

ANSWERS

1. ANGLE AND ITS MEASUREMENT

Exercise : 1.1

- 1) (A) (i), (iii), (iv), (vi) are co-terminal.
(ii), (v) are non co-terminal.
(B) (i) III (ii) III (iii) I (iv) I (v) III
(vi) I (vii) IV (viii) I (ix) II (x) III
- 2) (i) $\frac{17\pi}{36}$ (ii) $\frac{25\pi}{18}$ (iii) $\frac{11\pi}{15}$ (iv) $\frac{131\pi}{360}$
(v) $\frac{151\pi}{360}$ (vi) $\frac{51\pi}{225}$
- 3) (i) 105° (ii) -300° (iii) $\left(\frac{900}{\pi}\right)^\circ$
(iv) 110° (v) $\left(\frac{-45}{\pi}\right)^\circ$ or $14^\circ 19'$ approx"
- 4) (i) $183^\circ 42'$ (ii) $245^\circ 19' 48''$ (iii) $11^\circ 27' 33''$
- 5) 25° , $\frac{5\pi}{36}$
- 6) 30° , $\frac{\pi}{6}$
- 7) 40° , 50° and 90° that is $\frac{2\pi}{9}$, $\frac{5\pi}{18}$ and $\frac{\pi}{2}$
- 8) 420° and 480°
- 9) 30° , 70° and 80° that is $\frac{\pi}{6}$, $\frac{7\pi}{18}$ and $\frac{4\pi}{9}$
- 10) 20° , 60° and 100° that is $\frac{\pi}{9}$, $\frac{\pi}{3}$ and $\frac{5\pi}{9}$
- 11) 40° , 60° , 140° and 120°
- 12) 64° , 96° , and 128° that is $\frac{16\pi}{45}$, $\frac{8\pi}{15}$ and $\frac{32\pi}{45}$

$$13) (i) 72^\circ \text{ or } \frac{2\pi}{5} \text{ and } 108^\circ \text{ or } \frac{3\pi}{5}$$

$$(ii) 60^\circ \text{ or } \frac{\pi}{3} \text{ and } 120^\circ \text{ or } \frac{2\pi}{3}$$

$$(iii) (51.43)^\circ \text{ or } \frac{2\pi}{7}$$

$$\text{and } (128.57)^\circ \text{ or } \frac{5\pi}{7}$$

$$(iv) 45^\circ \text{ or } \frac{\pi}{4} \text{ and } 135^\circ \text{ or } \frac{3\pi}{4}$$

$$14) (i) 85^\circ \quad (ii) 100^\circ \quad (iii) 162^\circ 30'$$

$$(iv) 97^\circ 30' \quad (v) 50^\circ \quad (vi) 115^\circ$$

Exercise : 1.2

$$(1) 9\pi \text{ cm} \quad (2) 3\pi \text{ cm} \quad (3) \left(\frac{108}{\pi}\right)^\circ \text{ or } (34.40^\circ) \text{ approx} \quad (4) 4.4 \text{ cm}$$

$$(5) 4 : 5 \quad (6) 4\pi \text{ cm and } 10\pi \text{ sqcm}$$

$$(7) 18(\pi - 2\sqrt{2}) \text{ sqcm} \quad (8) \frac{225}{4} \left(\frac{\pi}{3} - 1\right) \text{ sqcm}$$

$$(9) 25 \text{ sq cm} \quad (10) 160 \text{ sq cm}$$

MISCELLANEOUS EXERCISE - 1

$$(I) (i) B \quad (ii) B \quad (iii) A \quad (iv) D \quad (v) D \quad (vi) C$$

$$(vii) B \quad (viii) B \quad (ix) A \quad (x) C.$$

$$(II) (1) 8 \quad (2) 49 \left(\frac{\pi}{2} - 1\right) \text{ sqcm} \quad (3) 3\pi \text{ cm}$$

$$(4) 35.7 \text{ cm} \quad (5) \left(\frac{450}{\pi}\right)^\circ \quad (6) 13:22$$

- (7) 15π cm and $\frac{135\pi}{2}$ sq cm (9) $17^\circ 11' 20''$ (11) $60^\circ, 80^\circ, 100^\circ, 120^\circ$ that is $\frac{\pi}{3}, \frac{4\pi}{9}, \frac{5\pi}{9}, \frac{2\pi}{3}$
- (10) $\frac{20\pi}{3}$

2. TRIGONOMETRY - I

Exercise : 2.1

(1)

θ	0°	30°	45°	60°	150°	180°	210°	300°	330°
$\sin\theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	0	$\frac{1}{-2}$	$-\frac{\sqrt{3}}{2}$	$\frac{1}{-2}$
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$
$\tan\theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	$-\frac{1}{\sqrt{3}}$	0	$\frac{1}{\sqrt{3}}$	$-\sqrt{3}$	$-\frac{1}{\sqrt{3}}$
$\operatorname{cosec}\theta$	N.D.	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	2	N.D.	-2	$-\frac{2}{\sqrt{3}}$	-2
$\sec\theta$	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	$-\frac{2}{\sqrt{3}}$	-1	$-\frac{2}{\sqrt{3}}$	2	$\frac{2}{\sqrt{3}}$
$\cot\theta$	N.D.	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	$-\sqrt{3}$	N.D.	$\sqrt{3}$	$-\frac{1}{\sqrt{3}}$	$-\sqrt{3}$

θ	-30°	-45°	-60°	-90°	-120°	-225°	-240°	-270°	-315°
$\sin\theta$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	$\frac{1}{\sqrt{2}}$
$\cos\theta$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$
$\tan\theta$	$-\frac{1}{\sqrt{3}}$	-1	$-\sqrt{3}$	N.D.	$\sqrt{3}$	-1	$-\sqrt{3}$	N.D.	1
cosec	-2	$-\sqrt{2}$	$-\frac{2}{\sqrt{3}}$	-1	$-\frac{2}{\sqrt{3}}$	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1	$\sqrt{2}$
$\sec$	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	N.D.	-2	$-\sqrt{2}$	-2	N.D.	$\sqrt{2}$
$\cot$	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0	$\frac{1}{\sqrt{3}}$	-1	$-\frac{1}{\sqrt{3}}$	0	1

(2) (i) Positive (ii) Positive (iii) Negative

(3) $\cos 4^\circ > \cos 4^c$, $\cos 4^\circ > 0$, $\cos 4^\circ < 0$

(4) (i) III (ii) III

(5) (i) $\frac{1+\sqrt{2}}{2}$ (ii) $1 + \sqrt{2}$ (iii) 0

(6) $\sin \theta = -\frac{4}{5}$, $\cos \theta = \frac{3}{5}$, $\tan \theta = -\frac{4}{3}$,
 $\operatorname{cosec} \theta = -\frac{5}{4}$, $\sec \theta = \frac{5}{3}$, $\cot \theta = -\frac{3}{4}$,

(7) $-\frac{119}{120}$, $\frac{144}{25}$

(8) (i) $\frac{1}{2}$ (ii) 2

(9) (i) $\sin \theta = -\frac{4}{5}$, $\operatorname{cosec} \theta = -\frac{5}{4}$, $\sec \theta = -\frac{5}{3}$
 $\tan \theta = \frac{4}{3}$, $\cot \theta = \frac{3}{4}$

(ii) $\cos A = -\frac{7}{25}$, $\sin A = \frac{24}{25}$, $\tan A = -\frac{24}{7}$

$\operatorname{cosec} A = \frac{25}{24}$, $\cot A = -\frac{7}{24}$

(iii) $\sin x = -\frac{4}{5}$, $\cos x = -\frac{3}{5}$, $\operatorname{cosec} x = -\frac{5}{4}$

$\sec x = -\frac{5}{3}$, $\tan x = \frac{4}{3}$

(iv) $\sin x = -\frac{5}{13}$, $\cos x = \frac{12}{13}$,

$\cot x = -\frac{12}{5}$, $\operatorname{cosec} x = -\frac{13}{5}$,

$\sec x = \frac{13}{12}$

Exercise : 2.2

(1) $\frac{2(1+\sqrt{3})}{\sqrt{3}(\sqrt{3}+\sqrt{2})}$ (2) -5 (3) $\frac{8}{11}$

(4) (i) $16x^2 - 9y^2 = 144$ (ii) $16x^2 - 9y^2 = 576$
 (iii) $x^2 + y^2 = 41$

(iv) $\left(\frac{x-5}{6}\right)^2 - \left(\frac{y-3}{8}\right)^2 = 1$

(v) $\left(\frac{3y-5}{3}\right)^2 - \left(\frac{2x-3}{4}\right)^2 = 1$

(5) $\cos \theta = \pm 1$ (6) $\frac{1}{2}$ (7) 30° (8) 60°

(9) 1 (10) -1 or $\frac{13}{12}$ (11) -8

(12) (i) (0, 3) (ii) (-1, 0)

(13) (i) $(5\sqrt{2}, 45^\circ)$ (ii) $(2, 60^\circ)$

(iii) $(\sqrt{2}, 225^\circ)$ (iv) $(2, 150^\circ)$

(14) (i) $\frac{\sqrt{3}}{2}$ (ii) $\frac{1}{2}$ (iii) $\frac{1}{\sqrt{3}}$

MISCELLANEOUS EXERCISE - 2

(I)

1	2	3	4	5	6	7	8	9	10
B	A	A	B	A	B	D	C	B	B

(II)

	90°	120°	225°	240°	270°	315°	-120°	-150°	-180°
sin	1	$\frac{\sqrt{3}}{2}$	$-\frac{1}{\sqrt{2}}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{1}{\sqrt{2}}$	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	0
cos	0	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	-1
tan	N.D.	$-\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	N.D.	-1	$\sqrt{3}$	$\frac{1}{\sqrt{3}}$	0
cosec	1	$\frac{2}{\sqrt{3}}$	$-\sqrt{2}$	$-\frac{2}{\sqrt{3}}$	-1	$-\sqrt{2}$	$-\frac{2}{\sqrt{3}}$	-2	N.D.
sec	N.D.	-2	$-\sqrt{2}$	-2	N.D.	$\sqrt{2}$	-2	$-\frac{2}{\sqrt{3}}$	-1
cot	0	$-\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0	1	$\frac{1}{\sqrt{3}}$	$\sqrt{3}$	N.D.

-210°	-300°	-330°
$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$
$-\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$
$-\frac{1}{\sqrt{3}}$	$\sqrt{3}$	$\frac{1}{\sqrt{3}}$
2	$\frac{2}{\sqrt{3}}$	2
$-\frac{2}{\sqrt{3}}$	2	$\frac{2}{\sqrt{3}}$
$-\sqrt{3}$	c	$\sqrt{3}$

$$(8) \cos \theta = \frac{2xy}{x^2 + y^2}, \quad \tan \theta = \frac{x^2 - y^2}{2xy}$$

$$(9) -1$$

3. TRIGONOMETRY - II

Exercise : 3.1

$$\text{Q.1 (i) } \frac{\sqrt{3}+1}{2\sqrt{2}} \quad \text{(ii) } \frac{\sqrt{3}-1}{2\sqrt{2}} \quad \text{(iii) } \frac{\sqrt{3}+1}{1-\sqrt{3}} \quad \text{(iv) } 1$$

$$\text{Q.3 (i) } \frac{33}{65} \quad \text{(ii) } \frac{-16}{65} \quad \text{(iii) } \frac{-33}{56}$$

Exercise : 3.2

$$\text{Q.1 (i) } -\frac{1}{2} \quad \text{(ii) } \frac{1}{\sqrt{2}} \quad \text{(iii) } \frac{1}{\sqrt{2}}$$

$$\text{(iv) } -\frac{1}{2} \quad \text{(v) } 1 \quad \text{(vi) } \frac{1}{\sqrt{3}}$$

(2) (i) Positive (ii) Negative (iii) Negative

(3) (i) IV (ii) III (iii) II

(4) $\sin 1856 > \sin 2006$

(5) $\sin(-310^\circ)$

(vii) -2 (viii) $-\sqrt{2}$ (ix) $\frac{2}{\sqrt{3}}$

(x) $-\sqrt{3}$

Exercise : 3.3

Q.1 (i) $\sqrt{\frac{\sqrt{2}-1}{2\sqrt{2}}}$ OR $\frac{\sqrt{2-\sqrt{2}}}{2}$

(ii) $\sqrt{\frac{\sqrt{2}+1}{2\sqrt{2}}}$ OR $\frac{\sqrt{2+\sqrt{2}}}{2}$

Q.2 $\frac{-120}{169}, \frac{-119}{169}, \frac{120}{119}$

Exercise : 3.4

Q.1 (i) $\sin 6x + \sin 2x$ (ii) $\sin \frac{7\pi}{12} + \sin \frac{\pi}{12}$

(iii) $\cos 6\theta + \cos 2\theta$ (iv) $\cos 110^\circ + \cos 40^\circ$

MISCELLANEOUS EXERCISE - 3

Q.1 (1) B (2) C (2) D (4) C (5) C
(6) B (7) C (8) B (9) A (10) A

4. DETERMINANTS AND MARTICES

Exercise : 4.1

Q.1 (i) -2 (ii) -10 (iii) 46

(iv) $abc + 2fgh - af^2 - bg^2 - ch^2$

Q.2 (i) $x = 0, x = -1, x = 2$ (ii) $x = -2$

Q.3 $x = 11, y = 52$

Q.4 $M_{11} = 11, C_{11} = 11, M_{12} = 7, C_{12} = -7,$
 $M_{13} = -3, C_{13} = -3$

$M_{21} = -23, C_{21} = 23, M_{22} = -11, C_{22} = -11,$
 $M_{23} = 19, C_{23} = -19$

$M_{31} = -5, C_{31} = -5, M_{32} = -5, C_{32} = 5,$
 $M_{33} = 5, C_{33} = 5$

Q.5 -28

Q.6 -2

Exercise : 4.2

Q.1 (i) 0 (ii) 0 (iii) 0

Q.5 (i) $x = -\frac{7}{3}$ (ii) $x = 1$ or 2 or 3 .

Q.6 $x = 0$ or 12

Exercise : 4.3

Q.1 (i) 1, 2, 3 (ii) $-5, 3, 4$ (iii) 2, 2, -1

(iv) $-\frac{1}{4}, \frac{1}{2}, 1$.

Q.2 3, 5, 7

Q.3 (1) Consistent (ii) Not Consistent
(iii) Consistent

Q.4 (i) 16 (ii) 2

Q.5 (i) 16 sq. unit (ii) $\frac{25}{8}$ sq. unit

(iii) 10 sq. unit

Q.6 21 sq. unit

Q.7 1 or -5

Q.8 (i) Collinear (ii) Non - Collinear
(iii) Collinear

MISCELLANEOUS EXERCISE - 4 (A)

(I)

1	2	3	4	5	6	7	8	9	10
B	B	B	B	B	C	C	D	D	C

(II) Q.1 (i) -113 (ii) -76

Q.2 -2

Q.3 (i) 0 (ii) 0

Q.4 (i) $M_{11}=14, C_{11}=14, M_{12}=-4, C_{12}=4,$
 $M_{13}=8, C_{13}=8$

$M_{21}=16, C_{21}=-16, M_{22}=-2, C_{22}=-2,$
 $M_{23}=4, C_{23}=-4$

$M_{31}=-4, C_{31}=-4, M_{32}=5, C_{32}=-5,$
 $M_{33}=-1, C_{33}=-1$

(ii) $M_{11}=0, C_{11}=0, M_{12}=11, C_{12}=-11,$
 $M_{13}=0, C_{13}=0$

$M_{21}=-3, C_{21}=3, M_{22}=-1, C_{22}=1, M_{23}$
 $=1, C_{23}=-1$

$M_{31}=2, C_{31}=2, M_{32}=-8, C_{32}=8, M_{33}=3,$
 $C_{33}=3$

Q.5 (i) $-\frac{1}{3}$ or 2 (ii) $\frac{2}{3}$

Q.9 (i) 1, 2, 1 (ii) 1, 2, 3 (iii) 1, 2, -1

(iv) $\frac{9}{2}, -\frac{3}{2}, \frac{1}{2}$

Q.10 (i) $\frac{1}{3}$ (ii) 5 (iii) 5

Q.11 (i) 4 (ii) $\frac{25}{2}$ (iii) $\frac{13}{2}$

Q.12 (i) 0 or 16 (ii) -1 or -34

Q.13 32 sq. unit

Q.14 ₹1750, ₹1500, ₹1750

Exercise : 4.4

$$Q.1 \text{ (i) } \begin{bmatrix} 0 & \frac{1}{4} \\ \frac{1}{2} & 0 \\ 2 & \frac{1}{2} \end{bmatrix} \text{ (ii) } \begin{bmatrix} -2 & -5 \\ -1 & -4 \\ 0 & -3 \end{bmatrix} \text{ (iii) } \frac{1}{5} \begin{bmatrix} 8 & 27 \\ 27 & 64 \\ 64 & 125 \end{bmatrix}$$

Q.2 (i) Upper triangular matrix

(ii) Skew - symmetric matrix

(iii) Column matrix

(iv) row matrix

(v) scalar matrix

(vi) Lower triangular matrix

(vii) diagonal matrix

(viii) symmetric matrix

(ix) Identity matrix

(x) symmetric matrix

Q.3 (i) Singular (ii) Singular

(iii) Non-Singular (iv) Non-Singular

Q.4 (i) $-\frac{6}{7}$ (ii) 6 (iii) $\frac{49}{8}$

$$Q.5 \begin{bmatrix} 5 & 1 & -1 \\ 3 & 2 & 0 \end{bmatrix}$$

$$Q.6 \begin{bmatrix} 7 & 3 & 1 \\ -2 & -4 & 1 \\ 5 & 9 & 1 \end{bmatrix}$$

Q.7 $a = -4, b = \frac{3}{5}, c = -7$

Q.8 $x = -\frac{3}{2}, y = 5i, z = \sqrt{2}$

Q.9 (i) Symmetric

(ii) Neither Symmetric nor Skew Symmetric

(iii) Skew Symmetric

$$\text{Q.10 } A = \begin{bmatrix} 0 & -1 & -2 \\ 1 & 0 & -1 \\ 2 & 1 & 0 \end{bmatrix} \text{ Skew Symmetric matrix}$$

Exercise : 4.5

$$\text{Q.2 } \begin{bmatrix} 5 & 4 \\ -3 & 23 \end{bmatrix}$$

$$\text{Q.3 } C = \begin{bmatrix} -10 & -1 & 1 \\ 7 & -9 & 3 \\ -4 & 6 & 2 \end{bmatrix}$$

$$\text{Q.4 } X = \begin{bmatrix} -1 & \frac{2}{5} \\ \frac{6}{5} & \frac{19}{5} \\ \frac{19}{5} & \frac{26}{5} \end{bmatrix}$$

$$\text{Q.5 } X = \begin{bmatrix} \frac{3}{8} & -\frac{1}{4} \\ -\frac{3}{8} & \frac{1}{2} \end{bmatrix}, Y = \begin{bmatrix} \frac{1}{8} & \frac{1}{4} \\ -\frac{1}{8} & \frac{1}{2} \end{bmatrix}$$

$$\text{Q.6 } A = \begin{bmatrix} 3 & -\frac{14}{3} & -\frac{8}{3} \\ -2 & 1 & 3 \end{bmatrix}, B = \begin{bmatrix} 0 & -\frac{10}{3} & -\frac{16}{3} \\ 0 & 0 & 5 \end{bmatrix}$$

$$\text{Q.7 } \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Q.8 $A - B$ is singular

$$\text{Q.9 } x = -\frac{1}{4}, y = \frac{9}{2}$$

$$\text{Q.10 } a = 1, b = 0, c = \frac{2}{5}, d = \frac{3}{5}$$

Q.11(i) 1760, 2090,

(ii) Profit of suresh book shop on P, C, M is ₹ 665, ₹675 ₹850 respectively. That of Ganesh ₹700, ₹750, ₹1020 respectively.

Exercise : 4.6

$$\text{Q.1 (i) } \begin{bmatrix} 6 & -12 & 9 \\ 4 & -8 & 6 \\ 2 & -4 & 3 \end{bmatrix} \quad (\text{ii) } [8]$$

Q.3 $AB \neq BA$

$$\text{Q.8 } \begin{bmatrix} -5 & -15 \\ 33 & 35 \end{bmatrix}$$

$$\text{Q.10 } \begin{bmatrix} 9 & 6 & 4 \\ 15 & 32 & -2 \\ 35 & -7 & 29 \end{bmatrix}$$

$$\text{Q.11 } \alpha = 1$$

$$\text{Q.13 } k = -7$$

$$\text{Q.17 } a = 2, b = -1$$

$$\text{Q.18 } X = \begin{bmatrix} \frac{5}{3} \\ \frac{7}{3} \\ \frac{7}{3} \end{bmatrix}$$

$$\text{Q.19 } K = 1$$

$$\text{Q.20 } x = -5/3$$

$$\text{Q.21 } x = 19, y = 12$$

$$\text{Q.22 } x = -3, y = 1, z = -1$$

$$\text{Q.24 } \text{Jay ₹104 and Ram ₹150.}$$

Exercise : 4.7

Q.1 (i) $\begin{bmatrix} 1 & -4 \\ 3 & 5 \end{bmatrix}$ (ii) $\begin{bmatrix} 2 & -4 \\ 6 & 0 \\ 1 & 5 \end{bmatrix}$

Q.2 $A = \begin{bmatrix} 0 & -2 & -4 \\ 2 & 0 & -2 \\ 4 & 2 & 0 \end{bmatrix}$ $A^T = \begin{bmatrix} 0 & 2 & 4 \\ -2 & 0 & 2 \\ -4 & -2 & 0 \end{bmatrix}$

both are skew symmetric.

Q.7 $C^T = \begin{bmatrix} -16 & 14 \\ -6 & -10 \end{bmatrix}$

Q.8 (i) $\begin{bmatrix} 7 & 8 \\ -5 & 8 \\ 12 & -18 \end{bmatrix}$ (ii) $\begin{bmatrix} 35 & -10 \\ 25 & 15 \\ -15 & 10 \end{bmatrix}$

Q.12 (i) $\begin{bmatrix} 4 & \frac{1}{2} \\ \frac{1}{2} & -5 \end{bmatrix} + \begin{bmatrix} 0 & \frac{-5}{2} \\ \frac{5}{2} & 0 \end{bmatrix}$

(ii) $\frac{1}{2} \begin{bmatrix} 6 & 1 & -5 \\ 1 & -4 & -4 \\ -5 & -4 & 4 \end{bmatrix} + \frac{1}{2} \begin{bmatrix} 0 & 5 & 3 \\ -5 & 0 & 6 \\ -3 & -6 & 0 \end{bmatrix}$

MISCELLANEOUS EXERCISE - 4 (B)

(I)

1	2	3	4	5	6	7	8	9	10
B	C	A	D	A	C	B	A	A	C

(II) Q.1 (i) diag $[-1 \ 1 \ 3]$ (ii) diag $[23 \ -32 \ -18]$

Q.2 (i) $\begin{bmatrix} \cos \alpha & \sin \alpha & 0 \\ -\sin \alpha & \cos \alpha & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(ii) $\begin{bmatrix} 2 \cos \alpha & 0 & 0 \\ 0 & 2 \cos \alpha & 0 \\ 0 & 0 & 2 \end{bmatrix}$

Q.3 (i) $A = \frac{1}{7} \begin{bmatrix} 3 & -4 \\ 1 & 3 \end{bmatrix}$ $B = \begin{bmatrix} -\frac{1}{7} & -\frac{1}{7} \\ \frac{2}{7} & -\frac{1}{7} \end{bmatrix}$

(ii) $A = \frac{1}{16} \begin{bmatrix} -5 & 10 & 6 \\ 4 & 0 & 25 \end{bmatrix}$ $B = \frac{1}{16} \begin{bmatrix} 1 & -2 & 2 \\ -4 & 0 & -5 \end{bmatrix}$

Q.5 $\alpha = 60^\circ$ or $\frac{\pi}{3}$

Q.16 $x = 2, y = 2$

Q.18 $\begin{bmatrix} 2 & -1 \\ 3 & -2 \end{bmatrix}$

Q.19 (i) $x = 7, y = -44$ (ii) $x = 5, y = -1$

Q.20 (i) $x = -9, y = -3, z = 0$.

(ii) $x = 31, y = 53, z = 19$.

Q.21 $AB^T = \begin{bmatrix} 8 & -7 \\ -12 & 22 \end{bmatrix}$ $A^TB = \begin{bmatrix} 2 & 0 & -4 \\ 7 & -2 & 6 \\ 15 & -6 & 30 \end{bmatrix}$

Q.25 (i)

	Shantaram	Kantaram
Rice	₹ 33000	₹ 39000
Wheat	₹ 28000	₹ 31500
Groundnut	₹ 24000	₹ 24000

(ii)

	Shantaram	Kantaram
Rice	₹ 3000	₹ 3000
Wheat	₹ 2000	₹ 1500
Groundnut	₹ 0	₹ 8000

5. STRAIGHT LINE

Exercise : 5.1

1. $2x - 4y + 5 = 0$
2. $9x - y + 6 = 0$
3. $3x^2 + 3y^2 + 4x + 24y + 32 = 0$
4. $x^2 + y^2 - 11x - 11y + 53 = 0$
5. $3x + 4y - 41 = 0$
6. $3x^2 + 4y^2 - 4x - 11y + 33 = 0$
7. (a) $(-1, 0)$ (b) $(0, 2)$
8. (a) $(6, 7)$ (b) $(4, 6)$
9. $(-3, 11)$
10. (a) $3X - Y + 6 = 0$
 (b) $X^2 + Y^2 + X + 4Y - 5 = 0$
 (c) $XY = 0$
 (d) $Y^2 - 4X = 0$
6. $m = 1, c = -1$
7. $x + y - 7 = 0$
8. a) $2x + y - 4 = 0$ b) $2x - 5y + 14 = 0$
 c) $2x + 4y - 13 = 0$
9. a) $3, 2$ b) $\frac{2}{3}, \frac{3}{2}$ c) $-6, 4$
10. $x - y + 2 = 0, 3x - y = 0$
11. $x + y = 7, 4x - 3y = 0$
12. A : $5x + y - 15 = 0$, B : $3x + 4y - 14 = 0$,
 C : $2x - 3y - 1 = 0$
13. $9x + y + 7 = 0, 8x + 22y - 31 = 0, 2x - 4y + 9 = 0$
14. $\left(\frac{5}{7}, \frac{4}{7}\right)$
15. $3x - 4y = 25$

Exercise : 5.4

1. a) Slope $-\frac{2}{3}$, X-intercept 3, Y-Intercept 2
 b) Slope 3, X-intercept 3, Y-Intercept -9
 c) Slope $-\frac{1}{2}$, intercepts 0
2. a) $2x - y - 4 = 0$ b) $0x + 1y - 4 = 0$
 c) $2x + y - 4 = 0$ d) $2x - 3y - 6 = 0$
4. $(1, -3)$ 5. ± 24 6. $(1, 2)$
7. $(1, -1)$ 8. $\left(\frac{5}{3}, \frac{2}{3}\right)$ 9. $(5, 5)$
10. $x + 3y = 3$ 11. 2 12. 4
13. $\frac{2}{5}$ 14. $\frac{25}{\sqrt{117}}$ 15. $(3, 1)$ and $(-7, 11)$
16. $5y - 8 = 0$ 17. $8x + 13y - 24 = 0$
18. $x - 3y + 5 = 0$
19. $2x + y + 13 = 0, x - 9y + 73 = 0$,
 $11x - 4y - 52 = 0, \left(\frac{-1}{19}, \frac{-10}{19}\right)$
20. $(2, 2)$

Exercise : 5.2

1. a) 2 b) $\frac{4}{7}$ c) not defined. d) 0.
2. $\frac{-3}{2}$ 3. $\frac{1}{\sqrt{3}}$ 4. 1 5. -1
7. -1 8. $k = 1$ 9. 45°

Exercise : 5.3

1. a) $y = 5$ b) $y = -5$ c) $y = -1$ or $y = 7$
2. a) $y = 3$ b) $x = 4$
3. a) $x = 2$ b) $y = -3$
4. a) $4x - y - 8 = 0$ b) $x = 2$
5. a) $y = \sqrt{3}x$ b) $y = -3x$
 c) $x - 2y - 7 = 0$ d) $2x - 3y + 9 = 0$
 e) $\sqrt{3}x + y - 4\sqrt{3} - 3 = 0$
 f) $3x - y = 0$

MISCELLANEOUS EXERCISE - 5

(I)

1	2	3	4	5	6	7	8	9	10
B	C	B	D	B	B	D	B	A	D

1. a) 22 b) $\frac{5}{3}$ c) 1
2. $y = -2x - \frac{8}{3}$, slope = -2
3. 2
4. No, point does not satisfy the equation.
5. (d)
6. a) $y + 3 = 0$ b) $x = -2$
c) $y = 5$ d) $x = 3$
7. a) $y = 3$ b) $y = 4$
8. a) $5x - y + 7 = 0$ b) $x = 7$ c) $3x - 2y = 0$
9. $x = 2$
10. 6
11. $\frac{12}{5}$
12. $x + y = 8$ or $5x - 3y = 0$
13. a) BC : $3x + y = 9$, CA : $x = 1$. AB : $x + y = 5$
b) Median AD : $x - y + 3 = 0$,
Median BE : $2x + y = 7$,
Median CF : $5x + y - 11 = 0$
c) $x - 3y + 12 = 0$, $y = 5$, $x - y + 2 = 0$
d) $x - 3y + 11 = 0$, $y = 3$, $x - y + 5 = 0$
14. $3y - 7 = 0$
15. $17x + 27y - 17 = 0$
16. $x + 3y = 7$
17. $-\frac{4}{3}$
18. 5
19. $\frac{22}{9}$

20. $3x + y = 9$ and $x - 3y + 7 = 0$
21. -20
22. $x - 2y + 14 = 0$, $x + 2y = 32$
23. $y = 3$, (1, 3)
24. $3x - 4y + 8 = 0$
25. $3x + 9y = 13$
26. $\left(\frac{68}{25}, \frac{-49}{25}\right)$
27. (-2, 0) and (8, 0)
28. $2x - 9y + 85 = 0$
30. $3\sqrt{2}$

6. CIRCLE

Exercise : 6.1

- (1) (i) $x^2 + y^2 = 16$
(ii) $x^2 + y^2 + 6x - 4y - 23 = 0$
(iii) $x^2 + y^2 - 4x + 6y - 12 = 0$
(iv) $x^2 + y^2 + 6x + 6y + 9 = 0$
- (2) (i) (0, 0); 5 (ii) (5, 3); $2\sqrt{5}$
(iii) $\left(\frac{1}{2}, -\frac{1}{3}\right); \frac{1}{6}$
- (3) (i) $x^2 + y^2 - 2ax - 2by + b^2 = 0$
(ii) $x^2 + y^2 + 4x - 6y + 4 = 0$
(iii) $x^2 + y^2 \pm 8x = 0$
(iv) $x^2 + y^2 - 6x - 2y + 6 = 0$
- (4) $x^2 + y^2 - 16x + 20y + 83 = 0$
- (5) $x^2 + y^2 - 2x - 4y = 0$
- (6) $x^2 + y^2 + 8x + 8y + 16 = 0$
- (7) $x^2 + y^2 - 4x + 5y = 0$
- (8) $x^2 + y^2 + 6x - 6y + 47 = 0$

Exercise : 6.2

- (1) (i) (1, -2); 3 (ii) (3, 4); 7 (iii) (3, 1), 4
 (3) $x^2 + y^2 - 4x - 6y - 12 = 0$

Exercise : 6.3

- (1) (i) $x = 3 \cos \theta$, $y = 3 \sin \theta$
 (ii) $x = -1 + 3 \cos \theta$, $y = 2 + 3 \sin \theta$
 (iii) $x = 3 + 5 \cos \theta$, $y = -4 + 5 \sin \theta$,
 (2) $x = \frac{2}{3} + \frac{5}{3} \cos \theta$, $y = -1 + \frac{5}{3} \sin \theta$
 (3) $3x - 2y = 0$
 (5) $4x - y - 18 = 0$

MISCELLANEOUS EXERCISE - 6

(I)

1	2	3	4	5	6	7	8	9	10
C	C	A	C	A	C	D	C	B	A

- (II) (1) $\left(\frac{1}{2}, -1\right), \frac{\sqrt{17}}{2}$ (2) (3, 2), 4
 (3) $x^2 + y^2 + 4x - 2y = 0$
 (4) $x^2 + y^2 - 4x - 6y = 0$
 (6) $x^2 + y^2 - 6y - 76 = 0$
 (8) $x + \sqrt{3} y + 16 = 0$
 (9) $x^2 + y^2 = 50$
 (10) $x^2 + y^2 - 4x + 6y - 3 = 0$
 (11) (i) x-intercept = 12, r - intercept = 9
 (ii) x-intercept = 9, r - intercept = 15
 (12) (i) $\left(\frac{1}{5}, \frac{-13}{5}\right)$, $3x - 4y - 11 = 0$
 (ii) (1, 2), $x + 3y - 7 = 0$

(13) (i) (2, -4), $y + 4 = 0$

(ii) $\left(\frac{8}{5}, \frac{6}{5}\right)$, $3x - 4y = 0$

(14) 7 (15) $k = -8$

(16) $3x + 2y - 26 = 0$ (17) $x - 2y = 5$

(18) $x + \sqrt{3} y = 10$ (19) (-3, 0)

(20) -61 (21) $2x + y \pm 4\sqrt{5} = 0$

(22) $3x + 2y \pm 2\sqrt{13} = 0$

(23) $x - 5y \pm 6\sqrt{26} = 0$

(24) $3x - y - 27 = 0$ and $3x - y - 13 = 0$

(25) $x^2 + y^2 = 18$

(26) (i) $xy = 0$ (ii) $5y^2 + 2xy = 5a^2$

(iii) $y^2 - a^2 = c(x^2 - a^2)$

7. CONIC SECTIONs

Exercise : 7.1

- 1) i. $\left(\frac{6}{5}, 0\right)$, $5x + 6 = 0$, $\frac{24}{5}$, $\left(\frac{6}{5}, \pm \frac{12}{5}\right)$
 ii. (-5, 0), $x - 5 = 0$, 20, $(-5, \pm 10)$
 iii. $\left(0, \frac{2}{3}\right)$, $3y + 2 = 0$, $\frac{8}{3}$, $\left(\pm \frac{4}{3}, \frac{2}{3}\right)$
 iv. (0, -2), $y - 2 = 0$, 8, $(\pm 4, -2)$
 v. $\left(-\frac{4}{3}, 0\right)$, $3x - 4 = 0$, $\frac{16}{3}$, $\left(-\frac{4}{3}, \pm \frac{8}{3}\right)$
 2) $x^2 = -20y$
 3) $3y^2 = 16x$
 4) $y^2 = -28x$
 5) i) $y^2 = 36x$ ii) $y^2 = \frac{9}{2}x$
 6) i) $-\frac{3}{2}$ ii) $-\frac{9}{2}$

- 7) 8
 8) i) $\left(\frac{1}{3}, 2\right), \frac{10}{3}$ ii) $\left(\frac{7}{2}, -\frac{7}{2}\right), \frac{35}{8}$
 9) (16, 8), (16, -8)
 10) 18 units
 11) 18 sq. units
 12) (5, 0)
 13) $(1, 2), \left(1, \frac{9}{4}\right)$,
 $4y - 7 = 0$,
 $x = 1$
 14) i) $x - y + 3 = 0, 3x - 2y + 4 = 0$
 ii) $3x - y + 3 = 0, 3x - 2y + 12 = 0$
 15) $k = 24$
 17) $x + 2y + 4 = 0$
 18) $y = -3x$
 19) $\frac{29}{4} = 7.25\text{cm}$

Exercise : 7.2

- (1) (a) 10, 6, (± 50) , $x = \pm \frac{a}{e}; \frac{18}{5}, 8, \frac{25}{2}$.
 (b) $4, 2\sqrt{3}, (\pm 10)$, $x = \pm 4, 3, 2, 8$.
 (c) $2\sqrt{3}, 2, (\pm \sqrt{2}, 0)$, $x = \pm \frac{3}{\sqrt{2}}, \frac{2}{\sqrt{3}}, 2\sqrt{2}, 3\sqrt{2}$.
 (d) $\frac{2}{\sqrt{3}}, 1, \left(\pm \frac{1}{2\sqrt{3}}, 0\right)$, $x = \pm \frac{2}{\sqrt{3}}, \frac{\sqrt{3}}{2}, \frac{1}{\sqrt{3}}, \frac{4}{\sqrt{3}}$
 (2) (i) $\frac{x^2}{64} + \frac{y^2}{55} = 1$ (ii) $\frac{x^2}{25} + \frac{y^2}{9} = 1$
 (iii) $\frac{x^2}{9} + \frac{y^2}{8} = 1$ (iv) $\frac{x^2}{72} + \frac{y^2}{64} = 1$
 (v) $\frac{x^2}{25} + \frac{y^2}{16} = 1$ (vi) $\frac{x^2}{16} + \frac{y^2}{12} = 1$

$$(vii) 3x^2 + 5y^2 = 32 \quad (viii) \frac{x^2}{15} + \frac{y^2}{6} = 1$$

$$(ix) \frac{x^2}{9} + \frac{y^2}{5} = 1$$

$$(4) e = \frac{2\sqrt{2}}{3}$$

$$(5) e = \frac{1}{\sqrt{3}}$$

$$(7) 4 \text{ sq. unit} \quad (8) \left(\frac{16}{5}, \frac{-9}{5}\right) \quad (9) (1, 2)$$

(10) The line is a tangent and point of contact

$$\left(\frac{1}{3\sqrt{2}}, \frac{4\sqrt{2}}{3}\right).$$

$$(11) k = \pm 12\sqrt{2}$$

$$(12) (i) y + 2 = 0, 8x - y - 18 = 0$$

$$(ii) y + 2 = 0, 12x + y = 34$$

$$(iii) 5x - y = 9, x + y = 3$$

$$(iv) 6y = \pm (4x + 15)$$

$$(v) x + y = \pm \sqrt{29}$$

$$(vi) 2x - y = \pm 3,$$

$$(vii) 3x - 4y = \pm 2\sqrt{65}$$

$$(13) x^2 + y^2 = 8 \quad (14) x^2 - xy - 5 = 0$$

$$(16) x^2 - y^2 = a^2 - b^2 \quad (19) x + y = \pm 5$$

$$(20) \frac{x}{a} + \frac{y}{b} = \sqrt{2} \quad (23) 3 \text{ sq. units}$$

Exercise : 7.4

- (1) (i) 10, 8, $\frac{\sqrt{41}}{5}, (\pm \sqrt{41}, 0)$, $x = \pm \frac{25}{41}, \frac{32}{5}$
 (ii) 8, 10, $\frac{\sqrt{41}}{4}, y = \pm \frac{16}{\sqrt{41}}, \frac{32}{5}$

- (iii) $6, 8, \frac{5}{3}, (\pm 5, 0), x = \pm \frac{9}{5}, \frac{32}{3}$
- (iv) $4, 2\sqrt{21}, \frac{5}{2}, (\pm 5, 0), x = \pm \frac{4}{5}, 21$.
- (v) $\frac{4}{\sqrt{3}}, 4, \sqrt{3}, \left(\pm \frac{4}{\sqrt{3}}, 0\right), x = \pm \frac{2}{3}, 4\sqrt{3}$
- (vi) $8, 8, \sqrt{2}, (\pm 4\sqrt{2}, 0), x = \pm 2\sqrt{2}, 32$
- (vii) $10, 6, \frac{\sqrt{34}}{5}, (0, \pm \frac{\sqrt{34}}{5}), y = \pm \frac{25}{\sqrt{34}}, \frac{18}{5}$
- (viii) $10, 24, \frac{13}{5}, (0, \pm 13), y = \pm \frac{25}{13}, \frac{288}{5}$.
- (ix) $20, 10, \frac{\sqrt{3}}{2}, (\pm 5\sqrt{3}, 0), x = \pm \frac{20}{\sqrt{3}}, 10$
- (x) $4, 4\sqrt{3}, 2, (\pm 4, 0), x = \pm 1, 12$.
- (2) $\frac{x^2}{24} - \frac{y^2}{25} = 1$ (3) $e = \frac{2}{\sqrt{3}}$
- (5) (i) $\frac{x^2}{4} - \frac{y^2}{21} = 1$ (ii) $\frac{x^2}{16} - \frac{y^2}{9} = 1$
- (iii) $\frac{x^2}{4} - \frac{y^2}{5} = 1$ (iv) $\frac{8x^2}{9} - \frac{y^2}{36} = 1$
- (v) $\frac{x^2}{9} - \frac{y^2}{27} = 1$ (vi) $\frac{x^2}{49} - \frac{y^2}{9} = 1$
- (vii) $\frac{9x^2}{16} - \frac{9y^2}{20} = 1$ (ix) $\frac{x^2}{16} - \frac{y^2}{9} = 1$
- (6) (i) $3x - \sqrt{2}y = 2; \sqrt{2}x + 3y = 3\sqrt{2} + 6$
- (ii) $x - y = 1; x + y = 7$
- (iii) $5x - 6\sqrt{3}y = 30; 6\sqrt{3}x + 5y = 169\sqrt{3}$
- (iv) $3\sqrt{2}x - 4y = 12; 4x + 3\sqrt{2}y = 25\sqrt{2}$
- (v) $5x - 4y = 16; 16x + 20y = 125$.
- (7) $(-6, -2)$ (8) $2\sqrt{10}$ (9) $x + y = \pm 4$
- (10) $3x + 2y = \pm 4$

MISCELLANEOUS EXERCISE - 7

(I)

1	2	3	4	5	6	7	8	9	10
A	C	A	C	A	B	C	C	B	B

11	12	13	14	15	16	17	18	19	20
C	C	B	B	B	C	B	A	C	A

- (II) 1) i) $\left(\frac{17}{8}, 0\right), 8x + 17 = 0, \frac{17}{2}, \left(\frac{17}{8}, \frac{17}{4}\right)$
- i) $\left(0, \frac{6}{5}\right) 5y + 6 = 0, \frac{24}{5}, \left(\frac{12}{5}, \frac{6}{5}\right)$
- 2) i) $(12, 12)$ ii) $(27, -18)$ 3) $(8, 8)$ and $(8, -8)$
- 4) $3x + 4y + 12 = 0$
- 5) $2x - y + 2 = 0$
- 6) $9x - 4y + 4 = 0, x - 4y + 36 = 0$
- 8) $x + y + 2 = 0, (2, 4), (2, -4)$
- 13) a) i) $10, 6$ ii) $(\pm 4, 0)$ iii) $x = \frac{23}{4}$ iv) $\frac{18}{5}$ v) 8
- vi) $\frac{25}{2}$
- b) i) $10, 8$ ii) $(0, \pm 3)$ iii) $y = \pm \frac{25}{3}$ iv) $\frac{32}{5}$
- v) 6 vi) $\frac{50}{3}$
- c) i) $24, 10$ ii) $(\pm 13, 0)$ iii) $x = \pm \frac{144}{13}$ iv) $\frac{25}{6}$
- v) 26 vi) $\frac{288}{13}$
- d) i) $8, 8$ ii) $(\pm 4\sqrt{2}, 0)$ iii) $x = \pm 2\sqrt{2}$ iv) 8
- v) $8\sqrt{2}$ vi) $\sqrt{2}$
- 14) i) $\frac{x^2}{64} + \frac{y^2}{55} = 1$ ii) $\frac{x^2}{25} + \frac{y^2}{9} = 1$
- iii) $3x^2 + 5y^2 = 32$

$$15) e = \pm \frac{1}{\sqrt{3}} \quad 17) y = \pm 4 \text{ or } y = 8x + 2\sqrt{11}$$

$$18) 2x + 3y = 25 \quad 19) (1, 2)$$

$$20) x^2 - xy - 5 = 0$$

$$22) \text{ i) } \frac{x^2}{36} - \frac{4y^2}{25} = 1 \quad \text{ii) } \frac{x^2}{16} - \frac{y^2}{20} = 1$$

$$\text{iii) } \frac{x^2}{4} - \frac{4y^2}{9} = 1$$

$$23) \text{ i) } 17x - 2y + 17 = 0 \quad \text{ii) } 10x - 3\sqrt{3}y = 15$$

$$\text{iii) } 32x - 25y = 400\sqrt{3}$$

$$24) (3, 2) \quad 25) y = 2x \pm 4$$

$$26) k(x^2 - a^2) = 2xy$$

$$5) \text{ S.D. } = 3.76$$

$$6) (C.V.)_p = 27.27; (C.V.)_Q = 33.33;$$

i) Worker P is more consistent.

ii) Worker Q seems to be faster in completing the job.

$$7) (C.V.)_1 = 1.07 \quad (C.V.)_2 = 2.5$$

i) First department has larger bill

ii) Second department has larger variability in wages.

$$8) (C.V.)_A = 18.6; (C.V.)_B = 18.7$$

Series B is more variable

$$9) (C.V.)_A = 80; (C.V.)_B = 74.5$$

Team B is more consistent.

$$10) (C.V.)_M = 10; (C.V.)_S = 12$$

The subject Statistic shows higher variability in marks.

8. MEASURES OF DISPERSION

Exercise : 8.1

$$1) 38 \quad 2) 717 \quad 3) 11 \quad 4) 5 \quad 5) 10$$

Exercise : 8.2

$$1) \sigma^2 = 8; \sigma = 2.82$$

$$2) \sigma^2 = 380; \sigma = 19.49$$

$$3) \sigma^2 = 32.39; \sigma = 5.69$$

$$4) \sigma^2 = 4.026; \sigma = 2.006$$

$$5) \sigma^2 = 3.0275; \sigma = 1.74$$

$$6) x = 58.2; \sigma^2 = 653.76; \sigma = 25.56$$

$$7) \sigma^2 x = 41.25; \sigma x = 6.42$$

$$8) 5 \text{ and } 7$$

Exercise : 8.3

$$1) \sigma_c = 5.15$$

$$2) \sigma_c = 3.14$$

$$3) C.V. = 6.32$$

$$4) C.V. = 20$$

MISCELLANEOUS EXERCISE - 8

(I)

1	2	3	4	5	6	7	8	9	10
C	A	B	D	A	C	B	B	C	B

(II)

$$1) \text{ Range } = 48$$

$$2) \text{ Range } = 89$$

$$3) \text{ Range } = \text{Rs. } 30$$

$$4) \text{ Range } = 60$$

$$5) \sigma = 2.72$$

$$6) \text{ S. D. } = 14.14$$

$$7) \text{ S. D. } = 1.48$$

$$8) \text{ S. D. } = 13.42$$

$$9) \text{ S. D. } = 16.85$$

$$10) \text{ A. M. } = 72; \text{ S. D. } = 13.92$$

$$11) \text{ Mean } = 19.15; \text{ S. D. } = 4.66$$

$$12) \text{ Mean } = 41; \text{ S. D. } = 7.1$$

$$13) \text{ Number of boys } = 75$$

$$\text{combined S. D. } = 10.07$$

- 14) combined S. D. = 2.65
- 15) C.V. = 26.65
- 16) $(C.V.)_B = 6.67$ $(C.V.)_G = 6.38$
Series of boys is more variable
- 17) $(C.V.)_I = 22.22$ $(C.V.)_{II} = 20.83$
Brand-I is more variable
- 18) C.V. = 29.76
- 19) C.V. = 31.35
- 20) $(C.V.)_x = 9.21$; $(C.V.)_y = 5.91$
The variation is greater in the area of the field.
- 21) $(C.V.)_U = 37.67$; $(C.V.)_V = 55.5$
i) Company U gives higher average life
ii) Company U shows greater consistency in performance.
- 22) $(C.V.)_1 = 15.50$ $(C.V.)_2 = 19.96$
Height shows more variability

9. PROBABILITY

Exercise : 9.1

- 1) $S = \{RR, GR, BR, PR, RG, GG, BG, PG, RB, GB, BB, PB, RP, GP, BP, PP\}$
a) $A = \{RR, GR, RB, RP, GR, BR, PR\}$
b) $B = \{RG, RB, RP, GR, GB, GP, BR, BG, BP, PR, PG, PB\}$
- 2) $S = \{(H, 1), (H, 2), (H, 3), (H, 4), (H, 5), (H, 6), (T, 1), (T, 2), (T, 3), (T, 4), (T, 5), (T, 6)\}$
a) $A = \{(T, 1), (T, 3), (T, 5)\}$
b) $B = \{(H, 2), (H, 3), (H, 5), (T, 2), (T, 3), (T, 5)\}$
c) $C = \{(H, 1), (H, 4)\}$
- 3) i) 56 ii) 120 iii) 720 iv) 1140
- 4) $S = \{(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)\}$
- a) $A = \{(1, 2), (2, 1), (1, 3), (2, 2), (3, 1), (1, 5), (2, 4), (3, 3), (4, 2), (5, 1), (2, 6), (3, 5), (4, 4), (5, 3), (6, 2), (3, 6), (4, 5), (5, 4), (6, 3), (6, 6)\}$
- b) $B = \{(1, 6), (2, 5), (3, 4), (4, 3), (5, 2), (6, 1)\}$
- c) $C = \{(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6)\}$
- d) $D = \{(2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)\}$
- c) A and B are mutually exclusive and exhaustive.
- f) C and Dare mutually exclusive and exhaustive.
- 5) a) $S = \{(5, 5), (5, 6), (5, 7), (5, 8), (6, 5), (6, 6), (6, 7), (6, 8), (7, 5), (7, 6), (7, 7), (7, 8), (8, 5), (8, 6), (8, 7), (8, 8)\}$
- b) $S = \{(5, 6), (5, 7), (5, 8), (6, 5), (6, 7), (6, 8), (7, 5), (7, 6), (7, 8), (8, 5), (8, 6), (8, 7)\}$
- 6) a) $\frac{1}{9}$ b) $\frac{5}{12}$ c) $\frac{1}{6}$ d) $\frac{1}{9}$
- 7) a) $\frac{8}{221}$ b) $\frac{13}{102}$ c) $\frac{12}{51}$ d) $\frac{25}{102}$ e) $\frac{13}{34}$
- 8) a) $\frac{6}{5525}$ b) $\frac{997}{1700}$ c) $\frac{22}{425}$ d) $\frac{16}{5525}$
- 9) a) $\frac{1}{2}$ b) $\frac{1}{2}$ c) $\frac{7}{10}$
- 10) a) $\frac{4}{25}$ b) $\frac{8}{75}$ c) $\frac{7}{25}$ d) $\frac{1}{15}$
- 11) a) $\frac{2}{7}$ 12) i) $\frac{25}{81}$ ii) $\frac{5}{18}$
- 13) i) $\frac{1}{6}$ ii) $\frac{5}{6}$

14) i) $\frac{1}{3}$ ii) $\frac{2}{3}$ iii) $\frac{1}{30}$ iv) $\frac{4}{15}$

15) $\frac{4!}{4^4} = \frac{3}{32}$ 16) $\frac{1}{105}$ 17) i) $\frac{7}{33}$ ii) $\frac{14}{55}$

Exercise : 9.2

1) $\frac{2}{3}$ 2) i) 1 ii) $\frac{8}{13}$

3) i) 0.85 ii) 0.74 iii) 0.15

4) a) $\frac{22}{75}$ b) $\frac{47}{75}$

5) 0.69 6) $\frac{5}{18}$

7) a) $\frac{1}{4}$ b) $\frac{3}{8}$ c) $\frac{3}{4}$

8) $\frac{1}{2}$ 9) $m = 6$

10) i) $\frac{7}{33}$ ii) $\frac{21}{25}$ 11) $\frac{33}{50}$

Exercise : 9.3

1) $\frac{2}{7}$ 2) $\frac{7}{22}$ 3) $\frac{1}{9}$

4) i) $\frac{1}{17}$ ii) $\frac{1}{16}$

5) a) $\frac{17}{64}$ b) $\frac{3}{64}$ c) $\frac{61}{64}$ d) $\frac{29}{64}$

6) i) $\frac{9}{20}$ ii) $\frac{11}{20}$ iii) $\frac{9}{20}$ 7) $\frac{11}{25}$

8) a) $\frac{14}{19}$ (0.733) b) $\frac{1}{7}$ (0.143) c) $\frac{5}{8}$ (0.625)

9) Independent

10) a) $\frac{5}{32}$ b) $\frac{23}{48}$ c) $\frac{35}{96}$ d) $\frac{61}{96}$

11) a) $\frac{1}{4}$ b) $\frac{1}{2}$

12) a) $\frac{21}{40}$ b) $\frac{19}{40}$ 13) $\frac{10}{21}$ 14) $\frac{1}{4}$

15) $\frac{9}{169}$ 16) $\frac{901}{1680}$ 18) $\frac{1}{3}$

Exercise : 9.4

1) 0.60 2) i) $\frac{27}{52}$ ii) $\frac{25}{52}$

3) $\frac{16}{99}$ 4) $\frac{4}{5}$ 5) $\frac{12}{37}$

6) T = Test positive, S = Sufferer, P(T) = Total probability = 0.10425

a) $\frac{0.00475}{0.10425}$

b) $P(S'/T') = \frac{p(T/S)P(S)}{1 - P(T)} = \frac{0.8955}{0.8958}$

7) $\frac{95}{127} = 0.748$ 8) $\frac{0.018}{0.166} = 0.108$

9) (a) Total Probability = $\frac{2}{3}$ b) $\frac{1}{2}$

10) $\frac{20}{59}$

Exercise : 9.5

1) i) $\frac{3}{5}$ ii) $\frac{3}{5}$ 2) $\frac{16}{21}$ 3) a) $\frac{73}{105}$ b) $\frac{32}{105}$

4) a) $\frac{61}{96}$ b) $\frac{35}{96}$ 5) 65:23 6) 2:1

7) 81 : 44

MISCELLANEOUS EXERCISE - 9

(I)

1	2	3	4	5	6	7	8	9	10
D	A	A	D	B	C	D	D	C	B

II) 1) a) $\frac{2}{15}$ b) $\frac{9}{46}$ 2) $\frac{505}{1001}$ 3) $\frac{4}{7}$

4) $\frac{1}{2}, 1, \frac{1}{3}$ 5) $\frac{6}{55}$ 6) $n(s) = \frac{12!}{(2!)^4}$

a) $\frac{1}{66}$ b) $\frac{1}{99}$ 7) $\frac{19}{90}$ 8) $\frac{3}{7}$

9) $\frac{32}{49}$ 10) $\frac{16}{21}$ 11) i) $\frac{4}{5}$ ii) $\frac{2}{3}$

12) a) $\frac{2}{5}$ b) $\frac{1}{4}$ c) $\frac{3}{5}$ 13) $\frac{5}{28}$

$$14) \text{ a) } \frac{23}{60} \quad \text{b) } \frac{8}{23} \quad 15) \frac{1}{21}$$

$$17) \frac{1}{11}$$

$$18) P(\text{A win}) = \frac{6}{11}, P(\text{B win}) = \frac{5}{11}$$

$$16) P(\text{A}) = \frac{1}{3}, P(\text{B}) = \frac{1}{2}, P(\text{C}) = \frac{1}{2}$$

$$19) \frac{2}{5}$$

$$20) \frac{90}{92}$$

$$21) \frac{2}{3}$$

$$22) \frac{28}{69}$$

$$23) \frac{1}{2}$$

