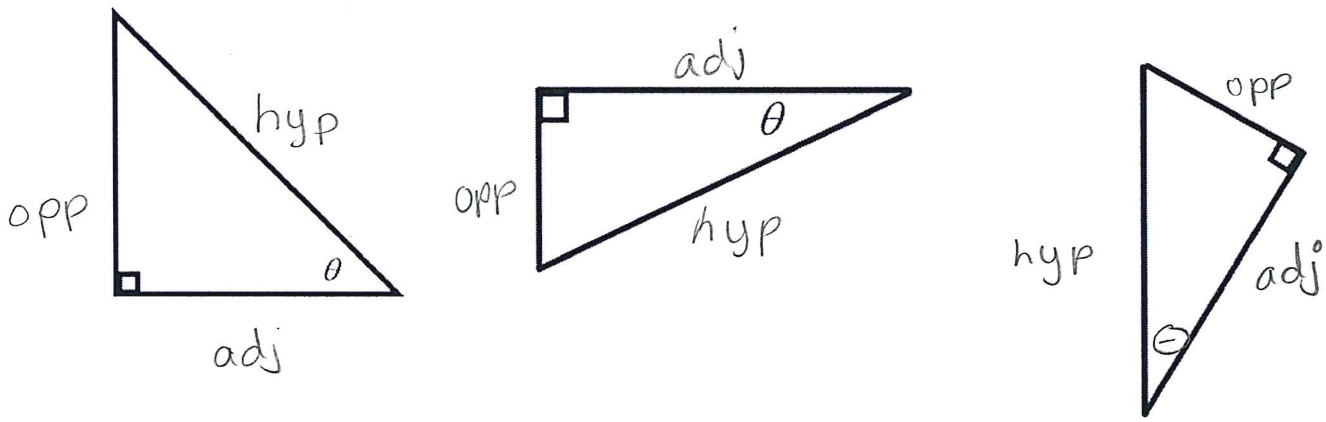
Solutions

STATION A

1. Label each of the triangles with hypotenuse, opposite and adjacent for the indicated angle.



2. a) Determine the value of sin 44°.

$\sin 44 = 0.7$

b) Determine the angle if cos C = 0.5983.

$C = \cos^{-1}(0.5983)$

$C \doteq 53$

$\therefore C = 53°$

Solutions.

STATION B

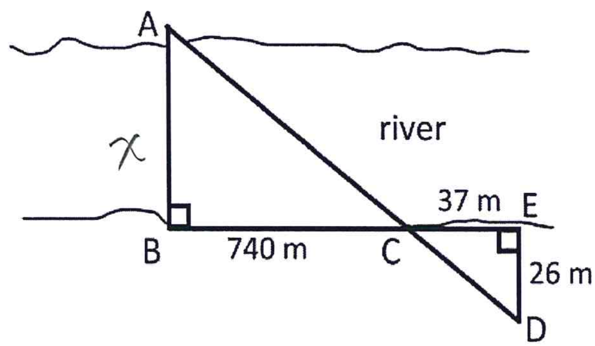
1) The following is a diagram of the Ottawa river. Since it is not possible to measure the distance across the river directly, indirect measurement must be used, as shown.

a) Prove that the two triangles are similar.

(A) $\angle ABC = \angle DEC$ given

(A) $\angle ACB = \angle DCE$ OAT

$\therefore \triangle ABC \sim \triangle DEC$



b) Using similar triangles, compute the distance across the river.

$$\frac{x}{26} = \frac{740}{37}$$

$$x = \frac{26(740)}{37}$$

$$x = 520$$

OR

$$\text{scale} = \frac{740}{37}$$

$$= 20$$

$$x = 26(20)$$

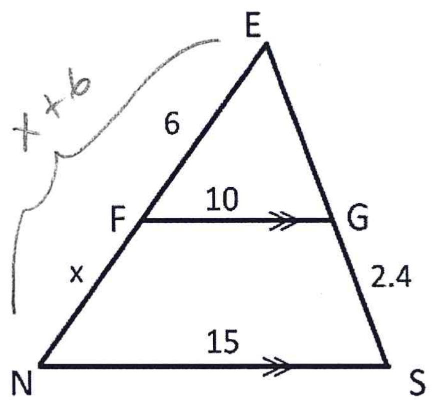
$$x = 520$$

$\therefore$ The river is 520m.

Solutions

STATION C

Given that the two triangles below are similar, find the value of x as indicated on the diagram.



$$\frac{6}{x+6} = \frac{10}{15}$$

$$10(x+6) = 6(15)$$

$$10x + 60 = 90$$

$$10x = 90 - 60$$

$$10x = 30$$

$$x = 3$$

OR

$$\text{Scale} = \frac{15}{10} = 1.5$$

$$EN = 6(1.5) = 9$$

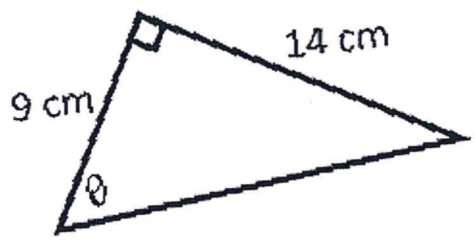
$$x = EN - EF = 9 - 6 = 3$$

$\therefore x = 3$ units

Solutions.

STATION D

1. Solve for the unknown as indicated in the triangle below.



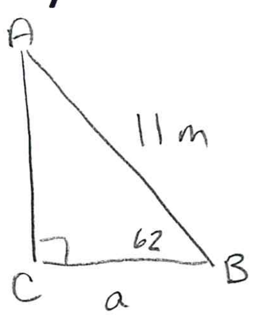
$\tan\theta = \frac{14}{9}$

$\theta = \tan^{-1}\left(\frac{14}{9}\right)$

$\theta \doteq 57.3$

$\therefore \theta = 57.3°$

3. In ΔABC, $C = 90°$, $B = 62°$ and c=11 m. Find the length of side a. Include a labeled diagram with your solution.



$\cos 62 = \frac{a}{11}$

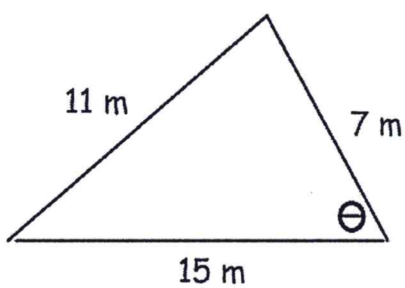
$11\cos 62 = a$

$5.2 \doteq a$

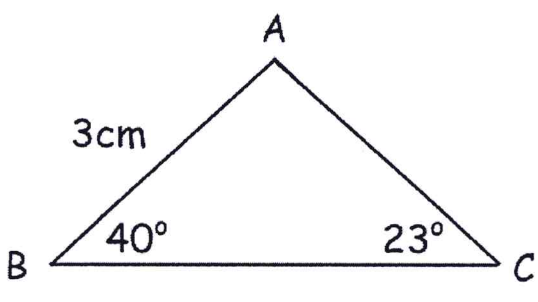
$\therefore a = 5.2m$

STATION E

1) Find the measure of angle θ using the cosine law.



2) Find the measure of side *a* using the sine law.



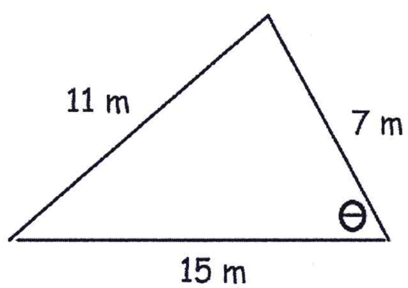
Solutions

STATION E

1) Find the measure of angle θ using the cosine law.

$\theta = \cos^{-1}\left[\frac{15^2 + 7^2 - 11^2}{2(15)(7)}\right]$

$\theta \doteq 43.2$

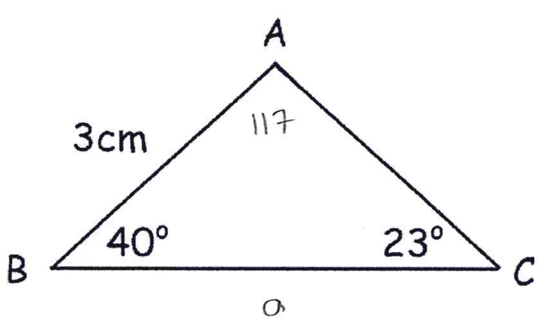


$\therefore \theta = 43.2°$

2) Find the measure of side *a* using the sine law.

$A = 180 - 40 - 23$

$\boxed{A = 117}$



$\frac{a}{\sin 117} = \frac{3}{\sin 23}$

$a = \frac{3 \sin 117}{\sin 23}$

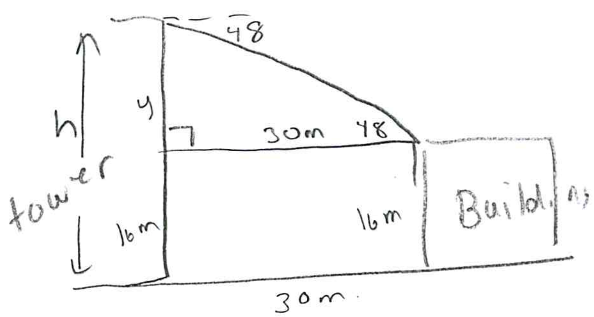
$a \doteq 6.8$

$\therefore a = 6.8$ cm

Solutions

STATION F

The angle of depression from the top of a tower to the top of a 16 m building is 48°. The tower and building are 30 m apart. How high is the tower? Include a labeled diagram with your solution.



$\tan 48 = \frac{y}{30}$

$30\tan 48 = y$

$33.3 \doteq y$

$h = y + 16$

$h = 33.3 + 16$

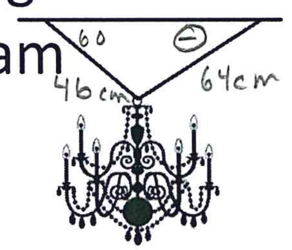
$h = 49.3$

∴ The tower is 49.3 m high

Solutions.

STATION G

A chandelier is suspended from the ceiling by two chains. One chain is 46 cm long and forms an angle of 60° with the ceiling. The other chain is 64 cm long. What angle does the longer chain make with the ceiling? Label the diagram provided as part of your solution.



$$\frac{\sin\theta}{46} = \frac{\sin 60}{64}$$

$$\sin\theta = \frac{46\sin 60}{64}$$

$$\theta = \sin^{-1}\left[\frac{46\sin 60}{64}\right]$$

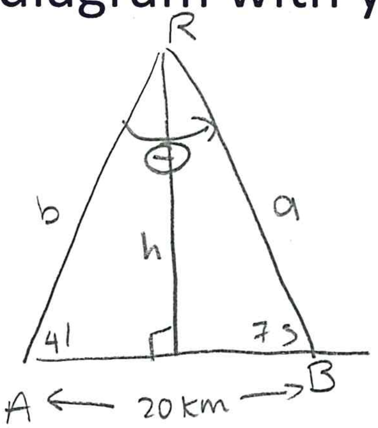
$$\theta \doteq 38.5$$

∴ The longer chain makes an angle of 38.5° with the ceiling.

Solutions

STATION H

Two tracking stations are on opposite sides of a rocket that has been shot into the air. The tracking stations are 20 km apart. From station A, the angle of elevation of the rocket is 41°; from station B, the angle of elevation of the rocket is 75°. What is the altitude of the rocket? Include a labeled diagram with your solution.



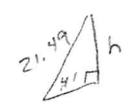
$\theta = 180 - 41 - 75$

$\theta = 64$

$\frac{b}{\sin 75} = \frac{20}{\sin 64}$

$b = \frac{20 \sin 75}{\sin 64}$

$b \doteq 21.49$



$\sin 41 = \frac{h}{21.49}$

$21.49 \sin 41 = h$

$14.1 \doteq h$

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alternate sol^{n}.

$\frac{a}{\sin 41} = \frac{20}{\sin 64}$

$a = \frac{20 \sin 41}{\sin 64}$

$a \doteq 14.599$

$\sin 75 = \frac{h}{14.599}$

$14.599 \sin 75 = h$

$14.1 = h$

$\therefore$ The rocket is 14.1 km high.