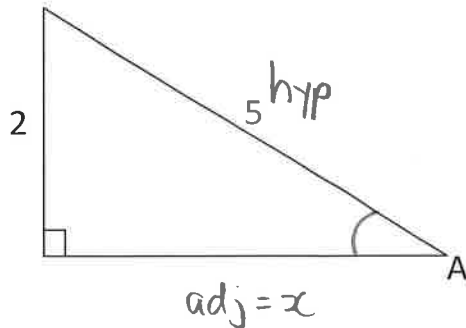


## Chapter 8 – Trigonometry Problem Solving

Show all work. Round all answers to the nearest tenth. Place answers in the "Answer" box and remember units. Draw sketches to help you!

1. Determine the ratio of
- $\cos A$



$$\cos A = \frac{\text{adj}}{\text{hyp}}$$

$$\cos A = \frac{x}{5}$$

$$\cos A = \frac{4.583}{5}$$

$$\cos A = 0.916$$

side trip for  $x$ :

$$a^2 + b^2 = c^2$$

$$2^2 + x^2 = 5^2$$

$$4 + x^2 = 25$$

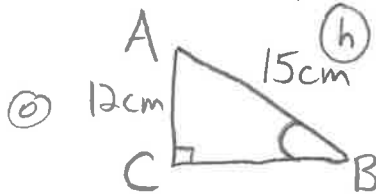
$$\sqrt{x^2} = \sqrt{21}$$

$$x = 4.583$$

ANSWER:

$$\cos A = 0.9$$

2. In
- $\triangle ABC$
- ,
- $\angle C = 90^\circ$
- ,
- $AB = 15\text{cm}$
- , and
- $AC = 12\text{cm}$
- . Calculate the measure of
- $\angle ABC$
- .



$$\sin B = \frac{12}{15}$$

$$\angle ABC = \angle B$$

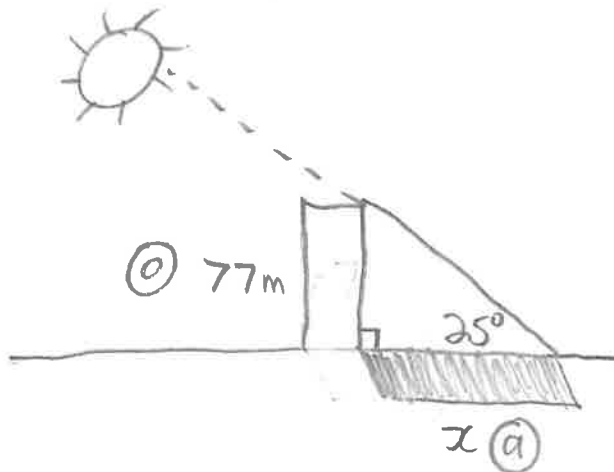
$$\angle B = \sin^{-1}\left(\frac{12}{15}\right)$$

$$\angle B = 53.1^\circ$$

ANSWER:

$$\angle ABC = 53.1^\circ$$

3. The angle of elevation of the sun is
- $25^\circ$
- . How long is the shadow of a
- $77\text{m}$
- tall building?



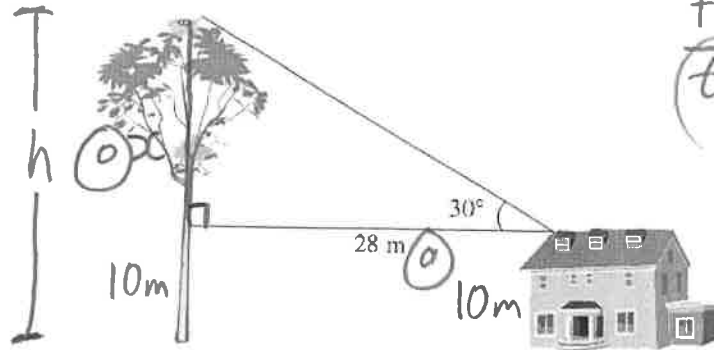
$$\tan 25^\circ = \frac{77}{x}$$

$$x = \frac{77}{\tan 25^\circ} \quad x = 165.1\text{m}$$

ANSWER:

$$165.1\text{m}$$

4. A 10 metre tall farmhouse is located 28.0 m away from a tree with an eagle's nest. The angle of elevation from the roof of the farmhouse to the eagle's nest is  $30^\circ$ .



find  $x$ :  $x = 28$

$$\tan 30^\circ = \frac{x}{28}$$

$$x = 16.17 \text{ m}$$

$$h = x + 10$$

$$h = 16.17 + 10$$

$$h = 26.17$$

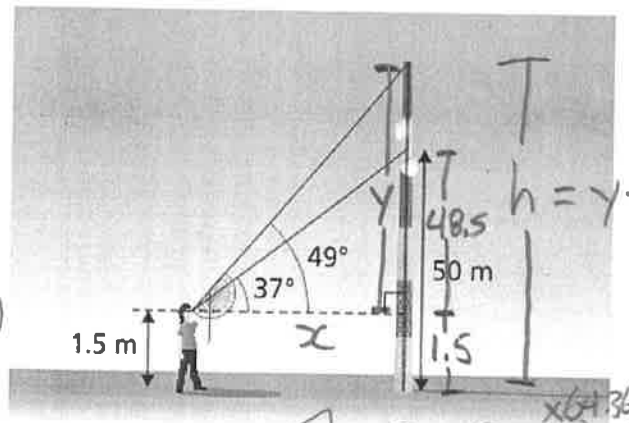
$$h = 26.2 \text{ m}$$

What is the height of the eagle's nest?

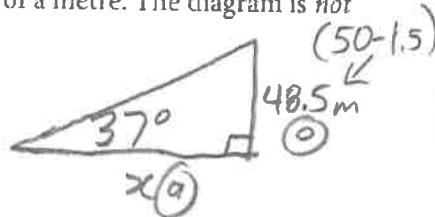
ANSWER:

26.2m

5. A student uses a clinometer to measure the angle of elevation of a sign that marks the point on a tower that is 50 m above the ground. The angle of elevation is  $37^\circ$  and the student holds the clinometer 1.5 m above the ground. She then measures the angle of elevation of the top of the tower as  $49^\circ$ . Determine the height of the tower to the nearest tenth of a metre. The diagram is *not* drawn to scale.



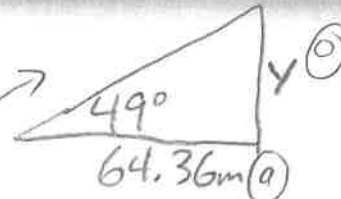
find  $x$ :



$$\tan 37^\circ = \frac{48.5}{x}$$

$$x = \frac{48.5}{\tan 37}$$

$$x = 64.36 \text{ m}$$



$$\tan 49^\circ = \frac{y}{64.36}$$

$$y = 74.04 \text{ m}$$

$$h = y + 1.5$$

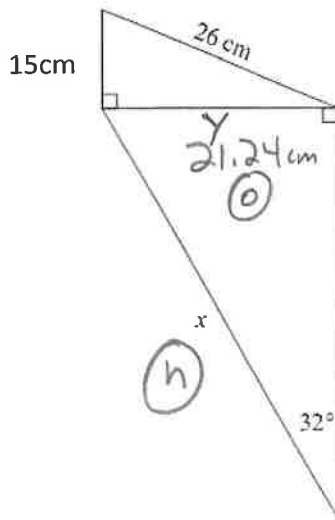
$$h = 74.04 + 1.5$$

$$h = 75.5 \text{ m}$$

ANSWER:

75.5m

6. Calculate the length of side  $x$  on the diagram below.



$$a^2 + b^2 = c^2$$

$$15^2 + y^2 = 26^2 - 15^2$$

$$y^2 = 451$$

$$y = 21.24 \text{ cm}$$

$$\sin 32^\circ = \frac{21.24}{x}$$

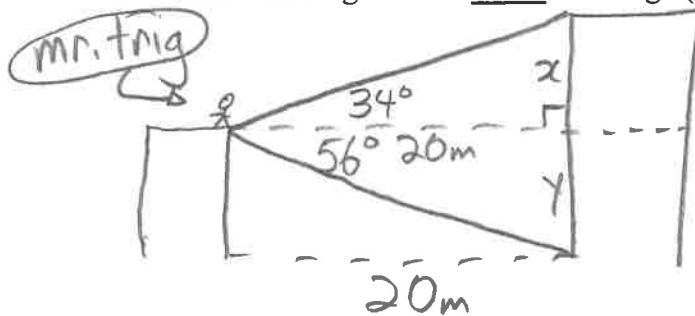
$$x = \frac{21.24}{\sin 32^\circ}$$

$$x = 40.08$$

ANSWER:

$$x = 40.1 \text{ cm}$$

7. From the roof of Mr. Trig's building, the angle of elevation of the top of a taller building is  $34^\circ$ . The angle of depression to the base of the taller building is  $56^\circ$ . The buildings are 20m apart. Determine the height of the **taller** building. (hint: draw a sketch!)



$$h = x + y$$

Find  $x$ :

$$\tan 34^\circ = \frac{x}{20}$$

$$x = \tan 34^\circ \times 20$$

$$x = 13.49 \text{ m}$$

Find  $y$ :

$$\tan 56^\circ = \frac{y}{20}$$

$$y = \tan 56^\circ \times 20$$

$$y = 29.65$$

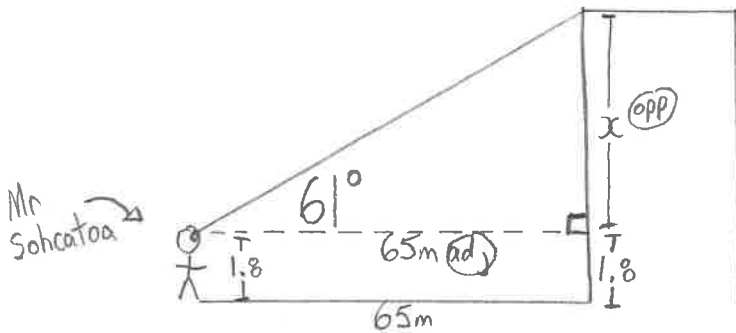
$$h = 13.49 + 29.65 = 43.14$$

ANSWER:

$$h = 43.1 \text{ m}$$

# - KEY -

- 8) Mr. Sohcatoo is standing on a surveyors mark 65 m from the base of a building. He measures a  $61^\circ$  angle of elevation to the top of the building. Mr. Sohcatoo is 1.8 m tall. How tall is the building to the nearest metre?



$$\tan 61^\circ = \frac{x}{65}$$

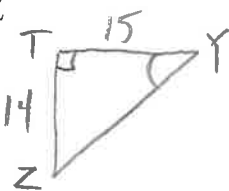
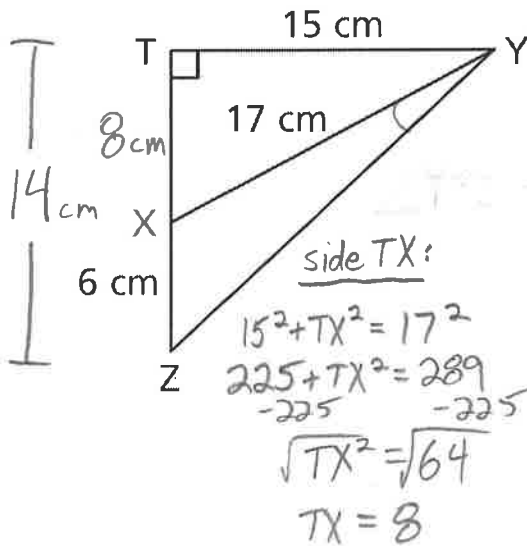
$$x = 117.2$$

$$117.2 + 1.8 = 119 \text{ m}$$

↑  
eye ht.

119 m

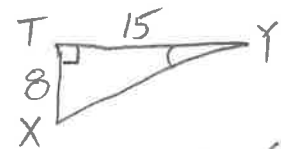
- 9) Calculate the measure of angle XYZ



$$\tan Y = \frac{14}{15}$$

$$\angle Y = \tan^{-1}\left(\frac{14}{15}\right)$$

$$\angle Y = 43.0^\circ$$



$$\tan X = \frac{8}{6}$$

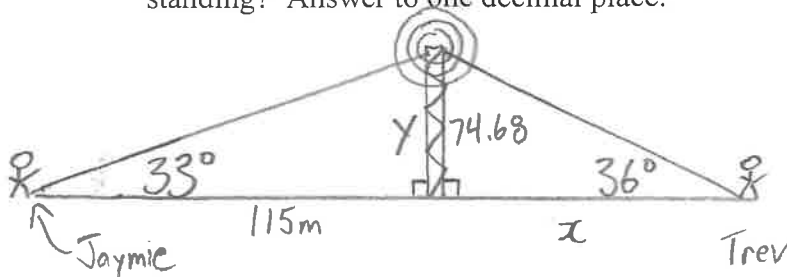
$$\angle X = \tan^{-1}\left(\frac{8}{6}\right)$$

$$\angle X = 28.1^\circ$$

14.9°

$$\angle XYZ = 43.0^\circ - 28.1^\circ = 14.9^\circ$$

- 10) Trevor and Jaymie are standing on opposite sides of a cell phone tower. Jaymie is standing 115m from the tower. Her angle of elevation to the tower is  $33^\circ$ . Trevor's angle of elevation to the top of the tower is  $36^\circ$ . How far from the base of the tower is he standing? Answer to one decimal place.



find y:  
 $\tan 33^\circ = \frac{y}{115}$   
 $y = 74.68$

find x:  
 $\tan 36^\circ = \frac{74.68}{x}$

$$x = \frac{74.68}{\tan 36^\circ}$$

$$x = 102.8 \text{ m}$$

102.8 m