JustMaths

Pythagoras' Theorem (F)

A collection of 9-1 Maths GCSE Sample and Specimen questions from AQA, OCR, Pearson-Edexcel and WJEC Eduqas.

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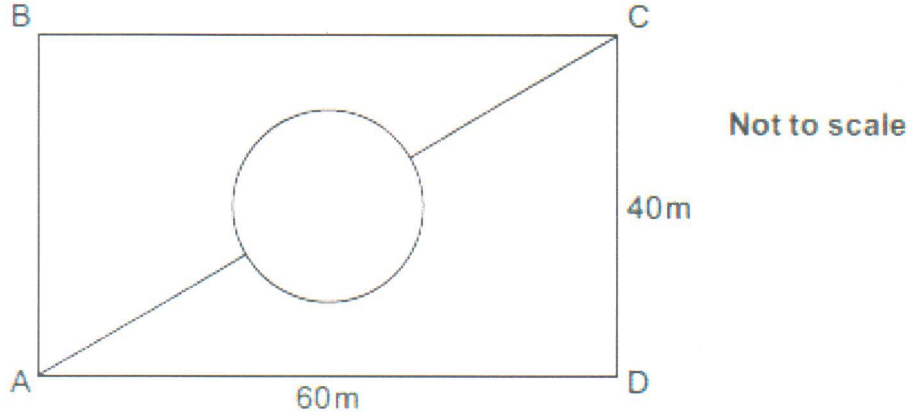
Total Marks:	

1. The rectangle ABCD represents a park.



The lines show all the paths in the park.

The circular path is in the centre of the rectangle and has a diameter of 10m.

Calculate the shortest distance from A to C across the park, using only the paths shown.

A → D → C = 60m + 40m
= 100m

A → C via circle

$\frac{\pi \times 10}{2} = 5\pi$

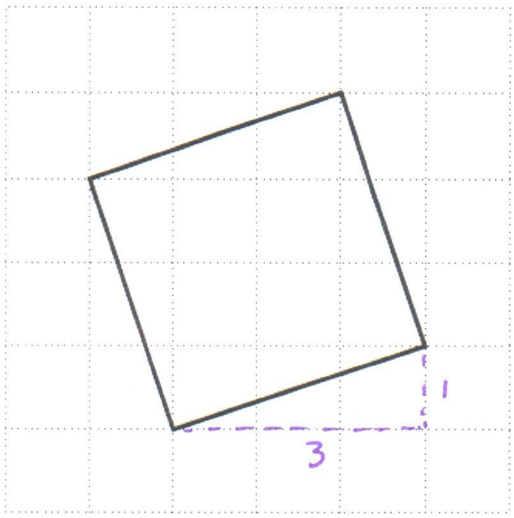
$AC^2 = 60^2 + 40^2$
$AC = \sqrt{60^2 + 40^2}$
$= 20\sqrt{13}$

missing diameter

So $20\sqrt{13} - 10 + 5\pi$
$= 77.8$m

77.8 .... m [6]

2. This square is drawn on a one-centimetre square grid.

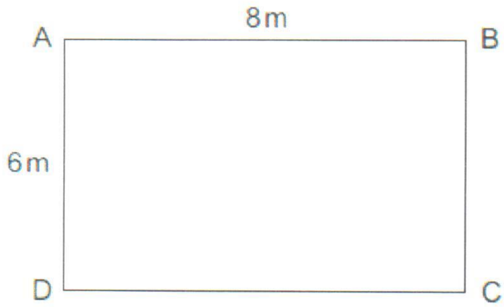


Work out the area of the square.

$\sqrt{1^2 + 3^2} = \sqrt{10}$ $\sqrt{10} \times \sqrt{10} = 10$

.... 10 cm² [3]

3. ABCD is a rectangle.



Not to scale

(a) Sunita calculates the length of AC, but gets it wrong.

$$8^2 - 6^2 = AC^2$$
$$\sqrt{28} = AC$$
$$\sqrt{28} = 5.29 \text{ or } {}^-5.29$$
$$AC = 5.29$$

Explain what Sunita has done wrong. She has subtracted $8^2 - 6^2$ Should have added $8^2 + 6^2$

[1]

(b) Calculate the length of AC.

$AC = \sqrt{8^2 + 6^2} = 10$

........................10.... m [2]

4. A triangle has sides of length 23.8 cm, 31.2 cm and 39.6 cm.

   Is this a right-angled triangle?

   Show how you decide.

longest side is hypotenuese.

if a right angled triangle then

$23.8^2 + 31.2^2 = 39.6^2$

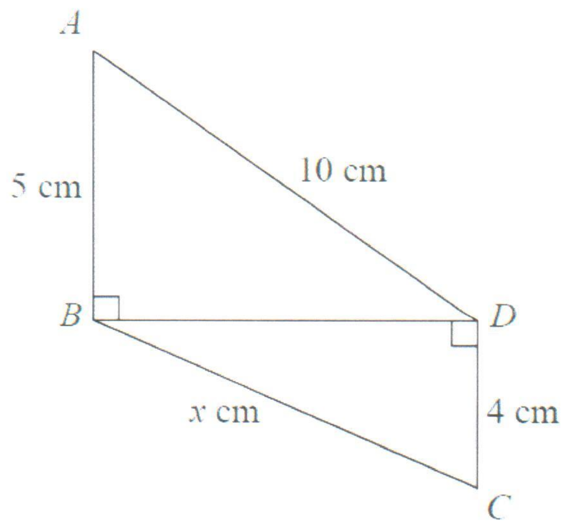
$23.8^2 + 31.2^2 = 1539.88$

$39.6^2 = 1568.16$

therefore it is not a right-angled triangle

[4]

5. Triangles ABD and BCD are right-angled triangles.



Work out the value of x.

Give your answer correct to 2 decimal places.

$BD = \sqrt{10^2 - 5^2}$
$= 5\sqrt{3}$

$BC = \sqrt{5\sqrt{3}^2 + 4^2}$
$= 9.539392014$

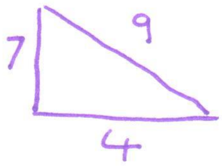
........................9.54........................ [4]

6. Triangle ABC has perimeter 20 cm.

AB = 7 cm.

BC = 4 cm.

By calculation, deduce whether triangle ABC is a right-angled triangle.



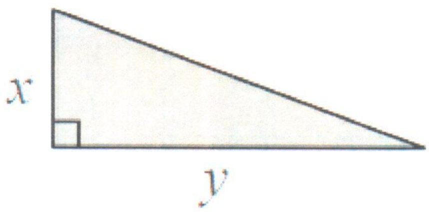
$\sqrt{7^2+4^2} = \sqrt{65}$

$9 \neq \sqrt{65}$

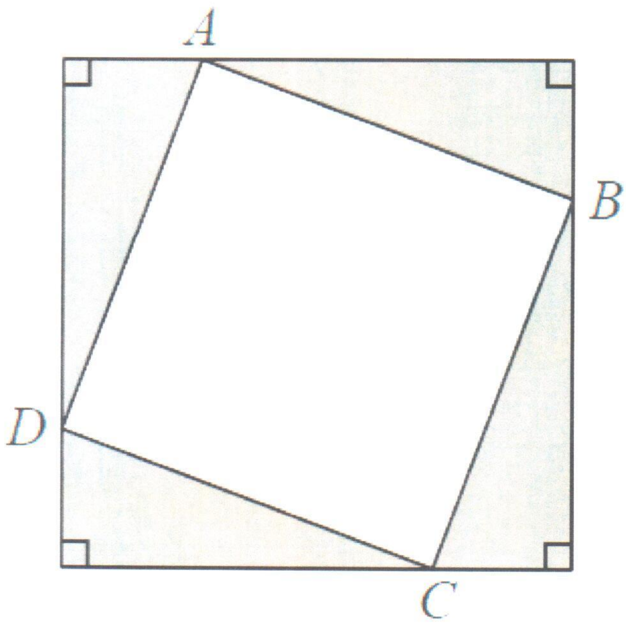
$\therefore$ it is not a right angled triangle.

[4]

7. Here is a right-angled triangle.



Four of these triangles are joined to enclose the square ABCD as shown below.



Show that the area of the square ABCD is $x^2 + y^2$

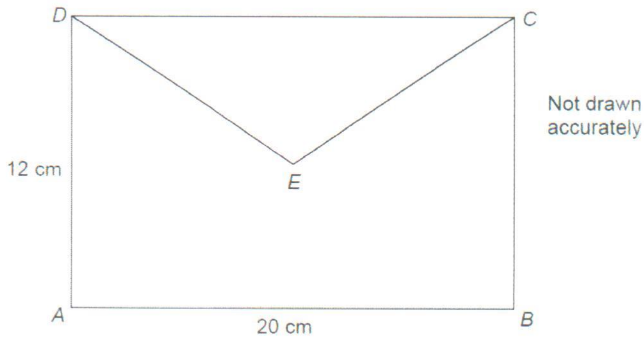
$AD = \sqrt{x^2+y^2}$

area ABCD is $\sqrt{x^2+y^2} \times \sqrt{x^2+y^2}$

$= \underline{x^2+y^2}$

[3]

8. E is the centre of rectangle ABCD.



Work out the length DE.

$DB = \sqrt{20^2 + 12^2}$

$= 4\sqrt{34}$

$DE = \frac{1}{2}$ of DB

$\therefore 4\sqrt{34} \div 2 = 2\sqrt{34}$

$= 11.7$cm

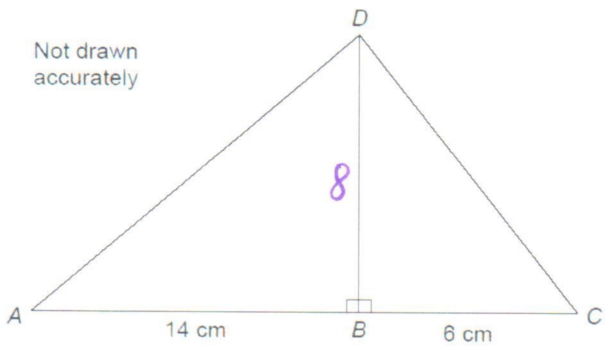
[3]

9. In the diagram the area of triangle ABD is 56 cm^2

Work out the length of CD.

$\frac{14}{2} \times h = 56$

$h = 8$

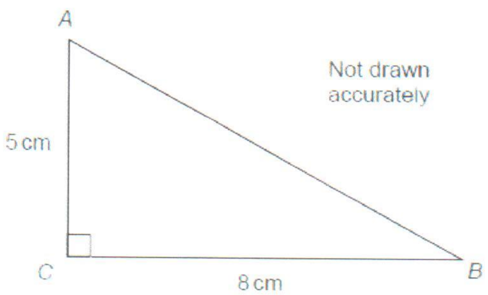


$CD = \sqrt{8^2 + 6^2}$

$= 10$cm

[4]

10. How long is side AB?



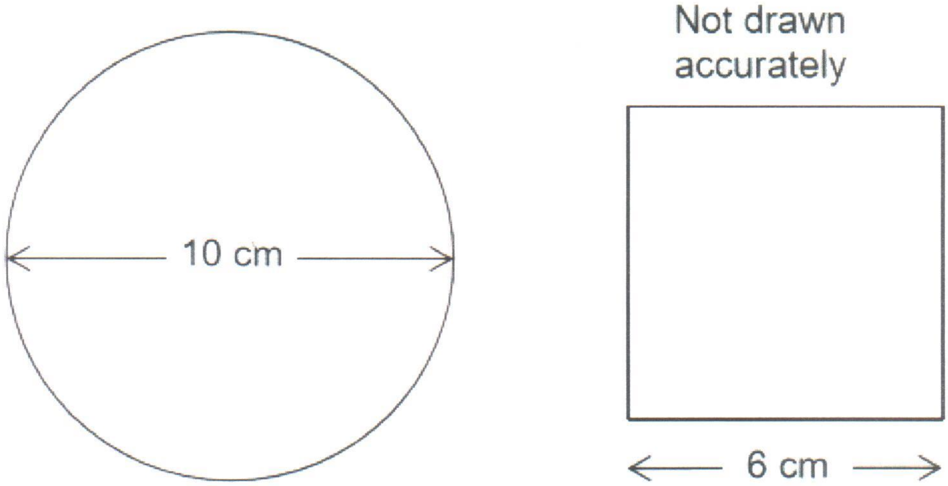
Tick a box.

Between 5 cm and 8 cm	☐	8 cm	☐
Between 8 cm and 13 cm	✓	More than 13 cm	☐

[1]

11. A circle has diameter 10 cm

A square has side length 6 cm



Use Pythagoras' theorem to show that the square will fit inside the circle without touching the edge of the circle.

Length of diagonal of square $= \sqrt{6^2 + 6^2}$

$= 8.5\text{cm} \ (1\text{dp})$

[3]

$\therefore$ square will fit into circle.