

2.2 Using the Tangent Ratio to Calculate Lengths

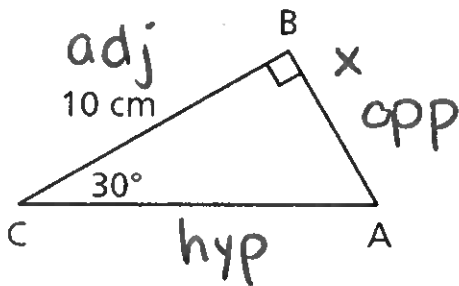
Solving Problems using the Tangent Ratio

Steps:

- 1) Label the angles and sides.
- 2) Write tangent ratio equation. $\tan \theta = \frac{o}{a}$
- 3) Fill in known values into equation.
- 4) Isolate the unknown and solve.

Examples:

- 1) Determine the length of AB to the nearest tenth of a centimetre.

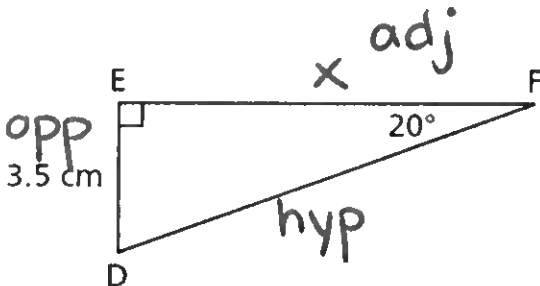


$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$(10) \tan 30 = \frac{x}{10}$$

$$\boxed{AB = 5.8 \text{ cm}}$$

- 2) Determine the length of EF to the nearest tenth of a centimetre.



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

$$(x) \tan 20 = \frac{3.5}{x}$$

$$\frac{x \tan 20}{\tan 20} = \frac{3.5}{\tan 20}$$

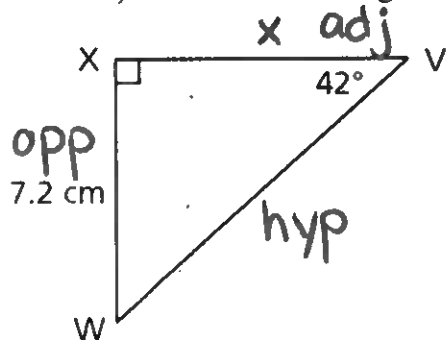
$$x = \frac{3.5}{\tan 20}$$

$$\boxed{EF = 9.6 \text{ cm}}$$

$$\tan 20 = \frac{3.5}{x}$$

$$x = \frac{3.5}{\tan 20}$$

- 3) Determine the length of VX to the nearest tenth of a centimetre.



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

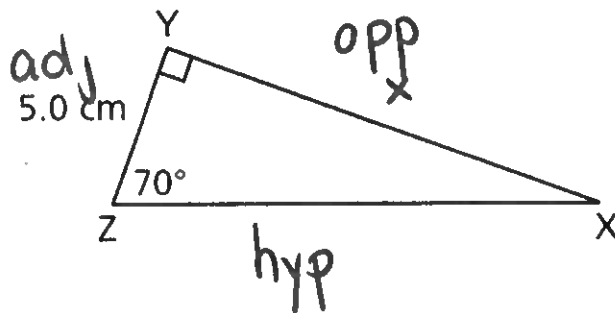
$$\tan 42 = \frac{7.2}{x}$$

$$x = \frac{7.2}{\tan 42}$$

7.996

$$VX = 8.0 \text{ cm}$$

- 4) Determine the length of XY to the nearest tenth of a centimetre.

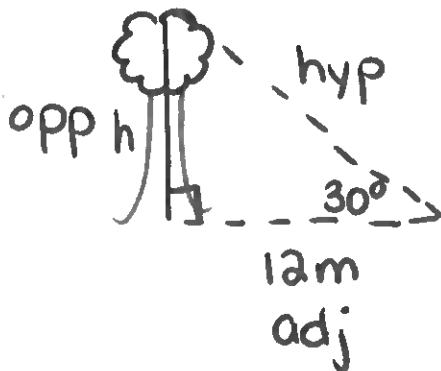


$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$(5.0) \tan 70 = \frac{x}{5.0}$$

$$XY = 13.7 \text{ cm}$$

- 5) A tree casts a shadow 12 m long. You measure the angle from the end of the shadow to the top of the tree to be 30° . How tall is the tree to the nearest meter? Assume a right angle.



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

$$(12) \tan 30 = \frac{h}{12}$$

$$h = 7 \text{ m}$$