BCM SCHOOL, BASANT AVENUE, DUGRI, LUDHIANA.
JULY ASSIGNEMENT- ANSWER KEY
CLASS- X (MATHEMATICS)
TOPICS: INTRODUCTION TO TRIGONOMETRY & APPLICATION OF TRIGONOMETRY.

SECTION –A (MULTIPLE CHOICE QUESTIONS)

1.	C
2.	D
3.	B

SECTION – B(2 MARKS QUESTIONS)

4.

AB = AD + DB = 6 m (given)

⇒ 2.54 m + DB = 6 m

⇒ DB = 3.46 m

Now, in the right ∠d ABCD.

$$\frac{BD}{CD} = \sin 60°$$

$$\Rightarrow \quad \frac{3.46\ m}{CD} = \frac{\sqrt{3}}{2}$$

$$\Rightarrow \quad CD = \frac{2 \times 3.46\ m}{1.73}$$

$$\Rightarrow \quad CD = 4\ m$$

Thus, the length of the ladder CD is 4 m.

5.

L.H.S. $= q(p^2 - 1)$

$= (\sec\theta + \text{cosec}\theta)\left\{(\sin\theta + \cos\theta)^2 - 1\right\}$

$= \left(\frac{1}{\cos\theta} + \frac{1}{\sin\theta}\right)(\sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta - 1)$

$= \left(\frac{1}{\cos\theta} + \frac{1}{\sin\theta}\right)(1 + 2\sin\theta\cos\theta - 1)$

$= \left(\frac{1}{\cos\theta} + \frac{1}{\sin\theta}\right) \cdot 2\sin\theta\cos\theta$

$= 2\left(\frac{\sin\theta\cos\theta}{\cos\theta} + \frac{\sin\theta\cos\theta}{\sin\theta}\right) = 2(\sin\theta + \cos\theta)$

$= 2p = R.H.S.$

SECTION – C (3 MARKS QUESTIONS)

6.

$m^2 - n^2 = (\tan A + \sin A)^2 - (\tan A - \sin A)^2$

$m^2 - n^2 = (\tan A + \sin A + \tan A - \sin A)(\tan A + \sin A - \tan A + \sin A)$

$m^2 - n^2 = (2\tan A)(2\sin A)$

$m^2 - n^2 = 4\tan A \sin A \quad ...(1)$

Also,

$4\sqrt{mn} = 4\sqrt{(\tan A + \sin A)(\tan A - \sin A)}$

$= 4\sqrt{\tan^2 A - \sin^2 A}$

$= 4\sqrt{\frac{\sin^2 A}{\cos^2 A} - \sin^2 A}$

$= 4\sin A\sqrt{\frac{1 - \cos^2 A}{\cos^2 A}}$

$= 4\sin A\sqrt{\frac{\sin^2 A}{\cos^2 A}}$

$= 4\sin A \cdot \frac{\sin A}{\cos A}$

$= 4\sin A.\tan A \quad ...(2)$

7.

Let x m be the distance between hill and man. The angles of elevation and depression are 60° and 30° respectively. Various arrangements are as shown in the figure.

In right ΔDBC, $\frac{AB}{BD}$ = tan 60°

$\frac{h}{x}$ = √3

h = √3x ..... (1)

In right ΔDBC, $\frac{BC}{BD}$ = tan 60°

$\frac{8}{x} = \frac{1}{\sqrt{3}}$

x = 8√3 ..... (2)

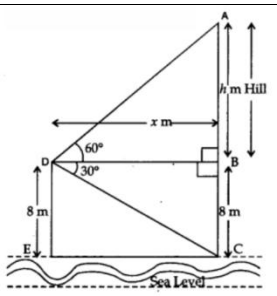
From (1) and (2), we get

h = √3 (8 √3) = 8 × 3 = 24 m

∴ Height of hill = (h + 8) m

= (24 + 8) m = 32 m

Hence, height of hill and distance of man from hill are 32 m and 8√3 m respectively.



SECTION – D (5 MARKS QUESTIONS)

8.	Considering triangle BAO, we get $\cos\alpha$ = OA/AB $\cos\alpha$ = y/AB y = AB$\cos\alpha$ Also, OA = AB $\cos\alpha$ ---------- (1) $\sin\alpha$ = OB/AB OB = BA $\sin\alpha$ ---------- (2) Considering triangle QSO, we get, $\sin\beta$ = QO/SQ QO = SQ $\sin\beta$ $\cos\beta$ = SO/SQ SO = SQ$\cos\beta$ Since the length of the ladder remains the same, we have, AB = SQ Hence, QO = AB $\sin\beta$ ---------- (3) SO = AB $\cos\beta$ ---------- (4) We know that, SA = OS - AO p = AB $\cos\beta$ - AB $\cos\alpha$ p = AB ($\cos\beta$ - $\cos\alpha$) ---------- (5) BQ = BO - QO q = BA $\sin\alpha$ - AB $\sin\beta$ q = BA ($\sin\alpha$ - $\sin\beta$) ---------- (6) According to the question, we need to prove that p/q = $\cos\beta$ - $\cos\alpha$/ $\sin\alpha$ - $\sin\beta$. p/q = AB ($\cos\beta$ - $\cos\alpha$)/BA ($\sin\alpha$ - $\sin\beta$) p/q = ($\cos\beta$ - $\cos\alpha$)/ ($\sin\alpha$ - $\sin\beta$)
9.	In right ΔABD $\tan\alpha = \frac{AD}{BD} = \frac{h}{x}$ $\Rightarrow h = x\tan\alpha$ $\Rightarrow x = \frac{h}{\tan\alpha}$ ...(i) In right ΔADC $\tan\beta = \frac{AD}{DC} = \frac{h}{1-x}$ $\Rightarrow h = \tan\beta - x\tan\beta$ ...(ii) Put for x in (ii) from (i), we get $h = \tan\beta - \left(\frac{h}{\tan\alpha}\right)\tan\beta$ $\Rightarrow h = \frac{\tan\alpha\tan\beta - h\tan\beta}{\tan\alpha}$ $\Rightarrow h\tan\alpha = \tan\alpha\tan\beta - h\tan\beta$ $\Rightarrow h(\tan\alpha + \tan\beta) = \tan\alpha.\tan\beta$
SECTION – E (CASE STUDY)	
10.	(A) 15 m (B) $15\sqrt{3}m$