

CLASS 10

MATHS

EXTRA QUESTIONS

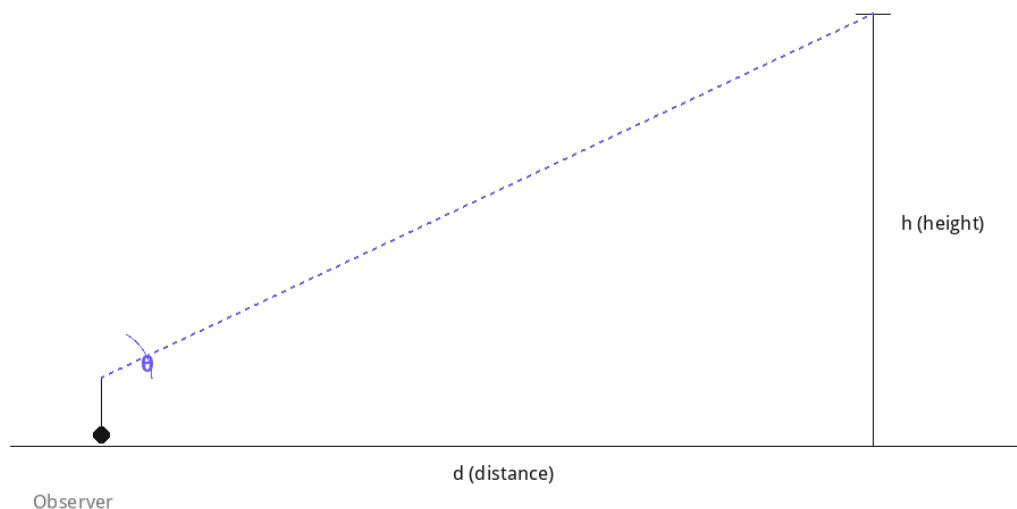
Class 10 Maths Chapter 9 Extra Questions – Some Applications of Trigonometry (HOTS)

These higher-order-thinking questions go beyond the standard Exercise 9.1 pattern -- general proofs, reverse-engineering, assertion-reason, and multi-step word problems, all with numbers not used in the NCERT textbook exercise. These Class 10 Mathematics Chapter 9 important questions are handy for last-minute exam p...

Contents

Class 10 Maths Chapter 9 Extra Questions (HOTS Level)

Class 10 Mathematics Chapter 9 – Solutions and Notes



$\tan \theta = h/d$, where θ is the angle of elevation from the observer to the top of the object.

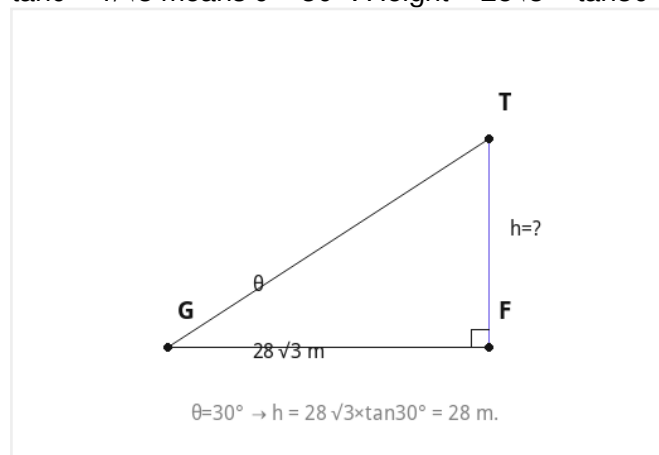
Reference figure — angle of elevation, height and distance

Class 10 Maths Chapter 9 Extra Questions (HOTS Level)

These higher-order-thinking questions go beyond the standard Exercise 9.1 pattern — general proofs, reverse-engineering, assertion-reason, and multi-step word problems, all with numbers not used in the NCERT textbook exercise. These Class 10 Mathematics Chapter 9 important questions are handy for last-minute exam practice.

Q1 (Reverse-engineering). The angle of elevation of a tower's top from a point $28\sqrt{3}$ m from its base is such that its tangent equals $1/\sqrt{3}$. Find the tower's height.

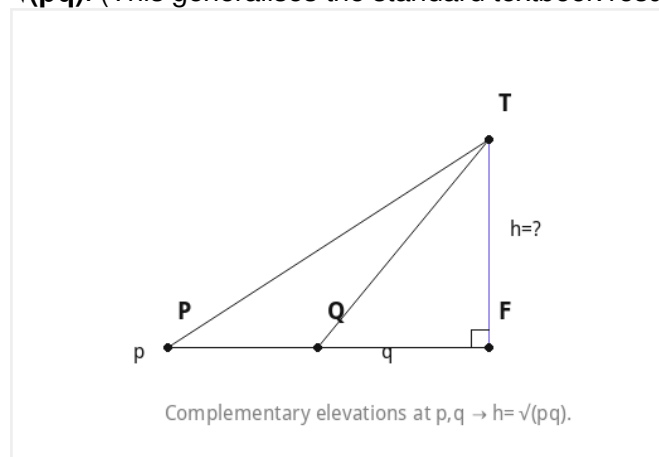
$\tan \theta = 1/\sqrt{3}$ means $\theta = 30^\circ$. Height = $28\sqrt{3} \times \tan 30^\circ = 28\sqrt{3} \times 1/\sqrt{3} = 28$ m.



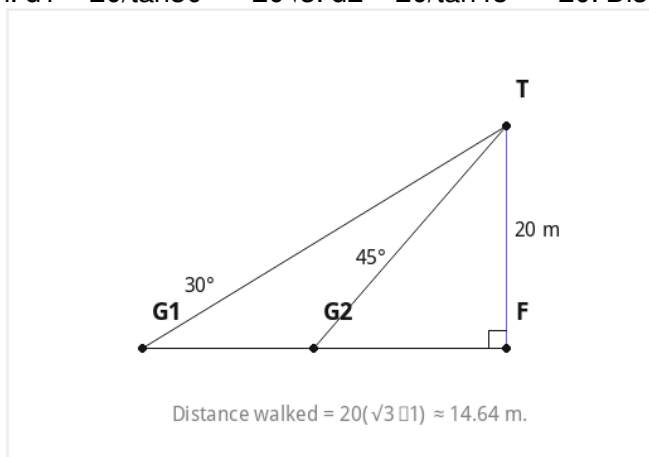
Q2 (General/abstract proof). From two points at distances p and q ($p > q$) from a tower's base, on the same side and in line with it, the angles of elevation are complementary. Prove that the tower's height is $\sqrt{pq}$.

Proof: $\tan \theta = h/q$, $\tan(90^\circ - \theta) = \cot \theta = h/p$. Multiplying: $\tan \theta \times \cot \theta = 1 = h^2/(pq)$, so $h^2 = pq$, giving $h = \sqrt{pq}$.

$\sqrt{pq}$. (This generalises the standard textbook result, where $p=9$, $q=4$, giving $h=6$.)



Q3 (Multi-number word problem). A 1.6 m tall boy notices the top of a 21.6 m pillar at 30° elevation, then walks towards it until the elevation is 45° . Find the distance he walked.
 Height above eye level = $21.6 - 1.6 = 20$ m. $d_1 = 20/\tan 30^\circ = 20\sqrt{3}$. $d_2 = 20/\tan 45^\circ = 20$. Distance walked =



$20\sqrt{3} - 20 = 20(\sqrt{3} - 1)$ m (approx 14.64 m).

Q4 (Assertion-Reason). Assertion (A): As the sun's angle of elevation decreases through the afternoon, the shadow of a vertical pole gets longer.

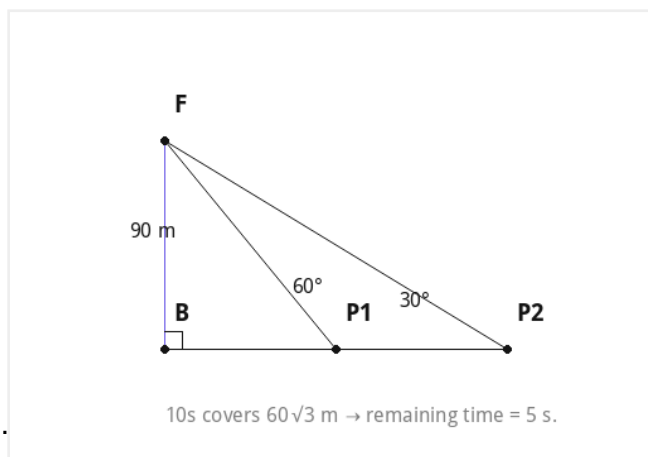
Reason (R): For a pole of fixed height h and sun elevation θ , shadow length = $h/\tan\theta$, and $\tan\theta$ is an increasing function of θ on $(0^\circ, 90^\circ)$.

Options: (a) Both A and R true, R correctly explains A. (b) Both true, R does not explain A. (c) A true, R false. (d) A false, R true.

Answer: (a). Since $\tan\theta$ increases with θ , a smaller θ gives a smaller $\tan\theta$, hence a larger shadow length $h/\tan\theta$ — R correctly explains A.

Q5 (Reciprocal-substitution speed/time, fresh numbers). From the top of a 90 m tower, a car's angle of depression changes from 30° to 60° in 10 seconds as it approaches at constant speed. Find the further time it takes to reach the tower's foot.

$d_1 = 90\sqrt{3}$, $d_2 = 90/\sqrt{3} = 30\sqrt{3}$. Distance covered in 10s = $60\sqrt{3}$, speed = $6\sqrt{3}/s$. Remaining distance $d_2 =$

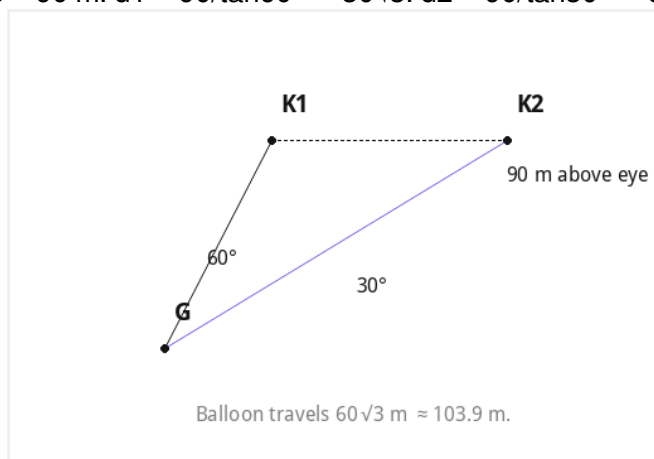


$30\sqrt{3}$, time = $30\sqrt{3}/6\sqrt{3} = 5$ seconds.

Q6 (General two-point formula, proof). A tower's angle of elevation from a point is θ . After moving a distance 'a' towards the tower, the angle becomes ϕ ($\phi > \theta$). Prove the tower's height is $h = a \cdot \tan\theta \cdot \tan\phi / (\tan\phi - \tan\theta)$.

Proof: Let height h , far point at distance $d = h/\tan\theta$, near point at distance $(d-a)$, so $h = (d-a)\tan\phi$. Equating: $d \cdot \tan\theta = (d-a)\tan\phi \Rightarrow d(\tan\phi - \tan\theta) = a \cdot \tan\phi \Rightarrow d = a \cdot \tan\phi / (\tan\phi - \tan\theta)$. Then **$h = a \cdot \tan\theta \cdot \tan\phi / (\tan\phi - \tan\theta)$** . Use this general template for any two-position elevation problem, substituting the problem's own values of a , θ , ϕ .

Q7 (Multi-number word problem). A 1.5 m tall girl spots a balloon at 91.5 m height; as the balloon drifts away horizontally, the angle of elevation reduces from 60° to 30° . Find the distance the balloon travelled. Height above eye = 90 m. $d_1 = 90/\tan 60^\circ = 30\sqrt{3}$. $d_2 = 90/\tan 30^\circ = 90\sqrt{3}$. Distance = $90\sqrt{3} - 30\sqrt{3} = 60\sqrt{3}$ m



(approx 103.9 m).

Class 10 Mathematics Chapter 9 – Solutions and Notes

For complete step-by-step answers and a quick summary, check the [Class 10 Mathematics Chapter 9 Solutions](#) and [Class 10 Mathematics Chapter 9 Revision Notes](#).