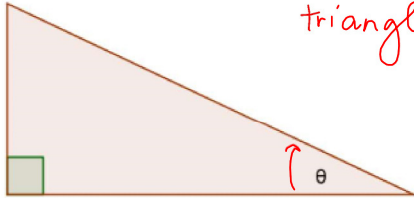


## Lesson Six – Solving Problems with 2 Right Triangles

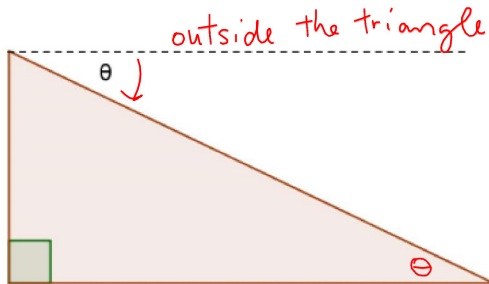
Recall:

**Angle of Elevation** *(inside the triangle)*



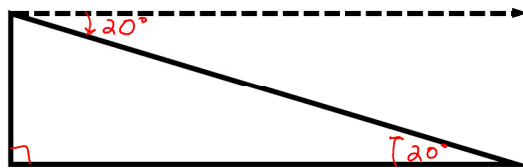
The angle of elevation is the angle between the horizontal and the line of sight to an object above the horizontal.

**Angle of Depression**



The angle of depression is the angle between the horizontal and the line of sight to an object beneath the horizontal.

**Angle of Elevation = Angle of Depression**



# Two right triangles.notebook

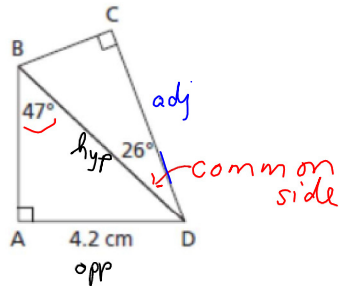
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Trigonometry

Lesson 6

## Example 1

Calculate the length of CD to the nearest tenth of a centimeter.



① Use  $\triangle ABD$  to find side  $BD$  (common side)

$$\sin B = \frac{\text{opp}}{\text{hyp}}$$

SOH CAH TOA

$$\sin 47^\circ = \frac{4.2}{BD}$$

$$BD \sin 47^\circ = 4.2$$

$$BD = \frac{4.2}{\sin 47^\circ}$$

$$BD = 5.7427\dots$$

② Use  $\triangle BCD$  to solve for  $CD$ .

SOH CAH TOA

$$\cos 26^\circ = \frac{\text{adj}}{\text{hyp}}$$

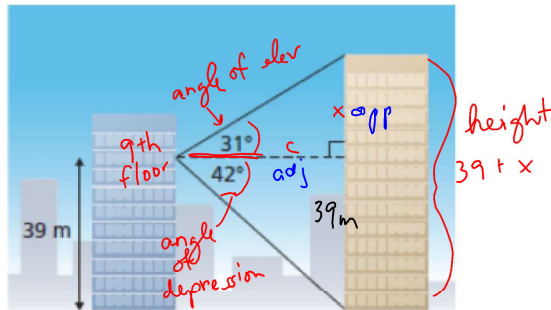
$$\cos 26^\circ = \frac{CD}{5.7427\dots}$$

$$\cos 26^\circ (5.7427\dots) = CD$$

$$CD = 5.2 \text{ cm}$$

**Example 2**

A surveyor stands at a window on the 9<sup>th</sup> floor of an office tower. He uses a clinometer to measure the angles of elevation and depression of the top and the base of a taller building. The surveyor sketches this plan of his measurements. Determine the height of the taller building to the nearest tenth of a metre.

SOH CAH TOA

$$\begin{aligned} \textcircled{1} \quad \tan 42^\circ &= \frac{\text{opp}}{\text{adj}} \\ \tan 42^\circ &= \frac{39}{c} \\ \tan 42^\circ c &= 39 \\ c &= \frac{39}{\tan 42^\circ} \\ c &= 43.313\dots \end{aligned}$$

 $\textcircled{2}$ 

$$\begin{aligned} \tan 31^\circ &= \frac{x}{43.313\dots} \\ x &= \tan 31^\circ (43.313\dots) \\ x &= 26.025\dots \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad \therefore \text{height} &= 39 + x \\ &= 39 + 26.025\dots \\ &= 65.0\text{ m} \end{aligned}$$

# Two right triangles.notebook

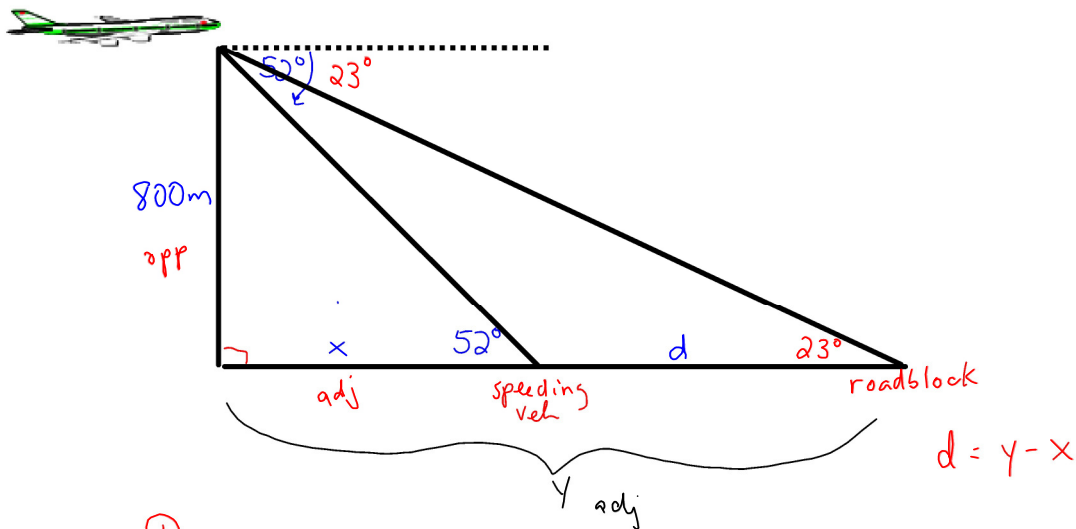
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Trigonometry

Lesson 6

## Example 3

A police airplane, flying at an altitude of <sup>height</sup> 800 m, spots a speeding vehicle at an angle of depression of  $52^\circ$ . If a roadblock is set up along the same highway at an angle of depression of  $23^\circ$ , find the distance the vehicle is from the roadblock to the nearest hundredth of a kilometer.



$$\textcircled{1} \quad \tan 52^\circ = \frac{800}{x}$$

$$x = \frac{800}{\tan 52^\circ}$$

$$x = 625.0285\dots$$

$$\textcircled{2} \quad \tan 23^\circ = \frac{800}{y}$$

$$y = \frac{800}{\tan 23^\circ}$$

$$y = 1884.681\dots$$

$$d = y - x$$

$$d = 1259.65 \text{ m}$$

$$\text{or } \div 1000$$

$$1.26 \text{ km}$$

Review pg. 124

Assignment: Pg 118; 3 a, 4 a, 5 (a,c), 6, 8, 13