# Math 10
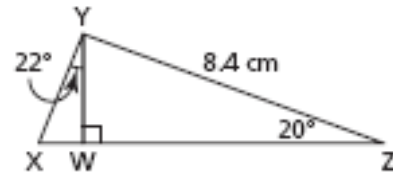
## Lesson 7-5  Answers

**Lesson Questions**

**Question 1**

For ∆WXY we only know an angle to start.  An angle is not enough to calculate XY. We need to know either WX or WY to calculate XY.  Note that we can calculate the common side WY from ∆WYZ using the sin function.

$$\sin 20 = \frac{WY}{YZ}$$

$$WY = YZ\sin 20$$

$$WY = 8.4\sin 20$$

$$WY = 2.87297$$

Now for ∆WXY we have

$$\cos 22 = \frac{WY}{XY}$$

$$XY = \frac{WY}{\cos 22}$$

$$XY = \frac{2.87297}{\cos 22}$$
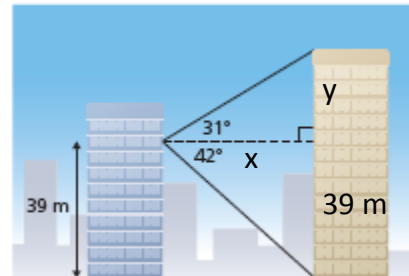
**XY = 3.1 cm**

**Question 2**

x is the common side to the two triangles. For the lower triangle we have

$$\tan 42 = \frac{39}{x}$$

$$x = \frac{39}{\tan 42}$$

$$x = 43.31389$$

Now we can find y

$$\tan 31 = \frac{y}{x}$$

$$y = x\tan 31$$

$$y = 26.0 m$$

The height of the building is 26.0 m + 39 m = **65.0 m**.

**Question 3**

Draw a labeled diagram. The fires are due south and due west of the tower, so the angle between the lines of sight, TW and TS, to the fires from the base of the tower is 90°. Since the angles of depression are 5° and 2° respectively, the angles between the tower, RT, and the lines of sight are 85° and 88° respectively. To calculate the distance WS between the fires, first calculate the distances, TW and TS, of the fires from the base of the tower.
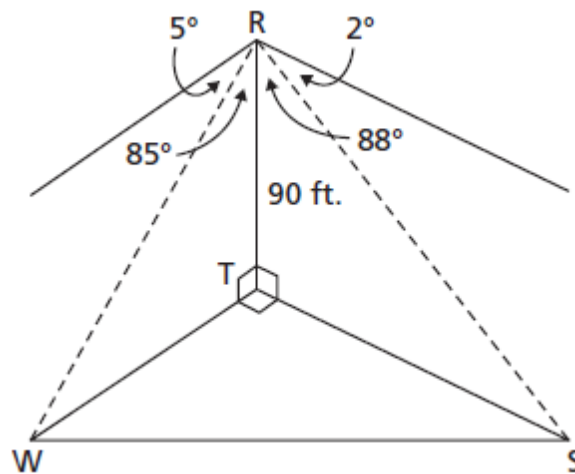


Use the tangent ratio in right $\triangle$RTW.

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

$$\tan 85 = \frac{WT}{90}$$

$$WT = 90 \tan 85$$

$$WT = 1028.7047...$$

Use the tangent ratio in right $\triangle$RTS.

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

$$\tan 88 = \frac{TS}{90}$$

$$TS = 90 \tan 88$$

$$TS = 2577.2627...$$

In right $\triangle$STW, use the Pythagorean Theorem.

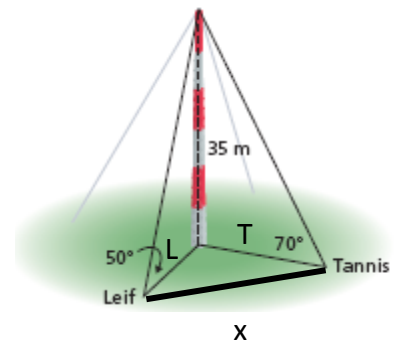$$SW^2 = WT^2 + TS^2$$

$$SW^2 = 1028.7047...^2 + 2577.2627...^2$$

$$SW = (1028.7047...^2 + 2577.2627...^2)^{1/2}$$

$$SW = 2774.9805...$$

The distance between the fires is approximately 2775 ft.

**Question 4**

Note that the angle between Leif, the base of the tower and Tannis is 90°. If we find the distance from the base of the tower to Leif (L) and the distance from the base of the tower to Tannis (T), we can then calculate the distance between Leif and Tannis (x).

| Find L | Find T |
|---|---|
| $\tan 50 = \dfrac{35}{L}$ | $\tan 70 = \dfrac{35}{T}$ |
| $L = \dfrac{35}{\tan 50}$ | $T = \dfrac{35}{\tan 70}$ |
| $L = 29.3685$ | $T = 12.73896$ |

Now calculate x

$$x^2 = L^2 + T^2$$
$$x^2 = (29.3685)^2 + (12.73896)^2$$
$$x^2 = 1024.79$$
$$x = \sqrt{1024.79}$$
$$\mathbf{x = 32\,m}$$

The distance between Leif and Tannis is 32 m.

## Assignment

1. a) 6.0 cm b) 6.0 cm

2. a) 5.7 cm b) 4.9 cm c) 5.7 cm

3. a) 93.2° b) 123.7°

4. a) 19 ft. b) 21 ft.

5. 4.5 m

6. a) 53 m b) 29 m c) 50 m

7. a) 23 m b) 20 m

8. a) 5.4 cm b) 33.9°

9. Approximately 8.3 m

10. Approximately 18 in.