# PYTHAGORAS

DATE OF SOLUTIONS: 15/05/2018
MAXIMUM MARK: 52

# SOLUTIONS

GCSE (+ IGCSE) EXAM QUESTION PRACTICE

**1.** [Edexcel, 2012] Pythagoras **[3 Marks]**

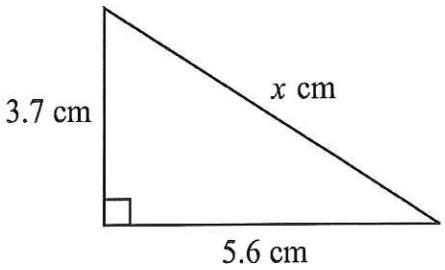



Diagram **NOT** accurately drawn

Work out the value of $x$.
Give your answer correct to 3 significant figures.

$x^2 = 3.7^2 + 5.6^2$ (M1)

$= 45.05$

$x = \sqrt{45.05}$ (M1)

$= 6.71192...$

$= \underline{6.71\text{ cm}}$ (A1)

**2.** [Edexcel, 2006] Pythagoras **[3 Marks]**

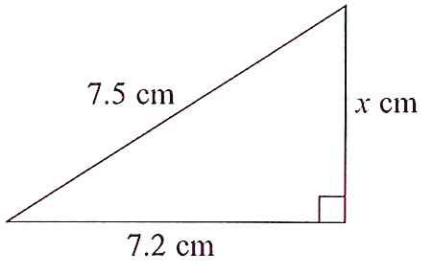



Diagram **NOT** accurately drawn

Work out the value of $x$.

$x^2 = 7.5^2 - 7.2^2$ M1

$= 4.41$ A1

$x = \sqrt{4.41}$

$x =$ 2.1 A1

**3.** [Edexcel, 2014] Pythagoras **[3 Marks]**

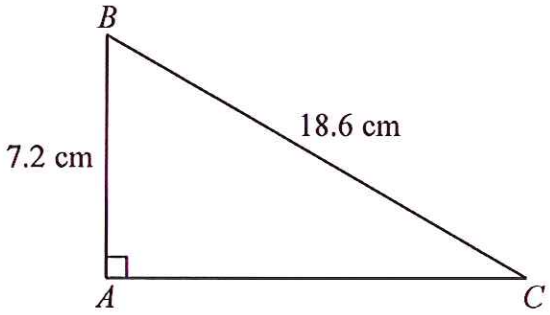



Diagram **NOT** accurately drawn

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

$AC^2 = 18.6^2 - 7.2^2$ (M1)

$= 294.12$

$\Rightarrow AC = \sqrt{294.12}$ (M1)

$= 17.1499...$

$= 17.1$ cm (A1)

**4.** [Edexcel, 2007] Pythagoras **[3 Marks]**

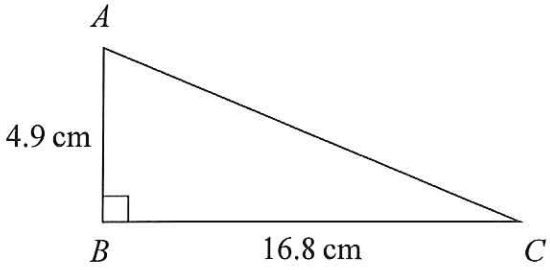



Diagram **NOT** accurately drawn

*ABC* is a triangle.
Angle *ABC* = 90°.
*AB* = 4.9 cm.
*BC* = 16.8 cm.

Calculate the length of *AC*.

$AC^2 = 16.8^2 + 4.9^2$ (M1)

$= 306.25$

$AC = \sqrt{306.25}$ (M1)

$= 17.5$ cm (A1)

**5.** [Edexcel, 2007] Pythagoras **[3 Marks]**

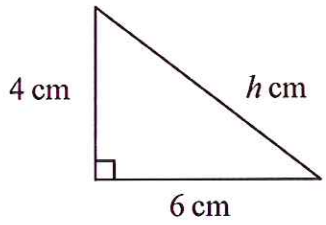



Diagram **NOT** accurately drawn

Calculate the value of $h$.
Give your answer correct to 3 significant figures.

$h^2 = 6^2 + 4^2$ (M1)

$= 52$

$h = \sqrt{52}$ (M1)

$= 7.2111..$

$h =$ 7.21 (A1)

**6.** [Edexcel, 2015] Pythagoras **[3 Marks]**

Here is a right-angled triangle.

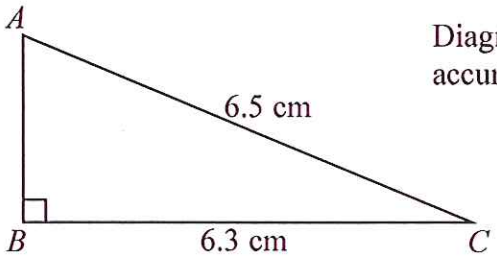



Diagram **NOT** accurately drawn

$AC = 6.5$ cm.
$BC = 6.3$ cm.
Angle $ABC = 90°$

Calculate the length of $AB$.

$AB^2 = 6.5^2 - 6.3^2$ (M1) [SUBTRACT SQUARES]

$= 2.56$

$AB = \sqrt{2.56}$ (M1) [SQUARE ROOT]

$= 1.6$

(A1)

1.6 ..... cm

**7.** [Edexcel, 2016] Pythagoras **[4 Marks]**

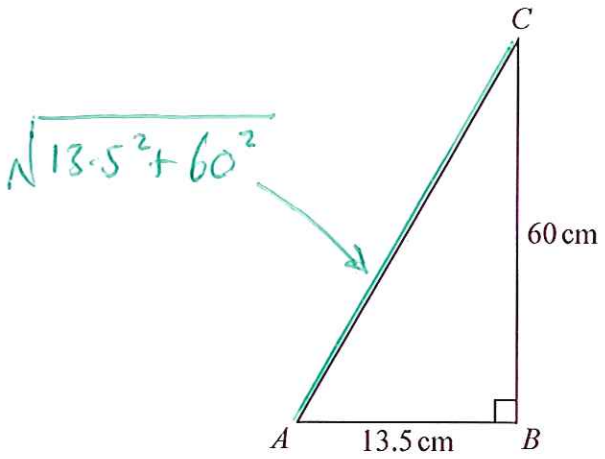



Diagram **NOT** accurately drawn

$\sqrt{13.5^2+60^2}$

Work out the perimeter of the triangle.

1ST

$AC = \sqrt{13.5^2+60^2}$ M1

$= \underline{61.5}$ A1

2ND

PERIMETER $= 61.5 + 60 + 13.5$ M1

135 cm A1

**8.** [Edexcel, 2004] Trigonometry (Compound Triangles) **[5 Marks]**

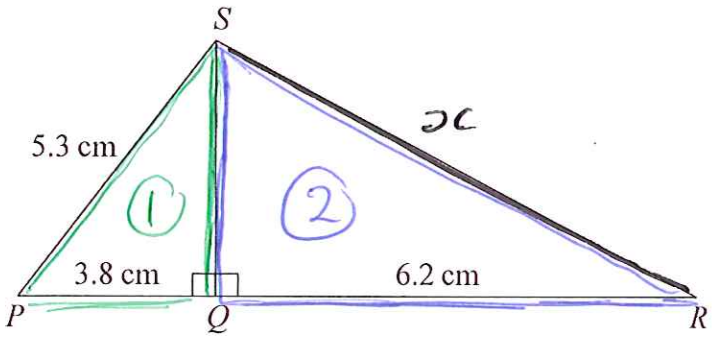



Diagram **NOT** accurately drawn

Angle $PQS = 90°$.
Angle $RQS = 90°$.
$PS = 5.3$ cm, $PQ = 3.8$ cm, $QR = 6.2$ cm.

Calculate the length of $RS$.
Give your answer correct to 3 significant figures.

1ST

$SQ^2 = 5.3^2 - 3.8^2$ M1

$= 13.65$ A1 $\rightarrow SQ = \sqrt{13.65}$

$= 3.6945...$

2ND

$x^2 = 3.6945...^2 + 6.2^2$ M1

$= 52.09$ A1

$x = \sqrt{52.09}$

$= 7.21734...$

$= \underline{\underline{7.22}}$ cm A1

**9.** [Edexcel, 2016] Trigonometry (Compound Triangles) **[4 Marks]**

Here is the quadrilateral *ABCD*.

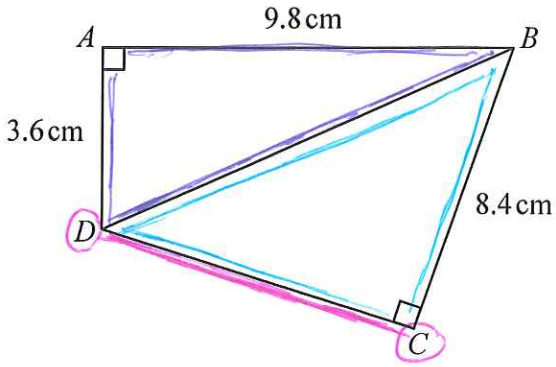



Diagram **NOT** accurately drawn

Angle *BAD* = 90° and angle *BCD* = 90°
*AB* = 9.8 cm
*AD* = 3.6 cm
*BC* = 8.4 cm

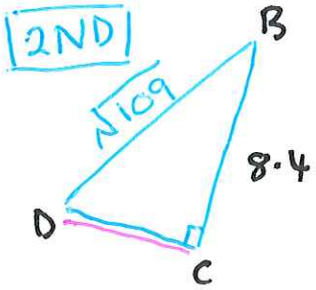
Calculate the length of *DC*.

1ST

$BD^2 = 9.8^2 + 3.6^2$

$= 109$ (B1)

2ND




$DC^2 = BD^2 - 8.4^2$ (M1)

$= 38.44$ (M1)

$\Rightarrow DC = \sqrt{38.44}$

$= 6.2$ (A1) cm

**10.** [Edexcel, 2009] Pythagoras **[4 Marks]**

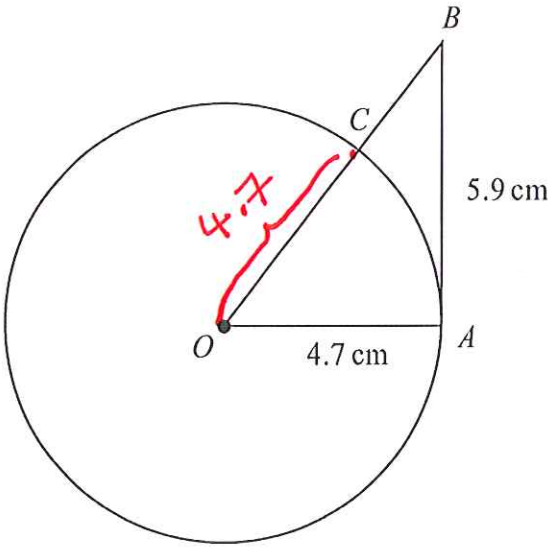



Diagram **NOT** accurately drawn

*A* is a point on a circle with centre *O* and radius 4.7 cm.
*AB* is the tangent to the circle at *A*.
*AB* = 5.9 cm.
*OB* intersects the circle at *C*.

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

$OB^2 = 4.7^2 + 5.9^2$ M1

$= 56.9$

$OB = \sqrt{56.9}$

$= 7.543$ A1

$BC = 7.543 - 4.7$ M1

$= 2.843$

$= 2.84$

2.84 A1 ..... cm

**11.** [Edexcel, 2008] Pythagoras **[4 Marks]**

The diagram shows a circle with centre $O$ and radius 5 cm.

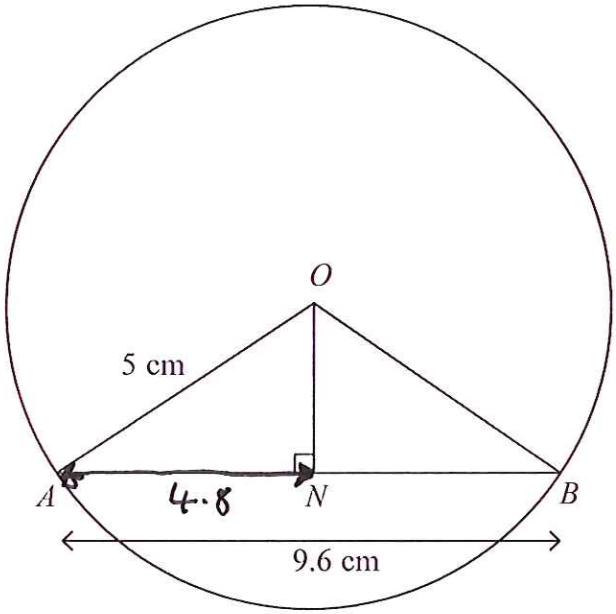



Diagram **NOT** accurately drawn

$ANB$ is a chord of the circle.
$AB = 9.6$ cm.
Angle $ONA = 90°$.

(a) Write down the length of $AN$.

A1

4.8 ..... cm

**(1)**

(b) Calculate the length of $ON$.

$ON^2 = 5^2 - 4.8^2$ M1

$= 1.96$

$ON = \sqrt{1.96}$ M1

$= 1.4$

A1

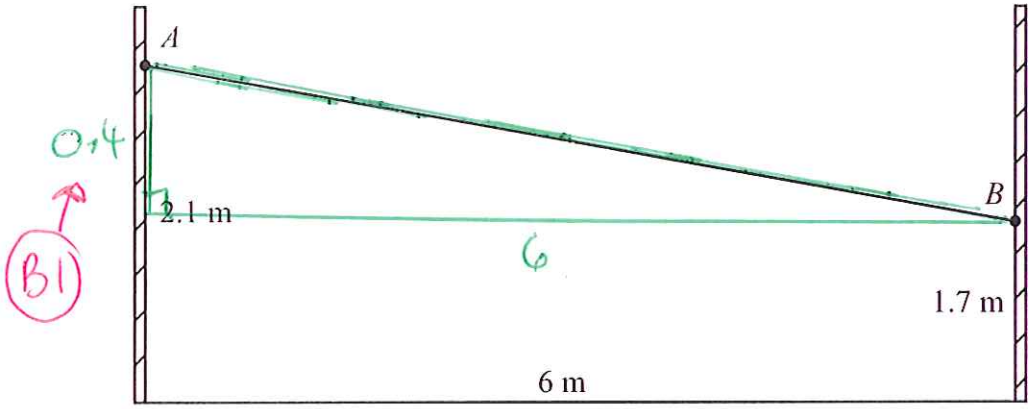
1.4 ..... cm

**(3)**

**12.** [Edexcel, 2013] Pythagoras **[4 Marks]**

A washing line is attached at points $A$ and $B$ on two vertical posts standing on horizontal ground.
Point $A$ is 2.1 metres above the ground on one post.
Point $B$ is 1.7 metres above the ground on the other post.
The horizontal distance between the two posts is 6 metres.

Diagram **NOT** accurately drawn




Calculate the distance $AB$.
Give your answer correct to 3 significant figures.

$AB^2 = 6^2 + 0.4^2 = 36.16$ M1

$AB = \sqrt{36.16}$ M1

$= 6.013731\ldots$

$= 6.01$ m

B1

**13.** [Edexcel, 2014] Pythagoras **[4 Marks]**

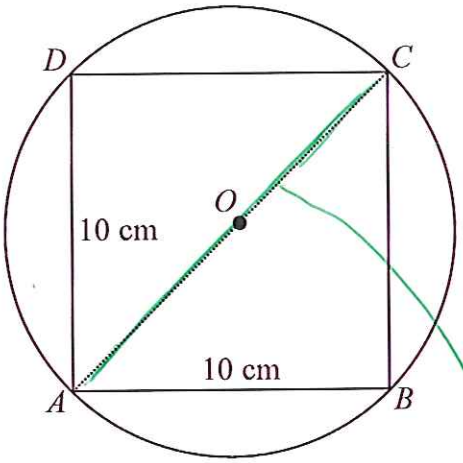



Diagram **NOT** accurately drawn

The diagram shows a square $ABCD$ drawn inside a circle, centre $O$.
$A$, $B$, $C$ and $D$ are points on the circle.
The lengths of the sides of the square are 10 cm.
$AC$ is a diameter of the circle.

Calculate the circumference of the circle.
Give your answer correct to 3 significant figures.

$C = \pi \times D$

$D^2 = 10^2 + 10^2$ (M1)

$= 200$

$D = \sqrt{200}$ (B1)

$= \pi \times \sqrt{200}$ (M1)

$= 44.4288...$

$= 44.4$ cm (A1)

**14.** [Edexcel, 2008] Pythagoras **[5 Marks]**

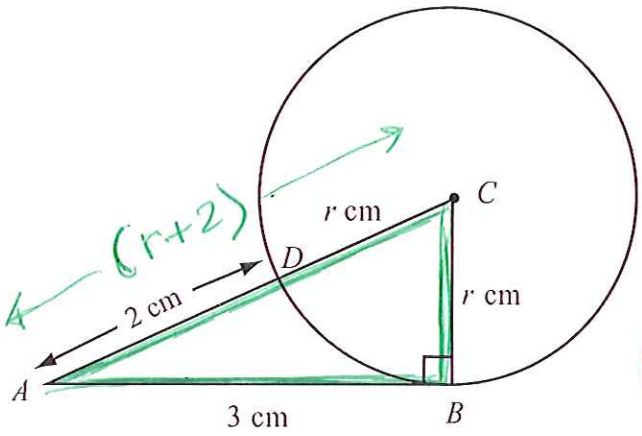



Diagram **NOT** accurately drawn

THIS IS ABOUT GENERATING AND SOLVING AN EQUATION

*B* and *D* are points on a circle, centre *C*.
*AB* is the tangent to the circle at *B*.
*ADC* is a straight line.
*AB* = 3 cm.
*AD* = 2 cm.

The radius of the circle is *r* cm.
Find the value of *r*.

USE PYTHAGORAS

B1 $(r+2)^2 = r^2 + 3^2$ M1

$(r+2)(r+2) = r^2 + 9$

$r^2 + 2r + 2r + 4 = r^2 + 9$ M1

$r^2 + 4r + 4 = r^2 + 9$

$r^2 - r^2 + 4r = 9 - 4$

$4r = 5$ M1

$r = \frac{5}{4}$

$= 1.25$ A1

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There is no warranty that these solutions will meet Your requirements or provide the results which You want, or that they are complete, or that they are error-free. If You find anything confusing within these solutions then it is Your responsibility to seek clarification from Your teacher, tutor or mentor.

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Sometimes a method used in these solutions might be unfamiliar to You. If You are able to use a different method to obtain the correct answer then You should consider to keep using your existing method and not change to the method that is used here. However, the choice of method is always up to You and it is often useful if You know more than one method to solve a particular type of problem.

Within these solutions there is an indication of where marks **might** be awarded for each question. B marks, M marks and A marks have been used in a similar, but **not identical**, way that an exam board uses these marks within their mark schemes. This slight difference in the use of these marking symbols has been done for simplicity and convenience. Sometimes B marks, M marks and A marks have been interchanged, when compared to an examiners' mark scheme and sometimes the marks have been awarded for different aspects of a solution when compared to an examiners' mark scheme.

B1 – This is an unconditional accuracy mark (the specific number, word or phrase must be seen. This type of mark cannot be given as a result of 'follow through').

M1 – This is a method mark. Method marks have been shown in places where they might be awarded for the method that is shown. If You use a different method to get a correct answer, then the same number of method marks would be awarded but it is not practical to show all possible methods, and the way in which marks might be awarded for their use, within these particular solutions. When appropriate, You should seek clarity and download the relevant examiner mark scheme from the exam board's web site.

A1 – These are accuracy marks. Accuracy marks are typically awarded after method marks. If the correct answer is obtained, then You should normally (but not always) expect to be awarded all of the method marks (provided that You have shown a method) and all of the accuracy marks.

Note that some questions contain the words 'show that', 'show your working out', or similar. These questions require working out to be shown. Failure to show sufficient working out is likely to result in no marks being awarded, even if the final answer is correct.

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