

8

NEET/IIT/JEE

FOUNDATION

COURSE

PREFACE

This book is specially for the students to get ready for competitive exams. The objective of this book is to make the students get ready for future.

At the same time it guides the students to face the challenges in math and science in various fields.

It places emphasis on developing, thinking and reasoning skills among students, by connecting mathematics, science curriculum with real life situations.

This book is compiled with four chapters in mathematics and three chapters in science. Each chapter is divided under different heads.



KEY FEATURES



UNDERSTANDING

Students will be able to understand the concept of different topics with related formulas, equations and concepts.

APPLICATION

- Apply effectively with the help of the guidelines given.*

ANALYSIS

- Analyze the concepts using the given formula and equations.*

OUTCOME

Get ready for competitive exams in future.

*“Education is the kindling of a flame,
Not the Filling of a vessel”*

IIT/JEE FOUNDATION COURSE
MATHEMATICS

*Mathematics Is Not About Numbers,
Equation, Computations, Or Algorithms: It Is
About Understanding.*



8 –MATHS

CONTENT

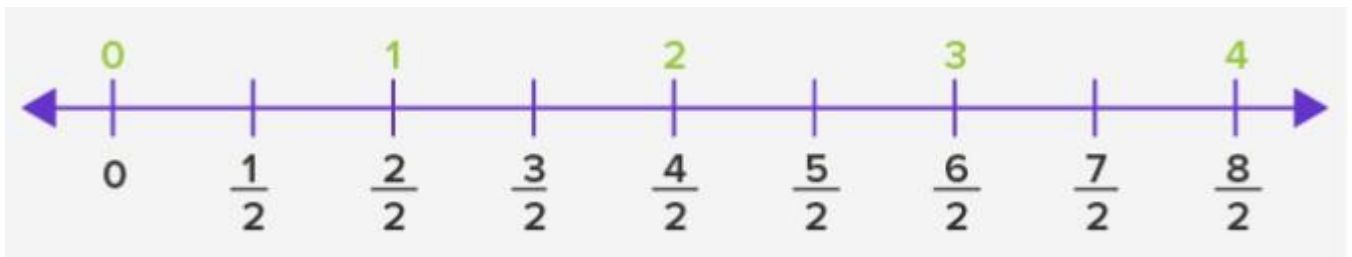
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UNIT-1 NUMBERS

Rational numbers

The numbers that can be expressed in the form of p/q where p and q are integers and $q \neq 0$.

Rational numbers can be represented on a number line between any two rational numbers.



Properties of Rational numbers:

Commutative property: $a+b = b+a$ and $a \times b = b \times a$

Addition and multiplication satisfies commutative property.

- **Associative property:** $a+(b+c)=(a+b)+c$
 $a \times (b+c)=(a \times b) + c$

- **Distributive property:**

$$a \times (b+c)=(a \times b)+(a \times c)$$

$$a \times (b-c)=(a \times b)-(a \times c)$$

- Additive identity is zero
- Additive inverse of p/q is $(-p/q)$
- Multiplication identity is 1
- Multiplicative inverse of p/q is q/p

COMPARISION OF FRACTION

$$\frac{1}{3} < \frac{5}{3}$$

Squares are the results obtained when we multiply a number by itself.

For example, The Square of 3 is $3 \times 3 = 3^2 = 9$.

Cubes are the results obtained when we multiply a number by itself thrice, i.e., three times.

The cube of 3 is $3 \times 3 \times 3 = 3^3 = 27$.

Find the square root:

1. $\sqrt{121}$
2. $\sqrt{0.25}$
3. $\sqrt{\frac{4}{9}}$

Solution

- a. $\sqrt{121} = \sqrt{11^2} = 11$
- b. $\sqrt{0.25} = \sqrt{0.5^2} = 0.5$
- c. $\sqrt{\frac{4}{9}} = \sqrt{\left(\frac{2}{3}\right)^2} = \frac{2}{3}$

Find the negative square root:

- a. $-\sqrt{64}$
- b. $-\sqrt{1}$

Solution

- a. $-\sqrt{64} = -\sqrt{8^2} = -8$
- b. $-\sqrt{1} = -\sqrt{1^2} = -1$

Simplify: $\sqrt{135}$.

Solution

Begin by finding the largest perfect square factor of 135.

$$\begin{aligned} 135 &= 3^3 \cdot 5 \\ &= 3^2 \cdot 3 \cdot 5 \\ &= 9 \cdot 15 \end{aligned}$$

Therefore,

$$\begin{aligned} \sqrt{135} &= \sqrt{9 \cdot 15} && \text{Apply the product rule for radicals.} \\ &= \sqrt{9} \cdot \sqrt{15} && \text{Simplify.} \\ &= 3 \cdot \sqrt{15} \end{aligned}$$

Answer

$$3\sqrt{15}$$

Simplify: $\sqrt[3]{-\frac{16}{343}}$

Solution

$$\begin{aligned}\sqrt[3]{-\frac{16}{343}} &= \frac{\sqrt[3]{-1 \cdot 8 \cdot 2}}{\sqrt[3]{7^3}} \\ &= \frac{\sqrt[3]{-1} \cdot \sqrt[3]{8} \cdot \sqrt[3]{2}}{\sqrt[3]{7^3}} \\ &= \frac{-1 \cdot 2 \cdot \sqrt[3]{2}}{7} \\ &= \frac{-2\sqrt[3]{2}}{7}\end{aligned}$$

Answer

Multiplication Law

As per the multiplication law of exponents, the product of two exponents with the same base and different powers equals to base raised to the sum of the two powers or integers.

$$a^m \times a^n = a^{m+n}$$

Division Law

When two exponents having same bases and different powers are divided, then it results in base raised to the difference between the two powers.

$$a^m \div a^n = a^m / a^n = a^{m-n}$$

Negative Exponent Law

Any base if has a negative power, then it results in reciprocal but with positive power or integer to the base.

$$a^{-m} = 1/a^m$$

The rules of exponents are:

$$a^0 = 1$$

$$a^m a^n = a^{m+n}$$

$$a^m/a^n = a^{m-n}$$

$$(a^m)^n = a^{mn}$$

HINT: $a^2 - b^2 = (a + b)(a - b)$

Scientific notation:

Scientific notation is the way of expressing numbers that are too large or too small to be conveniently written in decimal form.

Scientific Notation

$$45,000 \longrightarrow 4.5 \times 10^4$$
$$7.6 \times 10^{-4} \longrightarrow 0.00076$$

65000000.

7 6 5 4 3 2 1

↓

6.5×10^7

Scientific Notation

Move the decimal point to the left.

positive integer

$4500 \longrightarrow 4.5 \times 10^3$

Move the decimal point to the right.

negative integer

$0.0677 \longrightarrow 6.77 \times 10^{-2}$

Exercise: 1.1

1. Write the additive inverse of $(\frac{19}{-6})$ -

- a) $\frac{-6}{19}$ b) $\frac{-19}{6}$ c) $\frac{19}{6}$ d) none

Ans: c) $\frac{19}{6}$

2. Which of the following is the value of n is $\frac{6^n}{6^3} = 6^{-5}$

- a) -3 b) -2 c) 3 d) 2

Ans: b) -2

3. The standard form for 0.000064 is _____

- a) 64×10^4 b) 64×10^{-4} c) 6.4×10^5 d) 6.4×10^{-5}

Ans: d) 6.4×10^{-5}

4. The standard form for 234000000 is _____

- a) 2.34×10^8 (b) 0.234×10^9 (c) 2.34×10^{-8} (d) 0.234×10^{-9}

Ans: a) 2.34×10^8

5. The multiplicative inverse of 10^{10} is _____

- a) $\frac{1}{10^{10}}$ b) $\frac{1}{10}$ c) 1 d) 0

Ans: a) $\frac{1}{10^{10}}$

6. What is the reciprocal of $(\frac{-3}{4})$ is _____

- a) $(\frac{4}{-3})$ b) 1 c) $(-\frac{1}{-3})$ d) 1

Ans: a) $(\frac{4}{-3})$

7. Which of the following is the value of $\frac{\frac{4}{5}^{-9}}{\frac{4}{5}^{-9}}$ is _____

- a) -1 b) 1 c) 0 d) none

Ans: b) 1

8. Which of the following is the number non perfect square numbers between the Square of the numbers n and n+1

- a) n b) 2n c) 2n + 1 d) 2n-1

Ans: 2n

9. which of the following is a perfect cube?

- a) 10000 b)243 c)343 d) 270000

Ans: c) 343

10. Find the value $27^2 - 26^2$ without calculations _____

- a) 1 b) 53 c)50 d)144

Ans: b) 53

11. Find the square root of 2025

- a) 25 b)35 d)225 d)45

Ans: d) 45

12. Find the least numbers which is divisible by each of the numbers 4,8 and 12

- a) 12 b)8 c)144 d) 4

Ans: C)144

13. If $a = \frac{1}{2}$, $b = \frac{3}{4}$ then $a+b$ is _____

- a) $\frac{4}{6}$ b) $\frac{5}{4}$ c) $\frac{3}{8}$ d) 1

Ans: b) $\frac{5}{4}$

14. compare $(\frac{-9}{-4})$ and $(\frac{-2}{3})$

- a) < b)> c) = d) none

Ans: a) <

15. If one- third of one-fourth of a number is 15, then three-tenth of that number is:

- a) 35 b)36 c)45 d) 54

Ans: d) 54

16. Three times the first of three consecutive odd integers is 3 more than twice the third.

The third integer is _____

- a)9 b) 11 c) 13 d) 15

Ans: d)15

17. The difference between a two-digit number and the number obtained by inter changing the position of its digits is 36. What is the difference between the two digits of that number?

- a) 3 b)4 c) 9 d)none

Ans: b) 4

18. The difference between a two-digit number and the number obtained by interchanging the digits is 36. What is the difference between the sum and the difference of the digits of the number if the ratio between the digits of the number is 1: 2?

- a) 4 b)8 c) 16 d)none

Ans: b) 8

19. A two-digit number is such that the product of the digits is 8. When 18 is added to the number, then the digits are reversed. The number is:

- a) 18 b) 24 c) 42 d) 81

Ans : b) 24

20. The sum of the digits of a two-digit number is 15 and the difference between the digits is 3. What is the two-digit number?

- a) 69 b) 78 c) 96 d) none

Ans: d)none

21. The sum of the squares of three numbers is 138, while the sum of their products taken two at a time is 131. Their sum is:

- a) 20 b)30 c) 40 d) none

Ans: a) 20

22. . A number consists of two digits. If the digits interchange places and the new number is added to the original number, then the resulting number will be divisible by:

- a) 3 b) 5 c) 9 d) 11

Ans : d)11

23. In a two-digit, if it is known that its unit's digit exceeds its ten's digit by 2 and that the product of the given number and the sum of its digits is equal to 144, then the number is:

- a) 24 b) 26 c) 42 d) none

Ans: a) 24

24. Find a positive number which when increased by 17 is equal to 60 times the reciprocal of the number.

- a) 3 b) 10 c) 17 d) 20

Ans: a) 3

25. The product of two numbers is 9375 and the quotient, when the larger one is divided by the smaller, is 15. The sum of the numbers is:

- a) 380 b) 395 c) 400 d) 425

Ans: c) 400

26. The product of two numbers is 120 and the sum of their squares is 289. The sum of the number is:

- a) 20 b) 23 c) 169 d) none

Ans: b) 23

27. A number consists of 3 digits whose sum is 10. The middle digit is equal to the sum of the other two and the number will be increased by 99 if its digits are reversed. The number is:

- a) 145 b) 253 c) 370 d) 352

Ans: b) 253

28. The sum of two numbers is 25 and their difference is 13. Find their product

- a) 104 b) 114 c) 315 d) 325

Ans: b) 114

29. What is the sum of two consecutive even numbers, the difference of whose squares is 84?

- a) 34 b) 38 c) 42 d) 46

Ans: c) 4

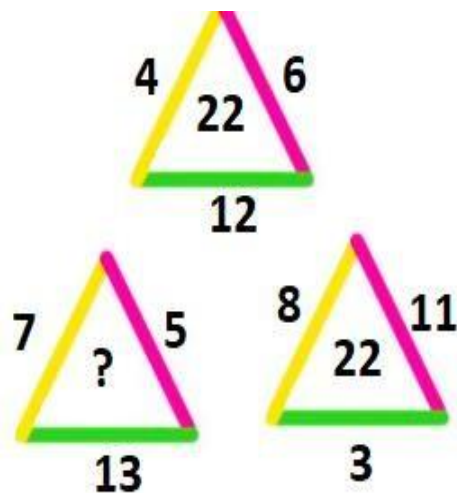
PUZZLE

$$\text{Apple} \times \text{Apple} \times \text{Apple} = 27$$

$$\text{Apple} \times \text{Lemon} \times \text{Lemon} \times \text{Lemon} = 24$$

$$\text{Apple} \times \text{Lemon} \times \text{Orange} \times \text{Orange} = 96$$

$$\text{Orange} + \text{Apple} \times \text{Lemon} = ?$$



Problem solving game: add them up

What you need to play:

- 3,4 or 5 players

How to play:

- Each player takes turns to say a number
- The number called must not be greater than 15 for 3 players, 20 for 4 players and 25 for 5 players.

- At the same time as the number is called, each player puts forward their hand, holding out 1,2,3,4 or 5 fingers.
- If the total of the fingers matches the number called, the player wins two points.
- If they score with in 2 of the total, they win one point.
- If the total fingers doesn't match, but stays below the number called, the player wins 2 points.
- Ask children to think about how else the game could be played. Get them to think about what would happen if they added their other hand in. What would be the maximum number of fingers shown?

WORKSHEET

[illegible]

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

26	A	B	C	D
27	A	B	C	D
28	A	B	C	D
29	A	B	C	D
30	A	B	C	D
31	A	B	C	D
32	A	B	C	D
33	A	B	C	D
34	A	B	C	D
35	A	B	C	D
36	A	B	C	D
37	A	B	C	D
38	A	B	C	D
39	A	B	C	D
40	A	B	C	D
41	A	B	C	D
42	A	B	C	D
43	A	B	C	D
44	A	B	C	D
45	A	B	C	D
46	A	B	C	D
47	A	B	C	D
48	A	B	C	D
49	A	B	C	D
50	A	B	C	D

51	A	B	C	D
52	A	B	C	D
53	A	B	C	D
54	A	B	C	D
55	A	B	C	D
56	A	B	C	D
57	A	B	C	D
58	A	B	C	D
59	A	B	C	D
60	A	B	C	D
61	A	B	C	D
62	A	B	C	D
63	A	B	C	D
64	A	B	C	D
65	A	B	C	D
66	A	B	C	D
67	A	B	C	D
68	A	B	C	D
69	A	B	C	D
70	A	B	C	D
71	A	B	C	D
72	A	B	C	D
73	A	B	C	D
74	A	B	C	D
75	A	B	C	D

76	A	B	C	D
77	A	B	C	D
78	A	B	C	D
79	A	B	C	D
80	A	B	C	D
81	A	B	C	D
82	A	B	C	D
83	A	B	C	D
84	A	B	C	D
85	A	B	C	D
86	A	B	C	D
87	A	B	C	D
88	A	B	C	D
89	A	B	C	D
90	A	B	C	D
91	A	B	C	D
92	A	B	C	D
93	A	B	C	D
94	A	B	C	D
95	A	B	C	D
96	A	B	C	D
97	A	B	C	D
98	A	B	C	D
99	A	B	C	D
100	A	B	C	D

Invigilator's Signature

UNIT-2

ALGEBRA

A mathematical expression of one or more algebraic terms each of which consists of a constant multiplied by one or more variables raised to a non-negative integral power (such as $a + bx + cx^2$) polynomial.

Algebraic Identities

1). Recalling the previous Identities:

a. $(x+y)^2 = x^2 + y^2 + 2xy$

b. $(x-y)^2 = x^2 + y^2 - 2xy$

c. $(x^2 - y^2) = (x-y)(x+y)$

d. $(x+a)(x+b) = x^2 + (a+b)x + ab$

2) Identity for square of trinomial:

a. $(x+y+z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$

3). Cubic and other Identities:

a. $(x+y)^3 = x^3 + y^3 + 3xy(x+y)$

b. $(x-y)^3 = x^3 - y^3 - 3xy(x-y)$

c. $x^3 + y^3 + z^3 - 3xyz = (x+y+z)(x^2 + y^2 + z^2 - xy - yz - zx)$

MONOMIAL, BINOMIAL & TRINOMIAL

MONOMIAL:

- A polynomial with one term.

E.g. : $5x^3$, 8, $4xy$

BINOMIAL:

- A polynomial with three terms which are not like terms.

E.g.: $2x-3$, $3x^5+8x^4$ and $2ab-6a^2b^5$

TRINOMIAL

- Polynomials with three terms are not like terms.

E.g. : x^2+2x-3 , $3x^5-8x^4+x^3$ and $a^2b+13x+c$

Like terms	Unlike terms
$2x, -7x$	$2x, -7y$
$13xy, -7xy$	$13xy, -7xz$
$5x^2y, 3x^2y$	$5x^2y, 3xy^2$

Exercise 2.1

1. The product of $4x$ and 0 is ____.

- a) $4x$ b) 4 c) 0 d) none

Ans : c) 0

2. The volume of a cuboids with length breadth and height as $5x, 3x^2$ and $7x^4$ respectively.

- a) $105x^7$ b) $105x^2$ c) $105x^4$ d) $105x$

Ans: a) $105x^7$

3. The area of the rectangle whose length and breadth are $3y$ and $9y^2$ respectively.

- a) $12y^2$ b) $21y^3$ c) $27y^3$ d) y^3

Ans : c) $27y^3$

4. The side of a cube is $2a$. Find the volume of a cube

- a) $4a^2$ b) $2a$ c) $8a^3$ d) 8

Ans: c) $8a^3$

5. The value of $(x-y)(x+y)+(y-z)(y+z)+(z-x)(z+x)$ is.

- a) $x+y+z$ b) $x^2+y^2+z^2$ c) $xy+yz+zx$ d) 0

Ans : d) 0

6. Which of the following is like term as $8xy$, $8xz$

- a) 8 b) $8x$ c) $8y$ d) xy

Ans : d) $8x$

7. Px is what type of polynomial?

- a) monomial b) binomial c) trinomial d) none

Ans: a) monomial

8. what is the value of $5x^{25}-3x^{32}+2x^{12}$ at $x=1$.

- a) 0 b) 2 c) 4 d) none

Ans: c) 4

9. Which of the following is obtained by subtracting x^2-y^2 from y^2-x^2 ? a) $-2(x^2-y^2)$ b) $-2(x^2+y^2)$ c) $2(x^2+y^2)$ d) $2(x^2-y^2)$

Ans: a) $-2(x^2-y^2)$

10. Using $(x+a)(x+b)=x^2+(a+b)x+ab$. Find 6.2×6.3

- a) 3.906 b) 39.6 c) 39.06 d) 0.396

Ans : c) 39.06

11. Expand $(3+m)^3$

- a) $m^3-9m^2+27m+27$ b) $m^3+9m^2-27m+27$
c) $m^3+9m^2+27m-27$ d) $m^3+9m^2+27m+27$

Ans : d) $m^3+9m^2+27m+27$

12. $(52)^3 = ?$

- a) 1,04,608 b) 1,04,806 c) 1,42,608 d) 1,40,608

Ans : d) 1,40,608

13. Expand $(97xy)^3$

- a) $912673x^3y^2$ b) $912673xy^2$ c) $912673x^3y^3$ d) $912673x^2y^2$

Ans : c) $912673x^3y^3$

14. Find the value of a cube whose side is $(x+1)$ cm

- a) $(x^3-3x^2+3x+1)cm^3$ b) $(x^3+3x^2+3x+1)cm^2$

- c) $(x^3-3x^2+3x+1)cm^3$ d) none

Ans: c) $(x^3+3x^2+3x+1)cm^3$

15. If $x^2-y^2=16$ and $(x+y)=8$ then $(x-y)=$ _____

- a) 8 b) 3 c) 2 d) 1

Ans: c) 2

16. $\frac{(a+b)(a^3-b^3)}{a^2-b^2} =$ _____.

- a) a^2-ab+b^2 b) a^2+ab+b^2 c) a^2+ab+b^2 d) $a^2-2ab+b^2$

Ans : b) a^2+ab+b^2

17. If $(a-b)=3$ and $ab=5$, then $a^3-b^3=$ _____.

- a) 15 b) 18 c) 62 d) 72

Ans: d) 72

18. $a^3+b^3 = (a+b)^3$ _____.

- a) $3a(a+b)$ b) $3ab(a-b)$ c) $-3ab(a+b)$ d) $3b(4a+5b)$

Ans : c) $-3ab(a+b)$

19. Factorization of $12a^2b+15ab^2$ is_____.

- a) $3ab(4ab-5)$ b) $3ab(4a+5b)$ c) $3a(4a+5b)$ d) $3b(4a+5b)$

Ans: b) $3ab(4a+5b)$

20. The factorization of $12x+36$ is.

- a) $12(x+3)$ b) $12(3x)$ c) $12(3x+1)$ d) $x(12+36x)$

Ans: a) $12(x+3)$

21. The factors of $6xy - 4y + 6 - 9x$ are.

- a) $(3x+2)(2y+3)$ b) $(3x-2)(2y-3)$ c) $(3x-2)(2y+3)$ d) $(3x+2)(2y-3)$

Ans : b) $(3x-2)(2y-3)$

22. The factors of $x^2 + xy + 8x + 8y$ are.

- a) $(x+y)(x+8)$ b) $(2x+y)(x+8)$ c) $(9x+2y)(x+8)$ d) $(x+y)(2x+8)$

Ans : a) $(x+y)(x+8)$

23. The factors of $49p^2 - 36$ are.

- a) $(7p+6)^2$ b) $(7p-6)^2$ c) $(7p-6)(7p+6)$ d) none

Ans: c) $(7p-6)(7p+6)$

24. When we factors $x^2 + 5x + 6$ then we get.

- a) $(x+2)(x+3)$ b) $(x-2)(x-30)$ c) $(x+2)+(x-3)$ d) $(x \times 2) - (x \times 3)$

Ans: a) $(x+2)(x+3)$

25. The factors of $3m^2 + 9m + 6$ are.

- a) $(m+1)(m+2)$ b) $3(m+1)(m+2)$ c) $6(m+1)(m+2)$ d) $a(m+1)(m+2)$

Ans: b) $3(m+1)(m+2)$

PUZZLE



Remove 3 digits so that the other digits form the biggest three-digit number possible.

$$\square + \square = 54$$

$$\square + \square = 54$$

The sum of two numbers is 54.

The smaller number can be found by crossing out a digit out of the bigger number.

Write down two possible answers.

WORKSHEET



Student's Name (In Block Letters Only)																									Set	Roll Number						Subject		
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AAAAAAAAAAAAAAAAAAAAAAAAAA																									A	00000000						000		
BBBBBBBBBBBBBBBBBBBBBBBBBB																									B	11111111						111		
CCCCCCCCCCCCCCCCCCCCCCCCCC																									C	22222222						222		
DDDDDDDDDDDDDDDDDDDDDDDDDD																									D	33333333						333		
EEEEEEEEEEEEEEEEEEEEEEEEEE																										44444444						444		
FFFFFFFFFFFFFFFFFFFFFFFFFF																										55555555						555		
GGGGGGGGGGGGGGGGGGGGGGGGGG																										66666666						666		
HHHHHHHHHHHHHHHHHHHHHHHHHH																										77777777						777		
IIIIIIIIIIIIIIIIIIIIIIIIII																										88888888						888		
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PPPPPPPPPPPPPPPPPPPPPPPPPP																										55555555						555		
QQQQQQQQQQQQQQQQQQQQQQQQQQQ																										66666666						666		
RRRRRRRRRRRRRRRRRRRRRRRRRR																										77777777						777		
SSSSSSSSSSSSSSSSSSSSSSSSSS																										88888888						888		
TTTTTTTTTTTTTTTTTTTTTTTTTT																										99999999						999		
UUUUUUUUUUUUUUUUUUUUUUUUUUU																										00000000						000		
VVVVVVVVVVVVVVVVVVVVVVVVVV																										11111111						111		
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UNIT- 3

PROBLEMS ON AGES

Formulas and Quick Tricks for Age Problems

1. If the current age is x , then n times the age is nx .
2. If the current age is x , then age n years later/hence = $x+n$.
3. If the current age is x , then age n years ago = $x - n$.
4. The ages in a ratio $a : b$ will be ax and bx .
5. If the current age is x , then $1/n$ of the age is x/n
6. If the sum of ages is X and Y and the ratio of their ages is $p:q$ respectively, then you can determine the age of Y by using the formula shown below
7. Age of $Y = \text{Ratio of } Y / \text{Sum of ratios} \times \text{sum of ages}$
8. Age of $Y = q / (p+q) \times A$

WORKED PROBLEMS

1. The average age of 8 men increases by 2 years when two women are included in place of two men of ages 20 and 24 years. Find the average age of the women?

A. 18 years
B. 24 years
C. 30 years
D. 36 years

Answer: C) 30 years

Explanation: $\frac{20+24+8 \times 2}{2} = 60/2 = 30$

2. Mohan correctly remembers that his father's birthday is before 20th January but after 16th January, whereas his sister correctly remembers that their father's birthday is after 18th January but before 23rd January. On which date in January is definitely their father's birthday?

A. 18th
B. 19th
C. 20th
D. Missing data

Answer: B) 19th

Explanation: According to Mohan 17th, 18th, or 19th...(i)

According to his sister 19th, 20th, 21st or 22nd ...(ii) From

common in (i) and (ii) => 19th January

3. The average age of husband, wife and their child 3 years ago was 27 years and that of wife and the child 5 years ago was 20 years. The present age of the husband is:
- A. 35 years
B. 40 years
C. 45 years
D. 55 years

Answer: B) 40 years

Explanation: Sum of the present ages of husband, wife and child
 $= (27 \times 3 + 3 \times 3) \text{ years} = 90 \text{ years}.$

Sum of the present ages of wife and child $= (20 \times 2 + 5 \times 2) \text{ years} = 50 \text{ years}.$

Therefore, Husband's present age $= (90 - 50) \text{ years} = 40 \text{ years}$

4. A is 2years older than B who is twice as old as C. If the total of the ages of A, B and C be 27, then how old is B?

- A. 7years
- B. 8years
- C. 9years
- D. 10years

Answer: D.10 years

Explanation: Let C's age be x years

Then, B's age = 2x years

A's age=(2x+2)years

$$(2x + 2) + 2x + x = 27$$

$$5x = 25 \Rightarrow x = 5$$

Hence, B's age=2x=10years

EXERCISE: 3.1

1. The total age of A and B is 12 years more than the total age of B and C. C is how many years younger than A?

- A. 12
- B. 24
- C. C is elder than A
- D. Data inadequate

HINT: $(A+B)-(B+C)=12$

Answer: A.12

2. A father said to his son, 'I was as old as you are at present at the time of your birth. If the father's age is 38 years now, the son's age five years back was:

- E. 14years
- F. 19years
- G. 33 years
- H. 38years

HINT: Let the son's present age be x years.

$$\text{Then, } (38 - x) = x$$

Answer: A) 14years

3.The sum of the ages of a son and father is 56 years after four years the age of the father will be three times that of the son. Their ages respectively are:

I. 12years,44years

J. 16years,42years

HINT: Present ages of son and father be x years(56-x)years

$$(56-x+4)=3(x+4)$$

K. 16years,48years

L. 18years,36years

Answer: A)12years, 44years

4.What is John's Present age, if after10years his age will be 5times his age 5 year back

a)6.2 years b)7.7 years c)8.7years d)10 years

Ans: c)8.7 years

HINT: Let John's present age be x

John's age before 5years =x-5

John's age after 10years=x+10.

$$\rightarrow x+10=5(x-5)$$

PUZZLE

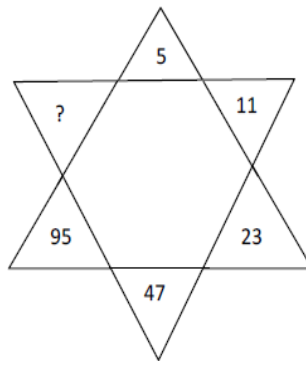
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58	74	?

A. 91

B. 90

C. 96

D. 92



1.A)189

2.B)191

3.C)3

4.D)255

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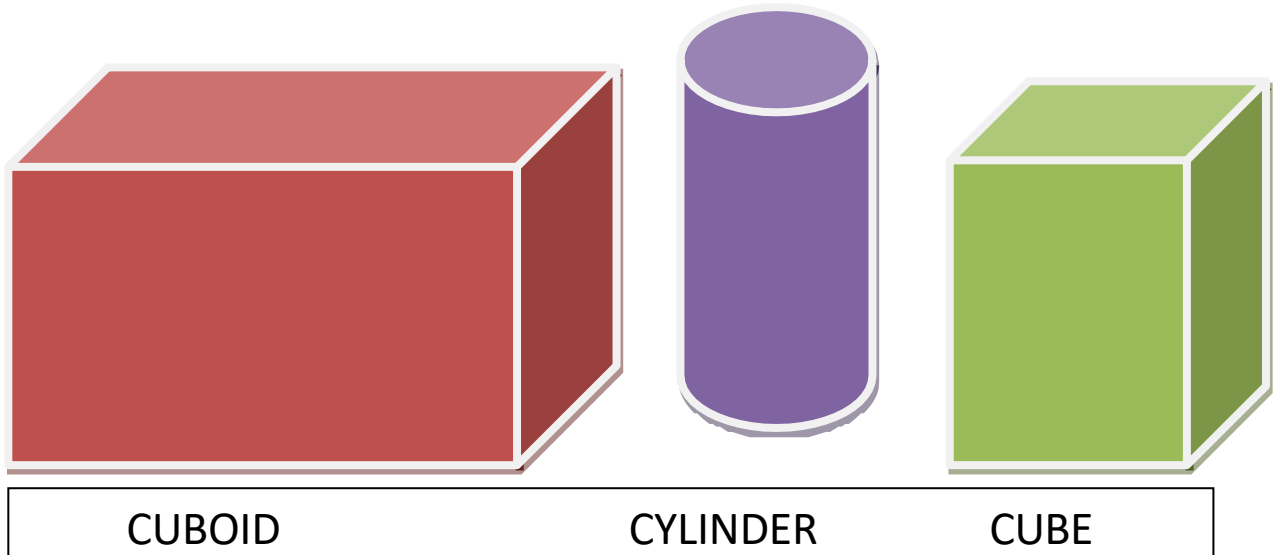
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Candidate's Signature

Invigilator's Signature

UNIT – 4
MENSURATIONS



CUBOID

TOTAL SURFACE AREA $= 2(lb + bh + hl)$ sq. units

LATERAL SURFACE AREA $= 2h(l + b)$ sq. units

VOLUME $= l \times b \times h$ cu. units

CUBE

Volume $V = a^3$

Surface area $A = 6a^2$

Diagonal $d = \sqrt{3}a$

Edges $a = \sqrt[3]{V}$



Cube

Lateral surface area $= 4a^2$ sq. units

Total surface area $= 6a^2$ sq. units

FORMULA:

- Area of a rectangle = $l \times b$ sq. units
- Perimeter of rectangle = $2(l+b)$ units
- Area of a square = a^2 sq. units
- Perimeter of a square = $4a$ units
- Area of a square = $\frac{1}{2}(\text{length of diagonal})^2$ (given diagonal)
- Area of a circle = πr^2 sq. units
- Circumference of a circle = $2\pi r$ units
- The distance covered by wheel in one round = πd
- Number of revolution = $\frac{\text{distance}}{\pi d}$

Solved Examples

1. The length of the rectangular field is 100m if its perimeter is 300m. what is its breadth?

$$\text{Perimeter of a rectangle} = 2l + 2b$$

$$= 2(l+b)$$

$$2(l+b) = 300$$

$$2(100+b) = 300$$

$$200 + 2b = 300$$

$$2b = 100$$

$$b = 50 \text{ m}$$

2. The area of the rectangle is 240sq cm if it

Length is 20cm. find its breadth.

Area of a rectangle= $l \times b$

$l = 20\text{cm}$ Area= 240sq cm $b=?$

$$l \times b = 240\text{cm}^2$$

$$20 \times b = 240\text{cm}^2$$

$$b = \frac{240}{20} \text{ cm}$$

$$b = 12\text{cm}$$

3. The side of a square is 70cm. find its area and perimeter.

Ans: Side of a square=70cm, Area =side $\times$ side

$$=70 \times 70$$

$$=4900\text{cm}^2$$

Perimeter=4 $\times$ side

$$= 4 \times 70$$

$$= 280\text{cm}$$

4. If the circumference of a circular sheet is 176m

Find its area

Ans:

Circumference $c=2 \pi r$

$$2\pi r = 176$$

$$2 \times \frac{22}{7} \times r = 176$$

$$r = \frac{176 \times 7}{44} = 28\text{m}$$

$$\text{Area} = \pi r^2 \text{sq. units}$$

$$= \frac{22}{7} \times 28 \times 28$$

$$= 88 \times 28$$

$$= 2464 \text{cm}^2$$

Exercise 4.1

1 . The diameter of a wheel is 70cm. How many times the wheel will revolve in order to cover a distance of 110 m?

- a) 50cm b) 60cm c) 70 cm d) 80cm

Ans: a) 50cm

2. The ratio of the radii of two wheel is 4:5 find the ratio of their circumference.

- a) 5:4 b) 3:2 c) 4:5 d) 1:2

Ans: c) 4:5

3. When folded into two equal halves a rectangular sheet had a perimeter of 34cm for each part folded along one set of sides and the same is 38cm when folded along the other set of sides. Find the area of the sheet.

- a) 140cm^2 b) 167cm^2 c) 792cm^2 d) 1320cm^2

Ans: a) 140cm^2

Hint: when folded along breadth $P = 2\left(\frac{l}{2} + h\right) = 34$

when folded along height $P = 2\left(l + \frac{b}{2}\right) = 38$

4. Find the area of circle whose radius 3.5cm.

- a) 64cm^2 b) 144cm^2 c) 34cm^2 d) 38.5cm^2

Ans: d) 38.5cm^2

5. What is the length of the diagonal of a square whose area is 4 times of another square with diagonal as $5\sqrt{2}\text{cm}$

- a) $20\sqrt{2}$ b) 10 c) $10\sqrt{2}$ d) 20

Ans: c) $10\sqrt{2}$

6. If the length is increased by 25% by what percent the width of a rectangle should be decreased so as to keep the area same

- a) 25% b) 20% c) 30% d) 10%

Ans: b) 20%

7. The ratio of the areas of a square and rhombus whose base is same is

- a) 1:2 b) 2:1 c) 1:1 d) 3:1

Ans: c) 1:1

8. Three dimensional quantity is called as _____.

- a) Area b) volume c) perimeter d) none of them

Ans: b) volume

9. $1500000\text{ cm}^3 = \underline{\hspace{2cm}}\text{ l.}$

- a) 150 b) 1500 c) 15 d) 15,000

Ans: b) 1500

10. Calculate the total surface area of a cylinder radius 3cm and height 15cm

- a) 339.24 sq cm b) 565.71 sq cm c) 282.6 sq cm d) 424.28 sq cm

Ans: 339.24 sq.cm

11. What is the total surface area of a cube of length 12cm?

- a) 1728 sq cm b) 864 sq cm c) 684 sq cm d) 576 sq cm

Ans: b) 864 sq cm

12. The space occupied by an object is _____.

- a) area b) volume c) perimeter d) none of the above

Ans : b) volume

13. Find the volume of a tool bar of dimensions 6cmx5cmx4cm.

- a) 15cu cm b) 120sq cm c) 15 sq cm d) 120cu cm

Ans : d) 120cu cm

14. Calculate the lateral surface area of a cuboids with dimension 6cmx4cm x2cm.

- a) 88 sq cm b) 40 sq cm c) 80 sq cm d) 48 sq cm

Ans : b) 40sq cm

Hint: use LSA of cuboids : $2h(l+b)$ sq units

15. Which one of the following is 3D object?

- a) square b) cylinder c) rectangle d) triangle

Ans : b) cylinder

16. Find the height of a cuboids whose volume is 504cu cm and the length and the breadth are 9 cm and 8 cm respectively

- a) 7cm b) 8cm c) 9cm d) 10cm

Ans: 7cm

17. What is the volume of a cube if its lateral surface area is 144cm^2 ?

- a) 1728 cm^3 b) 216 cm^3 c) 212 cm^3 d) 64cm^3

Ans: b) 216 cm^3

18. Find the side of a cube whose volume is 216.

- a) 1.15cm b) 6 cm c) 1.5cm d) 1.55cm

Ans: b) 6 cm

19. Volume of a cylinder=?

- a) a^3 cu units b) $\pi r^2 h$ cu units c) $\frac{1}{3}\pi r^3$ d) $l \times b \times h$ cu units

Ans: b) $\pi r^2 h$ cu units

20. Find the volume of the name board 1cmx5cmx8cm.

- a) 45cu cm b) 40 cu cm c) 30cucm d) 50cucm

Ans: b) 40 cu cm

21. Volume of the cuboids _____.

- a) $l \times b \times h$ cu units b) l^3 cu units
c) $\pi r^2 h$ cu units d) πr^3 cu unit

Ans: $L \times b \times h$ cu units

22. A right triangle with sides 3cm, 4cm and 5cm is rotated the side of 3cm to form a cone. The volume of the cones of or med is:

- a) $12\pi cm^3$ b) $15\pi cm^3$ c) $16\pi cm^3$ d) $20\pi cm^3$

Ans: a) $12\pi cm^3$

23. What is the area of an equilateral triangle of side 16cm?

- a) $48\sqrt{3}$ sq.cm b) $128\sqrt{3}$ sq.cm c) $96\sqrt{3}$ sq.cm d) $64\sqrt{3}$ sq.cm

Ans: d) $64\sqrt{3}$ sq.cm

24. If the sides of a triangle are 26 cm, 24 cm and 10 cm, what is its area?

- a) 120sq.cm b) 130sq.cm c) 312sq.cm d) 315sq.cm

Ans: a) 120sq.cm

25. The perimeter of a triangle is 28cm and the inner radius of the triangle is 2.5cm. What is the area of the triangle?

- a) 35sq.cm b) 42sq.cm c) 49sq.cm d) 70sq.cm

Ans: a) 35sq.cm

26 . Find the area of trapezium whose parallel sides are 20cm and 18cm long, and the Distance between them is 15cm.

- a) 225sq.cm b) 275sq.cm c) 285sq.cm d) 315sq.cm

Ans: c) 285sq.cm

27. Find the area of a parallelogram with base 24cm and height 16cm.

- a) 262sq.cm b)384sq.cm c) 192sq.cm d)131sq.cm

Ans: b) 384sq.cm

28. The ratio of the length and the breadth of a rectangle is 4 : 3 and the area of the rectangle is 6912sq cm. Find the ratio of the breadth and the area of the rectangle?

- a) 1:96 b)1:48 c)1: 84 d)1:68

Ans: a)1:96

29. A wire in the form of a circle of radius 3.5m is bent in the form of a rectangle, whose length and breadth are in the ratio of 6 : 5. What is the area of the rectangle?

- a) 60sq. cm b)30sq.cm c)45sq.cm d)15sq.cm

Ans: b)30sq.cm

30. The radius of a wheel is 22.4cm. What is the distance covered by the wheel in making 500 revolutions?

- a) 252m b)704m c)352m d) 808m

Ans : b) 704m

31. Find the diameter of a wheel if the distance traveled by the wheel in 120 revolutions is 1584 m.

- a) 4.2 m b)3.2m c)5.6m d)none

Ans: a)4.2 m

32. "What is the length of the rectangle if its perimeter is 3.2 meters and breadth is 60 centimeters?"

- a) 100cm b)110cm c)320cm d)200cm

Ans: a)100cm

33. The cube has the TSA of 486cm? Find its LSA?

- a) 324 cm² b)325 cm² c)314 cm² d)none

Ans: a)324 cm²

34. A circle has a radius of 21cm. find its circumference and area. (Use $\pi = 22/7$).

- a) 2098 cm² b) 3456 cm² c) 1386 cm² d) none

Ans: c) 1386 cm²

35. Find the TSA of cube whose side is 5cm.

- a) 156 sq.cm b) 152 sq.cm c) 153 sq.cm d) 150 sq.cm

Ans: d) 150 sq.cm

36. If the side of a cube is 'a' units then the TSA = _

- a) 6a² sq. units b) 3a² sq. units c) 4a² sq. units d) a² sq. units

Ans: a) 6a² sq. units

37. If the side of a cube is 'a' units then the LSA = _

- a) 6a² sq. units b) 3a² sq. units c) 4a² sq. units d) a² sq. units

Ans: c) 4a² sq. units

38. The dimensions of a fish tank are 3.8m x 2.5m x 1.6m how many liters of water it can hold?

- a) 15200 l b) 1520 l c) 15000 l d) 12500 l

Ans: a) 15200 l

39. Find the volume of a cube whose side is 10cm.

- a) 10cm³ b) 100cm³ c) 1000cm³ d) 1200cm³

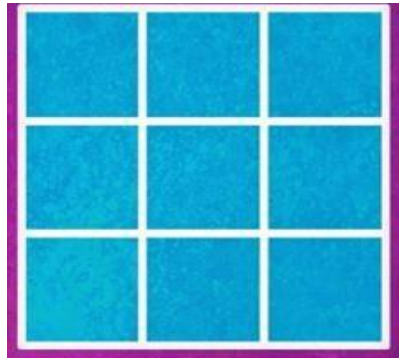
Ans: c) 1000cm³

40. A cubical tank can hold 64000 liter of water. Find the length of its side in meters.

- a) 4m b) 5m c) 1cm d) 2cm

Ans: a) 4m

PUZZLE



1. How many SQUARES are in the 3x3 grid?

2. Find the value of each symbol and the '?' in the puzzles below:

$$\begin{aligned}
 & \text{Donkey Kong} + \text{Donkey Kong} + \text{Donkey Kong} = 36 \\
 & \text{Donkey Kong} + \text{Banana} + \text{Banana} = 28 \\
 & \text{Banana} - \text{DK Jar} = 4 \\
 & \text{Donkey Kong} + \text{Banana} + \text{DK Jar} = ?
 \end{aligned}$$

$$\begin{aligned}
 36 &= \text{Mario} + \text{Princess Peach} + \text{Mario} \\
 \text{Toad} \times \text{Bowser} &= 0 \\
 \text{Mario} \div \text{Toad} &= 2 \\
 \text{Mario} &= \text{Princess Peach} \\
 \text{Mario} + \text{Bowser} + \text{Princess Peach} + \text{Toad} &= \text{Question Mark Block}
 \end{aligned}$$

$$\begin{aligned}
 & \text{Koopa} + \text{Koopa} + \text{Koopa} = 24 \\
 & \text{Koopa} + \text{Koopa} \times \text{Goomba} = 80 \\
 & \text{Goomba} + \text{Bowser} \times \text{Goomba} = 54 \\
 & \text{Bowser} + \text{Goomba} \times \text{Koopa} = ?
 \end{aligned}$$

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99	A	B	C	D
100	A	B	C	D

Invigilator's Signature

SCIENCE

CONTENT

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1	MOTION	72-98
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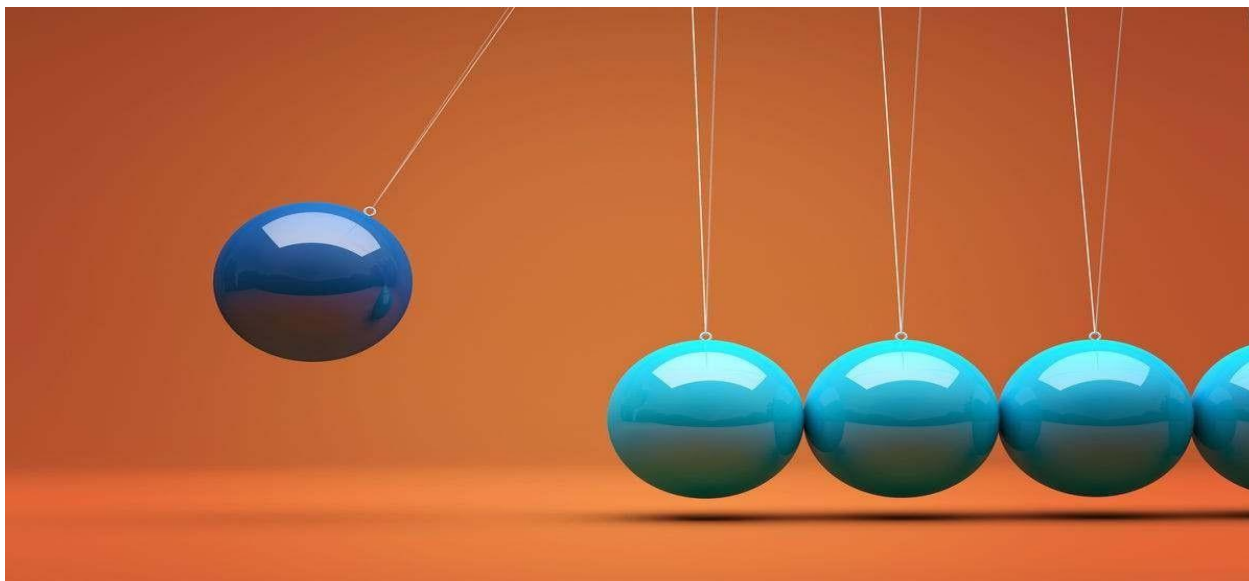


UNIT-1

MOTION

Types of motion:

In our day-to-day life the following kinds of motion are observed.



a) Linear motion:

An object is said to be in linear motion if it moves in a straight line.

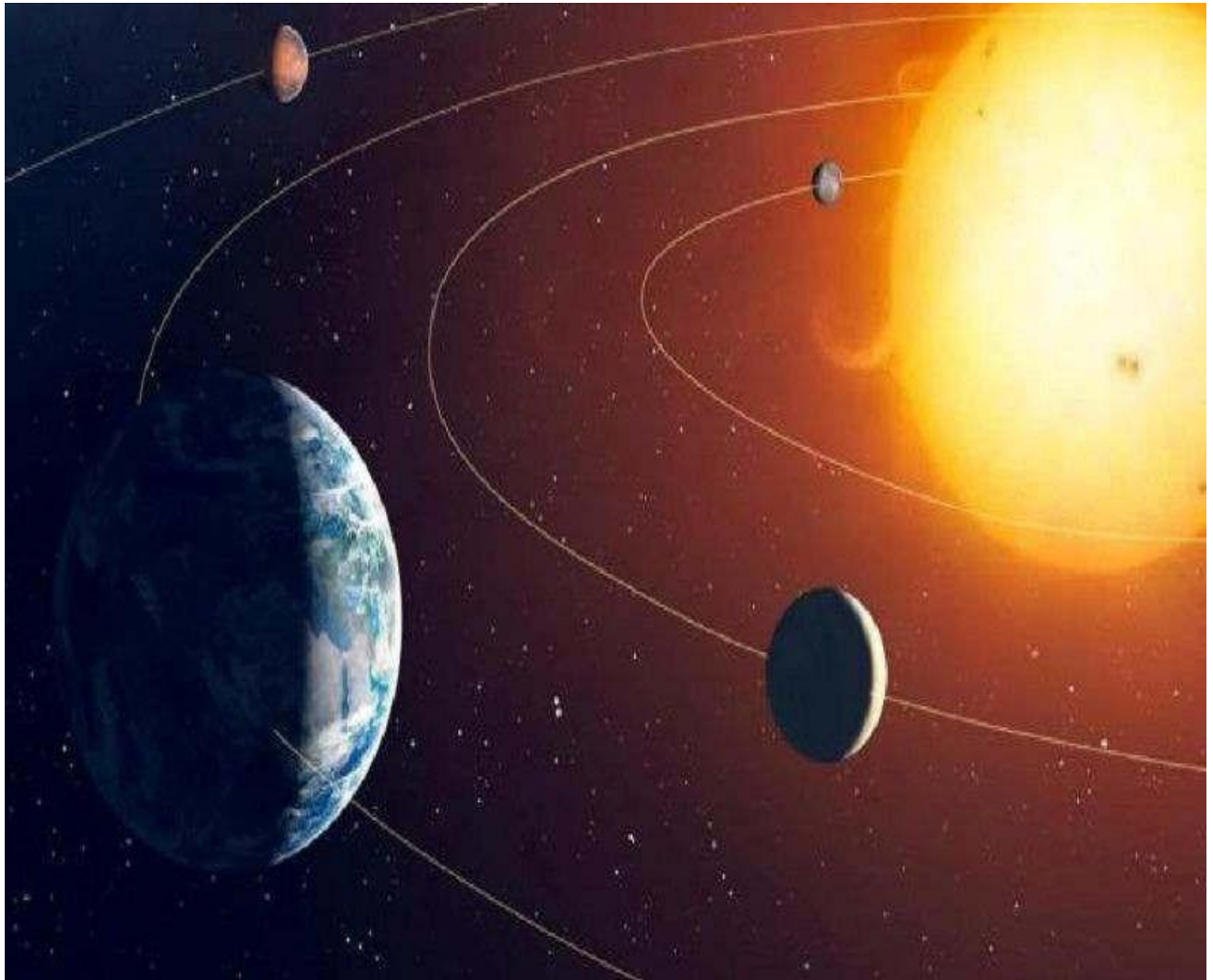


Ex: (i) An athlete running on a straight track

(ii) A particle falling vertically down words of the earth.

b)Circular motion:

Circular motion is defined as a motion described by an object travelling a circular path.



Eg: The whirling motion of a stone attached to a string.

The motion of satellite around the earth

c) Rotational motion:

If any object moves in a rotational motion about an axis, the motion is called ‘rotation’.

During rotation every point in the object trans verses a circular path About an axis.

Rotational motion



Ferris wheel

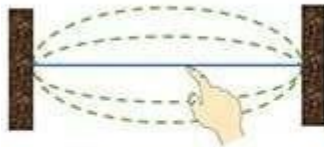
EX: Rotation of a disc about an axis through its centre.

Spinning of the earth about its own axis.

d)Vibratory motion:

If an object or particle executes to-and-fro motion about a fixed point, it is said to be in vibratory motion. This is sometimes also called oscillatory motion.

Examples of Vibratory Motion



A wire stretched between two fixed points when plucked, it start vibrating to and fro



Most of the musical instrument like guitar, sitar, violin, etc have strings attached to them to produce music by creating vibratory motion

EX: Vibration of a string on a guitar.

Movement of a swing.

(i) Motion in one dimension:

One dimensional motion is the motion of a particle moving along a straight line

This motion is sometimes known as rectilinear or linear motion.

In this motion, only one of the three rectangular co-ordinates specifying The position of the object change with time.

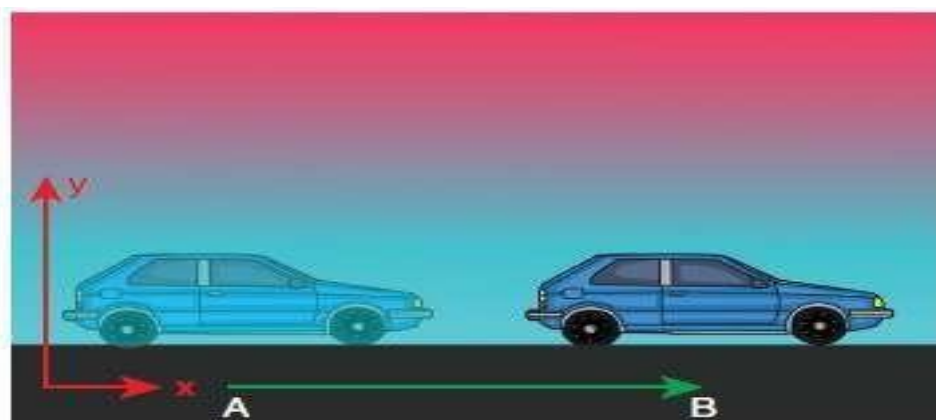


Figure 2.8 Motion of a particle along one dimension

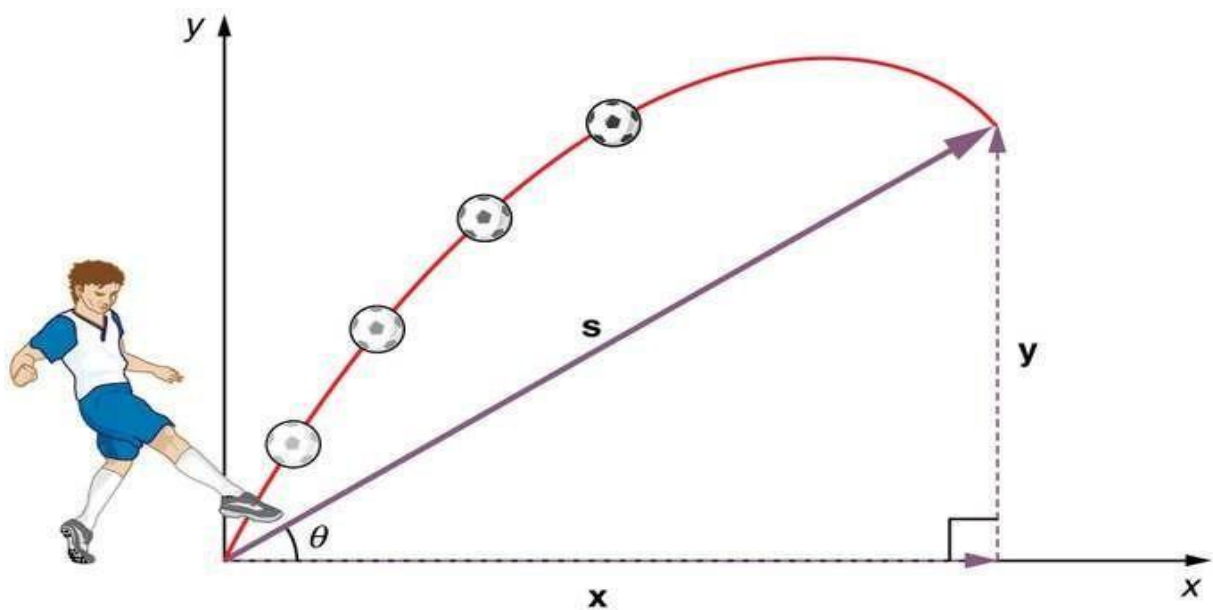
EX: (i) Motion of a train along a straight railway track.

(ii) An object falling freely under gravity close to earth.

(ii) Motion in two dimensions:

If a particle is moving along a curved path in a plane, then it is said to be in two dimensional motion.

In this motion, Two of the three rectangular co-ordinates specifying the position of object change with time.



EX

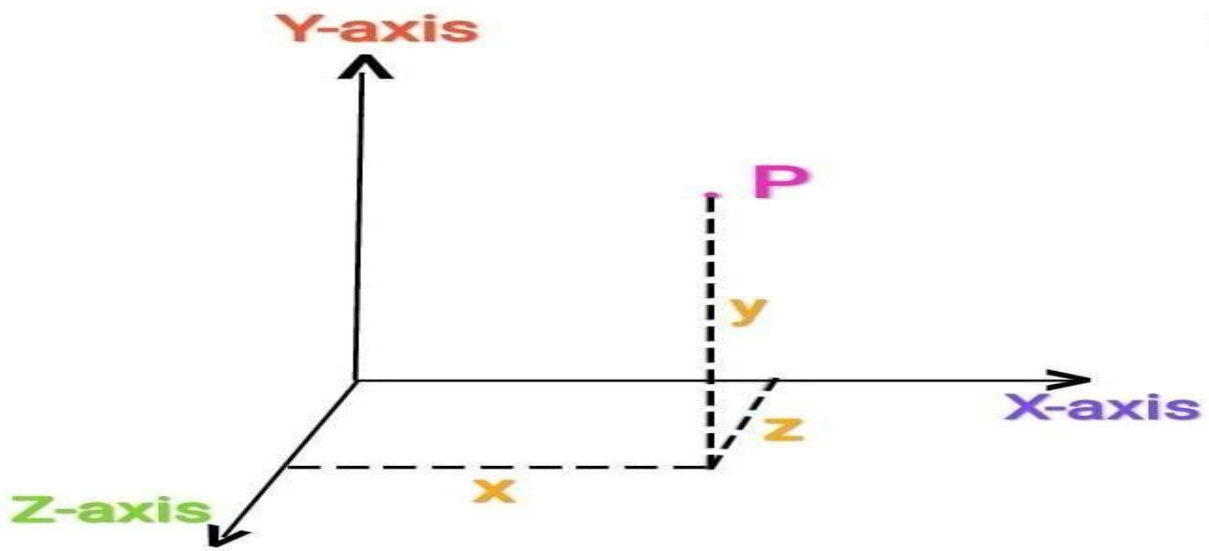
cr: (i) Motion of a coin on a carom board.

(ii) An insect crawling over the floor of a room.

(iii) Motion in three dimensions:

A particle moving in usual three dimensional space has three dimensional motion.

In this motion, all the three co-ordinates specifying the position of an object change with respect to time. When a particle moves in three dimensions, all the three co-ordinates x , y and z will vary.



EX: (i) A bird flying in the sky.

(ii) Random motion of gas molecules.

(iii) Flying of a kite on a windy day.

INERTIA

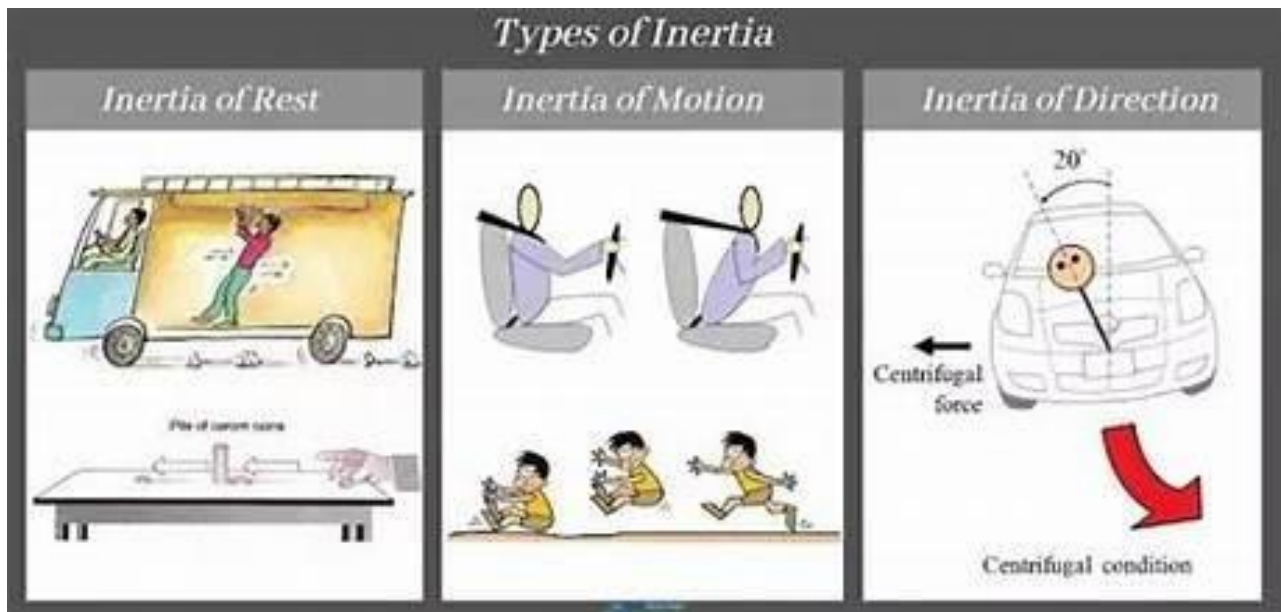
While you are travelling in a bus or in a car, when a sudden brake is applied, the upper part of your body leans in the forward direction.

Similarly, when the vehicle suddenly is move forward from rest, you lean back ward. This is due to, anybody would like to continue to be in its state of rest or the state of motion. This is known as ‘inertia’. The in here nt property of a body to resist any change in its state of rest or the state of uniform motion, unless it is influenced upon by an external unbalanced force, is known as ‘inertia’

Types of Inertia

- a) **Inertia of rest:** The resistance of a body to change in its state of rest is called inertia of rest.
- b) **Inertia of motion:** The resistance of a body to change in its state of motion is called inertia of motion.

c) **Inertia of direction:** The resistance of a body to change in its direction of motion is called inertia of direction



Examples of Inertia

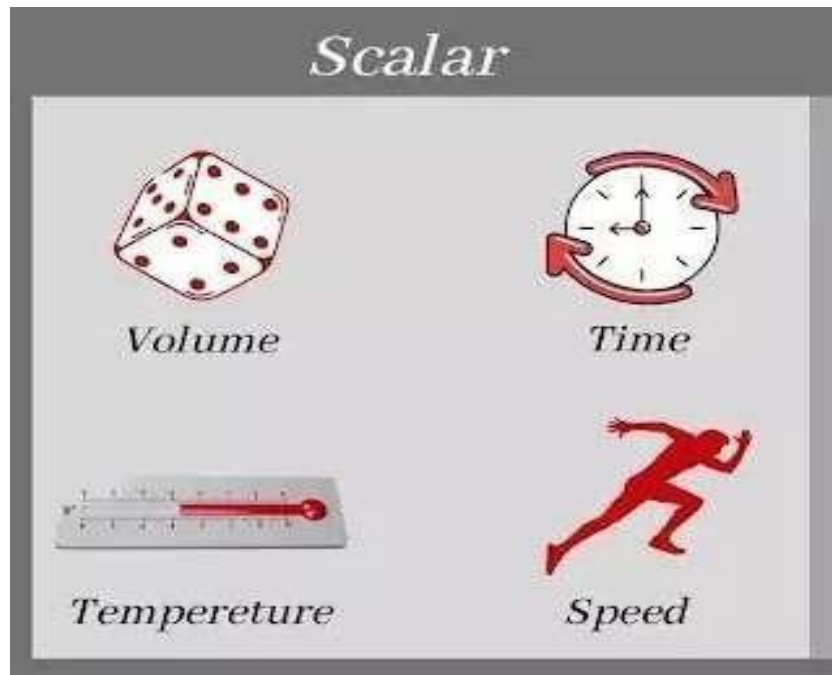
◆ An athlete runs some distance before jumping. Because, this will help him jump longer and higher. (Inertia of motion)

◆ When you make a sharp turn while driving a car, you tend to lean sideways, (Inertia of direction).

◆ When you vigorously shake the branches of a tree, some of the leaves and fruits are detached and they fall down, (Inertia of rest).

Scalar:

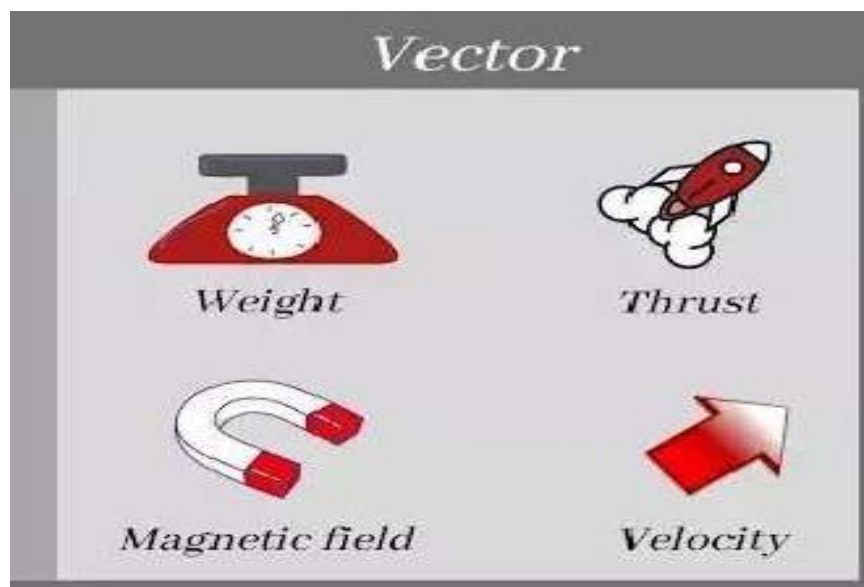
It is a property which can be described only by magnitude.
In physics a number of quantities can be described by scalar.



EX: Distance, Mass Temperature, Speed and Energy.

Vector:

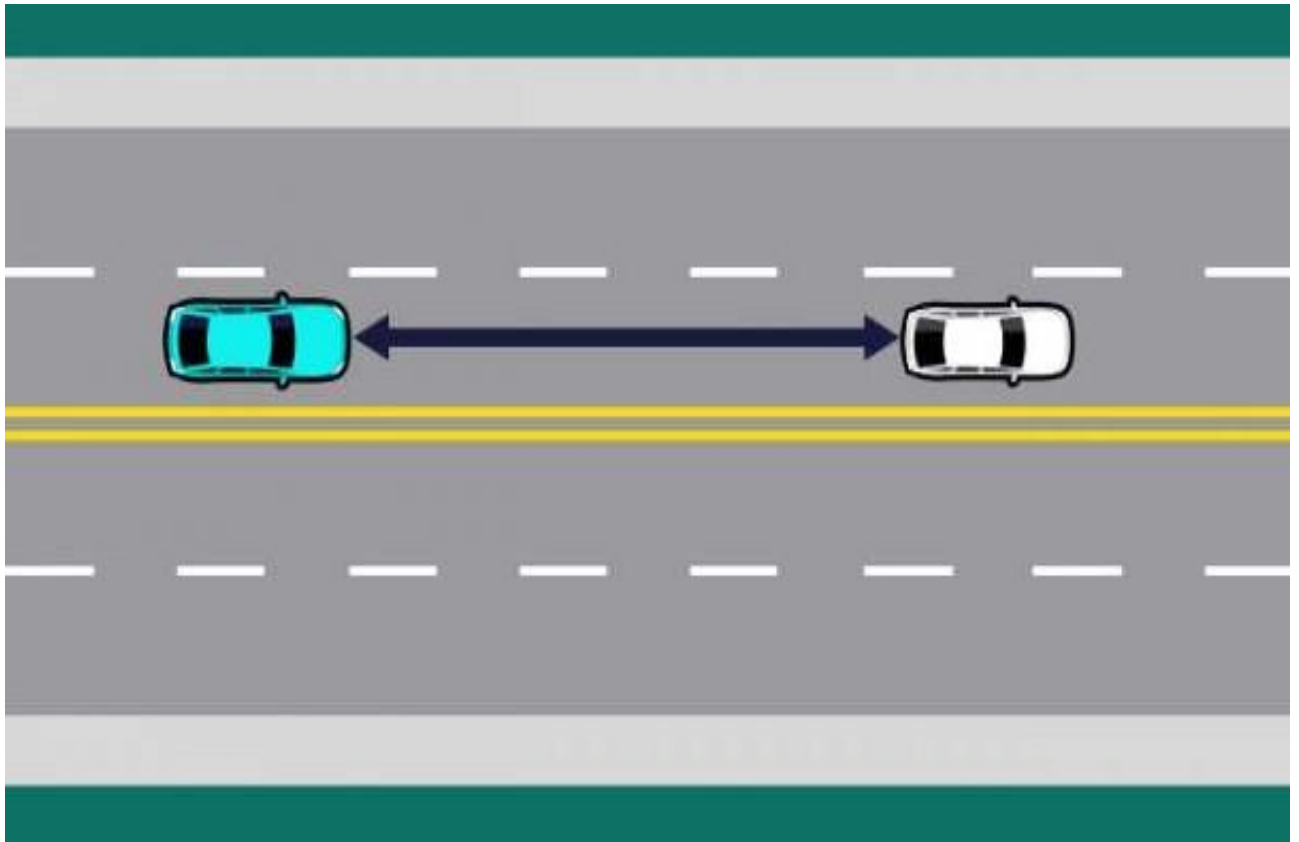
It is a quantity which is described by both magnitude and direction.



EX: Force, Velocity acceleration, Displacement, Momentum.

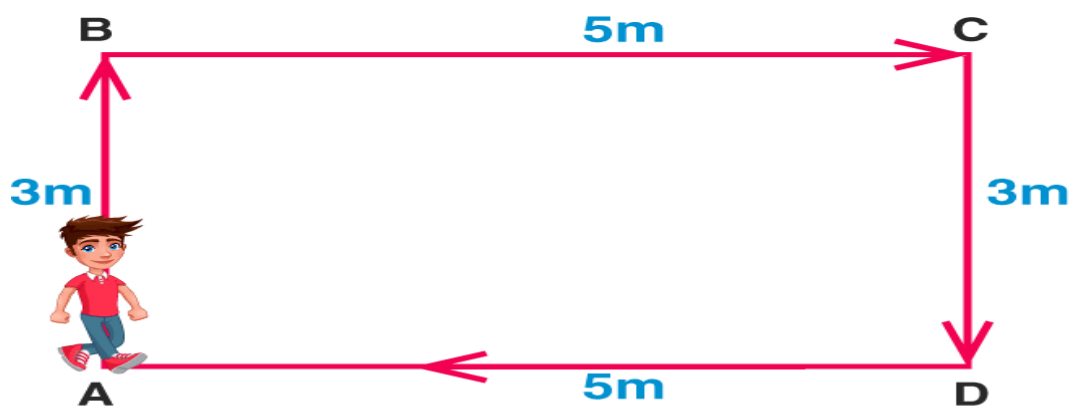
Distance:

Distance is the actual path length travelled by an object in the given interval of time during the motion. It is a positive scalar quantity.



Displacement:

Displacement is the difference between the final and initial position of the object in a given interval of time.



Displacement at point **A** = **0**
Distance travelled at point **A** = **0**

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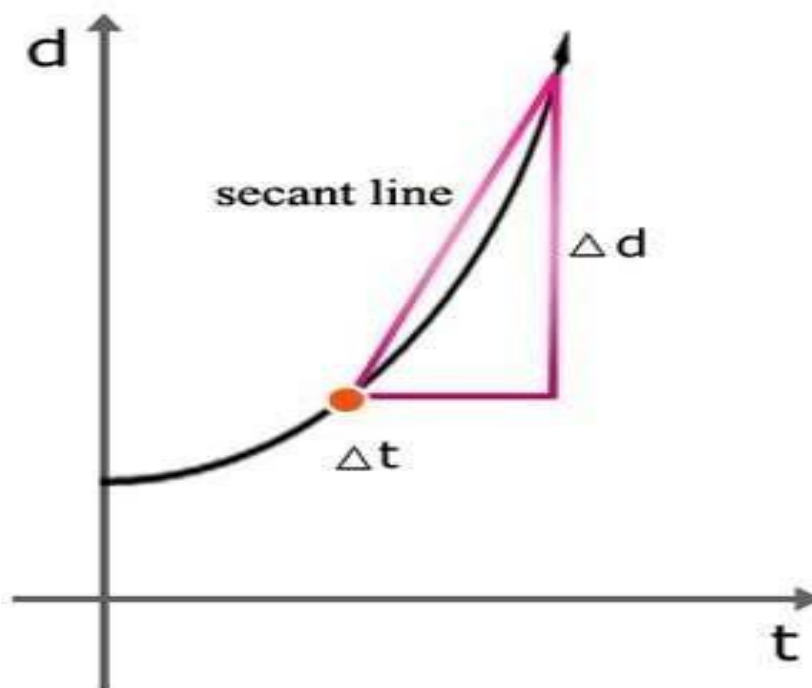
It can also be defined as the shortest distance between these two position of the object and its direction is from the initial to final position of the object during the given interval of time.

It is a vector quantity.

Average velocity:

The average velocity is defined as ratio of the displacement vector to the corresponding time interval

$$\dot{\underline{V}}_{\text{avg}\Delta t} = \frac{\Delta \underline{r}}{\Delta t} \text{ (or) } \underline{V} = \frac{dr}{dt}$$



Average speed:

The average speed is defined as the ratio of total path length travelled by the particle in a time interval.

$$\text{Average speed} = \frac{\text{total path length}}{\text{total time}}$$



Momentum:

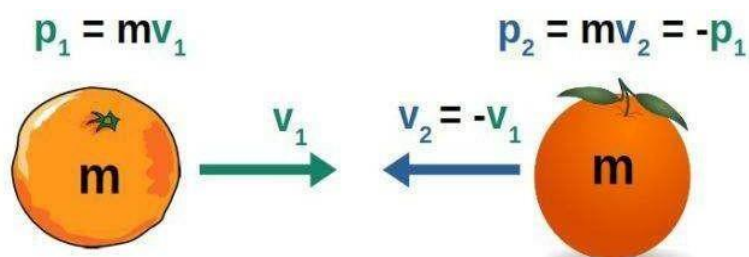
The linear momentum or simply momentum of a particle is defined as product of mass with velocity. It is denoted as P.

Momentum is also vector quantity.

$$\vec{P} = m\vec{v}$$

The magnitude of momentum is equal to product of mass and speed of the particle.

$$P = MV$$



Total momentum:

$$p = p_1 + p_2 = p_1 + (-p_1) = 0$$

Accelerated motion:

$$\text{Acceleration } a = \frac{\Delta v}{\Delta t} \rightarrow 0$$

$\vec{a} = \frac{d\vec{v}}{dt}$

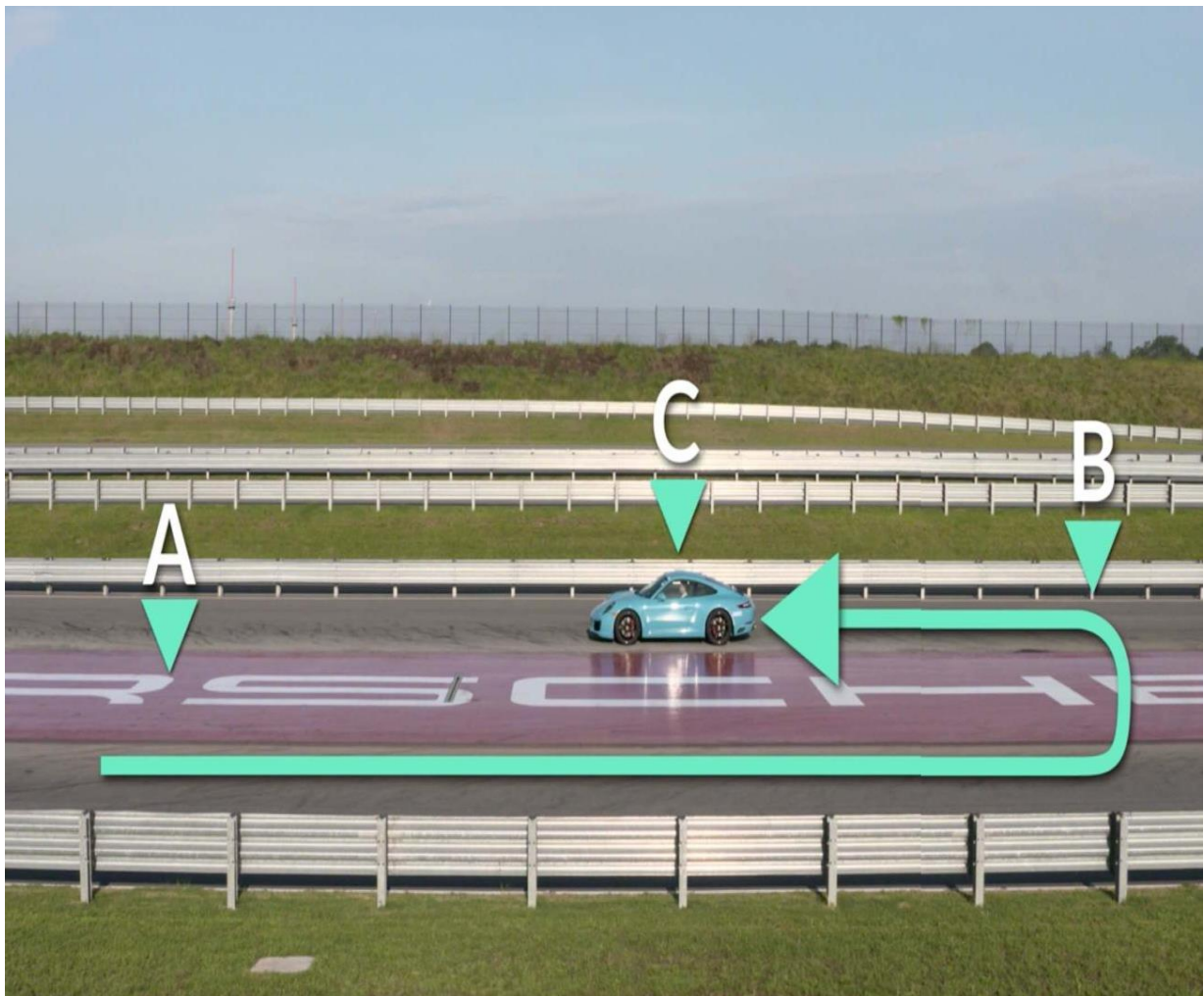
$\frac{dv}{dt}$

The acceleration of the particle at an instant t is equal to rate of change of velocity.

Acceleration is a vector quantity.

Its SI unit is ms^{-2} and its dimensional formula is $\text{M}^0\text{L}^1\text{T}^{-2}$. Acceleration is positive if its velocity is increasing, and is negative if the velocity is decreasing.

The negative acceleration is called retardation or deceleration.



LINEAR MOMENTUM

The impact of a force is more if the velocity and the mass of the body is more. To quantify the impact of a force exactly, a new physical quantity known as linear momentum is defined. The linear momentum measures the impact of a force on a body.

The product of mass and velocity of a moving body gives the magnitude of linear momentum. It acts in the direction of the velocity of the object. Linear momentum is a vector quantity.

Linear

Momentum=mass ×

velocity $p = mv$

It helps to measure the magnitude of a force. Unit of momentum in SI system is kg ms^{-1} and in C.G.S system its unit is g cm s^{-1}

Force

Force is external efforts in the form of push or pull, which:

1. Produces or tries to produce the motion of a static body.
2. Stops or tries to stop a moving body.
3. Changes or tries to change the direction of

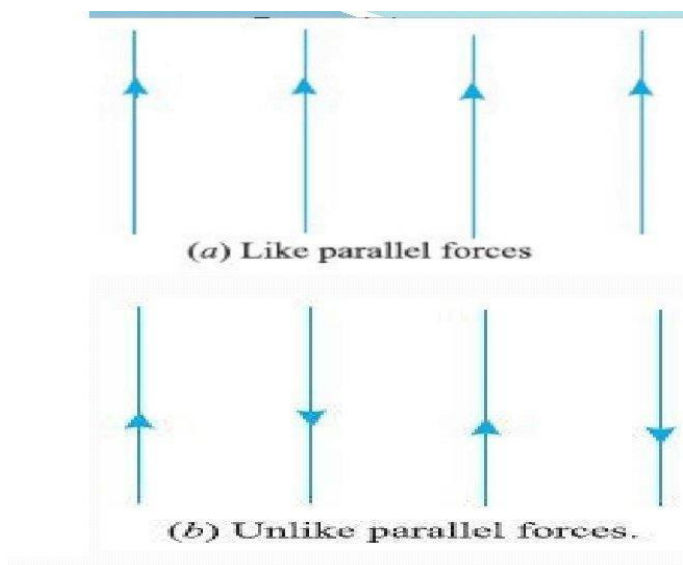
motion of a moving body. Force has both

magnitude and direction. So, it is a vector quantity

Types of forces

Based on the direction in which the forces act, they can be classified into two types as:

- (a) Like parallel forces and
- (b) Unlike parallel forces.



(a) Like parallel forces:

Two or more forces of equal or unequal magnitude acting along the same direction, parallel to each other are called like parallel forces.

(b) Unlike parallel forces:

If two or more equal forces or unequal forces act along opposite directions parallel to each other, then they are called unlike parallel forces.

Impulse

A large force acting for a very short interval of time is called as 'Impulsive force'. When a force F acts on a body for a period of time t , then the product of force and time is known as 'impulse' represented by ' J '

Impulse, $J = F \times t$

By Newton's second law $F = \Delta p / t$ (Δ

refers to change) $\Delta p = F \times t$

$$J = \Delta p$$

Impulse is also equal to the magnitude of change in momentum. Its unit is kgms^{-1} or Ns . Change in momentum can be achieved in two ways.

They are:

- i. A large force acting for a short period of time and**
- ii. A smaller force acting for a longer period of time.**

Examples:

◆Automobiles are fitted with springs and shock absorbers to reduce jerks while moving on uneven roads.

◆In cricket, a fielder pulls back his hands while catching the ball. He experiences a smaller force for a longer interval of time to catch the ball, resulting in a lesser impulse on his hands



Figure 1.6 Example of impulsive force

Uniform and Non-uniform motion

Uniform motion

Consider a car which covers 60 km in the first hour, 60 km in the second hour, and another 60 km in the third hour and so on. The car covers equal distance at equal interval of time. We can say that the motion of the car is uniform. An object is said to be in uniform motion if it covers equal distances in equal intervals of time howsoever big or small these time intervals may be.

Non-uniform motion

Now, consider a bus starting from one stop. It proceeds slowly when it passes through crowded area of the road. Suppose, it manages to travel merely 100 m in 5 minutes due to heavy traffic and is able to travel about 2 km in 5 minutes when the road is clear. Hence, the motion of the bus is non-uniform i.e. it travels unequal distances in equal intervals of time.

Thus, an object is said to be in non uniform motion if it covers unequal distances in equal intervals of time.

Speed, Velocity and Acceleration

Speed is the quantity which shows how fast the body is moving but velocity is the quantity which shows the speed as well as the direction of the moving body.

Speed

Speed is the rate of change of distance or the distance travelled in unit time. It is a scalar quantity. The SI unit of speed is ms^{-1} .

Speed = Distance travelled / Time taken

Velocity

Velocity is the rate of change of displacement. It is the displacement in unit time. It is a vector quantity. The SI unit of velocity is ms^{-1} .
Velocity = Displacement / Time taken.

Acceleration

Acceleration is the rate of change of velocity or it is the change of velocity in unit time. It is a vector quantity.

The SI unit of

acceleration is ms^{-2} .

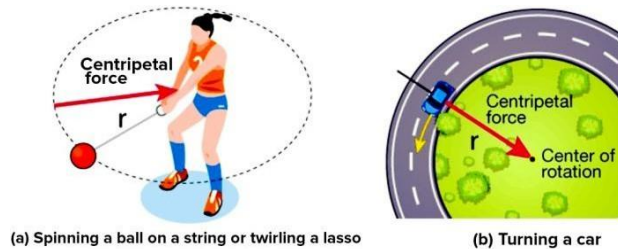
Acceleration = Change

in velocity / Time $a =$

(Final velocity – Initial

velocity) / Time $a = (v - u) / t$

Centripetal Acceleration and Centripetal Force



A body is said to be accelerated, if the velocity of the body changes either in magnitude or in direction. So, the motion of a stone in circular path with constant speed and continuous change of direction is an accelerated motion. In this case, there must be an acceleration acting along the string directed inwards, which makes the stone to move in circular path.

This acceleration is known as centripetal acceleration and the force is known as centripetal force. Since the centripetal acceleration is directed radially towards the centre of the circle, the centripetal force must act on the object radially towards the centre.

Let us consider an object of mass m , moving along a circular path of radius r , with a velocity, v . Its centripetal acceleration is given by

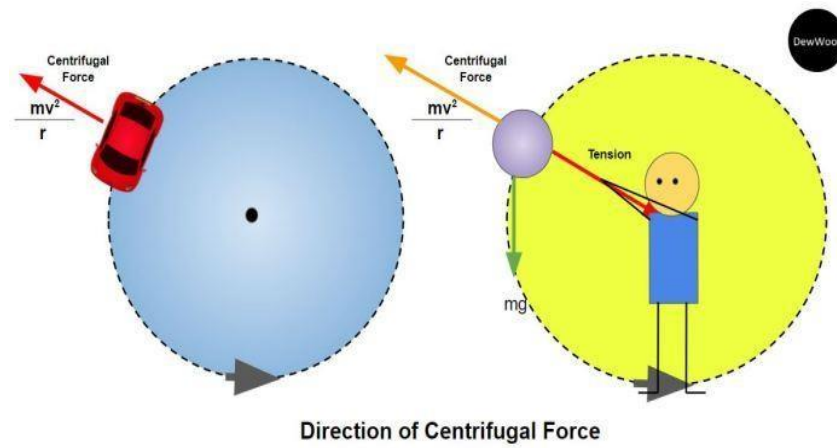
$$a = v^2/r$$

The magnitude of centripetal force is given by, $F = \text{Mass} \times$

$$\text{Centripetal acceleration } F = mv^2/r$$

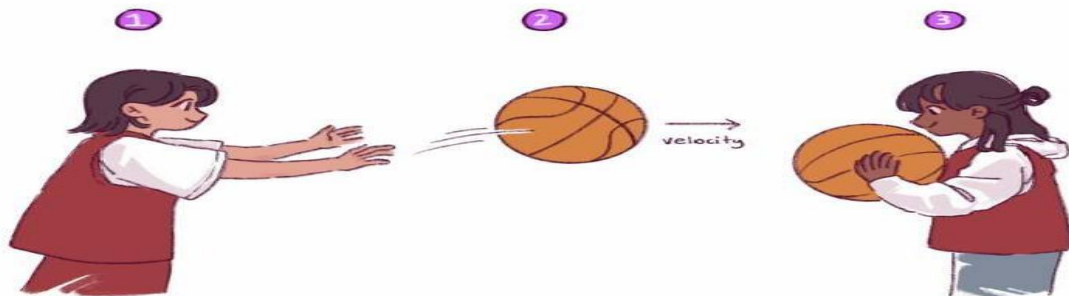
Centrifugal Force

A pulling force that acts away from the centre is experienced. This is called as centrifugal force. Force acting on a body away from the centre of circular path is called centrifugal force. Thus, centrifugal force acts in a direction which is opposite to the direction of centripetal force. Its magnitude is same as that of centripetal force. The dryer in a washing machine is an example for the application of centrifugal force.



Newton's Laws

First law:



Every object continues to be in the state of rest or of uniform motion [Constant velocity] unless there is external force act on it.

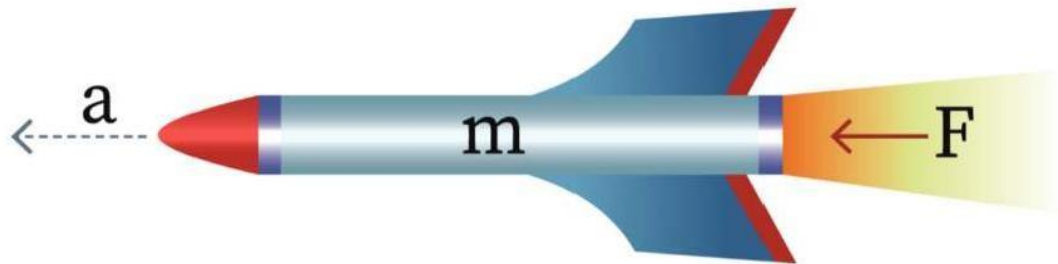
Newton's second law:

The force acting on an object is equal to rate of change of its momentum.

→ →

$$F=ma$$

NEWTON'S SECOND LAW OF MOTION



$$\underline{F = ma}$$

Where F - force
m - mass of the body
a - acceleration of the body

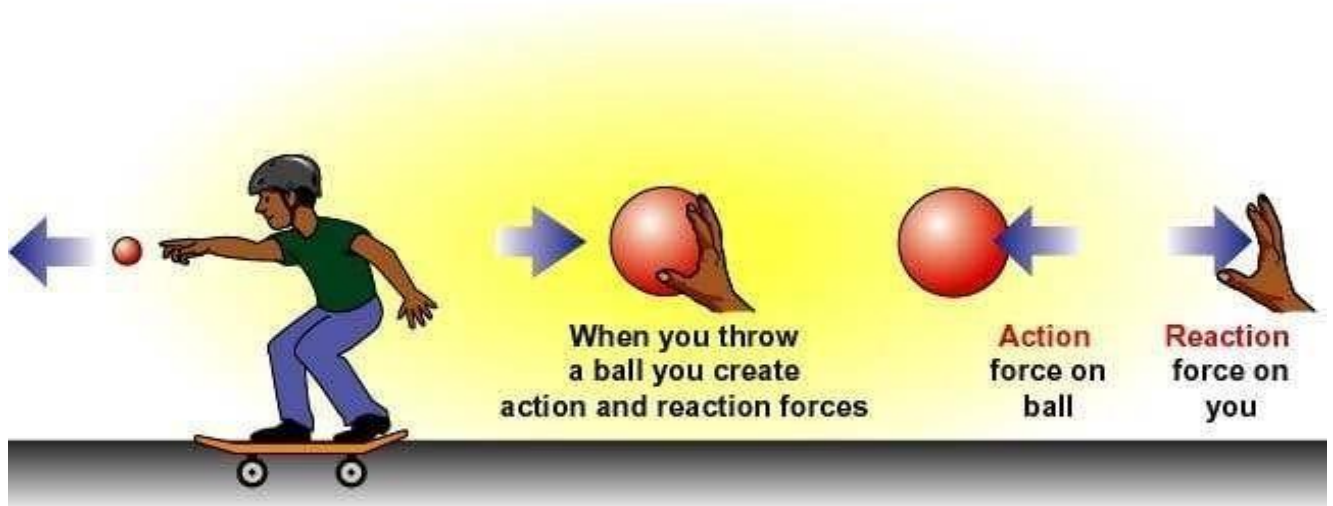
SI unit=N

In the SI system of units, the unit of force is measured in Newton's and it is denoted by symbol 'N'

One Newton is defined as the force which act 1kg of mass to give an acceleration 1ms^{-2} in the direction of the force.

Newton's third law:

Newton's Third Law of Motion



For every **action force**, there is a **reaction force** equal in strength and opposite in direction.

Newton's third law states that for every action there is an equal and opposite reaction.

$$\vec{F}_{12} = -\vec{F}_{21}$$

Angular velocity ($\vec{W}$):

The rate of change of angular displacement is called angular velocity (w).

$$\vec{W} = \frac{d\theta}{dt}$$

Angular acceleration (α):

The rate of change of angular velocity is called angular acceleration.

$$\vec{\alpha} = \frac{d\vec{\omega}}{dt}$$

CHOOSE THE CORRECT ANSWER:

1. An object is said to be in linear motion if it moves in a _____.

- a) Vibratory motion b) Rotational motion
c) Circular motion d) straight line

2. An athlete running on a straight track. This motion is _____.

- a) Linear motion b) Circular motion
c) Vibratory motion d) Rotational motion

3. If a particle falling vertically downwards to the earth, In this motion is _____.

- a) Linear motion b) Circular motion
c) Vibratory motion d) Rotational motion

4. The whirling motion of a stone attached to a string. Its motion is _____.

- a) Linear motion b) Circular motion
c) Rotational motion d) Vibratory motion

5. The motion of a satellite around the earth. In this motion is _____.

- a) Linear motion b) Circular motion
c) Rotational motion d) Vibratory motion

6. If any object moves in a rotational motion about an axis, the motion is ____.

- a) linear b) Circular c) Rotation d) Oscillatory

7. Spinning of the earth about its own axis in this motion is_____.

- a)Linear motion b)Circular motion
- c)Rotational motion d)Oscillatory motion

8.If an object or particle executes a to-and from motion about a fixed point, it is said to be in_____.

- a)linear motion b)Circular motion
- c)Rotational motion d)Vibratory motion

9. Vibratory motion is sometimes also called_____.

- a)Linear motion b)Circular motion
- c)Oscillatory motion d)All these above

10. Movement of swing its motion is called_____.

- a)Vibratory motion b)Oscillatory motion
- c)Both A and B d)None of the above

11. If the rotation every point in the object trans verses a circular path about an axis. In this motion called.

- a)Rotational motion b)Vibratory motion
- c)Oscillatory motion d)None of these

12. Example for three dimensional is_____.

- b)Athlete running on a straight track b)Movement of a swing
- c)Flying Of a kite on a windy day d)Motion of a coin on a carom board

13. Distance is a quantity.

- a)Scalar b)Vector c)Both A and B d)None

14.Displacement is a_____quantity.

- a)Scalar b)None c)Both A and B d)Vector

15. The actual path length travelled by an object in the given interval of time during the motion is called_____.

a)Distance b)Displacement c)Momentum d)Velocity

16. The shortest distance between these two position of the object and its direction is from the initial to final position of the object, during the given interval of time is called as,

a)Distance b)Displacement c)Momentum d)Velocity

17. Velocity is a_____quantity.

a)Scalar b)Vector c)Both d)None

18. Speed is a_____quantity.

a)Scalar b)Vector c)Both A and B d)None of these.

19.Momentum of a particle is defined as_____.

a)Product of mass with distance b)Product of mass with velocity
c)Product of mass with acceleration d)None of these

20. Momentum is a_____quantity.

a)Scalar b)Vector c)Both d)None

21. The unit of the momentum is_____

a) ms^{-2} b) ms^{-1} c)Meter d) kgms^{-1}

22. The momentum of the particle plays a very important role in_____.

a)Newton's law b)Ohms law c)Kirchhoff's law d)Kepler's law

23. The velocity(v) is replaced by angular velocity is_____.

a) θ b) m c) a d) m_0

24. The acceleration(a) is replaced by angular acceleration is,

a) θ b) α c) m d) a

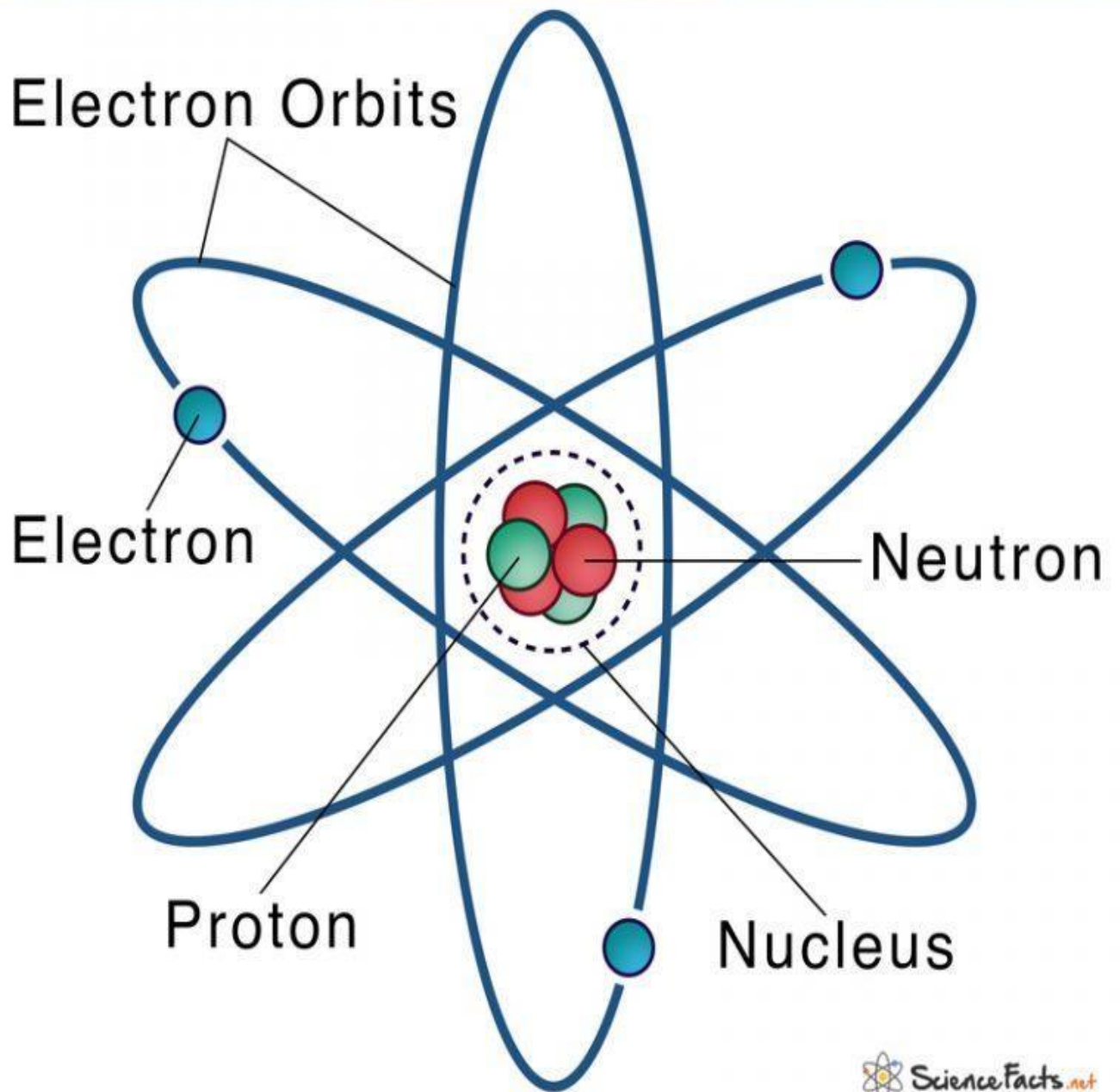
25. In physics, scalar and vector products are used to describe is_____.
- a) Constant concept **b) Various concepts**
 c) Concept of point mass d) none
26. Every action there is an equal and opposite reaction is called as_____.
- a) Newton's first law b) Newton's second law
 c) **Newton's third law** d) Newton's cooling law
27. _____ is the rate of change of velocity.
- a) **Acceleration** b) force c) speed d) velocity
28. The resistance of a body to change its state of rest is called _____
- a) Inertia of direction b) inertia of motion c) **inertia of rest** d) inertia
29. The product of mass and velocity of a moving body gives the magnitude of _____ momentum
- a) **Linear** b) angular c) circular d) none of these
30. A large force acting for a very short interval of time is called as _____ force.
- a) **Impulsive** b) repulsive c) attractive d) downfall
31. The SI unit of speed
 _____ a) **ims⁻¹** b) ms⁻² c) ms d) ms²
32. An object is said to be in _____ if it covers equal distances in equal intervals of time.
- a) Non uniform motion b) **uniform motion** c) circular motion d) linear motion

33. _____ Is the rate of change of distance or the distance travelled in unit time
a) velocity b) force c) speed d) momentum
34. _____ is an external effort in the form of push or pull.
a) velocity b) force c) speed d) momentum
35. The _____ force must act on the object radially towards the centre.
a) centripetal b) centrifugal c) centre d) none of these
36. A pulling force that acts away from the centre is _____
a) centripetal b) centrifugal c) centre d) none of these
37. Based on the direction in which the forces act, they can be classified into
types . _____
a) three b) four c) two d) five
38. Impulse represented by the symbol _____
a) J b) I c) M d) F
39. Two or more forces of equal or unequal magnitude acting along the
same direction, parallel to each other are called ____
a) Repulsive force b) like parallel forces c) unlike parallel forces d) none of
these
40. If two or more equal forces or unequal forces act along opposite
directions parallel to each other, then they are called ____
a) Repulsive force b) like parallel forces c) unlike parallel forces d) none of
these

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47	A	B	C	D
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71	A	B	C	D
72	A	B	C	D
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77	A	B	C	D
78	A	B	C	D
79	A	B	C	D
80	A	B	C	D
81	A	B	C	D
82	A	B	C	D
83	A	B	C	D
84	A	B	C	D
85	A	B	C	D
86	A	B	C	D
87	A	B	C	D
88	A	B	C	D
89	A	B	C	D
90	A	B	C	D
91	A	B	C	D
92	A	B	C	D
93	A	B	C	D
94	A	B	C	D
95	A	B	C	D
96	A	B	C	D
97	A	B	C	D
98	A	B	C	D
99	A	B	C	D
100	A	B	C	D

Invigilator's Signature

Atom



UNIT-2

ATOMIC STRUCTURE

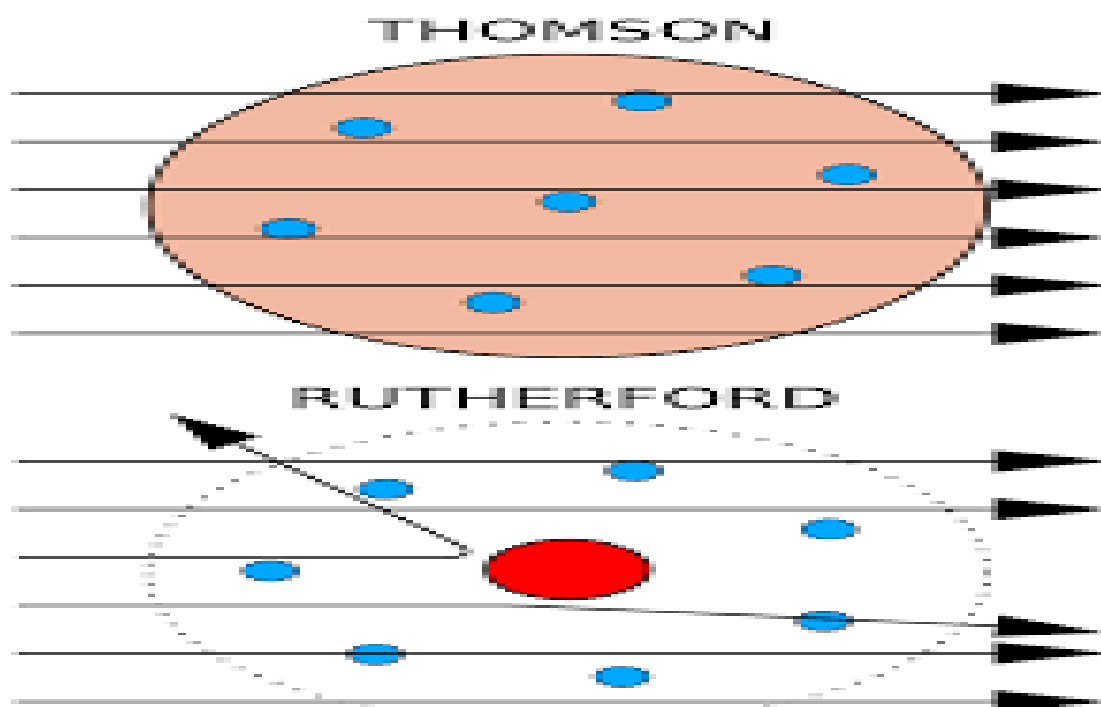
Atomic Structure:

The word atoms is derived from the greek work atomos. Tomos means smallest divisible particle and atomas means smallest indivisible particle. Atom consists of positively charged nucleus at the centre and negatively charged electrons revolving around it. Nucleus consists of protons and neutrons together called nucleons. Atom is electrically neutral. Because number of protons present in the nucleus is equal to number. A electrons revolving around the nucleus.

Discovery of nucleus:

In 1911, Rutherford, a scientist performed his famous experiment of Bombarding a thin gold foil with very small positively charged particles called alpha (α) particles. He observed that,

- Most of the alpha particles passed straight through the foil.
- Some alpha particles were slightly deflected from their straight path.
- Very alpha [particles completely bounced back



Dalton's Atomic Theory

John Dalton provided a basic theory about the nature of matter. He proposed a model of Atom known as Dalton's atomic theory in 1808 based on his experiments.

The main postulates of Dalton's atomic theory are:

- All the matters are made up of extremely small particles

called atoms (Greek philosopher Democritus used the same name for the smallest indivisible particles).

- Atoms of the same element are identical in all aspects

(size, shape, mass and properties).

- Atoms of different elements have different sizes and masses, and possess different properties.

- Atoms can neither be created nor be destroyed. i.e., atom is indestructible.

- Atoms of different elements may combine with each other in a fixed simple ratio to form molecules.

- An atom is the smallest particle of matter that takes part in a chemical reaction.

Limitations of Dalton's Atomic Theory

- Atom is no longer considered as the smallest indivisible particle.
- Atoms of the same element have different masses (Isotopes).
- Atoms of the different elements may have same masses(Isobars).
- Substances made up of same kind of atoms may have different properties(Ex. Coal and Graphite)

Advantages of Dalton's Atomic Theory

- Dalton's theory explains most of the properties of gases and liquids.
- This explains the law of chemical combination and the law of conservation of mass (They are explained at the last section)

Fundamental Particles

In 1878, sir William Crookes, while conducting an experiment using discharge tube, found certain visible rays travelling between two metal electrodes. These rays are known as Crookes rays or cathode rays. The discharge tube used in the experiment is now referred to as Crookes tube or more popularly as Cathode Ray Tube (CRT).

Cathode Ray Tube is a long glass tube filled with gas and sealed at both ends. It consists of two metal plates (which act as electrodes) connected with high voltage. The electrode which is connected to the negative terminal of the battery is called the cathode (negative electrode). The electrode connected to the positive terminal is called the anode (positive electrode).

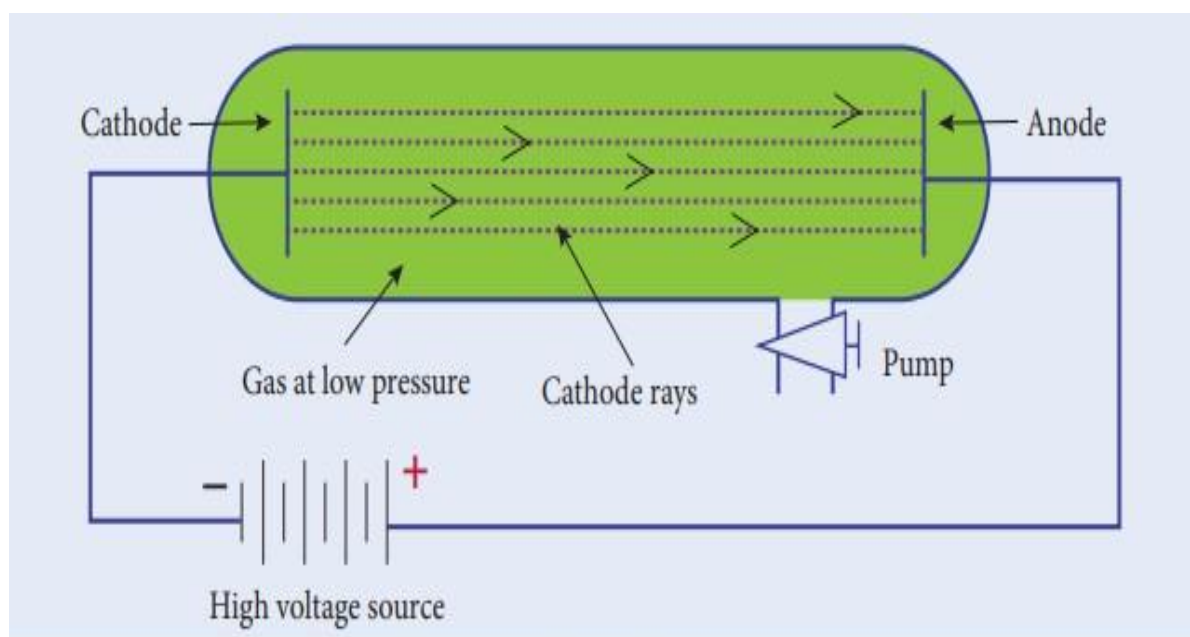


Figure 12.1 Cathode Ray Tube

Discovery of Electrons

When a high electric voltage of 10,000 volts or more is applied to the electrode of a discharge tube containing air or any gas at atmospheric pressure, no electricity flows through the air. However, when the high voltage of 10,000 volts is applied to the electrodes of discharge tube containing air or any gas at a very low pressure of about 0.001 mm of mercury, a greenish glow is observed on the walls of the discharge tube behind anode. This observations clearly show some invisible ray coming from the cathode. Hence, these rays are called cathode rays. Later, they were named as electrons.

Properties of Cathode rays

- Cathode rays travel in straight line from cathode towards anode.
- Cathode rays are made up of material particles which have mass and kinetic energy.
- Cathode rays are deflected by both electric and magnetic fields. They are negatively charged particles.

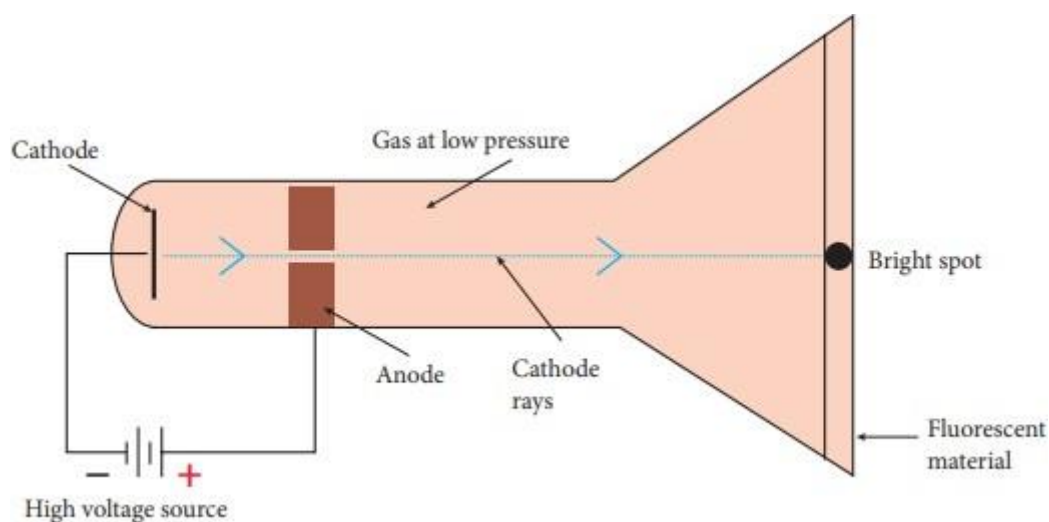


Figure 12.2 Emission of Electrons

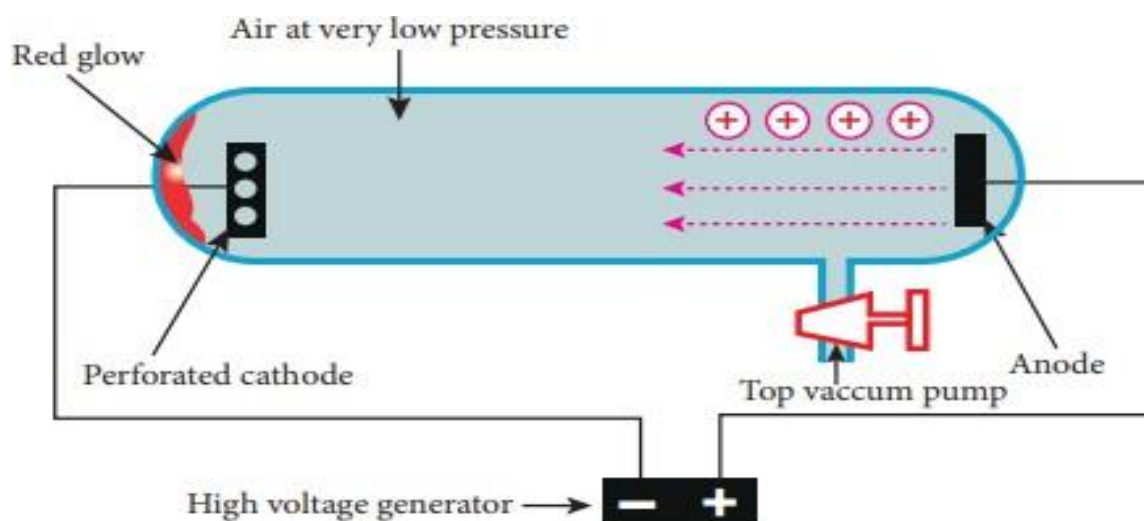


Figure 12.3 Emission of Protons

Atomic Number (Z):

The number of protons (or) the number of electrons in a nucleus. Is called the atomic number.

Mass Number(A):

The total number of protons and neutrons in a number.

$\text{Number of neutrons}(n) = \text{Mass number}(A) - \text{Atomic number}(Z)$
--

Valence shell and Valence electron:

The outer most shell of an atom is called valence shell and the electron present in the valence shell are known as valence electrons.

Isotopes:

The different atoms of the same element, having same atomic number but different mass numbers. E.g. $^{35}_{17}\text{Cl}$, $^{37}_{17}\text{Cl}$

Isobars:

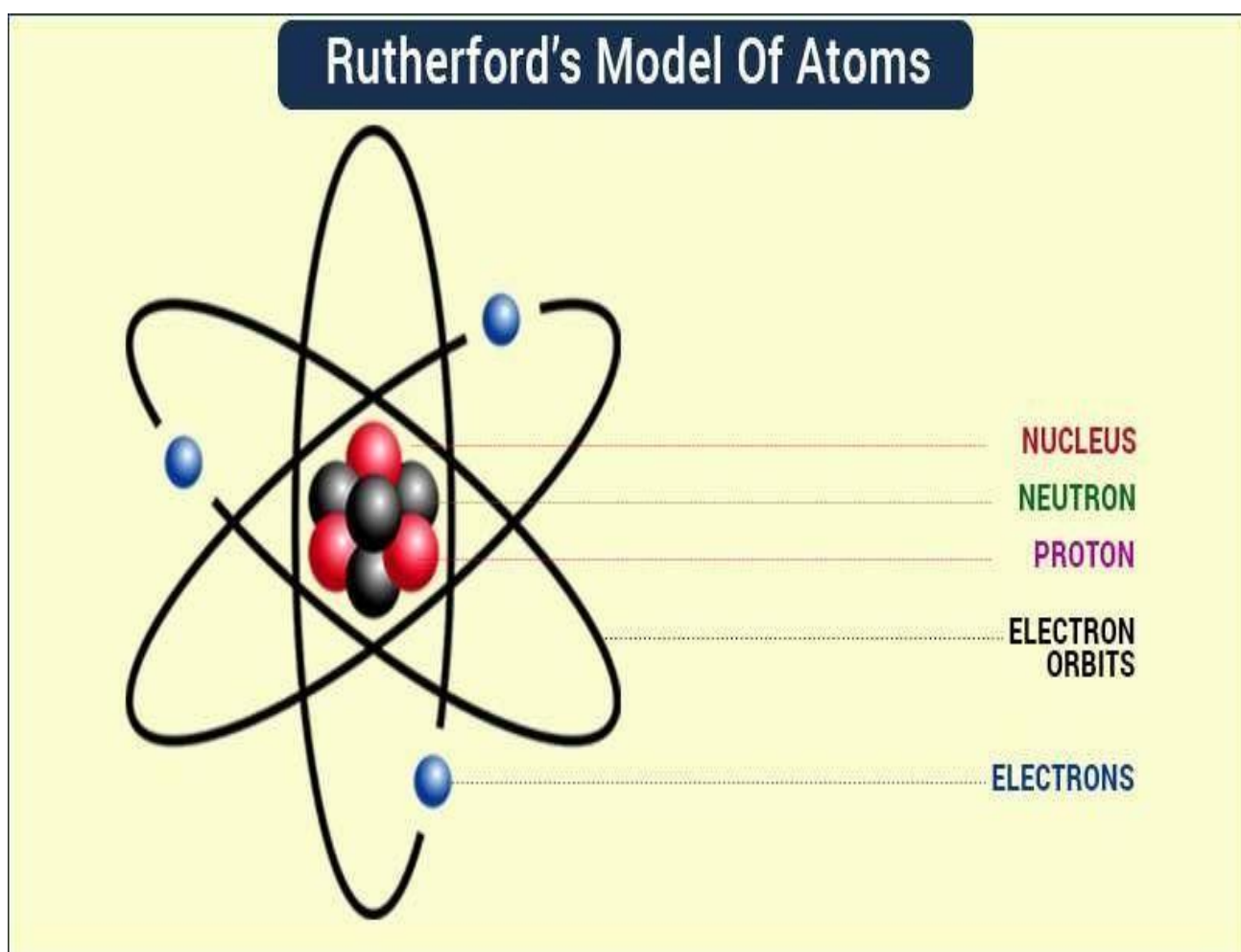
Atoms of different elements with different atomic numbers, and same mass number are known as Isobars.

Isotones:

Atoms of different elements with different atomic numbers and different mass numbers, but with same number of neutrons are called Isotones.

Rutherford's Atomic Model:

Rutherford's model of atomic structure is similar to the structure of the solar system. Just in the solar system, the sun is at the centre and the planets revolve around it, similarly in an atom the nucleus present at the centre and the electrons revolve around it in orbits (or) shells.



MODERN PERIODIC TABLE

With reference to the modern periodic law, the elements were arranged in the increasing order of their atomic numbers to form the modern periodic table. The modern periodic table is a tabular arrangement of elements in periods and groups, highlighting the regular repetition of properties of the elements

1
IA
1A

2
IIA
2A

13
IIIA
3A

14
IVA
4A

15
VA
5A

16
VIA
6A

17
VIIA
7A

18
VIIIA
8A

1
H
Hydrogen
1.008

3
Li
Lithium
6.941

11
Na
Sodium
22.990

19
K
Potassium
39.098

37
Rb
Rubidium
84.453

55
Cs
Cesium
132.905

87
Fr
Francium
223.020

2
He
Helium
4.003

4
Be
Beryllium
9.012

12
Mg
Magnesium
24.305

20
Ca
Calcium
40.078

38
Sr
Strontium
87.62

56
Ba
Barium
137.327

88
Ra
Radium
226.025

5
B
Boron
10.811

13
Al
Aluminum
26.982

21
Sc
Scandium
44.956

29
Cu
Copper
63.546

37
Ga
Gallium
69.723

45
In
Indium
114.818

53
Tl
Thallium
204.383

61
Tl
Thallium
204.383

69
Tm
Thulium
168.934

77
Ho
Holmium
164.930

85
Bi
Bismuth
208.980

93
Np
Neptunium
237.044

101
Md
Mendelevium
258.1

109
Mt
Meitnerium
268

117
Ts
Tennessine
289

6
C
Carbon
12.011

14
Si
Silicon
28.086

32
Ge
Germanium
72.61

50
Sn
Tin
118.71

68
Er
Erbium
167.26

86
Rn
Radon
222.018

104
Fl
Flerovium
289

112
Cn
Copernicium
277

120
Ds
Darmstadtium
269

128
Og
Oganesson
294

7
N
Nitrogen
14.007

15
P
Phosphorus
30.974

33
As
Arsenic
74.922

51
Sb
Antimony
121.760

69
Tm
Thulium
168.934

87
Ts
Tennessine
289

105
Uup
Ununpentium
unknown

113
Nh
Nihonium
284

121
Uts
Ununtrium
unknown

8
O
Oxygen
15.999

16
S
Sulfur
32.065

34
Se
Selenium
78.09

52
Te
Tellurium
127.6

80
Hg
Mercury
200.59

98
Cf
Californium
251.080

116
Lv
Livermorium
293

124
Uuq
Ununquadium
unknown

9
F
Fluorine
18.998

17
Cl
Chlorine
35.453

35
Br
Bromine
79.904

53
I
Iodine
126.904

81
At
Astatine
210

109
Mt
Meitnerium
268

117
Ts
Tennessine
289

10
Ne
Neon
20.180

18
Ar
Argon
39.948

36
Kr
Krypton
84.80

54
Xe
Xenon
131.29

86
Rn
Radon
222.018

118
Uuo
Ununoctium
unknown

8
VIII
8

9
VIII
8

10
VIII
8

Atomic Number

Symbol

Name

Atomic Mass

Lanthanide Series

Actinide Series

Alkali Metal

Alkaline Earth

Transition Metal

Basic Metal

Semimetal

Nonmetal

Halogen

Noble Gas

Lanthanide

Actinide

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Features of Periods

The horizontal rows are called periods. There are seven periods in the periodic table.

First period

(Atomic number 1 and 2): This is the shortest period. It contains only two elements (Hydrogen and Helium).

Second period

(Atomic number 3 to 10): This is a short period. It contains eight elements

(Lithium to Neon). Third period

Third period

(Atomic number 11 to 18): This is also a short period. It contains eight elements (Sodium to Argon).

Fourth period

(Atomic number 19 to 36): This is a long period. It contains eighteen elements (Potassium to Krypton). This includes 8 representative elements and 10 transition elements.

Fifth period

(Atomic number 37 to 54): This is also a long period. It contains 18 elements (Rubidium to Xenon). This includes 8 representative elements and 10 transition elements.

Sixth period

(Atomic number 55 to 86): This is the longest period. It contains 32 elements (Cesium to Radon). This includes 8 representative elements, 10 transition elements and 14 inner transition elements (Lanthanides).

Seventh period

(Atomic number 87 to 118): Like the sixth period, this period also accommodates 32 elements. Recently 4 elements have been included by IUPAC

Features of Groups

The vertical columns in the periodic table starting from top to bottom are called groups. There are 18 groups in the periodic table. < based on the common characteristics of elements in each group, they can be grouped as various families.

Group Number	Family
1	Alkali Metals
2	Alkaline earth metals
3 to 12	Transition metals
13	Boron Family
14	Carbon Family
15	Nitrogen Family
16	Oxygen Family (or) Chalcogen family
17	Halogens
18	Noble gases

- The Lanthanides and Actinides, which form part of Group 3 are called inner transition elements.
- Except 'group 18', all the elements present in each group have the same number of electrons in their valence shell and thus have the same valency. For example, all the elements of group 1 have one electron in their valence shells ($1s^1$). So, the valency of all the alkali metals is '1'.
- As the elements present in a group have identical valence shell electronic configurations, they possess similar chemical properties.
- The physical properties of the elements in a group such as melting point, boiling point and density vary gradually.
- The atoms of the 'group 18' elements have stable electronic configuration in their valence shells and hence they are un reactive.

Mass of sub-atomic particles:

Electron- 9.1×10^{-28}

Proton- 1.6×10^{-24}

Neutron- 1.6×10^{-24}

Electronic Configuration of atoms:

The maximum number of electron that can be accommodated in a shell is equal to $2n^2$. The orbit closest to the nucleus is the K shell. It has the least amount of energy and the electrons present in it are called K electrons.

Atomic number and mass number of first 10

elements

Hydrogen-1H ¹	Carbon-6C ¹²
Helium-2He ⁴	Nitrogen-7N
Lithium-3Li ⁷	Oxygen- 8O ¹⁶
Beryllium-4Be ⁹	Fluorine-9F ¹⁹
Boron-5B ¹¹	Neon-10Ne ²⁰

Uses of Radio Isotopes:

- Uranium-235, which is a source of nuclear reactors.
- Cobalt-60, which is used in radiotherapy treatment.

Oxygen is the most abundant element in both the earth's crust and the human body.

AVOGADRO HYPOTHESIS

In 1811 Avogadro framed a hypothesis based on the relationship between the number of molecules present in equal volumes of gases in different conditions. The Avogadro's law states that "equal volumes of all gases under similar conditions of temperature and pressure contain equal number of molecules".

It follows that the volume of any given gas must be proportional to the number of molecules in it. If 'V' is the volume and 'n' is the number of molecules of a gas, then Avogadro law is represented, mathematically, as follows: $V \propto n$ $V = \text{constant} \times n$ Thus, one liter (1 dm³) of hydrogen contains the same number of molecules as in one liter of oxygen, i.e. the volume of the gas is directly proportional to the number of molecules of the gas

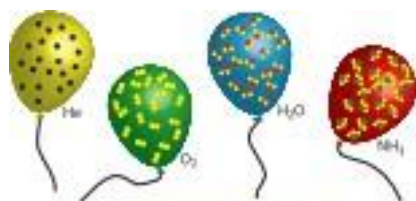


Figure 7.4 Avogadro Hypothesis

Explanation

Let us consider the reaction between hydrogen and chlorine to form hydrogen chloride gas $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2 \text{HCl}(\text{g})$ 1 vol + 1 vol $\rightarrow$ 2 volumes According to Avogadro's law 1 volume of any gas is occupied by "n" number of molecules. n molecules + n molecules $\rightarrow$ 2n molecules if $n = 1$ then 1 molecule + 1 molecule $\rightarrow$ 2 molecules. $\frac{1}{2}$ molecule + $\frac{1}{2}$ molecule $\rightarrow$ 1 molecule 1 molecule of hydrogen chloride gas is made up of $\frac{1}{2}$ molecule of hydrogen and $\frac{1}{2}$ molecule of chlorine. Hence, the molecules can be sub divided. This law is in agreement with Dalton's atomic theory.

APPLICATIONS OF AVOGADRO'S LAW

- i. It explains Gay-Lussac's law.
- ii. It helps in the determination of atomicity of gases.
- iii. Molecular formula of gases can be derived using Avogadro's law
- iv. It determines the relation between molecular mass and vapors density.
- v. It helps to determine gram molar volume of

Avogadro Number:

The number of units in one mole of any substance is called Avogadro's number. It is equal to 6.023×10^{23} .

Homo atomic & Hetero atomic Molecules:

Homo-atomic Molecule:

Molecules formed by only one type of atoms are known as Homo-atomic molecule.(e.x): $\text{H}_2, \text{N}_2, \text{P}_4$

Hetero-atomic Molecule:

Molecules formed by different types of atoms are known as Hetero-atomic molecules.

(e.x): $\text{CO}_2, \text{NO}_2, \text{CH}_4, \text{HCL}$

Atomicity:

The number of atoms present in the molecule is called atomicity.

$$\text{Atomicity} = \frac{\text{Molecular mass}}{\text{Atomic mass}}$$

Mass-energy relationship:

$$E=mc^2$$

Where, E-Energy, m=mass, C=speed of light

CHOOSE THE CORRECT ANSWER:-

1. The term nucleons refer to_____.
a) Protons and electrons b) Only neutrons
c) Electrons and neutrons **d) Protons and neutrons.**
2. Gold foil alpha particles scattering experiment was performed by_____.
a) Dalton B) Goldstein c) Thomson **d) Rutherford**
3. Hydrogen atom does not have_____.
a) Proton **b) Neutron** c) electrons d) proton & electron
4. Number of protons and electrons in an atom are_____.
a) Equal b) Not equal c) Zero d) Infinity
5. Rutherford's model of atomic structure is similar to the structure of the _____.
a) Plum pudding **b) Solar system** c) J.J Thomson model d) None
6. α -particles are_____.
a) Negatively charged particles **b) Positively charged particles**
c) Gamma radiation d) None
7. Mass of neutron is equal to _____g.
a) 1.7×10^{-24} _____ **b) 1.6×10^{-24}** c) 1.5×10^{-24} d) 1.4×10^{-24}
8. _____ is equal to no of protons = number of electrons.
a) Mass number b) Nucleons **c) Atomic number** d) None
6. Mass number = _____ + No. of neutrons.
a) **No of protons** b) No. of electrons c) Nucleons d) None
10. The orbital closest to the nucleus is the _____ shell.
a) **K** b) L c) M d) N

11. The maximum number of electrons that can be accommodated in a shell is equal to_____.

- a) $3n^2$ b) $4n^2$ c) $2n^2$ d) n^2

12. Atomic number of oxygen is_____.

- a)16 b)8 c)6 d)12

13. Atomic number of oxygen is_____.

- a)valency b)valence electron c)valence shell d)None

14. _____is the combining capacity of the element.

- a)Orbit b)valency c)valence shell d)valence electron

15. The elements which have same atomic number but different mass number is .

- a)Isotopes b)Isobars c)Isotones d)None

16. The isotope used in radio therapy treatment is_____.

- a)Uranium235 b)cobalt60 c)Iodine131 d)Soduim-24

17. Atoms of different elements with different atomic numbers, and same mass number are_____.

- a) Isotopes b)isobars c)isotones d)None

18. Atoms have same number of neutrons are called_____.

- a)Isotopes b)isobars c)isotones d)None

19. Carbon has_____protons.

- a)6 b)7 c)8 d)9

20. Which sub-atomic particles have no charge_____.

- a)Proton b)Neutron c)Electron .d)Proton &Electron

21. _____ is the most abundant element in both the earth's crust and the human body.

a)Hydrogen b)oxygen c)Nitrogen d)Boron

22. Values of Avogadro number is_____.

a)6.023×10²³ b)6.021×10²³ c)6.022×10²² d)6.023×10⁻²

23. Hetero atomic molecule is_____.

a)C₃ b)O₂ c)HCL d)N₂

24. The number of atoms present in the molecule is called its_____.

a)Atomic mass b)Atomicity c)Compound d)Molecular mass

25. The mass of an atom can be converted into_____.

a)Velocity b)Energy c)Work d)Power

26. What is the mass of subatomic molecule of electron_____ -

a)9.1x10⁻²⁸ b) 9.1x10⁻²⁶ c) 9.1x10⁻²⁵ d) 9.1x10⁻²⁴

27. The maximum number of electrons that can be filled in a shell is equal to?

a)2n² b)3n c)4n d)3n²

28. Atomic number of hydrogen is_____

a)2 b)1 c)3 d)4

29. Mass number of hydrogen is _____

a)3 b)4 c)1 d)0

30. Which one of the following is the source of nuclear reactors?

a)U-235 b) O-16 c) Hydrogen d) carbon

31. The number of units in mole of any substance is called ____
- a) Boltzmann constant b) Avogadro's number c) Bohr's number d) none of these
32. Avogadro's number is equal to ____
- a) 6.023×10^{23} b) 6.023×10^{28} c) 6.023×10^{234} d) 6.023×10^{26}
33. Molecules formed by only one type of atoms are known as ____
- a) Mono atomic b) hetero atomic c) homo atomic d) poly atomic
34. Which of the following is homo atomic molecule?
- a) H₂ b) CO c) NO d) none of these
35. Atomicity of water is ____
- a) polyatomic b) diatomic c) tri atomic d) homo atomic
36. Mass of an atom is converted into ____
- a) Energy b) force c) velocity d) none of these
37. The number of periods and groups in the periodic table are ____.
- a) 6,16 b) 7,17 c) 8,18 d) 7,18
38. The basis of modern periodic law is ____.
- a) Atomic number b) atomic mass
c) isotopic mass d) number of neutrons
39. ____ Group contains the member of halogen family.
- a) 17th b) 15th c) 18th d) 16th

40. The _____ law states that “equal volumes of all gases under similar conditions of temperature and pressure contain equal number of molecules”.

a) Pascal's b)Avogadro's c)Newton's law d)none of these

41. The third period contains eight elements_____

a)eight b) nine c) three d) five

42. The mass of a proton is equal to_____

a) 1.6×10^{-25} grams b) 1.6×10^{-24} grams c) 1.6×10^{-20} grams d) 1.6×10^{-28} grams

43. _____ Carries no charge and it is a neutral particle

a) Neutron b)proton c)electron d)none of these



Student's Name (In Block Letters Only)																									Set	Roll Number						Subject			
																									A	0	0	0	0	0	0	0	0	0	0
																									B	1	1	1	1	1	1	1	1	1	1
																									C	2	2	2	2	2	2	2	2	2	2
																									D	3	3	3	3	3	3	3	3	3	3
																									E	4	4	4	4	4	4	4	4	4	4
																									F	5	5	5	5	5	5	5	5	5	5
																									G	6	6	6	6	6	6	6	6	6	6
																									H	7	7	7	7	7	7	7	7	7	7
																									I	8	8	8	8	8	8	8	8	8	8
																									J	9	9	9	9	9	9	9	9	9	9
																									K	0	0	0	0	0	0	0	0	0	0
																									L	1	1	1	1	1	1	1	1	1	1
																									M	2	2	2	2	2	2	2	2	2	2
																									N	3	3	3	3	3	3	3	3	3	3
																									O	4	4	4	4	4	4	4	4	4	4
																									P	5	5	5	5	5	5	5	5	5	5
																									Q	6	6	6	6	6	6	6	6	6	6
																									R	7	7	7	7	7	7	7	7	7	7
																									S	8	8	8	8	8	8	8	8	8	8
																									T	9	9	9	9	9	9	9	9	9	9
																									U	0	0	0	0	0	0	0	0	0	0
																									V	1	1	1	1	1	1	1	1	1	1
																									W	2	2	2	2	2	2	2	2	2	2
																									X	3	3	3	3	3	3	3	3	3	3
																									Y	4	4	4	4	4	4	4	4	4	4
																									Z	5	5	5	5	5	5	5	5	5	5
																										6	6	6	6	6	6	6	6	6	6
																										7	7	7	7	7	7	7	7	7	7
																										8	8	8	8	8	8	8	8	8	8
																										9	9	9	9	9	9	9	9	9	9

Mobile Number										Test ID	
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1	1	1	1	1	1	1	1	1	1	1	1
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3	3	3	3	3	3	3	3	3	3	3	3
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5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
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9	A	B	C	D
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Candidate's Signature

Invigilator's Signature

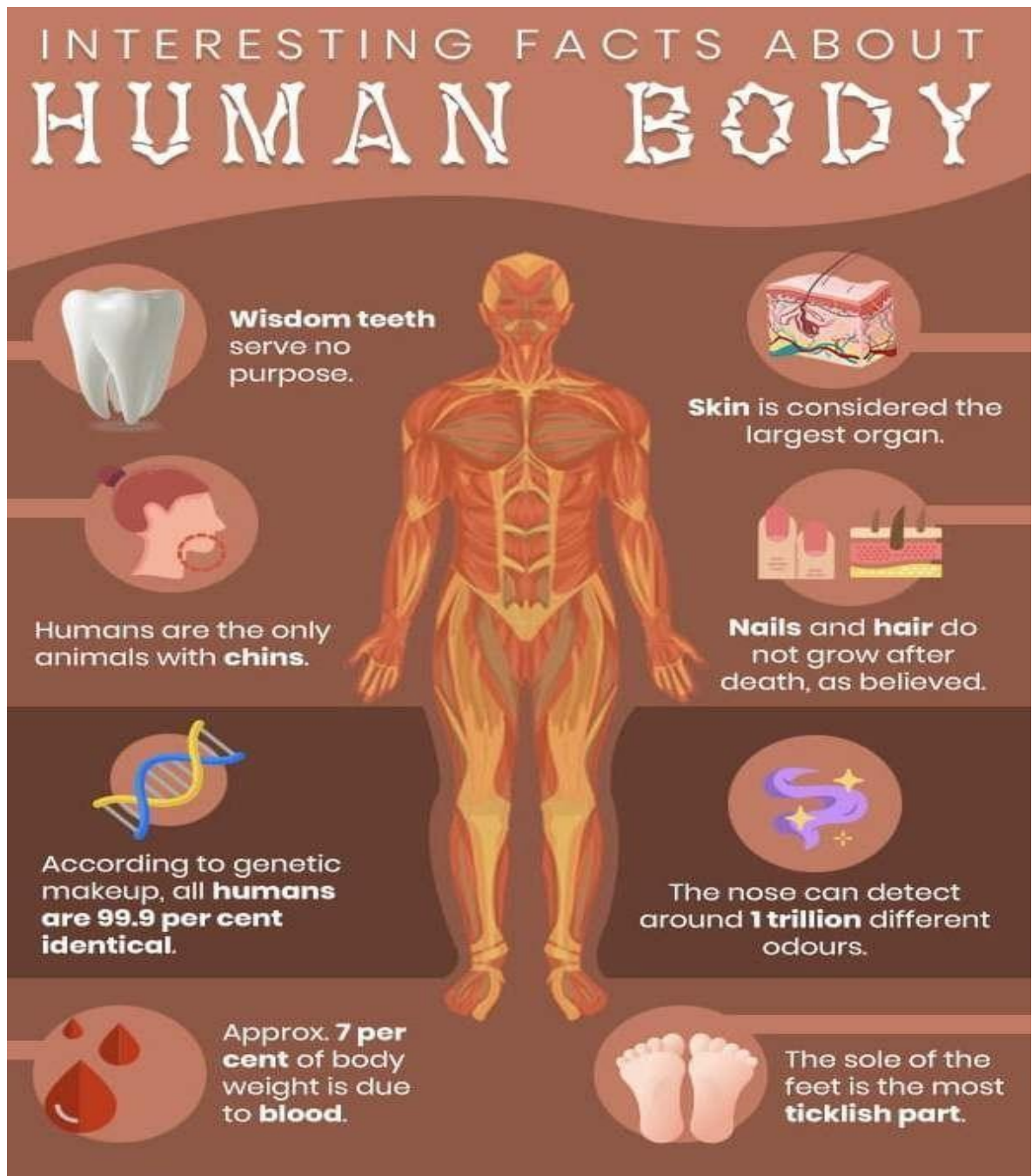
UNIT-3

HUMAN ANATOMY

About Human Body:

If we were to “break apart” the human body at the microscopic level, then the cell would constitute its most basic unit.

The average adult has somewhere between 30 – 40 trillion cells, and an estimated 242 billion new cells are produced every day.



When a select group of cells with similar functions come together, it forms a tissue.

Tissues cumulate into organs, group of organs form organ systems and eventually, a complete organism.

Cells->Tissues->Organs->Organ System->Organism

- **Human Anatomy**
- **Human Physiology**
- **Circulatory System**
- **Digestive System**
- **Reproductive System**
- **Respiratory System**
- **Nervous System**
- **Key Points About the Human Body**

Human Anatomy:

Skeleton

The human body exhibits a variety of movements from walking and running to crawling, jumping and climbing. The framework that enables us to do all these activities is the skeleton. Humans have as much as 300 bones at birth. However, the bones start to fuse with age. At adulthood, the total number of bones is reduced to 206.

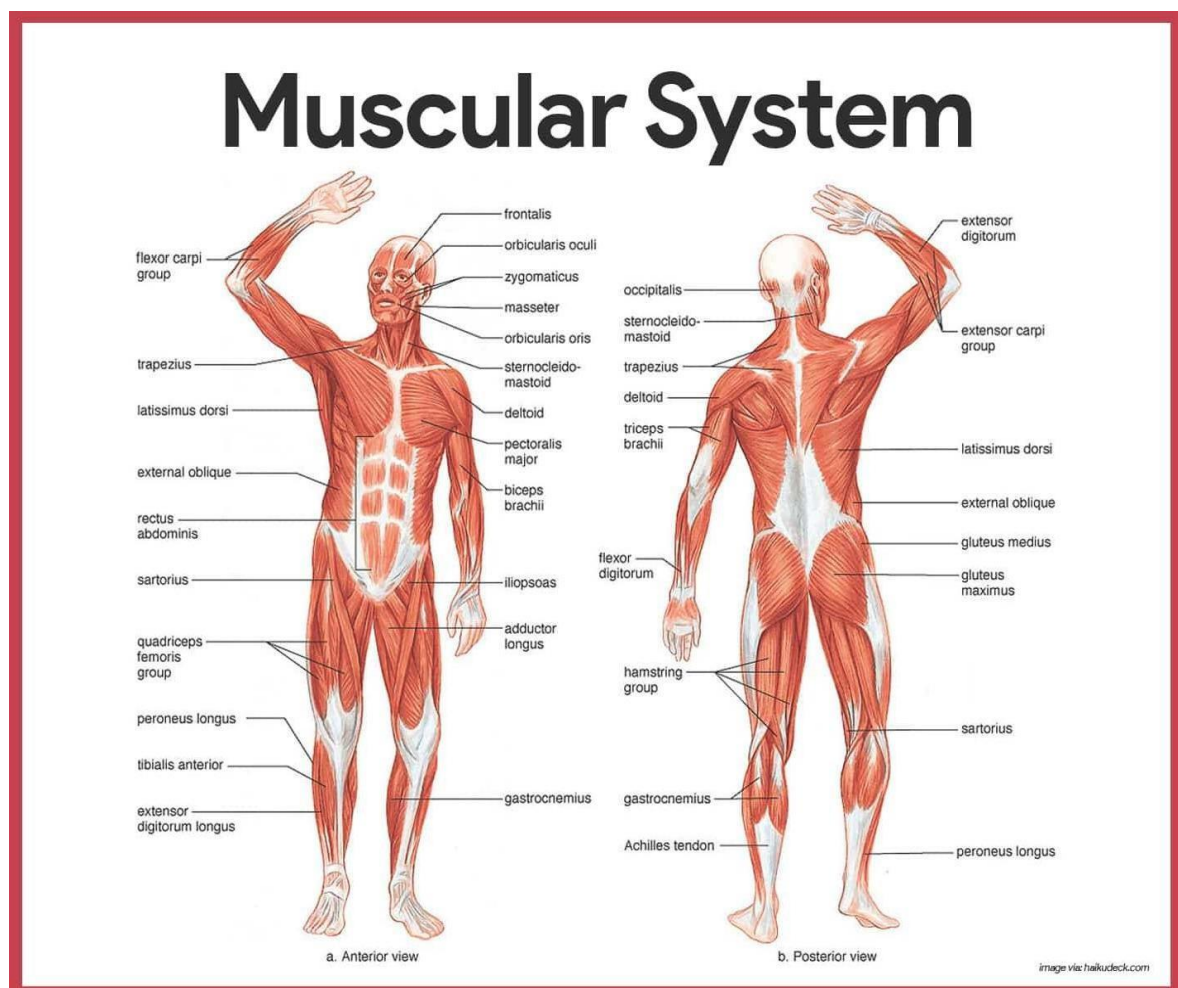


The skeleton also protects several vital organs such as the heart, lungs and the liver. Bones are attached to other bones through ligaments, a fibrous connective tissue.

Joints are the points at which two or more bones meet. They enable a range of movements like rotation, abduction, adduction, protraction, retraction and more. Based on flexibility and mobility, joints can be further classified into movable joints and immovable joints. Movable joints are flexible while immovable joints (also called fixed joints) are non-flexible since the bones are fused.

Muscles

Muscles are specialized tissues which assist the bones in locomotion. Muscles are attached to the bones through tendons. Movement of limbs happens due to the contraction and relaxation of the corresponding muscles present in that region. Joints help in the flexibility of bones, but a bone cannot be bent or stretched until a muscle acts on it. In other words, the muscles attached to that bone pulls it to the direction of movement.

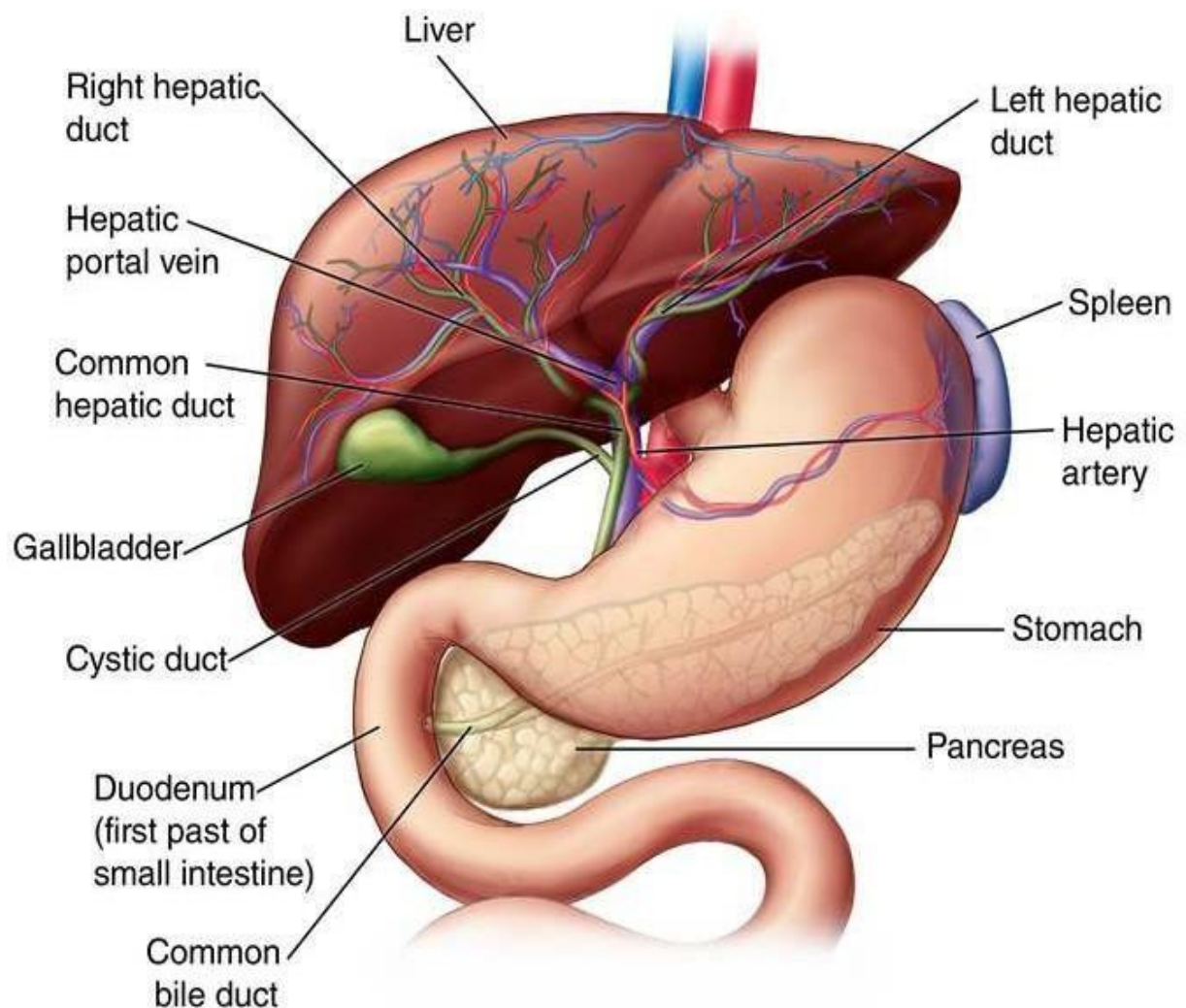


Furthermore, most movement involves muscles that work as a pair. For example, when we bend our arm, muscles in that region contract, become shorter and stiffer and pull the bones to the direction of movement. For relaxation (stretching), muscles in the opposite direction have to pull the bones towards it.

The liver is located in the upper right portion of the abdomen. It is the largest gland in the human body that performs several important functions. It is the only organ that has the ability to regenerate efficiently.

Liver Anatomy:

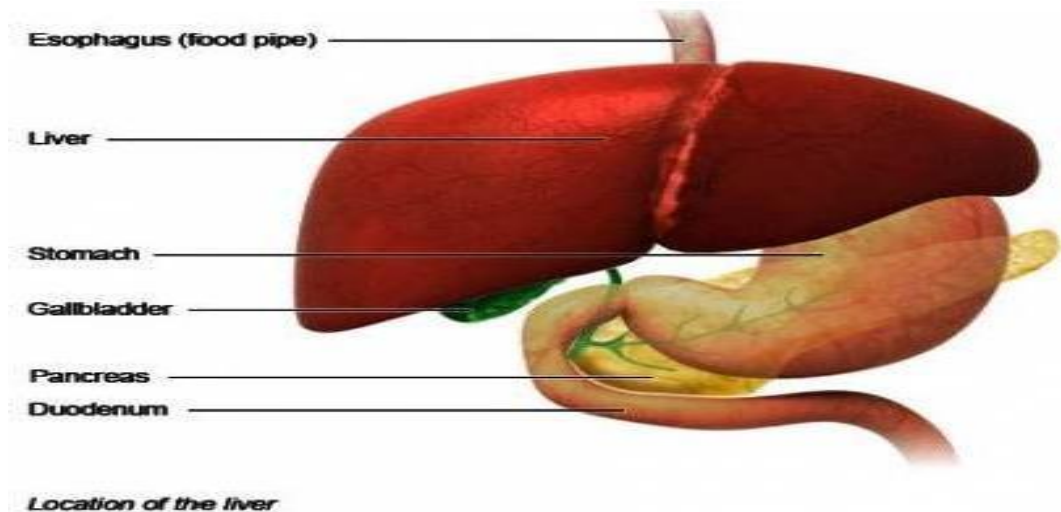
The liver is located in the upper right portion of the abdomen. It is the largest gland in the human body that performs several important functions. It is the only organ that has the ability to regenerate efficiently.



Structure of Liver:

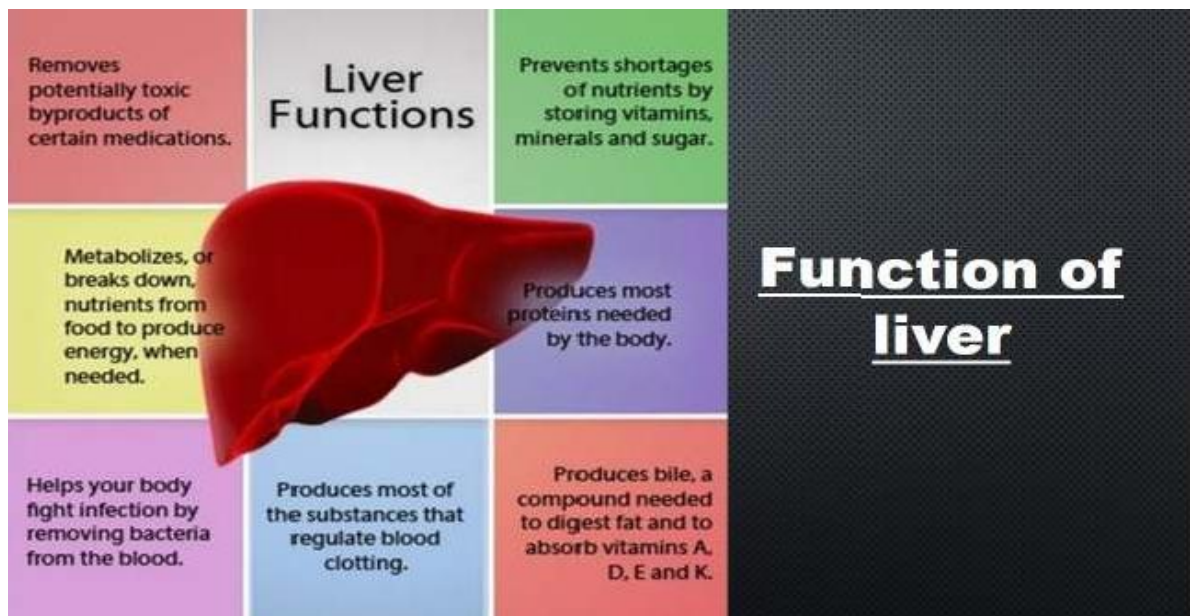
The liver is a triangular, bilobed structure consisting of a larger right lobe and a smaller left lobe. The falciform ligament separates the two lobes.

A layer of fibrous tissue called Glisson's capsule covers the liver. This capsule is covered by peritoneum. This protects the liver from physical damage.



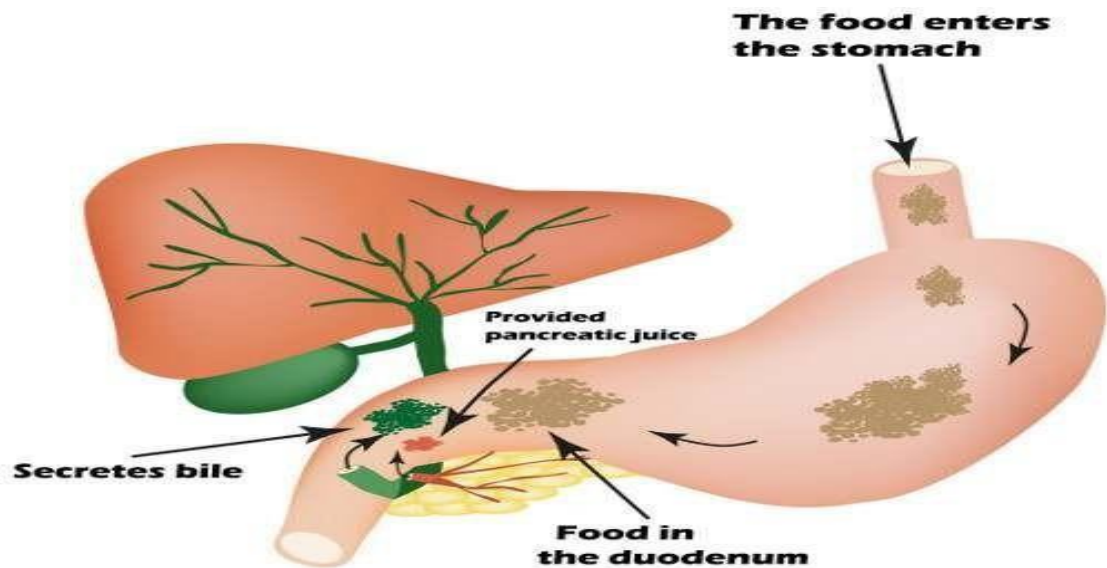
Functions of Liver:

The important functions of the liver are mentioned below:



Production of Bile:

Bile, which helps in the digestion and absorption of fats, vitamins and cholesterol is produced in the liver.



Absorption of Bilirubin:

Bilirubin is formed by the breakdown of hemoglobin. The iron released is stored in the liver to make next-generation blood cells.

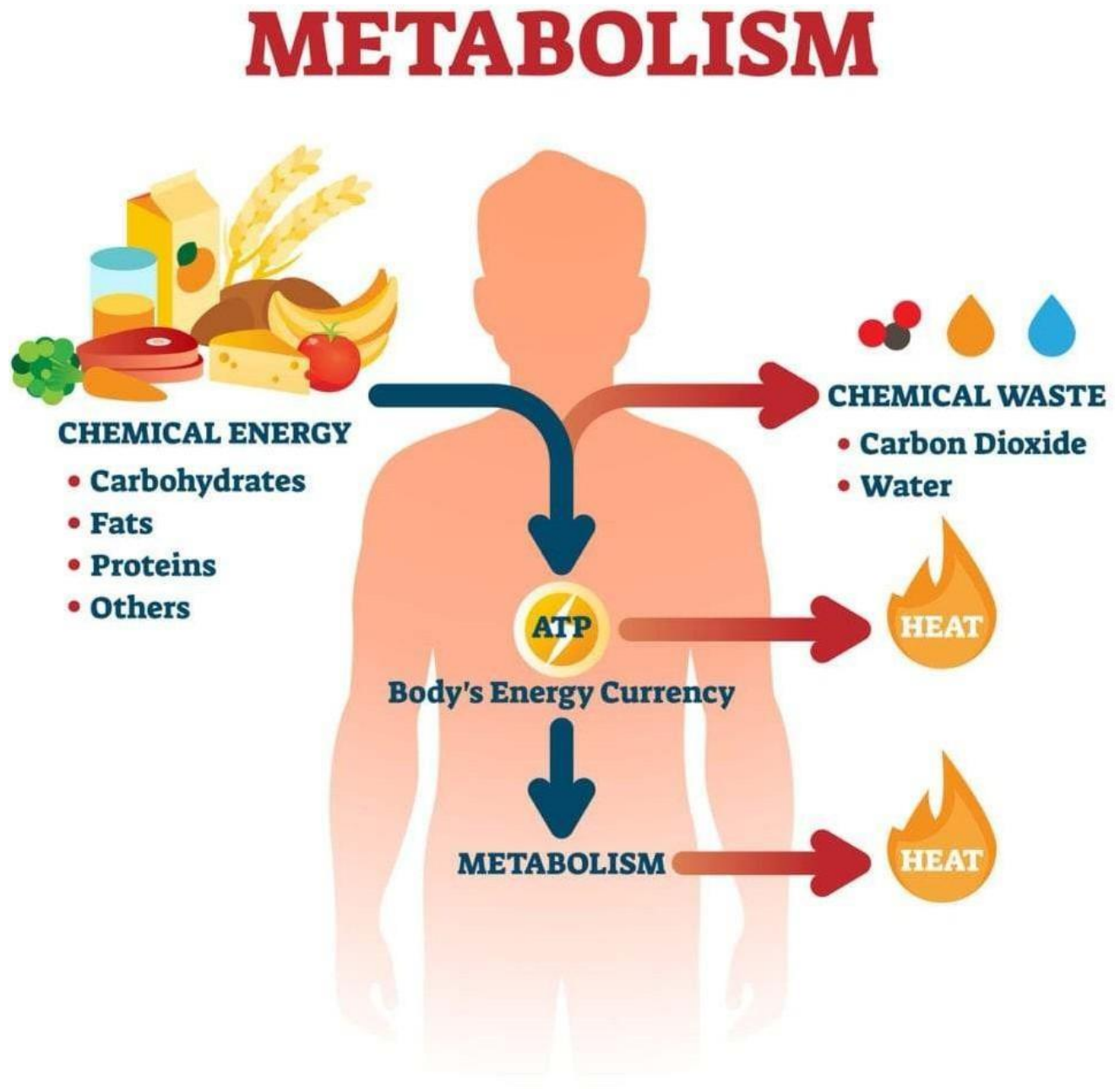
Supporting Blood Clots:

Bile is responsible for the absorption of vitamin K. If bile is not produced, clotting factors will not be produced.



Metabolism of Fats

Bile helps in the break down and digestion of fats.



Carbohydrate Metabolism

The carbohydrates stored in the liver as glycogen are broken down into glucose and released into the blood to maintain glucose levels.

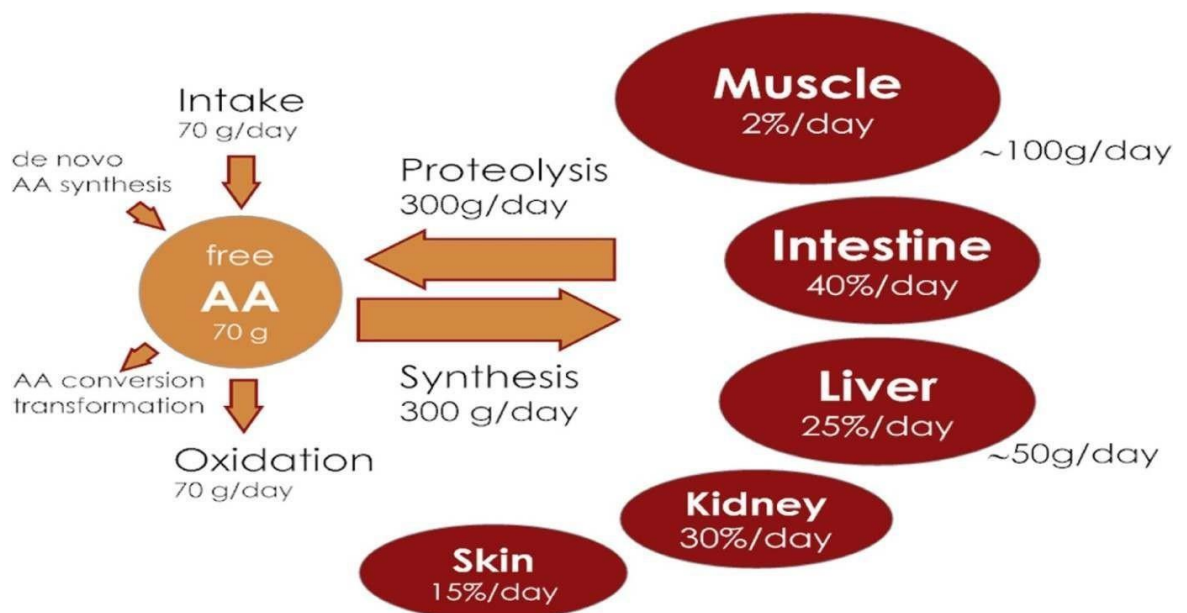
Storage of Vitamins and Minerals:

Vitamins A, D, E, K, and B₁₂ are stored in the liver . It also stores iron in the form of ferritin to form new red blood cells.



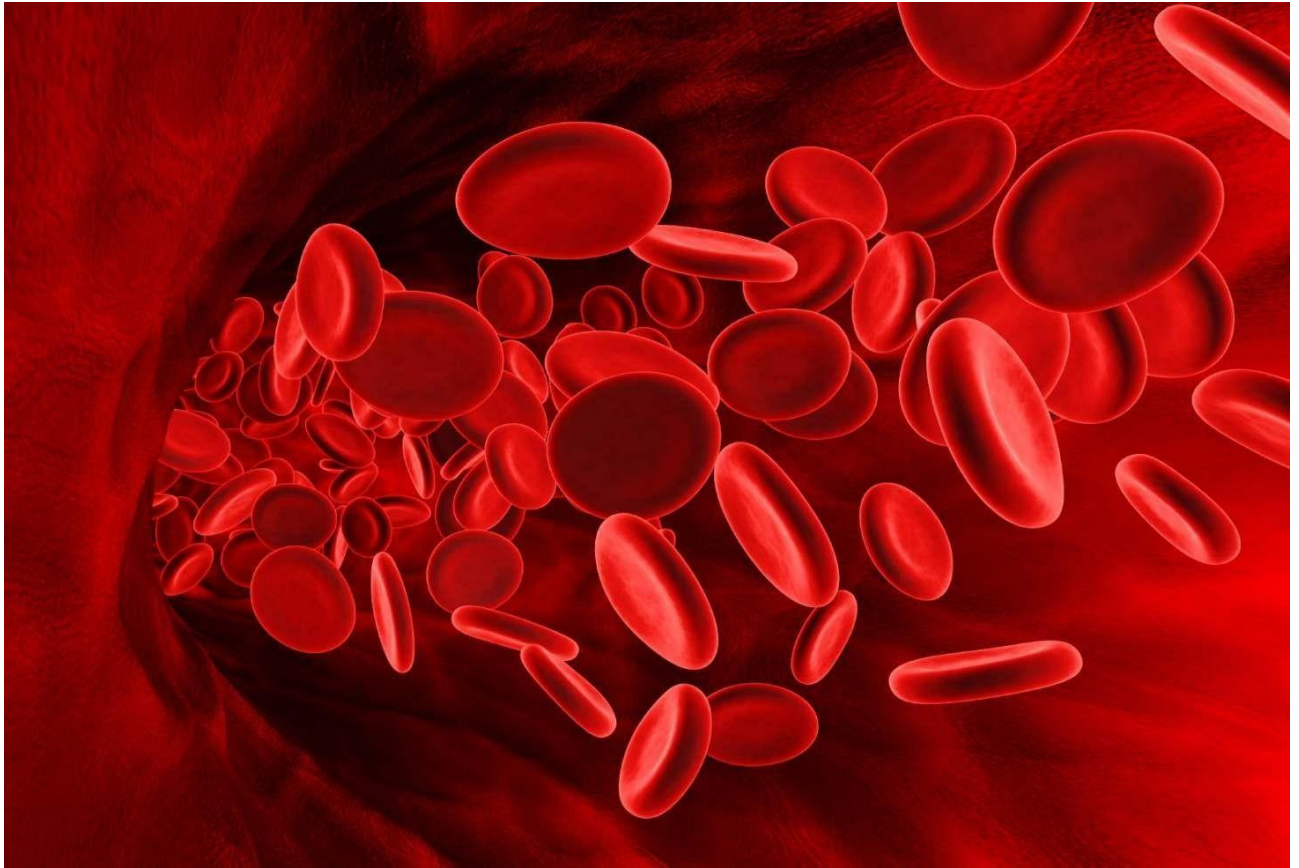
Metabolization of Proteins:

Bile helps in the digestion of proteins.



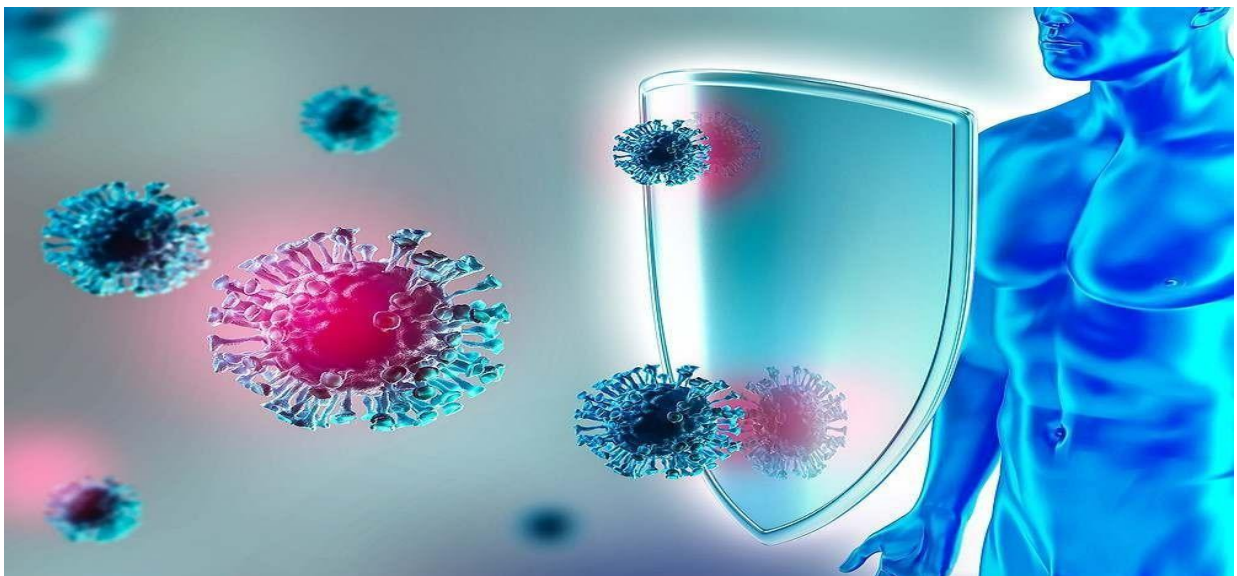
Filtering Blood

The compounds such as hormones, alcohol, etc are filtered by the liver from the **blood**.



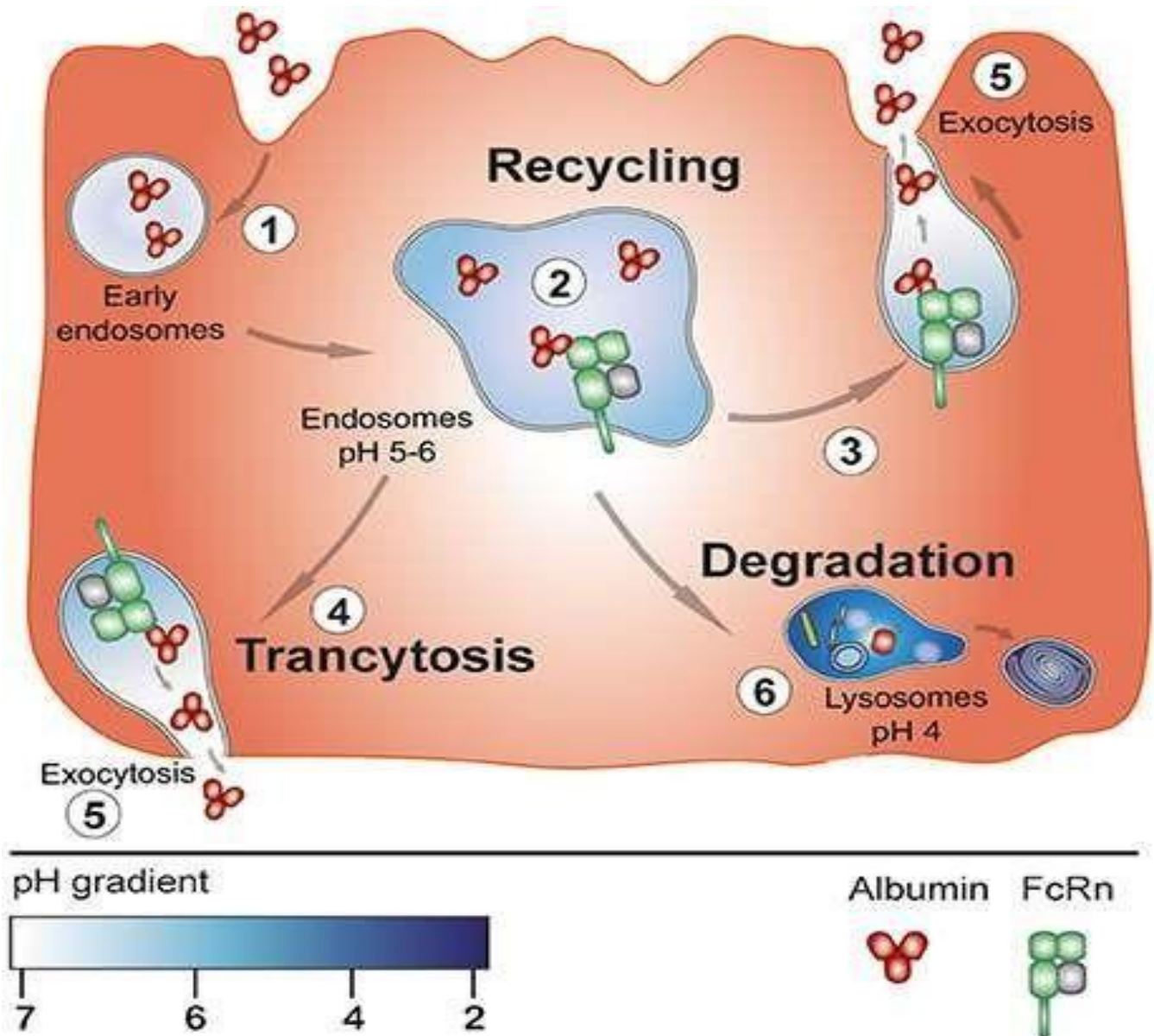
Immunological Function:

Liver contains Kuffer cells involved in immune activity. These destroy any disease-causing agents.



Albumin Production:

Albumin transports fatty acids and steroids to maintain correct pressure and prevent leakage of blood vessels.



Angiotensinogen Synthesis:

This hormone is responsible for narrowing of blood vessels which results in an increase in blood pressure.

Regeneration of Liver:

The liver has the ability to re grow in all the vertebrates. The functions of the liver are not lost during the growth process. In humans, regeneration takes 8-15 days.

In mice, the same process takes around 5-7 days.

Liver Diseases:

Fascioliasis:

This is caused by a parasite “liver fluke”. The parasite can lie dormant in the liver for months or even years.

Cirrhosis:

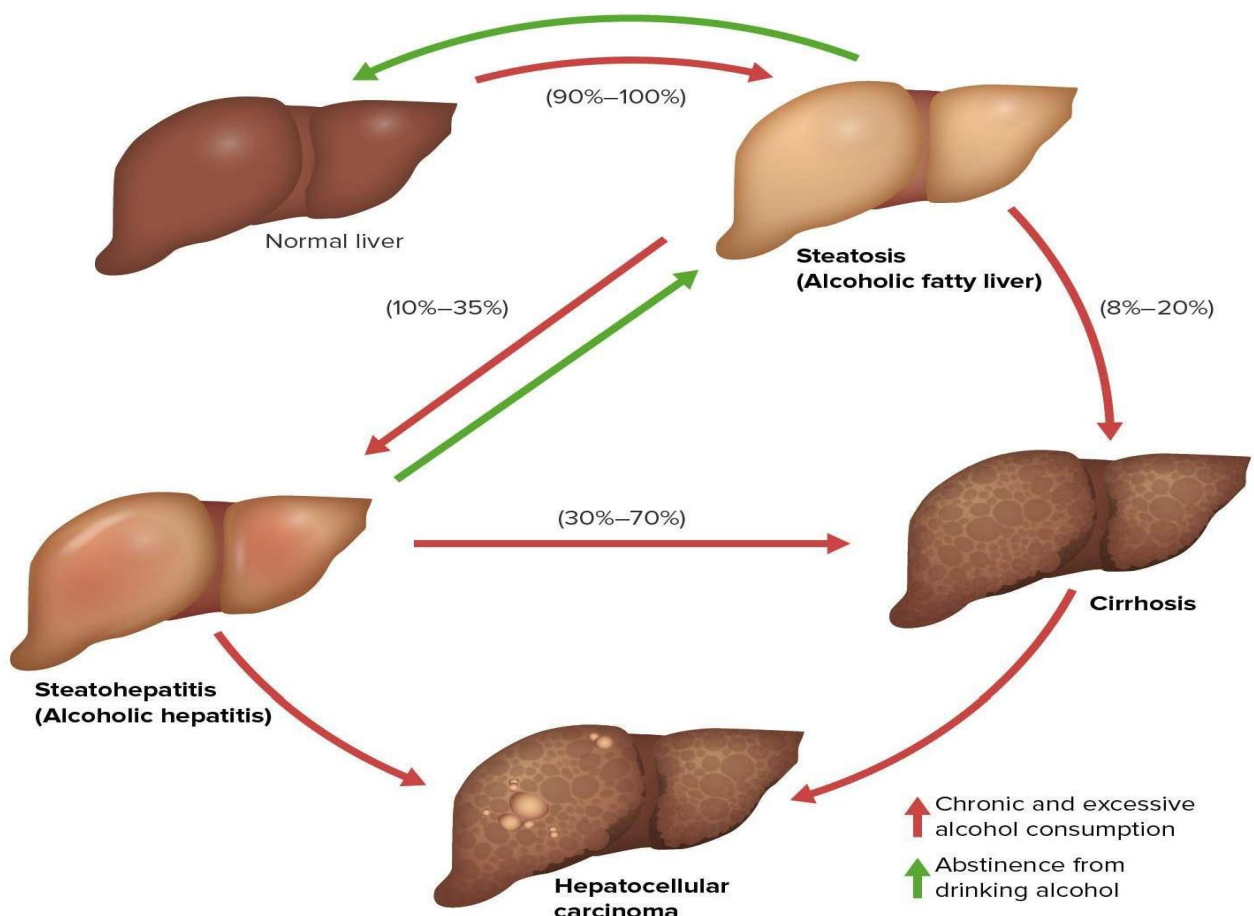
This can be caused due to alcohol consumption, toxins and hepatitis. Here, the scar cells replace liver cells in a process known as fibrosis. The functionality of liver cells is destroyed, which might lead to liver failure.

Hepatitis:

It is the inflammation of the liver caused by viruses such as hepatitis A, B and C. In most cases, it leads to liver failure.

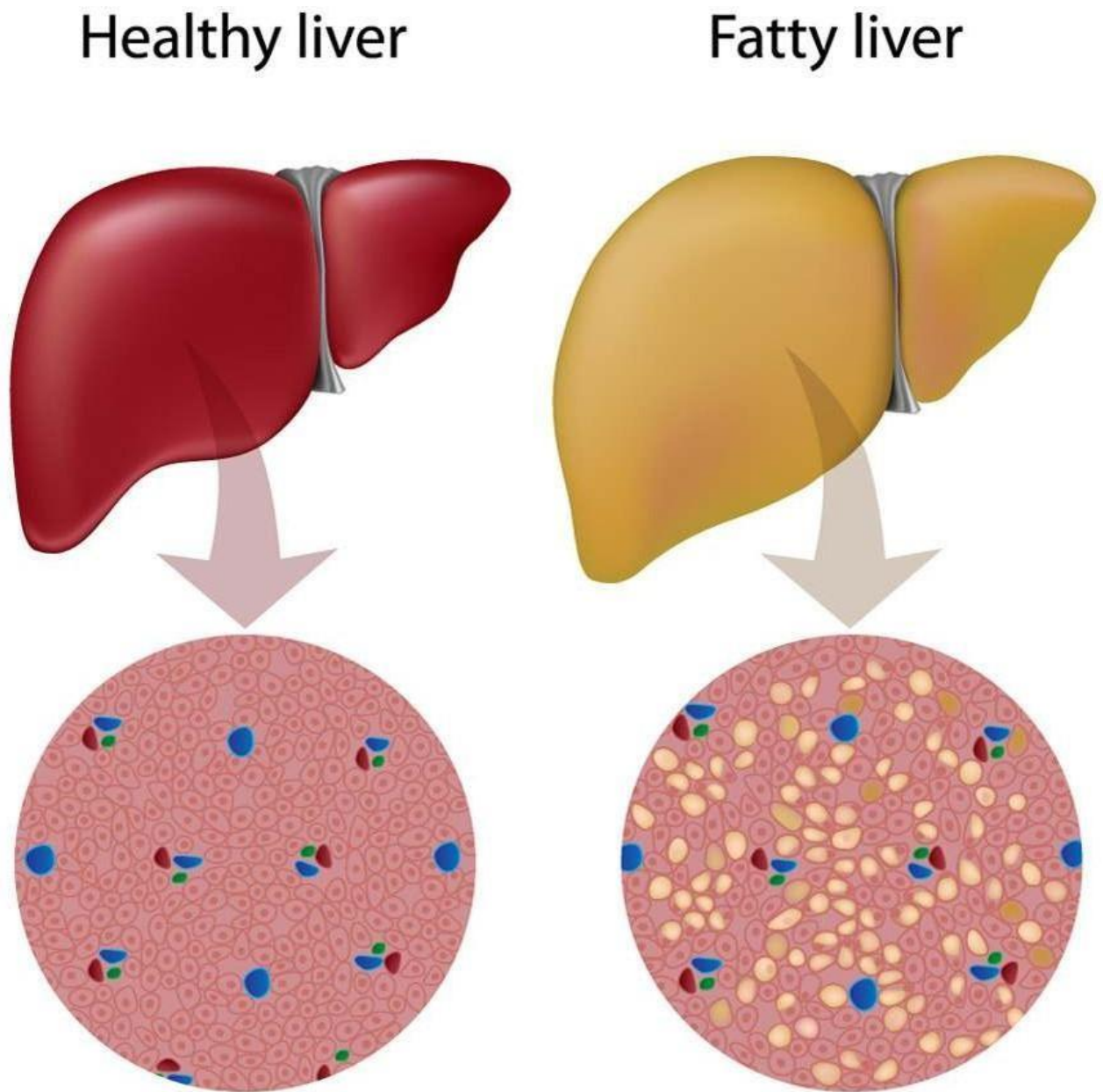
Alcoholic Liver Disease:

Uncontrolled alcohol consumption leads to liver damage. It is the most common cause of cirrhosis.



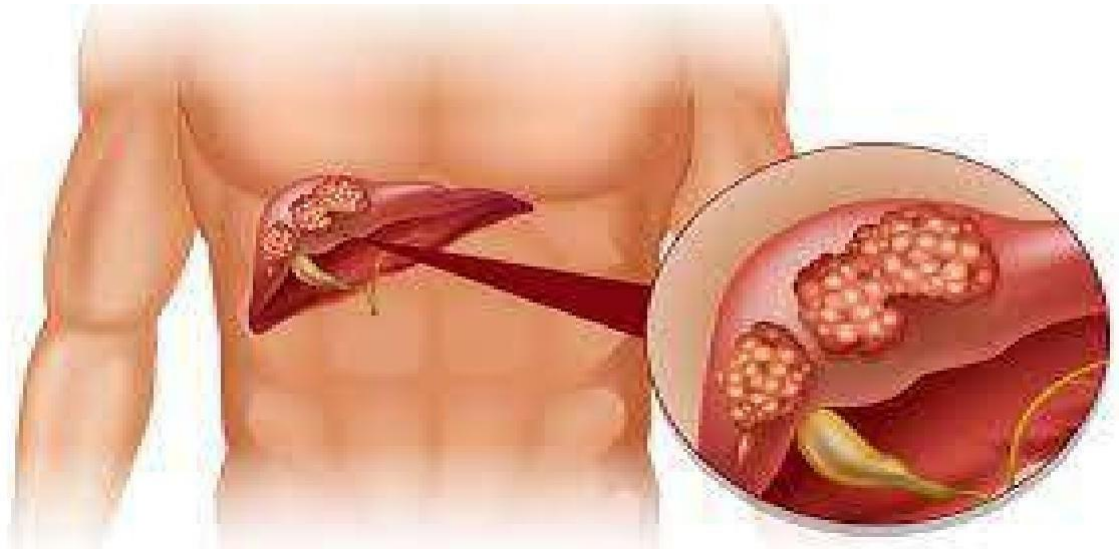
Fatty Liver Disease:

This is the result of alcohol abuse or obesity. In this disease, the vacuoles of fat build-up in the liver cells.



Liver Cancer

Alcohol and hepatitis are the major cause of liver cancer. Hepato cellular carcinoma and cholangiocarcinoma are the two types of liver cancer.



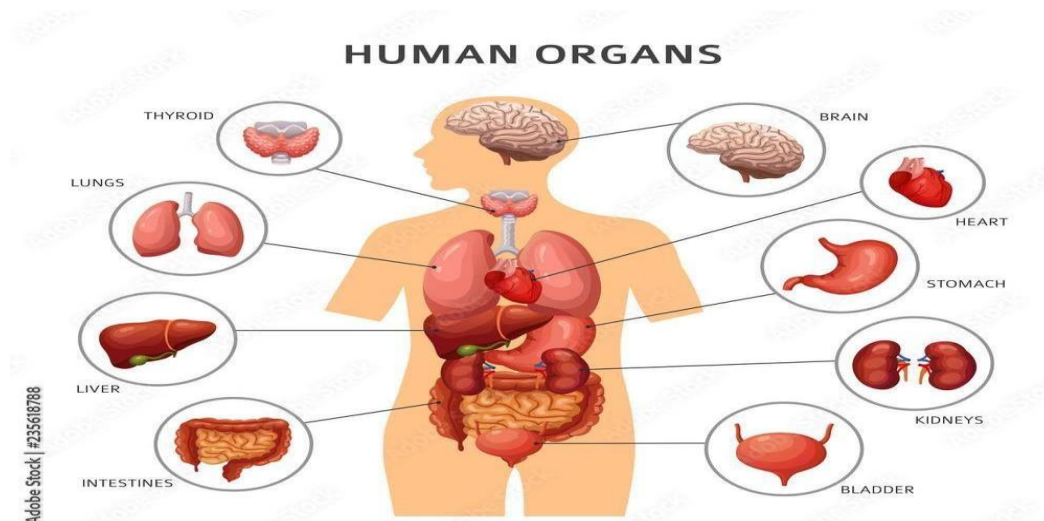
Human Physiology:

It is referred to the physical, mechanical, and biochemical function of humans. This connects health, medicine, and science in a way that studies how the human body acquaints itself to physical activity, stress, and diseases.

The person who is trained to study human physiology is called a physiologist. Claude Bernard is referred to as the father of Physiology for his exemplary research.

Human Body Parts and their Functions:

The list of human body parts vary as the standard definition of an organ is still up for debate. However, there are an estimated 79 organs identified to date. We also possess organs that have “lost” their function throughout our evolution. Such organs are called vestigial organs.



Some of these organs work together and form systems that are specialized to perform a specific function or a set of functions.

Collectively, these are known as organ systems. And out of these 79 organs, five are crucial for survival, and any damage to these five organs might result in termination of life.

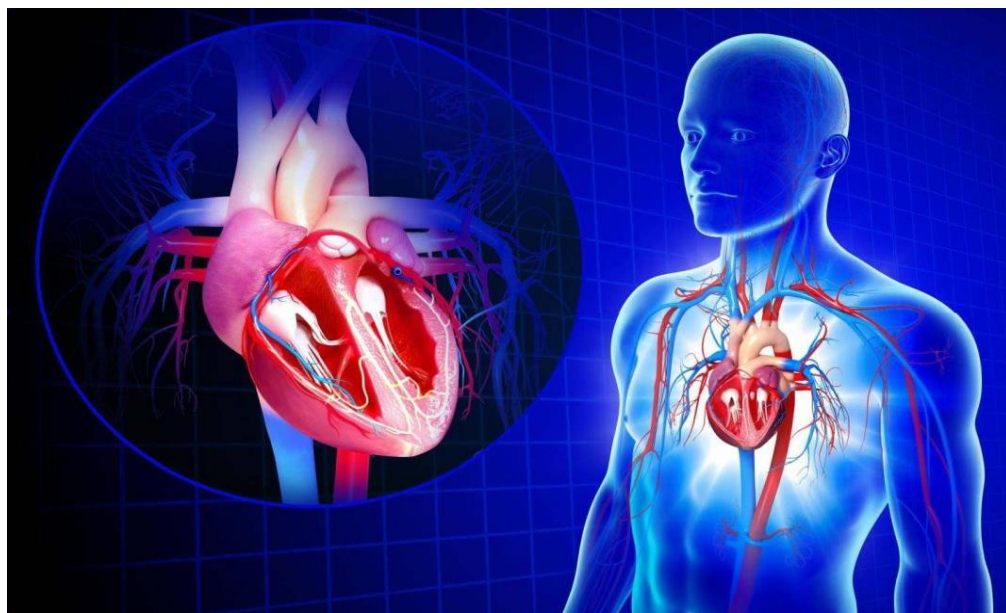
These five crucial human body parts are the brain, heart, liver, lungs and kidneys.

Read on to explore more about these body parts and their functions in detail.

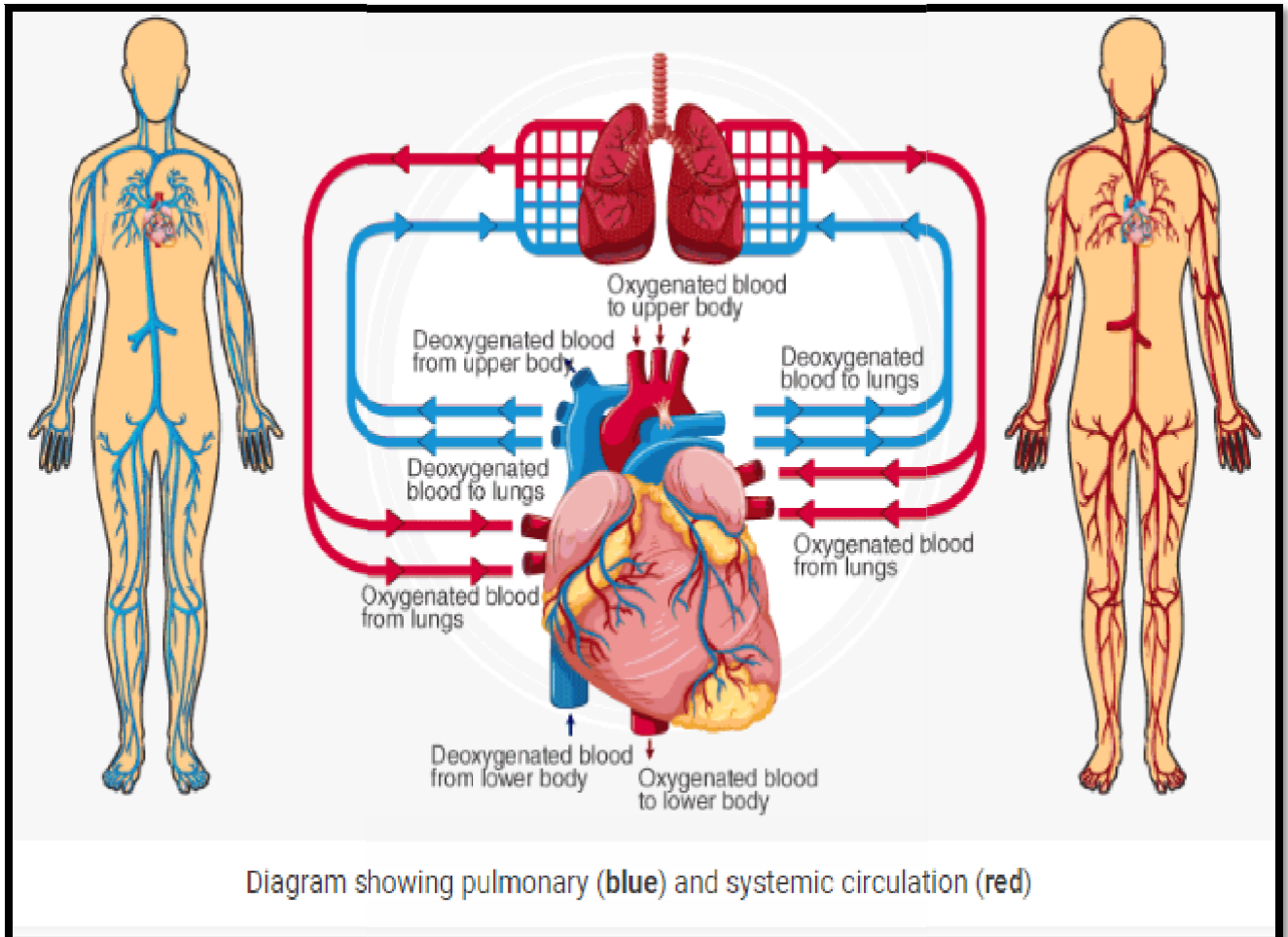
Circulatory System

The **circulatory system** is also referred to as the cardiovascular system. It comprises the heart and all the blood vessels: arteries, capillaries, and veins. There are essentially two components of circulation, namely:

- Systemic circulation
- Pulmonary circulation
- Besides these two, there is a third type of circulation called Coronary circulation. Because blood is the body's connective tissue, it helps to transport essential nutrients and minerals to the cells and waste by products away from it.
- Hence, it is also known as the body's "transport system."Anatomically, The **human heart** is similar to other vertebrate hearts in the animal kingdom and hence, is a homologous organ.

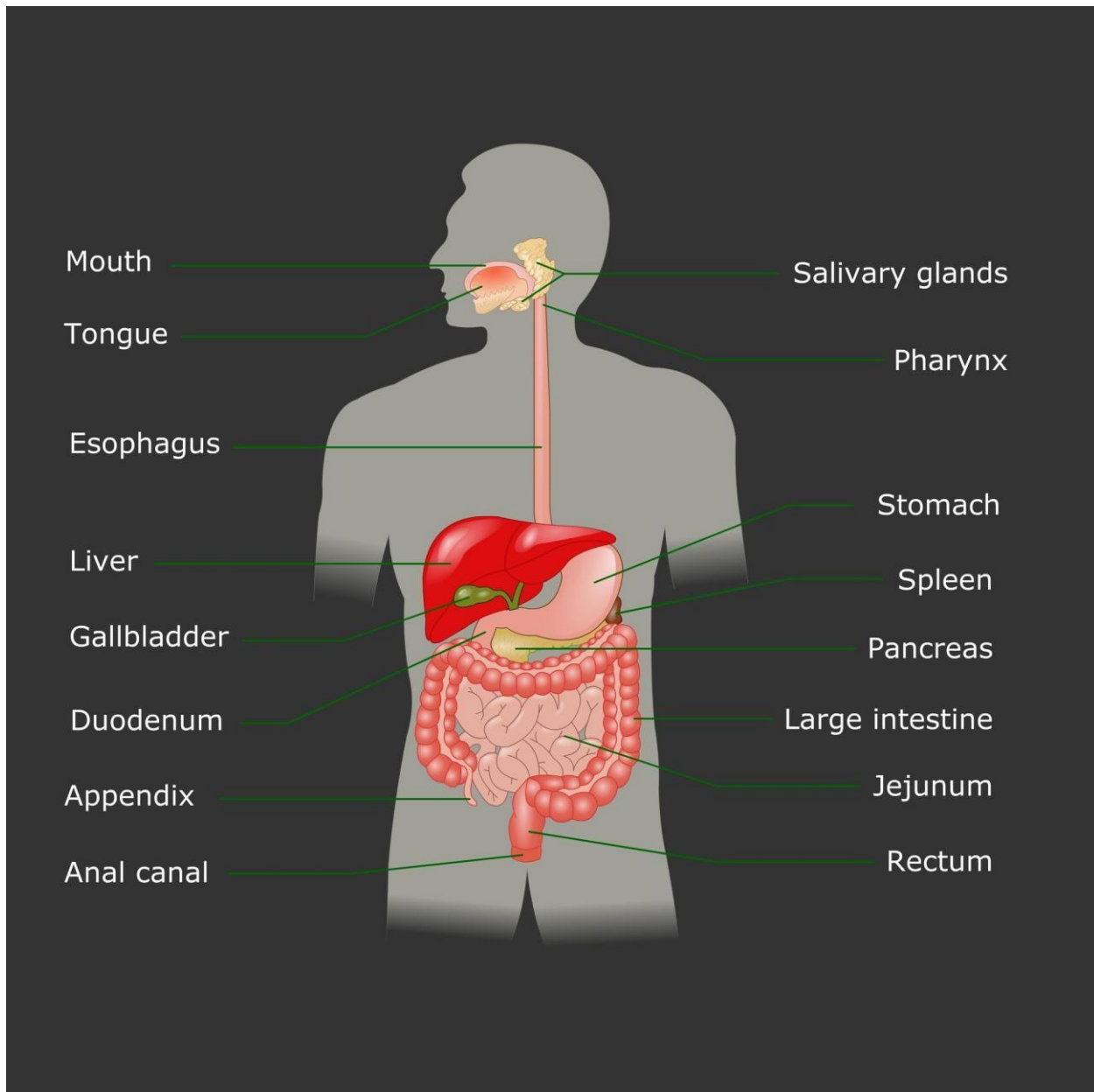


HUMAN CIRCULATORY SYSTEM



Human digestive system

The food we eat contain not only simple substances like vitamins and minerals but also complex substances such as carbohydrates, proteins and fats. The body cannot use these complex substances unless they are converted into simple substances. The five stages of nutrition process include ingestion, digestion, absorption, assimilation and egestion. The process of nutrition begins with intake of food, called ingestion. The breakdown of large complex insoluble food molecules into small, simpler soluble and diffusible particles by the action of digestive enzymes is called digestion. Parts of the body concerned with the digestion of food form the digestive system.



The digestive system consists of two sets of organs. They are as follows:

Alimentary canal(digestive tract/gastro intestinal tract):

It is a passage starting from the mouth and ending with the anus.

Digestive glands:

Glands associated with the alimentary canal are the salivary glands, gastric glands, pancreas, liver and intestinal glands.

Structure of Neuron

A neuron typically consists of three basic parts: Cyton, Dendrites, and Axon.

Types of Neurons The neurons may be of different types based on their structure and functions

Structurally the neurons may be of the following types:

(i) Unipolar neurons:

Only one nerve process arises from the cyton which acts as both axon and dendron.

(ii) Bipolar neurons:

The cyton gives rise to two nerve processes of which one acts as an axon while another as a dendron.

(iii) Multi polar neurons:

The cyton gives rise to many dendrons and an axon

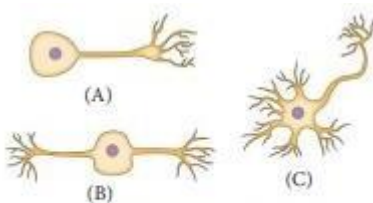


Fig. 15.2 Unipolar (A), Bipolar (B) and multipolar (C) neurons

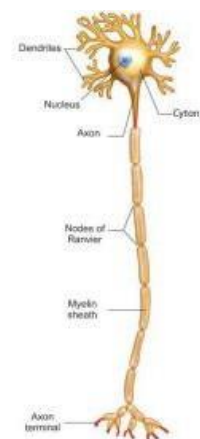


Fig. 15.1 Structure of Neuron

Human Nervous System

The complexity of nervous system can be observed during the course of evolution. We the human beings differ from other animals in our ability to think and take actions, which is due to the well developed nervous system.

Human nervous system is differentiated into central nervous system (CNS), peripheral nervous system (PNS) and autonomic nervous system (ANS). The CNS acts as centre for information processing and control. It consists of the brain and the spinal cord. The PNS is made up of the nerves which connect the brain and spinal cord to all parts of the body. The ANS is formed of sympathetic and parasympathetic nerves.

The Respiratory System

Our respiratory system consists of organs like trachea, bronchus and lungs which are responsible for exchange of air between the atmosphere and the blood. Let us see the organs of the respiratory system in detail.

The nose We inhale air through the nostrils, which lead to the nasal cavity. The inner surface of this cavity is lined with cilia and mucous producing cells, which make it sticky and moist. The cilia and mucous trap dust and germs to prevent them from going deeper into the respiratory tract. The blood vessels in the nose help to warm the inhaled air.

The wind pipe

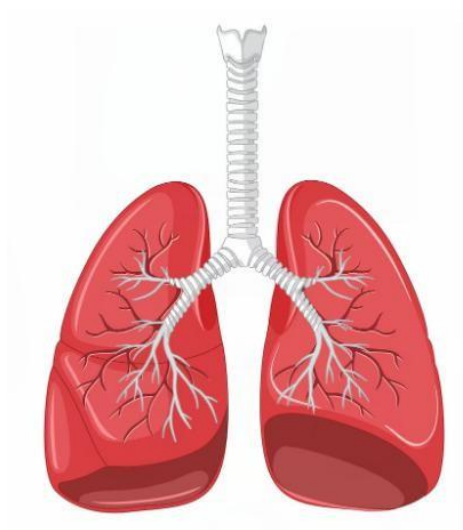
After passing through the nasal cavity, the air enters the pharynx. Then it goes into the trachea or the windpipe which is an elastic tube extending down the length of the neck and partly into the chest cavity. Between the pharynx and the trachea lies a small air passage called the larynx commonly known as the voice box. The larynx has fold of tissue which vibrate with the passage of air to produce sound.

Bronchi

The trachea divides into two branches called bronchi (Singular: bronchus). Each bronchus leads to a lung, where it divides and re divides to finally form air passages called bronchioles.

Lungs

The lungs are the organs present in the chest cavity that allow our body to exchange gases(oxygen and carbon dioxide). The lungs are two spongy elastic bags, on each side of the thoracic cavity. The thoracic cavity is bound dorsally by the vertebral column and ventrally by the sternum, laterally by the ribs and on the lower side by the dome shaped diaphragm. The left lung is slightly smaller than the right lung (allows room for the heart). Within the lungs, each bronchiole leads to a bunch of air sacs called alveoli (Singular: Alveolus)



Alveoli

Alveoli are tiny air sacs in the lungs that are located at the end of bronchial tubes, which is microscopic in nature. It is meant for the exchange of oxygen and carbon dioxide

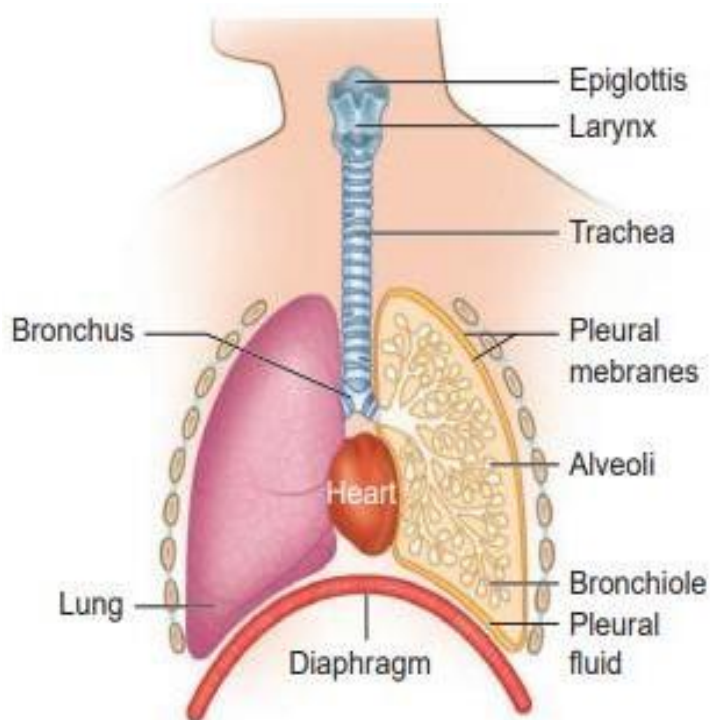


Figure 18.7 Human respiratory system

Mechanism of Breathing

Inspiration (Inhalation)

The process of taking air into the lungs is called inspiration or inhalation. During inspiration, the sternum is pushed up and outward and the diaphragm is pulled down.

This increases the volume of the thoracic cavity and thus the pressure decreases. The air outside the body flows into the lungs. Here exchange of gases takes place between the air and the blood.

Expiration (Exhalation)

The process of expelling air from the lungs is called expiration or exhalation. Upon exhalation, the lungs recoil to force the air out of the lungs. The inter costal muscles relax, returning the chest wall to its original position.

During exhalation, the diaphragm also relaxes, moving higher into the thoracic cavity. This increases the pressure within the thoracic cavity relative to the environment. Air rushes out of the lungs due to the pressure gradient. This movement of air out of the lungs is a passive event.

Exchange of gases in the Alveoli

The content of oxygen in the inhaled air in alveoli is more than the blood flowing through the capillaries. So, the oxygen moves into the blood by simple diffusion. Hemoglobin in the blood combines with oxygen to form oxy hemoglobin.

The blood carrying oxygen reaches the heart through blood vessels. The heart pumps it to all the tissues in the body. The tissues release carbon dioxide which is carried back to alveoli by the blood. Carbon dioxide diffuses from the blood to the air in the alveoli and is sent out of the body when the air is exhaled.

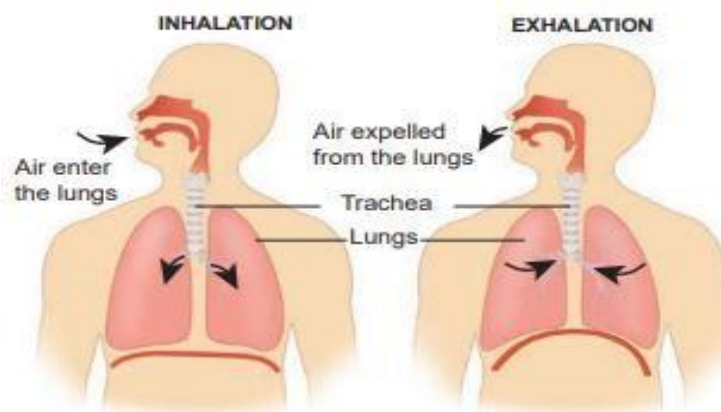


Figure 18.8 Inhalation and Exhalation

Inhalation	Exhalation
The muscles of the diaphragm contract.	The muscles of the diaphragm relax.
The diaphragm goes downward.	The diaphragm goes upward.
The ribs move upwards and outwards.	The ribs move downwards.
The volume of thoracic (chest) cavity increases.	The volume of thoracic (chest) cavity decreases.
Air enters the lungs through the nose.	Air goes out of the lungs through the nose.

CHOOSE THE CORRECT ANSWER

1. Which of the following statements is true about the weight of the human liver?
(a) 1.30kg to 1.56kg **(b)1.44 kg to 1.66kg** (c)1.68kg to 1.86kg d)1.36kg to 1.71 kg
2. Which of the following is the function of the human liver?
(a)Production of bile (b)Metabolization of fats
(c)Metabolization of carbohydrates **(d)All of the above.**
3. Albumin is the most important protein in blood serum. It is produced by _____.
(a) Heart (b)Lungs **(c)Liver** (d)Endocrine glands
4. Where is the liver located in the human body?
(a) Beside pancreas (b) Beside hear
(c)Beside kidney **(d)Above the abdominal** cavity
5. Which of the following vitamins is stored in the liver?
(a)Vitamin K (b)Vitamin D (c)Vitamin E **(d)All of the above**
6. Cirrhosis is a liver disease described by the abnormal structure and functioning of the liver. This is mainly diagnosed by_____.
(a)Blood Test **(b)Liver biopsy** (c)Physical examination (d)All of the above

7. Where is the liver located in the human body?

(a) Beside pancreas (b) Beside heart

(c) Beside kidney (d) Above the abdominal cavity

8. Which of the following vitamins is stored in the liver?

(a) Vitamin K (b) Vitamin D (c) Vitamin E (d) All of the above

9. Cirrhosis is a liver disease described by the abnormal structure and functioning of the liver. This is mainly diagnosed by.

(a) Blood Test (b) Liver biopsy (c) Physical examination (d) All of the above

10. The most common type of incurable viral hepatitis in the United States is _____.

(a) Hepatitis A (b) Hepatitis B (c) Hepatitis C (d) Hepatitis D

11. Severe, acute or incurable liver disease results in.

(a) Blood clotting (b) Production of blood proteins

(c) Elimination of water, drugs and toxins from the body (d) All of the above

12. Drinking too much alcohol over long periods of time results in ____.

(a) Fascioliasis (b) Fatty liver disease

(c) Alcoholic liver disease (d) Primary sclerosing cholangitis

13. Which of the following is not an example of liver disease?

(a) Fascioliasis (b) Chicken pox (c) Fatty liver disease (d) Gilbert's syndrome

14. Which of the following statements is true about the human liver?

(a) Liver is triangular in shape

(b) Liver is the only visceral organ that can regenerate

(c) Liver is the largest and the internal organ of the human body

(d) All of the above.

15. The normal diastolic blood pressure in a normal healthy adult human is
(a)80mmHg (b)60 mmHg (c)90mmHg (d)110mm Hg
16. _____ Is a blood disorder where the hemoglobin is defective
 (a)Hetero chromia (b)Alopecia (c)Haemolysis (d)Sickle cell anemia
17. Which of the following two-word items meant he same thing?
(a) Blood cancer–Hemophilia (b)Pacemaker– SA Node
 (c)Osteoporosis–arthritis (d)None of the above
18. In adult humans,_____of lead or less in the blood is considered to be normal.
 (a) 40µg/dL (b)20µg/dL (c) 10µg/dL (d)50µg/dL
19. In humans,_____is the difference between systolic and diastolic pressure.
(a)40mmHg (b) 20mmHg (c)0 mmHg (d)None of the above
20. An individual's blood is classified as _____if an inherited protein is found on the surface of the blood cells.
 (a)ANA-Positive (b)Rh-Neutral (c)Rh-Negative (d)Rh-Positive
21. _____Is a condition where plaque builds up on the inside of arteries.
(a) Arthrocentesis (b)Arthralgia (c)Arthritis (d)Atherosclerosis
22. _____Is a prenatal test in which, a sample of the fluid that surrounds the fetus is recovered for testing.
 (a)Paracentesis (b)Cordocentesis (c)Amniocentesis (d)None of the above
23. ____Carries deoxygenated blood to the lungs from the right ventricle.
(a)Pulmonary artery (b)Pulmonary vein (c)Aorta (d) None of the above

24. Snake venom usually enters the body through an open wound and enters the blood stream through the ____

- (a) Veins (b) Lymphatic system (c) Arteries (d) None of the above

25. _____ Forms clots when blood vessels get damaged.

- (a) Platelets (b) Cellulose (c) Hemoglobin (d) None of the above

26. _____ Is a fluid that drains from the lacteals of the small intestine into the lymphatic system during digestion. It usually contains fat and proteins.

- (a) Chyme (b) Bile (c) Chyle (d) None of the above

27. _____ Is a small branch of an artery that leads into a capillary.

- (a) Capillaria (b) Areolas (c) Arteriole (d) None of the above

28. Humans use haemoglobin to carry oxygen in their blood.

Similarly, mollusks and crustaceans use __ to carry oxygen in their blood.

- (a) Hemovanadin (b) Hemerythrin (c) Haemoglobin (d) Hemocyanin

29. Severe loss of blood due to trauma is called

- (a) Exsanguination (b) Haemolysis (c) Concussion (d) None of the above

30. _____ Is a condition where a blood clot forms in the circulatory system.

- (a) Thrombus (b) Strombus (c) Hematoma (d) None of the above

31. _____ New cells are produced every day.

- (a) 362 billion (b) 242 million (c) 242 billion (d) none of these

32. Group of cells with similar functions come together to form_____
- (a)Tissue (b)Organism (c)Organ system (d)Cell
33. The framework that enable us to do all these activities is the_____
- (a)Muscles (b)Skeleton (c)Organism (d)Tissue
34. Human Have _____bones at birth.
- (a)200 (b)400 (c)250 (d)300
35. At adulthood, the total number of bones is reduced to_____
- (a)206 (b)220 (c)275 (d)198
36. _____Are attached to other bones through ligaments, a fibrous connective tissue.
- (a)Muscles (b)Tendons (c)Bones (d)Cartilage
37. _____ are the points at which two or more bones meet.
- (a)Tendons (b)Joints (c)Ligament (d)Cartilage
38. Movable joints are also called _____
- (a)Immovable joint (b)Non–Flexible (c)Fixed Joints (d)None of These
39. _____Are attached to the bones through tendons.
- (a)Joint (b)Skeleton (c)Ligament (d)Muscles
40. The _____ is located in the upper right portion of the abdomen.
- (a)Liver (b)Heart (c)Lungs (d)Stomach

41. A layer of fibrous tissue called _____ covers the liver.

(a)Peritoneum (b)Cystic Duct (c)Gilson's Capsule (d)Spleen

42. Gilson's Capsule protects the liver from _____

(a)Minor damage (b)Physical damage (c)Major damage (d)None of these

43. _____ Carries nutrient-rich blood from the digestive system

(a)Hepatic artery (b)Hepatic duct (c)Hepatic portal vein (d)Cystic duct

44. _____ Carries oxygenated blood from the heart.

(a)Hepatic artery (b)Cystic duct (c)Hepatic portal vein (d)Hepatic duct

45. _____ Is the largest gland in the human body that performs several important functions.

(a)Heart (b)Pancreas (c)Liver (d) Lungs

46. _____ Helps in the digestion and absorption of fats, vitamin and cholesterol in the liver.

(a)Bilirubin (b)Glucose (c)Blood clots (d) Bile

47. _____ Is formed by the break down of hemoglobin.

(a)Glucose (b)Bilirubin (c)Bile (d)Blood clots

48. Bile is responsible for the absorption of _____

(a)Vitamin K (b)Vitamin C (c)Vitamin A (d)Vitamin D

49. _____ Help in the digestion of fats and protein.

(a)Bilirubin (b)Carbohydrates (c)Bile (d)None of these

50. The _____ stored in the liver as glycogen are broken down into glucose.

(a)Fats (b)Protein (c)Carbohydrates (d)Bilirubin

51. Which of the following vitamins are stored in the liver?

(a)Vitamin B12 (b)Vitamin E (c)Vitamin A (d)All of these

52. The compounds are filtered by the liver from the _____

(a)Blood (b)Cell (c)Spleen (d)Gallbladder

53. _____ Transports fatty acids and steroids to maintain correct pressure.

(a)Filtering blood (b)Albumin (c)Angiotensinogen synthesis (d)Immunological function

54. _____ Hormone is responsible for narrowing of blood vessels.

(a)Immunological function (b)Albumin (c)Filtering blood (d)Angiotensinogen synthesis

55. In human, regeneration of liver takes _____ days.

(a)9-16 (b)7-14 (c)8-15 (d)7-18

56. _____ Cells is caused by parasite 'Liver Fluke'.

(a)Fascioliasis (b)Hepatitis (c)Cirrhosis (d)Alcoholic liver disease

57. _____ Can be caused due to toxins and hepatitis.

(a)Fascioliasis (b)Hepatitis (c)Fibrosis (d)Cirrhosis

58. The scar cells replace liver cells in a process known as _____

(a)Hepatitis (b)fibrosis (c)Cirrhosis (d)Liver disease

59. _____ Is the inflammation of the liver caused by viruses.

(a)Hepatitis (b)Cirrhosis (c)Fibrosis (d)None of these

60. _____ Is the most common cause of cirrhosis.

(a)Fibrosis (b)Cirrhosis (c)Alcoholic Liver Disease (d)Hepatitis

61. _____ Is the result of alcohol abuse or obesity.

(a)Liver Cancer (b)Fatty Liver Disease (c) Healthy Liver (d)Liver Cells

62. Which of the following are the types of liver cancer?

(a)Hepato cellular carcinoma (b)Cholangio carcinoma (c)Both A&B (d)None of these

63. The organs that have lost their function through evolution is called _____

(a)Vestigial organ (b)Human organ (c)Homologous organ (d)None of these

64. _____ Is referred to the physical, mechanical and biochemical functions of humans.

(a)Zoology (b)Human physiology (c)Both A&B (d)None of these

65. The person who is trained to study human physiology is called ____

(a)Ornithologist (b)Zoologist (c)Entomologists (d)Physiologist

66. _____ Is referred to as the father of physiology for his exemplary research.

(a)Braden winch (b)Charles Babbage (c)Claude Bernard (d)Aristotle

67. There are ____crucial human body parts.

(a)Four (b)Five (c)Six (d)Seven

68. The circulatory system is also called as _____

- (a) Muscular System (b) Skeleton System
(c) Respiratory System (d) Cardio vascular System

69. Which of the following are the components of circulation?

- (a) Systemic Circulation (b) Pulmonary Circulation
(c) Both A&B (d) None of these

70. Coronary circulation is also called as _____

- (a) Transport System (b) Muscular System
(c) Skeleton System (d) Respiratory System

71. Uncontrolled alcohol consumption causes _____

- a) Cirrhosis b) heart attack c) dysentery d) none of these

72. Hepato cellular carcinoma is a type of _____

- a) Liver cancer b) brain tumour c) lung cancer d) none of these

73. How many organs are identified till now?

- a) 80 b) 76 c) 79 d) 110

74. The Father of physiology _____

- a) Claude Bernard _b) Mendel c) Newton d) none of these

75. Organs that have lost their functions are called _____

- a) Homologous organ b) vestigial organ c) irregular organ d) none of these

76. Muscles assist their bones in _____

- a) Locomotion b) blood movement c) oxygen movement d) none of these

77. Muscles are attached to the bones through _____

- a) Ligaments b) tendons c) joints d) none of these

78. _____ Is the largest gland in the human body.

- a) Liver b) kidney c) brain d) stomach

79. _____ Covers the liver.

- a) glisson's capsule b) duodenum c) pancreas d) spleen

80. Glisson's capsule is covered by _____

- a) Peritoneum b) duodenum c) pancreas d) spleen

81. Bile is produced by _____

- a) Bilirubin b) pituitary c) stomach d) none of these

82. _____ Is responsible for vitamin K.

- a) Bile b) pancreas c) kidney d) stomach

83. Iron is stored in the form of _____ by liver.

- a) Ferritin b) acetamine c) ferrous d) ammonium

84. The adults have _____ trillion cells.

- a) 30-40 b) 60-70 c) 50-45 d) none of these

85. How many new cells are produced every day?

- a) 200 billion b) 242 billion c) 100 billion d) 456 billion

86. Which is considered as the largest organ?

- a) Skin b) pituitary c) stomach d) none of these

87. _____ Are the only animals with chins.

- a) Tiger b) lion c) human d) none of these

88. _____ and _____ do not grow after death.

- a) Hair and head b) nails and hair c) hair and chin d) none of these

89. The framework that enable us to do all the activities _____

- a) Skeleton b)brain c)skin d)all of these

90. At adulthood the total number of bones are reduced into _____

- a) 206 b)205 c)67 d)456

91. Bones are attached to other bones through _____

- a) Gums b)ligaments c)tendons d)all of these

92. _____ Are the points at which two or more bones meet.

- a) Joints b)meeting c)skin d)none of these

93. Expand ANS _____

- a)Autonomic Nervous System b)Automatic Nervous System
c)Artificial Nervous System d)None Of These

94. During in halation the muscles of diaphragm _____

- a) Contract _b)relax c)both A and B d)none of these

95. The process of nutrition begins with intake of food, called _____

- a) ingestion b)digestion c)assimilation d)none of these

96. The breakdown of large complex insoluble food molecules into small, simpler soluble and diffusible particles by the action of digestive enzymes is called _

- a) ingestion b)digestion c)assimilation d)none of these

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
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92	A	B	C	D
93	A	B	C	D
94	A	B	C	D
95	A	B	C	D
96	A	B	C	D
97	A	B	C	D
98	A	B	C	D
99	A	B	C	D
100	A	B	C	D

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YOU HAVE TO KNOW HOW TO CONVERT NEGATIVES INTO POSITIVES.”

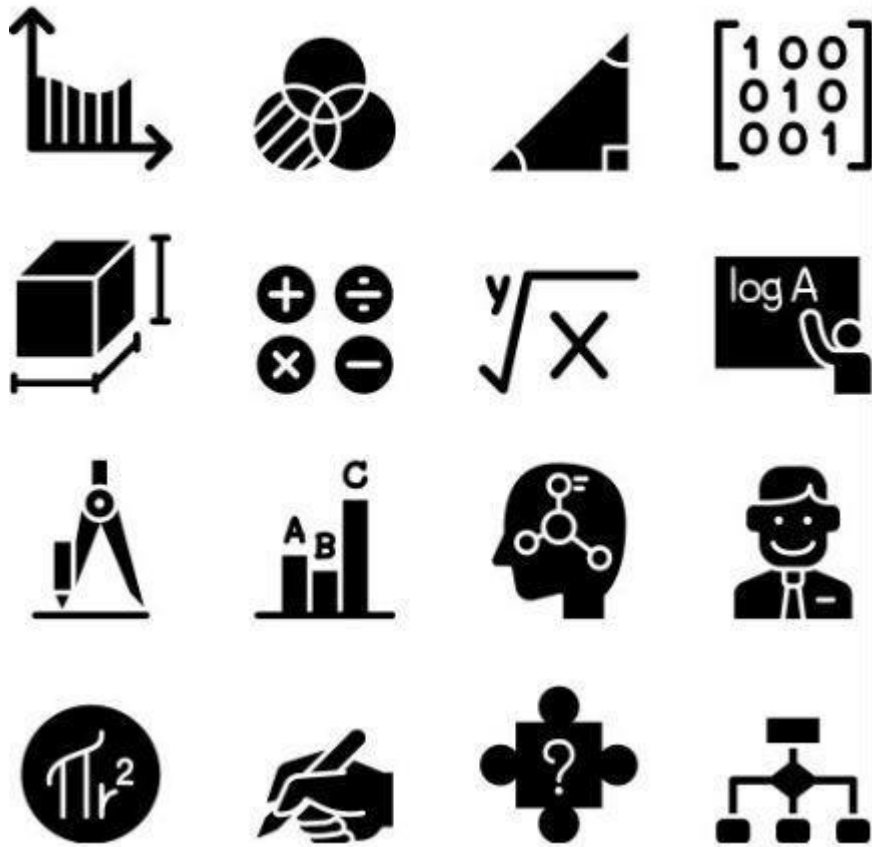
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NEW FACTS AS TO DISCOVER NEW WAYS OF THINKING ABOUT THEM.”

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Mathematics icon



“THE ESSENCE OF MATH IS NOT TOMAKE SIMPLE THINGS COMPLICATED, BUT

TO MAKE COMPLICATED THINGS SIMPLE.”

- STANGUDDER

