Mathematics 11C

1.2 – Solving Problems using Trig Ratios

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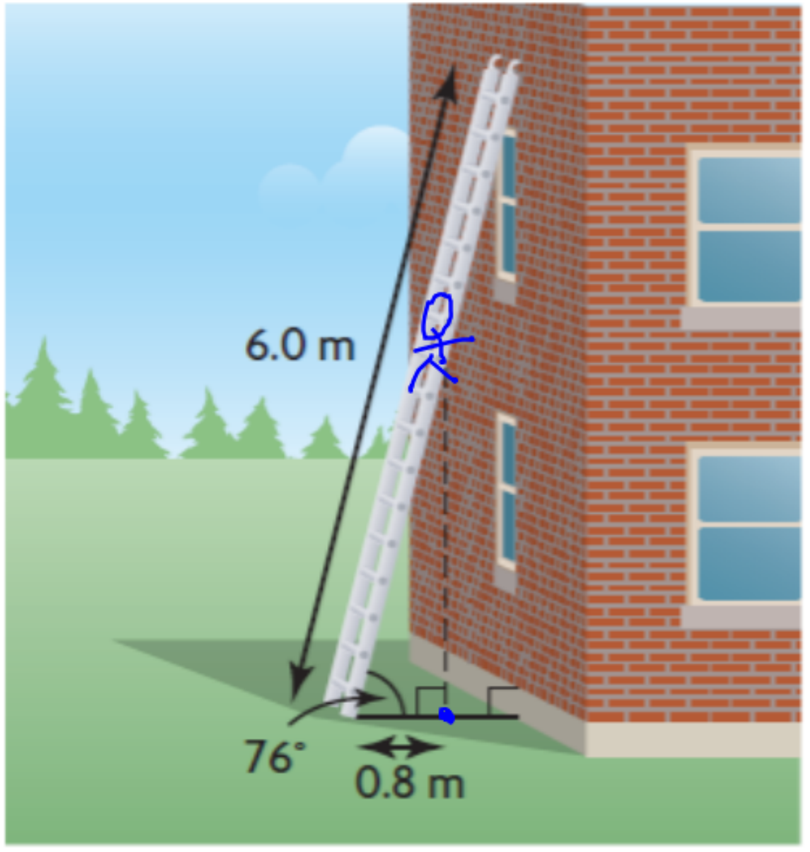
$$\sin\theta = \frac{opp}{hyp}$$

$$\cos\theta = \frac{adj}{hyp}$$

$$\tan\theta = \frac{opp}{adj}$$

Bill was climbing a 6.0 m ladder, which was placed against a wall at a 76° angle. He dropped one of his tools directly below the ladder. The tool landed 0.8 m from the base of the ladder. How far from the top of the ladder was Bill?



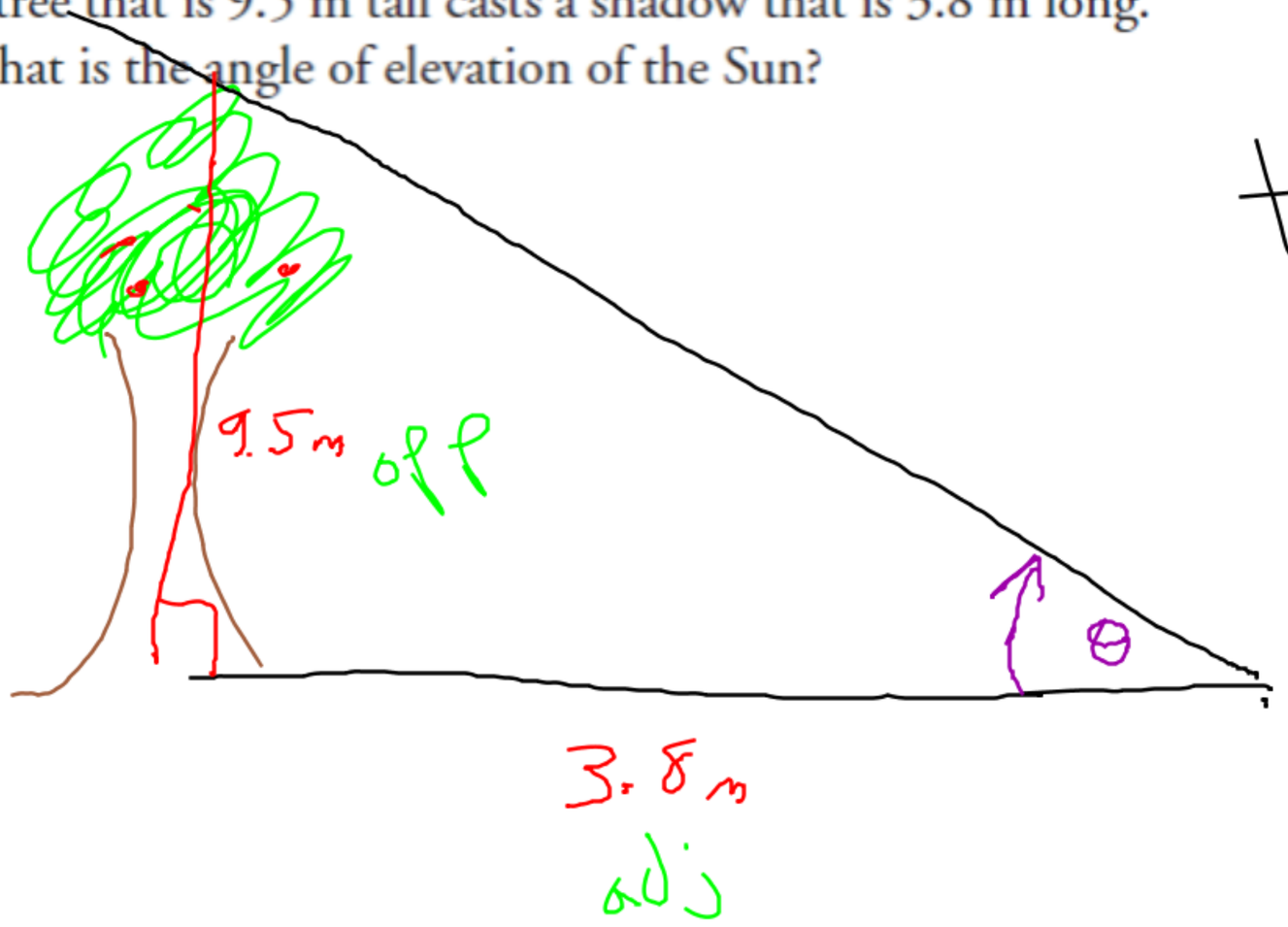
$$\cos 76 = \frac{0.8}{x}$$

$$x = \frac{0.8}{\cos 76}$$

$$x = 3.3\text{ m}$$

∴ Bill was 3.3m high on the ladder.

A tree that is 9.5 m tall casts a shadow that is 3.8 m long.
What is the angle of elevation of the Sun?



$$\tan\theta = \frac{9.5}{3.8}$$

$$\theta = \tan^{-1}\left(\frac{9.5}{3.8}\right)$$

$$\theta = 68^{\circ}$$

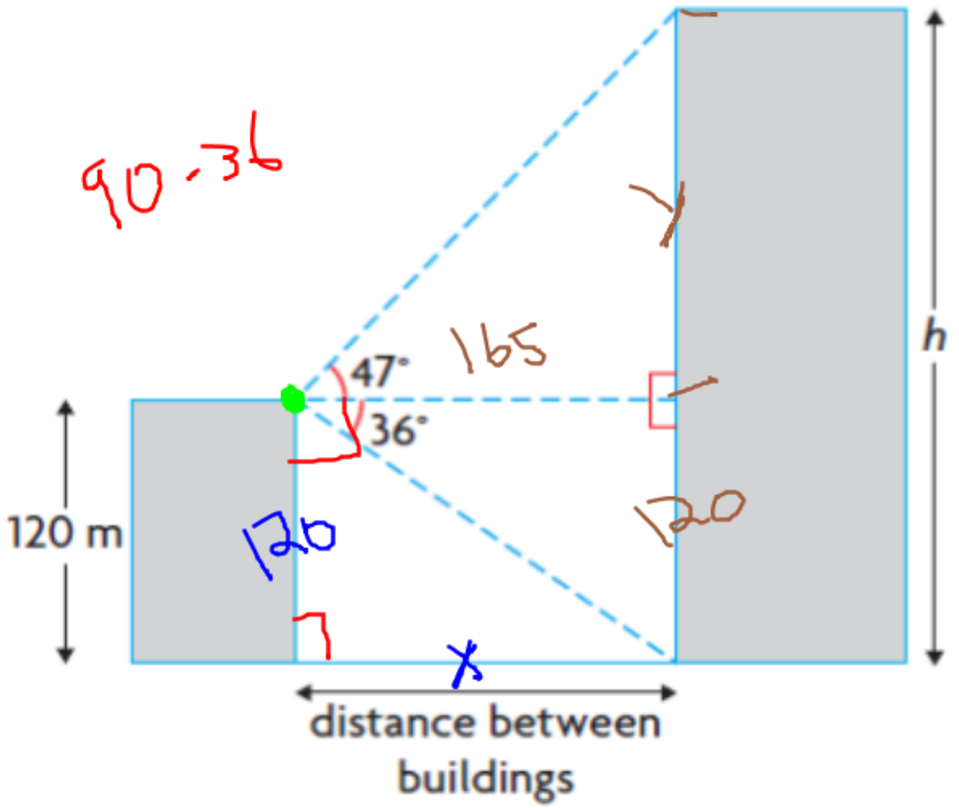
A Mayan pyramid at Chichén-Itzá has stairs that rise about 64 cm for every 71 cm of run. At what angle do these stairs rise?

$$\tan\theta = \frac{64}{71}$$

$$\theta = \tan^{-1}\left(\frac{64}{71}\right)$$

$$\theta = 42^\circ$$

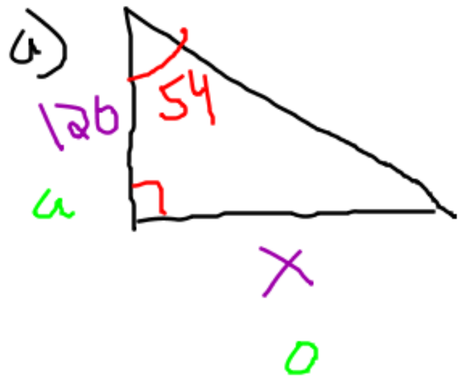
A video camera is mounted on top of a building that is 120 m tall. The angle of depression from the camera to the base of another building is 36°. The angle of elevation from the camera to the top of the same building is 47°.



a) How far apart are the two buildings? Round your answer to the nearest metre.

b) How tall is the building viewed by the camera? Round your answer to the nearest metre.

a)



$\tan 54 = \frac{x}{120}$

$120 \tan 54 = x$

$165 = x$

b)

$\tan 47 = \frac{y}{165}$

$165 \tan 47 = y$

$177 = y$

$h = 120 + 177 = 297 m$