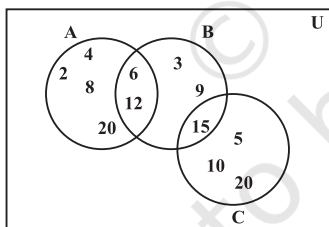


ANSWERS

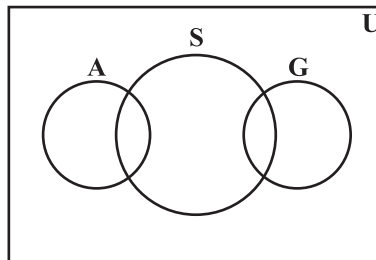
1.3 EXERCISE

1. (i) $\{2\}$ (ii) $\{0, 1\}$ (iii) $\{1, p\}$
2. (i) $\{0, -1, 1\}$ (ii) $\left\{-\frac{11}{3}\right\}$ (iii) $\{-\sqrt{3}, -\sqrt{2}, \sqrt{2}, \sqrt{3}\}$
3. $\{1, 2, 2^2, 2^3, \dots, 2^{p-1}, (2^p - 1)\}$
4. (i) True (ii) False (iii) True (iv) True
7. (i) $\{2, 4, 6, 8, \dots, 98\}$ (ii) $\{1, 4, 9, 16, 25, 36, 49, 64, 81, \dots\}$
8. (i) $\{4, 8, 12\}$ (ii) $\{7, 8, 9\}$ (iii) $\left\{\frac{1}{2}, 1, \frac{3}{2}\right\}$ (iv) $\{0, 1, 2\}$
9. (i) $\{4, 5, 6, \dots, 10\}$ (ii) $\{5\}$ (iii) $\{1, 2, 3, 4, 5\}$

10.



11.



13. True 14. False 15. True
16. True 17. True 22. $T = \{10\}$
24. (i) 2 (ii) 3 (iii) 3 (iv) 9
25. 25 26. 20 27. (a) 3300 (b) 4000
28. (i) 6, (ii) 3, (iii) 9, (iv) 1, (v) 2, (vi) 6, (vii) 30, (viii) 20 29. C
30. B 31. B 32. D 33. C
34. D 35. B 36. B 37. C

38. C 39. C 40. A 41. B
 42. B 43. C 44. [1,2] 45. 1
 46. $n(B)$ 47. $A \cap B'$ 48. $\{\phi, \{1\}, \{2\}, \{1, 2\}$
 49. $\{0, 1, 2, 3, 4, 5, 6, 8\}$ 50. (i) $\{1, 5, 9, 10\}$ (ii) $\{1, 2, 3, 5, 6, 7, 9, 10\}$
 51. $A \cup B'$ 52. (i) $\leftrightarrow$ (b) (ii) $\leftrightarrow$ (c) (iii) $\leftrightarrow$ (a) (iv) $\leftrightarrow$ (f) (v) $\leftrightarrow$ (d) (vi) $\leftrightarrow$ (e)
 53. True 54. False 55. False 56. True
 57. True 58. False

2.3 EXERCISE

- (i) $\{(-1, 1), (-1, 3), (2, 1), (2, 3), (3, 1), (3, 3)\}$
 (ii) $\{(1, -1), (1, 2), (1, 3), (3, -1), (3, 2), (3, 3)\}$
 (iii) $\{(1, 1), (1, 3), (3, 1), (3, 3)\}$
 (iv) $\{(-1, -1), (-1, 2), (-1, 3), (2, -1), (2, 2), (2, 3), (3, -1), (3, 2), (3, 3)\}$
- $\{(0, 1), (0, 2), (1, 1), (1, 2), (2, 1), (2, 2)\}$
- (i) $\{(0, 3), (1, 3)\}$
 (ii) $\{(0, 2), (0, 3), (0, 4), (0, 5), (1, 2), (1, 3), (1, 4), (1, 5)\}$
- (i) $a = \frac{11}{3}$ and $b = \frac{2}{3}$ (ii) $a = 0$ and $b = -2$
- (i) $\{(1, 4), (2, 3), (3, 2), (4, 1)\}$
 (ii) $\{(1, 1), (1, 2), (1, 3), (2, 1), (2, 2), (3, 1)\}$
 (iii) $\{(4, 5), (5, 4), (5, 5)\}$
- Domain of $R = \{0, 3, 4, 5\} =$ Range of R
- Domain of $R_1 = [-5, 5]$ and Range of $R_1 = [-3, 17]$
- $R_2 = \{(0, 8), (8, 0), (0, -8), (-8, 0)\}$
- Domain of $R_3 = \mathbf{R}$ and range of $R_3 = \mathbf{R}^+ \cup \{0\}$
- (i) h is not a function (ii) f is a function (iii) g is a function (iv) s is a function (v) t is a constant function
- (a) 6 (b) $\frac{1364}{4}$ (c) 13 (d) $t^2 - 4$ (e) $t + 5$
- (a) $x = 4$ (b) $x > 4$
- (i) $(f + g)x = x^2 + 2x + 2$ (ii) $(f - g)x = 2x - x^2$

$$(iii) (fg)x = 2x^3 + x^3 + 2x + 1 \quad (iv) \left(\frac{f}{g}\right)x = \frac{2x+1}{x^2+1}$$

$$14. (i) f = \{(-1, 0), (0, 1), (3, 28), (7, 344), (9, 730)\}$$

$$15. x = -1, \frac{4}{3}$$

$$16. \text{Yes, } \alpha = 2, \beta = -1$$

$$17. (i) \mathbb{R} - \{2n\pi : n \in \mathbb{Z}\}$$

$$(ii) \mathbb{R}^+$$

$$(iii) \mathbb{R}$$

$$(iv) \mathbb{R} - \{-1, 1\}$$

$$(v) \mathbb{R} - \{4\}$$

$$18. (i) \left[\frac{3}{2}, \infty\right)$$

$$(ii) (-\infty, 1]$$

$$(iii) [0, \infty)$$

$$(iv) [-2, 4]$$

$$19. f(x) = \begin{cases} -2x, & -3 \leq x < -2 \\ 4, & -2 \leq x < 2 \\ 2, & 2 \leq x \leq 3 \end{cases}$$

$$21. (i) (f+g)x = \sqrt{x} + x$$

$$(ii) (f-g)x = \sqrt{x} - x$$

$$(iii) (fg)x = x^{\frac{3}{2}}$$

$$(iv) \left(\frac{f}{g}\right)x = \frac{1}{\sqrt{x}}$$

$$22. \text{Domain of } f = (5, \infty) \text{ and Range of } f = \mathbb{R}^+$$

$$24. D$$

$$25. D$$

$$26. B$$

$$27. C$$

$$28. B$$

$$29. B$$

$$30. A$$

$$31. C$$

$$32. C$$

$$33. A$$

$$34. B$$

$$35. A$$

$$36. \{2, 3, 4, 5\}$$

$$37. (a) \leftrightarrow (iii) \quad (b) \leftrightarrow (iv) \quad (c) \leftrightarrow (ii) \quad (d) \leftrightarrow (i)$$

$$38. \text{False}$$

$$39. \text{False}$$

$$40. \text{True}$$

$$41. \text{False}$$

$$42. \text{True.}$$

3.3 EXERCISE

$$4. \frac{56}{33}$$

$$5. \frac{2 \cos x}{\sqrt{\cos 2x}}$$

8. $\frac{1}{\sqrt{2}+1}$

15. $\theta = n\pi + (-1)^n \frac{\pi}{4} - \frac{\pi}{4}$

16. $\theta = 2n\pi + \frac{7\pi}{4}$

17. $\theta = 2n\pi \pm \frac{\pi}{3}$

18. $\theta = \frac{\pi}{3}, \frac{5\pi}{3}$

19. $x = \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{2}$

22. 1

25. $\frac{23}{17} \left(\frac{\sqrt{3}-1}{2} + \frac{1}{\sqrt{2}} \right)$

26. $\frac{3}{2}$

27. $n\pi \pm \frac{\pi}{4}$

28. $\frac{n\pi}{2} \pm \frac{\pi}{8}$

29. $\theta = 2n\pi \pm \frac{\pi}{4} + \frac{\pi}{12}$

30. C

31. D

32. D

33. C

34. B

35. C

36. B

37. C

38. A

39. B

40. D

41. D

42. A

43. D

44. C

45. B

46. C

47. C

48. C

49. B

50. C

51. B

52. C

53. C

54. A

55. B

56. A

57. B

58. B

59. D

60. 1

61. $\frac{1}{8}$

62. $\tan \beta$

63. $\frac{1}{4} [4 - 3(a^2 - 1)^2], \sqrt{2 - a^2}$

64. $x^2 - \frac{2}{\sin 2A} x + 1$

65. 13

66. $[-3, 3]$

67. 2

68. True

69. False

70. False

71. True

72. False

73. True

74. True

75. True

76. (a) $\leftrightarrow$ (iv) (b) $\leftrightarrow$ (i) (c) $\leftrightarrow$ (ii) (d) $\leftrightarrow$ (iii)

4.3 EXERCISE

2. $P(n) : 1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$

28. A

30. False

5.3 EXERCISE

4. $\frac{2}{5}$

12. $\frac{1}{2} - 2i$

18. 0

22. $-2 - i$

25. (i) $(a^2 + b^2)(|z_1|^2 + |z_2|^2)$ (ii) -15

(vi) $\bar{z}_1$ (vii) 0

(x) $-2\sqrt{3} + 2i$

(iv) T

(viii) F

(f) $\iff$ (vi),

(f) $\iff$ (vi),

(h) $\iff$ (vii)

28. $\frac{-2}{25} - i \frac{11}{25}$

29. No

30. $\frac{(a^2+1)^4}{4a^2+1}$

31. $-2\sqrt{3} + 2i$

32. 1

33. $\frac{2\pi}{3}$

34. Real axis

35. D

36. C

37. B

38. A

39. B

40. A

41. A

42. B

43. D

44. D

45. B

46. B

47. C

48. C

49. C

50. A

6.3 EXERCISE

1. $\frac{1}{3} \leq x \leq 1$

2. $[0,1] \cup [3,4]$

3. $(-\infty, -5) \cup (-3, 3) \cup [5, \infty)$

4. $[-4, -2] \cup [2, 6]$

5. $\left[\frac{-34}{3}, \frac{22}{3} \right]$

6. No Solution

7. More than 2000.

8. Between 7.77 and 8.77.

9. More than 230 litres but less than 920 litres.

10. Between 104 °F and 113 °F

11. 41 cm.

12. Between 8 km and 10 km

13. No Solution

14. $x + y \leq 20, 3x + 2y \leq 48, x \geq 0, y \geq 0$

15. $x + y \leq 8, x + y \geq 4, x \leq 5, y \leq 5, x \geq 0, y \geq 0$

17. No Solution.

19. C

20. C

21. A

22. B

23. D

24. C

25. B

26. A

27. D

28. B

29. A

30. B

31. (i) F

(ii) F

(iii) T

(iv) F

(v) T

(vi) F

(vii) T

(viii) F

- (ix) T (x) F (xi) T (xii) F
 (xiii) F (xiv) T (xv) T
 32. (i) $\leq$ (ii) $\geq$ (iii) $>$ (iv) $>$
 (v) $>$ (vi) $>$ (vii) $<, >$ (viii) $\leq$.

7.3 EXERCISE

1. 1440 2. 481 3. 780 4. 144
 5. 22 6. 3960 7. 4,68000 8. 200
 9. ${}^{n-3}C_{r-3}(r-2)!3!$ 10. 14400 11. 112 15. $r = 3$
 16. 192 17. 190 18. 8400 19. 3 20. 11
 21. $\frac{18!}{(6!)^3}$ 22. (a) $11C_4$ (b) $6C_2 \times 5C_2$ (c) $6C_4 + 5C_4$
 23. (i) $14C_9$ (ii) $14C_{11}$ 24. $2(20C_5 \times 20C_6)$
 25. (i) 21, (ii) 441 (iii) 91 26. A 27. B
 28. C 29. B 30. C 31. A
 32. B 33. D 34. B 35. C
 36. D 37. A 38. C 39. B
 40. B 41. $n = 7$ 42. 0 43. n^r
 44. 1,51,200 45. 80 46. 5^6 47. 18
 48. 35 49. 7800 50. 64 51. False
 52. False 53. False 54. True 55. True
 56. True 57. True 58. False 59. False
 60. (a) $\leftrightarrow$ (ii) (b) $\leftrightarrow$ (iii) and (c) $\leftrightarrow$ (i)
 61. (a) $\leftrightarrow$ (iii) (b) $\leftrightarrow$ (i) (c) $\leftrightarrow$ (iv), (d) $\leftrightarrow$ (ii)
 62. (a) $\leftrightarrow$ (iv) (b) $\leftrightarrow$ (iii) (c) $\leftrightarrow$ (ii), (d) $\leftrightarrow$ (i)
 63. (a) $\leftrightarrow$ (i) (b) $\leftrightarrow$ (iii) (c) $\leftrightarrow$ (iv), (d) $\leftrightarrow$ (ii)
 64. (a) $\leftrightarrow$ (iii) (b) $\leftrightarrow$ (i) (c) $\leftrightarrow$ (ii)

8.3 EXERCISE

1. ${}^{15}C_{10} \left(\frac{1}{6}\right)^5$ 2. $k = \pm 3$ 3. -19 4. $-3003(3^{10})(2^5)$

5. (i) -252 (ii) $\frac{189}{8}x^{17}; \frac{-21}{16}x^{19}$ 6. -252 7. -1365 8. $252y^{\frac{5}{2}}x^{\frac{5}{3}}$
9. $r = 6$ 11. 990 12. $p = \pm 2$ 14. $n = 9$
17. $\frac{17}{54}$ 18. (C) 19. (A) 20. (C)
21. (D) 22. (B) 23. (B) 24. (C)
25. ${}^{30}C_{15}$ 26. $\frac{(n+1)(n+2)}{2}$ 27. ${}^{16}C_8$ 28. $n = 12$
29. $\frac{1120}{27}a^{-6}a^4$ 30. ${}^{28}C_{14}a^{56}b^{14}$ 31. 1 32. Third term
33. 12 34. F 35. T 36. F
37. F 38. T 39. F 40. F

9.3 EXERCISE

2. Rs 1400 3. Rs 8080, Rs 83520 5. 12 days
6. 3420° 7. $\frac{15}{8}cm$ 8. 2480 m 9. Rs 725
11. (i) $4n^3 + 9n^2 + 6n$ (ii) 4960 12. $T_r = 6r - 1$ 17. D
18. C 19. A 20. B 21. C
22. B 23. B 24. A 25. D
26. A 27. $\frac{a}{b}$ or $\frac{b}{c}$ 28. First term + last term
29. 4^5 30. F 31. T 32. T
33. F 34. F
35. (a) $\leftrightarrow$ (iii) (b) $\leftrightarrow$ (i) (c) $\leftrightarrow$ (ii)
36. (a) $\leftrightarrow$ (iii) (b) $\leftrightarrow$ (i) (c) $\leftrightarrow$ (ii)(d) $\leftrightarrow$ (iv)

10.3 EXERCISE

1. $x + y + 1 = 0$ 2. $x - 4y + 3 = 0$ 3. 60° or 120°

4. $x + y = 7$ or $\frac{x}{6} + \frac{y}{8} = 1$
7. $y - \sqrt{3}x - 2 + \sqrt{3} = 0$
9. $a = \frac{-8}{3}, b = 4$
11. $\sqrt{3}x + y = 8$
13. $\sqrt{\frac{2}{3}}$
15. 15° or 75°
18. $3x - 4y + 6 = 0$ and $4x - 3y + 1 = 0$
22. A
26. C
30. A
34. C
38. C
42. $(1, -2)$
45. opposite sides
47. $4x^2y^2 = p^2(x^2 + y^2)$
50. False
54. True
57. (a) $\leftrightarrow$ (iii)
58. (a) $\leftrightarrow$ (iv)
59. (a) $\leftrightarrow$ (iii)
5. $(3, 1), (-7, 11)$
8. $3x + 4y + 3 = 0$
10. $8x - 5y + 60 = 0$
12. $x - 7y - 12 = 0$
14. $(1, 1)$
17. $9x - 20y + 96 = 0$
20. $(0, 2 + \frac{5\sqrt{3}}{2})$
23. A
27. D
31. B
35. A
39. D
43. $x + y + 1 = 0$
46. $13(x^2 + y^2) - 83x + 64y + 182 = 0$
48. True
51. True
53. True
24. B
28. A
32. B
36. B
40. B
25. B
29. A
33. A
37. B
41. B
44. $3x - y - 7 = 0, x + 3y - 9 = 0$
49. False
52. True
55. False
56. False
- (b) $\leftrightarrow$ (i) and
- (c) $\leftrightarrow$ (ii)
- (c) $\leftrightarrow$ (i), (d) $\leftrightarrow$ (ii)
- (c) $\leftrightarrow$ (iv), (d) $\leftrightarrow$ (ii)

11.3 EXERCISE

1. $x^2 + y^2 - 2ax - 2ay + a^2 = 0$
3. $(\frac{a}{2}, \frac{b}{2})$

4. $x^2 + y^2 - 2x - 4y + 1 = 0$ 5. $\frac{3}{4}$
6. $x^2 + y^2 + 4x + 4y + 4 = 0$ 7. $(1, 2)$
8. $x^2 + y^2 - 2x + 4y - 20 = 0$ 9. $k \pm 8$
10. $x^2 + y^2 - 6x + 12y - 15 = 0$ 11. $\frac{\sqrt{3}}{2}$
12. eccentricity = $\frac{4}{5}$ and foci $(4, 0)$ and $(-4, 0)$ 13. $\frac{39}{4}$
14. $\frac{4x^2}{81} + \frac{4y^2}{45} = 1$ 15. 18 16. $(2, 4), (2, -4)$
17. $\frac{4a \cos \theta}{\sin^2 \theta}$ 18. $x^2 + 8y = 32$ 19. $m = 1$ 20. $x^2 - y^2 = 32$
21. $\frac{\sqrt{13}}{2}$ 22. $\frac{x^2}{4} - \frac{y^2}{5} = \frac{4}{9}$ 23. $x^2 + y^2 - 2x + 2y = 47$
24. $x^2 + y^2 - 4x - 10y + 25 = 0$ 25. $(x - 3)^2 + (y + 1)^2 = 38$
26. $x^2 + y^2 - 18x - 16y + 120 = 0$ 27. $x^2 + y^2 - 8x - 6y + 16 = 0$
28. (a) $y^2 = 12x - 36$, (b) $x^2 = 32 - 8y$, (c) $4x^2 + 4xy + y^2 + 4x + 32y + 16 = 0$
29. $3x^2 + 4y^2 - 36x = 0$ 30. $9x^2 + 5y^2 = 180$
32. (a) $15x^2 - y^2 = 15$ (b) $9x^2 - 7y^2 + 343 = 0$, (c) $y^2 - x^2 = 5$
33. False 34. False 35. True 36. False
37. True 38. False 39. True 40. True
41. $(x - 3)^2 + (y + 4)^2 = \left(\frac{45}{13}\right)^2$ 42. $x^2 + y^2 - 46x + 22y = 0$
43. $6 + 2\sqrt{5}, 2\sqrt{5}$ 44. $\frac{4x^2}{1} + \frac{4y^2}{5} = 1$
45. $4x^2 + 4xy + y^2 + 4x + 32y + 16 = 0$ 46. $\frac{y^2}{36} - \frac{x^2}{64} = 1$ and $(0, \pm 10)$.
47. (C) 48. (C) 49. (C) 50. (C)

51. A 52. B 53. A 54. A
 55. D 56. B 57. C 58. A
 59. A

12.3 EXERCISE

2. (i) 1st octant (ii) 4th octant (iii) viiith octant (iv) vth octant (v) 2nd octant
 (vi) 3rd octant (vii) viiith octant (viii) vith octant
3. (i) (3,0,0), (0,4,0), (0,0,2) (ii) (-5, 0, 0), (0,3,0), (0,0,7) (iii) (4,0,0), (0, -3, 0), (0,0,5)
4. (i) (3,4,0), (0,4,5), (3,0,5) (ii) (-5, 3, 0), (0,3,7), (-5, 0, 7) (iii) (4, -3, 0), (0, -3, -5), (4, 0, -5)
5. 5 6. 11 9. (2, -4, 16) 11. (-2, -2, -1)
12. (1, 1, -2) 13. (-3, 4, -7), (7, 2, 5) and (-3, 12, 17) 14. (4, 7, 6)
15. (4, -5, 1), (3, -2, -1) 16. $a = -2, b = -8, c = 2$
17. $\left(\frac{7}{2}, \frac{13}{2}, 9\right)$ 18. 2:1 externally
19. vertices are (3,4,5), (-1,6,-7), (1,2,3) and centroid is $\left(1, 4, \frac{1}{3}\right)$
20. 1:3 externally
21. (2,0,0), (2,2,0), (0,2,0), (0,2,2) (0,0,2) (2,0,2), (0,0,0), (2,2,2)
22. A 23. B 24. A 25. B
 26. A 27. B 28. B 29. A
 30. A 31. B 32. A 33. D
 34. A 35. Three coordinates planes 36. Three pairs
 37. given point 38. Eight 39. (0, y, z) 40. $x = 0$
 41. (0, 0, z) 42. $x = 0, y = 0$ 43. z- coordinates
 44. (y, z coordinates) 45. yz-plane 46. x-axis 47. $\sqrt{333}$
 48. $a = 5$ or -3 49. (1, 1, -2)
50. (a) $\leftrightarrow$ (iii) (b) $\leftrightarrow$ (i) (c) $\leftrightarrow$ (ii) (d) $\leftrightarrow$ (vi) (e) $\leftrightarrow$ (iv) (f) $\leftrightarrow$ (v) (g) $\leftrightarrow$ (viii)
 (h) $\leftrightarrow$ (vii) (i) $\leftrightarrow$ (x) (j) $\leftrightarrow$ (ix)

13.3 EXERCISE

1. 6

2. 2

3. $\frac{1}{\sqrt[2]{x}}$

4. $\frac{1}{3}2^{\frac{-2}{3}}$

5. 3

6. $\frac{5}{2}(a+2)^{\frac{3}{2}}$

7. 7

8. 8

9. $\frac{8}{5}$

10. 1

11. 0

12. $\frac{1}{15}$

13. $\frac{7}{2}$

14. $n = 5$

15. $\frac{3}{7}$

16. $\frac{1}{4}$

17. 2

18. 1

19. $\frac{m^2}{n^2}$

20. 3

21. $\sqrt{2}$

22. 2

23. 1

24. $2\sqrt{a} \cos a$

25. 4

26. $\frac{1}{4\sqrt{2}}$

27. 0

28. $k = \frac{3}{8}$

29. $3x^2 + 2x + 1 - \frac{1}{x^2}$

30. $3x^2 - \frac{3}{x^2} - \frac{3}{x^4} + 3$

31. $3x \sec^2 x + 5 \sec^2 x + 3 \tan x + 3$

32. $2 \tan x \sec^2 x$

33. $\frac{55 - 40x - 15x^2}{(5x^2 - 7x + 9)^2}$

34. $\frac{-x^5 \cos x + 5 \sec^4 \sin x + 1}{\sin^2 x}$

35. $\frac{x}{\sqrt{2}} \operatorname{cosec} x (2 - x \cot x)$

36. $(ax^2 + \cot x)(-q \sin x) + (p + q \cos x)(2ax - \operatorname{cosec}^2 x)$

37. $\frac{bc \cos x + ad \sin x + db}{(c + d \cos x)^2}$

38. $2 \cos 2x$

39. $(2x-7)(30x-43)(3x+5)^2$

40. $x^2 \cos x + 2x \sin x - 2 \sin 2x$

41. $\frac{3}{4} \sin^2 2x \cos 2x$

42. $\frac{-(2ax+b)}{(ax^2+bx+c)^2}$

43. $-2x \sin(x^2+1)$

44. $\frac{ad-bc}{(cx+d)^2}$

45. $\frac{2}{3} x^{-\frac{1}{3}}$

46. $\cos x - x \sin x$

47. $\sec x(x \tan x + 1)$

48. $\frac{2\alpha}{\alpha^2 - \beta^2}$

49. -4

50. $\frac{1}{\sqrt{2}}$

52. $k = 6$

53. $c = 1$

54. C

55. A

56. A

57. B

58. A

59. C

60. C

61. D

62. B

63. D

64. C

65. D

66. B

67. B

68. D

69. A

70. A

71. A

72. A

73. B

74. C

75. A

76. D

77. 1

78. $m = \frac{2\sqrt{3}}{3}$

79. y

80. 1

14.3 EXERCISE

1. (i) to (v) and (viii) to (x) are statements.

2. (i) p : Number 7 is prime
 q : Number 7 is odd(ii) p : Chennai is in India q : Chennai is capital of Tamil Nadu(iii) p : 100 is divisible by 3
 q : 100 is divisible by 11(iv) p : Chandigarh is capital of Haryana q : Chandigarh is the capital of U.P r : 100 is divisible by 5

- (v) $p : \sqrt{7}$ is a rational number (vi) $p : 0$ is less than every positive integer
 $q : \sqrt{7}$ is an irrational number $q : 0$ is less than every negative integer
- (vii) p : plants use sunlight for photosynthesis
 q : plants use water for photosynthesis
 r : plants use carbondioxide for photosynthesis
- (viii) p : two lines in a plane intersect at one point
 q : two lines in a plane are parallel
- (ix) p : a rectangle is a quadrilateral
 q : a rectangle is a 5- sided polygons.
3. (i) Compound statement is true and its component statements are :
 p : 57 is divisible by 2 and q : 57 is divisble by 3
- (ii) component statement is true and its component statements are :
 p : 24 is multiple of 4 and q : 24 is multiple of 6
- (iii) component statement is false and is component statements are
 p : All living things have two eyes
 q : All living things have two legs
- (iv) component statement is true and its component statements are :
 p : 2 is an number ; q : 2 is a prime number
4. (i) The number 17 is not prime (ii) $2 + 7 \neq 6$ (iii) Violet are not blue
- (iv) $\sqrt{5}$ is not a rational number (v) 2 is a prime number
- (vi) There exists a real number which is not an irrational number
- (vii) Cow has not four legs (viii) A leap year has not 366 days
- (ix) There exist similar triangles which are not congruent
- (x) Area of a circle is not same as the perimeter of the circle
5. (i) $p \wedge q$ where p : Rahul passed in Hndi; q : Rahul passed in English
- (ii) $p \wedge q$ where p : x is even integer ; q : y is even integer
- (iii) $p \wedge q \wedge r$ where p : 2 is factor of 12; q : 3 is factor of 12; r : 6 is factor of 12
- (iv) $p \vee q$ where p : x is an odd integer ; q : $x + 1$ is an odd integer
- (v) $p \vee q$ where p : a number is divisible by 2, q : it is divisibe by 3
- (vi) $p \vee q$ where p : $x = 2$ is a root of $3x^2 - x - 10 = 0$, q : $x = 3$ is a root of $3x^2 - x - 10 = 0$

- (vii) $p \vee q$ where p : student can take Hindi as an optional paper and q : student can take English as an optional paper.
6. (i) It is false that all rational numbers are real and complex
 (ii) It is false that all real numbers are rational or irrational
 (iii) $x = 2$ is not a root of the quadratic equation $x^2 - 5x + 6 = 0$ or $x = 3$ is not a root of the quadratic equation $x^2 - 5x + 6 = 0$
 (iv) A triangle has neither 3-sides nor 4-sides
 (v) 35 is not a prime number and it is not a complex number
 (vi) It is false that all prime integers are either even or odd
 (vii) $|x|$ is not equal to x and it not equal to $-x$
 (viii) 6 is not divisible by 2 or it is not divisible by 3.
7. (i) If the number is odd number then its square is odd number
 (ii) If you take the dinner then you will get sweet dish
 (iii) If you will not study then you will fail
 (iv) If an integer is divisible by 5 then its unit digits are 0 or 5
 (v) If the number is prime then its square is not prime
 (vi) If a, b and c are in A.P then $2b = a + c$.
8. (i) The unit digit of an integer is zero if and only if it is divisible by 5.
 (ii) A natural number n is odd if and only if it is not divisible by 2.
 (iii) A triangle is an equilateral triangle if and only if all three sides of triangle are equal.
9. (i) If $x \neq 3$ then $x \neq y$ or $y \neq 3$
 (ii) If n is not an integer then it is not a natural number.
 (iii) If the triangle is not equilateral then all three sides of the triangle are not equal
 (iv) If xy is not positive integer then either x or y is not negative integer.
 (v) If natural number n is not divisible by 2 and 3 then n is not divisible by 6.
 (vi) The weather will not be cold if it does not snow.
10. (i) If the rectangle R is rhombus then it is square.
 (ii) If tomorrow is Tuesday then today is Monday.
 (iii) If you must visit Taj Mahal you go to Agra.

- (iv) If the triangle is right angle then sum of squares of two sides of a triangle is equal to the square of third side.
- (v) If the triangle is equilateral then all three angles of triangle are equal.
- (vi) If $2x = 3y$ then $x:y = 3:2$
- (vii) If the opposite angles of a quadrilaterals are supplementary then S is cyclic.
- (viii) If x is neither positive nor negative than x is 0.
- (ix) If the ratio of corresponding sides of two triangles are equal then triangles are similar.
11. (i) There exists (ii) For all (iii) There exists (iv) For every (v) For all (vi) There exists (vii) For all (viii) There exists (ix) There exists (x) There exists
- 17.. C 18. D 19. B 20. D
21. C 22. B 23. A 24. B
25. C 26. A 27. C 28. B
29. A 30. C 31. B 32. A
33. C 34. A 35. C 36. D
37. (i), (ii) and (iv) are statement; (iii) and (v) are not statements.

15.3 EXERCISE

1. 0.32 2. 1.25 3. $\frac{n^2-1}{4n}$ 4. $\frac{n}{4}$
5. $\sqrt{\frac{n^2-1}{12}}$ 6. 3.87 7. $\sqrt{\frac{n_1(s_1)^2 + n_2(s_2)^2}{n_1 + n_2} + \frac{n_1 n_2 (\bar{x}_1 - \bar{x}_2)^2}{(n_1 + n_2)^2}}$
8. 5.59 9. 7 10. 1.38
11. Mean = 2.8, SD = 1.12 12. 8.9
13. 5000, 251600 14. Mean = 5.17, SD = 1.53
15. Mean = 5.5, Var. = 4.26 16. 0.99
17. 7.08 18. Mean = $\frac{239}{40}$, SD = 2.85

19. Var. = 1.16gm, S.D = 1.08 gm

20. Mean = $a + \frac{d(n-1)}{2}$,

$$\text{S.D} = d \sqrt{\frac{n^2-1}{12}}$$

21. Hashina is more intelligent and consistent

22. 10.24

23. Mean = 42.3, Var. 43.81

24. B

25. B

26. B

27. C

28. A

29. C

30. C

31. A

32. C

33. A

34. D

35. D

36. A

37. D

38. A

39. A

40. SD

41. 0, less

42. 11

43. Independent

44. Minimum

45. Least

46. greater than or equal

16.3 EXERCISE

1. $\frac{1}{72}$

2. $\frac{2}{3}$

3. 0.556

4. (a) 5^{k-1} elements (b) $\frac{5^k-1}{4}$

5. $\frac{4}{9}$

6. 0.93

7. (a) 0.65 (b) 0.55 (c) 0.8 (d) 0 (e) 0.35 (f) 0.2

8. (a) 0.35 (b) 0.77 (c) 0.51 (d) 0.57 9. (a) $\frac{2}{9}$ (b) $\frac{5}{9}$

10. (a) $p(\text{John promoted}) = \frac{1}{8}$, $p(\text{Rita promoted}) = \frac{1}{4}$, $p(\text{Aslam promoted}) = \frac{1}{2}$,

$p(\text{Gurpreet promoted}) = \frac{1}{8}$ (b) $P(A) = \frac{1}{4}$

11. (a) 0.20 (b) 0.17 (c) 0.45 (d) 0.13 (e) 0.15 (f) 0.51

12. (a) $S = \{B_1B_2, B_1W, B_2B_1, B_2W, WB_1, WB_2, BW_1, BW_2, W_1B, W_1W_2, W_2B, W_2W_1\}$

(b) $\frac{1}{6}$ (c) $\frac{2}{3}$

13. (a) $\frac{5}{143}$ (b) $\frac{28}{143}$ (c) $\frac{40}{143}$

14. (a) $\frac{2}{143}$ (b) $\frac{2}{143}$ (c) $\frac{25}{26}$ (d) $\frac{15}{26}$

15. $\frac{7}{13}$

16. (a) $p(A) = .25$, $p(B) = .32$, $p(A \cap B) = .17$ (b) $p(A \cup B) = .40$ (c) $.40$ (d) $.68$

17. (a) $\frac{1}{2}$ (b) $\frac{3}{4}$ (c) $\frac{3}{26}$ (d) $\frac{5}{36}$

18. A

19. B

20. C

21. C

22. D

23. A

24. A

25. C

26. B

27. C

28. C

29. B

30. False

31. False

32. False

33. True

34. True

35. False

36. True

37. 0.15

38. 0.3

39. $\bar{E} = \{2, 4, 6\}$

40. 0.2

41. 0.2

42. (a) $\leftrightarrow$ (iv) (b) $\leftrightarrow$ (v) (c) $\leftrightarrow$ (i) (d) $\leftrightarrow$ (iii) (e) $\leftrightarrow$ (ii)

43. (a) $\leftrightarrow$ (iv) (b) $\leftrightarrow$ (iii) (c) $\leftrightarrow$ (ii) (d) $\leftrightarrow$ (i)