

- Cadet College Hasan Abdal
- Cadet College Kohat
- Military College Jhelum/Murree/Sui
- PAF College Sargodha/Lower Topa
- Garrison Cadet College Kohat
- Cadet College Petaro, Palandri, Batrasi
- Cadet College Kalar Kahar/Swat
- WAPDA Cadet College Tarbela
- Pakistan Steel Cadet College, Karachi
& All other Cadet Colleges Class 8th Seekers



ASAN
CADET
COLLEGES ADMISSION
GUIDE

Author
Engr. Khawar Mahmood

Maths
G.Science

ASAN CADET COLLEGES ADMISSION GUIDE

For

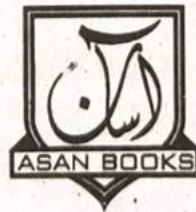
- ❖ Cadet college Hasan Abdal
- ❖ Cadet College Kohat
- ❖ Military College Jhelum/Murree/Sui
- ❖ PAF College Sargodha/Lower Topa
- ❖ Garrison Cadet College Kohat
- ❖ Cadet College Pataro, Palandri, Batrasi
- ❖ Cadet College Kalar Kahar/Swat
- ❖ WAPDA Cadet College Tarbella
- ❖ Pakistan Steel Cadet College, Karachi
- & All other Cadet Colleges Class 8th Seekers

Author:

Engr. Khawar Mahmood

Principal: Foundation Pre-Cadet School & Academy

Publisher



Academic Solutions & Assessment Network

CONTENTS

Textbook Exercises Solution

DOMAIN #	SUBJECT	PAGE #
1	NUMBERS AND OPERATIONS	1
2	ALGEBRA	55
3	MEASUREMENTS	85
4	GEOMETRY	103
5	DATA MANAGEMENT	127

Exercise on Examples

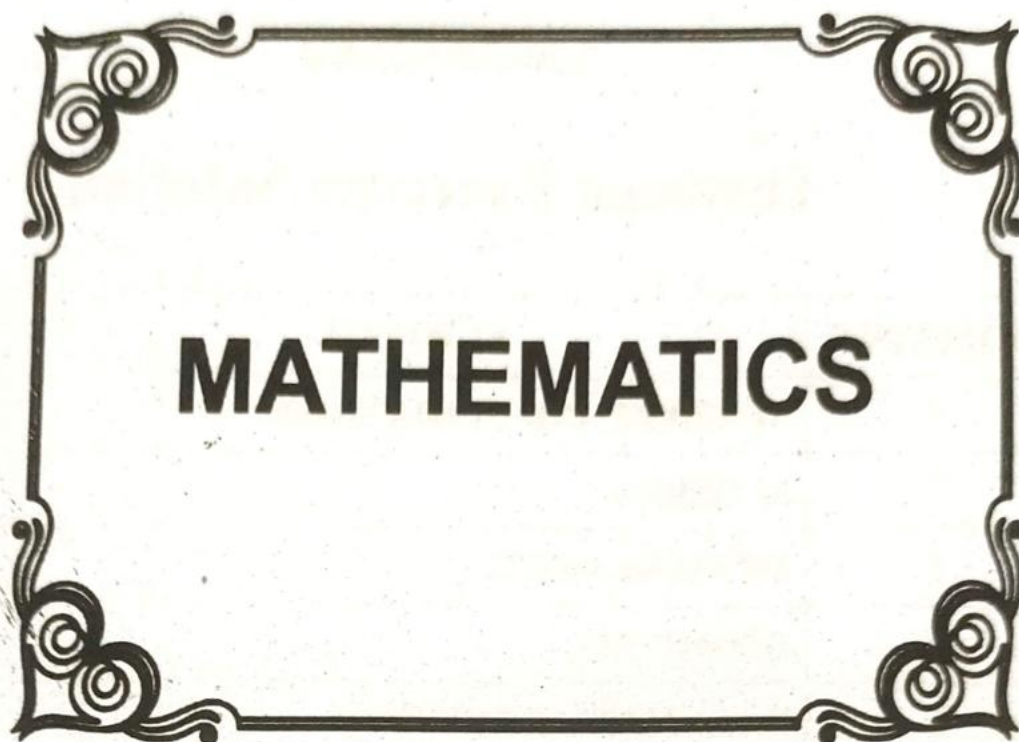
1	Exercise on Examples	144
----------	-----------------------------	------------

MCQs Tests

1	MCQs Tests	153
----------	-------------------	------------

Practice Exercises

1	Practice Exercises	191
----------	---------------------------	------------



MATHEMATICS

SECTION-A
Textbook Exercises Solution

SECTION-B
Practice Exercises

SECTION-C
Basic Concepts & Solved Examples

Domain 1

NUMBERS AND OPERATIONS

Sub-domain (i) Rational Numbers and Decimal Numbers

Exercise 1.1

1. Represent the following on the number line:

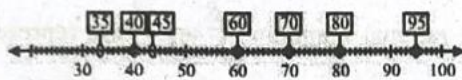
(i) 230, 130, 150, 100, 170, 120

Ans.



(ii) 70, 80, 95, 35, 40, 45, 60

Ans.



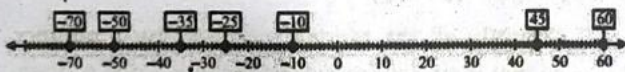
(iii) 1600, 1000, 1700, 1500, 900, 2000

Ans.



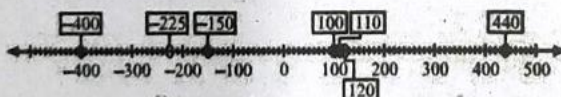
(iv) -50, 60, -25, -70, -10, -35, 45

Ans.



(v) -225, 440, -400, 100, -150, 120, 110

Ans.



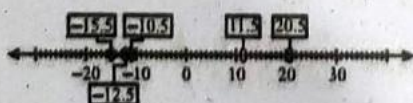
(vi) -1100, 2100, -1500, -2500, 1600

Ans.



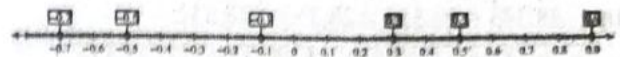
(vii) -15.5, 20.7, 11.2, -10.5, -12.5

Ans.



(viii) 0.5, -0.7, -0.1, 0.3, 0.9, -0.5

Ans.



2. Compare by using symbol $>$, $<$ Also arrange them in ascending and descending order.

(i) 235691, 235090, 245091, 245192

Ans. $235090 < 235691 < 245091 < 245192$

Ascending Order = 235090, 235691, 245091, 245192

Descending Order = 245192, 245091, 235691, 235090

(ii) 578901, 579803, 679807, 679817

Ans. $578901 < 579803 < 679807 < 679817$

Ascending Order = 578901, 579803, 679807, 679817

Descending Order = 679817, 679807, 579803, 578901

(iii) 10028, 100026, 110028, 110027

Ans. $10028 < 100026 < 110027, 110028$

Ascending Order = 10028, 100026, 110027, 110028

Descending Order = 110028, 110027, 100026, 10028

(iv) 562389, 562399, 572390, 572381

Ans. $562389 < 562399 < 572381 < 572390$

Ascending Order = 562389, 562399, 572381, 572390

Descending Order = 572390, 572381, 562399, 562389

3. Compare by using symbol $>$, $<$ Also arrange them in ascending and descending order.

(i) -8395, -8496, -8491, -8394

Ans. $-8496 < -8491 < -8395 < -8394$

Ascending Order = -8496, -8491, -8395, -8394

Descending Order = -8394, -8395, -8491, -8496

(ii) 503, 530, 556, -563

Ans. $-563 < 503 < 530 < 556$

Ascending Order = -563, 503, 530, 556

Descending Order = 556, 530, 503, -563

(iii) -137, -138, -1886, 1308

Ans. $-1886 < -138 < -137 < 1308$

Ascending Order = -1886, -138, -137, 1308

Descending Order = 1308, -137, -138, -1886

(iv) -87650, -78432, -78402, 78401

Ans. $-87650 < -78432 < -78402 < 78401$

Ascending Order = -87650, -78432, -78402, 78401

Descending Order = 78401, -78402, -78432, -87650

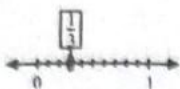
4. Compare by using symbol $>$, $<$ Also arrange them in ascending and descending order.

Exercise 1.2

1. Represent the following rational numbers on number line:

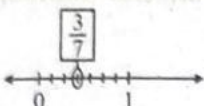
(i) $\frac{1}{3}$

Ans.



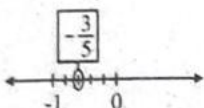
(ii) $\frac{3}{7}$

Ans.



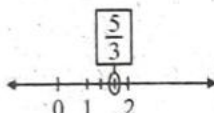
(iii) $-\frac{3}{5}$

Ans.



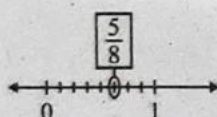
(iv) $\frac{5}{3}$

Ans.



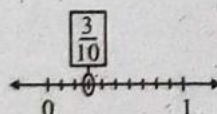
(v) $\frac{5}{8}$

Ans.



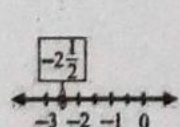
(vi) $\frac{3}{10}$

Ans.



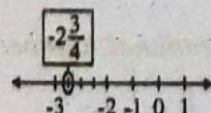
(vii) $-2\frac{1}{2}$

Ans.



(viii) $-2\frac{3}{4}$

Ans.



2. Convert:

(i) $1\frac{2}{3}, 3\frac{4}{5}, 2\frac{5}{11}, 8\frac{3}{7}$ into improper fractions

Ans. $\frac{5}{3}, \frac{19}{5}, \frac{27}{11}, \frac{59}{7}$

(ii) $\frac{18}{7}, \frac{63}{14}, \frac{43}{13}, \frac{115}{9}$ into mixed fractions

Ans. $2\frac{4}{7}, 4\frac{7}{14}, 3\frac{4}{13}, 12\frac{7}{9}$

3. Put the correct sign ($>$, $<$ or $=$) between the following rational numbers:

(i) $\frac{3}{5} \square \frac{6}{25}$

Ans. $\frac{15}{25} \square \frac{6}{25} = \frac{15}{25} > \frac{6}{25}$

So $\frac{3}{5} > \frac{6}{25}$

(ii) $\frac{7}{10} \square \frac{-7}{10}$

Ans. $\frac{7}{10} \square \frac{-7}{10} = \frac{7}{10} > \frac{-7}{10}$

So $\frac{7}{10} > \frac{-7}{10}$

(iii) $-\frac{3}{8} \square \frac{-5}{8}$

Ans. $\frac{-3}{8} \square \frac{-5}{8} = \frac{-3}{8} > \frac{-5}{8}$

So $-\frac{3}{8} > \frac{-5}{8}$

(iv) $1\frac{1}{7} \square 2\frac{3}{14}$

Ans. $\frac{8}{7} \square \frac{31}{14}$

$\frac{16}{14} \square \frac{31}{14} = \frac{16}{14} < \frac{31}{14}$

$1\frac{1}{7} < 2\frac{3}{14}$

(v) $1\frac{5}{12} \square \frac{7}{12}$

Ans. $\frac{17}{12} \square \frac{7}{12}$

$\frac{17}{12} > \frac{7}{12}$

So $1\frac{5}{12} > \frac{7}{12}$

$$3x = 72$$

$$x = \frac{72}{3}$$

$$x = 24$$

Example 11

If the cost of 15 pens is Rs. 150, then find the cost of 20 such pens.

Solution

Let the cost of 20 pens = x

Cost of pens (Rs.) : Number of pens

$$\begin{array}{ccc} 150 & : & 15 \\ x & : & 20 \end{array}$$

As, if the number of pens increased, then the price will also be increased.

Therefore, it is a direct proportion

$$\frac{150}{x} = \frac{15}{20}$$

$$(15)(x) = (150)(20)$$

$$(15x) = 3000$$

$$x = \frac{3000}{15} = 200$$

By Using Proportion Method

Rs. : Rs. :: No. of pens : No. of pens

$$150 : x :: 15 : 20$$

In proportion, Product of means = Product of extremes

$$(x)(15) = (150)(20)$$

$$x = \frac{3000}{15} = 200$$

So, the cost of 20 such pens is Rs. 200.

Example 12

If 10 men do a work in 24 days. In how many days 15 men can do the same task?

Solution

Let the required number of days = x

No. of days : No. of men

$$\begin{array}{ccc} 24 & : & 10 \\ x & : & 15 \end{array}$$

As, the number of men is increased then less time will be required to complete the same task.

So, it is an indirect proportion.

$$\frac{24}{x} = \frac{15}{10}$$

$$(x)(15) = (24)(10)$$

$$(15x) = 240$$

$$x = 16$$

Thus, 15 men will complete the same task in 16 days.

Exercise 1.13

1. Which of the following are in proportion?

(i) $7 : 2 :: 35 : 10$

Ans. $10 \times 7 = 2 \times 35$

$$70 = 70$$

Yes; In proportion

(ii) $2 : 6 :: 5 : 20$

Ans. $2 \times 20 \neq 6 \times 5$

$$40 \neq 30$$

No; Not in a proportion

(iii) $16 : 12 :: 4 : 3$

Ans. $16 \times 3 = 12 \times 4$

$$48 = 48$$

Yes; In a proportion

(iv) $10 : 8 :: 70 : 56$

Ans. $56 \times 10 = 8 \times 70$

$$560 = 560$$

Yes; In a proportion

(v) $15 : 50 :: 9 : 30$

Ans. $15 \times 30 = 50 \times 9$

$$450 = 450$$

Yes; In a proportion

(vi) $20 : 4 :: 3 : 40$

Ans. $20 \times 40 \neq 4 \times 3$

$$800 \neq 12$$

No; Not in a proportion

2. Find the value of variable in the following proportions.

(i) $7 : 6 :: x : 50$

Ans. $6x = 7 \times 50$

$$x = \frac{7 \times 50}{6} = \frac{7 \times 25}{3} = \frac{175}{3} = 58.33$$

(ii) $y : 8 :: 45 : 20$

Ans. $20y = 8 \times 45$

$$y = \frac{8 \times 45}{20} = \frac{8^2 \times 45^9}{204} = 18$$

(iii) $z : 9 :: 15 : 35$

Ans. $35z = 9 \times 15$

$$z = \frac{9 \times 15}{35} = \frac{9 \times 15^3}{357} = \frac{27}{7} = 3\frac{6}{7} = 3.9$$

(iv) $w : 2 :: 24 : 18$

Ans. $18w = 2 \times 24$

✓(c) 8 (d) 9

(xii) The number of zeros in square of 40 is:

(a) 1 ✓(b) 2
(c) 3 (d) 4

(xiii) How many natural numbers lies between 2^2 and 3^2 ?

✓(a) 4 (b) 5
(c) 7 (d) 9

(xiv) The ones place in the square of 16 is:

(a) 4 (b) 6
(c) 7 ✓(d) 8

(xv) A square shaped garden has an are of $100m^2$. Find the length of one side of the garden.

(a) 9 ✓(b) 10
(c) 11 (d) 12

2. Write the following in ratio form and reduce it into lowest form:

(i) $\frac{75}{125}$

Ans. 3 : 5

(ii) $\frac{200}{500}$

Ans. 2 : 5

(iii) 185 : 85

Ans. 37 : 17

(iv) 5 week to 60 days

Ans. 5 week : 60 days

$$5 \times 7 : 60$$

$$35 : 60$$

$$7 : 12$$

(v) 4km to 800m

Ans. 4km : 800m

$$4 \times 100m : 800m$$

$$4000 : 800$$

$$40 : 8$$

$$5 : 1$$

(vi) 3 litres to 1800 ml

Ans. 3 litres : 1800ml

$$30 : 18$$

$$10 : 6$$

$$5 : 3$$

3.(i) Increase 15 in the ratio of 8 : 5

$$\text{Ans. } 15 \times \frac{8}{5} = 24$$

(ii) Increase 120 in the ratio of 13 : 10

$$\text{Ans. } 120 \times \frac{13}{10} = 156$$

4.(i) Decrease 510 in the ratio of 7 : 10

$$\text{Ans. } 510 \times \frac{7}{10} = 357$$

(ii) Decrease 999 in the ratio of 2 : 9

$$\text{Ans. } 999 \times \frac{2}{9} = 222$$

5. If the price of a shirt is increased from Rs. 3200 to Rs. 3600, what will be the increased in ratio?

Ans. New price = 3600

Old price = 3200

Increase in ratio = New price : old price

$$= 3600 : 3200$$

$$= 18 : 16$$

$$= 9 : 8$$

6. If old price of an object was Rs. 890 and new price is Rs. 560. What will be decreased in ratio?

Ans. Decrease in ratio = 560 : 890

New Price: Old Price

$$56 : 89$$

7. A shopkeeper purchased 20 packets of almonds for Rs. 16000. How much will he have to pay if he buys 25 packets?

Ans. Cost of 20 packets = 16000

$$\text{Cost of 1 packet} = \frac{16000}{20} = \text{Rs. } 800$$

$$\text{Cost of 25 packets} = 25 \times 800$$

$$= \text{Rs. } 20,000$$

8. A train covers 140km in 2 hours. What will be the speed of the train per hour. Also find in how much distance will it cover in 4 hours?

Ans. Distance = 140km

Time = 2 hours

$$\text{Speed} = \frac{\text{distance}}{\text{time}} = \frac{140}{2} = 70\text{km/hr}$$

$$\text{In 4 hours, distance} = 4 \times 70 = 280\text{km}$$

9. Find the value of variable in the following proportions.

(iv) Which of the following angles so formed with transversal and parallel lines are supplementary?

- (a) alternate angles ✓ (b) interior angles
(c) vertically opposite angles
(d) corresponding angles

(v) If two angles of an isosceles triangle are 40° and 100° the third angle is _____.

- ✓(a) 40° (b) 80°
(c) 100° (d) 140°

(vi) The diagonal in the quadrilateral _____ do not bisect each other.

- (a) square (b) rectangle
✓(c) kite (d) rhombus

(vii) In which quadrilateral, there are no parallel lines?

- (a) square (b) rectangle
✓(c) kite (d) rhombus

(viii) In which quadrilateral, the opposite angles are not equal?

- (a) square (b) rectangle
(c) rhombus ✓(d) trapezium

(ix) A polygon is said to be _____ if atleast one angle is reflex.

- (a) regular ✓(b) concave
(c) convex (d) closed

(x) The exterior angle of regular octagon is ____.

- (a) 35° ✓(b) 45°
(c) 90° (d) 135°

(xi) If a figure is divided into the two equal parts, it is known as _____.

- ✓(a) reflection (b) rotation
(c) translation (d) image

(xii) The order of rotational symmetry of hexagon is _____.

- (a) 2 (b) 4
✓(c) 16 (d) 8

(xiii) Which of the following quadrilateral has no line of symmetry?

- (a) rectangle (b) rhombus
(c) kite ✓(d) square

(xiv) Which of the following quadrilateral has no rotational symmetry?

- (a) rectangle (b) rhombus
✓(c) kite (d) square

(xv) The movement of an object from one position to another along straight line is called _____.

- ✓(a) translation (b) rotation
(c) reflection (d) measurement

2. Using compass and ruler construct the following angles:

(i) 15°

Ans. Steps of Construction

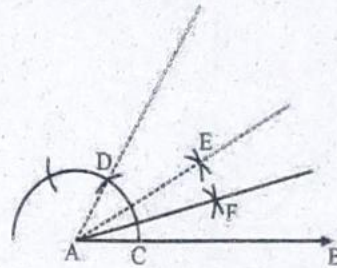
Draw a line AB.

With A as centre. Draw an arc which intersect AB at C.

With C as a centre constant 60° .

Bisect 60° to get 30° .

Now bisect 30° to get 15° .



(ii) $22\frac{1}{2}^\circ$

Ans. Steps of Construction

22.5°

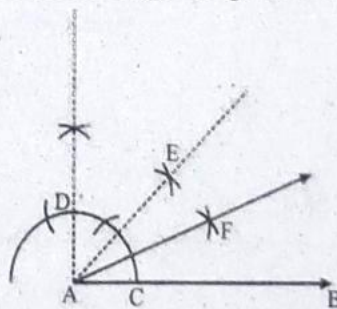
Draw a line AB.

Now draw arc of any convenient radius which intersect AB at C.

Now C as centre construct 90° .

Now bisect 90° to get 45° .

Now bisect 45° degree to get 22.5° .



(iii) $37\frac{1}{2}^\circ$

Ans. 37.5°

Steps of Construction

Construct 150°

26. D	27. C	28. D	29. A	30. B
31. A	32. C	33. B	34. C	35. C
36. A	37. A	38. A	39. D	40. A
41. C	42. C	43. A	44. B	45. C
46. C	47. D	48. A	49. C	50. C
51. A	52. D	53. A	54. A	55. B
56. D	57. C	58. B	59. B	60. D
61. A	62. E	63. B	64. B	65. C
66. C	67. C	68. B	69. D	70. D
71. D	72. A	73. D	74. A	75. E
76. D	77. C	78. C	79. C	80. C
81. B	82. B	83. B	84. D	85. B
86. B	87. C	88. D	89. C	90. D
91. A	92. A	93. C	94. B	95. C
96. A	97. D	98. B	99. C	100. A

MCQs Exercise 2

- The GCD of 125, 105 and 75 is
A. 10 B. 15
C. 28 D. None
- Relation between HCF & LCM of two number X Y is
A. $LCM = HCF \times XY$
B. $LCM \times X = HCF \times Y$
C. $LCM/HCF = X/Y$
D. $LCM.HCF = XY$
- By the solution of an equation we mean
A. To divide the equation by a suitable number
B. To multiply the equation by a suitable number
C. To find out the value of variable
D. To find out the value of constant
- In $(a^3 + 3a^2b + 3ab^2 + b^3) \div a + b$ the quotient is:
A. $a^2 + ab^2 + b^2$ B. $a^2 + 2ab + b^2$
C. $a^2 + b^2 + ab^2$ D. $a^2 + a + b^2$
- Simplify $(x + 3)(x + 4) - (x + 2)(x + 5)$
A. $2x + 12$ B. $10x + 22$
C. 2 D. $4x + 2$
- If length, breadth and thickness of a cuboid is 2 cm, 6 cm and 3 cm respectively. Its volume will be
A. 36 cubic cm B. 36 square cm
C. 11 cubic cm D. None
- Equations with the same solution are called
A. Twin equations B. Direct equations
C. Equivalent D. Linear equations
- If h is the perpendicular height and r is the radius of circular base, the volume of cylinder is:
A. $\pi r^2 h$ B. $\frac{1}{3}\pi r^2 h$
C. $2\pi h$ D. $\pi r h$
- A square and a rectangle have equal areas. If the length of the rectangle is 25 m and width 16 m, what is the length of the side of the square.
A. 22 m B. 21 m
C. 19 m D. 20 m
- The perimeter of a rectangle whose length is r/p and width is $(r + p)/q$ is given by:
A. $(r/p)(r + p)/q$ B. $2(r^3 + p)1 (r/p)^2$
C. $2\left(\frac{qr + rp + p^2}{pq}\right)$ D. $[(r/p) + (r + p/q)]$
- Each angle of 90 is:
A. Parallelogram B. Trapezium
C. Square D. Rhombus
- A quadrilateral in which only two sides and angles are parallel is called:
A. Pentagon B. Hexagon
C. Octagon D. Rhombus
- A polygon in which all eight sides and angles are equal is called:
A. Pentagon B. Hexagon
C. Octagon D. Rhombus
- Formula for finding external angle of any polygon is
A. $(n - 2) \times 180^\circ / x$ B. $360^\circ / n$
C. $(n + 2) \times 180^\circ$ D. $n(360^\circ)$
- If $\overline{AB}$ and $\overline{CD}$ are two parallel lines then:
A. $\overline{AB} \cap \overline{CD} = AB$ B. $\overline{AB} \cap \overline{CD} = \overline{CD}$
C. $\overline{AB} \cap \overline{CD} = \emptyset$ D. $\overline{AB} \cap \overline{CD} = \{ \}$
- If $U = \{1, 2, 3, 4, 5\}$, $A = \{1, 2, 3, 4, 5\}$. A complement will be:
A. $\{ \}$ B. $\{0\}$
C. $\{5\}$ D. $\{1\}$

- C. 9.004 D. 9.04
92. If $A = \{1, 3\}$, $B = \{2, 3, 4\}$ then $(A - B) \cup A$ will be
 A. $\{4\}$ B. $\{2, 3\}$
 C. $\{1, 3\}$ D. $\{2, 3, 4\}$
93. If $U = \{3, 13, 23\}$ and $A = \{3\}$ then complement of A will be
 A. $\{13\}$ B. $\{13, 23\}$
 C. $\{\}$ D. $\{3\}$
94. If $A = \{1, 3\}$, $B = \{\}$ then $A \cap B$ will be
 A. $\{\}$ B. $\{1\}$
 C. $\{2\}$ D. $\{1, 2\}$
95. The expression $\frac{5}{6} \div \frac{8}{10}$ is:
 A. Proportion B. Ratio
 C. Not proportional D. Polynomial
96. If your present age is x years, your age after $\frac{1}{4}$ years will be:
 A. $4x + 3$ B. $\frac{4x + 3}{4}$
 C. $x + \frac{1}{4}$ D. $\frac{x}{4}$
97. The exponent in $3x^2$ is:
 A. 3 B. 2
 C. x D. 1
98. The symbol “:” stands for:
 A. Ratio B. Proportion
 C. Triangle D. Square
99. Ali has Rs. 880 out of this amount he paid 0.75 to his brother. He paid 0.8 of remaining amount to his sister. Now amount left with Ali is:
 A. Rs. 46.50 B. Rs. 47.60
 C. Rs. 44 D. None of these
100. If $x = -1, y = 2, z = -3$ the value of $(x + y)^2 (y - z)^3$ will be:
 A. 26 B. 27
 C. 29 D. 25

Solution MCQs Exercise 4

1. B	2. B	3. A	4. A	5. C
6. D	7. B	8. D	9. B	10. C
11. A	12. B	13. A	14. A	15. A
16. B	17. B	18. C	19. B	20. B
21. B	22. C	23. D	24. A	25. A

26. A	27. C	28. C	29. C	30. A
31. B	32. C	33. D	34. B	35. B
36. 60°		37. 203 cm^2		38. 54°
39. 44 cm		40. 7 cm		41. 84 cm^2
42. $6x^2$		43. Side = 5 cm , $v = 125 \text{ cm}^3$		
44. 2 hrs		45. 76.66		
46. A	47. D	48. D	49. B	50. A
51. A	52. B	53. D	54. B	55. C
56. D	57. D	58. C	59. C	60. D
61. B	62. B	63. B	64. B	65. B
66. A	67. D	68. D	69. D	70. C
71. B	72. A	73. C	74. C	75. C
76. B	77. D	78. A	79. C	80. D
81. A	82. D	83. B	84. C	85. A
86. A	87. B	88. A	89. C	90. A
91. D	92. C	93. B	94. A	95. A
96. C	97. B	98. B	99. C	100. D

MCQs Exercise 5

1. The solution set of $0.1x + 0.4 = 0$ is
 A. $\{4\}$ B. $\{3\}$
 C. $\{0\}$ D. $\{-4\}$
2. 0.32 is equal to
 A. $16/50$ B. $32/1000$
 C. $32/500$ D. $32/10$
3. Which one is polynomial
 A. $5 + \frac{6}{x}$ B. $x + \frac{1}{5}$
 C. $x^2 + \frac{1}{x} + x$ D. x^{-2}
4. The simplified form of $15/2 : 26/3$ is
 A. $40 : 51$ B. $45 : 52$
 C. $52 : 45$ D. $45 : 61$
5. The ratio between 5 metre and Rs. 15 is:
 A. $5/15$ B. $15/5$
 C. $1/5$ D. Does not exist
6. 3% of 400 is:
 A. 12 B. 13
 C. 430 D. 100
7. 5 men can do a piece of work in 6 days. In how many days can 3 men do the

59. Simplify: $\left[1\frac{3}{8} - \left\{ \frac{2}{3} + \frac{1}{2} \left(\frac{3}{4} + \frac{5}{7} \times 1\frac{1}{20} \right) \right\} \right]$
60. $1\frac{1}{2} + \left[5\frac{2}{5} - \left\{ 2\frac{3}{5} + \left(2\frac{1}{12} + \frac{1}{2} + \frac{1}{3} \right) \right\} \right]$
61. $4\frac{2}{3} + \left[3\frac{8}{9} \times \left\{ 1\frac{3}{4} + \left(3\frac{1}{2} + 7\frac{1}{4} + 1\frac{1}{2} \right) \right\} \right]$
62. $[0.5 \times \{4.25 - (5.1 + 2.35 + 1.05)\}]$
63. $[2.95 + \{3.02 \times (6.125 + 5.196 - 2.746)\}]$
64. $11.34 \times [3.42 + \{11.075 - (3.05 + 2.064 + 1.032)\}]$
65. What was the total rainfall in a week when it rained $1\frac{1}{2}$ cm on Thursday, $\frac{2}{5}$ cm on Friday and $\frac{3}{10}$ cm on Sunday, the rest of week was dry?
66. From a $4\frac{3}{4}$ m long tin sheet, one was $2\frac{1}{2}$ m and second was $1\frac{1}{3}$ m got. How much of the sheet was left?
67. Simplify following:
(i) $1.3 : 3.9$ (ii) $.02 : 0.4$
68. Simplify the following ratio:
(i) $\frac{1}{4} : \frac{1}{6} : \frac{1}{8}$ (ii) $75 : 100 : 125$
70. Simplify the following ratio:
(i) $0.2 : 0.4 : 0.6$ (ii) $\frac{1}{10} : \frac{1}{100} : \frac{1}{1000}$
71. 2kg and 800 grams.
72. Find the simplest form:
1m and 500cm
73. Find the value of P in the following:
(i) $\frac{2}{5} = \frac{P}{20}$ (ii) $\frac{P}{5} = \frac{3}{10}$
74. Find the value of P if, $\frac{0.1}{0.4} = \frac{6}{P}$
75. Find the value of x in each of the following proportions.
(i) $2 : 7 :: x : 49$ (ii) $8 : 12 :: 6 : x$
(iii) $1.2 : 3.6 :: x : 3$ (iv) $x : 2 :: 150 : 100$
76. 5 : 9 is a ratio, if we increase first element of the ratio up to 40, what will be the second element?
77. Find mean proportional of 4 and 9.
78. If 150 shirts can be stitched on 6 sewing machines in a day, how many machines are required to stitch 225 shirts in a day?
79. If 7 buffaloes give 56 litres milk, how much milk can we get from 12 buffaloes?
80. A farmer has 8 days food for 33 cows. He bought 11 more cows. For how many days will the food be enough?

81. If 40 workers do work in 35 days, in how many days will the same work be done by increasing 10 more workers?
82. Raheem paid his servant Rs. 750 for 1 week and 3 days. What amount will he pay him for a month of 30 days?
83. A machine start working in 45 minutes at the temperature of 60°C . How much time is required to work it at the temperature of 75°C ?
84. 72 persons have enough food for 7 days. But after 1 day they decided to finish the food in 3 remaining days. For it they invited more persons. How many persons did they invited more persons. How persons did they invite?
85. Out of 150 eggs in a basket, 25 eggs were found rotten. Find the ratio of:
(i) rotten eggs to the good eggs
(ii) rotten eggs to the total eggs
(iii) good eggs to the total eggs
86. Out of 75 passengers in a bus, 35 are males, 30 are females and remaining are children. Find the ratio of:
(i) male passengers to the total passengers.
(ii) female passengers to the male passengers.
(iii) children to the total passengers.
87. Find the following percentages.
(i) 8% of 50 (ii) 65% of 25
(iii) 75% of 4 (iv) 3.5% of 1000
(v) 50% of 180 (vi) 90% of 190
(vii) 65% of 60 (viii) 18% of 1400
(ix) 18.5% of 2000 (x) 9.5% of 3000
88. Komal made a suit of 5.5 metres cloth out of 44 metres. What percentage of the cloth did she use for the suit?
89. 85% of the students in a school of 300 students passed in an annual examination. How many of them are fail?
90. The 60% length of a road is 75km. Find the total length of the road.
91. Sana get 484 marks out of 550 marks. Find the percentage of her marks.
92. In a town, 35% of 15,000 votes did not cast vote in an election. How many people did not cast vote?
93. In a test match, Shoaib Malik made 134 runs in the first inning and 41 runs in the 2nd innings. Find the percentage of Shoaib's score if total score in both innings of Pakistan was 500 runs.
94. Farooq paid 25% of salary as a house rent and 50% of salary for other expenses. Find the remaining amount if his salary is Rs. 8000.

162. The perimeter of a square garden is 12km. Find its area.

Ans. Perimeter of square garden = 12km
 Area of square garden = ?
 Perimeter of square garden = $4 \times \text{side}$
 $12\text{km} = 4 \times \text{side}$
 $\frac{12\text{km}}{4} = \text{side}$

$$3 = \text{side}$$

So, side of square garden = 3km

$$\begin{aligned}\text{Area of square garden} &= \text{length} \times \text{breadth} \\ &= 3\text{km} \times 3\text{km} \\ &= 9\text{km}^2\end{aligned}$$

163. Find the breadth of a swimming pool whose length is 18m and area is 198m^2 .

Ans. Length of swimming pool = 18m
 Area of swimming pool = 198m^2
 Breadth of swimming pool = ?
 $198\text{m}^2 = 18\text{m} \times b$
 $\frac{198\text{m}^2}{18\text{m}} = b$

$$11\text{m} = b$$

Hence, the breadth of swimming pool is 11m.

164. Find the area and perimeter of a square shaped garden whose measure of side is 21m.

Ans. Side of square shaped garden = 21m
 Area of perimeter = ?
 Area of square garden = $\text{side} \times \text{side}$
 $= 21\text{m} \times 21\text{m} = 441\text{m}^2$
 Perimeter of square garden = $4 \times \text{side}$
 $= 4 \times 21\text{m} = 84\text{m}$

165. The perimeter of a square shaped room is 36m. Find the cost of tilling the room at the rate of Rs. 182.5 per square meter.

Ans. Perimeter of square shaped room = $4 \times \text{side}$
 $36\text{m} = 4 \times \text{side}$
 $\frac{36\text{m}}{4} = \text{side}$

$$9\text{m} = \text{side}$$

Side of square room = 9m

$$\begin{aligned}\text{Area of square room} &= \text{side} \times \text{side} \\ &= 9\text{m} \times 9\text{m} = 81\text{m}^2\end{aligned}$$

Rate of tiling per square meter = Rs. 182.5

$$\text{Cost of tiling} = 182.5 \times 81 = \text{Rs. } 14782.5$$

166. Find the cost of leveling a play ground at the rate of Rs. $150/\text{m}^2$ whose length is 33m and breadth is 22m. Find the cost of fencing the play ground at the rate of Rs. 100/m.

Ans. Length of play ground = 33m
 Breadth of play ground = 22m
 Area of play ground = $\text{length} \times \text{breadth}$
 $= 33\text{m} \times 22\text{m} = 726\text{m}^2$
 Cost of leveling per square meter = Rs. 150

$$\text{Cost of leveling } 726\text{m}^2 = 150 \times 726$$

$$\text{Cost of leveling play ground} = \text{Rs. } 1,08,900$$

$$\begin{aligned}\text{Perimeter of play ground} &= (\text{length} + \text{breadth}) \times 2 \\ &= (33\text{m} + 22\text{m}) \times 2 \\ &= (55\text{m}) \times 2 = 110\text{m}\end{aligned}$$

$$\text{Cost of fencing per meter} = \text{Rs. } 100$$

$$\text{Cost of fencing 110 meter} = 100 \times 110 = 11000$$

$$\text{Cost of fencing play ground} = \text{Rs. } 11,000$$

167. The length of a side of a square shaped field is 48m. Find the cost of ploughing the field at the rate of Rs. $25/\text{m}^2$ and cost of fencing the field at the rate of Rs. 28/m.

Ans. Length of square shaped field = 48m
 Area of square shaped field = $\text{length} \times \text{length}$
 $= 48\text{m} \times 48\text{m}$
 $= 2304\text{m}^2$

$$\text{Rate of ploughing field per } \text{m}^2 = \text{Rs. } 25$$

$$\begin{aligned}\text{Cost of ploughing field } 2304\text{m}^2 &= 25 \times 2304 \\ &= \text{Rs. } 57600\end{aligned}$$

$$\begin{aligned}\text{Perimeter of a square shaped field} &= 4 \times \text{side} \\ &= 4 \times 48 \\ &= 192\text{m}\end{aligned}$$

$$\text{Rate of fencing per m} = \text{Rs. } 18$$

$$\text{Cost of fencing } 192\text{m} = 18 \times 192 = 3,456$$

$$\text{Cost of fencing square field} = \text{Rs. } 3,456$$

168. A garden is 45m long and 30m wide. Find the cost of repairing the garden at the rate of Rs. $50/\text{m}^2$ and cost of constructing a wall round it at the rate of Rs. 425/m.

Ans. Length of garden = 45m
 Breadth of garden = 30m
 Area of garden = $\text{length} \times \text{breadth}$
 $= 45\text{m} \times 30\text{m} = 1350\text{m}^2$

$$\text{Rate of repairing the garden per } \text{m}^2 = \text{Rs. } 50$$

$$\begin{aligned}\text{Cost of repairing the garden } 1350\text{m}^2 &= 50 \times 1350 \\ &= \text{Rs. } 67,500\end{aligned}$$

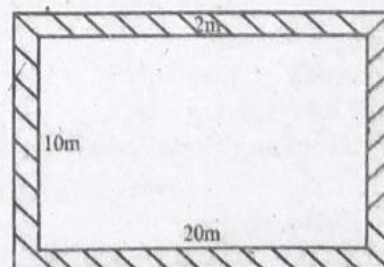
$$\begin{aligned}\text{Perimeter of garden} &= (\text{length} + \text{breadth}) \times 2 \\ &= (45\text{m} + 30\text{m}) \times 2 \\ &= (75\text{m}) \times 2 = 150\text{m}\end{aligned}$$

$$\text{Rate of constructing a wall ground per m} = \text{Rs. } 425$$

$$\text{Cost of constructing } 150\text{m} = 425 \times 150 = \text{Rs. } 63,750$$

169. Find the area of the border (shaded portion) from the following figures.

(i)



Ans. Let x be the father's age and y be the son's age now. According to given condition.

$$3(x + 4) = y + 4$$

$$3x + 12 = y + 4$$

$$3x - y = 4 - 12$$

$$3x - y = -8$$

(i)

and $7(x - 6) = y - 6$

$$7x - 42 = y - 6$$

$$7x - y = -6 + 42$$

$$7x - y = 36$$

(ii)

Subtract equation (ii) from (i)

$$3x - y = -8$$

$$\pm 7x \mp y = \pm 36$$

$$-4x = -44$$

$$x = 11 \text{ years}$$

Putting the value of x in equation (ii)

$$7(11) - y = 36$$

$$77 - y = 36$$

$$77 - 36 = y$$

$$41 = y$$

$$y = 41$$

So, The son's present age = 11 years

and The father's present age = 41 years

102. A shopkeeper mixed coffee powder worth \$2.50 per kg with coffee worth \$3.50 per kg, and sold 20kg of the mixture at \$2.80 per kg, find the weights of the 2 grades of coffee powder he mixed together?

Ans. Let x be the weight of coffee I and y be the weight of coffee 2.

According to given condition,

$$x + y = 20$$

(i)

and $2.50x + 3.50y = 2.80 \times 20$

$$2.50x + 3.50y = 56$$

(ii)

Equation (i) $\times$ by 2.50 and sub equation (ii) from (i)

$$2.50x + 2.50y = 50$$

$$\pm 2.50x \pm 3.50y = \pm 56$$

$$-y = -6$$

$$y = 6$$

Putting the value of y in equation (i)

$$x + 6 = 20$$

$$x = 20 - 6$$

$$x = 14$$

So, The weight of coffee 1 = 14kg

and The weight of coffee 2 = 6kg

103. Two cars leave at town at the same time and travel in opposite directions. The speed of one car is 12km/h more than the other. They are 444km apart after 3 hours. Find the speed of each car.

Ans. Let x be the speed of car B. Then,
Speed of car A = $(x + 12)$ km/h

After 3 hours,

Distance covered by both cars

$$3x + 3(x + 12) = 444$$

$$3x + 3x + 36 = 444$$

$$6x + 36 = 444$$

$$6x = 444 - 36$$

$$6x = 408$$

$$x = 68$$

So, Speed of car B = $x = 68$ km/h

$$\text{Speed of car A} = x + 12$$

$$= 68 + 12$$

$$= 80 \text{ km/h}$$

104. A motorist drove for 2 hours at one speed and then for 3 hours at another speed. He covered a distance of 252km. If he had traveled 4 hours at the first speed and one hour at the second speed, he would have covered 244km. Find the two speed.

Ans. Let x be first speed and y be the second speed.

$$\text{Distance covered during first speed} = 2 \times x$$

$$= 2x \text{ kms}$$

$$\text{Distance covered during second speed} = 3 \times y$$

$$= 3y \text{ km}$$

But, Distance covered during two speeds = 252km

$$2x + 3y = 252$$

(i)

and $4x + y = 244$

(ii)

$$2x + 3y = 252$$

$$\pm 12x \pm 3y = \pm 732$$

$$-10x = -480$$

$$10x = 480$$

$$x = 48$$

Put the value of x in equation (ii)

$$4x + y = 244$$

$$4(48) + y = 244$$

$$192 + y = 244$$

$$y = 244 - 192$$

$$y = 52$$

So, The first speed = 48km/h

and The second speed = 52km/h

105. The sum of digits of a two digit number is 12 and the units digits is twice the tens digits. Find the number.

Ans. Let x be the unit digit and y be the tens digit.

So, The number = $x + 10y$

According to given condition,

$$x + y = 12$$

(i)

and $2x = y$

$$2x - y = 0$$

(ii)

Add equations (i) and (ii)

$$x + y = 12$$

$$2x - y = 0$$

$$3x = 12$$

$$x = 4$$

Putting the value of x in equation (i)

195. (a) If $\frac{a-b}{c-b} = \frac{x}{y}$, make b the subject of the formula. Find, the value of b when $a = -1$, $c = 2$, $x = 10$ and $y = 6$.

$$\begin{aligned}\text{Ans. } \frac{a-b}{c-b} &= \frac{x}{y} \\ y(a-b) &= x(c-b) \\ ay - by &= cx - bx \\ bx - by &= cx - ay \\ b(x-y) &= cx - ay \\ b &= \frac{cx - ay}{x - y}\end{aligned}$$

When, $a = -1$, $c = 2$, $x = 10$ and $y = 6$.

$$\begin{aligned}b &= \frac{2(10) - (-1)(6)}{10 - 6} \\ &= \frac{20 + 6}{4} = \frac{26}{4} = \frac{13}{2} = 6\frac{1}{2}\end{aligned}$$

- (b) Solve the equation:

$$\begin{aligned}\text{Ans. } (2x+5)(2x-5) &= (x-1)(4x+3) \\ (2x+5)(2x-5) &= x(4x+3) - 1(4x+3) \\ [(2x)^2 - (5)^2] &= 4x^2 + 3x - 4x - 3 \\ 4x^2 - 25 &= 4x^2 - x - 3 \\ 4x^2 - 25 - 4x^2 + x + 3 &= 0 \\ x - 22 &= 0 \\ x &= 22\end{aligned}$$

196. If 5kg of tea and 2kg of coffee cost \$81 and 1kg of tea and 4kg of coffee cost \$54, find the price of 1kg of tea and 1kg of coffee.

Ans. Let \$ x be the cost price of tea per kg and y be the cost price of coffee per kg.

According to the given condition,

$$5x + 2y = 81 \quad (i)$$

$$x + 4y = 54 \quad (ii)$$

$$(i) \quad 5x + 2y = 81$$

$$-5 \times (ii) \quad -5x - 20y = -270$$

Equation (i) $\times$ by 2 and equation (ii) subtracting from equation (i)

$$10x + 4y = 162$$

$$\pm x \pm 4y = \pm 54$$

$$9x = 108$$

$$x = 12$$

Putting the value of x in equation (ii)

$$12 + 4y = 54$$

$$4y = 54 - 12$$

$$4y = 42$$

$$y = 10.50$$

Hence,

Cost price of tea = \$10.50 per kg.

and Cost price of coffee = \$12 per kg.

197. Simplify:

$$(a) \quad \frac{x}{y} + \frac{z^2}{xy} + \frac{y}{x}$$

$$\begin{aligned}\text{Ans. } \frac{x}{y} + \frac{z^2}{xy} + \frac{y}{x} &= \frac{x(x) + z^2 + y(y)}{xy} \\ &= \frac{x^2 + z^2 + y^2}{xy} \\ &= \frac{x^2 + y^2 + z^2}{xy} \quad \text{Ans.}\end{aligned}$$

$$(b) \quad \frac{3x-2y}{2} - \frac{x+y}{3} - 1$$

$$\begin{aligned}\text{Ans. } \frac{3x-2y}{2} - \frac{x+y}{3} - 1 &= \frac{3(3x-2y) - 2(x+y) - 6 \times 1}{6} \\ &= \frac{9x - 6y - 2x - 2y - 6}{6} \\ &= \frac{7x - 8y - 6}{6}\end{aligned}$$

198. Solve the following equations:

$$(a) \quad \frac{x+2}{6} + \frac{x-2}{2} = \frac{4-4x}{12}$$

$$\begin{aligned}\text{Ans. } \frac{x+2}{6} + \frac{x-2}{2} &= \frac{4-4x}{12} \\ \frac{2(x+2) + 6(x-2)}{12} &= \frac{4-4x}{12}\end{aligned}$$

$$2x + 4 + 6x - 12 = 4 - 4x$$

$$8x - 8 = 4 - 4x$$

$$8x - 8 - 4 + 4x = 0$$

$$12x - 12 = 0$$

$$12x = 12$$

$$x = 1$$

$$(b) \quad \frac{4}{5x} = \frac{1}{10} + \frac{7}{10x}$$

$$\text{Ans. } \frac{4}{5x} = \frac{1}{10} + \frac{7}{10x}$$

$$\frac{4}{5x} = \frac{x+7}{10x}$$

$$10x \times \frac{4}{5x} = x + 7$$

$$2 \times 4 = x + 7$$

$$8 = x + 7$$

$$8 - 7 = x$$

$$x = 1$$

$$(c) \quad \frac{3}{x+3} = \frac{4}{x+9}$$

$$\text{Ans. } \frac{3}{x+3} = \frac{4}{x+9}$$

$$3(x+9) = 4(x+3)$$

$$3x + 27 = 4x + 12$$

$$3x - 4x = 12 - 27$$

$$-x = -15$$

$$x = 15$$

$$(d) \quad \frac{15}{x-8} = \frac{6}{20-x}$$

$$\text{Profit of 2}^{\text{nd}} \text{ partner} = \frac{3 \times 60720}{12} = \text{Rs. } 15180$$

$$\text{Profit of 3}^{\text{rd}} \text{ partner} = \frac{7 \times 60720}{12} = \text{Rs. } 35420$$

90. The angles of a quadrilateral are in the ratio 3 : 4 : 6 : 7. Find the measures of the angles (Hint: the sum of the angles of a quadrilateral is 360°).

Ans. Sum of angles of quadrilateral = 360°

Ratio of between angles = 3 : 4 : 6 : 7

Sum of ratios = $3 + 4 + 6 + 7 = 20$

One angle = $\frac{3 \times 360}{20} = 54^\circ$

2nd angle = $\frac{4 \times 360}{20} = 72^\circ$

3rd angle = $\frac{6 \times 360}{20} = 108^\circ$

4th angle = $\frac{7 \times 360}{20} = 126^\circ$

91. The measures of the interior angles of a triangle are in the ratio 3 : 4 : 5. Find the measure of its largest angle. (Hint: the sum of the interior angles of a triangle is 180°).

Ans. Sum of angles of triangle = 180°

Ratio between angles = 3 : 4 : 5

One angle = $\frac{3 \times 180}{12} = 45^\circ$

2nd angle = $\frac{4 \times 180}{12} = 60^\circ$

3rd angle = $\frac{5 \times 180}{12} = 75^\circ$

92. A man buys eggs at Rs. 9.60 per dozen and sells 20 eggs at Rs. 18 per score. What is his gain or loss percent?

Ans. Purchase price of 1 dozen eggs = Rs. 9.60

Purchase price 1 egg = $\frac{9.60}{12} = \text{Rs. } 0.8$

Sale price of 1 score eggs = Rs. 18

Sale price of 1 egg = $\frac{18}{20} = \text{Rs. } 0.9$

Profit = $0.9 - 0.8 = \text{Rs. } 0.1$

Profit percent = $\frac{0.1}{0.8} \times 100 = 12.5\%$

93. Mr. Arslan sold a plot of land for Rs. 108000 and made a profit of 20% in his deal, at what price should it be sold for a gain of 25%?

Ans. Sale price of land = Rs. 108000

Profit percent = 20%

Purchase price = ?

If 20% is profit then sale price when purchase price is 100 = Rs. 120

If sale price is Rs. 120 then cost price = 100

If sale price is Rs. 1 then cost price = $\frac{100}{120}$

If sale price is Rs. 108000 then cost price

$$= \frac{100}{120} \times 108000 = 90,000$$

It cost price is Rs. 90,000 rate of profit 25 then profit

$$= 90,000 \times \frac{25}{100} = \text{Rs. } 22500$$

$$\text{Sale price} = 90,000 + 22,500 = 1,12,500$$

94. If 11% is lost on a book sold at Rs. 10.68, what was the cost price of the book? At Rs. 90. What is the quantity of tea sold?

Ans. Percent loss = 11%

If loss is Rs. 11 when cost is 100 then sale price = $100 - 11 = \text{Rs. } 89$

Now when sale price is Rs. 89, cost price = Rs. 100

Now when sale price is Rs. 1 cost price = $\frac{100}{89}$

Now when sale price is 10.68, cost of price

$$= \frac{100}{89} \times 10.68 = \frac{1068}{89} = \text{Rs. } 12$$

Now if we want to earn a profit of 10% then profit

$$= 12 \times \frac{10}{100} = \text{Rs. } 1.2$$

$$\text{Sale} = 12 + 1.2 = \text{Rs. } 13.2$$

95. A quantity of tea is sold at Rs. 48 per kg at a profit of 20%. The total gain is Rs. 90. What is the quantity of tea sold?

Ans. Rate of profit = 20%

If profit on Rs. 100 is Rs. 20 then sale price = Rs. 120

If sale price is Rs. 120 then cost price = Rs. 100

If sale price is 1 then cost price = $\frac{100}{120}$

If sale price is 48 then cost price = $\frac{100}{120} \times 48 = \text{Rs. } 40$

Profit = $48 - 40 = \text{Rs. } 8$

Rs. 8 is the profit on quantity = 1kg

Rs. 1 is the profit on quantity = $\frac{1}{8}$

Rs. 90 is the profit on quantity = $\frac{1}{8} \times 90$

$$= \frac{90}{8} = 11.25\text{kg}$$

96. If 13% is lost by selling goods for Rs. 1475, what would be the loss or gain if it is sold for Rs. 1615?

Ans. Rate of loss = 13%

If loss on Rs. 100 is Rs. 13 then sale price = $100 - 13 = \text{Rs. } 87$

If sale price is Rs. 87 then cost price = Rs. 100

If sale price is Re. 1 then cost price = $\frac{100}{87}$

If sale price is Rs. 1475 then cost price = $\frac{100}{87} \times 1475$

$$= \text{Rs. } 1695.40$$

If sale price = Rs. 1615

9. If a certain number is squared, the result is 121. What is the original number?
A) 9 B) 10
C) 11 D) 12
10. The product of two equal numbers is 225. What is the value of each number?
A) 15 B) 16
C) 17 D) 18
11. A square has an area of 64 sq. units. A smaller square has an area of 36 sq. units. What is the difference in their side lengths?
A) 1 unit B) 2 units
C) 3 units D) 4 units
12. The sum of the squares of two consecutive integers is 41. What are the numbers?
A) 3 and 4 B) 4 and 5
C) 5 and 6 D) 6 and 7

1.	A	2.	B	3.	C	4.	C	5.	D
6.	C	7.	B	8.	C	9.	C	10.	A
11.	B	12.	B						



CHAPTER - 4

DISTANCE -SPEED

1. A car travels 120 km in 2 hours, then 180 km in 3 hours. What is its average speed for the entire journey?
A. 40 km/h B. 50 km/h
C. 60 km/h D. 75 km/h
2. Two runners start from the same point. Runner A runs at 8 m/s and Runner B runs at 6 m/s. After 150 seconds, how much further has Runner A run than Runner B?
A. 300 m B. 225 m
C. 375 m D. 450 m
3. A train travels at 40 km/h for the first half of its journey and 60 km/h for the second half. If the total journey takes 5 hours, what is the total distance?
A. 240 km B. 200 km

- C. 250 km D. 300 km
4. A car travels at 50 km/h for 2 hours. If it increases its speed by 10 km/h, how much time will it take to cover the same distance?
A. 1.67 hours B. 1.5 hours
C. 2 hours D. 1.8 hours
5. Two buses depart from the same city in opposite directions. Bus A travels at 70 km/h, and Bus B travels at 80 km/h. How far apart will they be after 2.5 hours?
A. 350 km B. 375 km
C. 400 km D. 425 km

Answer:

1.	C	2.	A	3.	A	4.	A	5.	B
----	---	----	---	----	---	----	---	----	---



CHAPTER - 5

SETS

1. If $A = \{x \mid x \text{ is a natural number, } x < 10\}$ and $B = \{x \mid x \text{ is an even number, } x < 10\}$, what is $A \cap B$?
a) $\{1, 3, 5, 7, 9\}$
b) $\{2, 4, 6, 8\}$
c) $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$
d) $\{2, 3, 5, 7\}$
2. The common elements are $\{2, 4, 6, 8\}$. If $n(A) = 12$, $n(B) = 15$, and $n(A \cup B) = 20$, what is $n(A \cap B)$?
a) 5 b) 7
c) 8 d) None of these
3. If $A \subseteq B$, what is $A \cup B$?
a) A b) B
c) $A \cap B$ d) Φ
4. Two sets A and B are called disjoint if:
a) $A \cup B = U$ b) $A \cap B = A$
c) $A \cap B = \Phi$ d) $A \subseteq B$
5. If $U = \{1, 2, 3, 4, 5\}$ and $A = \{1, 3\}$, what is A' ?
a) $\{1, 3\}$ b) $\{2, 4, 5\}$
c) $\{1, 2, 3, 4, 5\}$ d) $\{1, 2, 4, 5\}$
6. Which of the following represents a proper subset?
a) $\{1, 2, 3\} \subset \{1, 2, 3\}$
b) $\{1, 2\} \subset \{1, 2, 3\}$

- c) $\{4, 5, 6\} \not\subset \{4, 5, 6\}$
 d) $\{\} \subset \{\}$
7. The set $\{a, b, c\}$ is an improper subset of which set?
 a) $\{a, b\}$ b) $\{a, b, c, d\}$
 c) $\{a, b, c\}$ d) $\{b, c\}$
8. What is the intersection of two disjoint sets?
 a) The set itself b) An empty set ($\emptyset$)
 c) The union of the sets
 d) All elements of both sets
9. Which pair of sets are disjoint?
 a) $\{1, 2, 3\}$ and $\{3, 4, 5\}$
 b) $\{a, b, c\}$ and $\{d, e, f\}$
 c) $\{1, 3, 5\}$ and $\{2, 3, 4\}$
 d) $\{\text{apple, banana}\}$ and $\{\text{banana, cherry}\}$
10. Set $A = \{x \mid x \text{ is an even number less than } 10\}$ and Set $B = \{y \mid y \text{ is a multiple of } 5 \text{ less than } 10\}$. Are these sets overlapping or disjoint?
 a) Disjoint b) Overlapping
 c) Both disjoint and overlapping
 d) Neither
11. If Set $P = \{3, 6, 9\}$ and Set $Q = \{3, 9, 12\}$, what is their intersection ($P \cap Q$)?
 a) $\{3\}$ b) $\{6, 9\}$
 c) $\{3, 9\}$ d) $\{3, 6, 9\}$
12. Which of the following represents De Morgan's first law for sets?
 a) $(A \cup B)' = A' \cap B'$
 b) $(A \cap B)' = A' \cup B'$
 c) $(A \cup B)' = A \cap B'$
 d) $(A \cap B)' = A \cup B$
13. Which of the following represents De Morgan's second law for sets?
 a) $(A \cup B)' = A' \cap B'$
 b) $(A \cap B)' = A' \cup B'$
 c) $(A \cup B)' = A \cap B'$
 d) $(A \cap B)' = A \cup B$
14. The law $(A \cup B)' = A' \cap B'$ is known as:
 a) Associative Law
 b) Distributive Law
 c) De Morgan's Law
 d) Commutative Law
15. If A' represents the complement of set A , then $(A \cap B)'$ is equivalent to:
 a) $A' \cup B'$ b) $A \cup B'$
 c) $A' \cap B'$ d) $A \cup B$
16. If A' represents the complement of set A , then $(A \cup B)'$ is equivalent to:
 a) $A' \cap B'$ b) $A \cap B'$
 c) $A' \cup B'$ d) $A \cap B$
17. Which Venn diagram illustrates $(A \cup B)'$?
 a) The area outside both A and B .
 b) The area outside A but inside B .
 c) The area inside A but outside B .
 d) The entire universal set.
18. Which Venn diagram illustrates $A' \cap B'$?
 a) The area outside both A and B .
 b) The area outside A but inside B .
 c) The area inside A but outside B .
 d) The area inside the universal set but outside of A and outside of B .
19. What is the dual of the statement $(A \cap B)' = A' \cup B'$?
 a) $(A \cup B)' = A' \cap B'$
 b) $(A \cup B) = A' \cap B'$
 c) $(A \cap B) = A' \cup B'$
 d) $(A \cap B)' = A \cap B'$
20. If $A = \{1, 2, 3\}$ and $B = \{3, 4, 5\}$, and $U = \{1, 2, 3, 4, 5, 6\}$, then $(A \cup B)'$ is:
 a) $\{1, 2, 3, 4, 5\}$ b) $\{6\}$
 c) $\{1, 2, 3, 4, 5, 6\}$
 d) $\{\}$ (Empty set)
21. If the Universal Set $U = \{1, 2, 3, 4, 5, 6\}$ and Set $A = \{1, 3, 5\}$, what is the complement of A (A')?
 A) $\{1, 3, 5\}$ B) $\{2, 4, 6\}$
 C) $\{1, 2, 3, 4, 5, 6\}$
 D) $\{\}$ (Empty Set)
22. The complement of a set A (denoted by A') contains:
 (A) Elements also in A
 (B) Elements not in A but in the universal set
 (C) All elements of the universal set
 (D) Elements not in the universal set

ASAN Cadet Colleges Admission Guide

General Science (6th)

*For Entry Tests Included in the Syllabus of Most of the
Cadet/PAF/Military Colleges*

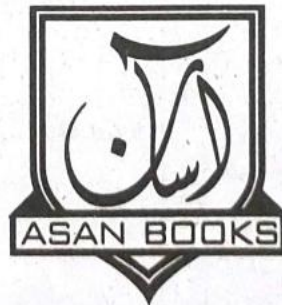
**Subjective + Objective + Solved Exercises +
Multiple Choice Questions**

By:

Engr. Khawar Mahmood

Principal: Foundation Pre-Cadet School & Academy, Islamabad

Published by



Academic Solutions & Assessment Network

Lahore – Islamabad – Quetta

Contents

Unit No. 1. Plant System	3	Unit No. 7. Solutions	79
Short & Long Q/As.....	3	Short & Long Q/As.....	79
Key Points.....	11	Key Points.....	83
Exercise Solution.....	11	Exercise Solution.....	83
Additional MCQs.....	16	Additional MCQs.....	84
Unit No. 2. Human Respiratory & Circulatory System	19	Unit No. 8. Force & Motion	87
Short & Long Q/As.....	19	Short & Long Q/As.....	87
Key Points.....	26	Key Points.....	94
Exercise Solution.....	26	Exercise Solution.....	94
Additional MCQs.....	28	Additional MCQs.....	96
Unit No. 3. Immunity & Diseases	32	Unit No. 9. Waves and Energy	98
Short & Long Q/As.....	32	Short & Long Q/As.....	98
Key Points.....	38	Key Points.....	104
Exercise Solution.....	38	Exercise Solution.....	105
Additional MCQs.....	40	Additional MCQs.....	109
Unit No. 4. Structure of Atom	42	Unit No. 10. Heat and Temperature	112
Short & Long Q/As.....	42	Short & Long Q/As.....	112
Key Points.....	47	Key Points.....	119
Exercise Solution.....	48	Exercise Solution.....	119
Additional MCQs.....	50	Additional MCQs.....	121
Unit No. 5. Physical and Chemical Changes	54	Unit No. 11. Technology in Everyday Life	125
Short & Long Q/As.....	54	Short & Long Q/As.....	125
Key Points.....	62	Key Points.....	128
Exercise Solution.....	62	Exercise Solution.....	128
Additional MCQs.....	65	Additional MCQs.....	129
Unit No. 6. Chemical Bonds	68	Unit No. 12. Earth & Space	132
Short & Long Q/As.....	68	Short & Long Q/As.....	132
Key Points.....	74	Key Points.....	136
Exercise Solution.....	75	Exercise Solution.....	137
Additional MCQs.....	77	Additional MCQs.....	139

Unit # 1

Plant System

Short & Long Q/As

Q. 1. Define Science. Why do we study science?

Ans: Science:

Science came from the Latin word, "Scientia" which means knowledge, a knowing, expertness or experience, covering general truth.

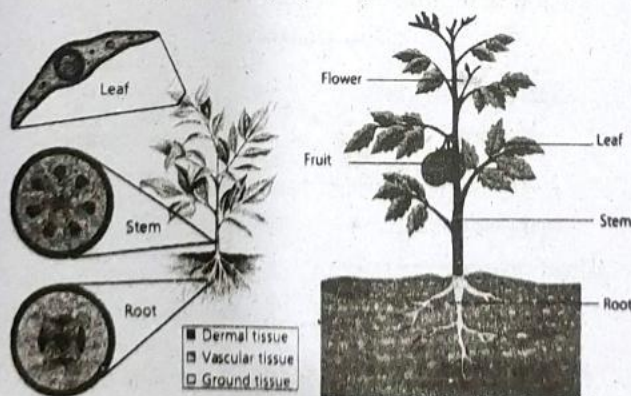
Why we study science:

Science is research-based knowledge, practice-based skill and inquiry-based approach to investigate and learn further through scientific method. The key activities involved in scientific method are observation, experimentation and deduction. Technology is application of scientific knowledge for solving daily life problems, making arduous works easy and improving quality of life. In order to meet the globally recognized standards, we need to broaden our educating horizons and adopt scientific method to learn science.

The inquiries and activities of scientific method involve observations, experimentations and conclusions. Hypothesis, theory and principle, etc., are the developmental stages in scientific research.

Q. 2. Name the organs and organ system in plants.

Ans: Organs and Organ System in Plants:



Organs and organ systems in plants

Q. 3. Name the two major systems of plants.

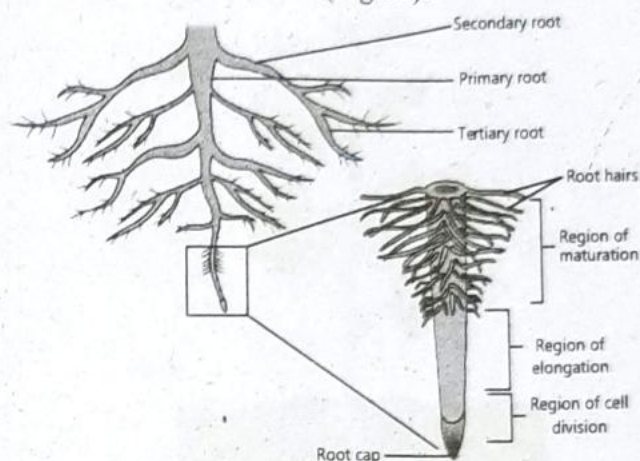
Ans: Plants have two major systems:

- (a) Roots system (b) Shoot system

Q. 4. Describe the structure and function of the Root system in plants.

Ans: Root System:

Roots are the underground parts of the plants forming a system specialized for absorption of water and minerals from the soil (Figure).



Parts of root

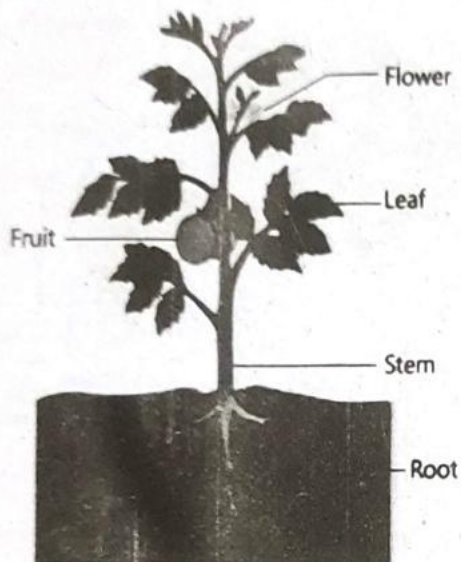
The initial root which grows from radicle of the embryo is the **primary root** or **tap root**. Its further branches form **secondary** and **tertiary** root system. The tips of roots and shoots in plants consist of tissues formed by the cells called meristematic tissues. These cells are specialized for growth. These cells increase in number by rapid cell division.

Root tip is covered by hard and protective structure called **root cap**. It protects the newly born soft cells from being damaged and environmental stresses. It enables root tip to grow through soil. More and more cells are formed by rapid cell divisions in this region causing the root to grow deep into the soil and elongate the root behind. The **region of maturation** has root hairs. **Root hairs** are thread like outgrowths of epidermal cells which increase the surface area for absorption of water. Plants, like grasses and strawberry have thread like roots spread in soil but not growing deep. Such roots are called **fibrous roots** (Figure).

the body. *Stomach* facilitates digestion of food. *Liver* produces chemicals (enzymes) which speed up digestion of food. *Lungs* conduct the exchange of gases. *Kidneys* help us to get rid of wastes.

Q. 5. What are the main functions of roots, stem and leaves?

Ans: Roots in plants absorb water and nutrients from soil. Stem supports the plants and leaves facilitate in making food.

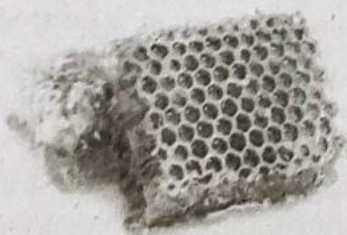


Plant's roots, stem and leaves

Q. 6. Define Cell. Draw the structure of an animal and a plant cell?

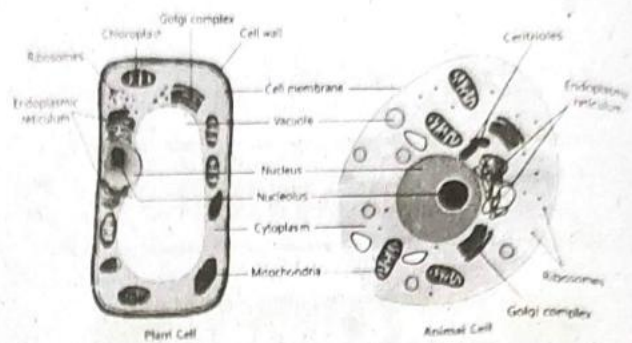
Ans: Cell:

The concept of cell has been taken from the cells of a honeycomb consisting of numerous small boxes/rooms.



Cells in a honeycomb

A cell is defined as the structural and functional unit of the living organisms. An adult animal or plant consists of trillions of cells. There are about 50 to 60 trillion cells in an adult human body. Cells are too small to see through naked eyes. Microscopic structures of plant and animal cells are shown below.



Microscopic structures of a plant cell and an animal cell

Q. 7. Define the cell organelles. Name common cell organelles.

Ans: Cell Organelles:

Different structures or parts of the cells are called **cell organelles**. Some common cell organelles are:

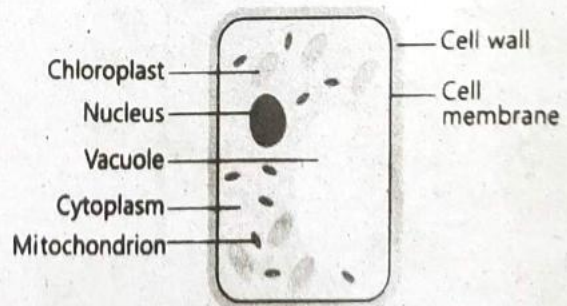
- (i) Cell Wall
- (ii) Cell Membrane
- (iii) Nucleus
- (iv) Cytoplasm
- (v) Chloroplast
- (vi) Mitochondrion
- (vii) Vacuole

Q. 8. Relate the structure of the following with the functions they perform.

- (i) Cell Wall; (ii) Cell Membrane;
- (iii) Nucleus

Ans: (i) Cell Wall:

Cell wall is present in the cells of plants, algae, fungi and bacteria. It is not present in animal cells. It makes the outer covering of the cells. In plant cells, it is mainly composed of cellulose. It supports the cell and maintains its shape.



Cell wall and cell membrane in a plant cell

(ii) Cell Membrane:

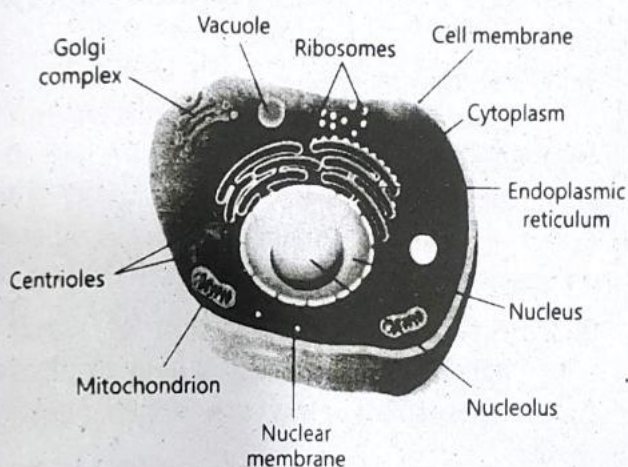
In an animal cell, the outermost covering of

the cell is called *cell membrane*. It is partially permeable and is also called *plasma membrane*. It separates the interior of the cells from the outer environment. In plant cell, it is found inside the cell wall (see figure above). Cell membrane is composed of *lipids* and *proteins*. Things enter or leave the cell by passing across the cell membrane.

(iii) Nucleus:

Nucleus is the most important cell organelle. In an animal cell, it is located almost in the centre of the cell (Figure below). In plant cells, a large vacuole pushes it to one side of the cell. Nucleus acts as brain of the cell and controls all its functions. Nucleus is also bounded by a membrane called **nuclear membrane**. The material inside the nucleus is called **nucleoplasm**. Nucleoplasm contains thread like structures called **chromosomes**. Chromosomes are made up of *DNA* and *protein*.

The nucleus also contains one or more small darkly coloured areas called **nucleoli** (singular: **nucleolus**).



Nucleus in an animal cell

Q. 9. Describe the structure and function of following cell organelles.

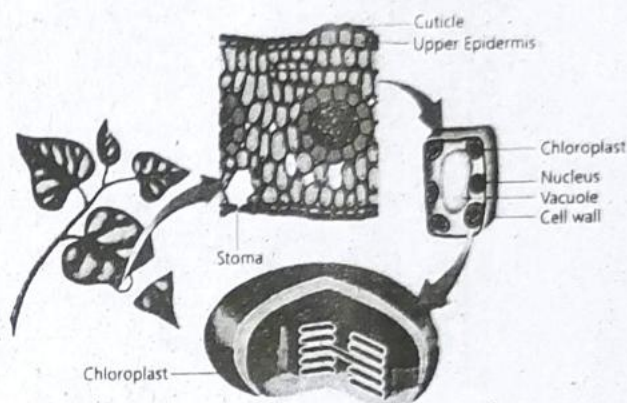
(i) Cytoplasm; (ii) Chloroplast

Ans: (i) Cytoplasm:

The content of the cell covered by cell membrane is called *cytoplasm*. It is a semi-viscous material that mainly consists of *water*, *salts* and *proteins*, etc. Most of the cell functions take place in cytoplasm. It facilitates the cell organelles floating in it to function properly.

(ii) Chloroplast:

Plant cells have *chloroplasts* containing green pigment called *chlorophyll* (figure below). This is the reason that the parts of the plants with chloroplasts in their cells look green. Chlorophyll absorbs energy from *sunlight* which is used in *photosynthesis* for production of food. Chloroplasts are thus called *food producers* in plant cells. Chloroplasts are not present in animal cells.



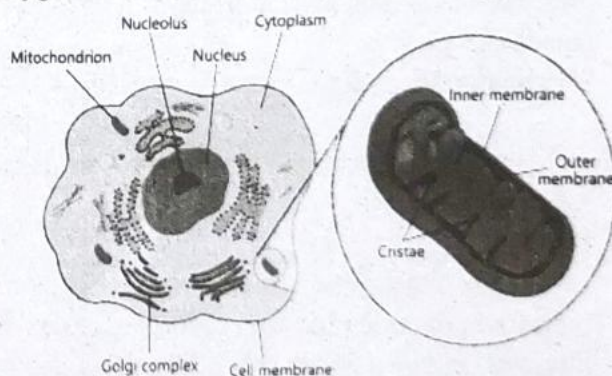
Chloroplast in plant cell

Q. 10. Relate the following with the function they perform.

(i) Mitochondria; (ii) Vacuole

Ans: (i) Mitochondria:

Mitochondria are rod shaped and double membranous cell organelles present in the *cytoplasm* of a cell (figure below). The inner membrane in mitochondria has finger like structures called *cristae*. Mitochondria are known as *power generators* in the cells. This is because, energy producing reactions are taking place in the mitochondria. During *respiration*, oxygen reacts with food to produce energy.



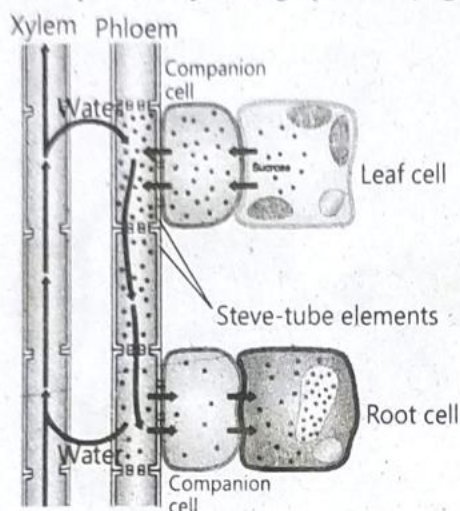
Mitochondrion in an animal cell

(ii) Vacuole

Cytoplasm of a plant cell contains a large or-

Transport of food (Translocation):

Food prepared by photosynthesis in leaves (carbohydrates, i.e., glucose, sucrose, etc.) enters the phloem *sieve tube elements* in dissolved form through companion cells. It is then transported to all other parts of plant body through phloem (Figure).



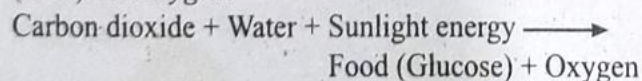
Transport of food in plants

Xylem tissue consists of dead cells joined end to end with no end walls to form a continuous tube. Phloem is composed of living cells called sieve tubes, companion cells and phloem **parenchyma**. Parenchyma is a type of permanent tissue forming major part of ground tissue in plants. The main function of parenchyma is to store and assimilate food.

Q. 7. Define the process of photosynthesis and derive word equation for it.

Ans: **Photosynthesis:**

Photosynthesis is defined as the process during which *carbon dioxide* and *water* combine in the presence of *sunlight* and *chlorophyll* to form glucose (food) and *oxygen*.



The process of photosynthesis depends on the following factors:

Light:

Photosynthesis requires energy for combining carbon dioxide and water to form glucose (food). Sunlight provides this energy. The rate of photosynthesis depends upon the *intensity of light*. There is more light intensity at noon, so, the rate of photosynthesis is fast at the noon. In the evening or morning, the rate of photosynthesis is slower due to less light

intensity. Photosynthesis stops at night, because, there is no sunlight at night.

Carbon Dioxide:

Air contains 0.35 to 0.4 % carbon dioxide. If there is more amount of *carbon dioxide* in the environment, the rate of photosynthesis will be fast, but once the carbon dioxide concentration reaches a certain level, there is no further increase in the rate of photosynthesis. Less quantity of carbon dioxide in an environment slows down the process of photosynthesis.

Water:

Besides carbon dioxide, *water* is also an essential requirement for photosynthesis. If it is not available as much as require, the rate of photosynthesis will be affected and plant will produce less food.

Chlorophyll:

The process of photosynthesis cannot take place without *chlorophyll*. It is only the chlorophyll which absorbs sunlight and makes it usable in the photosynthesis process. Chlorophyll is present in chloroplasts which are present in photosynthetic cells (mesophyll).

Temperature:

Like many other chemical reactions, photosynthesis is also affected by *temperature*. The suitable temperature for this process is 25 – 35°C. At very high or very low temperatures, the process of photosynthesis either stops or slows down.

Q. 8. Explain that the structure of leaves is adopted to the process of photosynthesis.

Ans: **Adaptations in leaf structure for photosynthesis:**

1. The blades of leaves are flat and absorb maximum light required for photosynthesis.
2. Thin blades of leaves make the *light* and *carbon dioxide* reach the internal parts easily.
3. Thick layer of palisade mesophyll containing large number of *chloroplasts* just beneath the *upper epidermis* can make maximum absorption of light to make food for the plant.
4. Maximum *air spaces* among *spongy mesophyll* near the lower epidermis provide an easy passage for carbon dioxide to diffuse into cells containing chloroplasts to facilitate photosynthesis.

5. Numerous *stomata* in the lower epidermis absorb maximum carbon dioxide from the air needed for photosynthesis.
6. Division of *vascular bundles* into small branches spread throughout the leaf makes an easy and maximum water supply needed for photosynthesis.

Q. 9. Which minerals are required by plants to maintain healthy growth and life processes? OR Describe the role of magnesium and nitrogen in plants nutrition.

Ans: Mineral Nutrition in Plants:

Minerals are the chemical substances required by an organism for growth and other vital functions. *Carbon, hydrogen, oxygen, nitrogen, magnesium*, etc. are the nutrients required by plants in large quantities. Carbon, hydrogen and oxygen are obtained from carbon dioxide and water. The other nutrients like magnesium and nitrogen are obtained from the soil dissolved in water.

Magnesium:

Magnesium is required by plants for the formation of chlorophyll. It is helpful for the functioning of *enzymes* to produce *carbohydrates* and *fats*. Its deficiency causes poor growth, yellowing and wilting of leaves.

Nitrogen:

Nitrogen in the form of its compounds, (nitrates) dissolved in soil water, is required by plants for making *chlorophyll* and *amino acids*. Amino acids form *proteins*. Chlorophyll is necessary for photosynthesis. Proteins are necessary for growth, repair and other developments and defensive functions. Deficiency in nitrogen makes the leaves pale green or yellow. It affects the rate of photosynthesis and growth in plants.

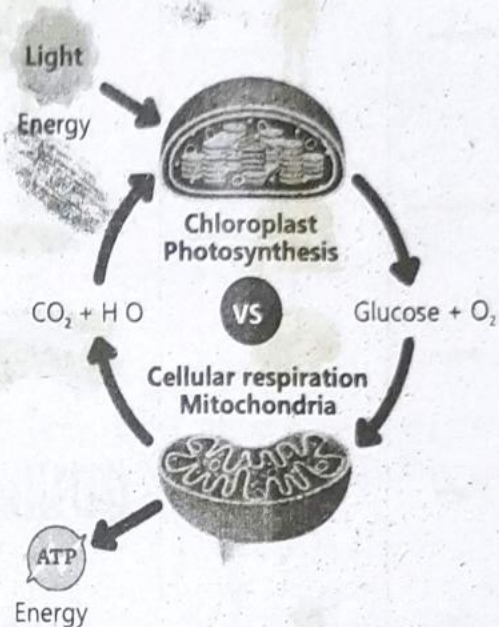
Q. 10. Describe the process of respiration and write word equation for it.

Ans: Respiration in Plants:

Respiration is defined as the process during which glucose (food) reacts with oxygen to produce carbon dioxide, water and energy required for survival of life.

Food (Glucose) + Oxygen $\longrightarrow$ Carbon dioxide + Water + Chemical energy
Respiration takes place in all the cells of liv-

ing bodies. ~~The mitochondria~~ which are found in the cells perform the process of *respiration*. For this reason, mitochondria (Figure) are called power house of the cell.



Comparison between photosynthesis and respiration

Importance of Respiration:

Respiration is the only process which provides energy in usable **form** by living things. This process continues all the **time** in all kinds of living organisms. **Stopping** of **respiration** means death of the organism. In **plants**, the **oxygen** required for respiration comes from **photosynthesis**.

Q. 11. Compare and contrast the process of photosynthesis and respiration.

Ans: Comparison and Contrast between Photosynthesis and Respiration:

1. *Photosynthesis* takes place in green plants, algae and some bacteria, whereas, *respiration* takes place in all the living things.
2. *Photosynthesis* takes place in *chloroplasts*, whereas, *respiration* takes place in *mitochondria*.
3. *Photosynthesis* uses *sunlight energy* to prepare food, whereas, *respiration* releases energy from *food* which is used for growth and performing all other body functions.
4. The **products** made during photosynthesis, i.e., glucose and oxygen are the reactants of

oesophagus, stomach, small intestine and large intestine.

- ❖ Digestive glands include salivary glands, gastric glands, liver, and pancreas.
- ❖ Oesophagus is just a passage way. No digestion takes place here.
- ❖ Stomach is a bag like structure. Its digestive glands secrete gastric juice which contains hydrochloric acid, enzymes and water.
- ❖ Bile is produced in liver and stored in gallbladder. Pancreatic juice is produced by pancreas. Bile breaks large drops of fats into small droplets. Digestion and absorption of food is completed in small intestine.
- ❖ In large intestine, salt, water and minerals are absorbed. Undigested food is converted into faeces which are removed from the body through the opening of the rectum called anus.

Exercise Solution

4.1 Fill in the blanks.

- Salivary glands secrete _____.
- The end products of digestion of proteins are _____.
- Finger-like projections in the lining of small intestine are called _____.
- Bile is secreted by _____.
- The function of the gallbladder is to store _____.

Solution:

1. Salvia	2. Amino acids
3. Villi	4. Liver 5. Bile

4.2 Select the correct option.

- A part of the digestive system which is not in contact with food.
 - small intestine
 - stomach
 - liver
 - large intestine
- In humans, most of digestion takes place in:
 - mouth
 - oesophagus
 - stomach
 - small intestine

- Saliva is produced in:
 - oral cavity
 - oesophagus
 - stomach
 - small intestine
- The food digested by the enzyme 'sucrase' belongs to nutrients group:
 - carbohydrates
 - fats
 - oils
 - proteins
- The muscular tube leading from oral cavity to stomach:
 - small intestine
 - large intestine
 - oesophagus
 - bile duct
- Germes present in food are killed in stomach by:
 - hydrochloric acid
 - citric acid
 - carbonic acid
 - none of these
- Digestive enzymes convert starch into:
 - fatty acids
 - vitamins
 - minerals
 - simple sugar
- Proteins are digested, into:
 - fatty acids
 - amino adds
 - glycerol
 - glucose
- Digested food is absorbed into blood through the walls of:
 - villi
 - large intestine
 - stomach
 - bile duct
- Water and salts from undigested food are absorbed into blood through walls of:
 - small intestine
 - large intestine
 - villi
 - gallbladder

Solution:

1. c	2. d	3. a	4. a	5. c
6. a	7. d	8. b	9. a	10. b

4.3 Give short answer.

- Define digestion.

Ans: See Q. No. 1

- How is chewing important in human digestive system?

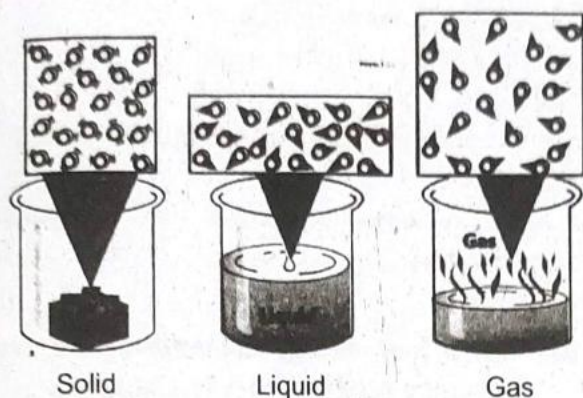
Ans: See Q. No. 3

- Name the liquid which is secreted by salivary glands.

Ans: Saliva is secreted by salivary glands.

Heat energy:

Energy of a substance due to movement of its particles is called heat energy. When a substance is heated, its particles move fast and its hotness or temperature increases. When a substance is cooled, movement of its particles slows down and temperature decreases (Figure).



Heat energy of the objects

Light energy:

Light is a form of energy. It travels in the form of rays and waves.

Sound energy:

Sound is a form of energy. It is produced by vibrating objects.

Electrical energy:

Flow of electrical charge is called electrical energy or electricity. It is produced by electric generators.

Mechanical energy:

Mechanical energy is the energy possessed by an object due to its motion as well as due to its position. Therefore, it is the sum of kinetic energy and potential energy.

At hydropower stations, flowing water energy (K.E.) is used to produce electricity. In wind power stations, energy (K.E.) of wind is used to produce electricity.

Q. 6. Why energy is a physical quantity? What is its unit?

Ans: A physical quantity is the property of matter or value of a system that can be quantified or measured. Energy is expressed as work done. It can be measured. It is therefore a physical quantity. In System International (SI), the standard unit used to measure energy is Joule (J).

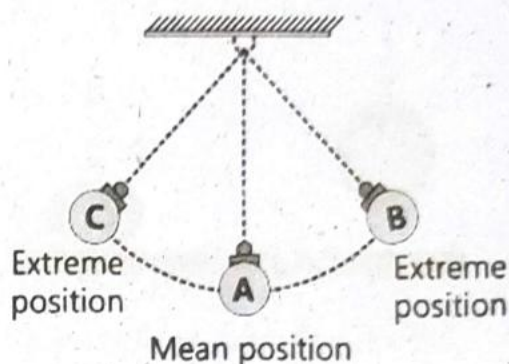
Q. 7. Describe the law of conservation of energy. How will you explain this law with the help of simple pendulum?

Ans: Definition of "Law of Conservation of Energy":

"Energy can neither be created nor be destroyed, but, it can be changed from one form to another." This fact is known as law of conservation of energy.

Explanation:

We explain this law with the help of a simple pendulum (Figure).



Conservation of energy in the motion of a simple pendulum

As shown in the Figure, the position A is the mean position of the bob (metallic ball). If it is displaced from position A to B and left free to move to and fro from position B to C and C to B by passing through A. During motion, its energy will be conserved as under:

- At positions B and C, it has maximum potential energy and no kinetic energy.
- During motion from B to A and from C to A, its potential energy keeps converting into kinetic energy.
- At position A, it has maximum kinetic energy and no potential energy.
- During motion from A to B and then back from A to C, its kinetic energy keeps converting into potential energy.
- During the process, energy is also consumed in the form of work done. In this way, the energy keeps on changing its forms but not ceased.

28. The winds when blow over the surface of the sea, causes
- Tides
 - Lakes
 - Oceans
 - River
29. Our food contains
- Chemical energy in the form of kinetic energy
 - Chemical energy in the form of mechanical energy
 - Chemical energy in the form of nuclear energy
 - Chemical energy in the form of potential energy
30. A bus has:
- Mechanical energy
 - Chemical energy
 - Kinetic energy
 - None of these
31. Food has:
- Mechanical energy
 - Chemical energy
 - Kinetic energy
 - None of these

Solution:

1. b	2. d	3. d	4. c	5. b
6. a	7. b	8. d	9. d	10. b
11. a	12. b	13. d	14. c	15. c
16. c	17. c	18. c	19. a	20. a
21. d	22. a	23. b	24. a	25. a
26. a	27. b	28. a	29. d	30. c
31. b	32. b			



Unit # 9

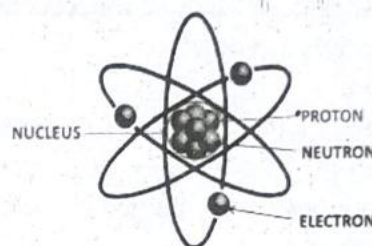
Electricity

Short & Long Q/As

Q. 1. What is charge? How does it produce electricity?

Ans: Charge:

Electricity is a form of energy. It is produced by the charge. Charge is the basic property of matter. It is of two types, i.e., positive charge and negative charge. Positively charged protons and negatively charged electrons are present in every atom of the matter (Figure).

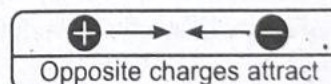
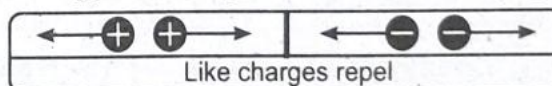


Electrons, neutrons and protons in an atom

An electrical charge is created when electrons are transferred to or removed from an object. Electrons have negative charge, when they are added to an object, it becomes negatively charged.

Properties of charge:

1. Like charges repel each other.
2. Opposite charges attract each other (Figure).



Properties of charges

Q. 2. Despite the presence of positively charged protons and negatively charged electrons in an atom, it is known as a neutral particle. Why?

Ans: Investigation and discussion about atom:

As for as, the total number of negatively charged electrons remains equal to the total

Unit # 11

Technology in
Everyday Life

Short & Long Q/As

Q. 1. Name the type of seasonal plants.

Ans: Seasonal plants are mainly divided into two types, summer plants and winter plants.

Q. 2. Define the following:

- a. **Agriculture**
- b. **Fertilizers**
- c. **Solar energy**
- d. **Solar oven**

Ans:

- a. **Agriculture**
An occupation related to growing crops and rearing animals is called *agriculture*.
- b. **Fertilizers**
Chemicals consisting of minerals and other nutrients used to enhance soil are called *fertilizers*.
- c. **Solar energy**
Energy coming from the Sun is called *solar energy*.
- d. **Solar oven**
A device which makes use of solar energy for cooking foods is called *solar oven*.

Q. 3. When are summer plants grown? Name the summer vegetables and summer flowers.

Ans: Summer Plants:

Summer season vegetables and other plants are grown generally in February-March and harvested in September-October.

Examples:

Bitter gourd, Brinjal, Cucumber, Okra, Tomato, Pepper, etc.



Bitter gourd



Pepper



Cucumber



Brinjal



Okra



Tomato

Summer vegetables

Summer season flowering plants are generally first grown in nursery, beds as seedlings which are then transplanted in fields or earthen pots.

Examples:

Sunflower, Rose Moss (Gul-e-Dophari), Marigold (Gainda), Gul-e-kalga (Kock's comb), Touch-me-not (Choimoi) and Zinnia.



Sunflower



Touch-me-not



Zinnia



Kock's comb



Marigold



Rose Moss

Summer flowers

Q. 4. What is the importance of agriculture as a profession?

Ans: Agriculture is an occupation of growing crops and rearing animals. Farming is a part of agriculture where crops are grown and animals reared on a commercial scale by planning. Growing plants and rearing domesticated birds and animals belong to agriculture profession.

Q. 5. When are winter plants grown? Name the winter vegetables and winter flowers.

Ans: Winter Plants:

Winter season vegetables and other plants

lar muscles are responsible for pupil accommodation and reaction to light.

2. Structure and functions of the following in plants:

(a) Epidermal tissue

Ans: Epidermal tissues are the outermost layer of cells covering the stem, root, leaf, flower, fruit and seed. It provides a protective barrier against mechanical injury, water loss and infection.

(b) Mesophyll tissue

Ans: Palisade mesophyll tissues are elongated tightly packed together, forming a layer beneath the upper epidermis.

(c) Chloroplast

Ans: Chloroplast contains spongy mesophyll cells. Photosynthesis takes place in these tissues. Mesophyll cells are loosely arranged with air spaces among them.

Additional MCQs

- A cell wall consists of:**
 - Chlorophyll
 - Centriole
 - Cytoplasm
 - Cellulose
- The part of the cell which provides energy is:**
 - Mitochondrion
 - Vacuole
 - Nucleus
 - Cytoplasm
- The passage of a material in and out of the cell is controlled by:**
 - Cell wall
 - Cell membrane
 - Cytoplasm
 - Chromosome
- The tissue which is responsible for preparation of food in plants is:**
 - Photosynthetic tissue
 - Vascular tissue
 - Epidermal tissue
 - Nervous tissue
- Proteins are made by:**
 - Ribosomes
 - Mitochondria
 - Nucleus
 - Chloroplasts
- There are the tiny building block structured units that make up all living things.**
 - Cells
 - Tissues
 - Organs
 - Systems
- Scope means to:**
 - Examine
 - See
 - Judge
 - Decide
- Compound microscope has:**
 - 4 lenses
 - 3 lenses
 - 5 lenses
 - 2 lenses
- An animal cell has:**
 - cell membrane, nucleus, ribosome, centriole and chloroplast
 - Cell membrane, nucleus, ribosome, centriole and cell wall
 - Cell membrane, nucleus, ribosome, centriole and vacuole
 - All of these
- It takes part in making proteins:**
 - Mitochondria
 - Nucleus
 - Cytoplasm
 - Ribosomes
- In an animal cell there are:**
 - 2 centrioles
 - 4 centrioles
 - 3 centrioles
 - 5 centrioles
- Cell wall in plant cells, consists of:**
 - Nitrogen
 - Cellulose
 - Glucose
 - Fructose
- It absorbs light energy to make glucose:**
 - Mitochondria
 - Ribosome
 - Chlorophyll
 - Nucleus
- It is absent in plant walls:**
 - Mitochondria
 - Cell membrane
 - Centrioles
 - Nuclear membrane
- These are animal tissues:**
 - Epidermal tissues and nerve tissues
 - Vascular tissues and muscular tissues
 - Epidermal and vascular tissues
 - Nerve tissues and muscle tissues
- The true level of organisation is:**
 - Tissues→cells→systems→organs
 - Organs→cell tissues→system
 - cells→tissue→organs→systems
 - Cells→organs→systems→tissues
- It stores water, food and waste products:**
 - Centrioles
 - Mitochondria
 - Vacuole
 - Chromosomes
- It contains genes and control transfer of characteristics**
 - Centrioles
 - Mitochondria
 - Vacuole
 - Chromosomes

Unit # 3

Immunity & Diseases

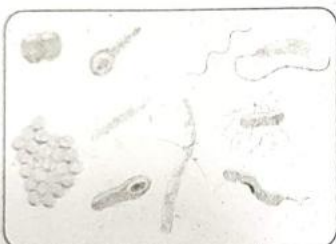
Short & Long Q/As

Q. 1. Name the disease causing organisms (agents).

Ans: The disease causing organisms (agents) are as under:



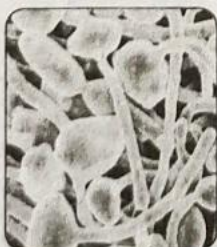
Virus



Bacteria



Plasmodium



Fungus

Q. 2. Define the following:

a. Immunity

- b. Infection
- c. Antibodies
- d. Pathogens
- e. Parasites

Ans:

a. **Immunity**

Ability of an organism's body to defend itself against disease-causing organisms is called immunity.

b. **Infection**

Entry and growth of microorganisms into the bodies of other organisms is called infection.

c. **Antibodies**

Proteins that protect human body when an unwanted substance enters it are called antibodies.

d. **Pathogens**

Disease causing microorganisms are called pathogens.

e. **Parasites**

An organism living in the body of another organism for food that may cause diseases are called parasites.

Q. 3. Write 'C' against the correct and 'I' against the incorrect statement in the middle column. Also correct the incorrect statement and write it in the next column.

Ans:

Correct/Incorrect	C/I	Correct statement
Diseases that can be transmitted from one person to another are called contagious diseases.	C	
Diseases that are not transferred from one person to another are called contagious diseases.	I	Diseases that are not transferred from one person to another are called non-contagious diseases.
Cancer and diabetes are the examples of contagious diseases.	I	Cancer and diabetes are the examples of non-contagious diseases.

deficiency.

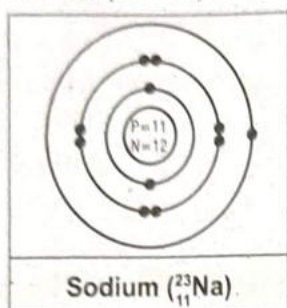
- i. **Iron-59** is used to study absorption of iron in human body.
- j. **Cobalt-60** is used in cancer treatment.
- j. **Iodine-131** is used to treat a disease called goiter.

4.5 Project

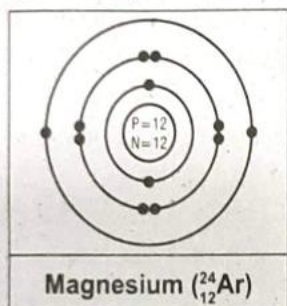
1. Draw the atomic structures of sodium and magnesium having atomic number 11 and 12 respectively.

Ans:

Sodium ($Z = 11, A = 23$)



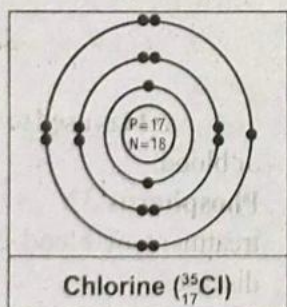
Magnesium ($Z = 12, A = 24$)



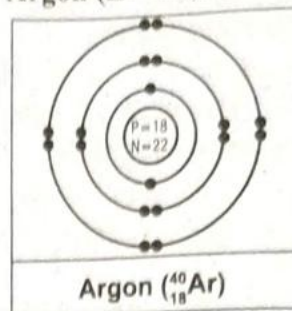
2. Draw the atomic structures of chlorine and argon having atomic number 17 and 18.

Ans:

Chlorine ($Z = 17, A = 35$)



Argon ($Z = 18, A = 40$)



Additional MCQs

1. The smallest particle of matter that cannot exist independently is called:
 - a. Molecule
 - b. Atom
 - c. Element
 - d. Compound
2. For the first time, the idea of atom was given by:
 - a. An English Scientist John Dalton
 - b. A Greek Philosopher Democritus
 - c. An English scientist Aristotle
 - d. A Greek philosopher Dalton
3. In 19th century, he presented the first atomic model:
 - a. An English Scientist John Dalton
 - b. A Greek Philosopher Democritus
 - c. An English scientist Aristotle
 - d. A Greek philosopher Dalton
4. These are present in the nucleus, in the central part of an atom:
 - a. Proton only
 - b. Proton and neutron
 - c. Neutron only
 - d. Proton and electron
5. It revolves around the nucleus and has negative charge:
 - a. Proton
 - b. Neutron
 - c. Electron
 - d. Both a. and b.
6. It has positive charge and present in the nucleus:
 - a. Electron
 - b. Proton
 - c. Neutron
 - d. None of these
7. The number of protons in an atom is equal to:
 - a. The number of neutrons present in its nucleus.
 - b. The number of electrons present in its nucleus.
 - c. The number of electrons revolving around nucleus.

have few bones present in their jaws that can sense slight vibration on the ground. So they know some one coming towards them.

Additional MCQs

1. A wave in which particles of the medium move perpendicularly to the direction of the wave is called:
 - a. Longitudinal wave
 - b. Transverse wave
 - c. Compressional wave
 - d. None of these
2. A wave in which particles of a medium move back and forth, parallel to the direction of the wave is called:
 - a. Longitudinal wave
 - b. Transverse wave
 - c. Compressional wave
 - d. None of these
3. The part of the longitudinal waves where particles of the medium are spread out, are called:
 - a. Compressions b. Refraction
 - c. Rarefactions d. Dispersion
4. The parts of a longitudinal wave, where particles of the medium are compressed together:
 - a. Compressions b. Refraction
 - c. Rarefactions d. Dispersion
5. Sound waves are:
 - a. Transverse waves
 - b. Longitudinal waves
 - c. Rarefactional waves
 - d. None of these
6. Waves that are produced in water are:
 - a. Transverse waves
 - b. Longitudinal waves
 - c. Rarefactional waves
 - d. None of these
7. By moving the free end of a rope up and down, when the other end is fixed in a wall, we create:
 - a. Transverse waves
 - b. Longitudinal waves
 - c. Rarefactional waves
 - d. None of these
8. The lowest point between two crests is called:
 - a. Incident point b. Trough
 - c. Normal point d. None of these
9. In case of transverse waves, wavelength is:
 - a. The shortest distance between two adjacent crests.
 - b. The shortest distance between two adjacent troughs.
 - c. Both a. and b.
 - d. None of these
10. Wavelength is the distance between (in case of longitudinal waves):
 - a. Two adjacent compressions or rarefactions
 - b. Two adjacent crests
 - c. Two adjacent troughs
 - d. Both b. and c.
11. Amplitude is:
 - a. The maximum distance of the particles of the medium from the rest position.
 - b. The height of a crest, in case of transverse waves.
 - c. The depth of a trough, in case of transverse waves
 - d. All of these
12. The number of vibrations produced by a vibrating body in one second is called its:
 - a. Amplitude b. Frequency
 - c. Pitch d. Wavelength
13. Hertz (Hz) is the unit of :
 - a. Amplitude b. Pitch
 - c. Frequency d. Wavelength
14. Speed of sound in air is:
 - a. 530 m/s b. 430 m/s
 - c. 330 m/s d. 630 m/s
15. The speed of sound in liquids is:
 - a. Two times than the speed in air
 - b. Three times than the speed in air
 - c. Five times than the speed in air
 - d. 10 times than the speed in air
16. Speed of sound in bricks is:
 - a. 1600 m/s b. 3600 m/s
 - c. 4600 m/s d. 5600 m/s
17. Frequency is the:
 - a. Number of vibrations produced by a vibrating body in 1 second.
 - b. Number of vibrations produced by a vibrating body in 1 minute.

Unit # 11

Technology in
Everyday Life

Short & Long Q/As

Q. 1. What does irrigation means? Explain drip and sprinkler irrigation.

Ans: Irrigation:

Irrigation means to provide water for agriculture.

Drip and Sprinkler Irrigation:

Drip Irrigation:

Drip irrigation is a type of irrigation system by which wastage of water and nutrients is controlled by allowing water to drip slowly to the roots of plants. This system distributes water through a network of pipes, valves, tubing, etc.

Sprinkle Irrigation:

Sprinkle irrigation involves use of pipes to distribute water with the help of spray heads which moisten the whole soil surface.

Q. 2. Describe the preparation/method of simple drip irrigation system.

Ans: Making a Simple Drip Irrigation System:

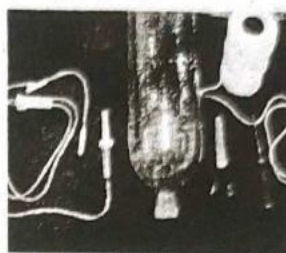
Material required:

Plastic bottles, drip pipes each fitted with needle and valve/stopper, glue gun, thread, small sized screw driver potted plants, etc.

Procedure:

1. Take clean plastic bottles, cut their bottom ends and make holes in their lids using hot screw driver.
2. Hang the bottles above the potted plants with some supports with the help of the thread.
3. Attach the needle ends of the drip pipes with the stems of the potted plants in such a way that the needles can drip water to the roots of the plants.
4. Insert the other ends of the drip pipes in the bottles through holes in their lids.

5. Put some glue with the help of glue gun to fix the hole and pipe.
6. Fill the bottles with water through their cut ends.
7. Water will start dripping and easily be able to reach plant roots.
8. We can stop dripping of water with the help of stoppers or valves fitted in the drip pipes.



Q. 3. How will you direct to make sprinkler irrigation system?

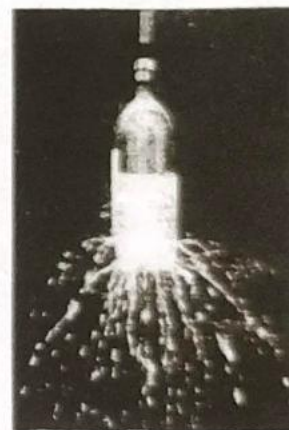
Ans: Sprinkler Irrigation System:

Material required:

Plastic bottle, plastic pipe, tub or plastic water tank, glue gun, iron nail, etc.

Procedure:

1. Take a plastic water tank, make a hole in it slightly above its bottom and place it at certain height.
2. Fix one end of the plastic pipe in the hole made in water tank.
3. Put some glue with the help of glue gun to fix the pipe in the hole in water tank.
4. Fix the other end of the pipe over the mouth of a plastic bottle and apply the glue with the help of glue gun.
5. Make small holes in the bottom of the plastic bottle with the help hot iron nail.
6. Hang the plastic bottle over the plants.
7. Fill the water tank with water containing dissolved chemical fertilizers.
8. The water with dissolved salts (fertilizers)



- c) Animal cells
- d) Fungi

Frog Life Cycle

13. Which is the first stage in the life cycle of a frog after the egg stage?
 - a) Tadpole b) Froglet
 - c) Adult frog d) Spawn
14. The process of a tadpole gradually developing into a frog is called:
 - a) Fertilization b) Metamorphosis
 - c) Respiration d) Ingestion
15. What is the adult frog's primary method of breathing?
 - a) Gills b) Lungs and skin
 - c) Fins d) Water absorption

Fish Life Cycle

16. Where do most fish lay their eggs?
 - a) On land b) In the air
 - c) In water d) In nests on trees
17. What is the stage of a young fish called?
 - a) Tadpole b) Larva
 - c) Fry or juvenile d) Embryo
18. Which of the following is a key difference between a fish embryo and a tadpole embryo?
 - a) Fish embryos develop in water, tadpoles on land.
 - b) Fish embryos develop with fins, tadpoles with legs.
 - c) Fish embryos do not breathe, tadpoles do.
 - d) Fish embryos typically hatch into "fry" with gills, while tadpoles are a distinct larval stage.

Germination of Seed

19. What is the first part of a seedling to emerge from the seed during germination?
 - a) Leaf b) Stem
 - c) Roots (radicle) d) Cotyledons
20. Which of these is a necessary condition for seed germination?
 - a) Light b) Oxygen
 - c) High temperature
 - d) All of the above

21. What is the protective outer layer of a seed called?
 - a) Embryo b) Cotyledon
 - c) Seed coat (testa) d) Stigma

Micropropagation

22. Micropropagation is a form of:
 - a) Sexual reproduction
 - b) Asexual reproduction (vegetative propagation)
 - c) Pollination
 - d) Photosynthesis
23. What does micropropagation involve for plant propagation?
 - a) Growing plants from seeds
 - b) Using cuttings from a parent plant
 - c) Growing plant cells or tissues in a laboratory
 - d) Using pollen for pollination
24. The small pieces of plant tissue used in micropropagation are called:
 - a) Seeds b) Cuttings
 - c) Explants d) Roots

Nymph

25. What is a nymph in the context of an insect's life cycle?
 - A) A fully developed adult insect.
 - B) The stage between larva and adult in complete metamorphosis.
 - C) An immature insect whose overall form resembles the adult but lacks wings or fully developed reproductive organs.
 - D) A young insect that is born live and doesn't undergo molting.

Moult

26. What is the process of "moulting" in insects?
 - A) The absorption of minerals from the soil.
 - B) A directional growth response to light.
 - C) The shedding of an insect's outer skeleton to allow for growth.
 - D) The development of a protective covering around an insect.

CHAPTER - 13**SIMPLE CHEMICAL REACTIONS**

1. Which of the following is a characteristic of an endothermic reaction?
A. It releases heat into the surroundings.
B. The temperature of the surroundings increases.
C. Heat energy is absorbed from the surroundings.
D. Chemical bonds are formed in preference to breaking.
2. Melting ice cubes is an example of a physical process that demonstrates the principle of an endothermic reaction. Why is this process classified as endothermic?
A. Water molecules gain energy from the surroundings to break bonds.
B. Heat is released as water molecules form hydrogen bonds.
C. The process requires energy to be put into the system to break bonds.
D. The water molecules lose energy and become more ordered.
3. A chemical reaction is described as having a positive energy change. This indicates:
A. An exothermic reaction where heat is released.
B. An endothermic reaction where heat is absorbed.
C. A combustion reaction.
D. A reaction where bonds are predominantly formed.
4. Which of the following processes is an example of an endothermic reaction?
A. The burning of wood in air.
B. The dissolution of sodium hydroxide in water.
C. The reaction of citric acid and sodium hydrogen carbonate.

- D. Neutralisation reaction between an acid and an alkali.
5. If a chemical reaction causes a significant decrease in the temperature of the reaction mixture, it is most likely to be:
A. A decomposition reaction where energy is released.
B. An exothermic reaction where heat is transferred to the surroundings.
C. An endothermic reaction where heat is absorbed from the mixture.
D. A reaction where bonds are formed more readily than they are broken.
6. Which statement best explains why thermal decomposition reactions are endothermic?
A. The formation of new chemical bonds releases a large amount of energy.
B. Energy is required to break down the single reactant into multiple products.
C. The products have more complex structures than the reactant.
D. Energy is released as the system moves towards a more stable state.

Rusting of Iron

7. Which of the following is the most effective method for preventing rusting by using a sacrificial metal?
A) Painting the iron surface
B) Coating with zinc (Galvanization)
C) Alloying with chromium to form stainless steel
D) Alloying with silicon to form cast iron
8. In the process of rusting, iron reacts with which two substances in the air to form hydrated iron(III) oxide?
A) Oxygen and nitrogen
B) Water and carbon dioxide
C) Oxygen and water
D) Water and hydrogen

Burning of Fuel