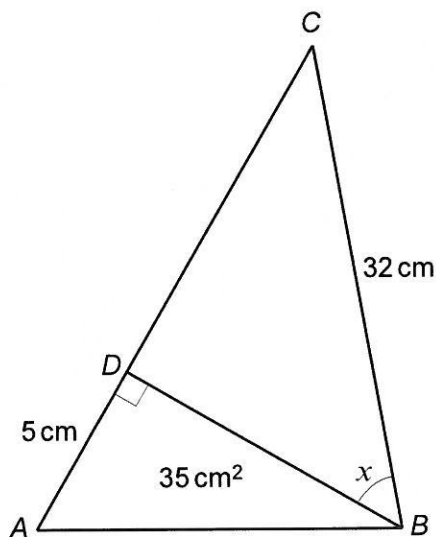


Diagram not drawn to scale

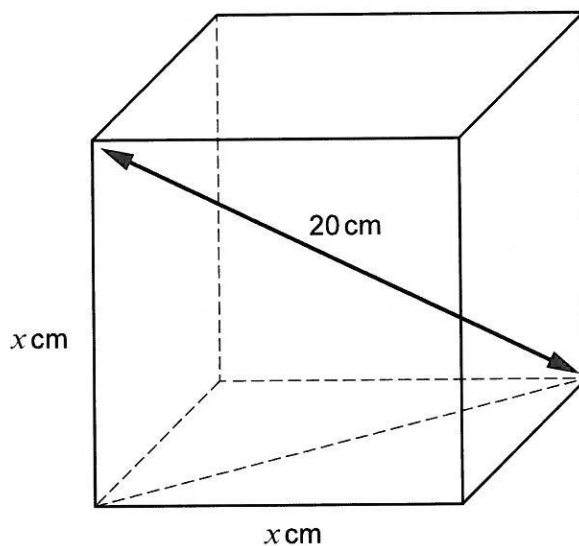
Calculate the size of angle  $x$ .  
You must show all your working.

[5 + 2 OCW]

[illegible]



21. The cube below has an internal diagonal of length 20 cm.  
Each edge of the cube is of length  $x$  cm.



*Diagram not drawn to scale*

Calculate the value of  $x$ .  
You must use an algebraic method and show all your working.

[4]

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**END OF PAPER**



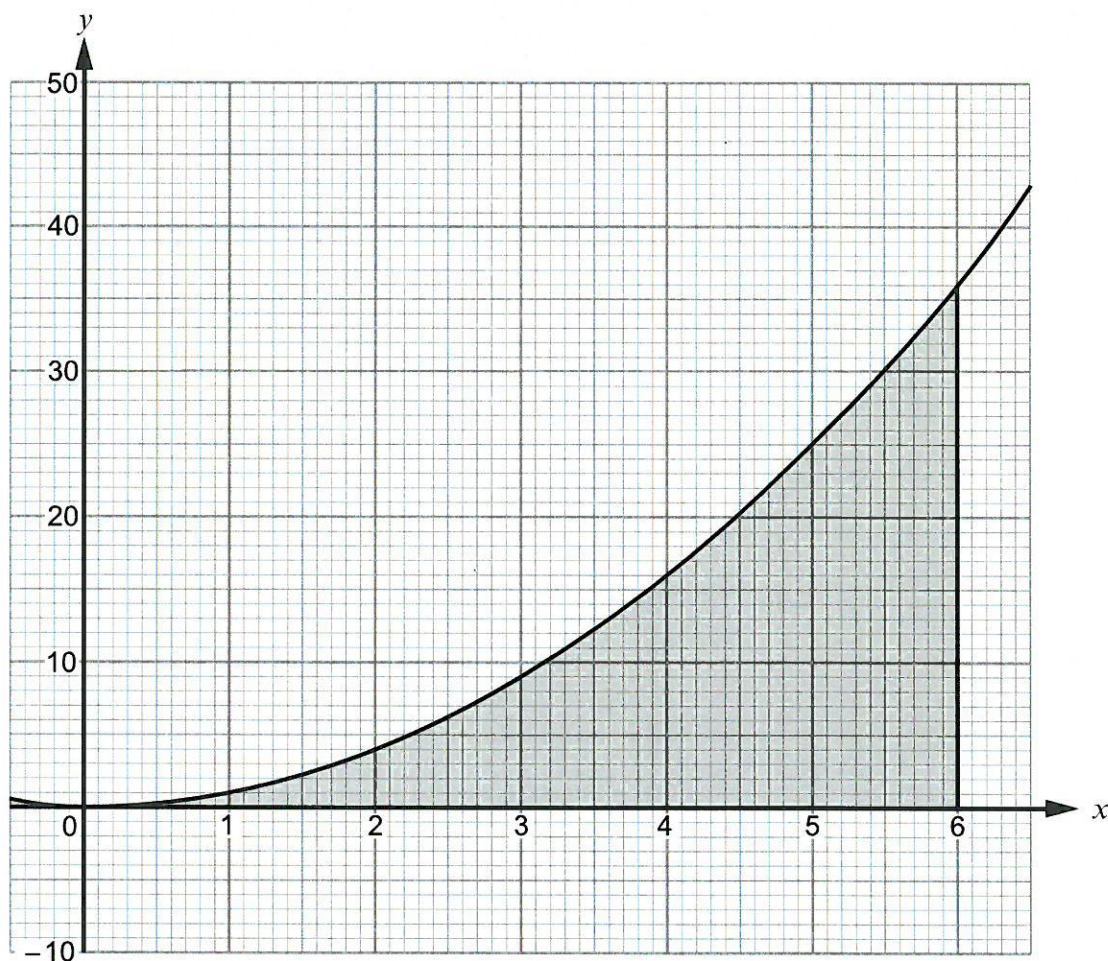
# Trapezium Rule

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18. The graph of  $y = x^2$  has been drawn below, for values of  $x$  from  $x = 0$  to  $x = 6$ .



Use the trapezium rule, with the ordinates  $x = 0$ ,  $x = 1$ ,  $x = 2$ ,  $x = 3$ ,  $x = 4$ ,  $x = 5$  and  $x = 6$ , to estimate the area of the shaded region shown above. [4]

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# Proportion

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11. Given that  $y$  is directly proportional to  $\sqrt{x}$  and that  $y = 30$  when  $x = 36$ ,

(a) find an expression for  $y$  in terms of  $x$ ,

[3]

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(b) use the expression you found in part (a) to complete the following table.

[2]

$x$	36	49	
$y$	30		40

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11. Given that  $y$  is inversely proportional to  $x$ , and that  $y = 4$  when  $x = 3$ ,

(a) find an expression for  $y$  in terms of  $x$ ,

[3]

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(b) use the expression you found in (a) to complete the following table.

[2]

$x$	3	0.25	
$y$	4		$\frac{1}{5}$

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13. Given that  $y$  is inversely proportional to  $x^3$  and that  $y = 120$  when  $x = 2$ ,

(a) find an expression for  $y$  in terms of  $x$ ,

[3]

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(b) use the expression you found in part (a) to complete the following table.

[2]

$x$	2	10	
$y$	120		15

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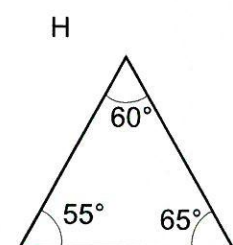
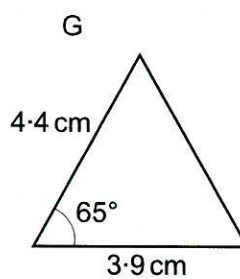
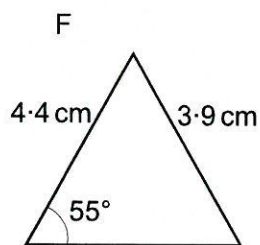
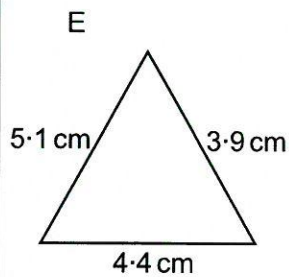
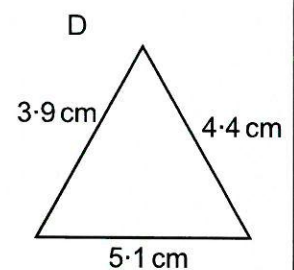
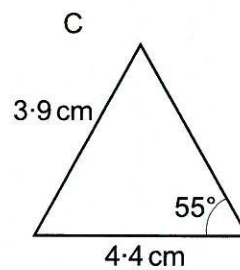
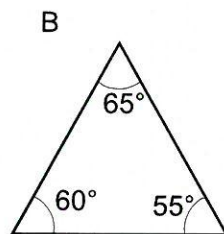
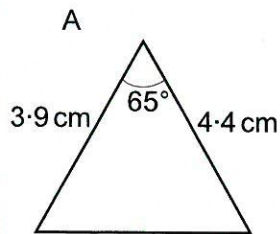


# Congruent Triangles

H Maths June 2015 14 U1

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12. In the diagrams below, only two pairs of triangles are **definitely** congruent. Identify the two pairs. In each case, state the condition of congruency. [4]



Diagrams not drawn to scale

Triangle ..... is congruent to triangle .....

Condition of congruency:

.....

Triangle ..... is congruent to triangle .....

Condition of congruency:

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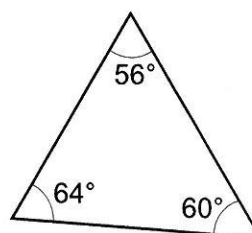
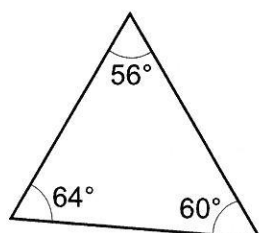
14. SSS, SAS, ASA and RHS are notations used to describe the conditions required to prove that two triangles are congruent.

[S  $\equiv$  Side, A  $\equiv$  Angle, R  $\equiv$  Right angle and H  $\equiv$  Hypotenuse.]

The following triangles are **not** drawn to scale.

For each pair of triangles, circle the correct statement.

(a)



[1]

congruent:  
SSS

congruent:  
SAS

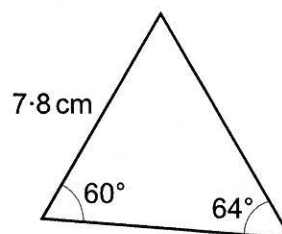
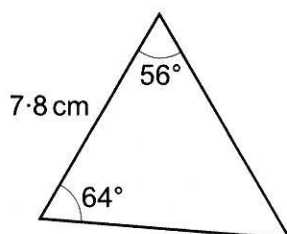
congruent:  
ASA

congruent:  
RHS

definitely  
not congruent

not necessarily  
congruent

(b)



[1]

congruent:  
SSS

congruent:  
SAS

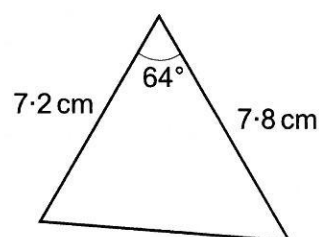
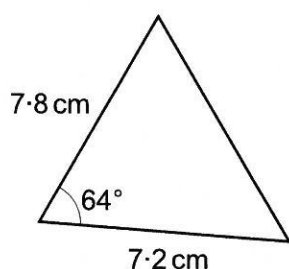
congruent:  
ASA

congruent:  
RHS

definitely  
not congruent

not necessarily  
congruent

(c)



[1]

congruent:  
SSS

congruent:  
SAS

congruent:  
ASA

congruent:  
RHS

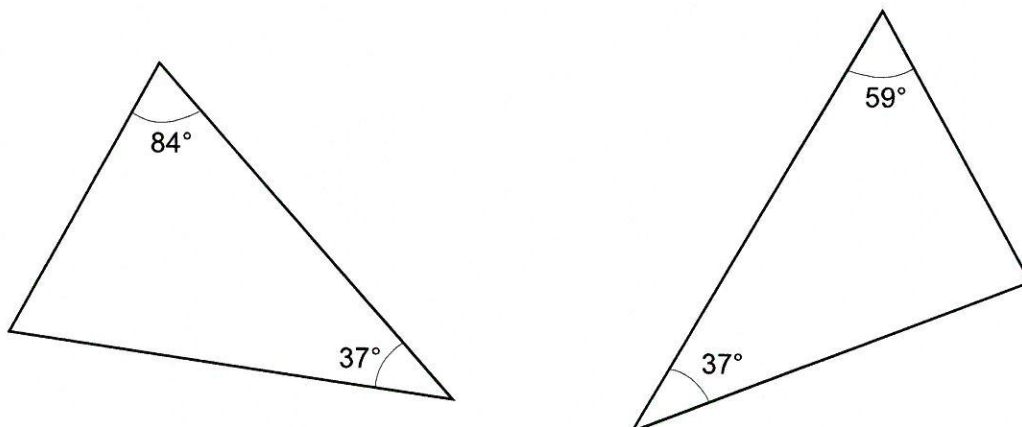
definitely  
not congruent

not necessarily  
congruent





14. The two triangles shown below are not drawn to scale.



Which **one** of the following statements is correct?  
Give full reasons for your answer.

[2]

- |   |
|---|
| A: the triangles <b>must</b> be congruent   |
| B: the triangles <b>could</b> be congruent  |
| C: the triangles <b>cannot</b> be congruent |

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The correct statement is .....

This is because .....

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11 Nov 2016

18

16. Triangle  $ABC$  is an isosceles triangle with  $\hat{A}BC = \hat{A}CB$ .

Examiner  
only

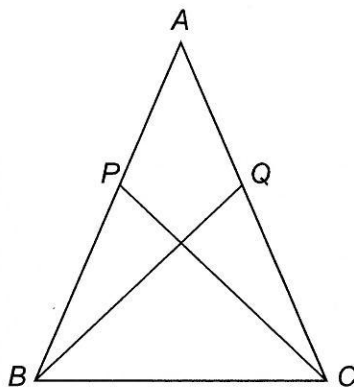


Diagram not drawn to scale

$P$  and  $Q$  are points on  $AB$  and  $AC$  respectively such that  $AP = AQ$ .

Prove that triangle  $ABQ$  is congruent to triangle  $ACP$ .

You must give reasons for each step of your proof.

[4]



# Angles

I+H Maths June 2015 U2

Examiner  
only

1. (a) Calculate  $\frac{145.3}{(12.4 - 9.8)^3}$ , giving your answer correct to 3 significant figures. [2]

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- (b) Calculate the reciprocal of 47, giving your answer correct to 4 decimal places. [2]

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2. Circle the correct answer in each of the following.

- (a) Which of the following values **cannot** be an external angle of a regular polygon? [1]

10°                  18°                  30°                  48°                  72°

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.....

- (b) An arrow on a spinner is facing north.  
It is turned clockwise through an angle of 1530°.  
In which direction will the arrow now be facing? [1]

North                  East                  South                  West                  None of these

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- (c) Point A is on a bearing of 100° from point B.  
What is the bearing of point B from point A? [1]

260°                  100°                  280°                  180°                  80°



u2 June 2017

3

Examiner  
only

1. (a) Calculate  $\sqrt{8 \cdot 5^3 + (4 \cdot 5 - 0 \cdot 76)^2}$ , correct to 3 significant figures. [2]

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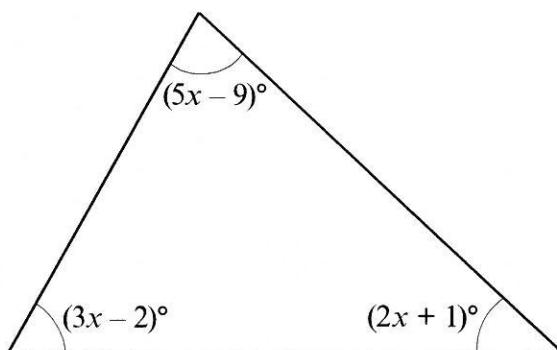
- (b) Calculate the reciprocal of  $-0 \cdot 07$ , correct to 1 decimal place. [2]

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2. Show that the triangle below is **not** a right-angled triangle. [5]



*Diagram not drawn to scale*

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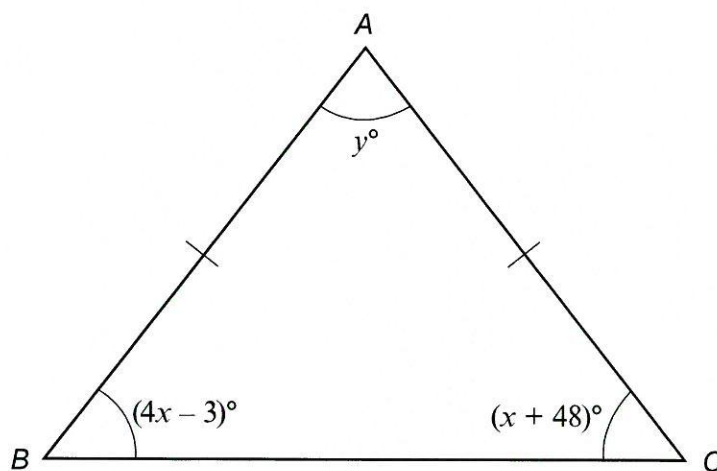
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03

3.  $ABC$  is an isosceles triangle with  $AB = AC$ .



*Diagram not drawn to scale*

Calculate the value of  $y$ .

[6]

[illegible]

# Arc length, Area of Sector, Sine and Cosine Rule

42 June 2017

14

13.

Examiner  
only

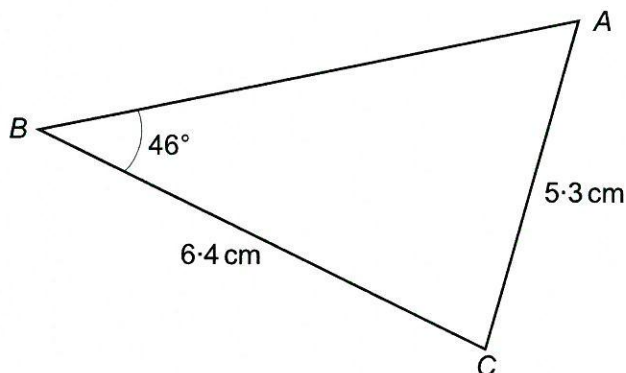


Diagram not drawn to scale

By first calculating the size of  $\hat{BAC}$ , calculate the area of triangle ABC.  
You must show all your working.

[5]



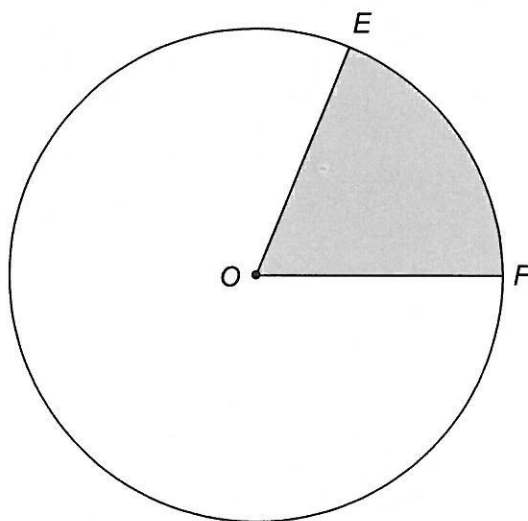


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Examiner  
only

14. Points  $E$  and  $F$  lie on a circle, centre  $O$ .  
The radius of the circle is 10 cm.  
The area of the shaded sector is  $65\text{ cm}^2$ .



*Diagram not drawn to scale*

- (a) Calculate the size of  $\widehat{EOF}$ .

[3]

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- (b) Hence, calculate the length of the arc  $EF$ .

[2]

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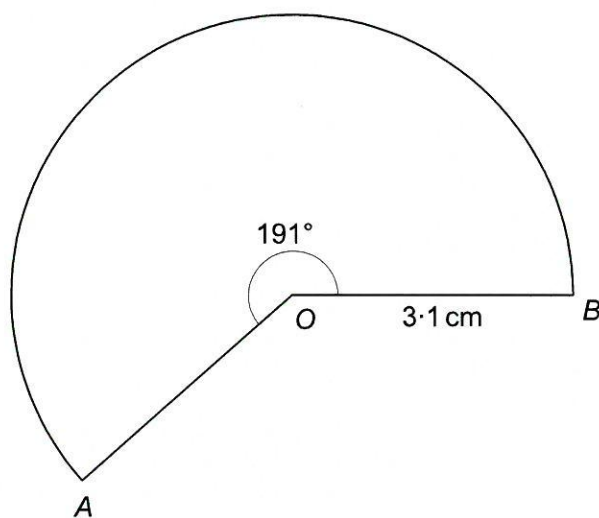
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14.  $A$  and  $B$  are points on a circle with centre  $O$ .  
Calculate the length of the arc  $AB$  shown below.

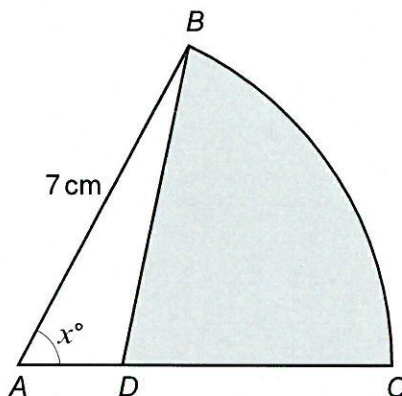
[2]



*Diagram not drawn to scale*



17.  $ABC$  represents the **sector** of a circle with radius 7 cm and centre  $A$ , as shown below.  
 $\widehat{BAC} = x^\circ$ ,  $AD = 3$  cm and  $BD = 6$  cm.



Find the area of the shaded region  $BCD$ .

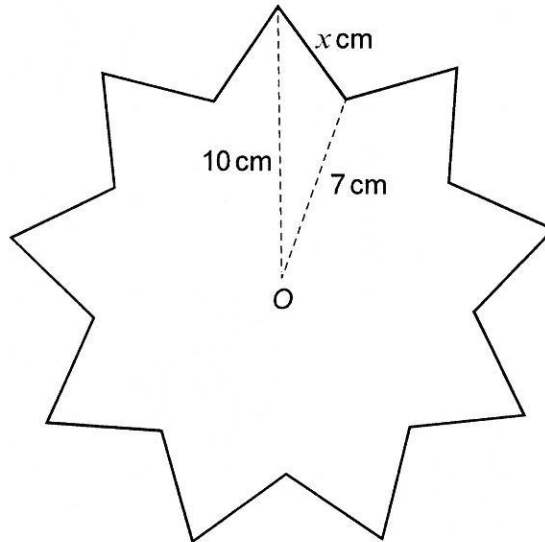
[8]

**END OF PAPER**



18. A 9-pointed star, with centre O, is shown below. Each side of the star is of length  $x$  cm.

The distance from the centre to every **inner** vertex of the star is 7 cm.  
The distance from the centre to every **outer** vertex of the star is 10 cm.



*Diagram not drawn to scale*

- (a) Calculate the perimeter of the star.

[5]

[illegible]

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21

(b) Calculate the area of the star.

[3]

Examiner  
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**END OF PAPER**



# 2D+3D Shape, Similar Shapes, Perimeter, Area and Volume, Dimensions

I+H Maths Nov 2017 41

Examiner  
only

1. Look at the following descriptions of special quadrilateral shapes.  
Circle the correct name for each one.

- (a) Its diagonals intersect at  $90^\circ$ .  
Only one diagonal is a line of symmetry.

[1]

Kite      Rhombus      Square      Trapezium      Rectangle

- (b) Only one pair of sides are parallel.

[1]

Kite      Rhombus      Square      Trapezium      Rectangle

- (c) All four sides are equal.  
Its diagonals are not equal in length.

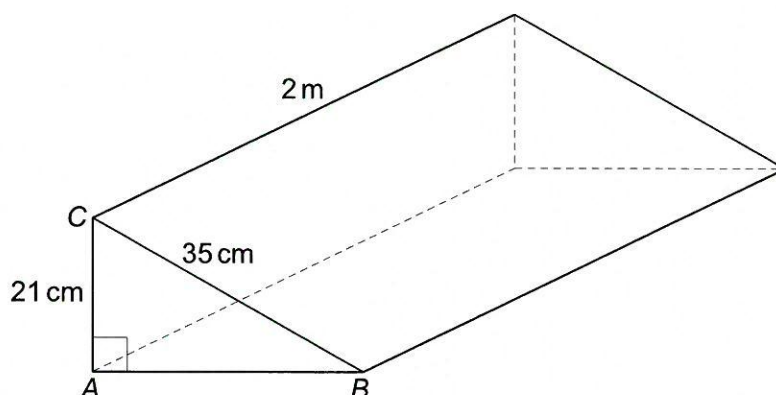
[1]

Kite      Rhombus      Square      Trapezium      Rectangle

3300U501  
03



4. A triangular prism of length 2 metres is shown below.



*Diagram not drawn to scale*

$AC = 21 \text{ cm}$ ,  $BC = 35 \text{ cm}$  and  $\hat{BAC} = 90^\circ$ .

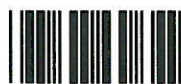
- (a) *In this part of the question, you will be assessed on the quality of your organisation, communication and accuracy in writing.*

Calculate the area of triangle  $ABC$ .

Give your answer in  $\text{cm}^2$ .

You must show all your working.

[5 + 2 OCW]





I+H Maths Nov 2017<sup>7</sup> 42

- (b) Calculate the volume of the prism.  
You must give the units of your answer.

[3]

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11 June 2017

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Examiner  
only

6. In the following formulae, each measurement of length is represented by a letter.

Consider the dimensions implied by the formulae.

Write down, for each case, whether the formula could be for a length, an area, a volume or none of these.

The first one has been done for you.

[3]

Formula

Formula could be for

$$d^3 - 3 \cdot 14r^2h$$

volume

$$d^2 + hw$$

$$d + w + h$$

$$2\pi r - \pi r^2$$

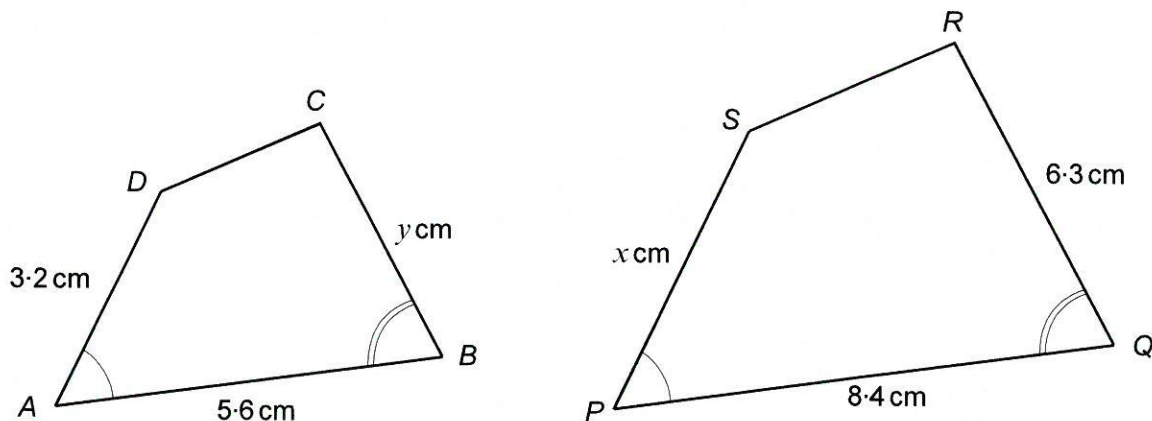
$$(d + h)w$$

$$d^3 + dwh$$



08

7. The diagrams below show two similar shapes,  $ABCD$  and  $PQRS$ .



*Diagrams not drawn to scale*

- (a) Calculate the value of  $x$ .

[2]

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- (b) Calculate the value of  $y$ .

[2]

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- (c) Explain clearly why the following statement cannot be true.

[2]

'The length of  $CD$  is 3.9 cm and the length of  $RS$  is 6.5 cm'.

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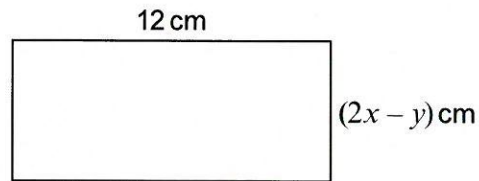
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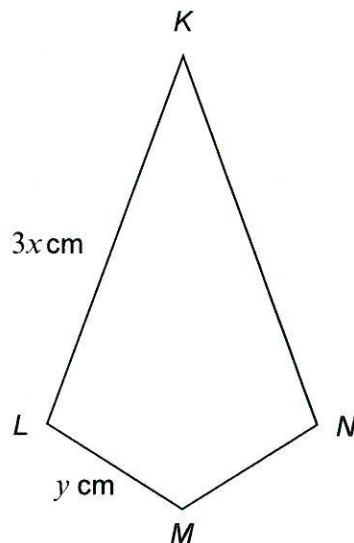


8. A rectangle of length 12 cm and width  $(2x - y)$  cm has an area of  $72 \text{ cm}^2$ .



*Diagram not drawn to scale*

$KLMN$  is a kite where  $KL = 3x \text{ cm}$  and  $LM = y \text{ cm}$ .



*Diagram not drawn to scale*

The perimeter of the kite  $KLMN = 33 \text{ cm}$ .

Calculate the values of  $x$  and  $y$ .

You must show all your working.

Do not use a trial and improvement method.

[5]

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T+H maths June 2015 11 42

Examiner  
only

Handwriting practice lines consisting of 12 horizontal dotted lines.

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9. Circle the correct answer for each of the following statements.

(a)  $9^{-\frac{1}{2}}$  is equal to

-3

$-\frac{1}{3}$

$\frac{1}{4\frac{1}{2}}$

$-4\frac{1}{2}$

$\frac{1}{3}$

[1]

(b)  $8^{\frac{2}{3}}$  is equal to

$5\frac{1}{3}$

4

6

$8\frac{2}{3}$

$\frac{16}{24}$

[1]

10. The radius of a hemisphere and the radius of a cylinder are equal.  
The hemisphere and cylinder have equal volumes.

Calculate the ratio of the height of the cylinder to the radius of the cylinder.

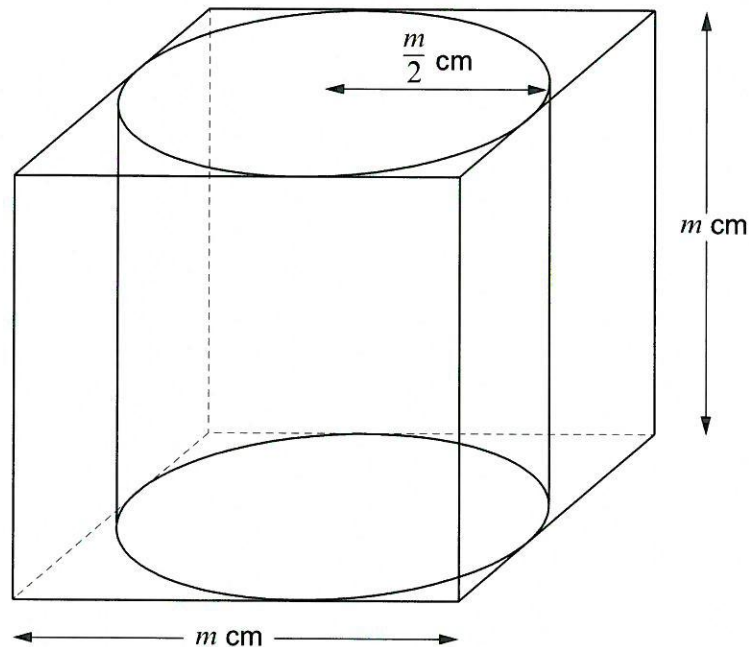
[3]

height of cylinder : radius of cylinder

= ..... : .....



10. A cylinder just fits inside a hollow cube with sides of length  $m$  cm.



*Diagram not drawn to scale*

The radius of the cylinder is  $\frac{m}{2}$  cm.

The height of the cylinder is  $m$  cm.

The ratio of the volume of the cube to the volume of the cylinder is given by

volume of cube : volume of cylinder

$$= k : \pi,$$

where  $k$  is a number.

Find the value of  $k$ .

You must show all your working.

[4]

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I+H maths Nov<sup>15</sup> 2017 U1

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10. Factorise  $4m^2 - 289$ .

[2]

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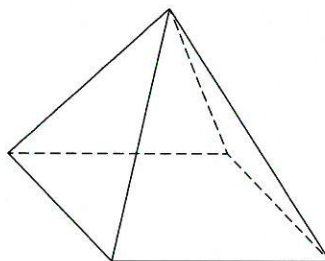
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11. Calculate the volume of a pyramid with a base area of  $13\,200\text{ cm}^2$  and a perpendicular height of  $460\text{ cm}$ .  
Give your answer in  $\text{m}^3$ .

[3]



*Diagram not drawn to scale*

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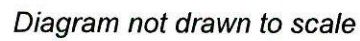
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Volume = .....  $\text{m}^3$



- [4]

[illegible]

Total surface area = ..... cm<sup>2</sup>



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Examiner  
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11. A rectangle measures 38 cm by 26 cm.  
Each measurement is correct to the nearest cm.  
Calculate the least possible area of the rectangle.

[2]

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11 Nov 2016

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Examiner  
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14. Aled has three concrete slabs.

Two of the slabs are square, with each side of length  $x$  metres.

The third slab is rectangular and measures 1 metre by  $(x + 1)$  metres.

The three concrete slabs cover an area of  $7 \text{ m}^2$ .

(a) Show that  $2x^2 + x - 6 = 0$ .

[1]

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(b) Solve the equation to find the length of each side of the square slabs.  
You must justify any decisions that you make.

[4]

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15. Two **similar** pyramids have volumes of  $3970\text{ cm}^3$  and  $3100\text{ cm}^3$  respectively.  
The height of the larger pyramid is 25 cm.  
Calculate the height of the smaller pyramid.

[3]

Height = ..... cm

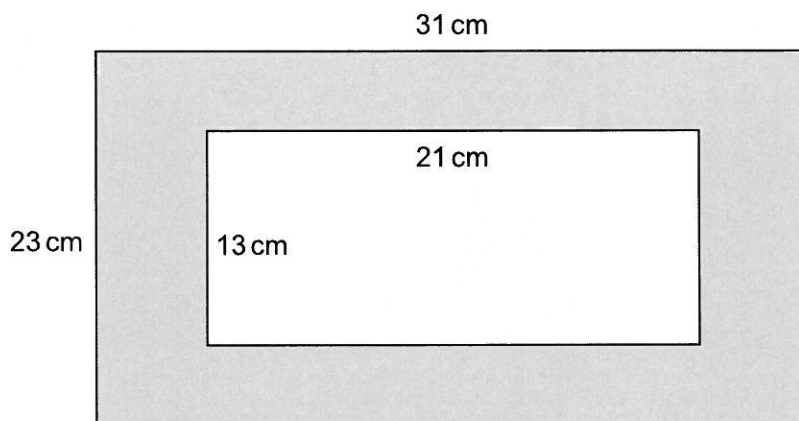


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15

Examiner  
only

14. The region between two rectangles is shaded, as shown in the diagram below. All of the measurements shown are given **correct to the nearest cm**.



*Diagram not drawn to scale*

Calculate the greatest possible area of the shaded region.

[3]

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Examiner  
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17. Two similar shapes have areas of  $700 \text{ cm}^2$  and  $140 \text{ cm}^2$ .  
The perimeter of the smaller shape is 83 cm.  
Calculate the perimeter of the larger shape.

[3]

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- 16.** The diagram shows two rectangles.

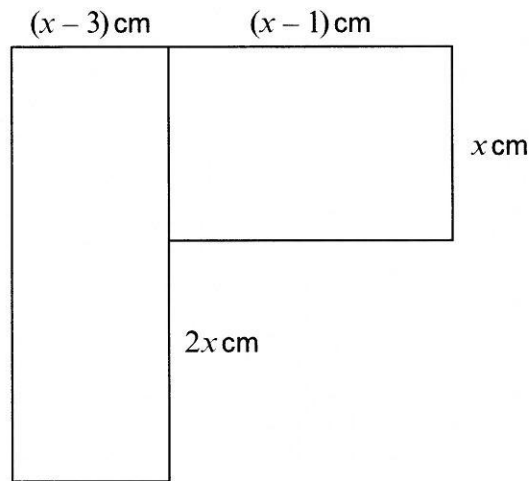


Diagram not drawn to scale

The combined area of both rectangles is  $50 \text{ cm}^2$ .

By considering the areas of the two rectangles, show that  $2x^2 - 5x - 25 = 0$  and hence find the value of  $x$ . [6]

[illegible]

U1 June 2017

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Examiner  
only

19. By considering algebraic expressions, show that it will never be possible for the surface area of a sphere of radius  $r$  to be equal to the surface area of a cube with sides of length  $r$ . [2]

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END OF PAPER

