

This set focuses on problems where you must use the tangent (tan) ratio. Show all working. Use a calculator and give your answers to 1 decimal place where appropriate.

1. In triangle JKL, angle K is a right angle. The side adjacent to angle J is 12 cm and the side opposite angle J is 6.6 cm. Find the size of angle J.
2. A ramp rises vertically 2.8 m over a horizontal distance of 9 m. Find the angle the ramp makes with the ground.
3. In triangle MNO, angle N is a right angle. The side adjacent to angle M is 7 cm and the side opposite angle M is 6.1 cm. Find the size of angle M.
4. A building casts a shadow of 15 m and its height is 6.8 m. Find the angle of elevation of the sun.
5. In triangle QRS, angle S is a right angle. The side adjacent to angle Q is 10 cm and the side opposite angle Q is 7.3 cm. Find the size of angle Q.
6. A slide descends from a platform with a vertical height of 3.2 m and the horizontal distance from the base to the platform is 8 m. Find the angle the slide makes with the ground.
7. In triangle TUV, angle U is a right angle. The side adjacent to angle T is 14 cm and the side opposite angle T is 4.7 cm. Find the size of angle T.
8. A tree casts a shadow of 11 m and its height is 6.3 m. Find the angle of elevation of the sun.
9. In triangle XYZ, angle Y is a right angle. The side adjacent to angle Z is 6 cm and the side opposite angle Z is 5.5 cm. Find the size of angle Z.
10. A signpost casts a shadow of 4 m and its height is 2.6 m. Find the angle of elevation of the sun.

1) Triangle JKL (right angle at K)Adjacent to $\angle J = 12$ cm, Opposite to $\angle J = 6.6$ cm

$$\tan J = \frac{6.6}{12}$$

$$\tan J = 0.55$$

$$J = \tan^{-1}(0.55) = 28.8^\circ$$



2) Ramp (rise 2.8 m, run 9 m)

Opposite = 2.8, Adjacent = 9

$$\tan \theta = \frac{2.8}{9}$$

$$\tan \theta = 0.3111...$$

$$\theta = \tan^{-1}(0.3111...) = 17.3^\circ$$



3) Triangle MNO (right angle at N)Adjacent to $\angle M = 7$ cm, Opposite to $\angle M = 6.1$ cm

$$\tan M = \frac{6.1}{7}$$

$$\tan M = 0.8714...$$

$$M = \tan^{-1}(0.8714...) = 41.1^\circ$$



4) Building and shadow

Height = 6.8 m (opposite), shadow = 15 m (adjacent)

$$\tan \theta = \frac{6.8}{15}$$

$$\tan \theta = 0.4533...$$

$$\theta = \tan^{-1}(0.4533...) = 24.4^\circ$$

☒ 24.4°

5) Triangle QRS (right angle at S)

Adjacent to $\angle Q = 10$ cm, Opposite to $\angle Q = 7.3$ cm

$$\tan Q = \frac{7.3}{10}$$

$$\tan Q = 0.73$$

$$Q = \tan^{-1}(0.73) = 36.1^\circ$$

☒ 36.1°

6) Slide (height 3.2 m, run 8 m)

Opposite = 3.2, Adjacent = 8

$$\tan \theta = \frac{3.2}{8}$$

$$\tan \theta = 0.4$$

$$\theta = \tan^{-1}(0.4) = 21.8^\circ$$

☒ 21.8°

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7) Triangle TUV (right angle at U)

Adjacent to $\angle T = 14$ cm, Opposite to $\angle T = 4.7$ cm

$$\tan T = \frac{4.7}{14}$$

$$\tan T = 0.3357...$$

$$T = \tan^{-1}(0.3357...) = 18.6^\circ$$

✓

8) Tree and shadow

Height = 6.3 m (opposite), shadow = 11 m (adjacent)

$$\tan \theta = \frac{6.3}{11}$$

$$\tan \theta = 0.5727...$$

$$\theta = \tan^{-1}(0.5727...) = 29.8^\circ$$

✓

9) Triangle XYZ (right angle at Y)

Adjacent to $\angle Z = 6$ cm, Opposite to $\angle Z = 5.5$ cm

$$\tan Z = \frac{5.5}{6}$$

$$\tan Z = 0.9166...$$

$$Z = \tan^{-1}(0.9166...) = 42.5^\circ$$

✓

10) Signpost and shadow

Height = 2.6 m (opposite), shadow = 4 m (adjacent)

$$\tan \theta = \frac{2.6}{4}$$

$$\tan \theta = 0.65$$

$$\theta = \tan^{-1}(0.65) = 33.0^\circ$$

✓