



Aakash

Medical | IIT-JEE | Foundations

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Edition: 2026-27

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PREFACE

What is Knowledge Bytes ?

Knowledge Bytes is a collection of riddles, interesting facts, mnemonics, and puzzles that will make your learning fun and engaging.

We want you to be delighted about studying. Knowledge Bytes helps you to know more about the subject in a fun, motivating and educational way and helps to implement what you learn in a creative way.

Benefits



Saves Time



Develops Learning Skills



Stimulates Interest



Leads to Increased Comprehension

Aakash

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Cross word

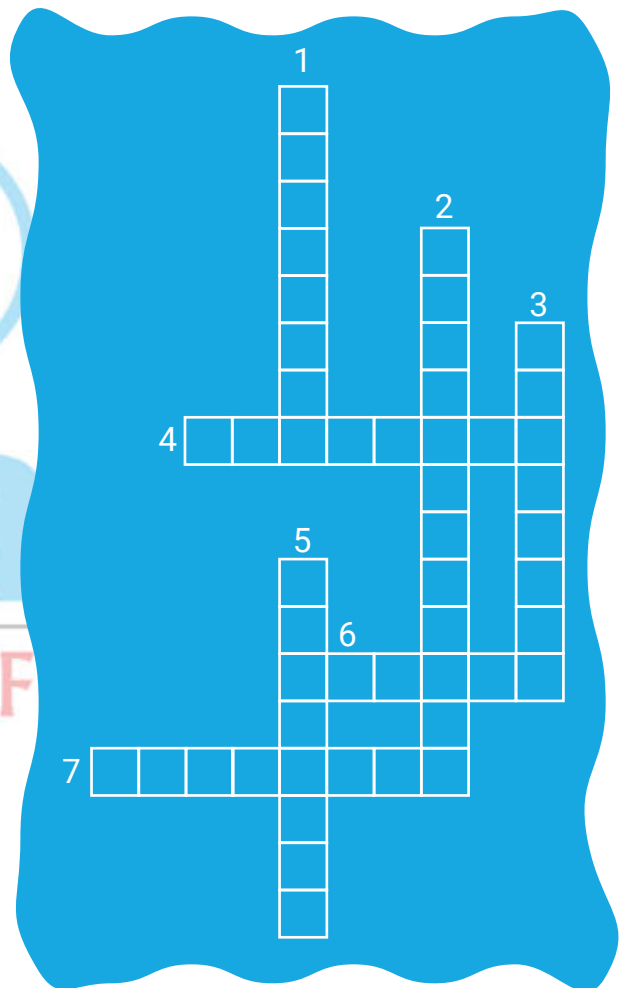
Linear Equation

Across

4. Answer of an equation is also called its _____
6. Every solution of the linear equation in two variables represents a _____ on the graph of the equation.
7. Number of solutions of a linear equation in two variables of the type $px + qy = 0$ is/are _____

Down

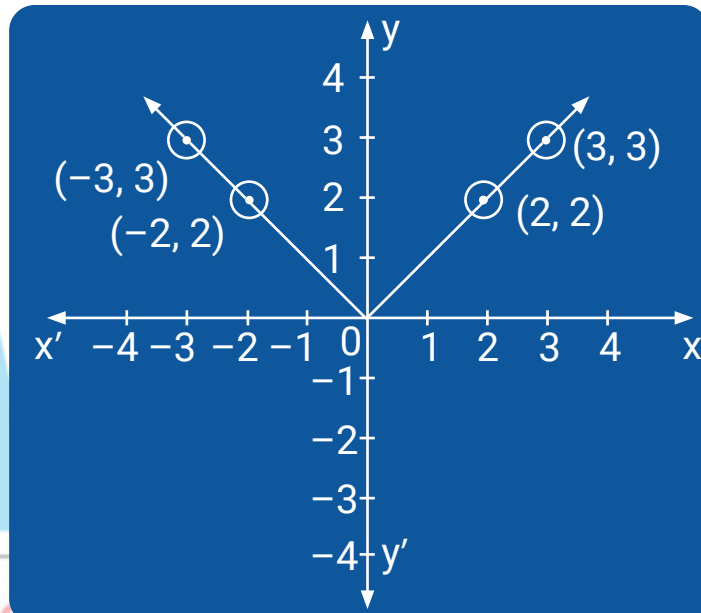
1. Graph of the equation of the type $x = a$ is a line _____ to y-axis.
2. The graph of a linear equation in two variables is a _____
3. The term whose value doesn't change is called a _____
5. A linear equation in two variables has _____ solutions.



Handy Graphs

$$y = |x|$$

x	0	2	-2	3	-3
y	0	2	2	3	3

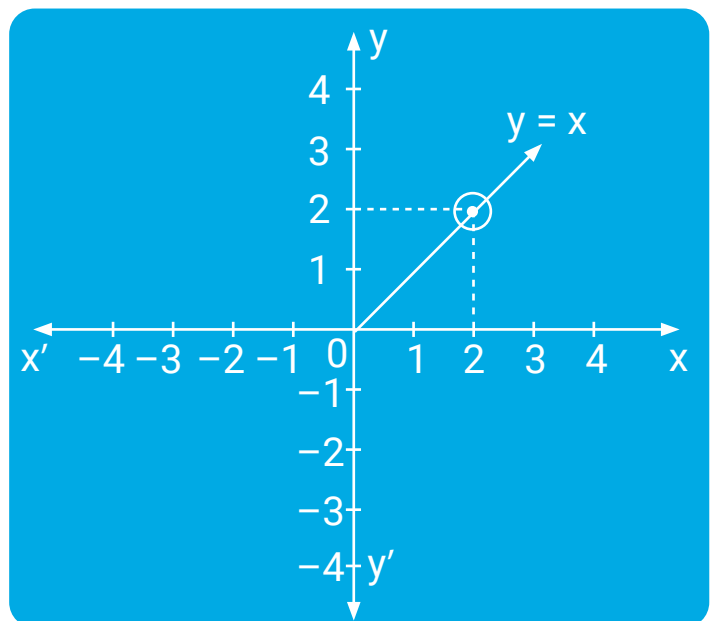
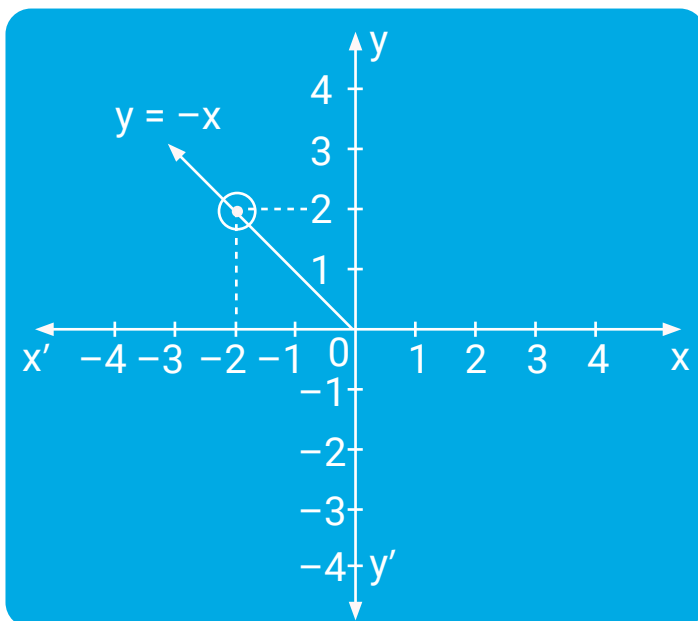


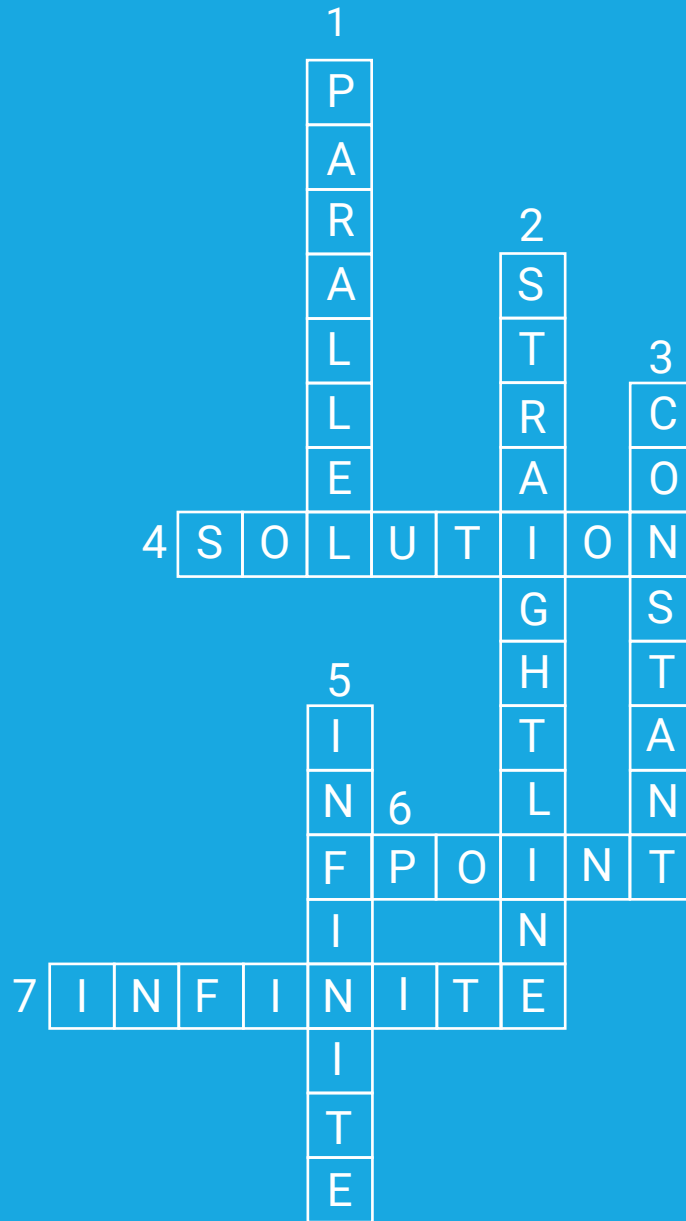
$$y = -x, \text{ when } x < 0$$

x	-2	-3	0
y	2	3	0

$$y = x, \text{ when } x \geq 0$$

x	0	2	3
y	0	2	3





Quiz Time

- 1 Find the distance between (a, b) and $(-a, -b)$.
- 2 Point of intersection of x -axis and y -axis is called
 - (a) Origin
 - (b) Abscissa
 - (c) Ordinate
 - (d) Axes
- 3 $(2a, 4a)$, $(2a, 6a)$ and $(2a + \sqrt{3}a, 5a)$ are vertices of a/an
 - (a) Isosceles triangle
 - (b) Equilateral triangle
 - (c) Scalene triangle
 - (d) Isosceles right triangle
- 4 Find the distance between $A(at_1^2, 2at_1)$ and $B(at_2^2, 2at_2)$ if $t_1 t_2 = -1$.
- 5 Find the distance between mid-point of line segment AB with $A(2, -7)$ $B(9, -2)$ and the point $C(5, -6)$.

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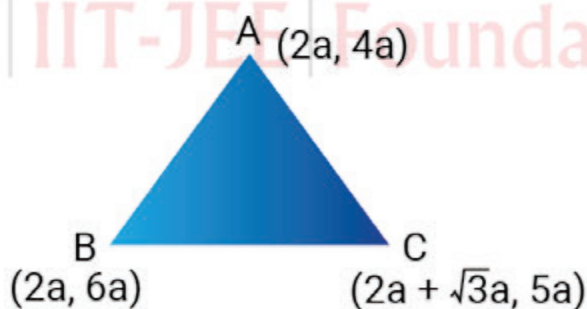
Answer (Quiz Time)

1 Distance formula = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$$= \sqrt{(-a - a)^2 + (-b - b)^2}$$
$$= \sqrt{(-2a)^2 + (-2b)^2}$$
$$= \sqrt{4a^2 + 4b^2}$$
$$= \sqrt{4(a^2 + b^2)}$$
$$= 2\sqrt{a^2 + b^2}$$

2 (a) Origin

3 (b) Equilateral triangle



$$AB = \sqrt{(2a - 2a)^2 + (6a - 4a)^2} = \sqrt{(2a)^2} = 2a$$

$$BC = \sqrt{(2a + \sqrt{3}a - 2a)^2 + (5a - 6a)^2} = \sqrt{3a^2 + a^2} = 2a$$

$$AC = \sqrt{(2a + \sqrt{3}a - 2a)^2 + (5a - 4a)^2} = \sqrt{3a^2 + a^2} = 2a$$

$$\Rightarrow AB = BC = AC$$

So, ABC is an equilateral triangle.

$$\begin{aligned}
4 \quad \text{Distance between two points} &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\
&= \sqrt{(at_2^2 - at_1^2)^2 + (2at_2 - 2at_1)^2} \\
&= \sqrt{a^2(t_2^2 - t_1^2)^2 + 4a^2(t_2 - t_1)^2} \\
&= \sqrt{a^2(t_2 - t_1)^2(t_2 + t_1)^2 + 4a^2(t_2 - t_1)^2} \\
&= a(t_2 - t_1) \sqrt{t_1^2 + t_2^2 + 2t_1t_2 + 4} \\
&= a(t_2 - t_1) \sqrt{t_1^2 + t_2^2 - 2 + 4} \quad (\because t_1t_2 = -1) \\
&= a(t_2 - t_1) \sqrt{t_1^2 + t_2^2 + 2 \times 1} \\
&= a(t_2 - t_1) \sqrt{t_1^2 + t_2^2 + 2 \times (-t_1t_2)} \quad (\because 1 = -t_1t_2) \\
&= a(t_2 - t_1) \sqrt{t_1^2 + t_2^2 - 2t_1t_2} \\
&= a(t_2 - t_1) \sqrt{(t_2 - t_1)^2} \\
&= a(t_2 - t_1)^2 = a(t_1 - t_2)^2
\end{aligned}$$



5

$$\begin{aligned}\text{Mid-point} &= \left(\frac{9+2}{2}, \frac{-7-2}{2} \right) \\ &= \left(\frac{11}{2}, \frac{-9}{2} \right)\end{aligned}$$

Distance between two point = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$$= \sqrt{\left(\frac{11}{2} - 5\right)^2 + \left(\frac{-9}{2} + 6\right)^2}$$

$$= \sqrt{\left(\frac{11-10}{2}\right)^2 + \left(\frac{-9+12}{2}\right)^2}$$

$$= \sqrt{\left(\frac{1}{4} + \frac{9}{4}\right)}$$

$$= \sqrt{\frac{10}{4}} = \frac{\sqrt{10}}{2} \text{ units}$$

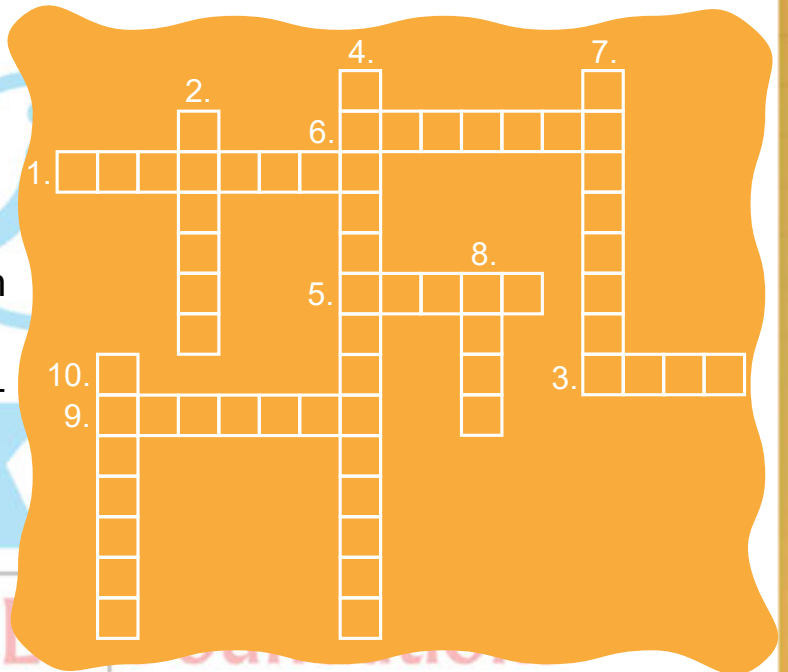


Cross word

How Forces Affect Motion

Across

- Quantity of motion contained in a body
- CGS unit of force
- Swimming is possible due to Newton's _____ law of motion
- Mass is a measure of _____
- Change in linear momentum



Down

- Unit of force
- Action and reaction force act _____
- Forces which produce no net acceleration
- When a carpet is beaten with a stick, dust particles come out due to inertia of _____
- Type of friction which comes into play when one surface moves over the other



INTERESTING FACTS

Why is ice slippery

Ice offers very little friction, so objects keep moving due to inertia and are hard to stop or control.



Pushing a Wall Feels Tiring

Even if a wall doesn't move, you still apply force. According to Newton's Third Law, the wall applies an equal and opposite force on you, making you feel tired.

Catching a Ball Safely

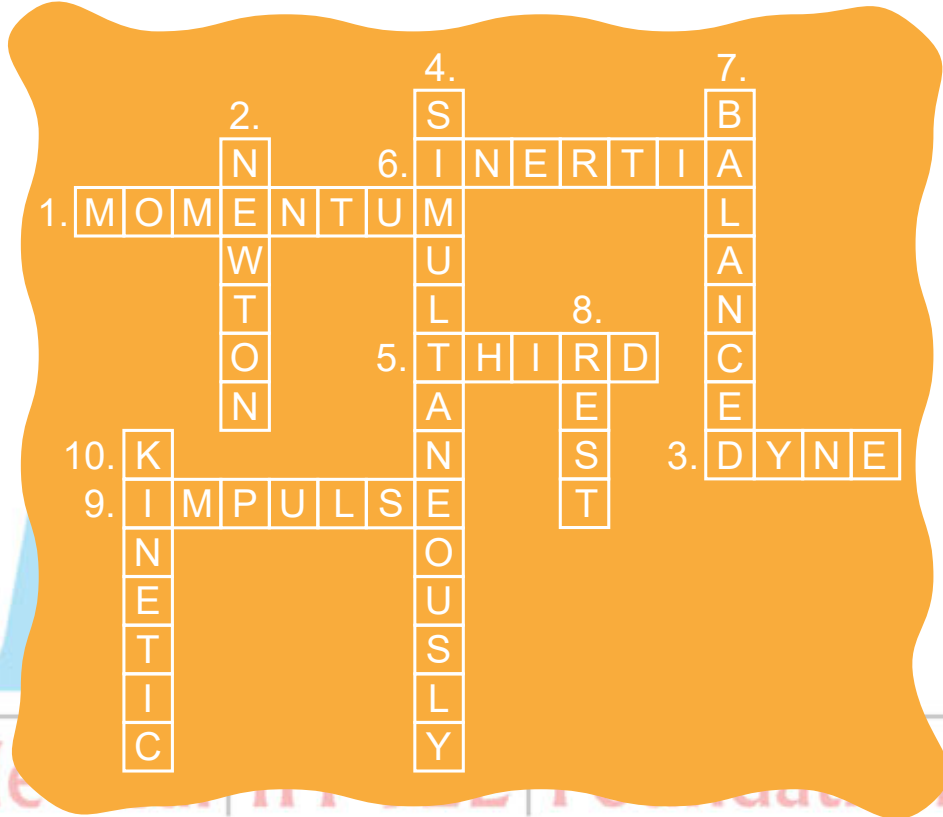
While catching a fast ball, players move their hands backward. This increases the time of impact and reduces force, making it less painful.



Why Helmets Are Important

Helmets increase the time over which the head stops during an accident, thus reducing the force and protecting the brain.





Exploring Mixtures and their Separation

Fun Time



Want to hear a joke about sodium, bromine and oxygen ?

NaBrO.

Sure enough, the chemical symbols of sodium (Na), bromine (Br) and oxygen (O) combine to form a casual way to tell someone you're not interested in hearing a joke.

Two chemists walk into a cafe.

One says, "I'll have H₂O." The other says, "I'll have H₂O, too." The second chemist dies.

H₂O₂ is the chemical formula for hydrogen peroxide, which you can't drink without grievous consequences.

If H₂O is water and H₂O₂ is hydrogen peroxide, what is H₂O₄ ?

Drinking, bathing and lots of other daily activities.

Get it? What is it 4?





Riddles

Who I am?? What I am, an element, a compound or a mixture?

1. You breathe me in.

2. You breathe me out.

3. I am attracted towards the magnet.

4. I am colourless gas with rotten eggs smell.

3. I am a liquid metal

4. I am a liquid non-metal

3. I am obtained as a black mass when Fe + S is heated

4. I am an emulsion and you drink me everyday.



Match the Following

- | | |
|-------------------|-----------------|
| (a) Fog | (i) Foam |
| (b) Butter | (ii) Sol |
| (c) Mud | (iii) Solid sol |
| (d) Milky glass | (iv) Gel |
| (e) Shaving cream | (v) Aerosol |



Answers (Riddles)

- | | |
|-----------------------------|---------------------------------|
| 1. Oxygen – Element | 2. Carbon dioxide – Compound |
| 3. Iron – Element | 4. Hydrogen sulphide – Compound |
| 5. Mercury – Element | 6. Bromine – Element |
| 7. Iron sulphide – Compound | 8. Milk – Mixture |

Answers: Match the Following

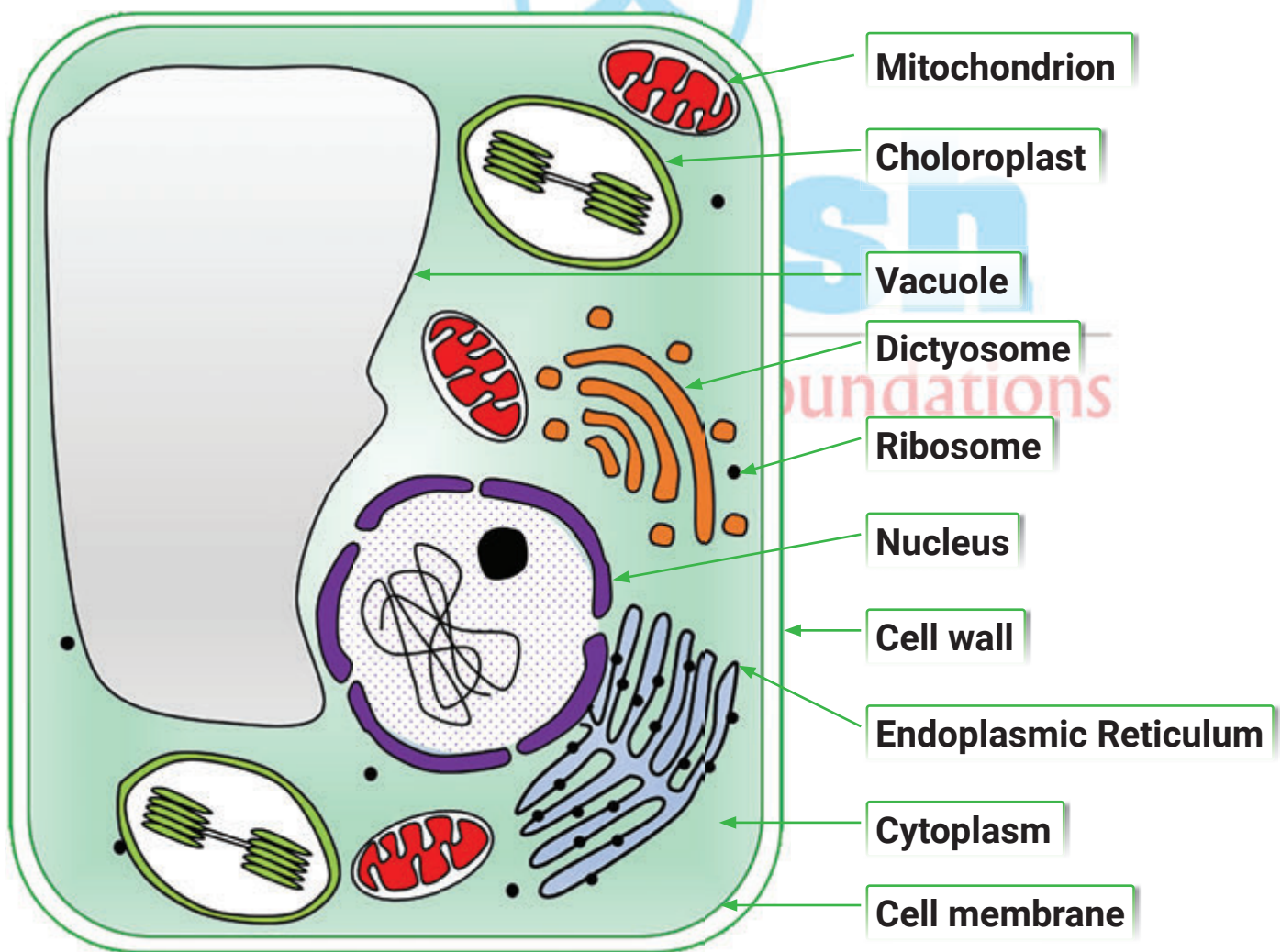
- | |
|-------------|
| (a) — (v) |
| (b) — (iv) |
| (c) — (ii) |
| (d) — (iii) |
| (e) — (i) |



Cell- The Building Blocks of Life

Astounding Archetypes

PLANT CELL



Unscramble

Unscramble the following

1

I T O M C N D H O R A I

HINT : Powerhouses of the cell

2

U C L L N E O S U

HINT : Ribosome factory

3

H L O P C O R L S A T

HINT : Kitchen of the cell

4

I B S R O O E M S

HINT : Protein factory

5

Y S L O O S M S E

HINT : Suicidal bag

6

C E N S U U L

HINT : Brain of the cell

7

D S E M M S E O S O

HINT : Connections between adjacent animal cells

8

I F U D S F O I N

HINT : Movement of gas molecules



Word Puzzle

F	P	L	G	O	L	G	I	B	O	D	Y
C	U	K	G	D	D	J	C	F	W	G	E
E	R	H	E	E	C	H	F	C	S	V	T
N	K	F	N	W	N	X	C	Z	Z	B	I
T	I	H	E	F	M	E	E	H	G	V	O
R	N	T	O	N	O	P	L	A	S	T	P
O	J	V	B	G	B	K	L	G	V	B	L
S	E	H	A	J	M	D	A	L	A	S	A
O	E	D	X	E	J	K	C	B	N	M	S
M	K	X	V	L	N	H	V	C	F	B	T
E	C	H	R	O	M	O	P	L	A	S	T
A	W	T	O	N	O	P	L	A	S	T	V

Med

1. He coined the term 'Protoplasm'.
2. These are coloured plastids which impart colour in fruits, flowers and roots and contain pigments called carotenoids.
3. Membrane which bound sap vacuole
4. It helps in storage, modification and packaging of products in vesicles coming from ER.
5. It helps in cell division of animal cells.
6. The fundamental unit of life
7. The functional unit of DNA which is present on chromosome.
8. Chloroplast that have not been exposed to light.



Answer (Unscramble)

1. MITOCHONDRIA
2. NUCLEOLUS
3. CHLOROPLAST
4. RIBOSOMES
5. LYSOSOMES
6. NUCLEUS
7. DESMOSOMES
8. DIFFUSION

Answer (Word Puzzle)

F	P	L	G	O	L	G	I	B	O	D	Y
C	U	K	G	D	D	J	C	F	W	G	E
E	R	H	E	E	C	H	F	C	S	V	T
N	K	F	N	W	N	X	C	Z	Z	B	I
T	I	H	E	F	M	E	E	H	G	V	O
R	N	T	O	N	O	P	L	A	S	T	P
O	J	V	B	G	B	K	L	G	V	B	L
S	E	H	A	J	M	D	A	L	A	S	A
O	E	D	X	E	J	K	C	B	N	M	S
M	K	X	V	L	N	H	V	C	F	B	T
E	C	H	R	O	M	O	P	L	A	S	T
A	W	T	O	N	O	P	L	A	S	T	V

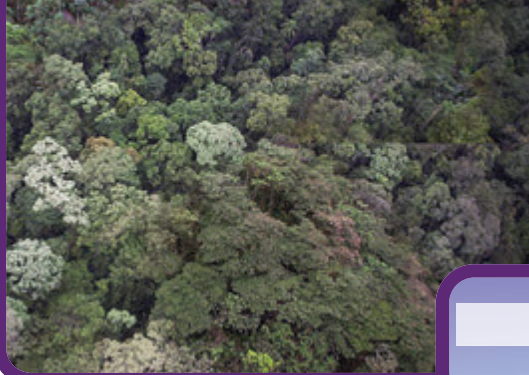
1. Purkinje
2. Chromoplast
3. Tonoplast
4. Golgi body
5. Centrosome
6. Cell
7. Gene
8. Etioplast

Natural Vegetation

TYPES OF VEGETATION

Major types of vegetation in our country

Tropical Evergreen Forests



Tropical Deciduous Forests



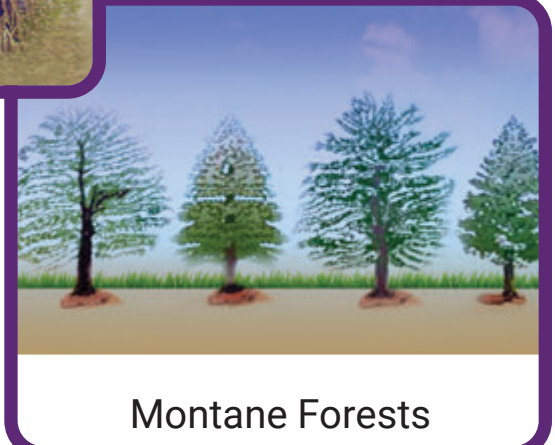
Mangrove Forests



Tropical Thorn Forests
and Scrubs



Montane Forests



6 All of _____ sudden _____ sky became too dark, as if it was covered with _____ thick cloud.

(a) the, a, the

(b) the, the, the

(c) a, the, a

(d) a, a, the

7 _____ grey car belongs to my father.

(a) A

(b) An

(c) The

(d) No article

8 Such _____ girl is not fit for _____ role.

(a) X (No article), a

(b) a, a

(c) the, X (No article)

(d) a, the

9 There is _____ index at _____ end of the book.

(a) the, the

(b) an, the

(c) an, a

(d) the, a

10 _____ seal is _____ excellent swimmer.

(a) A, the

(b) The, an

(c) X (No article), an

(d) The, the

Answer

1 (b) The, a

2 (c) the

3 (c) The

4 (a) the, the

5 (c) the

6 (c) a, the, a

7 (c) The

8 (d) a, the

9 (b) an, the

10 (b) The, an

Number and Alphabet Test

Quiz Time

A * 5 9 I N & E @ # U 1 &

1 How many vowels in the above arrangement are immediately preceded by a symbol?

- (a) One (b) Two (c) Three
(d) Four

2 Which is the second element to the left of the sixth element from the right end ?

- (a) & (b) @ (c) N
(d) E

435 224 786 823 902

3 When all the digits in each of the given numbers are arranged in ascending order, which number becomes the highest?

- (a) 435 (b) 224 (c) 786
(d) 823

@ 1 8 H L I 6 K * & ? U E

- 4** How many such consonants are there in the series which are immediately followed by a symbol and preceded by a number?
- (a) One (b) Two (c) Three
(d) None

1 5 8 4 2 1 5 2 3 4 5 6 7 8 9 5 1 4 1 5 6 8 7 4

- 5** Which of the following is ninth to the left of twenty first from the left end in the above arrangement?
- (a) 7 (b) 5 (c) 6
(d) 8

1 5 8 4 2 1 5 2 3 4 5 6 7 8 9 5 1 4 1 5 6 8 7 4

- 6** How many such 1's are there in the above arrangement each of which is immediately followed by a perfect square?
- (a) None (b) One (c) Two
(d) Three

1 5 8 4 2 1 5 2 3 4 5 6 1 4 7 6 2 8 9 5 6 4 1 5 6

- 7** How many such 4's are there in the above arrangement each of which is immediately preceded by a digit which has a numerical value more than four?
- (a) None (b) One (c) Two
(d) Three

8 The Next alphabetical pair is

ZA BY XC DW ?

(a) VF

(b) EU

(c) UE

(d) VE

9 If the digits in the number 79246358 are arranged in descending order from left to right, what will be the difference between the digits which are third from the right and second from the left in the new arrangement?

(a) 1

(b) 2

(c) 3

(d) 4

10 The positions of how many letters will remain the same if each of the letter in the word DETRIMENT is rearranged in the alphabetical order from left to right?

(a) None

(b) One

(c) Two

(d) Three



Answer (Quiz Time)

- 1 (b) Two
"E" is preceded by "&" and "U" is preceded by "#"
- 2 (c) N
Sixth element from the right end is E and second to its left is N
- 3 (c) 786
- 4 (a) One
K, is followed by "*" and preceded by "6"
- 5 (c) 6
- 6 (b) One
- 7 (c) Two
- 8 (d) VE
- 9 (d) 4
- 10 (d) Three



Happy Birthday

Ronald Ross

“Science is the Differential Calculus of the mind. Art the Integral Calculus; they may be beautiful when apart, but are greatest only when combined.”



Born - 13 May 1857
Died - 16 Sep 1932

Ronald Ross was born on May 13, 1857, in Almora, India. At the age of 14, Ross won a prize in mathematics and was presented the book *Orbs of Heaven*, which sparked his interest in the field of mathematics. Ross is known for his outstanding research work on malaria-causing parasites in mosquitoes. He discovered malarial parasites in the salivary glands of mosquitoes.

Nobel Prize in Physiology or Medicine (1902), The James Tait black Memorial Prize - Biography (1923).

NEET 2025 Wasn't Easy. Our Results Say Otherwise.

5 AAKASHIANS IN TOP 10 AIR NEET(UG) 2025



OUR NATIONAL TOPPERS IN NEET (UG) 2025



Our Problem *Solvers* shine bright in **JEE (Advanced) 2025**

Our Top 100 AIR



Aakashians Create History in International Olympiads

(Classroom Program Students)



Dhruv Advani

IBO 2023



Gold Medalists

34th International Biology Olympiad



Rohit Panda



Chirag Falor



International Olympiad on Astronomy & Astrophysics



Dhiren Bhardwaj



32nd International Biology Olympiad



Anshul



32nd International Biology Olympiad



Amritansh Nigam



33rd International Biology Olympiad



Prachi Jindal



33rd International Biology Olympiad



Tanishka Kabra



54th International Chemistry Olympiad

1484 Students Scored Above MAS

420

Classroom Students
Qualified in
NSEs* 2024-25

(Group A & B)

49
NSEA*

(Group A & B)

229
NSEB*

(Group A & B)

70
NSEC*

(Group A & B)

38
NSEP*

34
NSEJS*

Aakashians Qualified for INO-2025



Krishna Agrawal
NSEA | NSEP | NSEC



Mohit Shekher Shukla
NSEA | NSEP | NSEC



Utkarsh Awadhya
NSEB | NSEP | NSEC



Rupayan Pal
NSEC | NSEP | NSEP



Devansh Garg
NSEJS



Aaron Thakkar
NSEJS

and many more...

*NSEA-National Standard Examination in Astronomy | NSEB-National Standard Examination in Biology | NSEC-National Standard Examination in Chemistry
NSEP-National Standard Examination in Physics | NSEJS-National Standard Examination in Junior Science | INO-Indian National Olympiad

Aakashians Qualified for RMO 2024

899

Classroom Students

Qualified
in IOQM
2024



Joish Achyuta
Class - VIII



Dhanush Damu
Class - IX



Arnav Singh
Class - X



Pranit Goel
Class - XI



Aayush Agarwal
Class - XII

and many more...

Aakashians Qualified for INMO 2025

161

Classroom Students

Qualified
in RMO 2024-25



Kotha D Reddy
Reg. No. 00006657265



Abhipraya Verma
Reg. No. 00010407513



Aditya Singh
Reg. No. 00012631688



Rujul Garg
Reg. No. 00005153903



Mohit Shekher Shukla
Reg. No. 00006093814

and many more...

Aakashians Qualified for OCSC/IMOTC-2025

25

Classroom Students

Qualified
in INOs 2025



Pranit Goel
Qualified INMO



Harshit Singh
Qualified INJSO



Subhrojit Paul
Qualified INBO



Mohit Shekher Shukla
Qualified INChO



Rujul Garg
Qualified INPhO



Aditya Singh
Qualified INAO Jr

and many more...

Aakashians Qualified for Merit Certificate

1019

Classroom Students

Qualified
in IMO (Level-I)
2023-24



Intl.
Rank
1

Prisha Miglani
Class - IX



Intl.
Rank
2

Sushant Agarwal
Class - X



Intl.
Rank
4

Ekaashar Gupta
Class - IX



Intl.
Rank
7

Harshit Singh
Class - VIII

438

Classroom Students

Qualified
in IMO (Level-II)
2024

and many more...

Aakashians Qualified for Merit Certificate

4902

Classroom Students

Qualified
in NSO (Level-I)
2024-25



Intl.
Rank
2

Meghav Ladani
Class - X



Intl.
Rank
2

Anubhab Manna
Class - VIII



Intl.
Rank
3

Arnav Gupta
Class - IX



Intl.
Rank
7

Parshti Bajpai
Class - IX



Intl.
Rank
10

Shreya
Class - VIII

and many more...