BCM SCHOOL, BASANT AVENUE, DUGRI, LUDHIANA.
AUGUST ASSIGNEMENT- 2026-27
CLASS- X (MATHEMATICS)

ANSWER KEY

SECTION –A (MULTIPLE CHOICE QUESTIONS)

1.	D
2.	B
3.	D
4.	B

SECTION B(2 MARKS QUESTIONS)

5.

$mt_m = nt_n$

From equation (1) and (2),

$m[a + (m - 1)d] = n[a + (n - 1)d]$

$m[a + (m - 1)d] - n[a + (n - 1)d] = 0$

$a(m - n) + d[(m + n)(m - n) - (m - n)] = 0$

$(m - n)[a + d((m + n) - 1)] = 0$

$a + [(m + n) - 1]d = 0$ ------------- (3)

But, $a + [(m + n) - 1]d = t_{m+n}$

Thus, $t_{m+n} = 0$ [From equation (3)]

6.	We have given $\tan\theta + \sin\theta = m$, and $\tan\theta - \sin\theta = n$, then LHS $= (m^2 - n^2) = (\tan\theta + \sin\theta)^2 - (\tan\theta - \sin\theta)^2$ $= \tan^2\theta + \sin^2\theta + 2\tan\theta\sin\theta - \tan^2\theta - \sin^2\theta + 2\tan\theta\sin\theta$ $= 4\tan\theta\sin\theta = 4\sqrt{\tan^2\theta\sin^2\theta}$ $= 4\sqrt{\frac{\sin^2\theta}{\cos^2\theta}(1-\cos^2\theta)} = 4\sqrt{\frac{\sin^2\theta}{\cos^2\theta} - \sin^2\theta}$ $= 4\sqrt{\tan^2\theta - \sin^2\theta} = 4\sqrt{(\tan\theta - \sin\theta)(\tan\theta + \sin\theta)} = 4\sqrt{mn} =$ RHS
SECTION – C (3 MARKS QUESTIONS)	
7	roots are equal so, $D = b^2 - 4ac = 0$ $\{2(ab + cd)\}^2 - 4(a^2 + b^2)(c^2 + d^2) = 0$ $4(ab + cd)^2 - 4(a^2 + b^2)(c^2 + d^2) = 0$ $(a^2b^2 + c^2d^2 + 2abcd) - a^2c^2 - a^2d^2 - b^2d^2 - b^2c^2 = 0$ $-a^2c^2 - b^2d^2 + 2abcd = 0$ $-(a^2c^2 + b^2d^2 - 2abcd) = 0$ $\{(ac - bd)^2\} = 0$ $ac - bd = 0$
8.	$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ Substituting the coordinates: $AB = \sqrt{(3-0)^2 + (\sqrt{3}-0)^2} = \sqrt{3^2 + (\sqrt{3})^2}$ $= \sqrt{9+3} = \sqrt{12} = 2\sqrt{3}$

	1. For AC: $AC = \sqrt{(a-0)^2 + (b-0)^2} = 2\sqrt{3}$ Squaring both sides: $a^2 + b^2 = (2\sqrt{3})^2 = 12$ 2. For BC: $BC = \sqrt{(a-3)^2 + (b-\sqrt{3})^2} = 2\sqrt{3}$ Squaring both sides: $(a-3)^2 + (b-\sqrt{3})^2 = 12$ $(a-3)^2 + (b-\sqrt{3})^2 = 12$ $(a^2 - 6a + 9) + (b^2 - 2b\sqrt{3} + 3) = 12$ Substituting $a^2 + b^2 = 12$ into the equation: $12 - 6a + 9 + 3 - 12 = 0$ This simplifies to: $-6a + 0 = 0 \implies 6a = 0 \implies a = 0$ Substituting $a = 0$ into the first equation: $0^2 + b^2 = 12 \implies b^2 = 12 \implies b = \pm 2\sqrt{3}$ Thus, the third vertex C can be: 1. $C(0, 2\sqrt{3})$ 2. $C(0, -2\sqrt{3})$
9	$2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta)$ $= 2\sin^6\theta + 2\cos^6\theta - 3\sin^4\theta - 3\cos^4\theta$ $= (2\sin^6\theta - 3\sin^4\theta) + (2\cos^6\theta - 3\cos^4\theta)$ $= \sin^4\theta(2\sin^2\theta - 3) + \cos^4\theta(2\cos^2\theta - 3)$ $= \sin^4\theta\{2(1 - \cos^2\theta) - 3\} + \cos^4\theta\{2(1 - \sin^2\theta) - 3\}$ $= \sin^4\theta(2 - 2\cos^2\theta - 3) + \cos^4\theta(2 - 2\sin^2\theta - 3)$ $= \sin^4\theta(-1 - 2\cos^2\theta) + \cos^4\theta(-1 - 2\sin^2\theta)$ $= -\sin^4\theta - 2\sin^4\theta\cos^2\theta - \cos^4\theta - 2\cos^4\theta\sin^2\theta$

$= -\sin^4\theta - \cos^4\theta - 2\cos^4\theta\sin^2\theta - 2\sin^4\theta\cos^2\theta$

$= -\sin^4\theta - \cos^4\theta - 2\cos^2\theta\sin^2\theta(\cos^2\theta + \sin^2\theta)$

$= -\sin^4\theta - \cos^4\theta - 2\cos^2\theta\sin^2\theta(1)$

$= -\sin^4\theta - \cos^4\theta - 2\cos^2\theta\sin^2\theta$

$= -(\sin^4\theta + \cos^4\theta + 2\cos^2\theta\sin^2\theta)$

$= -\{(\sin^2\theta)^2 + (\cos^2\theta)^2 + 2\sin^2\theta\cos^2\theta\}$

$= -(\sin^2\theta + \cos^2\theta)^2$

$= -(1)^2$

$= -1$

$2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta) + 1 = -1 + 1 = 0 = \text{RHS}$

SECTION – D (5 MARKS QUESTIONS)

10.

Solution : Let C be the lower window, D be the upper window such that CB = 2 m, CD = 4 m and G be the position of the balloon.

Here, $\angle ECG = 60°$ and $\angle FDG = 30°$

Let CE = DF = x m and GF = h m

In ΔFDG, we have, $\tan 30° = \frac{GF}{DF} = \frac{h}{x} \Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{x}$

$\Rightarrow x = \sqrt{3}h$ ...(*i*)

In ΔECG, we have, $\tan 60° = \frac{EG}{CE} \Rightarrow \sqrt{3} = \frac{h+4}{x}$

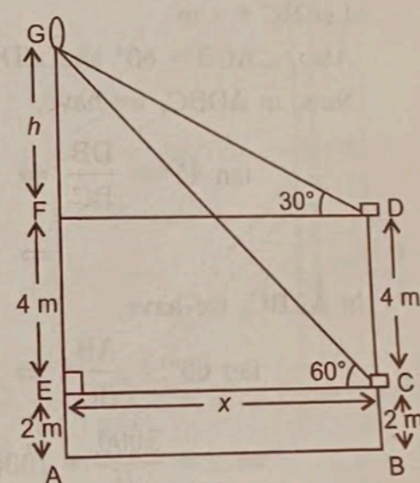
$\Rightarrow x = \frac{h+4}{\sqrt{3}}$ ...(*ii*)

Comparing (*i*) and (*ii*), we get

$\Rightarrow \sqrt{3}h = \frac{h+4}{\sqrt{3}} \Rightarrow 3h = h + 4$

$\Rightarrow 2h = 4 \Rightarrow h = 2$

Hence, height of the balloon AG = AE + EF + FG = (2 + 4 + 2) m = 8 m



11.

In ΔTXM,

seg BN || seg XM ---- **[Given]**

$\therefore \frac{TN}{NM} = \frac{TB}{BX}$ ---- (i) [By B.P.T.]

In ΔTMC,

seg XN || seg CM ---- [Given]

$\therefore \frac{TN}{NM} = \frac{TX}{CX}$ ---- (ii) [By B.P.T.]

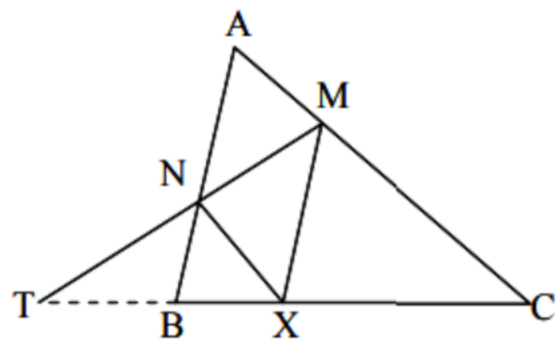
$\therefore \frac{TB}{BX} = \frac{TX}{CX}$ ---- [From (i) and (ii)]

$\therefore \frac{BX}{TB} = \frac{CX}{TX}$ ---- [By invertendo]

$\therefore \frac{BX+TB}{TB} = \frac{CX+TX}{TX}$ ---- [By componendo]

$\therefore \frac{TX}{TB} = \frac{TC}{TX}$ ---- [T–B–X, T–X–C]

$\therefore$ **TX^2 = TB·TC**



12.

Solution : Let C be the position of the cloud, C' be its reflection, AB be the surface of the lake. Also, Let DE = x m and CE = h m Also, $\angle CDE = 30°$ and $\angle EDC' = 60°$

In ΔCDE, we have, $\tan 30° = \frac{CE}{DE} \Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{x} \Rightarrow x = \sqrt{3}h$ ...(i)

In ΔC'DE, we have, $\tan 60° = \frac{C'E}{DE} \Rightarrow \sqrt{3} = \frac{BE+C'B}{DE}$

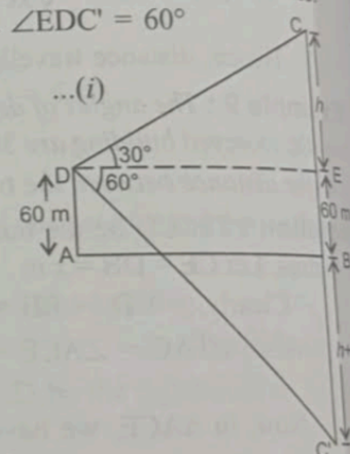
$\Rightarrow \sqrt{3} = \frac{60+h+60}{x}$

$\Rightarrow \sqrt{3} = \frac{h+120}{x} \Rightarrow x = \frac{h+120}{\sqrt{3}}$ ...(ii)

Comparing (i) and (ii), we get,

$\sqrt{3}h = \frac{h+120}{\sqrt{3}} \Rightarrow 3h = h + 120 \Rightarrow 2h = 120 \Rightarrow h = 60$ m

Hence, height of the cloud from the surface of the lake = h + 60 m = 120 m.



SECTION – E (CASE STUDY)

13.

(A) $2x(x-10) = x^2 + 300.$

(B)the number of rows in the original arrangement is 30

(C) The total number of seats in the original arrangement is 900

OR

the total number of seats after re-arrangement is 900+300 = 1200

14.		
	(A)	$\boxed{150\sqrt{34}\ \text{km} \approx 874.6\ \text{km}}$
	(B)	$\boxed{K = (2, 8.2)}$
	(C)	$\boxed{(0, 5)}$
	OR	$\boxed{\triangle LNP \text{ is an isosceles triangle}}$