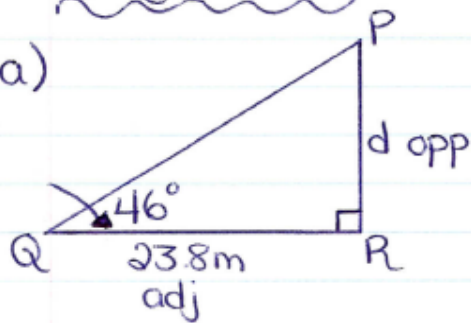


SOLUTIONS => Trigonometry Worksheet #5.

1 a)  
Angle of  
Elevation



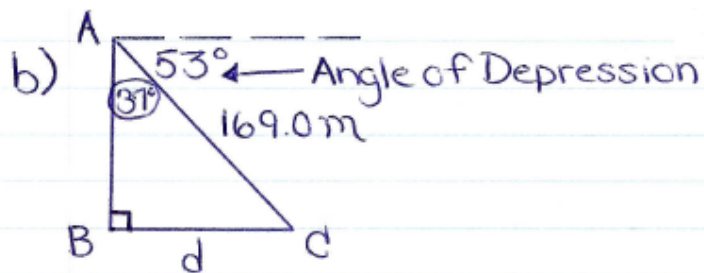
$$\tan 46^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\tan 46^\circ = \frac{d}{23.8 \text{ m}}$$

$$23.8 \tan 46^\circ = d$$

$$23.8(1.0355) = d$$

$$24.6 \text{ m} = d$$



Method 1

$$\sin 37^\circ = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 37^\circ = \frac{d}{169.0 \text{ m}}$$

$$169.0 \sin 37^\circ = d$$

$$169.0 (0.6018) = d$$

$$101.7 \text{ m} = d$$

Method 2

$$\cos 53^\circ = \frac{\text{adj}}{\text{hyp}}$$

$$\cos 53^\circ = \frac{d}{169.0 \text{ m}}$$

$$169.0 \cos 53^\circ = d$$

$$169.0 (0.6018) = d$$

$$101.7 \text{ m} = d$$

2.

hyp  
96.0m

Angle of Elevation  $76^\circ$

h opp

Q

R

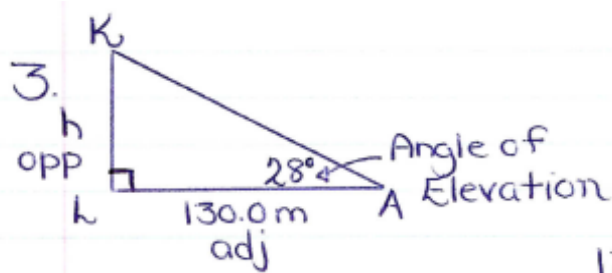
$$\sin 76^\circ = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 76^\circ = \frac{h}{96.0\text{m}}$$

$$96.0 \sin 76^\circ = h$$

$$96.0(0.9703) = h$$

$$93.1\text{m} = h$$



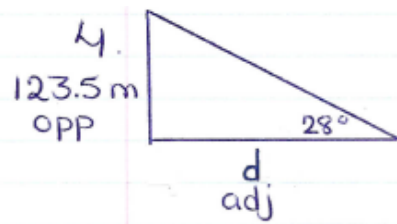
$$\tan 28^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\tan 28^\circ = \frac{h}{130.0\text{ m}}$$

$$130.0 \tan 28^\circ = h$$

$$130.0(0.5317) = h$$

$$69.1\text{ m} = h$$



$$\tan 28^\circ = \frac{\text{opp}}{\text{adj}}$$

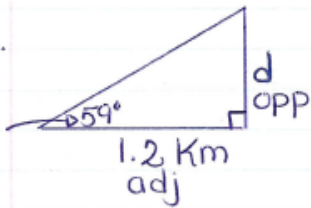
$$\tan 28^\circ = \frac{123.5 \text{ m}}{d}$$

$$\cancel{d} \tan 28^\circ = \frac{123.5 \text{ m}}{\cancel{\tan 28^\circ}}$$

$$d = \frac{123.5 \text{ m}}{0.5317}$$

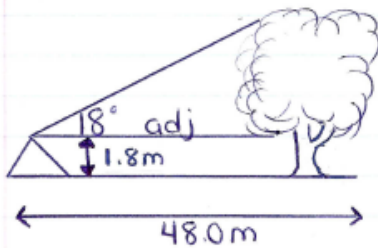
$$d = 232.3 \text{ m}$$

5.  
Angle of  
Elevation



$$\begin{aligned}\tan 59^\circ &= \frac{\text{opp}}{\text{adj}} \\ \tan 59^\circ &= \frac{d}{1.2 \text{ Km}} \\ 1.2 \tan 59^\circ &= d \\ 1.2 (1.6643) &= d \\ 2.0 \text{ Km} &= d\end{aligned}$$

6.



$$\begin{aligned}\tan 18^\circ &= \frac{\text{opp}}{\text{adj}} \\ \tan 18^\circ &= \frac{h}{48.0\text{m}} \\ 48.0 \tan 18^\circ &= h \\ 48.0 (0.3249) &= h \\ 15.6 \text{ m} &= h\end{aligned}$$

$$\begin{aligned}\text{Height of tree} &= 15.6\text{m} + 1.8\text{m} \\ &= 17.4\text{m}\end{aligned}$$



If we use the bottom triangle first:

Diagram of a right-angled triangle with angle  $52^\circ$ , opposite side  $100.0\text{m}$ , and adjacent side  $d$ .

$$\tan 52^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\tan 52^\circ = \frac{100.0\text{m}}{d}$$

$$\frac{d \tan 52^\circ}{\tan 52^\circ} = \frac{100.0}{\tan 52^\circ}$$

$$d = \frac{100.0}{1.2799}$$

$$d = 78.1\text{m}$$

Now we can determine the "height" of the top triangle:

Diagram of a right-angled triangle with angle  $48^\circ$ , adjacent side  $78.1\text{m}$ , and opposite side  $h$ .

$$\tan 48^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\tan 48^\circ = \frac{h}{78.1\text{m}}$$

$$78.1 \tan 48^\circ = h$$

$$78.1(1.1106) = h$$

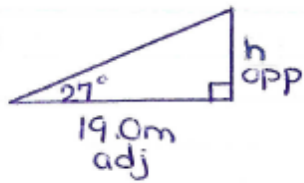
$$86.7\text{m} = h$$

Therefore, the height of the building is:

$$86.7\text{m} + 100.0\text{m}$$

$$= 186.7\text{m} \text{ or } 187\text{m}$$

8a)



$$\tan 27^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\frac{\tan 27^\circ}{1} = \frac{h}{19.0 \text{ m}}$$

$$19.0 \tan 27^\circ = h$$
$$19.0 (0.5095) = h$$
$$9.7 \text{ m} = h$$

b)



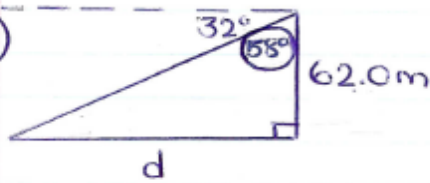
$$\tan 36^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\frac{\tan 36^\circ}{1} = \frac{h}{126.0 \text{ m}}$$

$$126.0 \tan 36^\circ = h$$
$$126.0 (0.7265) = h$$
$$91.5 \text{ m} = h$$



9a)



Method 1

$$\tan 58^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\frac{\tan 58^\circ}{1} = \frac{d}{62.0\text{m}}$$

$$62.0 \tan 58^\circ = d$$

$$62.0(1.6003) = d$$

$$99.2\text{m} = d$$

Method 2

$$\tan 32^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\frac{\tan 32^\circ}{1} = \frac{62.0\text{m}}{d}$$

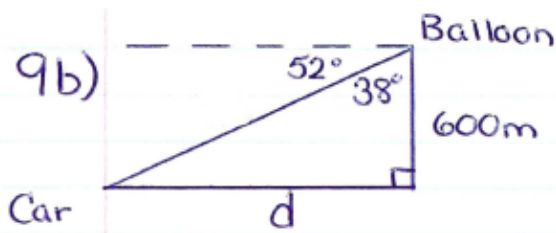
$$d \tan 32^\circ = 62.0\text{m}$$

$$\frac{d}{\tan 32^\circ} = \frac{62.0\text{m}}{\tan 32^\circ}$$

$$d = \frac{62.0\text{m}}{0.6249}$$

$$0.6249$$

$$d = 99.2\text{m}$$



Method 1

$$\tan 38^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\tan 38^\circ = \frac{d}{600\text{m}}$$

$$600 \tan 38^\circ = d$$

$$600(0.7813) = d$$

$$468.8\text{m} = d$$

or

$$469\text{m}$$

Method 2

$$\tan 52^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\tan 52^\circ = \frac{600\text{m}}{d}$$

$$d \tan 52^\circ = 600$$

$$\frac{d}{\tan 52^\circ} = \frac{600}{\tan 52^\circ}$$

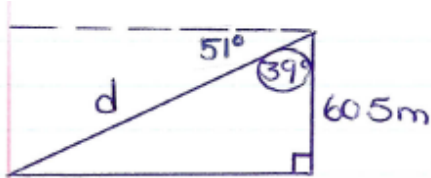
$$d = \frac{600}{1.2799}$$

$$d = 468.8\text{m}$$

or

$$469\text{m}$$

10.



Method 1

$$\cos 39^\circ = \frac{\text{adj}}{\text{hyp}}$$

$$\cos 39^\circ = \frac{60.5\text{m}}{d}$$

$$\frac{d \cos 39^\circ}{\cos 39^\circ} = \frac{60.5\text{m}}{\cos 39^\circ}$$

$$d = \frac{60.5\text{m}}{0.7771}$$

$$d = 77.9\text{m}$$

Method 2

$$\sin 51^\circ = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 51^\circ = \frac{60.5\text{m}}{d}$$

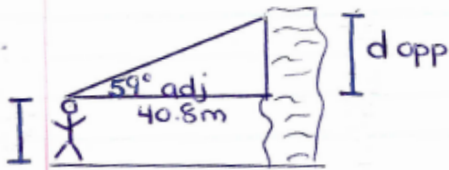
$$\frac{d \sin 51^\circ}{\sin 51^\circ} = \frac{60.5\text{m}}{\sin 51^\circ}$$

$$d = \frac{60.5\text{m}}{0.7771}$$

$$d = 77.9\text{m}$$

b) Assumption:

11.  
185cm  
↓  
1.85m

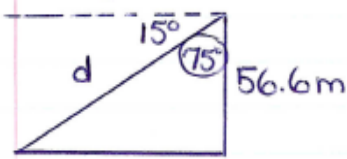


$$\tan 59^\circ = \frac{\text{opp}}{\text{adj}}$$
$$\tan 59^\circ = \frac{d}{40.8\text{m}}$$

$$40.8 \tan 59^\circ = d$$
$$40.8(1.6643) = d$$
$$67.9 \text{ m} = d$$

Height of cliff:  $67.9\text{m} + 1.85\text{m}$   
 $= 69.8\text{m}$

12.



Method 1

$$\cos 75^\circ = \frac{\text{adj}}{\text{hyp}}$$

$$\frac{\cos 75^\circ}{1} = \frac{56.6\text{m}}{d}$$

$$d \cos 75^\circ = 56.6$$

$$\cancel{\cos 75^\circ} \cos 75^\circ$$

$$d = \frac{56.6}{0.2588}$$

$$d = 218.7\text{m}$$

Method 2

$$\sin 15^\circ = \frac{\text{opp}}{\text{hyp}}$$

$$\frac{\sin 15^\circ}{1} = \frac{56.6}{d}$$

$$d \sin 15^\circ = 56.6$$

$$\cancel{\sin 15^\circ} \sin 15^\circ$$

$$d = \frac{56.6}{0.2588}$$

$$d = 218.7\text{m}$$