CBSE Class 12 Maths Question Paper Solution 2020 Set 65/2/1

QUESTION PAPER CODE 65/2/1

EXPECTED ANSWER/VALUE POINTS

SECTION – A

Question Numbers 1 to 20 carry 1 mark each.

Question Numbers 1 to 10 are multiple choice type questions. Select the correct option.

Q.No.		Marks
1.	The relation R in the set {1, 2, 3} given by R = {(1, 2), (2, 1), (1, 1)} is **(A)** symmetric and transitive, but not reflexive **(B)** reflexive and symmetric, but not transitive **(C)** symmetric, but neither reflexive nor transitive **(D)** an equivalence relation **Ans:** (C) symmetric, but neither reflexive nor transitive	1
2.	$\tan^{-1}3 + \tan^{-1}\lambda = \tan^{-1}\frac{3+\lambda}{1-3\lambda}$ is valid for what values of λ? **(A)** $\lambda \in \left(-\frac{1}{3}, \frac{1}{3}\right)$ **(b)** $\lambda > \frac{1}{3}$ **(C)** $\lambda < \frac{1}{3}$ **(d)** All real values of λ **Ans:** (C) $\lambda < \frac{1}{3}$	1
3.	If A is a non-singular square matrix of order 3 such that $A^2 = 3A$, then value of |A| is **(A)** –3 **(B)** 3 **(C)** 9 **(D)** 27 **Ans:** (D) 27	1
4.	The function $f : R \to R$ given by $f(x) = -\|x-1\|$ is **(A)** continuous as well as differentiable at x = 1 **(B)** not continuous but differentiable at x = 1 **(C)** continuous but not differentiable at x = 1 **(D)** neither continuous nor differentiable at x = 1 **Ans:** (C) continuous but not differentiable at x = 1	1
5.	Let A = {1, 3, 5}. Then the number of equivalence relations in A containing (1, 3) is **(A)** 1 **(B)** 2 **(C)** 3 **(D)** 4 **Ans:** (B) 2	1

6. The interval in which the function f given by $f(x) = x^2e^{-x}$ is strictly increasing, is

(A) $(-\infty, \infty)$ **(B)** $(-\infty, 0)$ **(C)** $(2, \infty)$ **(D)** $(0, 2)$

Ans: (D) $(0, 2)$ **1**

7. If $|\vec{a}| = 4$ and $-3 \le \lambda \le 2$, then $|\lambda\vec{a}|$ lies in

(A) $[0, 12]$ **(B)** $[2, 3]$ **(C)** $[8, 12]$ **(D)** $[-12, 8]$

Ans: (A) $[0, 12]$ **1**

8. The vector $3\hat{i} - \hat{j} + 2\hat{k}$, $2\hat{i} + \hat{j} + 3\hat{k}$ and $\hat{i} + \lambda\hat{j} - \hat{k}$ are coplanar if value of λ is

(A) -2 **(B)** 0

(C) 2 **(D)** Any real number

Ans: (A) -2 **1**

9. The area of a triangle formed by vertices O, A and B, where

$\overrightarrow{OA} = \hat{i} + 2\hat{j} + 3\hat{k}$ $\hat{j}$ and $\overrightarrow{OB} = -3\hat{i} - 2\hat{j} + \hat{k}$ is

(A) $3\sqrt{5}$ sq. units **(B)** $5\sqrt{5}$ sq. units

(C) $6\sqrt{5}$ sq. units **(D)** 4 sq. units

Ans: (A) $3\sqrt{5}$ sq. units **1**

10. The coordinates of the foot of the perpendicular drawn from the point (2, –3, 4) on the y-axis is

(A) (2, 3, 4) **(B)** (–2, –3, –4)

(C) (0, –3, 0) **(D)** (2, 0, 4)

Ans: (C) (0, –3, 0) **1**

Fill in the blanks in questions numbers 11 to 15.

11. The range of the principal value branch of the function $y = \sec^{-1} x$ is __________.

Ans: $[0, \pi] - \left\{\frac{\pi}{2}\right\}$ **1**

OR

The principal value of $\cos^{-1}\left(-\frac{1}{2}\right)$ is ____________.

Ans: $\frac{2\pi}{3}$ **1**

12. Given a skew-symmetric matrix $A = \begin{bmatrix} 0 & a & 1 \\ -1 & b & 1 \\ -1 & c & 0 \end{bmatrix}$, the value of $(a + b + c)^2$ is ______

Ans: 0 **1**

13. The distance between parallel planes $2x + y - 2z - 6 = 0$ and $4x + 2y - 4z = 0$ ______ units.

Ans: 2 **1**

OR

If P(1,0,–3) is the foot of the perpendicular from the origin to the plane, then the cartesian equation of the plane is ________

Ans: $x - 3z = 10$ **1**

14. If the radius of the circle is increasing at the rate of 0.5 cm/s, then the rate of increase of its circumference is ________

Ans: π cm/s **1**

15. The corner points of the feasible region of an LPP are (0,0), (0,8), (2,7), (5,4) and (6,0). The maximum profit $P = 3x + 2y$ occurs at the point ________

Ans: (5, 4) **1**

Question numbers 16 to 20 are very short answer type questions.

16. Differentiate $\sec^2(x^2)$ with respect to x^2.

Ans: Let $x^2 = u$, differentiating $\sec^2 u$ w.r.t u, putting $u = x^2$ **1/2**

$2\sec^2 x^2 \tan x^2$ **1/2**

OR

If $y = f(x^2)$ and $f'(x) = e^{\sqrt{x}}$, then find $\frac{dy}{dx}$.

Ans: $\frac{dy}{dx} = f'(x^2)2x$ **1/2**

$= 2xe^x$ **1/2**

17. Find the value of k, so that the function $f(x) = \begin{cases} kx^2 + 5, & \text{if} \quad x \le 1 \\ 2 \quad , & \text{if} \quad x > 1 \end{cases}$

is continuous at x = 1.

Ans: L.H.L. is $k + 5$ **1/2**

getting $k = -3$ **1/2**

18. Evaluate: $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} x\cos^2 x dx$.

Ans: Let $f(x) = x\cos^2 x$ $\quad f(-x) = -f(x)$ or f is odd **1/2**

$\therefore \int_{-\pi/2}^{\pi/2} x\cos^2 x dx = 0$ **1/2**

19. Find the general solution of the differential equation $e^{y-x}\frac{dy}{dx} = 1$.

Ans: Given differential equation is $e^y dy = e^x dx$ **1/2**

Integrating to get $e^y = e^x + C$ **1/2**

20. Find the coordinates of the point where the line $\frac{x-1}{3} = \frac{y+4}{7} = \frac{z+4}{2}$ cuts the line xy-plane.

Ans: Putting z = 0 in given equation gives $\frac{x-1}{3} = \frac{y+4}{7} = 2$ **1/2**

Coordinates of required point are (7, 10, 0) **1/2**

SECTION-B

Question numbers 21 to 26 carry 2 marks each.

21. If $A = \begin{bmatrix} -3 & 2 \\ 1 & -1 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, find scalar k so that $A^2 + I = kA$.

Ans: $A^2 = \begin{bmatrix} 11 & -8 \\ -4 & 3 \end{bmatrix}$ **1**

$A^2 + I = kA \Rightarrow \begin{bmatrix} 12 & -8 \\ -4 & 4 \end{bmatrix} = \begin{bmatrix} -3k & 2k \\ k & -k \end{bmatrix}$ **1/2**

$k = -4$ **1/2**

22. If $f(x)=\sqrt{\dfrac{\sec x-1}{\sec x+1}}$, find $f'\left(\dfrac{\pi}{3}\right)$.

Ans: $f(x) = \sqrt{\dfrac{\dfrac{1}{\cos x}-1}{\dfrac{1}{\cos x}+1}} = \tan\dfrac{x}{2}$ **1**

$f'(x) = \dfrac{1}{2}\sec^2\dfrac{x}{2}$ **1/2**

$f'\left(\dfrac{\pi}{3}\right) = \dfrac{2}{3}$ **1/2**

OR

Find $f'(x)$ if $f(x)=(\tan x)^{\tan x}$.

Ans: Taking log on both sides. $\log f(x) = \tan x \log \tan x$ **1/2**

differentiating to get $\dfrac{f'(x)}{f(x)} = \sec^2 x + \sec^2 x \log \tan x$ **1**

Thus, $f'(x) = (\tan x)^{\tan x} \cdot \sec^2 x(1 + \log \tan x)$ **1/2**

23. Find $\displaystyle\int \frac{\tan^3 x}{\cos^3 x}dx$.

Ans: Given Integral is $I = \displaystyle\int \frac{\sin^3 x}{\cos^6 x}dx$ **1/2**

Put $\cos x = t$

$\sin x\, dx = -dt$ **1/2**

$$= \int\left[\frac{-1}{t^6}+\frac{1}{t^4}\right]dt$$

$$= \frac{t^{-5}}{5}-\frac{t^{-3}}{3}+c \quad \textbf{1/2}$$

$$= \frac{1}{5(\cos x)^5}-\frac{1}{3(\cos x)^3}+c \text{ or } \frac{\sec^5 x}{5}-\frac{\sec^3 x}{3}+c \quad \textbf{1/2}$$

24. Find a vector $\vec{r}$ equally inclined to the three axes and whose magnitude is $3\sqrt{3}$ units.

Ans: Let the vector $\vec{r} = a\hat{i} + a\hat{j} + a\hat{k}$ **1/2**

$\therefore \quad \sqrt{3a^2} = 3\sqrt{3}$ **1**

required vector is $3\hat{i} + 3\hat{j} + 3\hat{k}$ or $-3\hat{i} - 3\hat{j} - 3\hat{k}$ **1/2**

OR

Find the angle between unit vectors $\vec{a}$ and $\vec{b}$ so that $\sqrt{3}\,\vec{a}-\vec{b}$ is also a unit vector.

Ans: Using $\left|\sqrt{3}\,\vec{a}-\vec{b}\right|=1$ i.e. $\left|\sqrt{3}\,\vec{a}-\vec{b}\right|^2=1$ **1/2**

& getting $\vec{a}\cdot\vec{b}=\dfrac{\sqrt{3}}{2}$ **1**

getting angle $\dfrac{\pi}{6}$ or 30° **1/2**

25. Find the points of intersection of the line $\vec{r}=2\hat{i}-\hat{j}+2\hat{k}+\lambda(3\hat{i}+4\hat{j}+2\hat{k})$ and the plane $\vec{r}\cdot(\hat{i}-\hat{j}+\hat{k})=5$.

Ans: Any point on line is $(2+3\lambda,-1+4\lambda,2+2\lambda)$ **1**

Putting in equation of plane to get $\lambda = 0$ **1/2**

Thus point of intersection is (2, –1, 2) **1/2**

26. A purse contains 3 silver and 6 copper coins and a second purse contains 4 silver and 3 copper coins. If a coin is drawn at random from one of the two purses, find the probability that it is a silver coin.

Ans: E_1 : coin is drawn from purse 1.

E_2 : coin is drawn from purse 2. **1/2**

A : Silver coin is drawn

$$P(E_1)=\frac{1}{2},\ P(E_2)=\frac{1}{2},\ P\left(\frac{A}{E_1}\right)=\frac{3}{9},\ P\left(\frac{A}{E_2}\right)=\frac{4}{7}$$ **1**

$$P(A)=\frac{1}{2}\times\frac{3}{9}+\frac{1}{2}\times\frac{4}{7}$$

$$=\frac{19}{42}$$ **1/2**

SECTION-C

Question numbers 27 to 32 carry 4 marks each.

27. Check whether the relation R in the set N of natural numbers given by

$R=\{(a,b): a \text{ is divisor of } b\}$

is reflexive, symmetric or transitive. Also determine whether R is an equivalence relation.

Ans: For reflexive

Let $a\in N$ clearly a divides a $\therefore$ $(a, a)\in R$

$\therefore$ R is reflexive **1**

For symmetric

$(1, 2) \in R$ but $(2, 1) \notin R$ **1**

$\therefore$ R is not symmetric

For transitive

Let $(a, b), (b, c) \in R$

$\therefore$ a divides b and b divides c

$\Rightarrow$ a divides c $\quad \therefore (a, c) \in R$ **1**

R is transitive

As R is not symmetric $\therefore$ It is not an equivalence relation **1**

OR

Prove that $\tan^{-1}\frac{1}{4} + \tan^{-1}\frac{2}{9} = \frac{1}{2}\sin^{-1}\left(\frac{4}{5}\right)$.

Ans: LHS $= \tan^{-1}\left(\dfrac{\frac{1}{4}+\frac{2}{9}}{1-\frac{1}{4}\cdot\frac{2}{9}}\right) = \tan^{-1}\frac{1}{2}$ **2**

$= \frac{1}{2}\cdot 2\tan^{-1}\frac{1}{2}$ **1**

$= \frac{1}{2}\sin^{-1}\left(\dfrac{2\times\frac{1}{2}}{1+\frac{1}{4}}\right) = \frac{1}{2}\sin^{-1}\left(\frac{4}{5}\right)$ **1**

= RHS

28. If $\tan^{-1}\left(\frac{y}{x}\right) = \log\sqrt{x^2+y^2}$, prove that $\frac{dy}{dx} = \frac{x+y}{x-y}$.

Ans: Differentiating both sides w.r.t. x to get

$$\frac{1}{1+\frac{y^2}{x^2}}\cdot\frac{x\frac{dy}{dx}-y}{x^2} = \frac{1}{\sqrt{x^2+y^2}}\cdot\frac{2x+2y\frac{dy}{dx}}{2\sqrt{x^2+y^2}}$$ $1\frac{1}{2}+1\frac{1}{2}$

Simplyfying we get $x\frac{dy}{dx} - y = x + y\frac{dy}{dx}$ $\frac{1}{2}$

getting $\frac{dy}{dx} = \frac{x+y}{x-y}$ $\frac{1}{2}$

OR

If $y = e^{a\cos^{-1}x}, -1 < x < 1$, then show that $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - a^2y = 0$

Ans: $\dfrac{dy}{dx} = \dfrac{-ae^{a\cos^{-1}x}}{\sqrt{1-x^2}}$ **1**

$\sqrt{1-x^2}\dfrac{dy}{dx} = -ae^{a\cos^{-1}x}$ **$\frac{1}{2}$**

Differentiating again & getting

$\sqrt{1-x^2}\dfrac{d^2y}{dx^2} - \dfrac{x}{\sqrt{1-x^2}}\cdot\dfrac{dy}{dx} = \dfrac{a^2e^{a\cos^{-1}x}}{\sqrt{1-x^2}}$ **2**

$(1-x^2)\dfrac{d^2y}{dx^2} - x\dfrac{dy}{dx} - a^2y = 0$ **$\frac{1}{2}$**

29. Find $\displaystyle\int \frac{x^3+1}{x^3-x}dx$

Ans: Writing Integral as $I = \displaystyle\int \frac{x^3 - x + x + 1}{x^3 - x}dx$ **1**

$= \displaystyle\int 1dx + \int \frac{1}{x(x-1)}dx$ **1**

$= x + \displaystyle\int\left(\frac{1}{x-1} - \frac{1}{x}\right)dx$ **1**

$= x + \log|x - 1| - \log|x| + c$ **1**

30. Solve the following differential equation:

$(1+e^{y/x})dy + e^{y/x}\left(1-\dfrac{y}{x}\right)dx = 0 \ (x \neq 0)$

Ans: Writing given differential equation as $\dfrac{dy}{dx} = \dfrac{e^{y/x}(y/x-1)}{1+e^{y/x}}$ **1**

Putting $y = vx$ & $\dfrac{dy}{dx} = v + x\dfrac{dv}{dx}$ **$\frac{1}{2}$**

to get $x\dfrac{dv}{dx} = \dfrac{-(e^v+v)}{1+e^v}$ **1**

$\Rightarrow \displaystyle\int\frac{e^v+1}{e^v+v}dv = -\int\frac{dx}{x}$

$\log|e^v + v| = -\log|x| + \log c$ **1**

$e^{y/x} + \dfrac{y}{x} = \dfrac{c}{x}$ or $xe^{y/x} + y = c$ **$\frac{1}{2}$**

31. Find the shortest distance between the lines

$\vec{r} = 2\hat{i} - \hat{j} + \hat{k} + \lambda(3\hat{i} - 2\hat{j} + 5\hat{k})$

$\vec{r} = 3\hat{i} + 2\hat{j} - 4\hat{k} + \mu(4\hat{i} - \hat{j} + 3\hat{k})$

Ans: $\vec{a}_2 - \vec{a}_1 = \hat{i} + 3\hat{j} - 5\hat{k}$ **1**

$$\vec{b}_1 \times \vec{b}_2 = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 3 & -2 & 5 \\ 4 & -1 & 3 \end{vmatrix} = -\hat{i} + 11\hat{j} + 5\hat{k}$$ **2**

Using, shortest distance $= \left| \dfrac{(\vec{a}_2 - \vec{a}_1)\cdot(\vec{b}_1 \times \vec{b}_2)}{|\vec{b}_1 \times \vec{b}_2|} \right|$

$= \dfrac{7}{\sqrt{147}}$ units or $\dfrac{1}{\sqrt{3}}$ units **1**

32. A cotton industry manufactures pedestal lamps and wooden shades. Both the products require machine time as well as craftsman time in the making. The number of hour(s) required for producing 1 unit of each and the corresponding profit is given in the following table

Items	Machine time	Craftsman time	Profit (in ₹)
Pedestal lamp	1.5 hours	3 hours	30
Wooden shades	3 hours	1 hour	20

In a day, the factory has availability of not more than 42 hours of machine time and 24 hours of craftsman time.

Assuming that all items manufactured are sold, how should the manufacture schedule his daily production in order to maximize the profit? Formulate it as an LPP and solve it graphically.

Ans: Let number of pedestal lamps = x
number of wooden shades = y

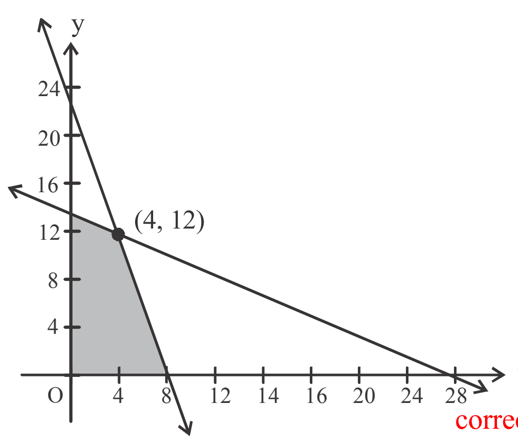
Maximize Profit Z = 30x + 20y **$\frac{1}{2}$**

Subject to constraints

$1.5x + 3y \leq 42$ **$1\frac{1}{2}$**

$3x + y \leq 24$

$x \geq 0,\ y \geq 0$



correct graph **1**

getting corners points & values of Z

(0, 0)	0
(8, 0)	240
(4, 12)	360
(0, 14)	280

1/2

Maximum profit = ₹ 360 where x = 4, y = 12 **1/2**

SECTION-D

Question numbers 33 to 36 carry 6 marks each.

33. $A = \begin{bmatrix} 5 & -1 & 4 \\ 2 & 3 & 5 \\ 5 & -2 & 6 \end{bmatrix}$, find A^{-1} and use it to solve the following system of equations:

$$5x - y + 4z = 5$$
$$2x + 3y + 5z = 2$$
$$5x - 2y + 6z = -1$$

Ans: $|A| = 51$ **1**

Cofactors: $\begin{matrix} A_{11} = 28 & A_{12} = 13 & A_{13} = -19 \\ A_{21} = -2 & A_{22} = 10 & A_{23} = 5 \\ A_{31} = -17 & A_{32} = -17 & A_{33} = 17 \end{matrix}$ **2**

$$A^{-1} = \frac{1}{51}\begin{bmatrix} 28 & -2 & -17 \\ 13 & 10 & -17 \\ -19 & 5 & 17 \end{bmatrix}$$ **1**

Given system is AX = B where $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix} B = \begin{bmatrix} 5 \\ 2 \\ -1 \end{bmatrix}$ $\frac{1}{2}$

$$\Rightarrow X = A^{-1}B = \frac{1}{51}\begin{bmatrix} 28 & -2 & -17 \\ 13 & 10 & -17 \\ -19 & 5 & 17 \end{bmatrix}\begin{bmatrix} 5 \\ 2 \\ -1 \end{bmatrix} = \begin{bmatrix} 3 \\ 2 \\ -2 \end{bmatrix}$$ **1**

x = 3, y = 2, z = –2 $\frac{1}{2}$

OR

If x, y, z are different and $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0$, then using properties of determinants show that 1 + xyz = 0.

Ans: Writing L.H.S as $\begin{vmatrix} x & x^2 & 1 \\ y & y^2 & 1 \\ z & z^2 & 1 \end{vmatrix} + \begin{vmatrix} x & x^2 & x^3 \\ y & y^2 & y^3 \\ z & z^2 & z^3 \end{vmatrix} = 0$ **1**

$$\Rightarrow \begin{vmatrix} x & x^2 & 1 \\ y & y^2 & 1 \\ z & z^2 & 1 \end{vmatrix} + xyz \begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix} = 0$$ **1**

getting

$$(1+xyz) \begin{vmatrix} x & x^2 & 1 \\ y & y^2 & 1 \\ z & z^2 & 1 \end{vmatrix} = 0$$ **2**

Applying $R_2 \to R_2 - R_1$, $R_3 \to R_3 - R_1$

$$(1+xyz) \begin{vmatrix} x & x^2 & 1 \\ y-x & (y+x)(y-x) & 0 \\ z-x & (z+x)(z-x) & 0 \end{vmatrix} = 0$$ **1**

Expanding and simplifying to get

$\Rightarrow$ (1 + xyz) (x – y) (y – z) (z – x) = 0 **1/2**

As x, y, z are different **1/2**

$\therefore$ 1+ xyz = 0

34. Amongst all open (from the top) right circular cylindrical boxes of volume 125π cm^3, find the dimensions of the box which has the least surface area.

Ans: Let radius = r & height = h

$\pi r^2 h = 125\pi$ or $h = \frac{125}{r^2}$ **1**

Surface Area, $S = 2\pi r h + \pi r^2$

$$S = \frac{250\pi}{r} + \pi r^2$$ **1**

$$\frac{dS}{dr} = \frac{-250\pi}{r^2} + 2\pi r$$ **1**

$$\frac{dS}{dr} = 0 \Rightarrow r = 5$$ **1/2+1**

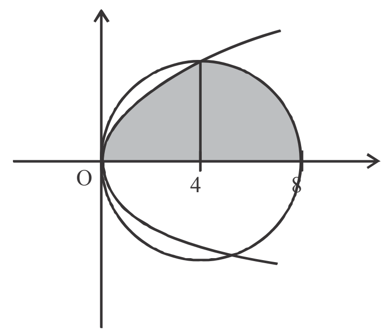
$$\frac{d^2S}{dr^2} = \frac{500\pi}{r^3} + 2\pi > 0 \text{ so s is least}$$ **1**

when r = 5 cm , gives h = 5 cm **1/2**

35. Using integration, find the area lying above x-axis and included between the circle $x^2 + y^2 = 8x$ and inside the parabola $y^2 = 4x$.

Ans. Correct figure **1**

x-coordinate of point of intersection is 4, 0 **1**



$$\text{Required Area} = \int_0^4 2\sqrt{x}\,dx + \int_4^8 \sqrt{16-(x-4)^2}\,dx$$ **2**

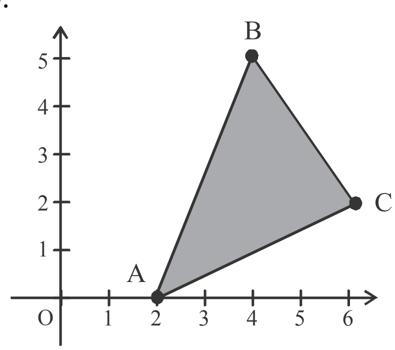
$$= \frac{4}{3}x^{\frac{3}{2}}\Big|_0^4 + \frac{x-4}{2}\sqrt{16-(x-4)^2} + 8\sin^{-1}\frac{x-4}{4}\Big|_4^8$$ **1**

$$= \frac{32}{3} + 4\pi$$ **1**

OR

Using the method of integration, find the area of the ΔABC, coordinates of whose vertices are A(2, 0), B(4, 5) and C(6, 3).

Ans. Correct figure **1**



Equation of AB : $y = \frac{5}{2}(x-2)$ **1/2**

Equation of BC : $y = 9 - x$ **1/2**

Equation of AC : $y = \frac{3}{4}(x-2)$ **1/2**

$$\text{Required Area} = \frac{5}{2}\int_2^4 (x-2)\,dx + \int_4^6 (9-x)\,dx - \frac{3}{4}\int_2^6 (x-2)\,dx$$ **2**

$$= \frac{5}{2}\frac{(x-2)^2}{2}\Big|_2^4 + \frac{(9-x)^2}{-2}\Big|_4^6 - \frac{3}{4}\frac{(x-2)^2}{2}\Big|_2^6$$ **1**

$$= 7$$ **1/2**

36. Find the probability distribution of the random variable X, which denotes the number of doublets in four throws of a pair of dice. Hence, find the mean of the number of doublets (X).

Ans. Let X denote the number of doublets P(doublet) = $\frac{1}{6}$, P(not a doublet) = $\frac{5}{6}$ **1**

X	0	1	2	3	4	**1**
P(X)	$\frac{625}{1296}$	$\frac{500}{1296}$	$\frac{150}{1296}$	$\frac{20}{1296}$	$\frac{1}{1296}$	**$2\frac{1}{2}$**
X·P(X)	0	$\frac{500}{1296}$	$\frac{300}{1296}$	$\frac{60}{1296}$	$\frac{4}{1296}$	**1**

mean = $\sum X \cdot P(X) = \frac{864}{1296}$ or $\frac{2}{3}$ **1/2**