

Trigonometry solutions

Green Section

1. $x = \tan^{-1}\left(\frac{3}{4}\right) \Rightarrow x = 38.9^\circ (1 \text{ d.p.})$
2. $x = \cos^{-1}\left(\frac{6}{10}\right) \Rightarrow x = 53.1^\circ (1 \text{ d.p.})$
3. $x = \sin^{-1}\left(\frac{5}{12}\right) \Rightarrow x = 24.6^\circ (1 \text{ d.p.})$
4. $x = \sin^{-1}\left(\frac{8}{11}\right) \Rightarrow x = 46.7^\circ (1 \text{ d.p.})$
5. $x = \tan^{-1}\left(\frac{16}{20}\right) \Rightarrow x = 38.7^\circ (1 \text{ d.p.})$
6. $x = \sin^{-1}\left(\frac{11}{15}\right) \Rightarrow x = 47.2^\circ (1 \text{ d.p.})$
7. $x = \cos^{-1}\left(\frac{5.7}{13.1}\right) \Rightarrow x = 64.2^\circ (1 \text{ d.p.})$
8. $x = \tan^{-1}\left(\frac{2.1}{1.3}\right) \Rightarrow x = 58.2^\circ (1 \text{ d.p.})$
9. $x = \sin^{-1}\left(\frac{14.9}{19.5}\right) \Rightarrow x = 49.8^\circ (1 \text{ d.p.})$

Yellow Section

1. $\sin 30 = \frac{x}{24} \Rightarrow x = 24 \sin 30 \Rightarrow x = 12$
2. $\sin 45 = \frac{6}{x} \Rightarrow x = \frac{6}{\sin 45} \Rightarrow x = 6\sqrt{2} = 8.5 (1 \text{ d.p.})$
3. $\sin 60 = \frac{x}{17} \Rightarrow x = 17 \sin 60 \Rightarrow x = 14.7 (1 \text{ d.p.})$
4. $\cos 20 = \frac{x}{24} \Rightarrow x = 24 \cos 20 \Rightarrow x = 22.6 (1 \text{ d.p.})$
5. $\tan 54 = \frac{x}{9} \Rightarrow x = 9 \tan 54 \Rightarrow x = 12.4 (1 \text{ d.p.})$
6. $\sin 27 = \frac{19}{x} \Rightarrow x = \frac{19}{\sin 27} \Rightarrow x = 41.9 (1 \text{ d.p.})$
7. $\tan 37 = \frac{10.2}{x} \Rightarrow x = \frac{10.2}{\tan 37} \Rightarrow x = 13.5 (1 \text{ d.p.})$
8. $\cos 48 = \frac{2.1}{x} \Rightarrow x = \frac{2.1}{\cos 48} \Rightarrow x = 3.1 (1 \text{ d.p.})$
9. $\sin 61 = \frac{x}{27.5} \Rightarrow x = 27.5 \sin 61 \Rightarrow x = 24.1 (1 \text{ d.p.})$

Red Section

1. $x = \tan^{-1}\left(\frac{17}{10}\right) \Rightarrow x = 59.5 (1 \text{ d.p.})$
2. $\tan 32 = \frac{x}{23} \Rightarrow x = 23 \tan 32 \Rightarrow x = 14.4 (1 \text{ d.p.})$
3. $\sin 51 = \frac{6.5}{x} \Rightarrow x = \frac{6.5}{\sin 51} \Rightarrow x = 8.4 (1 \text{ d.p.})$
4. $x = \sin^{-1}\left(\frac{12.9}{19.1}\right) \Rightarrow x = 42.5 (1 \text{ d.p.})$
5. $\cos 42 = \frac{240}{x} \Rightarrow x = \frac{240}{\cos 42} \Rightarrow x = 323.0 (1 \text{ d.p.})$
6. $x = \tan^{-1}\left(\frac{0.9}{1.2}\right) \Rightarrow x = 36.9 (1 \text{ d.p.})$
7. $x = \sin^{-1}\left(\frac{0.99}{1.1}\right) \Rightarrow 64.2 (1 \text{ d.p.})$
8. $\sin 61 = \frac{1400}{x} \Rightarrow x = \frac{1400}{\sin 61} \Rightarrow x = 1600.7 (1 \text{ d.p.})$
9. $x = \cos^{-1}\left(\frac{1.14}{1.89}\right) \Rightarrow x = 52.9 (1 \text{ d.p.})$

Apply

1. Finding the short side

$$\tan 47 = \frac{x}{24} \Rightarrow x = 24 \tan 47 \Rightarrow x = 25.7 \text{ (1 d.p.)}$$

Finding Hypotenuse

$$\sin 47 = \frac{24}{x} \Rightarrow x = \frac{24}{\sin 47} \Rightarrow x = 32.8 \text{ (1 d.p.)}$$

If right angled then $24^2 + 25.7^2 = 32.8^2$

$$24^2(576) + 25.7^2(660.49) \text{ does not equal } 32.8^2(1075.84)$$

So no, it is not right – angled.

2. The units need to be the same.

$$\cos x = \frac{0.89}{1.16} \Rightarrow x = 39.9 \text{ (1 d.p.)}$$

3. Short side

$$\tan 29 = \frac{x}{8.2} \Rightarrow x = 8.2 \tan 29 \Rightarrow 4.5 \text{ (1 d.p.)}$$

Hypotenuse

$$\cos 29 = \frac{8.2}{x} \Rightarrow x = \frac{8.2}{\cos 29} \Rightarrow x = 9.4 \text{ (1 d.p.)}$$

$$\text{Perimeter} = 8.2 + 4.5 + 9.4 = 22.1 \text{ cm}$$

4. Height

$$\tan 72 = \frac{x}{18} \Rightarrow x = 18 \tan 72 \Rightarrow x = 55.4$$

$$\text{Area} = 55.4 \times 18 = 997.2 \text{ (1 d.p.)}$$