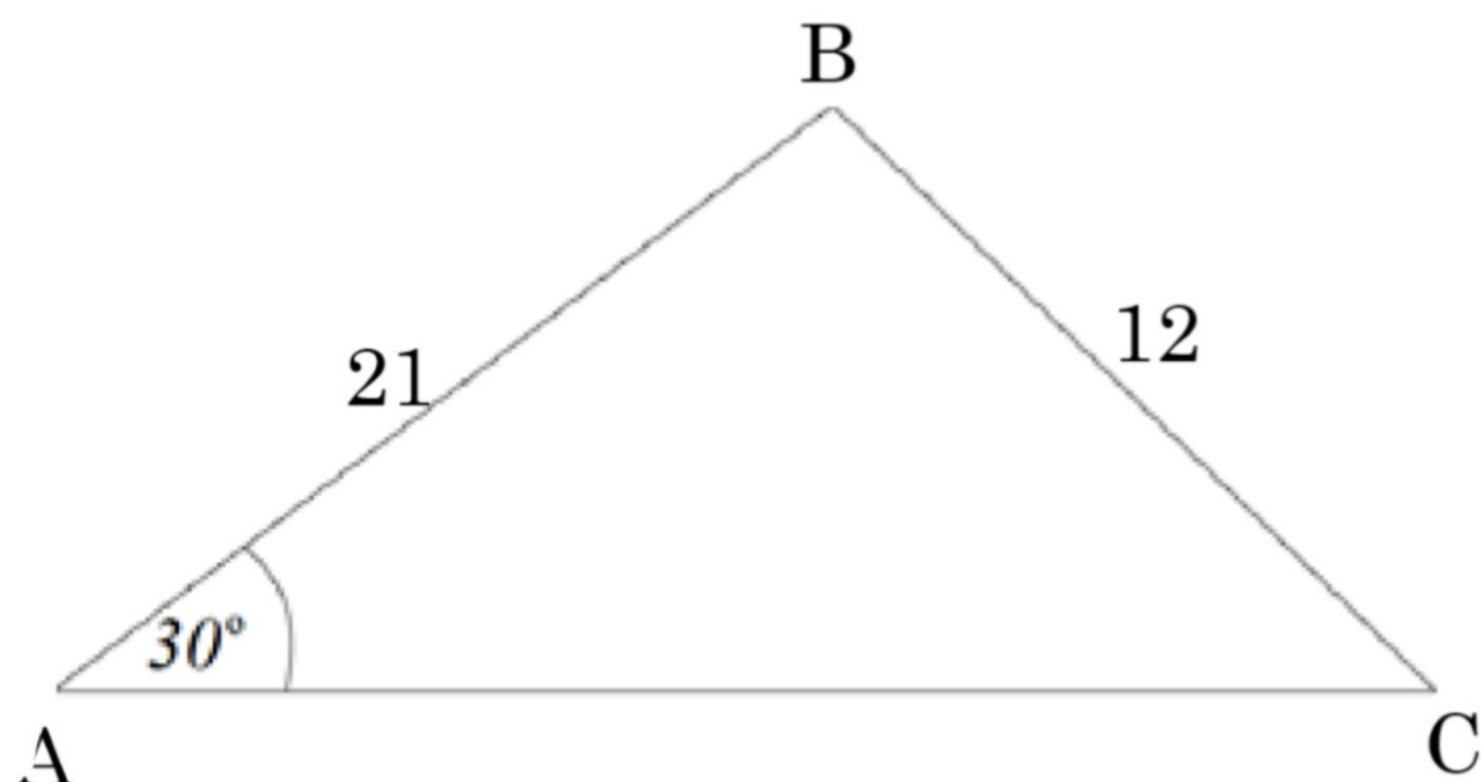# The Sine Rule Exam Practice

Q1. Find the size of the acute angle BCA in the triangle below to 1 decimal place.

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

$$\frac{\sin 30}{12} = \frac{\sin C}{21}$$
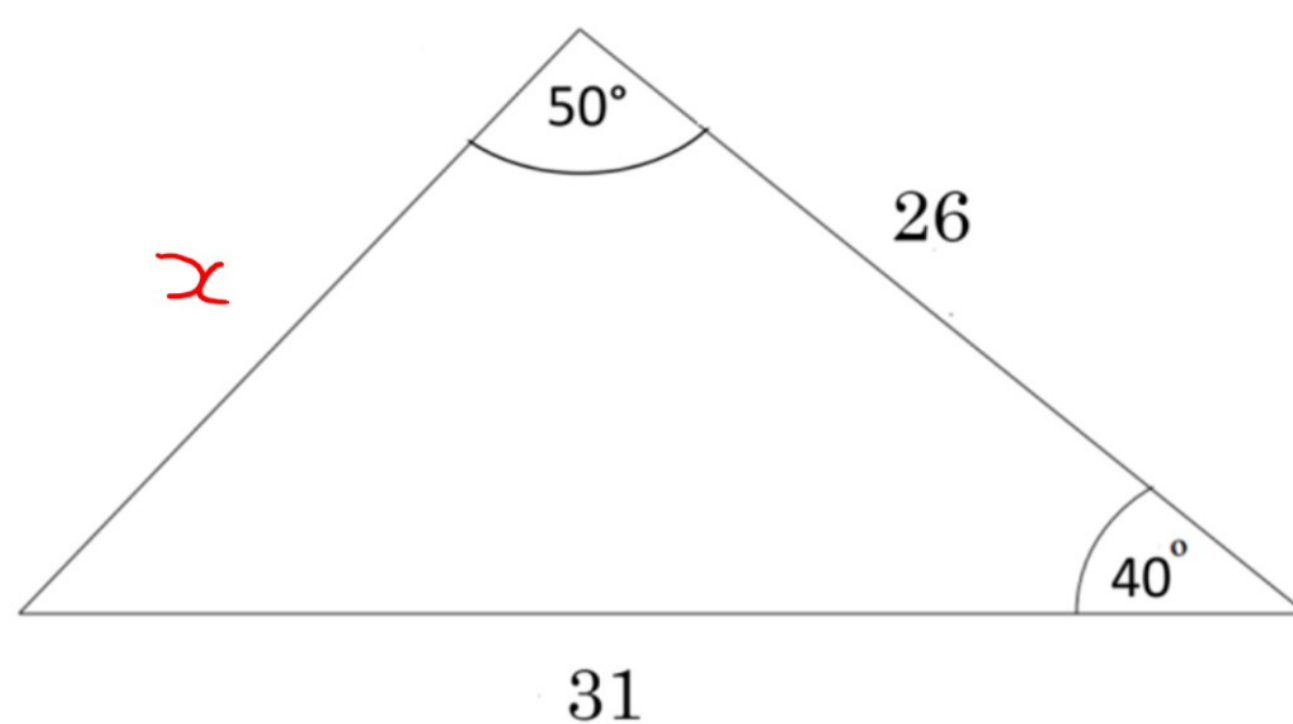
$$\frac{21 \sin 30}{12} = \sin C$$

$$C = \sin^{-1}\left(\frac{21 \sin 30}{12}\right)$$

$$\Rightarrow C = 61.04$$

Answer: $61.0°$

(2 marks)

Q2. Find the length of the missing side in the triangle shown to 1 decimal place.
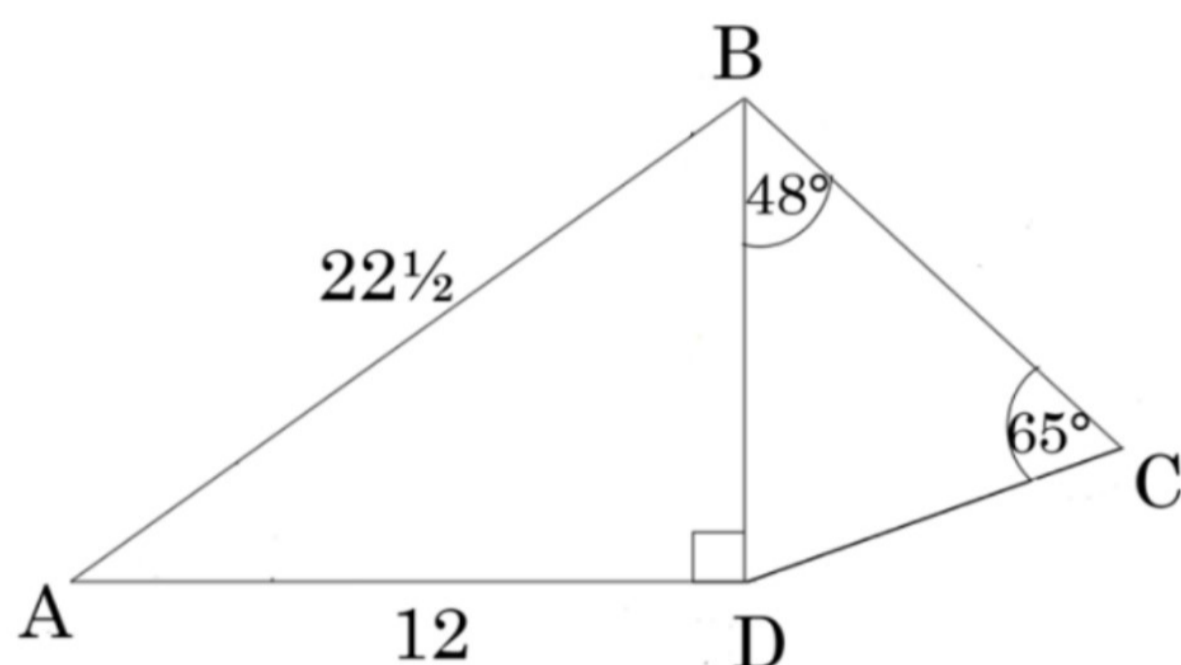

$$\frac{x}{\sin 40} = \frac{31}{\sin 50}$$

$$x = \frac{31 \sin 40}{\sin 50}$$

$$x = 26.01$$

Answer: __26.0_____

(2 marks)

Q3. Find the length of the side BC in the triangle below to 2 decimal places.

B

48°

22½

65° C

A   12   D

- $BD = \sqrt{(AB)^2 - (AD)^2}$ by Pythagoras' Theorem

  $= \sqrt{22.5^2 - 12^2}$

  $= 19.032...$

- $\dfrac{BC}{\sin 67} = \dfrac{19.032}{\sin 65}$

$\Rightarrow BC = \dfrac{19.032 \times \sin 67}{\sin 65}$

$BC = 19.331...$

$= 19.33$

Answer: __19.33__

(2 marks)

Q4. The area of the triangle below is 542.22 squared units.

Find the size of the missing side to 1 decimal place.

35

42.34°

x

31
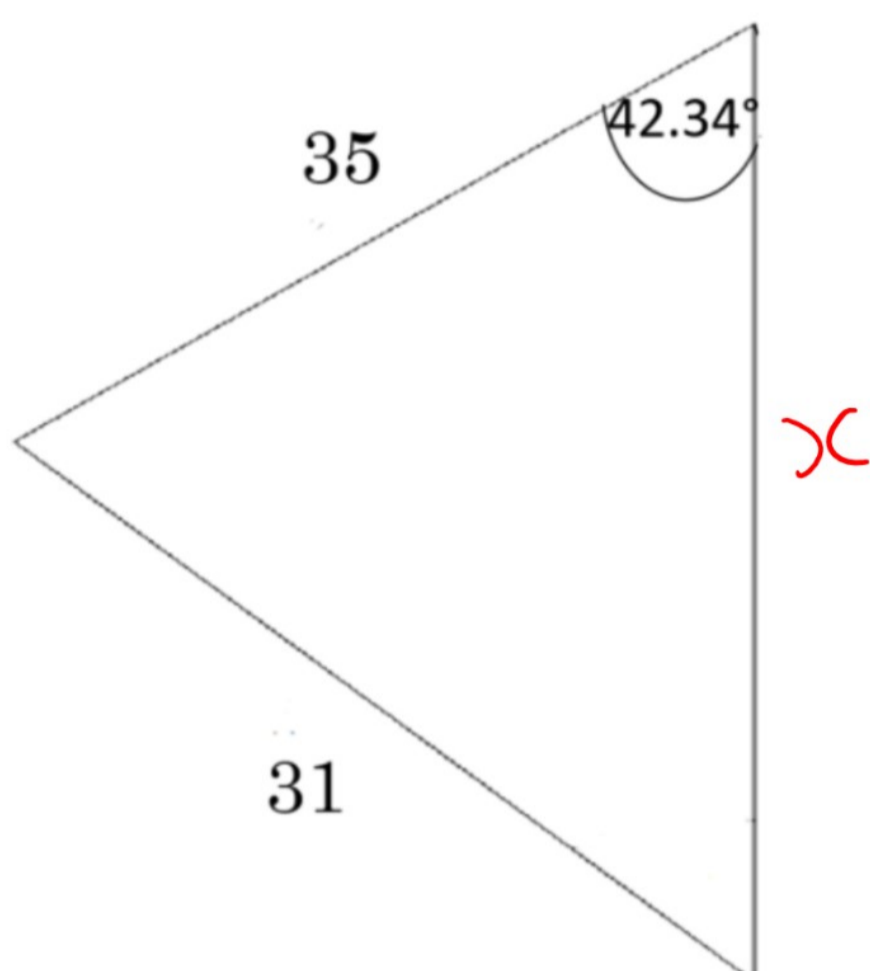
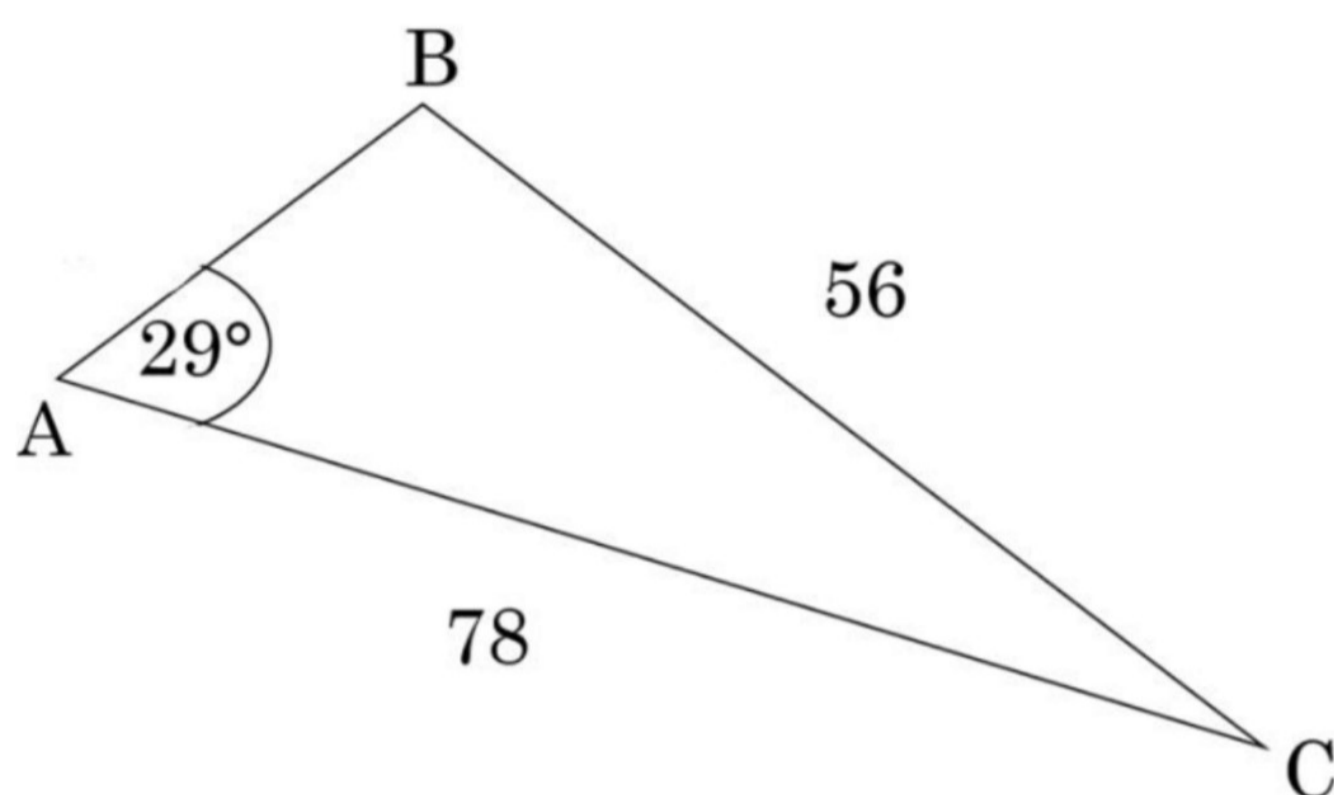$\frac{1}{2} \times 35 \times x \times \sin(42.34) = 542.22$

$x = 46.00$

$= 46.0$

Answer: 46.0

(2 marks)

Q5. Find the obtuse angle B.

$\dfrac{\sin B}{78} = \dfrac{\sin 29}{56}$

$\sin B = \dfrac{78 \sin 29}{56}$
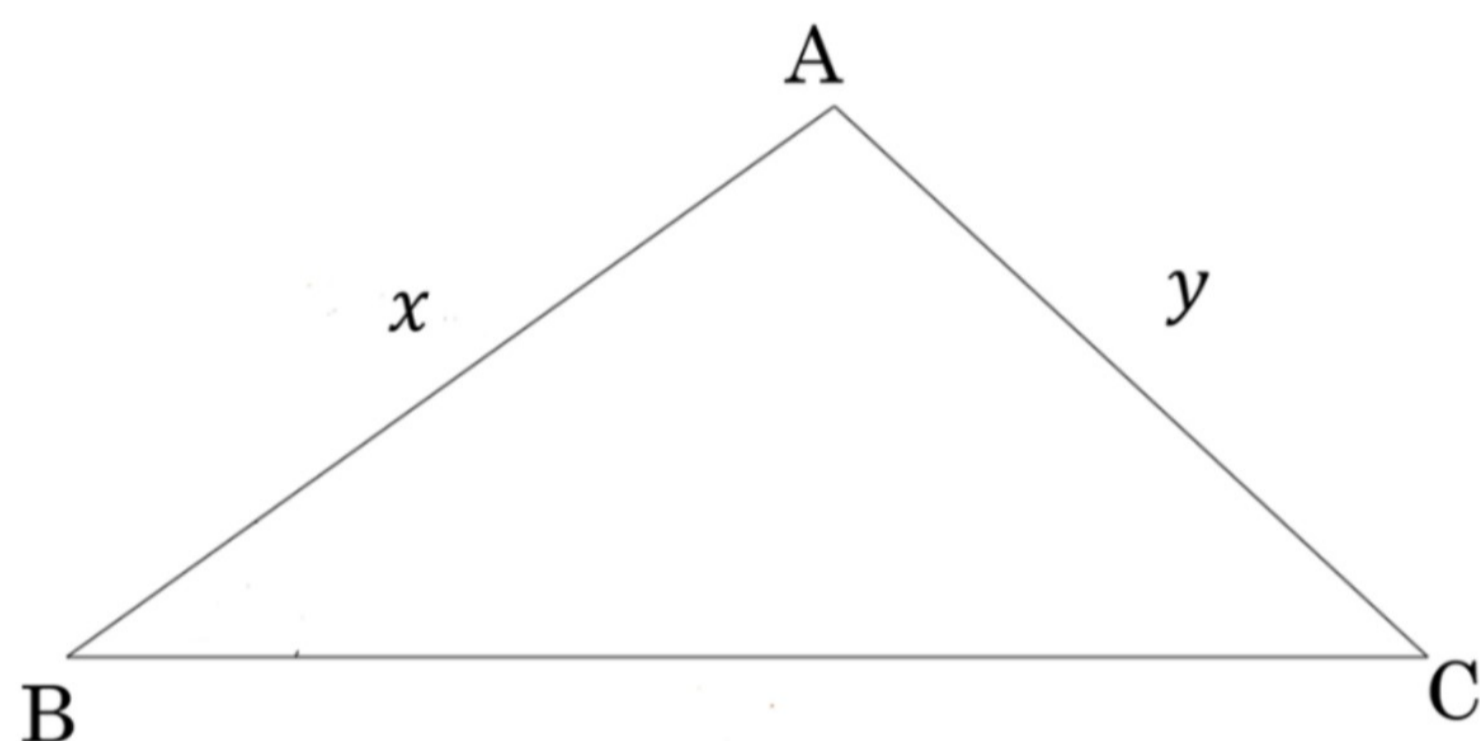
$B = \sin^{-1}\left(\dfrac{78 \sin 29}{56}\right)$

$B = 42.475$

$\Rightarrow$ B obtuse, so $B = 180 - 42.475$

$= 137.5°$

Answer: $137.5°$

(4 marks)

Q6. You are given that $\sin(A) = \frac{84}{85}$, $\sin(B) = \frac{8}{17}$ and $\sin(C) = \frac{4}{5}$.

a) Use the sine rule to show that $y = \frac{17}{10}x$

$$\frac{y}{\sin B} = \frac{x}{\sin C}$$

$$\frac{y}{8/17} = \frac{x}{\frac{4}{5}} \implies \frac{4y}{5} = \frac{8x}{17}$$

$68y = 40x$

$y = \frac{40x}{68} \implies y = \frac{10}{17}x$

Answer:_____

(3 marks)

b) The area of the triangle is 21cm^2. Find the value of x and y.

$\text{Area} = \frac{1}{2}bc\sin A$

$\implies 21 = \frac{1}{2} \times x \times \frac{10}{17}x \times \frac{84}{85}$

$\implies 21 = \frac{84}{289}x^2$

$\implies 72.25 = x^2$

$x = \underline{8.5}$, $y = \frac{10}{17}(8.5)$

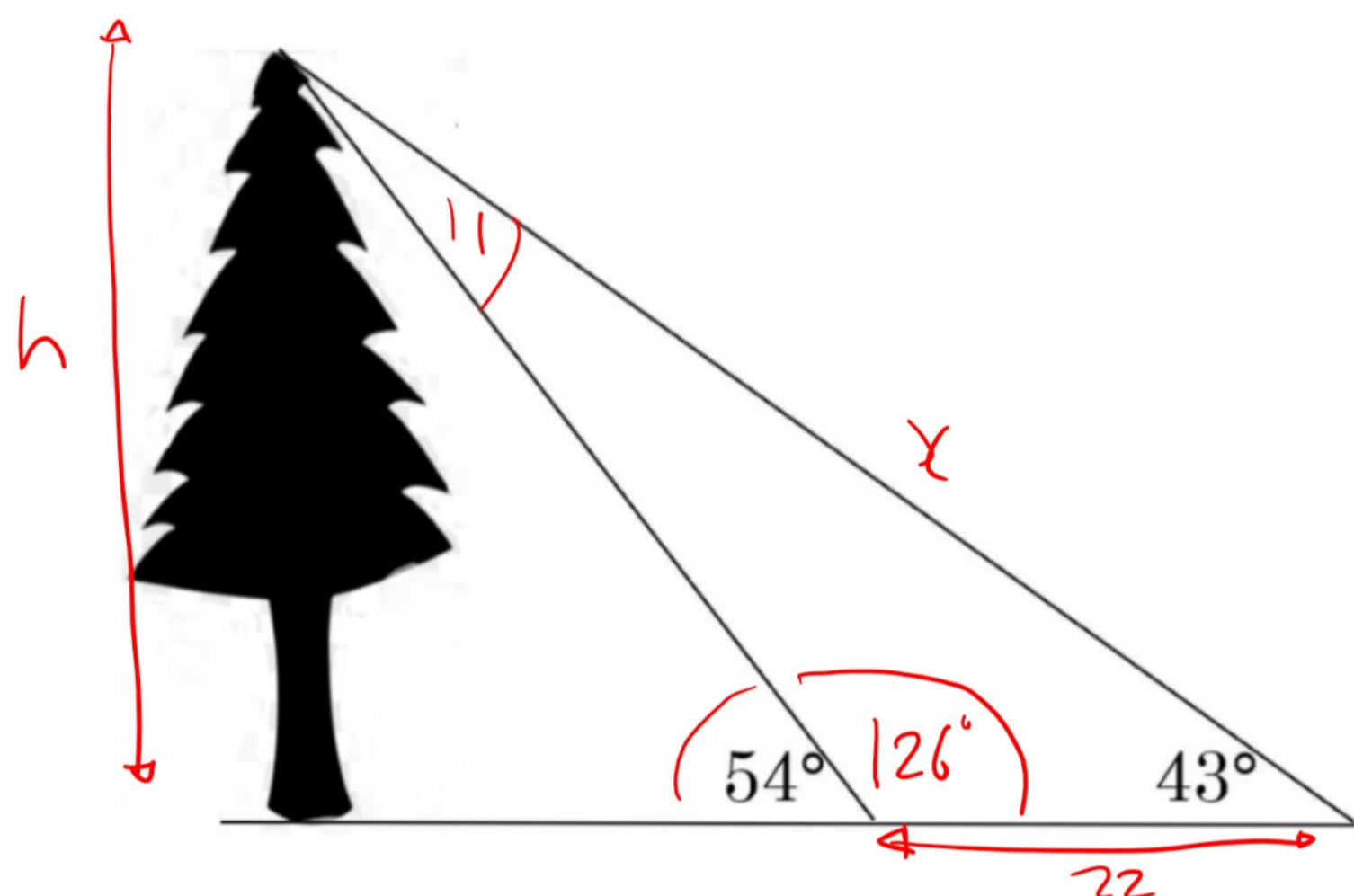$y = \underline{5}$

Answer:_$x = 8.5, y = 5$_____

(3 marks)

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Q7. Two people stand facing a tall tree in a straight line. Each person measures their angle of elevation to the top of the tree.

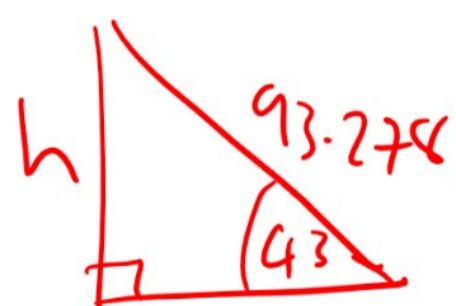The distance between the people is 22 m. Find the height of the tree to the nearest cm.

- Find x using the Sine rule.

$$\frac{x}{\sin(126)} = \frac{22}{\sin(11)}$$

$$\rightarrow x = \frac{22 \times \sin(126)}{\sin(11)}$$

$$\rightarrow x = 93.278\cdots$$

- Find h using 'Soh Cah Toa' relationships
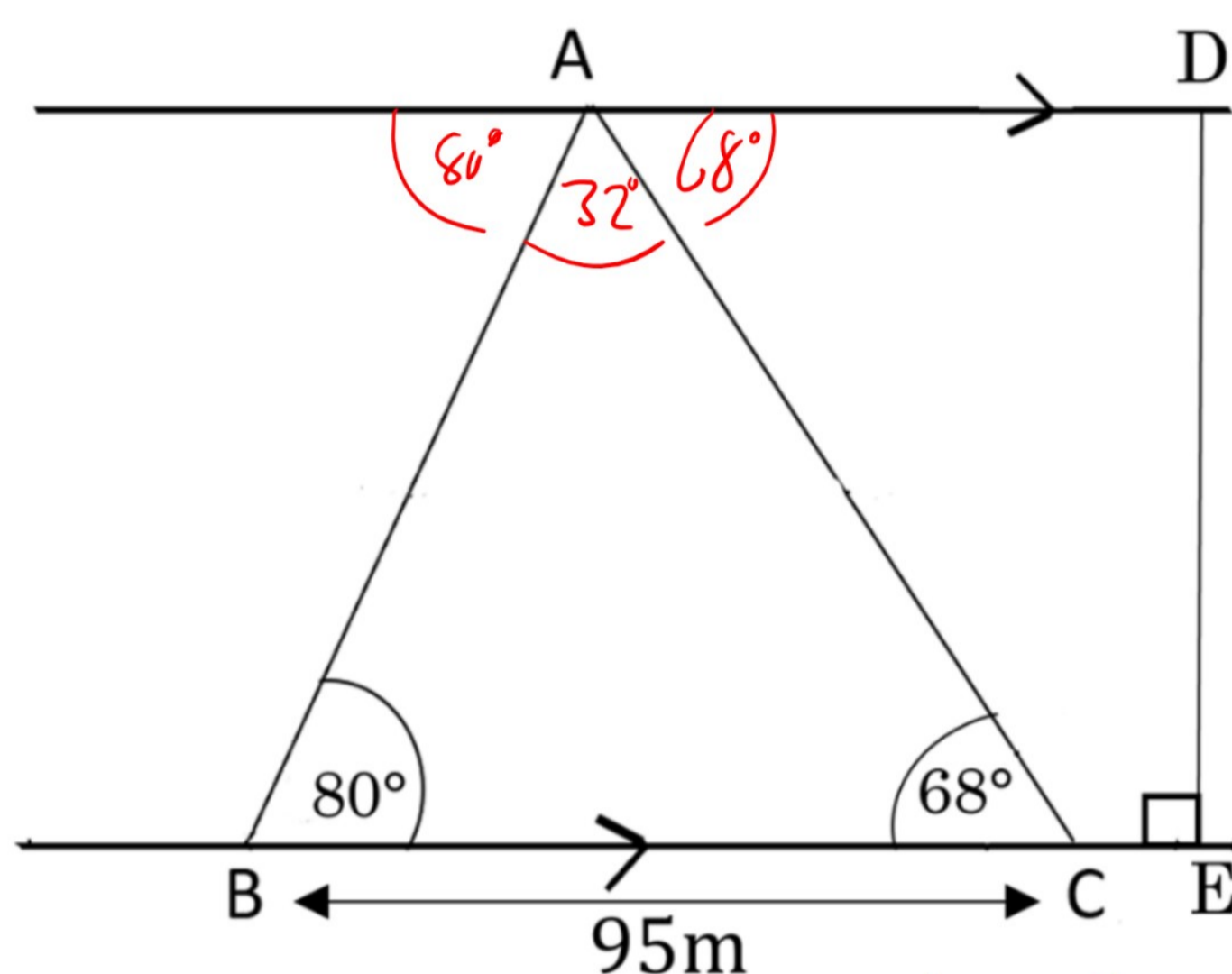
$$\sin(43) = \frac{h}{93.278}$$

$$h = 63.615 \text{ m}$$
$$= 63.62 \text{ m}$$

Answer: ___63.62 m___

(4 marks)

Q8. Below is a diagram of a river with parallel river banks. There are 3 bridges which cross the river: AB, AC and DE. Three boys cross the river each using a different bridge, each at a constant 2 m/s.
Work out the difference between the slowest and fastest times to the nearest second.

(AB)

$$\frac{AB}{\sin 68} = \frac{95}{\sin 32}$$

$$\Rightarrow AB = \frac{95 \times \sin 68}{\sin 32}$$

$$= 166.218.. \, m$$
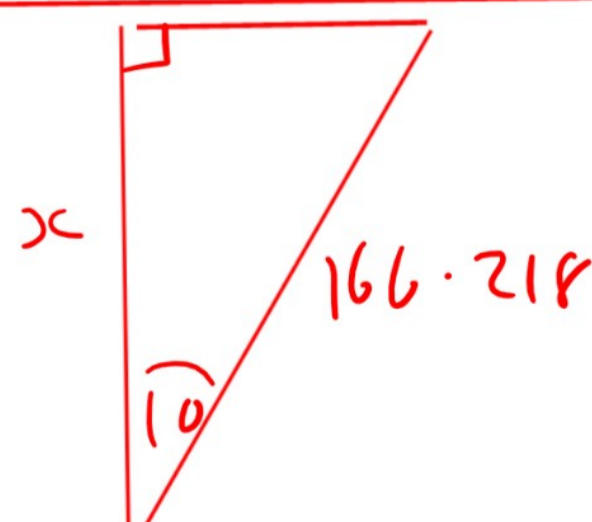
$$Time = \frac{166.218}{2}$$

$$= 83.109 \, s$$

(AC)

$$\frac{AC}{\sin 80} = \frac{95}{\sin 32}$$

$$\Rightarrow AC = 176.549.. \, m$$

$$Time = 88.274.. \, s$$

let DE = x.

$$\Rightarrow \cos(10) = \frac{x}{166.218}$$

$$\Rightarrow x = 163.69$$

$$Time = 81.846... \, s$$

• slowest - fastest
$$= 88.274 - 81.846$$
$$= 6.42$$

Answer: __6 seconds__

(6 marks)

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