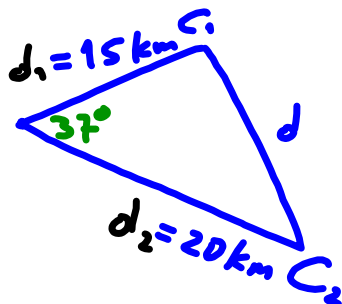


Applications of Trigonometry Continued

Example 3: Two roads separate from a village at an angle of 37° . Two cyclists leave the village at the same time. One travels 7.5 km/h on one road and the other travels 10.0 km/h on the other road. How far apart are the cyclists after 2 hours?

Solution: - Draw a diagram



- Let d represent the distance between the cyclists after 2 hours.

distance = speed \times time

$$d_1 = 7.5 \times 2 \\ = 15 \text{ km}$$

$$d_2 = 10 \times 2 \\ = 20 \text{ km}$$

- Use the cosine law (SAS) to find d .

$$d^2 = 15^2 + 20^2 - 2(15)(20)\cos 37^\circ$$

$$d^2 = 225 + 400 - 479.18$$

$$d^2 = 145.82$$

$$\sqrt{d^2} = \pm \sqrt{145.82}$$

$$d = \pm 12.1 \rightarrow d = 12.1$$

$$d = -12.1 \leftarrow \text{inadmissible}$$

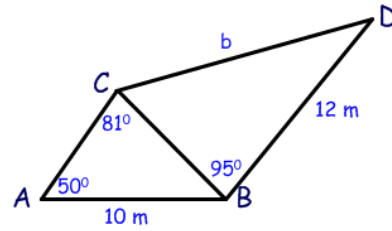
\therefore The cyclists are approximately 12.1 km apart after 2 hours.

Example 4: How would you calculate b?

Answer:

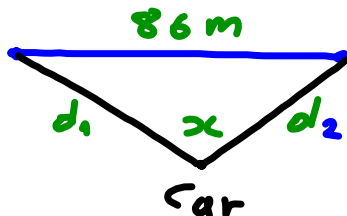
① Use the sine law to find BC

② Use the cosine law to find b



Example 5: A cable car stops part of the way across an 86-m wide gorge. The cable holding the car makes an angle of depression of 57° at one end and an angle of depression of 40° at the other end. How long is the cable that holds the car? Round your answer to the nearest metre.

Solution: - Draw a diagram



$$x = 180^\circ - 57^\circ - 40^\circ = 83^\circ$$

- Use the sine law to find d_1 and d_2

$$\frac{d_1}{\sin 40^\circ} = \frac{d_2}{\sin 57^\circ} = \frac{86}{\sin 83^\circ}$$

$$\frac{d_1}{\sin 40^\circ} = \frac{86}{\sin 83^\circ} \quad \text{and}$$

$$\frac{d_2}{\sin 57^\circ} = \frac{86}{\sin 83^\circ}$$

$$\frac{d_1}{\sin 40^\circ} \div 86.65$$

$$d_1 \doteq 86.65 \times \sin 40^\circ$$

$$d_1 \doteq 56 \text{ m}$$

$$\frac{d_2}{\sin 57^\circ} \div 86.65$$

$$d_2 \doteq 86.65 \times \sin 57^\circ$$

$$d_2 \doteq 73 \text{ m}$$

\therefore The cable that holds the car is $56 + 73 = 129 \text{ m}$ long.

Homework: Pg. 48: #8, 12, 16