ANSWERS

EXERCISE 1.1

1.	(C)	**2.**	(C)	**3.**	(D)	**4.**	(D)	**5.**	(D)
6.	(C)	**7.**	(D)	**8.**	(C)	**9.**	(C)	**10.**	(C)
11.	(B)	**12.**	(A)	**13.**	(D)	**14.**	(B)	**15.**	(B)
16.	(C)	**17.**	(C)	**18.**	(B)	**19.**	(A)	**20.**	(A)
21.	(C)								

EXERCISE 1.2

1. Yes. Let $x = 21$, $y = \sqrt{2}$ be a rational number.

Now $x + y = 21 + \sqrt{2} = 21 + 1.4142 \ldots = 22.4142 \ldots$

Which is non-terminating and non-recurring. Hence $x + y$ is irrational.

2. No. $0 \times \sqrt{2} = 0$ which is not irrational .

3. (i) False. Although $\dfrac{\sqrt{2}}{3}$ is of the form $\dfrac{p}{q}$ but here p, i.e., $\sqrt{2}$ is not an integer.

(ii) False. Between 2 and 3, there is no integer.

(iii) False, because between any two rational numbers we can find infinitely many rational numbers.

(iv) True. $\dfrac{\sqrt{2}}{\sqrt{3}}$ is of the form $\dfrac{p}{q}$ but p and q here are not integers.

(v) False, as $\left(\sqrt[4]{2}\right)^2 = \sqrt{2}$ which is not a rational number.

(vi) False, because $\frac{\sqrt{12}}{\sqrt{3}} = \sqrt{4} = 2$ which is a rational number.

(vii) False, because $\frac{\sqrt{15}}{\sqrt{3}} = \sqrt{5} = \frac{\sqrt{5}}{1}$ which is p, i.e., $\sqrt{5}$ is not an integer.

4. (i) Rational, as $\sqrt{196} = 14$

(ii) $3\sqrt{18} = 9\sqrt{2}$, which is the product of a rational and an irrational number and so an irrational number.

(iii) $\sqrt{\frac{9}{27}} = \frac{1}{\sqrt{3}}$, which is the quotient of a rational and an irrational number and so an irrational number.

(iv) $\frac{\sqrt{28}}{\sqrt{343}} = \frac{2}{7}$, which is a rational number.

(v) Irrational, $-\sqrt{0.4} = -\frac{2}{\sqrt{10}}$, which is the quotient of a rational and an irrational.

(vi) $\frac{\sqrt{12}}{\sqrt{75}} = \frac{2}{7}$, which is a rational number.

(vii) Rational, as decimal expansion is terminating.

(viii) $\left(1+\sqrt{5}\right) - \left(4+\sqrt{5}\right) = -3$, which is a rational number.

(ix) Rational, as decimal expansion is non-terminating recurring.

(x) Irrational, as decimal expansion is non-terminating non-recurring.

EXERCISE 1.3

1. Rational numbers: (ii), (iii)

Irrational numbers: (i), (iv)

2. (i) –1.1, –1.2, –1.3

(ii) 0.101, 0.102, 0.103

(iii) $\frac{51}{70}, \frac{52}{70}, \frac{53}{70}$

(iv) $\frac{9}{40}, \frac{17}{80}, \frac{19}{80}$

3. (i) 2.1, 2.040040004 ... (ii) 0.03, 0.007000700007, ...

(iii) $\frac{5}{12}$, 0.414114111 ... (iv) 0, 0.151151115 ...

(v) 0.151, 0.151551555 ... (vi) 1.5, 1.585585558 ...

(vii) 3, 3.101101110 ... (viii) 0.00011, .0001131331333 ...

(ix) 1, 1.909009000 ... (x) 6.3753, 6.375414114111 ...

7. (i) $\frac{1}{5}$ (ii) $\frac{8}{9}$ (iii) $\frac{47}{9}$ (iv) $\frac{1}{999}$ (v) $\frac{23}{90}$

(vi) $\frac{133}{990}$ (vii) $\frac{8}{2475}$ (viii) $\frac{40}{99}$

9. (i) $\sqrt{5}$ (ii) $\frac{7\sqrt{6}}{12}$ (iii) $168\sqrt{2}$ (iv) $\frac{8}{3}$ (v) $\frac{34\sqrt{3}}{3}$

(vi) $5-2\sqrt{6}$ (vii) 0 (viii) $\frac{5}{4}\sqrt{2}$ (ix) $\frac{\sqrt{3}}{2}$

10. (i) $\frac{2}{9}\sqrt{3}$ (ii) $\frac{2}{3}\sqrt{30}$ (iii) $\frac{2+3\sqrt{2}}{8}$ (iv) $\sqrt{41}+5$

(v) $7+4\sqrt{3}$ (vi) $3\sqrt{2}-2\sqrt{3}$ (vii) $5+2\sqrt{6}$ (viii) $9+2\sqrt{15}$

(ix) $\frac{9+4\sqrt{6}}{15}$

11. (i) $a = 11$ (ii) $a=\frac{9}{11}$ (iii) $b=\frac{-5}{6}$ (iv) $a = 0, b = 1$

12. $2\sqrt{3}$

13. (i) 2.309 (ii) 2.449 (iii) 0.463 (iv) 0.414 (v) 0.318

14. (i) 6 (ii) $\frac{2025}{64}$ (iii) 9 (iv) 5

(v) $3^{-\frac{1}{3}}$ (vi) –3 (vii) 16

EXERCISE 1.4

1. $\frac{167}{90}$ **2.** 1 **3.** 2.063 **4.** 7

5. 98 **6.** $\frac{1}{2}$ **7.** 214

EXERCISE 2.1

1. (C)	**2.** (B)	**3.** (A)	**4.** (D)	**5.** (B)
6. (A)	**7.** (D)	**8.** (C)	**9.** (B)	**10.** (B)
11. (D)	**12.** (C)	**13.** (B)	**14.** (D)	**15.** (D)
16. (B)	**17.** (D)	**18.** (D)	**19.** (C)	**20.** (C)
21. (C)				

EXERCISE 2.2

1. Polynomials: (i), (ii), (iv), (vii)

because the exponent of the variable after simplification in each of these is a whole number.

2. (i) False, because a binomial has exactly two terms.

(ii) False, $x^3 + x + 1$ is a polynomial but not a binomial.

(iii) True, because a binomial is a polynomial whose degree is a whole number ≥ 1, so, degree can be 5 also.

(iv) False, because zero of a polynomial can be any real number.

(v) False, a polynomial can have any number of zeroes. It depends upon the degree of the polynomial.

(vi) False, $x^5 + 1$ and $-x^5 + 2x + 3$ are two polynomials of degree 5 but the degree of the sum of the two polynomials is 1.

EXERCISE 2.3

1. (i) One variable (ii) One variable

(iii) Three variable (iv) Two variables

2. (i) 1 (ii) 0 (iii) 5 (iv) 7

3. (i) 6 (ii) $\frac{1}{5}$ (iii) -1 (iv) $\frac{1}{5}$

4. (i) 1 (ii) 0 (iii) 3 (iv) -16

5. Constant Polynomial : (v)

Linear Polynomials : (iii), (vi), (x)

Quadratic Polynomials : (iv), (viii), (ix)

Cubic Polynomials : (i), (ii), (vii)

6. (i) $10x$ (ii) $x^{20} + 1$ (iii) $2x^2 - x - 1$

7. 61, -143 **8.** $\frac{-31}{4}$

9. (i) $-3, 3, -39$ (ii) $-4, -3, 0$

10. (i) False (ii) True (iii) False (iv) True (v) True

11. (i) 4 (ii) $\frac{1}{2}$ (iii) $\frac{7}{2}$ (iv) 0

12. 0 **13.** $x^3 + x^2 + x + 1$, 2

14. (i) 0 (ii) 62 (iii) $\frac{3}{2}$ (iv) $\frac{-136}{27}$

15. (i) No (ii) No **17.** (i) **19.** 1

20. $\frac{3}{2}$ **21.** -2 **22.** 2

23. (i) $(x + 6)(x + 3)$ (ii) $(3x - 1)(2x + 3)$

(iii) $(x - 5)(2x + 3)$ (iv) $2(7 + r)(6 - r)$

24. (i) $(x - 2)(x + 3)(2x - 5)$ (ii) $(x - 1)(x - 2)(x - 3)$

(iii) $(x + 1)(x - 2)(x + 2)$ (iv) $(x - 1)(x + 1)(3x - 1)$

25. (i) 1092727 (ii) 10302 (iii) 998001

26. (i) $(2x + 5)^2$ (ii) $(3y - 11z)^2$ (iii) $\left(3x - \frac{1}{6}\right)\left(x + \frac{5}{6}\right)$

27. (i) $3(x - 1)(3x - 1)$ (ii) $(3x - 2)(3x - 2)$

28. (i) $16a^2 + b^2 + 4c^2 - 8ab - 4bc + 16ac$

(ii) $9\ a^2 + 25b^2 + c^2 - 30ab + 10bc - 6ac$

(iii) $x^2 + 4y^2 + 9z^2 - 4xy - 12yz + 6xz$

29. (i) $(3x + 2y - 4z)\ (3x + 2y - 4z)$ (ii) $(-5x + 4y + 2z)\ (-5x + 4y + 2z)$

(iii) $(4x - 2y + 3z)\ (4x - 2y + 3z)$

30. 29

31. (i) $27a^3 - 54a^2b + 36ab^2 - 8b^3$ (ii) $\frac{1}{x^3} + \frac{y}{x^2} + \frac{y^2}{3x} + \frac{y^3}{27}$

(iii) $64 - \frac{16}{x} + \frac{4}{3x^2} - \frac{1}{27x^3}$

32. (i) $(1 - 4a)\ (1 - 4a)\ (1 - 4a)$ (ii) $\left(2p + \frac{1}{5}\right)\left(2p + \frac{1}{5}\right)\left(2p + \frac{1}{5}\right)$

33. (i) $\frac{x^3}{8} + 8y^3$ (ii) $x^6 - 1$

34. (i) $(1 + 4x)\ (1 - 4x + 16x^2)$ (ii) $\left(a - \sqrt{2}\,b\right)\left(a^2 + \sqrt{2}\,ab + 2b^2\right)$

35. $8x^3 - y^3 + 27z^3 + 18xyz$

36. (i) $(a - 2b - 4c)\ (a^2 + 4b^2 + 16c^2 + 2ab - 8bc + 4ac)$

(ii) $\left(\sqrt{2}a + 2b - 3c\right)\left(2a^2 + 4b^2 + 9c^2 - 2\sqrt{2}ab + 6bc + 3\sqrt{2}ac\right)$

37. (i) $-\frac{5}{12}$ (ii) -0.018 **38.** $3(x - 2y)\ (2y - 3z)\ (3z - x)$

39. (i) 0 (ii) 0

40. One possible answer is:

Length = $2a - 1$, Breadth = $2a + 3$

EXERCISE 2.4

1. -1 **2.** $a = 5$; 62 **5.** $-120x^2y - 250y^3$ **6.** $x^3 - 8y^3 - z^3 - 6xyz$

EXERCISE 3.1

1. (B)	**2.** (C)	**3.** (C)	**4.** (A)	**5.** (D)
6. (A)	**7.** (C)	**8.** (C)	**9.** (D)	**10.** (C)
11. (C)	**12.** (D)	**13.** (B)	**14.** (B)	**15.** (B)
16. (D)	**17.** (B)	**18.** (D)	**19.** (B)	**20.** (C)
21. (B)	**22.** (C)	**23.** (C)	**24.** (A)	

EXERCISE 3.2

1. (i) False, because if ordinate of a point is zero, the point lies on the x-axis.

(ii) False (1, –1), lies in IV quadrant and (–1, 1) lies in II quadrant.

(iii) False, because in the coordinates of a point abscissa comes first and then the ordinate .

(iv) False, because a point on the y-axis is of the form (0, y).

(v) True, because in the II quadrant, signs of abscissa and ordinate are –, +, respectively.

EXERCISE 3.3

1. P(1, 1), Q(–3, 0), R(–3, –2), S(2,1), T(4, –2), O(0,0)

2. Trapezium

4. (i) Collinear (ii) Not collinear (iii) Collinear

5. (i) II (ii) III (iii) II (iv) I

6. (i) P(3, 2), R(3, 0), Q(3, –1) (ii) 0

7. II, IV, x-axis, I, III

8. C, D, E, G **10.** (7, 0), (0, –7) **11.** (i) (0, 0) (ii) (0,– 4) (iii) (5, 0)

EXERCISE 3.4

1. C(–2, – 4) **2.** (0, 0), (–5, 0), (0, –3) **3.** (4, 3)

4. (i) A, L and O

(ii) G, I and O

(iii) D and H

5. (i) (2, 1), (ii) (5, 7)

EXERCISE 4.1

1. (C)	**2.** (A)	**3.** (A)	**4.** (A)	**5.** (D)
6. (B)	**7.** (C)	**8.** (A)	**9.** (B)	**10.** (A)
11. (C)	**12.** (B)	**13.** (A)	**14.** (C)	**15.** (C)
16. (B)	**17.** (C)	**18.** (C)	**19.** (D)	

EXERCISE 4.2

1. True, since (0, 3) satisfies the equation $3x + 4y = 12$.

2. False, since (0, 7) does not satisfy the equation.

3. True, since (–1, 1) and (–3, 3) satisfy the given equation and two points determine a unique line.

4. True, since this graph is a line parallel to y-axis at a distance 3 units (to the right) from it.

5. False, since the point (3, – 5) does not satisfy the given equation.

6. False, since every point on the graph of the equation represents a solution.

7. False, since the graph of a linear equation in two variables is always a line.

EXERCISE 4.3

1. Graph of each equation is a line passing through (0, 0).

2. (2, 3)

3. Any line parallel to x-axis and at a distance of 3 units below it is given by $y = –3$

4. $x + y = 10$ **5.** $y = 3x$ **6.** $\frac{5}{3}$

7. (i) one (ii) Infinitely many solutions

8. (i) (4, 0) (ii) (0, 2)

9. $c = \frac{8-2x}{x}, x \neq 0$ **10.** $y = 3x$; $y = 15$.

EXERCISE 4.4

2. The graph cuts the x-axis at (3, 0) and the y-axis at (0, 2).

3. The graph cuts the x-axis at (2, 0) and the y-axis $\left(0, \frac{3}{2}\right)$.

4. (i) 30°C (ii) 95°F (iii) 32°F, $\left(\frac{-160}{9}\right)^{\circ}$C

(iv) – 40

5. (i) 104°F (ii) 343°K

6. $y = mx$, where y denotes the force, x denotes the acceleration and m denotes the constant mass.

(i) 30 Newton (ii) 36 Newton

EXERCISE 5.1

1.	(A)	**2.**	(C)	**3.**	(B)	**4.**	(A)	**5.**	(A)
6.	(A)	**7.**	(A)	**8.**	(B)	**9.**	(B)	**10.**	(D)
11.	(A)	**12.**	(B)	**13.**	(A)	**14.**	(C)	**15.**	(B)
16.	(A)	**17.**	(C)	**18.**	(C)	**19.**	(A)	**20.**	(A)
21.	(C)	**22.**	(B)						

EXERCISE 5.2

1. False, it is valid only for the figures in the plane.

2. False, boundaries of the solids are surfaces.

3. False, the edges of surfaces are line.

4. True, one of the Euclid's axioms.

5. True, because of one of Euclid's axioms.

6. False, statements that are proved are theorms.

7. True, it is an equivalent version of Euclid's fifth postulate.

8. True, it is an equivalent version of Euclid's fifth postulate.

9. True, these geometries are different from Euclidean geometry.

EXERCISE 5.4

1. Answer this question on the same manner as given in the solution of Sample Question 1 in (**E**).

3. No **4.** No **5.** Consistent

EXERCISE 6.1

1. (C)	**2.** (D)	**3.** (A)	**4.** (A)	**5.** (D)
6. (A)	**7.** (C)	**8.** (B)		

EXERCISE 6.2

1. $x + y$ must be equal to 180°. For ABC to be a line, the sum of the two adjacent angles must be 180°.

2. No, angle sum will be less than 180°.

3. No, angle sum cannot be more than 180°.

4. None, angle sum cannot be 181°.

5. Infinitely many triangles. sum of the angles of every triangle is 180°.

6. 136°.

7. No, each of these will be a right angle only when they form a linear pair.

8. Each will be a right angle. Linear pair axiom .

9. $l \parallel m$ because $132° + 48° = 180°$, p is not parallel to q, because $73° + 106° \neq 180°$.

10. No, they are parallel

EXERCISE 6.3

7. 90° **8.** 40°, 60, 80°

EXERCISE 7.1

1. (C)	**2.** (B)	**3.** (B)	**4.** (C)	**5.** (A)
6. (B)	**7.** (B)	**8.** (D)	**9.** (B)	**10.** (A)
11. (B)				

EXERCISE 7.2

1. QR; They will be congruent by ASA.

2. RP; They will be congruent by AAS.

3. No; Angles must be included angles.

4. No; Sides must be corresponding sides.

5. No; Sum of the two sides = the third side.

6. No; BC = PQ.

7. Yes; They are corresponding sides.

8. PR; Side opposite the greater angle is longer.

9. Yes; AB + BD > AD and AC + CD > AD.

10. Yes; AB + BM > AM and AC + CM > AM.

11. No; Sum of two sides is less than the third side.

12. Yes, because in each case the sum of two sides is greater than the third side.

EXERCISE 7.4

1. 60°, 60°, 60°

3. It is defective to use $\angle ABD = \angle ACD$ for proving this result.

19. $\angle B$ will be greater.

EXERCISE 8.1

1. (D)	**2.** (B)	**3.** (C)	**4.** (C)	**5.** (D)
6. (C)	**7.** (D)	**8.** (C)	**9.** (B)	**10.** (D)
11. (C)	**12.** (C)	**13.** (C)	**14.** (C)	

EXERCISE 8.2

1. 6 cm, 4 cm; Diagonals of a parallelogram bisect each other.

2. No; Diagonals of a parallelogram bisect each other.

3. No; Angle sum must be 360°.

4. Trapezium.

5. Rectangle.

6. No; Diagonals of a rectangle need not be perpendicular.

7. No; sum of the angles of a quadrilateral is 360°.

8. 3.5 cm, as $DE = \frac{1}{2} AC$.

9. Yes; because BD = EF and CD = EF.

10. 55°, $\angle F = \angle A$ and $\angle A = \angle C$.

11. No; Angle sum of a quadrilateral is 360°.

12. Yes, Angle sum of a quadrilateral is 360°.

13. 145° **14.** 4 cm

EXERCISE 8.3

1. 84° **2.** 135° each **3.** 120°, 60°, 120°, 60° **4.** 120°, 60°, 120°, 60°

EXERCISE 8.4

2. 4 cm.

EXERCISE 9.1

1. (A)	**2.** (D)	**3.** (D)	**4.** (C)	**5.** (C)
6. (A)	**7.** (B)	**8.** (D)	**9.** (B)	**10.** (B)

EXERCISE 9.2

1. False, since ar (AXCD) = ar (ABCD) – ar (BCX) = 48 – 12 = 36 cm^2

2. True, $SR = \sqrt{(13)^2 - (5)^2} = 12$, ar (PAS) $= \frac{1}{2}$ ar (PQRS) = 30 cm

3. False, because area of Δ QSR = 90 cm^2 and area of Δ ASR < area of Δ QRS.

4. True, $\frac{\text{ar BDE}}{\text{ar ABC}} = \frac{\frac{\sqrt{3}\,(BD)^2}{4}}{\frac{\sqrt{3}\,(BC)^2}{4}} = \frac{(BC)^2}{(BC)^2} = \frac{1}{4}$

5. False, because ar (DPC) $= \frac{1}{2}$ ar (ABCD) = ar (EFGD)

EXERCISE 9.3

3. (i) 90 cm^2 (ii) 45 cm^2 (iii) 45 cm^2

7. 12 cm^2

EXERCISE 10.1

1. (D)	**2.** (A)	**3.** (C)	**4.** (B)	**5.** (D)
6. (A)	**7.** (C)	**8.** (B)	**9.** (C)	**10.** (D)

EXERCISE 10.2

1. True. Because the distances from the centre of two chords are equal.
2. False. The angles will be equal only if AB = AC.
3. True. Because equal chords of congruent circles subtend equal angles at the respective centres.
4. False. Because a circle through two points cannot pass through a point which is collinear to these two points.
5. True. Because AB will be the diameter.
6. True. As $\angle C$ is right angle, $AC^2 + BC^2 = AB^2$.
7. False, as $\angle A + \angle C = 90° + 95° = 185° \neq 180°$.
8. False, because there can be many points D such that $\angle BDC = 60°$ and each such point cannot be the centre of the circle through A,B,C.
9. True. Angles in the same segment.
10. True. $\angle B = 180° - 120° = 60°$, $\angle CAB = 90° - 60° = 30°$.

EXERCISE 10.3

1.	1:1	**9.**	60°	**14.**	30°	**15.**	100°	**16.**	50°
17.	40°	**19.**	278	**20.**	$\angle BOC = 66°$, $\angle AOC = 54°$				

EXERCISE 10.4

13. $x = 30°$, $y = 15°$ **14.** 30°

EXERCISE 11.1

1. (B) **2.** (A) **3.** (D)

EXERCISE 11.2

1. True. As $52.5° = \dfrac{210°}{4}$ and $210° = 180° + 30°$ which can be constructed.
2. False. As $42.5° = \dfrac{1}{2} \times 85°$ and 85° cannot be constructed.
3. False. As BC + AC must be greater than AB which is not so.
4. True. As AC – AB < BC, i.e., AC < AB + BC.

5. False. As $\angle B + \angle C = 105° + 90° = 195° > 180°$.

6. True. As $\angle B + \angle C = 60° + 45° = 105° < 180°$.

EXERCISE 11.3

2. Yes.

EXERCISE 12.1

1.	(A)	**2.**	(D)	**3.**	(C)	**4.**	(A)	**5.**	(D)
6.	(B)	**7.**	(C)	**8.**	(A)	**9.**	(B)		

EXERCISE 12.2

1. False, area of the triangle is 12 cm^2.

2. True, area of the triangle = $\frac{1}{2} \times 4 \times 4 = 8 \text{ cm}^2$

3. True, Each of equal side = 3 cm.

4. False, area of the triangle $16\sqrt{3} \text{ cm}^2$.

5. True, the other diagonal will be 12 cm.

6. False, the area of the parallelogram is 35 cm^2.

7. False, area is the sum of all the six equilateral triangles.

8. True, area = 306 m^2.

9. True, area of the triangle = $12\sqrt{105} \text{ cm}^2$.

EXERCISE 12.3

1.	Rs 10500	**2.**	Rs 84, 000	**3.**	$300\sqrt{3}$ cm	**4.**	$32\sqrt{2}$ cm^2
5.	180 cm^2	**6.**	$600\sqrt{15}$ m^2	**7.**	$2100\sqrt{15} \text{ m}^2$	**8.**	$24\left(\sqrt{6}+1\right) \text{cm}^2$
9.	Rs 960	**10.**	114 m^2				

EXERCISE 12.4

1. Yelllow : 484 m^2; Red : 242 m^2; Green : 373.04 m^2

2. $20\sqrt{30}$ cm^2 **3.** 23 cm, 27 cm **4.** 374 cm^2

5. Rs 19200 **6.** 3 cm **7.** 45 cm, 40 cm

8. 1632 cm^2, 1868 cm^2

EXERCISE 13.1

1. (D) **2.** (C) **3.** (B) **4.** (C)

5. (B) **6.** (B) **7.** (A) **8.** (B)

9. (A) **10.** (A)

EXERCISE 13.2

1. True, $\frac{4}{3}\pi r^3 = \frac{2}{3}\pi r^2(2r)$

2. False, since new volume $= \frac{1}{3}\pi\left(\frac{r}{2}\right)^2 \cdot 2h = \frac{1}{2}$ (Original volume)

3. True, since $r^2 + h^2 = l^2$

4. True, $2\pi rh = 2\pi(2r) \cdot \frac{h}{2}$

5. True, since volume of cone $= \frac{1}{3}\pi r^2 \cdot (2r) = \frac{2}{3}\pi r^3$ = volume of hemisphere

6. True, since V_1 = volume of cylinder $= \pi r^2 h$

since V_2 = volume of cone $= \frac{1}{3}\pi r^2 h$ Therefore, $V_1 = 3V_2$

7. True, $V_1 = \frac{1}{3}\pi r^2 r$, $V_2 = \frac{2}{3}\pi r^3$, $V_3 = \pi r^2 r$

8. False, $\sqrt{3}a = 6\sqrt{3} = a = 6$ Therefore, edge = 6 cm

9. True, V_1 (volume of cube) = a^3

Radius of sphere = $\frac{a}{2}$. V_2 (Volume of sphere) = $\frac{4}{3}\pi\frac{a^3}{8}$

$V_1 : V_2 = 6 : \pi$

10. True, new volume = $\pi(2r)^2 \cdot \left(\frac{h}{2}\right) = 2\left[\pi r^2 h\right]$ .Therefore, volume is doubled.

EXERCISE 13.3

1. 488 cm^3	**2.** 7.5 cm^3	**3.** 14.8 cm^3	**4.** 471.42 m^2
5. 5 cm	**6.** 739.2 litres	**7.** 200 revolutions	**8.** 40 days
9. 8 laddoos	**10.** 304 cm^3, 188.5 cm^2		

EXERCISE 13.4

1. 8800 cm^3	**2.** 677.6 cm^3	**3.** 110, 241.7 cm^3	**4.** 668.66 m^3
5. 16 : 9	**6.** 30.48 cm^3	**7.** 50%	**8.** (i) 9152 cm^2

(ii) 55440 cm^3

EXERCISE 14.1

1. (B)	**2.** (D)	**3.** (B)	**4.** (C)	**5.** (B)
6. (B)	**7.** (B)	**8.** (C)	**9.** (B)	**10.** (D)
11. (D)	**12.** (C)	**13.** (B)	**14.** (D)	**15.** (B)
16. (B)	**17.** (C)	**18.** (B)	**19.** (D)	**20.** (B)
21. (C)	**22.** (C)	**23.** (C)	**24.** (B)	**25.** (D)
26. (C)	**27.** (C)	**28.** (C)	**29.** (C)	**30.** (D)

EXERCISE 14.2

1. Not correct. The classes are of varying widths, not of uniform widths.

2. Median will be a good representative of the data, because

(i) each value occcurs once,

(ii) The data is influenced by extreme values.

3. Data has to be arranged in ascending (or descending) order before finding the median.

4. No, the data have first to be arranged in ascending (or descending) order before finding the median.

5. It is not correct. In a histogram, the area of each rectangle is propotional to the frequency of its class.

6. It is not correct. Reason is that differnce between two consecutive marks should be equal to the class size.

7. No. Infact the number of children who watch TV for 10 or more hours a week is 4 + 2, i.e., 6.

8. No, since the number of trials in which the event can happen cannot be negative, and the total number of trials is always positive.

9. No, since the number of trials in which the event can happen cannot be greater than the total number of trials.

10. No. As the number of tosses of a coin increases, the ratio of the number of heads to the total number of tosses will be **nearer** to $\frac{1}{2}$, not exactly $\frac{1}{2}$.

EXERCISE 14.3

1.

Blood Group	Number of Students (frequency)
A	12
B	8
AB	4
O	6
Total	**30**

2.

Digit	0	1	2	3	4	5	6	7	8	9
Frequency	1	2	5	6	3	4	3	2	5	4

3.

Scores	48	58	64	66	69	71	73	81	83	84
Frequency	3	3	4	7	6	3	2	1	2	2

4.

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Frequency	4	8	13	12	6

Class size = 10

5.

Class intervals	**Frequency**
149.5 - 153.5	7
153.5 - 157.5	7
157.5 - 161.5	15
161.5 - 165.5	10
165.5 - 169.5	5
169.5 - 173.5	6

153.5 is included in the class interval 153.5-157.5 and 157.5 in 157.5 - 161.5.

9. 20 **10.** 8.05 **11.** 72.2 **12.** 80.94 **13.** 20

14. Median = 12, mode = 10

15.

Class intervals	**Frequency**
150 - 200	50
200 - 250	30
250 - 300	35
300 - 350	20
350 - 400	10
Total	**145**

16. (i) 0.06 (ii) 0.19 (iii) $\frac{3}{400}$

17. (i) 0.06 (ii) 0.086 (iii) 0.282 (iv) 0.254

18. (i) $\frac{4}{7}$ (ii) $\frac{59}{350}$ (iii) $\frac{669}{700}$

19. (i) 0.25 (ii) 0.75 (iii) 0.73 (iv) 0

20. (i) 0.675 (ii) 0.325 (iii) 0.135 (iv) 0.66

EXERCISE 14.4

1.

Class	0 - 9	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 - 89	90 - 99
Frequency	1	2	5	6	3	4	3	2	5	4

2.

Class intervals	Frequency
0 - 10	4
10 - 20	7
20 - 30	5
30 - 40	10
40 - 50	5
50 - 60	8
60 - 70	5
70 - 80	8
80 - 90	5
90 - 100	3

10. $a = 5$, frequency of 30 is 28 and that of 70 is 24.

11. 2 : 1

12. Mean = 75.64, Median = 77, Mode = 85