"Full Coverage": Pythagoras' Theorem

This worksheet is designed to cover one question of each type seen in past papers, for each GCSE Higher Tier topic. This worksheet was automatically generated by the DrFrostMaths Homework Platform: students can practice this set of questions interactively by going to www.drfrostmaths.com/homework, logging on, *Practise → Past Papers/Worksheets* (or *Library → Past/Past Papers* for teachers), and using the 'Revision' tab.

Question 1

Categorisation: Use Pythagoras' theorem to find the hypotenuse of a right-angled triangle.

[Edexcel GCSE June2007-4I Q17, June2007-6H Q5]

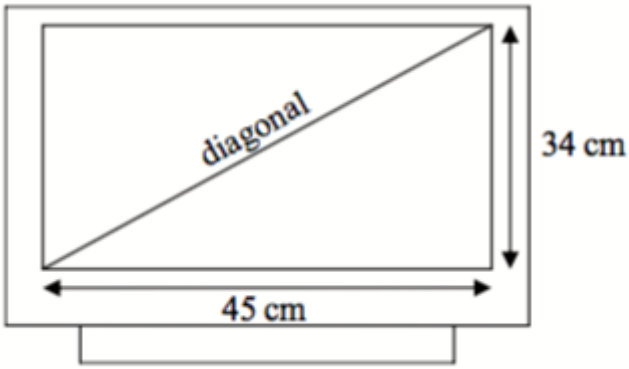


Diagram **NOT** accurately drawn

A rectangular television screen has a width of 45 cm and a height of 34 cm.

Work out the length of the diagonal of the screen.
Give your answer correct to the nearest centimetre.

..... cm

Question 2

Categorisation: Use Pythagoras' theorem to find one of the shorter sides of a right-angled triangle.

[Edexcel IGCSE Nov2010-3H Q8b]

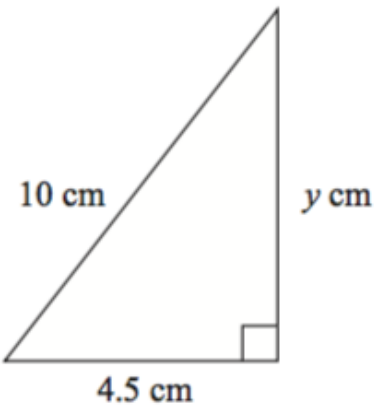


Diagram **NOT** accurately drawn

Calculate the value of y .

Give your answer correct to 3 significant figures.

$y =$ ..... cm

Question 3

Categorisation: Use Pythagoras' theorem in an applied setting.

[Edexcel GCSE Jun2015-2F Q26]

A frame is made from wire.

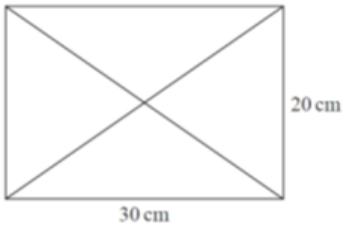


Diagram **NOT** accurately drawn

The frame is in the shape of a rectangle, 30 cm by 20 cm.

The two diagonals of the rectangle are also made from wire.

Calculate the total length of wire needed to make the frame and the diagonals.

Give your answer correct to 1 decimal place.

..... cm

Question 4

Categorisation: Use Pythagoras' theorem twice when considering adjoining triangles.

[Edexcel IGCSE May2016(R)-3H Q13]

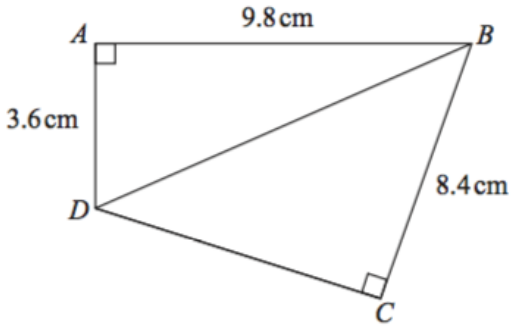


Diagram **NOT** accurately drawn

Here is the quadrilateral *ABCD.*
Angle *BAD* = 90° and angle *BCD* = 90°
AB = 9.8 cm *AD* = 3.6 cm *BC* = 8.4 cm

Calculate the length of *DC*.

..... cm

Question 5

Categorisation: Use Pythagoras' theorem with surd lengths.

[Edexcel GCSE Nov2005-5H Q20bii]

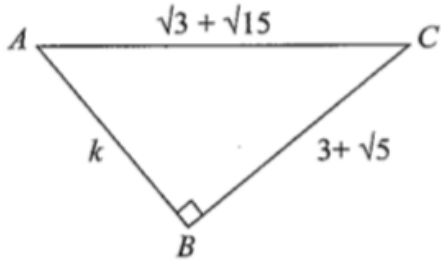


Diagram **NOT** accurately drawn

All measurements on the triangle are in centimetres. ABC is a right-angled triangle.k is a positive integer. Find the value of k .

$k =$ .....

Question 6

Categorisation: Use Pythagoras' theorem in the context of circle theorems.

[Edexcel GCSE Nov2010-3H Q22b]

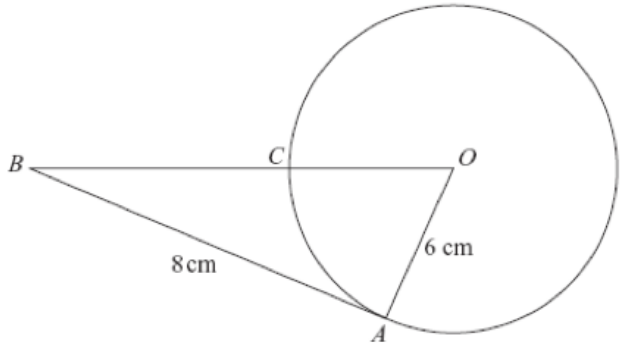


Diagram **NOT** accurately drawn

In the diagram, *O* is the centre of the circle. *A* and *C* are points on the circumference of the circle. *BCO* is a straight line. *BA* is a tangent to the circle.

AB = 8 cm. *OA* = 6 cm.

Work out the length of *BC*.

..... cm

Question 7

Categorisation: Use Pythagoras' theorem involving prior identification of a triangle in the diagram.

[Edexcel GCSE Nov2015-2F Q26, Nov2015-2H Q7 Edited]

Here is part of a field.

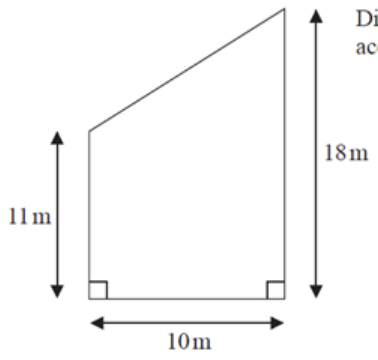


Diagram **NOT** accurately drawn

This part of the field is in the shape of a trapezium. A farmer wants to put a fence all the way around the edge of this part of the field. How much fence will he require?

..... m

Question 8

Categorisation: As above, but involving multiple applications of Pythagoras' theorem.

[Edexcel GCSE Nov2012-2H Q15]

ABCD is a trapezium.

AD = 10 cm *AB* = 9 cm *DC* = 3 cm
Angle *ABC* = angle *BCD* = 90°

Calculate the length of *AC*. Give your answer correct to 3 significant figures.

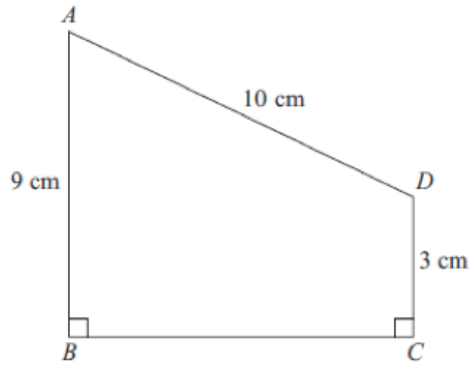


Diagram **NOT** accurately drawn

$AC =$ ..... cm

Question 9

Categorisation: Subtract length to find sides of a right-angled triangle.

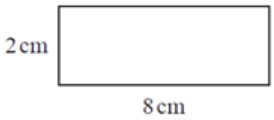


Diagram **NOT** accurately drawn

[Edexcel GCSE Jun2015-1H Q13]

Here is a rectangle.

The 8-sided shape below is made from 4 of these rectangles and 4 congruent right-angled triangles.

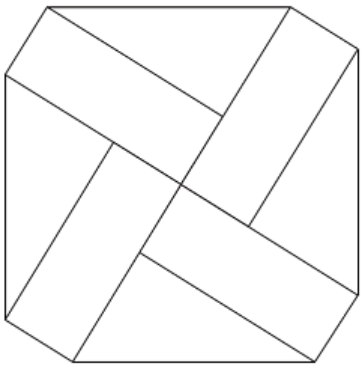


Diagram **NOT** accurately drawn

Work out the perimeter of the 8-sided shape.
You must show all your working.

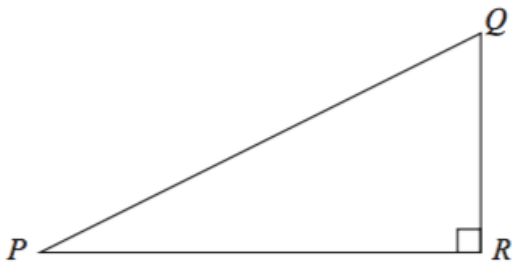
..... cm

Question 10

Categorisation: Use Pythagoras' theorem in the context of exact trigonometric values.

[Edexcel GCSE(9-1) Mock Set 3 Autumn 2017 2H Q12]

Here is triangle *PQR*.



The length of *QR* is 60% of the length of *PR*. Find the value of sin *QPR*.

Give your answer correct to 3 significant figures.

.....

Question 11

Categorisation: Use Pythagoras' theorem in area problems involving circles.

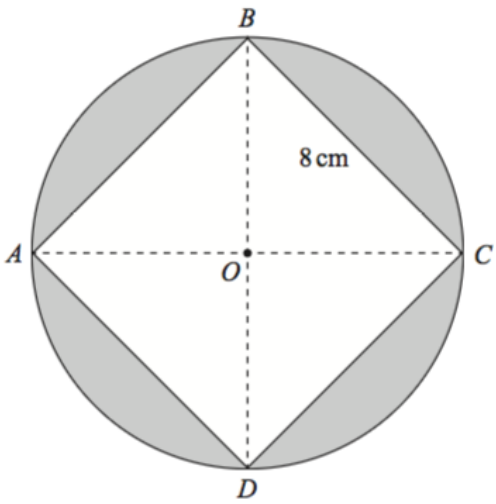
[Edexcel GCSE(9-1) Mock Set 3 Autumn 2017 2F Q26]

The diagram shows a square *ABCD* of side 8 cm inside a circle, centre *O*.

The vertices of the square lie on the circle.

Work out the total area of the four shaded segments.

Give your answer correct to 3 significant figures.



..... cm^2

Question 12

Categorisation: As above.

[Edexcel IGCSE Jan2014-3H Q12]

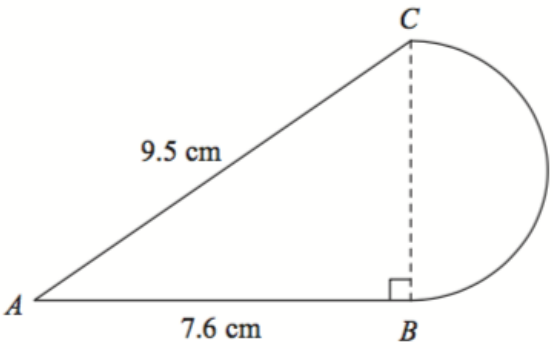


Diagram **NOT** accurately drawn

The diagram shows a shape made from triangle *ABC* and a semicircle with diameter *BC*. Triangle *ABC* is right-angled at *B*. *AB* = 7.6 cm and *AC* = 9.5 cm.

Calculate the area of the shape. Give your answer correct to 3 significant figures.

..... cm^2

Question 13

Categorisation: Use Pythagoras' theorem for triangles with algebraic sides.

[Edexcel GCSE June2010-3H Q25]

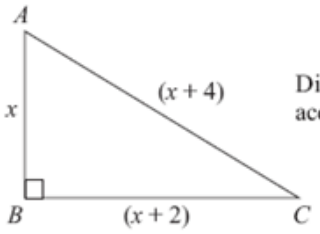


Diagram **NOT** accurately drawn

ABC is a right-angled triangle. All the measurements are in centimetres.

$AB = x$ $\quad BC = (x + 2)$ $\quad AC = (x + 4)$

Use the information to form a quadratic equation of the form $x^2 + ax + b = 0$, where a and b are constants which you need to find.

.....

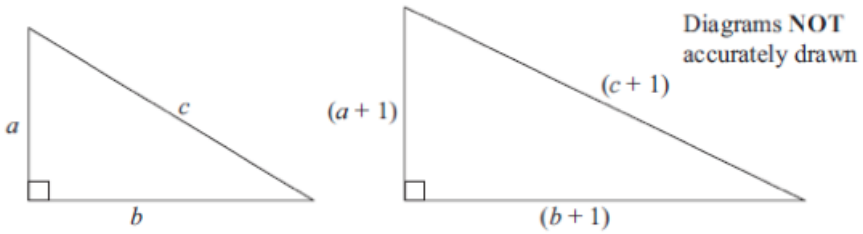
Question 14

Categorisation: As above, but with multiple triangles.

[Edexcel GCSE March2012-3H Q24b Edited]

Here are two right-angled triangles.

All the measurements are in centimetres.



Write $2c$ in terms of a and b

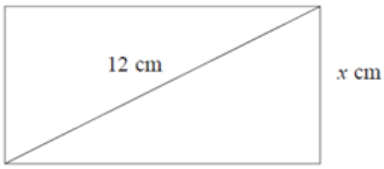
$2c =$ .....

Question 15

Categorisation: Determine the algebraic expression for the third side of a triangle, and subsequently use Pythagoras' theorem to form an equation.

[Edexcel IGCSE Jan2016-3H Q22]

The diagram shows a rectangle.



The width of the rectangle is x cm. The length of a diagonal of the rectangle is 12 cm. The perimeter of the rectangle is 28 cm.

Find the possible values of x. Give your values correct to 3 significant figures.

Show your working clearly

.....

Question 16

Categorisation: As above but involving a second variable.

[Edexcel GCSE Nov2006-6H Q18b Edited]

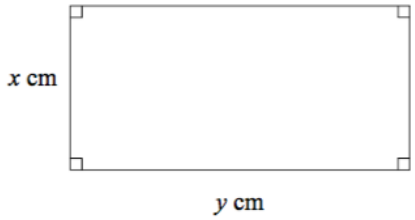


Diagram **NOT** accurately drawn

The diagram shows a rectangle.

The width of the rectangle is x cm and its length is y cm.
The perimeter of the rectangle is 10 cm.

The length of a diagonal of the rectangle is 4 cm.

(b) Show that $ax^2 + bx + c = 0$ where a , b and c are integers to be found.

.....

Question 17

Categorisation: Introduce a variable so that algebraic expressions for each side of a right-angled triangle can be formed, with Pythagoras' theorem subsequently used.

[Edexcel IGCSE Nov2009-4H Q21]

A, B and L are points on a circle, centre O.
AB is a chord of the circle. M is the midpoint of AB. LOM is a straight line.
AB = 24cm. LM = 18cm.
Calculate the diameter of the circle.

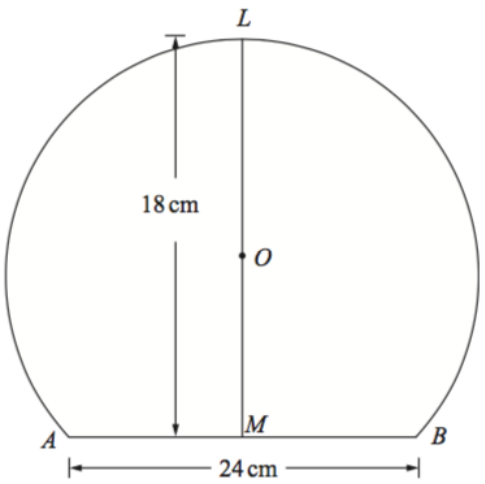


Diagram **NOT** accurately drawn

..... cm

Question 18

Categorisation: Find the area of a triangle using Pythagoras' theorem.

[Edexcel GCSE Nov2011-3H Q21]

The diagram shows a right-angled triangle. The length of the base of the triangle is $2\sqrt{3}$ cm. The length of the hypotenuse of the triangle is 6 cm. The area of the triangle is A cm^2.

Show that $A = k\sqrt{2}$ giving the value of k .

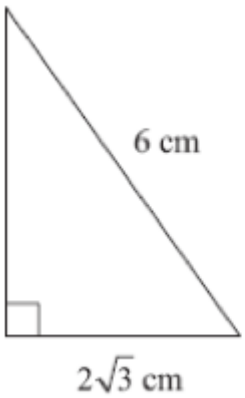


Diagram **NOT** accurately drawn

$k =$ .....

Question 19

Categorisation: Use Pythagoras' theorems in the context of cones.

[Edexcel IGCSE May2014(R)-4H Q20]

The diagram shows a solid cone.

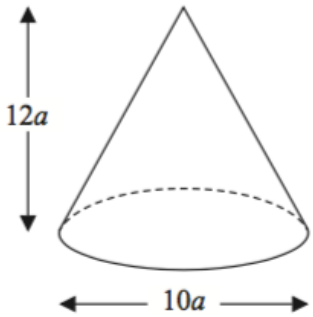


Diagram **NOT** accurately drawn

The diameter of the base of the cone is $10a$ cm.
The height of the cone is $12a$ cm. The total surface area of the cone is 360π cm^2. The volume of the cone is $k\pi$ cm^3, where k is an integer.

Find the value of k .

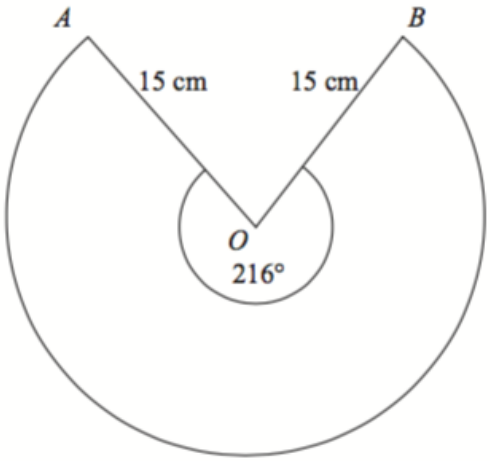
.....

Question 20

Categorisation: As above.

[Edexcel GCSE June2007-6H Q25b Edited]

Here is the net of a cone.



The net is a sector of a circle, centre O, and radius 15 cm.
Reflex angle AOB = 216°
The net makes a cone of slant height 15 cm.

(b) Work out the vertical height of the cone

..... cm

Answers

Question 1

56 cm

Question 2

$y =$ 8.93 cm

Question 3

any value in the range 172 cm to 172.2 cm

Question 4

6.2 cm

Question 5

$k = 2$

Question 6

4 cm

Question 7

51.2 m

Question 8

$AC =$ 12.0 cm

Question 9

48 cm

Question 10

0.514

Question 11

any value in the range 36.5 cm^2 to 36.6 cm^2

Question 12

34.4 cm^2

Question 13

$x^2 - 4x - 12 = 0$

Question 14

$2c = 2a + 2b + 1$

Question 15

$x = 11.8$ or $x = 2.20$

Question 16

$a = 2$, $b = -10$, $c = 9$

Question 17

26 cm

Question 18

$k =$ 6

Question 19

$k = 800$

Question 20

12 cm