Lite GCSE Maths

Tigonometry & Pythagoras 1

Name:

Class:

Solutions

Author:

Date:

Time: **36**

Marks: **29**
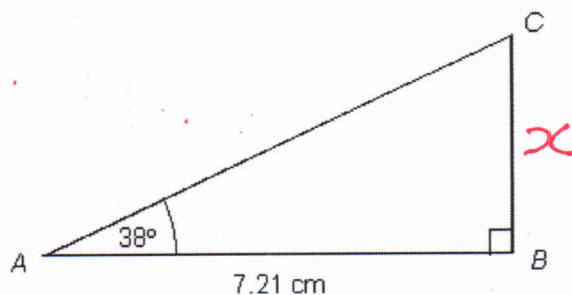
Comments:

Q1. Triangle *ABC* has a right angle at *B*.

Angle *BAC* = 38°

AB = 7.21 cm

Not drawn accurately

$\tan 38° = \dfrac{x}{7.21}$

Calculate the length of *BC*.

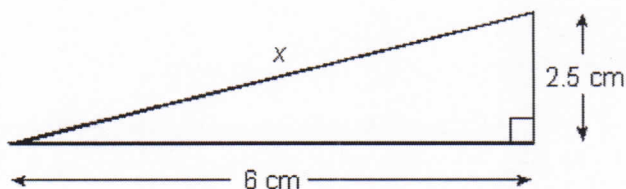Give your answer to an appropriate degree of accuracy.

$7.21 \tan 38° = x$

$x = 5.633 \text{ cm}$

Answer ...... 5.63 ...... cm

(Total 4 marks)

Q2. The diagram shows a right-angled triangle.

Not drawn accuratelly

Calculate the length x. **Pythagoras** $2.5^2 + 6^2 = x^2$

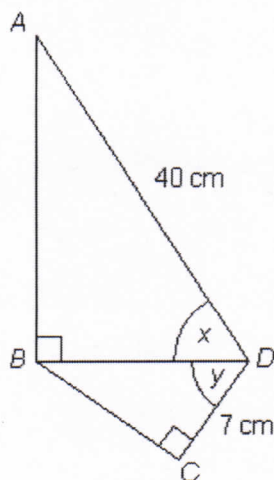$$42.25 = x^2$$

$$\sqrt{42.25} = x$$

Answer ~~6.5~~ $x = 6.5$ cm

(Total 3 marks)

Q3. The diagram shows two right-angled triangles.
$AD = 40$ cm
$CD = 7$ cm
$\cos x = \dfrac{5}{8}$

40 cm   Not drawn accurately

First work in $\triangle ABD$ to find BD

Then use Pythagoras in $\triangle BCD$ to find BC

Then $\sin y = \dfrac{BC}{BD}$

Find the value of sin *y*.

$$\cos x = \frac{BD}{40} \Rightarrow \frac{5}{8} = \frac{BD}{40}$$

$$BD = \frac{40 \times 5}{8} = 25 \, cm$$

Pythagoras $\quad 7^2 + BC^2 = BD^2$
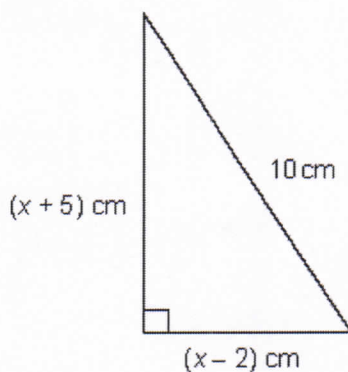
$$7^2 + BC^2 = 25^2$$

$$BC^2 = 25^2 - 7^2 = 576$$

$$BC = \sqrt{576} = 24 \, cm$$

$$\sin y = \frac{BC}{BD} = \frac{24}{25}$$

Answer $\quad \sin y = \frac{24}{25}$

(Total 6 marks)

Q4. This right-angled triangle has sides of lengths $(x - 2)$ cm, $(x + 5)$ cm and 10 cm.

Not drawn accurately

10 cm

$(x + 5)$ cm

$(x - 2)$ cm

Pythagoras $\quad (x-2)^2 + (x+5)^2 = 10^2$

$$x^2 - 4x + 4 + x^2 + 10x + 25 = 100$$

$$2x^2 + 6x + 29 - 100 = 0$$

$$2x^2 + 6x - 71 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-6 \pm \sqrt{36 + 4 \times 2 \times 71}}{4}$$

$$x = \frac{-6 \pm \sqrt{604}}{4}$$

Calculate the value of *x*.
Give your answer to an appropriate degree of accuracy.

$$x = \frac{-6 \pm 24.58}{4}$$

$$x = 4.645 \quad or \quad x = -7.645$$

In this context *x* cannot be negative

so $x = 4.65$ cm

Answer .... 4.65 .... cm

(Total 5 marks)

Q5. (a) Ali uses this method to estimate the height of a flag pole.

- He stands, as shown, so that his angle of sight is 45° when he looks up to the top of the flag pole.

- He then measures his distance from the flagpole.

- Finally he measures the distance that his eyes are above the ground.

This sketch shows Ali's measurements.

Not drawn accurately

Flagpole

8.7 m

1.45 m

Ali's line of sight

45°

1.45m

8.7 m
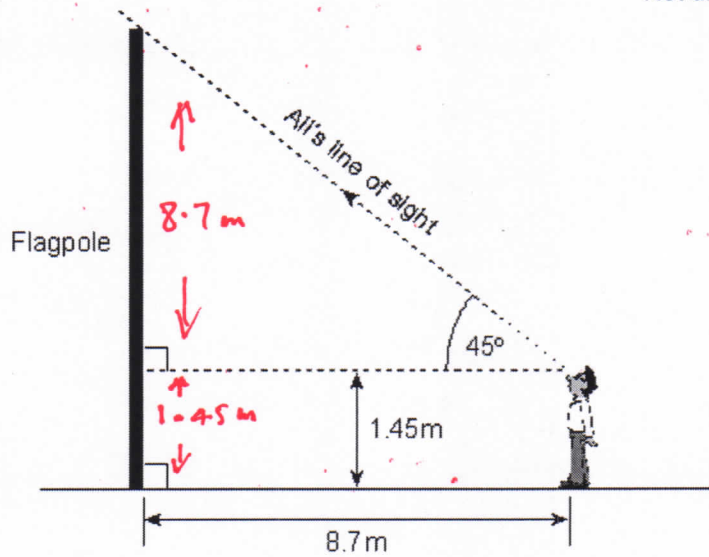
Use Ali's measurements to calculate the height of the flag pole, explaining why he uses an angle of 45°.

$8.7 + 1.45 = 10.15 m$

$45°$ angle makes isosceles △ so no need for trig calculations

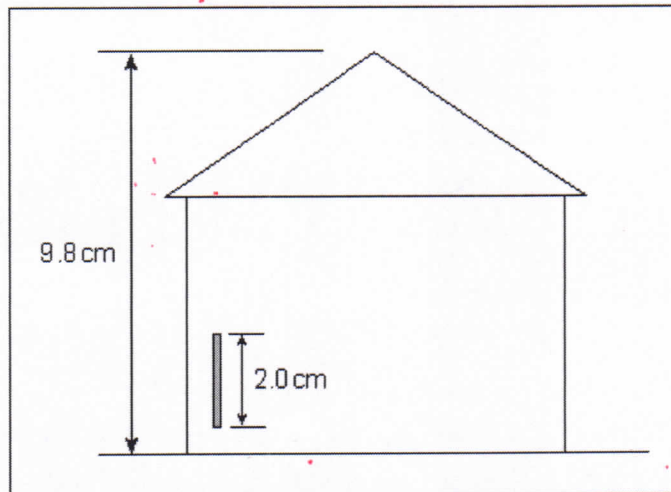Answer .... 10.15 .... m

(2)

(b) Ben uses this method to estimate the height of a building.

- He tapes a 1 metre ruler to the building.

- He takes a photograph of the building and the metre ruler.

On the graph he measures the height of the building and the length of the ruler.
The measurements are shown on this sketch.

Not drawn accurately

9.8 cm

2.0 cm

Use this information to estimate the height of the building.
Give your answer to the nearest metre.

2.0 cm multiplied by 50 to give 1 m

9.8 cm x 50 = 490 cm = 4.9 m

Answer .... 4.9 .... metres
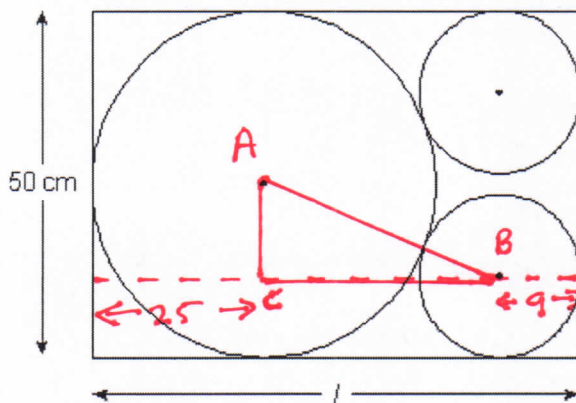
= 5 m to nearest m

(3)

(Total 5 marks)

Q6. Three circles fit inside a rectangle as shown.

Two of the circles are identical and the third is larger.
The circles have radii 9 cm, 9 cm and 25 cm.

Not drawn accurately

Calculate the length, *l*, of the rectangle.

$l = 25 + CB + 9$

$AC = 25 - 9 = 16$

$AB = 25 + 9 = 34$

Pythagoras

$AC^2 + BC^2 = AB^2$

$16^2 + BC^2 = 34^2$

$BC^2 = 34^2 - 16^2$

$BC^2 = 900$

$BC = \sqrt{900} = 30 \text{ cm}$

$l = 25 + 30 + 9 = 64 \text{ cm}$

Answer .... 64 .... cm

(Total 6 marks)