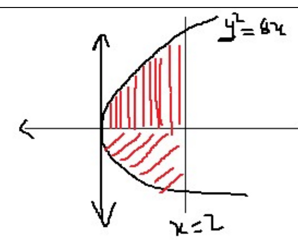
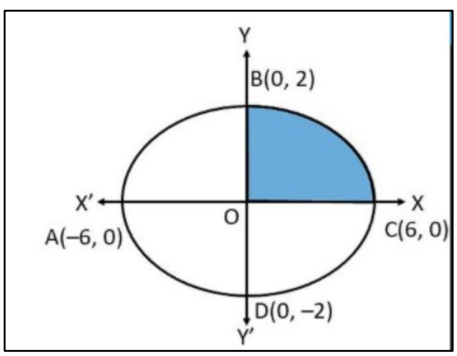
VALUE POINTS OF PRACTICE PAPER – 1 (2020-21)
CLASS XII
MATHEMATICS

S.NO.	OBJECTIVE TYPE QUESTIONS (SECTION – I)	MARKS
1.	$\frac{\pi}{4}$	1
2.	$\frac{1}{36}$	1
3.	x = 3	1
4.	0	1
5.	$\frac{16}{3} sq.units$ OR F(x) = |x – 1| + |x – 2| (Or any Correct Response)	1 1
6.	3	1
7.	1 unit	1
8.	$\frac{1}{x^2}$	1
9.	0 OR $f(x) = x.e^x$	1 1
10.	11	1
11.	$\frac{1}{15}$	1
12.	$I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ OR m + n = 1	1 1
13.	(1, 0, 0)	1
14.	2 OR 0	1 1
15.	1 OR 3	1 1
16.	$\frac{1}{\sqrt{7}}$	1
	SECTION – II	
17. (i)	(d)	1
17. (ii)	(c)	1
17. (iii)	(b)	1
17. (iv)	(c)	1
17. (v)	(a)	1

18. (i)	**(d)**	**1**
18. (ii)	**(c)**	**1**
18. (iii)	**(c)**	**1**
18. (iv)	**(d)**	**1**
18. (v)	**(c)**	**1**
	SECTION – III	
19.	**Reflexive** : Since, a+a=2a, which is even ∴ (a,a) $\in R\ \forall a \in$ Z Hence R is reflexive **Symmetric**: If (a,b) ∈ R, then a+b = 2λ ⇒ b+a = 2 λ ⇒ (b,a) ∈R, Hence R is symmetric **Transitive:** If (a,b) ∈ R and (b,c,) ∈ R then a+b = 2 λ---(1) and b+c =2 μ ---- (2) Adding (1) and (2) we get a+2b+c=2(λ + μ) ⇒ a+c=2 (λ + $\mu - b$) ⇒ a+c=2k ,where λ + μ − b = k ⇒ (a,c) ∈R, Hence R is transitive	**½** **½** **1**
20.	**NO. OF REFLEXIVE RELATIONS = 2^6 = 64** **NO. OF SYMMETRIC RELATIONS = 2^3 = 8**	**1** **1**
21.	$Cartesian\ Equation: \frac{x-4}{-1}=\frac{y-7}{-2}=\frac{z-1}{2}$ $Vector\ Equation: \ \vec{r}=(4\hat{i}+7\hat{j}+\hat{k})+\lambda(-\hat{i}-2\hat{j}+2\hat{k})$ **OR** **The given lines can be written as:** $\frac{x-q}{p}=\frac{y-0}{1}=\frac{z-s}{r}\ \ and\ \ \frac{x-q'}{p'}=\frac{y-0}{1}=\frac{z-s'}{r'}$ **As lines are perpendicular then pp′ + rr′ + 1 = 0.**	**1** **1** **1 ½** **½**
22.	$\vec{a}=\hat{i}-\hat{j}+3\hat{k}\ \ and\ \vec{b}=2\hat{i}-7\hat{j}+\hat{k}$ $\vec{a}\times\vec{b}=\begin{vmatrix}\hat{i} & \hat{j} & \hat{k}\\ 1 & -1 & 3\\ 2 & -7 & 1\end{vmatrix}=20\hat{i}+5\hat{j}-5\hat{k}$ $\text{Area of parallelogram}=\frac{1}{2}\lvert\vec{a}\times\vec{b}\rvert=\frac{1}{2}\sqrt{400+25+25}=\frac{15}{2}\sqrt{2}\ \ sq.units$ **OR** As,Each one of them being perpendicular to the sum of other two $2(\vec{a}.\vec{b}+\vec{c}.\vec{a}+\vec{b}.\vec{c})=0$ and $\lvert\vec{a}+\vec{b}+\vec{c}\rvert^2=(\vec{a}+\vec{b}+\vec{c}).(\vec{a}+\vec{b}+\vec{c})$ $=\lvert\vec{a}\rvert^2+\lvert\vec{b}\rvert^2+\lvert\vec{c}\rvert^2+2(\vec{a}.\vec{b}+\vec{c}.\vec{a}+\vec{b}.\vec{c})$ $= 9 + 16 + 25 + 0 = 50$ $\lvert\vec{a}+\vec{b}+\vec{c}\rvert=5\sqrt{2}$	**1** **1** **½** **1** **½**
23.	$f'(x)=4x(x-1)(x-2)$ $so, f(x)$ is increasing for $x\in[0,1]\cup[2,\infty)$	**1** **1**

24.	$I=\int\frac{dx}{(x-2)^2-1^2}=\frac{1}{2}\log\left\|\frac{x-2-1}{x-2+1}\right\|+c$ $I=\frac{1}{2}\log\left\|\frac{x-3}{x-1}\right\|+c$	**½ + 1** **½**
25.	$\frac{dy}{d\theta}=a\theta\sin\theta,\frac{dx}{d\theta}=a\theta\cos\theta$ $\frac{dy}{dx}=\frac{a\theta\sin\theta}{a\theta\cos\theta}=\tan\theta$	**1** **1**
26.	**As $(10,\ 3)\in$ R, $(3,\ 2)\ \in$ R but $(10,\ 2)\ \notin$ R** *so*, R is not Transitive. **(OR Any Correct Response)** **OR** $Let, f(x)=f(y)\Rightarrow\frac{2x-4}{3x-9}=\frac{2y-4}{3y-9}\Rightarrow x=y$ $So, f(x)$ is one-one function. $Let, y=f(x)=\frac{2x-4}{3x-9}\Rightarrow x=\frac{9y-4}{3y-2}$ *As, Range = Codomain* *thus*, f(x) is onto function. So, f(x) is Bijective Function.	**1 ½** **½** **½** **1** **½**
27.	$I=\int_0^{\frac{\pi}{2}}\frac{\sin x}{\sin x+\cos x}dx=\int_0^{\frac{\pi}{2}}\frac{\cos x}{\cos x+\sin x}dx$ $2I=\int_0^{\frac{\pi}{2}}\frac{\sin x+\cos x}{\sin x+\cos x}dx=\int_0^{\frac{\pi}{2}}1.dx=\frac{\pi}{2}$ $I=\frac{\pi}{4}$	**½** **1** **½**
28.	$A=2\int_0^2 2\sqrt{2}\sqrt{x}.dx=\frac{4\sqrt{2}}{3}(x^{\frac{3}{2}})_0^2$ $A=\frac{32}{3}sq.units$  	**1 ½** **1/2**
	SECTION - IV	
29.	**Area of Ellipse = 4 (Area of BOC)** $A=4\int_0^6\frac{1}{3}\sqrt{6^2-x^2}.dx=$ $A=\frac{4}{3}(\frac{x}{2}\sqrt{6^2-x^2}+\frac{36}{2}\sin^{-1}(\frac{x}{6}))_0^6$ $A=12\pi\ \ sq.units$  	**½ + ½ (FOR FIGURE)** **1** **1**

30.

Let the Events be

E_1 : Choosing 1^{st} Coin

E_2 : Choosing 2^{nd} Coin

E_3 : Choosing 3^{rd} Coin

A: Getting Heads — **1**

$$P(E_1) = P(E_2) = P(E_3) = \frac{1}{3}$$

$$P(\frac{A}{E_1}) = \frac{40}{100}, P(\frac{A}{E_2}) = \frac{75}{100}, P(\frac{A}{E_3}) = \frac{1}{2}$$ **1**

$$P(\frac{E_3}{A}) = \frac{\frac{1}{3}\cdot\frac{1}{2}}{\frac{1}{3}(\frac{40+75+50}{100})} = \frac{50}{165} = \frac{10}{33}$$ **1**

OR

Let X represents the number of defective bulbs drawn.

∴ X can take values 0,1 ,2, 3 or 4 — **½**

$$P(X=0) = (\frac{6}{10}\cdot\frac{5}{9}\cdot\frac{4}{8}\cdot\frac{3}{7}) = \frac{360}{5040}$$

$$P(X=1) = 4(\frac{6}{10}\cdot\frac{5}{9}\cdot\frac{4}{8}\cdot\frac{4}{7}) = \frac{1920}{5040}$$

$$P(X=2) = 6(\frac{6}{10}\cdot\frac{5}{9}\cdot\frac{4}{8}\cdot\frac{3}{7}) = \frac{2160}{5040}$$

$$P(X=3) = 4(\frac{6}{10}\cdot\frac{4}{9}\cdot\frac{3}{8}\cdot\frac{2}{7}) = \frac{576}{5040}$$

$$P(X=4) = 1(\frac{4}{10}\cdot\frac{3}{9}\cdot\frac{2}{8}\cdot\frac{1}{7}) = \frac{24}{5040}$$

PROBABILITY DISTRIBUTION

X	P(X)
0	$\frac{360}{5040}$
1	$\frac{1920}{5040}$
2	$\frac{2160}{5040}$
3	$\frac{576}{5040}$
4	$\frac{24}{5040}$
TOTAL	1

2½

31.

Two dice are thrown together i.e.,

∴ $n(S) = 36$, where S is the sample space.

Event 'E' is 'a total of 4'

∴ $E = \{(2, 2), (3, 1), (1, 3)\}$

Event 'F' is 'a total of 9 or more'

∴ $F = \{(3, 6), (6, 3), (4, 5), (5, 4), (4, 6), (6, 4), (5, 5), (5, 6), (6, 5), (6, 6)\}$

Event 'G' is 'a total divisible by 5'

∴ $G = \{(1, 4), (4, 1), (2, 3), (3, 2), (4, 6), (6, 4), (5, 5)\}$

Here, $(E \cap F) = \phi$ and $(E \cap G) = \phi$

Also, $(F \cap G) = \{(4, 6), (6, 4), (5, 5)\}$

∴ $$P(E) = \frac{n(E)}{n(S)} = \frac{3}{36} = \frac{1}{12}$$ **1**

$$P(F) = \frac{n(F)}{n(S)} = \frac{10}{36} = \frac{5}{18}$$

$$P(G) = \frac{n(G)}{n(S)} = \frac{7}{36}$$ **1**

$$P(F \cap G) = \frac{3}{36} = \frac{1}{12}$$

and $$P(F) \cdot P(G) = \frac{5}{18} \cdot \frac{7}{36} = \frac{35}{648}$$

So, $P(F \cap G) \neq P(F) \cdot P(G)$

Hence, there is no pair which is independent. **1**

32.	The function f(x)=2x−|x| can be written as f(x)={3x , x ≤ 0 x , x>0. Now, Lim x→0− f(x) = 0. And, Lim x→0+ f(x) = 0. f(0) = 0 So we've, LHL = RHL = f(x=0), Thus the function f(x) is continuous at x = 0. We observe LHD = 3, RHD = 1 thus LHD is not equal to RHD, thus f(x) is not differentiable at x = 0. OR $y=\cot^{-1}(\cot\frac{x}{2})=\frac{x}{2}$ $\frac{dy}{dx}=\frac{1}{2}$	1 ½ 1 ½ 2 1
33.	$\frac{dy}{dx}+\frac{1}{x\log x}y=\frac{2}{x^2}$ $Integrating$ factor = $\log x$ so, solution of given differential equation is, $y.\log x=\int\frac{2}{x^2}\log x\ dx$ $y.\log x=\frac{-2}{x}(1+\log x)+c$	1 1 1
34.	$\frac{dy}{dx}=\frac{-b}{a}\cot\theta$ so, slope of tangent = $\frac{-b}{a}$ Slope of Normal = $\frac{a}{b}$ **Equation of Tangent:** $\sqrt{2}(bx+ay)=ab$ **Equation of Normal:** $2\sqrt{2}(by-ax)=b^2-a^2$	1½ 1½
35.	$I=\int_{-1}^{2}\|x^3-x\|dx=\int_{-1}^{0}(x^3-x)dx+\int_{0}^{1}(x-x^3)dx+\int_{1}^{2}(x^3-x)dx$ $I=[\frac{x^4}{4}-\frac{x^2}{2}]_{-1}^{0}-[\frac{x^4}{4}-\frac{x^2}{2}]_{0}^{1}+[\frac{x^4}{4}-\frac{x^2}{2}]_{1}^{2}$ $I=\frac{11}{4}$ OR $Let,\frac{x+1}{(x+3)(x^2+4)}=\frac{A}{(x+3)}+\frac{Bx+C}{x^2+4}$ On solving we get, A = $\frac{-2}{13},B=\frac{2}{13},C=\frac{7}{13}$	1 2 1 ½

	$I = \frac{-2}{13}\log(x+3) + \frac{1}{13}\log(x^2+4) + \frac{7}{26}\tan^{-1}(\frac{x}{2}) + C$	**1 ½**
	SECTION - V	
36.	$A^{-1} = \frac{1}{18}\begin{bmatrix} 1 & 7 & -5 \\ -5 & 1 & 7 \\ 7 & -5 & 1 \end{bmatrix}$	**2**
	Then $X = A^{-1}B = \frac{1}{18}\begin{bmatrix} 1 & 7 & -5 \\ -5 & 1 & 7 \\ 7 & -5 & 1 \end{bmatrix}\begin{bmatrix} 6 \\ 6 \\ 6 \end{bmatrix} = \frac{1}{18}\begin{bmatrix} 18 \\ 18 \\ 18 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$	**2½**
	$Thus, x = 1, y = 1, z = 1$	**½**
	OR	
	$A^{-1} = \frac{1}{-4}\begin{bmatrix} 7 & 8 & -3 \\ 6 & 4 & -2 \\ -5 & -4 & 1 \end{bmatrix}$	**2**
	$X = (A^T)^{-1}B = (A^{-1})^T B = \frac{1}{-4}\begin{bmatrix} 7 & 6 & -5 \\ 8 & 4 & -4 \\ -3 & -2 & 1 \end{bmatrix}\begin{bmatrix} 1 \\ 4 \\ 7 \end{bmatrix} = \frac{1}{-4}\begin{bmatrix} -4 \\ -4 \\ -4 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$	**2 ½**
	$Thus, x = 1, y = 1, z = 1$	**½**
37.	**Let the required equation of plane passing through the intersection of planes x + 3y + 6 =0 and 3x - y -4z = 0 be** $(x + 3y + 6) + \lambda(3x - y - 4z) = 0$ ...(i) Above equation can be written as $x + 3y + 6 + 3\lambda x - \lambda y - 4\lambda z = 0$ or $x(1 + 3\lambda) + y(3 - \lambda) - 4\lambda z + 6 = 0$ ...(ii) which is the general form of equation of plane. Also, given that perpendicular distance of plane (i) from origin, i.e., (0, 0, 0) is unity, i.e., one. $\therefore \left[\frac{(1+3\lambda).(0)+(3-\lambda)(0)-4\lambda(0)+6}{\sqrt{(1+3\lambda)^2+(3-\lambda)^2+(-4\lambda)^2}}\right] = 1$ [$\because$ distance of point (x_1, y_1, z_1) from a plane $ax + by + cz + d = 0$ is given by $d = \left\lvert\frac{ax_1 + by_1 + cz_1 + d}{\sqrt{a^2+b^2+c^2}}\right\rvert$ here, $a = 1 + 3\lambda, b = 3 - \lambda, c = -4\lambda$, $(x_1, y_1, z_1) = (0,0,0)$]	**2**

or $\left|\dfrac{6}{\sqrt{1+9\lambda^2+6\lambda+9+\lambda^2-6\lambda+16\lambda^2}}\right| = 1$

or $\dfrac{6}{\sqrt{26\lambda^2+10}} = 1$ or $6 = \sqrt{26\lambda^2+10}$

On squaring both sides, we get

$$36 = 26\lambda^2 + 10$$

or $26\lambda^2 = 26$ or $\lambda^2 = 1$ or $\lambda = \pm 1$

Now, on putting $\lambda = \pm 1$ in Eq, (i), we get

$x + 3y + 6 - 3x + y + 4z = 0$

or $-2x + 4y + 4z + 6 = 0$

or $x - 2y - 2z - 3 = 0$ [divide by -2] ...(iv)

Hence, required equations of the plane are

$$2x + y - 2z + 3 = 0 \text{ and } x - 2y - 2z - 3 = 0$$

OR

2x = y = z

or $\dfrac{x}{1/2} = \dfrac{y}{1} = \dfrac{z}{1}$

Direction ratios of this line are $\left(\dfrac{1}{2}, 1, 1\right)$

$\therefore$ Line parallel to this line and passing through

(3, 4, 5) is $\dfrac{x-3}{1/2} = \dfrac{y-4}{1} = \dfrac{z-5}{1} = k$ (let)

or $x = 3 + \dfrac{k}{2}$, $y = 4 + k$, $z = 5 + k$

Substituting in the plane $x + y + z = 2$, we get

$3 + \dfrac{k}{2} + 4 + k + 5 + k = 2$

or $12 + \dfrac{5k}{2} = 2$

or $5k = -10 \times 2$

or $k = -4$

Point of intersection is :

$\left(3 - \dfrac{4}{2}, 4 - 4, 5 - 4\right) = (1, 0, 1)$

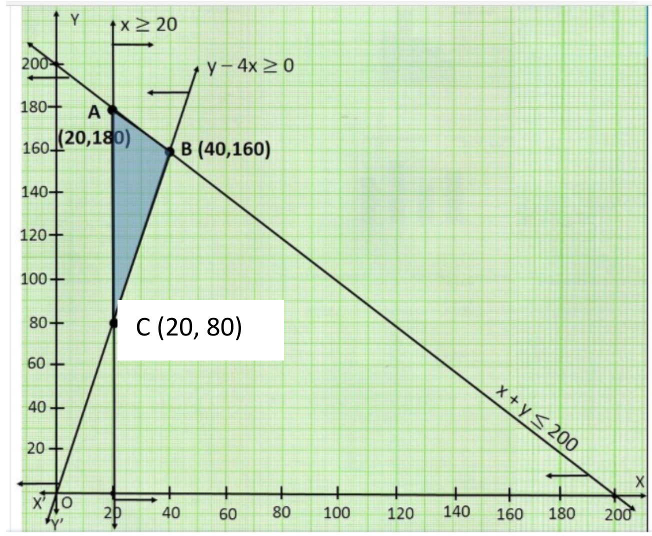
$\therefore$ Distance $= \sqrt{(3-1)^2 + (4-0)^2 + (5-1)^2}$

$= \sqrt{4 + 16 + 16}$

$= 6$ units

38.

Corner points are A(20,180), B(40, 160) and C(20, 80)



Z at A = 1,88,000
Z at B = 1,76,000
Z at C = 88,000

SO maximum Z = 1,88,000
At x = 20 and y = 180

OR

(i)

Corner points	$Z = 3x - 4y$
O(0,0)	0
A(0,8)	-32
B(4,10)	-28
C(6,8)	-14
D(6,5)	-2
E(4,0)	12

1 ½

$Max\ Z$ **= 12** $at\ E$**(4,0)** $Min\ Z$ **= −32** $at\ A$**(0,8)** **1**

(ii) Since maximum value of Z occurs at B(4,10) and C(6, 8)
$\therefore 4p + 10q = 6p + 8q \Rightarrow 2q = 2p \Rightarrow p = q$ **2**

Number of optimal solution are infinite **½**