Name: _____   Date: _____

Learning Goal 2.2	Solve problems involving multiple right triangles.

Recap: Angles of Elevation and Depression

∠ angle of elevation

horizontal (horizon)

angle of depression ✓
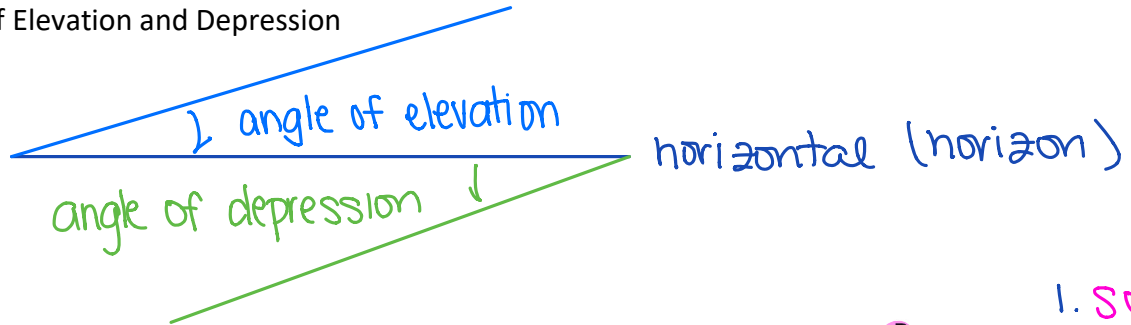
1. SOH
2. CAH
TOA

Example Calculate the measure of $\angle ABC$, to the nearest degree.

1. Find $\overline{BC}$ (opposite to $\angle D$)

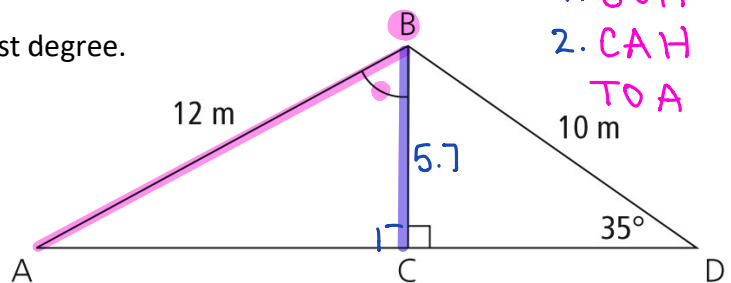$$10 \times \left(\sin 35\right) = \left(\frac{\overline{BC}}{10}\right) \times 10$$

$$\overline{BC} = 10 \times \sin 35$$

$$= 5.7 \, m$$

12 m   *10 m*

5.7

35°

$\cos^{-1}$ $\cos^{-1}$

2. $\left(\cos(ABC)\right) = \left(\frac{5.7}{12}\right)$

don't clear
your
calculator

$$\angle ABC = \cos^{-1}\left(\frac{5.7}{12}\right)$$

$$= 62°$$

Example What is the length of side y in the following diagram, to the nearest tenth of a centimetre?

2 cm   8 cm

4 cm

y
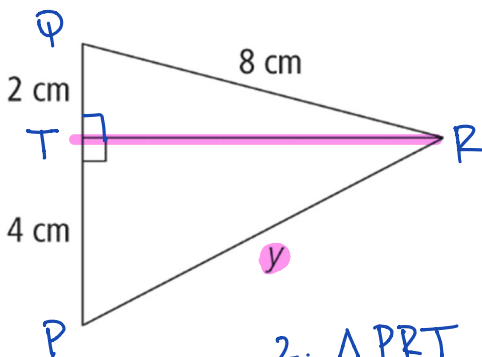
1. $\triangle QRT$

$$\overline{QT}^2 + \overline{RT}^2 = \overline{QR}^2$$
$$2^2 + \overline{RT}^2 = 8^2$$
$$4 + \overline{RT}^2 = 64$$
$$-4 \qquad\qquad -4$$
$$\sqrt{\overline{RT}^2} = \sqrt{60}$$
$$\overline{RT} = 7.7 \, cm$$

2. $\triangle PRT$

$$\overline{PT}^2 + \overline{RT}^2 = \overline{PR}^2$$
$$4^2 + 7.7^2 = \overline{PR}^2$$
$$16 + 60 = \overline{PR}^2$$
$$\sqrt{76} = \sqrt{\overline{PR}^2}$$

$$y = 8.7 \, cm.$$

Assignment   p. 118 #1-6, 8-11, 14, 17   Quiz: Next Day!

$$PR = 8.7 \, cm$$

Example The Saskatoon Balloon Festival is organized by Sundance Balloons and the Canada Remembers Airshow. In Kinsmen Park, Wayne has tethered his balloon to the ground at points B, C, and D, using three guy wires, as shown.
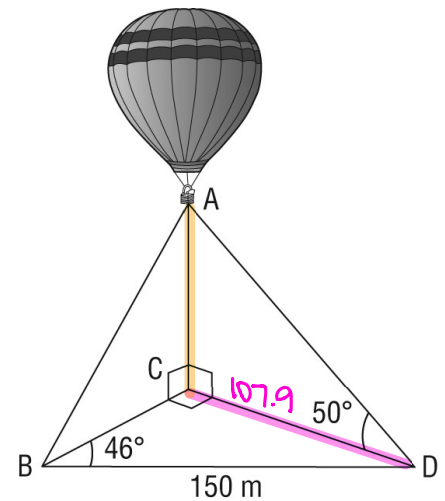
a. What is the length of CD, to the nearest tenth of a metre?

$$\angle CBD = 46°$$
$$\overline{BD} = 150 \text{ m} \quad \text{hypotenuse of BCD}$$

$$150 \times (\sin 46) = \left(\frac{\overline{CD}}{150}\right) \times 150$$

$$\overline{CD} = 150 \times \sin 46$$

$$= 107.9 \text{ m}$$

b. What is the height of the hot air balloon, to the nearest tenth of a metre?

$$\angle ADC = 50°$$
$$\overline{CD} = 107.9 \text{ m} \quad \text{adjacent to } \angle ADC$$

$$107.9 \times (\tan 50) = \left(\frac{\overline{AC}}{107.9}\right) \times 107.9$$

$$\overline{AC} = 107.9 \times \tan 50$$

$$= 128.6$$

The height of the balloon is 128.6 m.