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FOR HARYANA CLASS 12 PREPARATION

HBSE Class 12 Sample Paper 2027 Mathematics Stepwise Marking Scheme

EXAM	YEAR	TYPE	SUBJECT
Haryana Class 12	2027	Answer Key	Maths

BOARD OF SCHOOL EDUCATION HARYANA

MARKING SCHEME

CLASS: 12th (Sr. Secondary)

Practice Paper 2026 – 27 **SET – A**

गणित

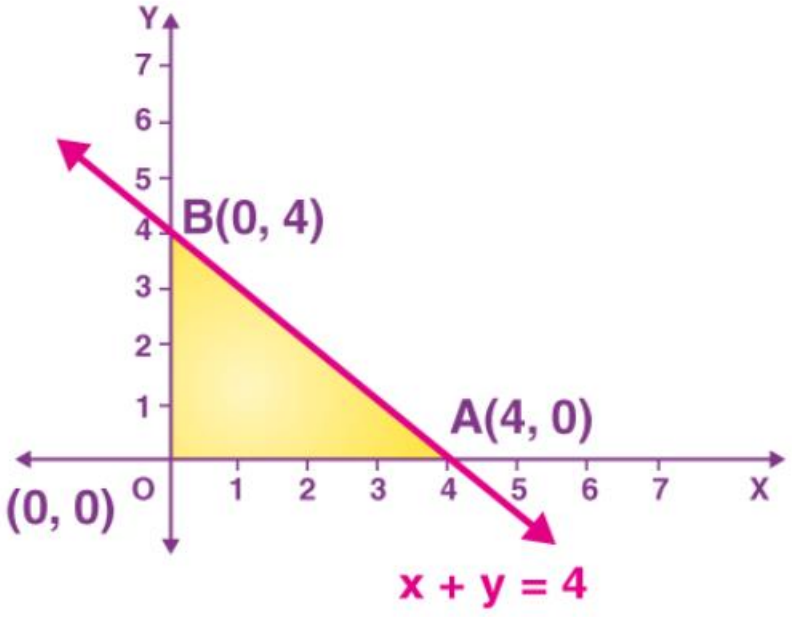
[MATHEMATICS]

[ENGLISH MEDIUM]

- मार्किंग स्कीम में दिए गए हल केवल एक विधि है इसके अतिरिक्त सब विधियां भी बराबर मान्य होंगी यदि वे गणितीय रूप से सही हैं |
- The solution methods adopted in the marking scheme are suggestive. Different methods are also acceptable if these are mathematically correct.

Section -A : (1 Mark each)

Question No.	Answer	Hints/ Solution
1.	B	Because single element relation is always transitive.
2.	A	$\cos^{-1}\left(\cos\frac{3\pi}{2}\right) = \cos^{-1}\cos^{-1}\left(\cos\left(2\pi - \frac{\pi}{2}\right)\right)$ $= \cos^{-1}\left(\cos\left(\frac{\pi}{2}\right)\right) = \frac{\pi}{2}$
3.	D	None of these is always true.
4.	D	$(A+B)^{-1} = B^{-1} + A^{-1}$
5.	B	$\frac{dx}{dt} = 2t, \frac{dy}{dt} = 3t^2$, so $\frac{dy}{dx} = \frac{3}{2t}$ $\frac{d^2y}{dx^2} = \frac{3}{4t}$
6.	$\frac{-2}{\sqrt{1-x^2}}$	$put\ x = \cos\theta \Longrightarrow \theta = \cos^{-1}x$ So $y = \cos^{-1}(2cos^2\theta - 1) = \cos^{-1}\cos 2\theta = 2\theta$ $\Longrightarrow 2\cos^{-1}x$, so $\frac{dy}{dx} = \frac{-2}{\sqrt{1-x^2}}$
7.	$\cos x$	$Many\ examples\ possible$

8.	D	$y = x^2e^{-x}$ $\frac{dy}{dx} = xe^{-x}(-x+2) = \frac{x(2-x)}{e^x} > 0 \; in \; (0,2)$
9.	Critical point	*At critical ponit the given condition holds.*
10.	A	$I = \int \frac{2cos^2x - 1 - 2cos^2\theta + 1}{\cos x - \cos\theta} \, dx = 2\int \frac{cos^2x - cos^2\theta}{\cos x - \cos\theta} dx$ $= 2\int (\cos x + \cos\theta) \, dx$ $= 2(\sin x + x\cos\theta) + c$ Note: *treat* $\cos\theta$ *as constant.*
11.	A	Degree = no. of arbitrary constants = 1
12.	D	For orthogonal vectors $\vec{a}.\vec{b} = 0$. So $(2\hat{\imath} + \lambda\hat{\jmath} + \hat{k}).(\hat{\imath} + 2\hat{\jmath} + 3\hat{k}) = 0$ $2 + 2\lambda + 3 = 0 \Rightarrow \lambda = \frac{-5}{2}$
13.	$\vec{a}.\hat{b}$	$\left(\frac{\vec{a}.\vec{b}}{\lvert\vec{b}\rvert}\right)$ *or* $\frac{1}{\lvert\vec{b}\rvert}(\vec{a}.\vec{b})$
14.	D	Required Distance = $\sqrt{(\alpha-0)^2 + (\beta-\beta)^2 + (\gamma-0)^2}$ = $\sqrt{\alpha^2+\gamma^2}$ *since any point on* $y-axis$ *is* $(0,\beta,0)$
15.	B	*objective function is a function to be optimised.*
16.	C	 Z is maximum at (0,4) where Z = 16

17.	A	Given, $P(A) = 0.8, P(B) = 0.5 \; and \; P(B\|A) = 0.4$ By conditional probability, we have; $P(B\|A) = P(A \cap B)/P(A)$ $\Rightarrow P(A \cap B) = P(B\|A).P(A) = 0.4\,x\,0.8 = 0.32$
18.	$P(A \cap B) = P(A).P(B)$	$By\ definition\ of\ independent\ events.$
19.	D	A is false but R is true here.
20.	D	A is false $Since\ \lambda = -1\ here\ for\ the\ given\ condition.$ but R is true here.

खंड – ब

SECTION – B (2×5=10)

21.	Check for one to one function: $f(1) = f(2) = f(3) = 1, so\ f\ is\ not\ one-one.$ Check for Onto Function: Here range of $f = \{-1,0,1\}$ but domain of $f \neq R$ *So f is not onto.*	1 1
22(a).	Since the corresponding elements of equal matrices are identical, we get: $2x + y = 7$ $x - 2y = -4$ On solving we get $x = 2, y = 3$	1 1
OR 22(b).	Area of triangle$=\frac{1}{2}\begin{vmatrix}1 & 0 & 1\\6 & 0 & 1\\4 & 3 & 1\end{vmatrix}$ On solving: $=\frac{15}{2}\ square\ units$	1 1
23	$y = 2^{cos^2 x}$ $\log y = log\ 2^{cos^2 x} = cos^2 x.\log 2$	0.5

	So, $\frac{1}{y}\frac{dy}{dx} = \log 2 \,.\, (2\cos x)(-\sin x)$	1
	$\frac{dy}{dx} = -2^{cos^2 x}.\log 2\,(\sin 2x)$	0.5
24(a)	$I = \int \frac{2x-1}{2x+3}dx = \int \frac{2x+3-3-1}{2x+3}dx$	0.5
	$= \int 1dx - 4\int \frac{1}{2x+3}dx$	0.5
	$= x - 2log(2x+3) + C$	0.5
	$x - log(2x+3)^2 + C$	0.5
24(b)	$I = \int_0^1 \frac{x}{\sqrt{1+x^2}}dx$	0.5
	$put\ 1 + x^2 = t^2, 2x\,dx = 2t\,dt \Longrightarrow x\,dx = t\,dt$	
	When $x = 0, t = 1\,; if\ x = 1\,, t = \sqrt{2}$	0.5
	$I = \int_1^{\sqrt{2}} \frac{t\,dt}{t} = [t]_1^{\sqrt{2}} = \sqrt{2} - 1$	1
25.	*Given that A and B are independent*	
	So $P(A \cap B) = P(A).P(B)$	0.5
	Now	
	$P(problem\ is\ solved)$	
	$= Problem\ is\ solved\ by\ A\ or\ problem\ is\ solved\ by\ B$	0.5
	$or\ problem\ is\ solved\ by\ both$	
	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$	0.5
	$P(A \cup B) = P(A) + P(B) - P(A).P(B)$	
	$P(A \cup B) = \frac{1}{2} + \frac{1}{3} - \frac{1}{2}.\frac{1}{3}$	
	$P(A \cup B) = \frac{3+2-1}{6} = \frac{2}{3}$	0.5

खंड – स

SECTION – C (3×6=18)

26.	put $x = \cos 2\theta$	
	$\tan^{-1}\left(\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right) =$	0.5
	$= \tan^{-1}\left(\frac{\sqrt{1+\cos 2\theta}-\sqrt{1-\cos 2\theta}}{\sqrt{1+\cos 2\theta}+\sqrt{1-\cos 2\theta}}\right)$	

$$= \tan^{-1}\left(\frac{\sqrt{2cos^2\theta} - \sqrt{2sin^2\theta}}{\sqrt{2cos^2\theta} + \sqrt{2sin^2\theta}}\right) \quad 0.5$$

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

$$= \tan^{-1}\left(\frac{1 - \tan\theta}{1 + \tan\theta}\right) = \tan^{-1}\left(\tan\left(\frac{\pi}{4} - \theta\right)\right) \quad 1$$

$$= \frac{\pi}{4} - \frac{1}{2}\cos^{-1} x$$

27(a).

At $x = 0$

$$\lim_{x\to 0} f(x) = \lim_{x\to 0} \frac{3x + 4\tan x}{x} = \frac{0}{0}\ form$$

So we cannot say it continuous at $x = 0$

For f to be continuous we should have

$$\lim_{x\to 0} f(x) = f(0) \quad 1$$

Applying L'Hospital Rule:

$$\lim_{x\to 0} f(x) = \lim_{x\to 0} \frac{3 + 4\,sec^2 x}{1} = 3 + 4 = 7 \quad 1$$

So $at\ x = 0$ for being continuous function should be redefined as:

$$f(x) = \begin{cases} \dfrac{3x + 4\tan x}{x} & ;\ x \neq 0 \\ 7 & ;\quad x = 0 \end{cases} \quad 1$$

Then $\lim_{x\to 0} f(x) = f(0) = 7$

So f is continuous at $x = 0$

OR

OR 27(b).

Here

$$f(x) = 4x^3 - 6x^2 - 72x + 30$$

So

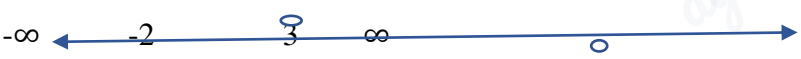
$$f'(x) = 12x^2 - 12x - 72$$

$$= 12(x^2 - x - 6) \quad 0.5$$

$$= 12(x - 3) + (x + 2)$$

Put $f'(x) = 0$ gives 0.5

$$x = 3, x = -2$$



0.5

INTERVAL	SIGN OF $f'(x)$	Nature of $f(x)$	
$(-\infty, -2)$	> 0	$f\ is\ strictly\ increasing$	0.5
$(-2,3)$	< 0	$f\ is\ strictly\ decreasing$	0.5
$(3, \infty)$	> 0	$f\ is\ strictly\ increasing$	0.5

28.	Here: $$f(x) = \lvert x \sin \pi x \rvert = \begin{cases} x \sin \pi x \; ; \; -1 \le x \le 1 \\ -x \sin \pi x \; ; 1 \le x \le \frac{3}{2} \end{cases}$$ Now : $$\int_{-1}^{\frac{3}{2}} \lvert x \sin \pi x \rvert dx = \int_{-1}^{1} x \sin \pi x \, dx + \int_{1}^{\frac{3}{2}} -x \sin \pi x \, dx$$ $$= \int_{-1}^{1} x \sin \pi x \, dx - \int_{1}^{\frac{3}{2}} x \sin \pi x \, dx$$ $$= \left[\frac{-x \cos \pi x}{\pi} + \frac{\sin \pi x}{\pi^2}\right]_{-1}^{1} - \left[\frac{-x \cos \pi x}{\pi} + \frac{\sin \pi x}{\pi^2}\right]_{1}^{\frac{3}{2}}$$ $$= \frac{2}{\pi} - \left[-\frac{1}{\pi^2} - \frac{1}{\pi}\right] = \frac{3}{\pi} + \frac{1}{\pi^2}$$	1 1 1
29.	$$V = x^3 \Longrightarrow \frac{dV}{dt} = 3x^2 \frac{dx}{dt} = 3x^2 . 2 = 6x^2$$ Put $x = 12 \; cm \Longrightarrow \frac{dV}{dt} = (6 \times 144) \; cm^3/s = 864 \; cm^3/s$	1.5 1.5
30(a).	$$\vec{a} + \vec{b} = (\hat{\imath} + \hat{\jmath} + \hat{k}) + (\hat{\imath} + 2\hat{\jmath} + 3\hat{k}) = 2\hat{\imath} + 3\hat{\jmath} + 4\hat{k}$$ $$\vec{a} - \vec{b} = (\hat{\imath} + \hat{\jmath} + \hat{k}) - (\hat{\imath} + 2\hat{\jmath} + 3\hat{k}) = -\hat{\jmath} - 2\hat{k}$$ Now $$\vec{c} = (\vec{a} + \vec{b}) \times (\vec{a} - \vec{b}) = \begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ 2 & 3 & 4 \\ 0 & -1 & -2 \end{vmatrix}$$ $$\vec{c} = -2\hat{\imath} + 4\hat{\jmath} \pm 2\hat{k}$$ $$\lvert \vec{c} \rvert = 2\sqrt{6}$$ $$\Longrightarrow \hat{c} = \frac{\vec{c}}{\lvert \vec{c} \rvert} = \frac{-1}{\sqrt{6}}\hat{\imath} + \frac{2}{\sqrt{6}}\hat{\jmath} - \frac{1}{\sqrt{6}}\hat{k}$$ Then $\hat{c}$ will be perpendicular to $(\vec{a} + \vec{b})$ *and* $(\vec{a} - \vec{b})$ *since* $\vec{a} \times \vec{b}$ *is always perpendicular to both* $\vec{a}$ *and* $\vec{b}$.	1 1 1
30(b)	**OR** Here $m = cos\frac{\pi}{4} = \frac{1}{\sqrt{2}}$, $n = cos\frac{\pi}{2}$=0 $$l^2 + m^2 + n^2 = 1$$ $$l = \pm\frac{1}{\sqrt{2}}$$ $$\vec{r} = l\hat{\imath} + m\hat{\jmath} + n\hat{k}$$	1 1 1

	$\vec{r} = \pm 3\hat{\imath} + 3\hat{\jmath}$	
31.	Here $n(s) = 6 \times 6 \times 6 = 216$ Let $E_1 = the\ event\ that\ sum\ of numbers\ on\ the\ dic\ was\ 6$ $E_1 = \{(1,1,4),(1,2,3),(1,3,2),(1,4,1),(2,1,3),(2,2,2),(2,3,1)$ $(3,1,2),(3,2,1),(4,1,1)\}$ Let $E_2 = the\ event\ that\ three\ two's\ occurs$ $E_2 = \{(2,2,2)\}$ So $n(E_1) = 10\ and\ n(E_2) = 1, n(E_1 \cap E_2) = 1$ $P\left(\frac{E_1}{E_2}\right) = \frac{P(E_1 \cap E_2)}{P(E_1)} = \frac{1}{10}$	1 1 1

खंड – द

SECTION – D (5×4=20)

32(a).	The given system of equations can be written as: $AX = B, where$ $A = \begin{bmatrix} 3 & 2 & -2 \\ 1 & 2 & 3 \\ 2 & -1 & 1 \end{bmatrix}, \quad X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}, B = \begin{bmatrix} 3 \\ 6 \\ 2 \end{bmatrix}$ $\lvert A \rvert = 35 \neq 0$ $\Rightarrow A^{-1}\ exists$ Co-factors of A are : $A_{11} = 5, A_{12} = 5, A_{13} = -5$ $A_{21} = 0, A_{22} = 7, A_{23} = 7$ $A_{31} = 10, A_{32} = -11, A_{33} = 4$ $\Rightarrow adjA = \begin{bmatrix} 5 & 0 & 10 \\ 5 & 7 & -11 \\ -5 & 7 & 4 \end{bmatrix}$ $\Rightarrow A^{-1} = \frac{adj\ A}{\lvert A \rvert} = \frac{1}{35}\begin{bmatrix} 5 & 0 & 10 \\ 5 & 7 & -11 \\ -5 & 7 & 4 \end{bmatrix}$ $\Rightarrow X = A^{-1}B = \frac{1}{35}\begin{bmatrix} 5 & 0 & 10 \\ 5 & 7 & -11 \\ -5 & 7 & 4 \end{bmatrix}\begin{bmatrix} 3 \\ 6 \\ 2 \end{bmatrix}$ $\Rightarrow A^{-1} = \frac{adj\ A}{\lvert A \rvert} = \frac{1}{35}\begin{bmatrix} 15+20 \\ 15+42-22 \\ -15+42+8 \end{bmatrix}$	0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5

$$\Rightarrow X = A^{-1}B = \frac{1}{35}\begin{bmatrix}35\\35\\35\end{bmatrix} = \begin{bmatrix}1\\1\\1\end{bmatrix}$$

$$\Rightarrow x = 1, y = 1, z = 1$$ — 0.5

OR

OR 32(b).

Given that $A = \begin{bmatrix}2 & 2 & -4\\-4 & 2 & -4\\2 & -1 & 5\end{bmatrix}, B = \begin{bmatrix}1 & -1 & 0\\2 & 3 & 4\\0 & 1 & 2\end{bmatrix}$

So

$$BA = \begin{bmatrix}6 & 0 & 0\\0 & 6 & 0\\0 & 0 & 6\end{bmatrix} = 6I$$ — 1

So

$$B^{-1} = \frac{1}{6}A = \frac{1}{6}\begin{bmatrix}2 & 2 & -4\\-4 & 2 & -4\\2 & -1 & 5\end{bmatrix} = \begin{bmatrix}1 & -1 & 0\\2 & 3 & 4\\0 & 1 & 2\end{bmatrix}^{-1}$$ — 1

Also

$$y + 2z = 7$$
$$x - y = 3$$
$$2x + 3y + 4z = 17$$

So $\begin{bmatrix}x\\y\\z\end{bmatrix} = \begin{bmatrix}1 & -1 & 0\\2 & 3 & 4\\0 & 1 & 2\end{bmatrix}^{-1}\begin{bmatrix}3\\17\\7\end{bmatrix} = \frac{1}{6}\begin{bmatrix}6+34-28\\-12+34-28\\6-17+35\end{bmatrix} = \frac{1}{6}\begin{bmatrix}12\\-6\\24\end{bmatrix}$ — 1+1

$$\Rightarrow x = 2, y = -1, z = 4$$ — 1

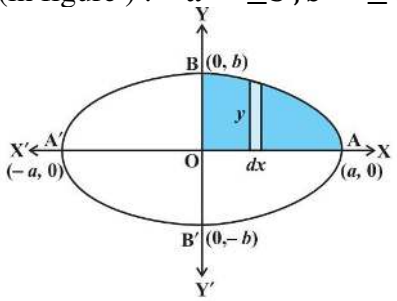
33(a).

Given ellipse is :

$$\frac{x^2}{5^2} + \frac{y^2}{4^2} = 1$$

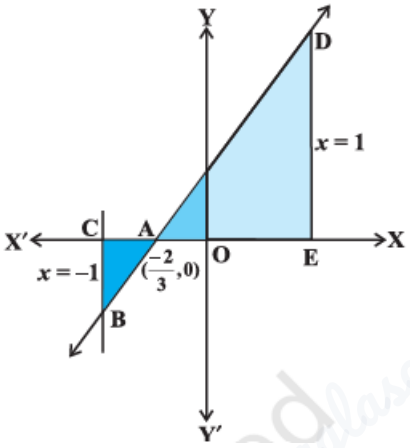
$$\Rightarrow y = 4\sqrt{1 - \frac{x^2}{5^2}} = \frac{4}{5}\sqrt{5^2 - x^2}$$ — 1

(in figure) : $a = \pm 5, b = \pm 4$

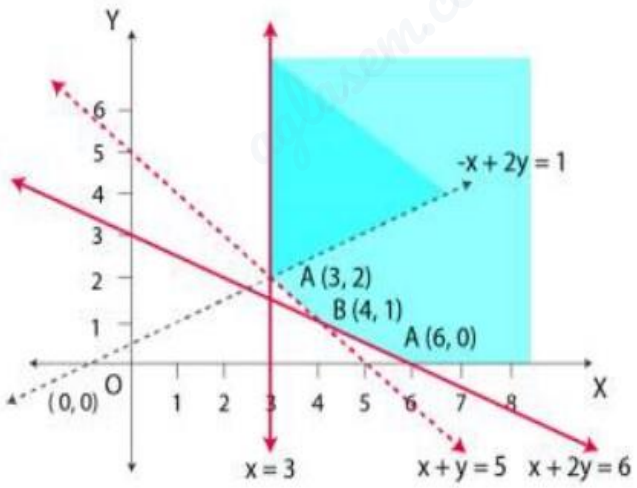


— 1

Required Area $= A = 4.\int_0^a y.\,dx$ — 1

OR 33(b).	$A = 4\int_0^5 \frac{4}{5}\sqrt{5^2 - x^2}dx = \frac{16}{5}\int_0^5 \sqrt{5^2 - x^2}\,dx$	1
	$\Rightarrow A = \frac{16}{5}\left[\frac{x}{2}\sqrt{25 - x^2} + \frac{25}{2}\sin^{-1}\frac{x}{5}\right]_0^5$	1
	$A = \frac{16}{5}\left[\frac{25}{2} \times \frac{\pi}{2}\right] = 20\pi \; square \; units.$	
	(OR)	
		1
	The line $y = 3x + 2$ meets $x - axis \; at \; x = -\frac{2}{3}$ and its graph lies below $x - axis \; for \; x \in \left(-1, -\frac{2}{3}\right)$ $and \; above \; x - axis \; for x \in \left(-\frac{2}{3}, 1\right)$	1
	Required area = Area of the region ACBA+ Area of the region ADEA	
	$= \left\lvert\int_{-1}^{-\frac{2}{3}}(3x+2)dx\right\rvert + \int_{-\frac{2}{3}}^{1}(3x+2)dx$	1
	$= \left[\frac{3x^2}{2} + 2x\right]_{-1}^{-\frac{2}{3}} + \left[\frac{3x^2}{2} + 2x\right]_{-\frac{2}{3}}^{1}$	1
	$= \frac{1}{6} + \frac{25}{6} = \frac{13}{3}$	1
34(a)	Here : $\overrightarrow{a_1} = -\hat{\imath} - \hat{\jmath} - \hat{k}\;, \quad \overrightarrow{b_1} = 7\hat{\imath} - 6\hat{\jmath} + \hat{k}$ $\overrightarrow{a_2} = 3\hat{\imath} + 5\hat{\jmath} + 7\hat{k}\;, \quad \overrightarrow{b_2} = \hat{\imath} - 2\hat{\jmath} + \hat{k}$ $\overrightarrow{a_2} - \overrightarrow{a_1} = 4\hat{\imath} + 6\hat{\jmath} + 8\hat{k}$	0.5 1

	$\overrightarrow{b_1} \times \overrightarrow{b_2} = \begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ 7 & -6 & 1 \\ 1 & -2 & 1 \end{vmatrix} = -4\hat{\imath} - 6\hat{\jmath} - 8\hat{k}$	1
	$S.D. = \left\| \frac{(\overrightarrow{b_1} \times \overrightarrow{b_2}).(\overrightarrow{a_2} - \overrightarrow{a_1})}{\lvert\overrightarrow{b_1} \times \overrightarrow{b_2}\rvert} \right\|$	0.5
	$(S.D.) = \left\| \frac{(-4\hat{\imath} - 6\hat{\jmath} - 8\hat{k}).(4\hat{\imath} + 6\hat{\jmath} + 8\hat{k})}{\lvert\sqrt{16 + 36 + 64}\rvert} \right\|$	1
	$S.D. = \left\| \frac{116}{\lvert\sqrt{116}\rvert} \right\| = \sqrt{116} = 2\sqrt{29}\ units$	1
	OR	
OR 34(b).	Rewrite the eqn of given line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3} = k\ (say)$ Then arbitrary D(x,y,z) point on the line is	
	$x = k\ , y = 2k + 1\ , z = 3k + 2$ Let this point D is the foot of perpendicular on the line. Now position vector from given point P (1,6,3) to Point D is given by: $\overrightarrow{PD} = (k-1)\hat{\imath} + (2k-5)\hat{\jmath} + (3k-1)\,\hat{k}$	1 0.5
	Now Direction vector of line $\vec{b} = 1\hat{\imath} + 2\hat{\jmath} + 3\hat{k}$	0.5
	Here $\vec{b} \perp \overrightarrow{PD} \implies \vec{b}.\overrightarrow{PD} = 0$ $\implies k - 1 + 4k - 10 + 9k - 3 = 0$ $\implies 14k - 14 = 0$ $\implies k = 1$ So foot of perpendicular is:	0.5
	D = (1 , 3, 5) Let $E(a\ , b\ , c\ )$ be the image of P(1,6,3) then D(1,3,5) will be mid point of PE. So by mid point formula :	1
	$\frac{a+1}{2} = 1\ , \frac{b+6}{2} = 3\ , \frac{c+3}{2} = 5$ $\implies a = 1, b = 0, c = 7$ So image of P = E (1,0,7)	1

	Also the distance PE $= \sqrt{(1-1)^2+(6-0)^2+(3-7)^2} = \sqrt{0+36+16}$ $= \sqrt{52}\ units$	0.5
35(a).	Objective function : $Z = -x + 2y$ Given constraints are: $x \geq 3, x + y \geq 5, x + 2y \geq 6, y \geq 0$ Consider the system of lines according to given constraints: $x = 3$ <table><tr><td>x</td><td>3</td><td>3</td></tr><tr><td>y</td><td>0</td><td>1</td></tr></table> $x + y = 5$ <table><tr><td>x</td><td>5</td><td>0</td></tr><tr><td>y</td><td>0</td><td>5</td></tr></table> $x + 2y = 6$ <table><tr><td>x</td><td>6</td><td>0</td></tr><tr><td>y</td><td>0</td><td>3</td></tr></table>  <table><tr><td>Corner Point</td><td>$Z = -x + 2y$ (Value of Z)</td></tr><tr><td>(6,0)</td><td>-6</td></tr><tr><td>(4,1)</td><td>-2</td></tr><tr><td>(3,2)</td><td>1</td></tr></table>	0.5 0.5 0.5 1 0.5 0.5 0.5

OR 35(b).	Since feasible region is unbounded so we have to graph the inequality $Z > 1$ from which we find that resulting region has points in common with U.F.R. So Z has no maximum value **OR** Let $E_1 =$ *the chosen person have blood group O* $E_2 =$ *the chosen person have blood group other than O* $A =$ *the chosen person is left handed* Now $P(E_1) = 30\% = \frac{30}{100}$ $P(E_2) = 70\% = \frac{70}{100}$ Now $P\left(\frac{A}{E_1}\right) =$ $P(Left\ handed\ person\ with\ blood\ group\ O) = 6\% = 6/100$ Now $P(A/E_2) =$ $P(Left\ handed\ person\ with\ blood\ group\ other\ than\ O = 10\% = 10/100$ Using Bayes Theorem: $P\left(\frac{E_1}{A}\right) = \frac{P(E_1).P\left(\frac{A}{E_1}\right)}{P(E_1).P\left(\frac{A}{E_1}\right) + P(E_2).P\left(\frac{A}{E_2}\right)}$ $= \frac{0.3 \times 0.06}{0.3 \times 0.06 + 0.7 \times 0.1}$ $= \frac{0.0180}{0.0880} = \frac{180}{880} = \frac{9}{44}$	1 1 1 1 1 1

खंड – ल

SECTION – E (4×3=12)

36.	Here: (a). $A + B = \begin{bmatrix} 15000 & 30000 & 36000 \\ 70000 & 40000 & 20000 \end{bmatrix}$ (b). $A - B = \begin{bmatrix} 5000 & 10000 & 24000 \\ 30000 & 20000 & 0 \end{bmatrix}$ (c). $2\%\ of\ B = 0.02 \times B$	1 1

	$A = \begin{bmatrix} Basmati & Permal & Naura \\ 100 & 200 & 120 \\ 400 & 200 & 200 \end{bmatrix} \begin{matrix} \\ Ramkishan \\ Gurcharan\ singh \end{matrix}$	2
37. (a) (b) (c)	If AR= $x\ m \implies BR = (20 - x)\ m$ $S(x) = RP^2 + RQ^2 = 2x^2 - 40x + 1140$ Here co-eff. Of $x = -40$ Using second derivative test : $on\ putting\ \ S'(x) = 0 \Longrightarrow 4x - 40 = 0$ $\Longrightarrow x = 10$ $S''(x) = 4 = +ve \implies x = 10\ is\ a\ point\ of\ minima.$ $AR = 10\ m, BR = 10\ m$	1 1 1 1
38. (a) (b) (c)	Given differential equation is : $\frac{dy}{dx} = \frac{1 + y^2}{1 + x^2}$ here degree =1,order = 1 Suitable method : separating the variables General Solution: Separating the variables we get: $\frac{dy}{1 + y^2} = \frac{dx}{1 + x^2}$ Integrating both sides $\int \frac{dy}{1 + y^2} = \int \frac{dx}{1 + x^2}$ $\tan^{-1} y = \tan^{-1} x + c$ Which is the required general solution where c is the constant of integration.	1 1 1 1