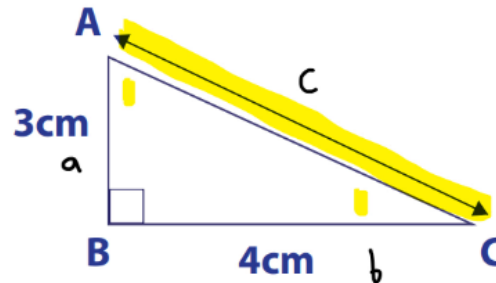


Trigonometry & Pythagoras

Question 1

ABC is a right angle triangle
Find the unknown length AC



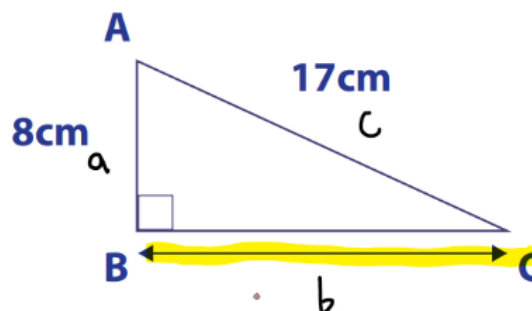
Topic: Trigonometry and Pythagoras' Theorem

3. Apply
2. $a^2 + b^2 = c^2$ ✓
1. Label (a, b, c) ✓

$$\begin{aligned} 3^2 + 4^2 &= c^2 \\ 9 + 16 &= c^2 \\ 25 &= c^2 \Rightarrow \sqrt{25} = c \\ &\underline{5 = c} \end{aligned}$$

Question 2

ABC is a right angle triangle
Find the unknown length BC



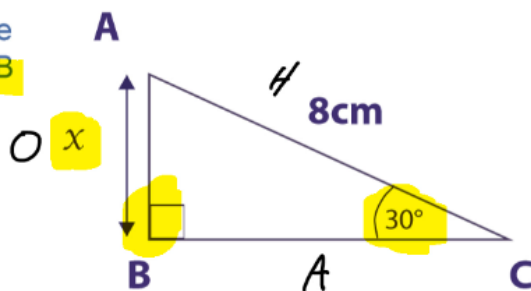
Topic: Trigonometry and Pythagoras' Theorem

3. Apply
2. $a^2 + b^2 = c^2$
1. Label (a, b, c)

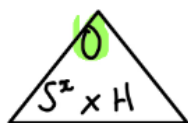
$$\begin{aligned} 8^2 + b^2 &= 17^2 \\ 64 + b^2 &= 289 \\ b^2 &= 289 - 64 \\ b^2 &= 225 \Rightarrow b = \sqrt{225} \Rightarrow \underline{b = 15} \end{aligned}$$

Question 3

ABC is a right angle triangle
Find the unknown length AB



SOH, CAH, TOA



$$= \sin(30) \times 8$$

$$= 4 \text{ cm}$$

Topic:

Trigonometry and
Pythagoras' Theorem

3. Apply ONE

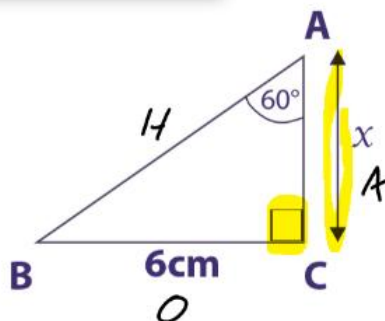
2.



1. Label sides(H,O,A)

Question 4

ABC is a right angle triangle
Find the unknown length AC
Give your answer to 3 significant figures.



SOH, CAH, TOA



$$= \frac{6}{\tan 60} = \frac{6}{\tan(60)} = 3.46 \text{ cm}$$

Topic:

Trigonometry and
Pythagoras' Theorem

3. Apply ONE

2.



1. Label sides(H,O,A)

Core 5 - Bronze

Topic:

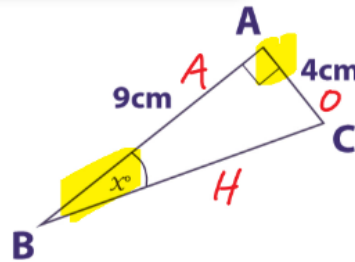
Trigonometry and
Pythagoras' Theorem

Question 5

ABC is a right angle triangle.

Find the unknown angle ABC

Give your answer to 3 significant figures.



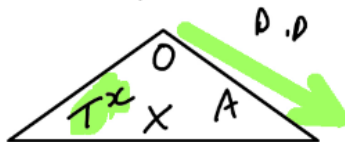
✓ 3. Apply ONE

✓ 2.



✓ 1. Label sides (H, O, A)

SOH, CAH, TOA



$$= \frac{O}{A} = \frac{4}{9}$$

$$\tan^{-1}\left(\frac{4}{9}\right) = \underline{24}$$

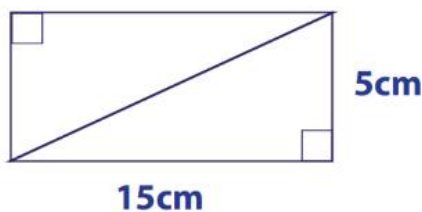
Core 6 - Silver

Topic:

Trigonometry and
Pythagoras' Theorem

Question 6

This rectangular frame is made from 5 straight pieces of metal.



$$\begin{aligned} \text{Total length} &= (2 \times 15) + (2 \times 5) + 15.81 \\ &= 30 + 10 + 15.81 \\ &= 55.81 \text{ cm} \end{aligned}$$

$$\begin{aligned} 5^2 + 15^2 &= c^2 \\ 250 &= c^2 \\ 15.81 &= c \end{aligned}$$

$$55.81 \text{ cm} = 0.5581 \text{ m}$$

$$0.5581 \times 2.5 = \underline{1.40}$$

The weight of the metal is 2.5 Kg per metre.

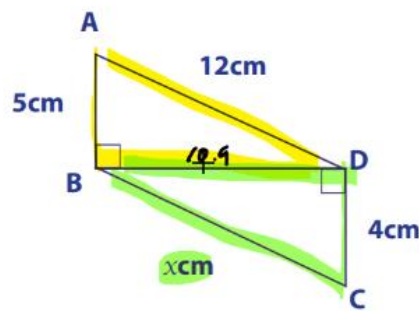
Work out the total weight of the metal in the frame (Give your answer in grams)

Core 7 - Silver

Topic: Trigonometry and Pythagoras' Theorem

Question 7

Triangles ABD and BCD are right angles triangles.



$$12^2 - 5^2 = BD^2$$

$$144 - 25 = 119$$

$$\sqrt{119} = 10.9 \text{ (3sf)}$$

$$10.9^2 + 4^2 = 135$$

$$11.6 = \sqrt{135}$$

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

Core 8 - Silver

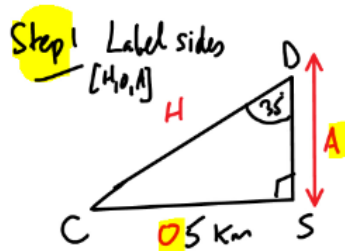
Topic: Trigonometry and Pythagoras' Theorem

Question 8

The diagram show two towns, C and D.

Ship S is exactly 5 km due east of town C and exactly due south of town D.

Town C is on a bearing of 215° from town D. Find the distance, ship S is due south of town D.



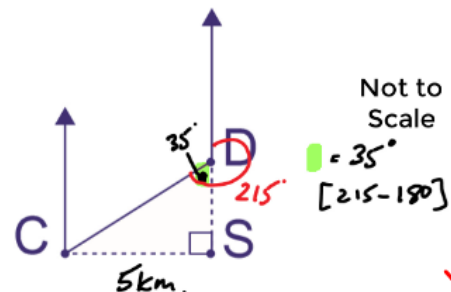
Step 1 Label sides
[40, A]
H

Step 2

SOH, CAH, TOA

Choose $\tan x$

[We have side O and need to find A]



Not to Scale

$\angle = 35^\circ$
[$215 - 180$]

Step 3 Apply

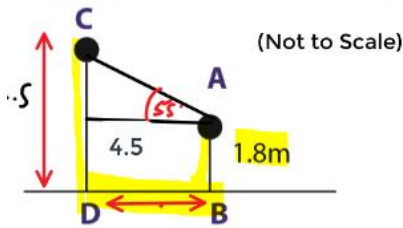
$$\frac{\text{Opposite}}{\text{Adjacent}} = \frac{O}{A} = \frac{5}{\tan 35}$$

$$= 7.14 \text{ km}$$

= Cover up

Question 9

The diagram shows two lamp posts, AB and CD on a horizontal ground.



$AB = 1.8\text{m}$

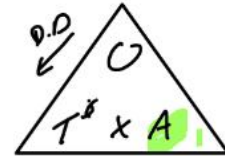
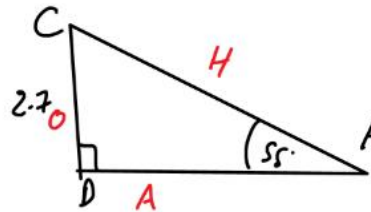
$CD : AB = 2.5 : 1$

The angle of elevation of C from A is 55°

Calculate the length of BD.

Give your answer to 3 significant figures.

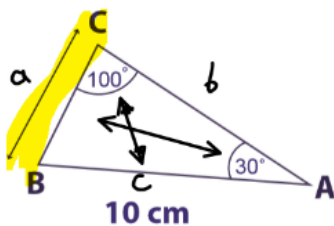
$1.8 \times 2.5 = 4.5\text{m}$



$\frac{2.5}{\tan 55} = 1.89\text{m}$

Question 10

a) Calculate the unknown length BC

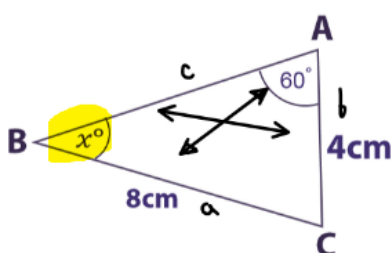


Step 1
Label (a, b, c)
+ Identify

Step 2
Choose formula
 $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Step 3
Substitute values
 $\frac{a}{\sin 30} = \frac{10}{\sin 100}$
 $\frac{a}{\sin 30} = 10.15 \dots$
 $a = 5.01 (2\text{sf})$

b) Calculate the unknown angle ABC



Step 1
✓
Step 2
 $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

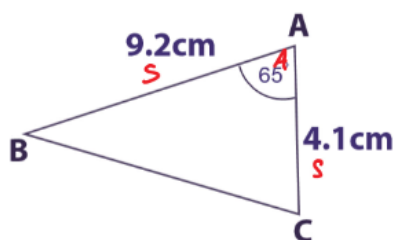
Step 3
Sub
 $\frac{\sin 60}{8} = \frac{\sin B}{4} \Rightarrow 0.108 = \frac{\sin B}{4} \Rightarrow \sin B = 0.43 \dots$
 $\sin^{-1}(0.43) = 25.7 (3\text{sf})$

Core 11 - Silver

Topic: Trigonometry and Pythagoras' Theorem

Question 11

Calculate the area of triangle ABC



$$= \frac{1}{2} \times 9.2 \times 4.1 \times \sin 65$$

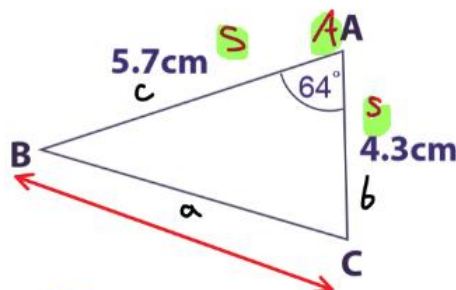
$$= \underline{17.1 \text{ cm}^2}$$

Core 12 - Silver

Topic: Trigonometry and Pythagoras' Theorem

Question 12

Calculate the length BC.



Step 1: Label & Identify

Step 2: Choose formula

$$a^2 = b^2 + c^2 - (2bc \cos A)$$

'AAA'

Step 3: Substitute values

$$a^2 = 4.3^2 + 5.7^2 - (2 \times 4.3 \times 5.7 \times \cos 64)$$

$$a^2 = 29.49$$

$$a = \sqrt{29.49}$$

$$a = \underline{5.43 \text{ (3sf)}}$$

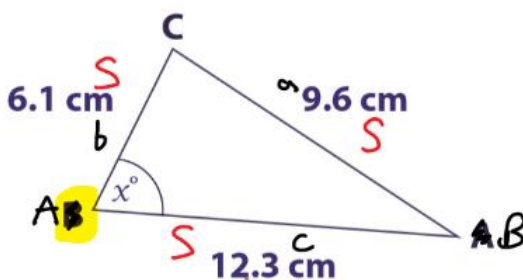
Question 13

Calculate the angle ABC.



Step 1: Label + Identify

'AAA'



Step 2: Choose Formula

$$\cos A = \frac{b^2 + c^2 - a^2}{(2bc)}$$

Step 3: Substitute values

$$= \frac{6.1^2 + 12.3^2 - 9.6^2}{(2 \times 6.1 \times 12.3)}$$

$$\cos A = 0.642$$

$$\cos^{-1}(0.642) = \underline{50.1(3sf)}$$

Question 14

The diagram shows two triangles adjoined to one another.

AB = 8cm BC = 10cm

Angle ADC = 66° Angle DCA = 32°

Calculate the length AD

Pythagoras

$$8^2 + 10^2 = AC^2$$

$$164 = AC^2$$

$$\sqrt{164} = AC \therefore 12.81$$

Step 1
✓

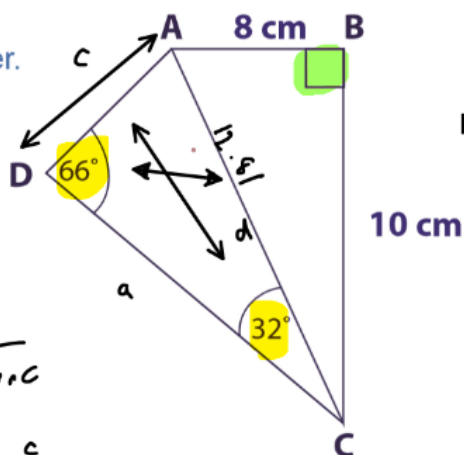
Step 2

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Step 3
Sub

$$\frac{12.81}{\sin 66} = \frac{c}{\sin 32}$$

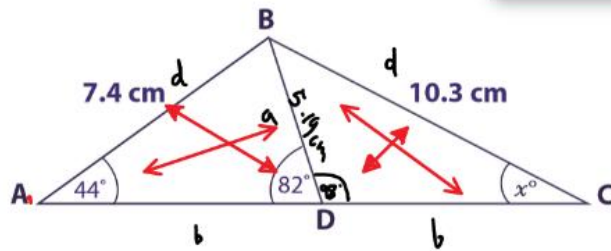
$$\frac{12.81 \sin 32}{\sin 66} = c \therefore c = \underline{7.43(3sf)}$$



Not to Scale

Question 15

ABC is a triangle. D is a point on line AC
AB = 7.4 cm and BC = 10.3 cm
Angle BAD = 44° Angle BDA = 82°
Calculate the angle DCB



Step 1: Label + Identify

Step 2: Apply $\frac{a}{\sin 44} = \frac{7.4}{\sin 82}$

Step 3: sub $\frac{a}{\sin 44} = 7.47$
 $\therefore a = 5.19$

$BDC = 98 [180 - 82]$

Now look at + apply same three steps

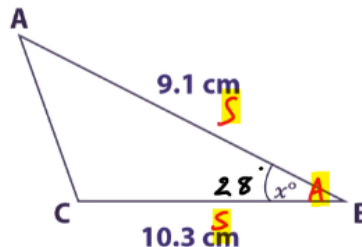
$\frac{\sin C}{5.19} = \frac{\sin 98}{10.3} \therefore \frac{\sin C}{5.19} = 0.096$

$\sin C = 0.499$
 $C = \sin^{-1}(0.499)$
 $= 29.9^\circ (3sf)$

Question 16

The area of the triangle ABC is 22cm^2
AB = 9.1cm CB = 10.3cm

Calculate the angle ABC



Let's find x by rearranging Sine Area formula

$\frac{1}{2} \times 10.3 \times 9.1 \times \sin B = 22$
 $\frac{10.3 \times 9.1 \times \sin B}{2} = 22$

$93.73 \times \sin B = 44$

$\sin B = \frac{44}{93.73}$

$B = \sin^{-1}(0.468) \therefore B = 28^\circ$



Identify ✓

Question 17

The shape shows triangles ABC and ADC

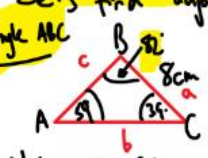
Angle $BAC = 59^\circ$ Angle $BCA = 39^\circ$ Angle $DAC = 28^\circ$

$BC = 8\text{cm}$ and $AD = 4\text{cm}$

Calculate length DC

Let's find adj. length BC first. [Sine Rule]

Angle ABC



Using sine rule

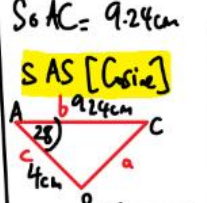
$$\frac{b}{\sin 82} = \frac{8}{\sin 59}$$

$$\frac{b}{\sin 82} = 9.33$$

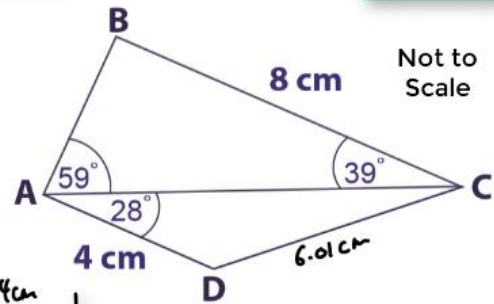
$$b = 9.24\text{cm}$$

So $AC = 9.24\text{cm}$

SAS [Cosine]



Let's call this B



Not to Scale

$$a^2 = b^2 + c^2 - (2bc \cos A)$$

$$a^2 = 9.24^2 + 4^2 - (2 \times 9.24 \times 4 \times \cos 28)$$

$$a^2 = 36.11$$

$$a = 6.01 (3\text{sf})$$

$$\underline{DC = 6.01\text{cm}}$$



Question 18

ABC is a triangle. BC is 7.3cm BD is 7.4cm

The line AC is such that $AD:DC = 2:1$. AC is 7.5cm

Calculate the length AB (Write to 3 sf)

SSS



SSS

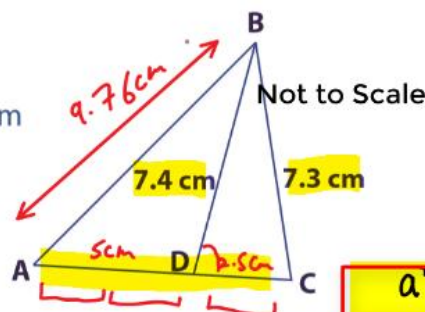
$$\cos A = \frac{b^2 + c^2 - a^2}{(2bc)}$$

$$= \frac{2.5^2 + 7.4^2 - 7.3^2}{(2 \times 2.5 \times 7.4)}$$

$$\cos A = (0.20964)$$

$$\cos^{-1}(0.20964)$$

$$A = 77.96^\circ [77.9568...]$$



Not to Scale

SAS

$$a^2 = b^2 + c^2 - (2bc \cos A)$$

$$= 5^2 + 7.4^2 - (2 \times 5 \times 7.4 \times \cos(77.96))$$

$$a^2 = 95.2$$

$$a = \sqrt{95.2}$$

$$\underline{a = 9.76 (3\text{sf})}$$