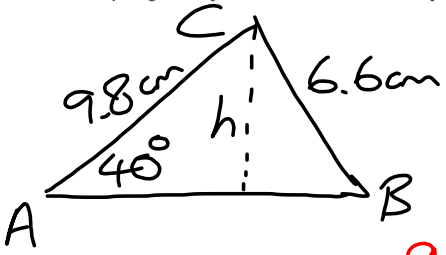
Solutions

2. A triangular plot of land is enclosed by a fence. Two sides of the fence are 9.8 m and 6.6 m long, respectively. The other side forms an angle of 40° with the 9.8 m side.

a) Draw a sketch of the situation.

b) Calculate the height of the triangle to the nearest tenth. Compare it to the given sides.

c) How many lengths are possible for the third side? Explain.



Check for # of triangles

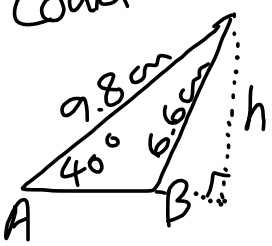
$b \sin A < a < b$

$9.8 \sin 40 < 6.6 < 9.8$

height $h = b \sin A \rightarrow 6.3 < 6.6 < 9.8$

$= 6.3$ cm $\Rightarrow$ TRUE, so there are two possible triangles.

Could also have



3. Determine whether it is possible to draw a triangle, given each set of information. Sketch all possible triangles where appropriate. Label all side lengths to the nearest tenth of a centimetre and all angles to the nearest degree.

a) $a = 5.2$ cm, $b = 2.8$ cm, $\angle B = 65°$

Check $a\sin B < b < a$

$5.2\sin 65 < 2.8 < 5.2$

height — $4.7 < 2.8 < 5.2$ — side length

$\Rightarrow$ FALSE.

shorter than height

$\Rightarrow$ NO TRIANGLE POSSIBLE

3. Determine whether it is possible to draw a triangle, given each set of information. Sketch all possible triangles where appropriate. Label all side lengths to the nearest tenth of a centimetre and all angles to the nearest degree.

b) $b = 6.7$ cm, $c = 2.1$ cm, $\angle C = 63°$

Check $b\sin C < c < b$

$6.7\sin 63 < 2.1 < 6.7$

height — $6.0 < 2.1 < 6.7$ — side length

$\Rightarrow$ FALSE.

shorter than height

$\Rightarrow$ NO TRIANGLE POSSIBLE

3. Determine whether it is possible to draw a triangle, given each set of information. Sketch all possible triangles where appropriate. Label all side lengths to the nearest tenth of a centimetre and all angles to the nearest degree.

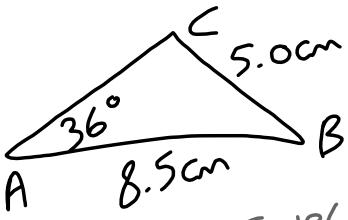
c) $a = 5.0$ cm, $c = 8.5$ cm, $\angle A = 36°$

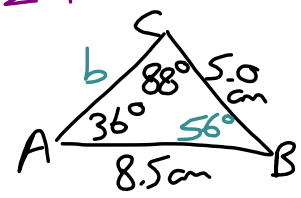
Check $c\sin A < a < c$

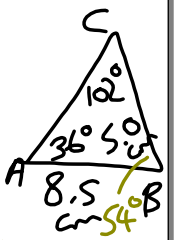
$8.5\sin 36 < 5.0 < 8.5$

$4.996 < 5.0 < 8.5$

$\Rightarrow$ TRUE $\Rightarrow$ 2 TRIANGLES POSSIBLE







$\frac{\sin C}{8.5} = \frac{\sin 36}{5.0}$

$\sin C = \frac{8.5\sin 36}{5.0}$

$C = 88°$ or $92°$

$\frac{b}{\sin 56} = \frac{5.0}{\sin 36}$

$b = \frac{5.0\sin 56}{\sin 36}$

$b = 7.1$ cm

$\frac{b}{\sin 52} = \frac{5.0}{\sin 36}$

$b = \frac{5.0\sin 52}{\sin 36}$

$b = 6.7$cm

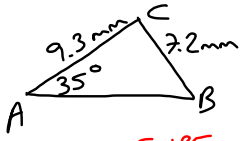
5. Where appropriate, sketch all possible triangles, given each set of information. Label all side lengths to the nearest tenth of a centimetre and all angles to the nearest degree.

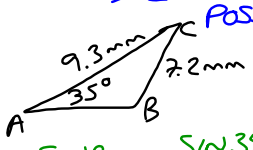
a) $a = 7.2$ mm, $b = 9.3$ mm, $\angle A = 35°$

$b\sin A < a < b$

$9.3\sin 35 < 7.2 < 9.3$ $\Rightarrow$ TRUE

$5.33 < 7.2 < 9.3$ $\Rightarrow$ 2 TRIANGLES POSSIBLE





$\frac{\sin B}{9.3} = \frac{\sin 35}{7.2}$

$\sin B = \frac{9.3\sin 35}{7.2}$

$\angle B = \sin^{-1}(\text{ANS})$

$\angle B = 48°$

$\Rightarrow \angle C = 180 - 35 - 48$

$= 97°$

$\frac{b}{\sin 97} = \frac{7.2}{\sin 35}$

$b = \frac{7.2\sin 97}{\sin 35}$

$b = 12.5$mm

$\frac{\sin B}{9.3} = \frac{\sin 35}{7.2}$

$\sin B = \frac{9.3\sin 35}{7.2}$

$\angle B = \sin^{-1}(\text{ANS})$

$\angle B = 48°$

But $\angle B$ is obtuse

$\Rightarrow 180 - 48° = 132°$

$\Rightarrow \angle C = 180 - 132 - 35$

$= 13°$

$\frac{c}{\sin 13} = \frac{7.2}{\sin 35}$

$c = \frac{7.2\sin 13}{\sin 35}$

$c = 2.8$mm

5. Where appropriate, sketch all possible triangles, given each set of information. Label all side lengths to the nearest tenth of a centimetre and all angles to the nearest degree.

b) $a = 7.3$ m, $b = 14.6$ m, $\angle A = 30°$

Check $b\sin A < a < b$

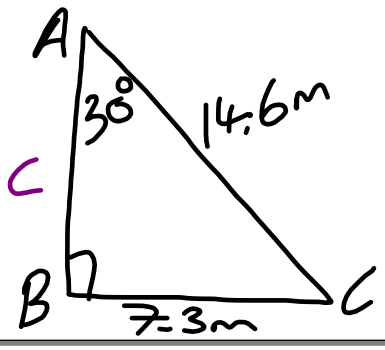
$14.6\sin 30 < 7.3 < 14.6$

$7.3 < 7.3 < 14.6$

$\Rightarrow$ ONE TRIANGLE

As $b\sin A = a$ and b = hypotenuse

height



$c^2 = 14.6^2 - 7.3^2$

$c^2 = 159.87$

$c = 12.6$ m

$\angle C = 180 - 30 - 90 = 60°$

5. Where appropriate, sketch all possible triangles, given each set of information. Label all side lengths to the nearest tenth of a centimetre and all angles to the nearest degree.

c) $a = 1.3$ cm, $b = 2.8$ cm, $\angle A = 33°$

Check $b\sin A < a < b$

$2.8\sin 33 < 1.3 < 2.8$

$1.5 < 1.3 < 2.8$

$\Rightarrow$ FALSE.

not long enough to make the perpendicular height

$\Rightarrow$ NO TRIANGLE POSSIBLE

5. Where appropriate, sketch all possible triangles, given each set of information. Label all side lengths to the nearest tenth of a centimetre and all angles to the nearest degree.

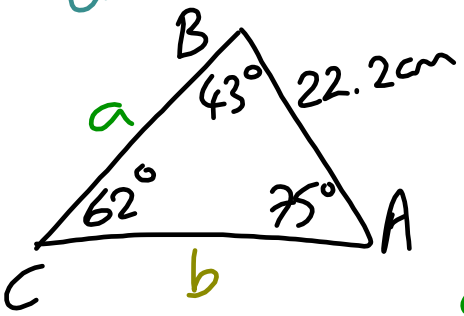
d) $c = 22.2$ cm, $\angle A = 75°$, $\angle B = 43°$

We have 2 angles

$\Rightarrow \angle C = 180 - 75 - 43$

$= 62°$

As we know all 3 angles, there is only one triangle possible.



$\frac{a}{\sin 75} = \frac{22.2}{\sin 62}$

$a = \frac{22.2 \sin 75}{\sin 62}$

$a = 24.3$cm

$\frac{b}{\sin 43} = \frac{22.2}{\sin 62}$

$b = \frac{22.2 \sin 43}{\sin 62}$

$b = 17.1$cm