Aakash

Medical | IIT-JEE | Foundations

KNOWLEDGE BYTES

FEBRUARY 2025

CLASS 9

Aakash

Medical | IIT-JEE | Foundations

Edition: 2024-25

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

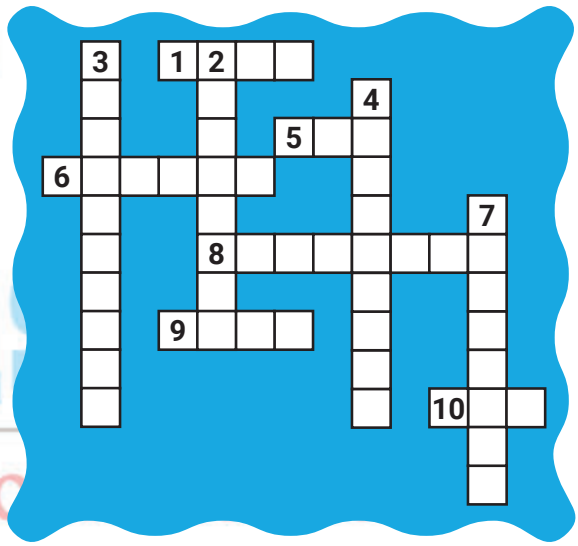
Stimulates Interest

Leads to Increased Comprehension

EXPLORE

Co-ordinate Geometry

Crossword



ACROSS

1. The coordinate axes divide the Cartesian plane into _____ quadrants. [4]
5. The Cartesian plane consists of _____ axes. [3]
6. Point of intersection of x-axis and y-axis is called _____. [6]
8. The x-coordinate is also called _____. [8]
9. The y-coordinate of every point on x-axis is _____. [4]
10. Distance formula is valid for _____ quadrants. [3]

DOWN

2. The y-coordinate is also called _____. [8]
3. The _____ axes divide the plane into four quadrants. [10]
4. Three points A, B and C are such that AB + BC = AC, then these points are _____. [9]
7. Parallelogram is a quadrilateral in which each pair of opposite sides are _____. [8]

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

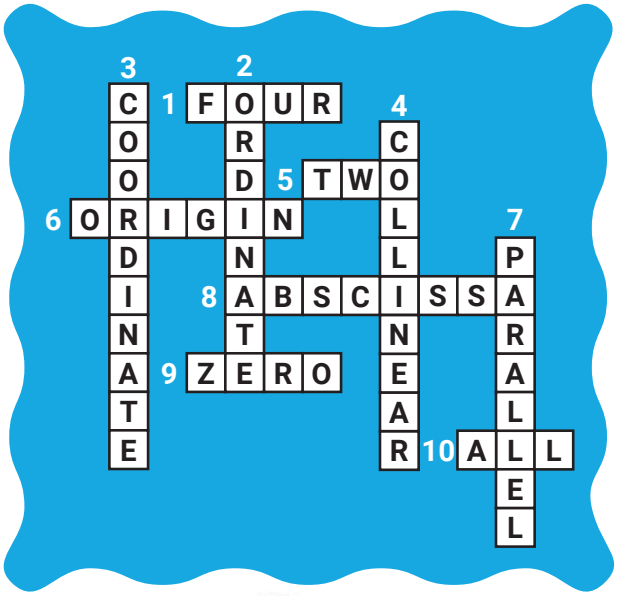
(a) Isosceles triangle (b) Equilateral triangle

(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 $t_1t_2 = -1$.

5 Find the distance between mid-point of line segment AB with A(2, − 7) B(9, −2) and the point C(5, −6).

Answer (Crossword)



Answer (Quiz Time)

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

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

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

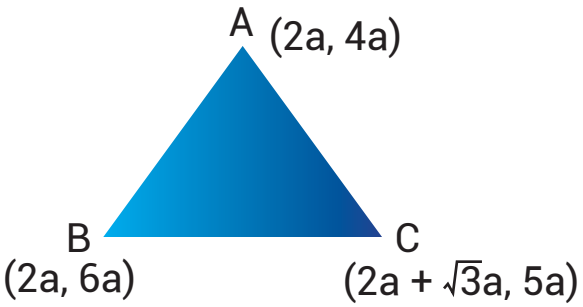
$= \sqrt{4a^2 + 4b^2}$

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

$= 2\sqrt{a^2 + b^2}$

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.

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

$= \sqrt{(at_2^2 - at_1^2)^2 + (2at_2 - 2at_1)^2}$

$= \sqrt{a^2(t_2^2 - t_1^2)^2 + 4a^2(t_2 - t_1)^2}$

$= \sqrt{a^2(t_2 - t_1)^2 (t_2 + t_1)^2 + 4a^2(t_2 - t_1)^2}$

$= a(t_2 - t_1) \sqrt{t_1^2 + t_2^2 + 2t_1t_2 + 4}$

$= a(t_2 - t_1) \sqrt{t_1^2 + t_2^2 - 2 + 4} \quad (\because t_1t_2 = -1)$

$= a(t_2 - t_1) \sqrt{t_1^2 + t_2^2 + 2 \times 1}$

$= a(t_2 - t_1)\sqrt{t_1^2 + t_2^2 + 2 \times (-t_1t_2)} \quad (\because 1 = -t_1t_2)$

$= a(t_2 - t_1) \sqrt{t_1^2 + t_2^2 - 2t_1t_2}$

$= a(t_2 - t_1) \sqrt{(t_2 - t_1)^2}$

$= a(t_2 - t_1)^2 = a(t_1 - t_2)^2$

5

$$\text{Mid-point} = \left(\frac{9+2}{2}, \frac{-7-2}{2}\right)$$

$$= \left(\frac{11}{2}, \frac{-9}{2}\right)$$

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

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

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

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

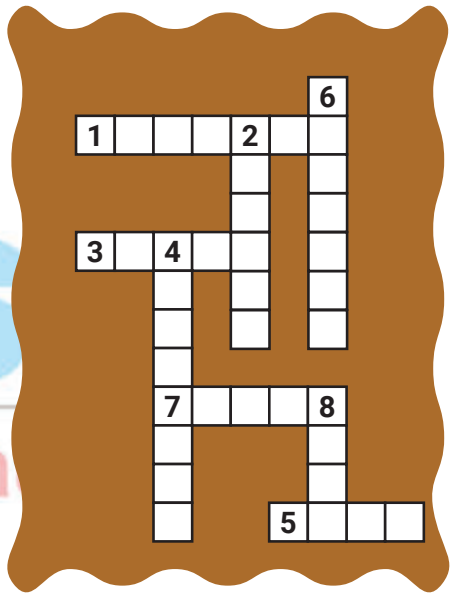
$$= \sqrt{\frac{10}{4}} = \frac{\sqrt{10}}{2} \text{ units}$$

Force and Laws of Motion

Crossword

ACROSS

1. The product of force and time is called _____.
3. A push or a pull on an object is called _____.
5. A body is said to be under balanced forces, when the resultant force acting on the body is _____.
7. Recoil velocity of gun is an example of Newton's _____ law.



DOWN

2. The product of mass and velocity is called _____ momentum.
4. To every action there is an equal and opposite _____.
6. _____ force is always pulling in nature.
8. The CGS unit of force is _____.

Scientific Contribution

Isaac Newton

Sir Isaac Newton's three laws of motion describe the motion of bodies and how they interact. While Newton's law may seem obvious to us today, more than three centuries ago they were considered revolutionary.

Newton developed the three laws of motion which form the basic principles of modern physics. His work in optics included the study of white light and the discovery of the colour spectrum.

Newton's law and its real life applications

Newton's first law of motion

According to this law, a body at rest or in uniform motion will continue to be in the state of rest or uniform motion unless it is compelled by an unbalanced external force to change its state of rest or uniform motion.

Real life application

- An athlete runs for a certain distance before taking a long jump.
- A person sitting / standing on a bus falls back when the bus suddenly starts moving forward.
- The carpet is beaten with a stick to remove the dust particles.

Newton's second law of motion

The acceleration produced in the body by the action of a force acting on it is directly proportional to the force and inversely proportional to the mass of the body.

Mathematically, $F = ma$,

where, F = force, m = mass of the body.

a = acceleration

In other words, Newton's second law of motion can be stated as: The rate of change of linear momentum is equal to the force applied to the body and the change in momentum always takes place in the direction of the force.

Real life application

- A cricket player lowers his hands while catching a ball.
- A person falling on a cemented floor gets injured, but a person falling on a heap of sand does not get injured.

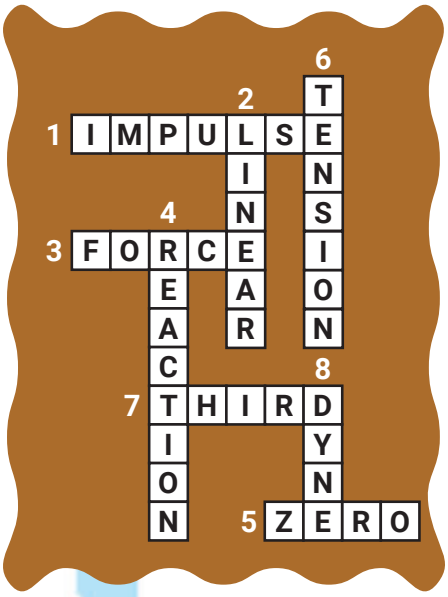
Newton's third law of motion

For every action, there is an equal and opposite reaction (Law of action and reaction)

Real life application

- Gun gives a jerk to shoulder of the gunman on firing a bullet from it.
- Boatman pushes the river bank with a bamboo pole to take his boat into the river.

Answer (Crossword)



Matter in Our Surroundings

St. Elmo's Fire

St. Elmo's fire is a persistent blue glow that occasionally appears near pointy objects during storms. It is a luminous plasma discharge from a pointed object. That is why it usually emanates from the nose of a plane or the mast of a ship.

St. Elmo's Fire was named by sailors of old time. They couldn't understand what caused the glow around their ship that looked like a sort of divine fire and named it after St. Erasmus, also known as St. Elmo. He is the patron saint of sailors. The appearance of the mysterious glow was said to be a good omen of the saint watching over the crew, though it may be scary.

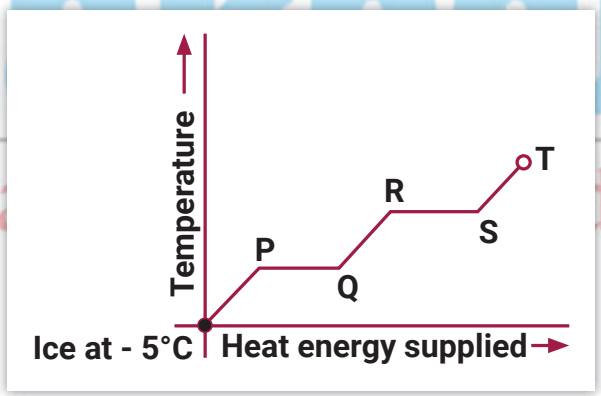
The glow and subsequent discharge typically occur when a plane or ship comes near a thunderstorm or volcanic activity. It can also occur on the tops of buildings and electrical towers.

Scientific Explanation Behind the St. Elmo's Fire

When the electrical field around a pointed object builds a sufficient charge, it ionizes the air around it and turns it into plasma. The blue/violet colour is the result of nitrogen and oxygen, which make up the majority of the atmosphere. Although the glow and discharge bursts can sometimes make a hiss or buzz, St. Elmo's Fire itself is completely harmless.

Quiz Time

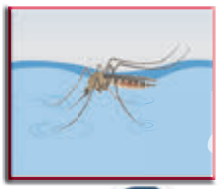
Consider the given graph.



1. State of matter represented by the portion PQ of the graph
2. State of matter represented by the portion RS of the graph
3. Temperature at portion PQ of the graph
4. Temperature at portion RS of the graph
5. The heat supplied during portion RS of the graph.

Match the following

Match the following images with the corresponding phenomenon

(a)	Evaporation		(i)
(b)	Condensation		(ii)
(c)	Osmosis		(iii)
(d)	Melting		(iv)
(e)	Boiling		(v)
(f)	Surface Tension		(vi)
(g)	Diffusion		(vii)
(h)	Fluidity		(viii)

Answer (Quiz Time)

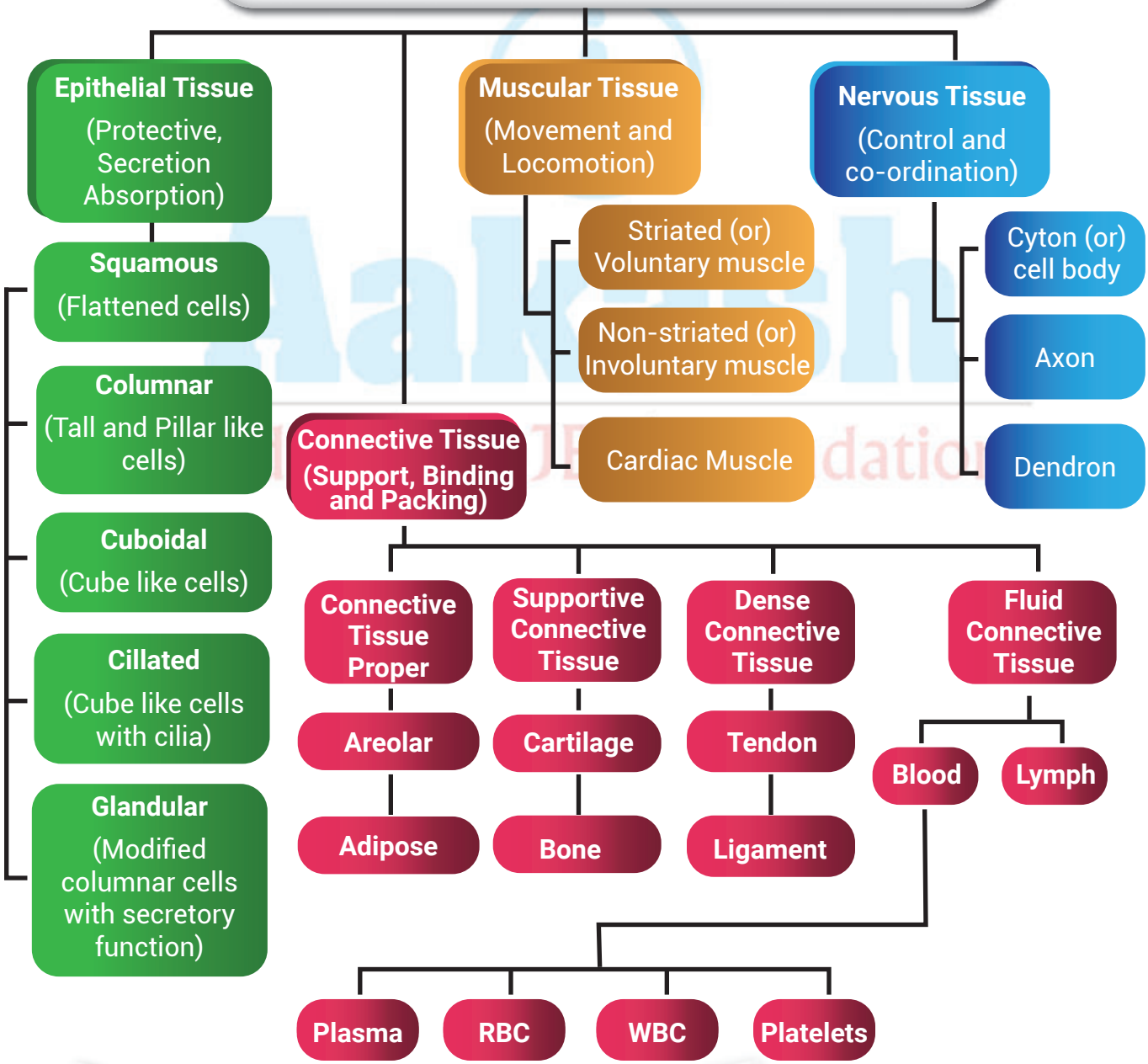
1. Solid + Liquid (Ice + Water)
2. Liquid + Gas (Water + Vapour)
3. 0 degree Celsius (melting point)
4. 100 degree Celsius (boiling Point)
5. Latent heat of vaporisation

Answer (Match the following)

(a)	→	(v)
(b)	→	(iv)
(c)	→	(vi)
(d)	→	(i)
(e)	→	(vii)
(f)	→	(viii)
(g)	→	(iii)
(h)	→	(ii)

Tissues

Classification of Animal Tissues



Concept Map

TISSUES

PLANT TISSUE

ANIMAL TISSUE

MERISTEMATIC TISSUE (Dividing)

PERMANENT TISSUE (Non- dividing)

APICAL

LATERAL

INTERCALARY

SIMPLE

COMPLEX

Shoot Apical Meristem

Node Intercalary Meristem

Root Apical Meristem

Stem Lateral Meristem

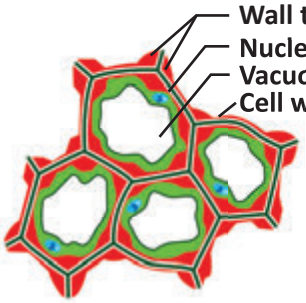
XYLEM

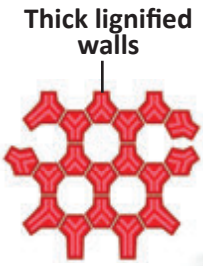
PHLOEM

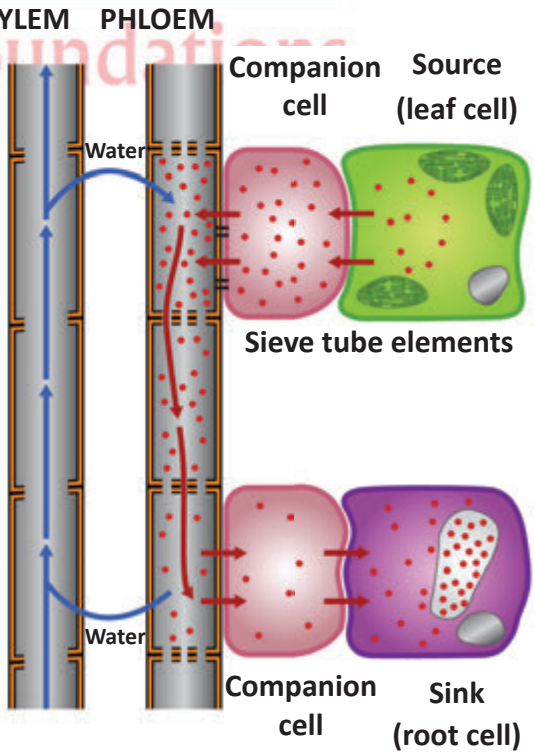
PARENCHYMA

COLLENCHYMA

SCLERENCHYMA







Riddles

1		
	Hint	I help in increase in height of the plant, *i.e.*, primary growth. Who am I?
2		
	Hint	I am living and forms the basic packing tissue of the plant body. Who am I?
3		
	Hint	I am the protective layer of the plant and made up of single layer of cells but multilayered in xerophytic plants. Who am I?
4		
	Hint	I am kidney shaped in dicots and help in opening and closing of stomata. Who am I?
5		
	Hint	I am light in weight and does not catch fire easily and hence used in making sports goods, insulators and shock absorbers. Who am I?
6		
	Hint	Without me plants can't take water and minerals from soil and I also provide support and mechanical strength to their body. Who am I?
7		
	Hint	I provide crunchiness to pear and guava and also yields coir (for making mats, brushes, etc.). Who am I?

Interesting Facts About Tissues

1. Ciliated epithelium helps in removing dust particles and germs from the air you breathe in.
2. Epithelial tissue make our skin waterproof, as they are filled with keratin protein.
3. A new born baby has around one cup of blood in his body.
4. If we put all neurons in our body in a line, it will be around 6000 miles long.
5. In every 7 years you have a new skeleton, as the collagen in bone constantly replenishes itself.

Mnemonics about Tissues

Simple Squamous

BLEM

B	L	E	M
Bowman's Capsule	Lung Alveoli	Endothelium	Mesothelium

Simple Cuboidal

ROT

R	O	T
Renal Tubules	Outer Enamel Epithelium	Thyroid Follicles

Answer (Riddles)

1	A	P	I	C	A	L	M	E	R	I	S	T	E	M

2	P	A	R	E	N	C	H	Y	M	A

3	E	P	I	D	E	R	M	I	S

4	G	U	A	R	D	C	E	L	L	S

5	C	O	R	K

6	X	Y	L	E	M

7	S	C	L	E	R	E	N	C	H	Y	M	A

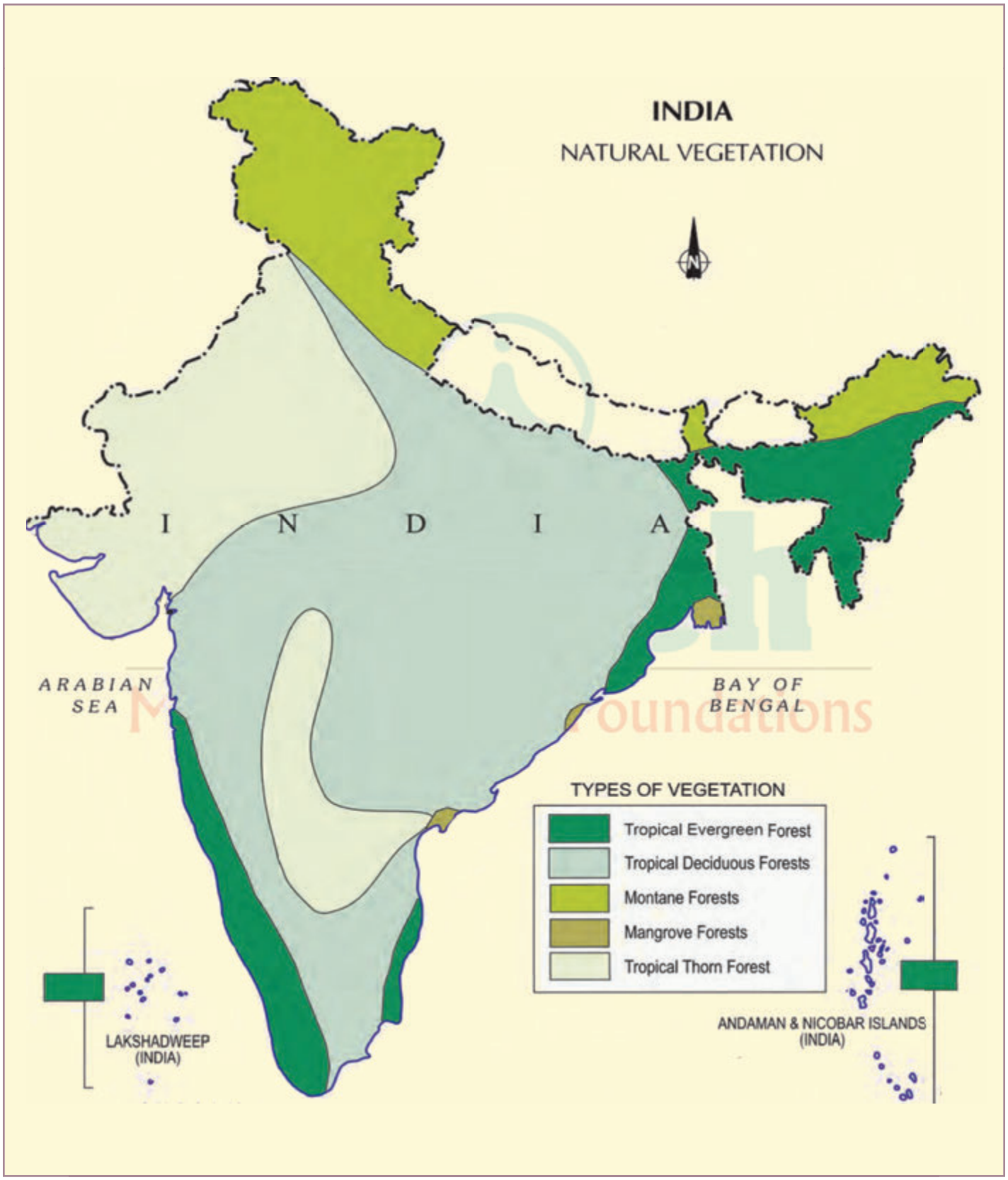
Natural Vegetation and Wildlife

India State of Forest Report (ISFR) 2019

According to this report, the forest cover in India is 21.67per cent.

Forest Cover

- Madhya Pradesh has the largest area under permanent forests, constituting 75 per cent of its total forest area.
- All North-Eastern states and parts of Gujarat have a very high percentage of their forests as unclassed forests managed by local communities.


INDIA
NATURAL VEGETATION
N
I N D I A
ARABIAN SEA
BAY OF BENGAL
TYPES OF VEGETATION
Tropical Evergreen Forest
Tropical Deciduous Forests
Montane Forests
Mangrove Forests
Tropical Thorn Forest
LAKSHADWEEP (INDIA)
ANDAMAN & NICOBAR ISLANDS (INDIA)

Steps taken to protect the flora and fauna of the country

Wildlife (Protection) Act 1972

Protection of wildlife by controlling poaching, smuggling and illegal trade.

Specialized Projects

- Project Tiger - 1973
- Project Crocodile - 1975
- Project Rhinoceros - 1987
- Project Elephant - 1988

Establishment of Protected Areas

- Biosphere Reserves
- National Parks
- Wildlife Sanctuaries
- Bird Sanctuaries
- Community Reserves

Articles

Articles are of two types

1. Indefinite — a /an
2. Definite — the

1 _____ man who is wearing a black shirt is my father. My mother is _____ doctor.

(a) A, the
(b) The, a
(c) The, the
(d) A, a

2 She asked her mother for _____ money to buy a laptop.

(a) a
(b) an
(c) the
(d) no article

3 _____ car is ready now. You can visit the showroom to collect it.

(a) A
(b) An
(c) The
(d) No article

4 Mount Everest is _____ highest mountain in _____ world.

(a) the, the
(b) X (No Article), X (No Article)
(c) the, X (No Article)
(d) X (No Article), a

5 Everyone has to write business letters of some sort; and may have to face some problem in writing _____ important letters.

(a) a
(b) an
(c) the
(d) no article

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

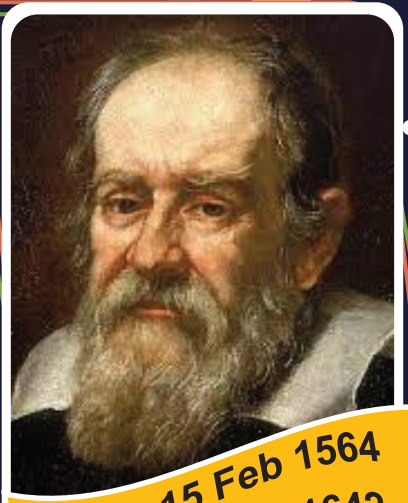
9 **(d)** 4

10 **(d)** Three

FATHER OF OBSERVATIONAL ASTRONOMY

Happy Birthday

Galileo Galilei



Born - 15 Feb 1564
Died - 08 Jan 1642

Galileo Galilei is a famous Italian Astronomer, Mathematics Professor, and Physicist who first used the telescope to study space. His contributions in Science and Mathematics still resonate today, and became the basis for different ideas that sprung up during the scientific revolution during and after his time.

OUR RESULTS 2024

NEET (UG) 2024

AIR 1

JEE (Advanced) 2024

1430 Students Scored Above MAS

344 Classroom Students Qualified in NSEs* 2023-24

- (Group A & B) 34+30 NSEA*
- 156 NSEB*
- 72 NSEC*
- 23 NSEP*
- 29 NSEJS*

Aakashians Qualified for INO-2024

Diptanshu Sharma	Priyanshu Sarkar	Mridul Garg	Zaman Hussain	Shubhradeep Paul	Samvit Shandilya
NSEB | NSEC | NSEP	NSEB | NSEC | NSEP	NSEB | NSEC | NSEP	NSEA | NSEC | NSEP	NSEA | NSEC | NSEP	NSEA | NSEC | NSEP

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 OCSC/IMOTC-2024

32 Classroom Students Qualified in INOs 2024

Aneesh Shastri	Sanvi Jain	Mridul M Anand	Zaman Hussain	Sushant Agarwal	Archit Kumar
Qualified INAO	Qualified INChO	Qualified INBO	Qualified INMO	Qualified INJSO	Qualified INAO Jr

OCSCs - Orientation cum Selection Camps | **IMOTC** - International Mathematical Olympiad Training Camp

and many more...

Aakashians Qualified for RMO from Classroom Programs

869 Classroom Students Qualified in IOQM 2024

Class VIII Joish Achyuta	Class VIII Pranava NS	Class VIII Bruteshwar Rajguru	Class VIII Hardik Mishra	Class VIII Hardik Dhariwal	Class IX Dhanush Damu
2 Year Classroom	3 Year Classroom	3 Year Classroom	2 Year Classroom	2 Year Classroom	4 Year Classroom

IOQM - Indian Olympiad Qualifier in Mathematics

and many more...

Board Exam Results 2024

Top Performers from Class X

Devidyuti K Pisharody	P Harini	Jiya Dugar V
Marks 500/500	Marks 499/500	Marks 498/500
CBSE	CBSE	CBSE

and many more...

Top Performers from Class XII

Ananthan R	Ansh Agrawal	Himanshu Agarwal
Marks 496/500	Marks 495/500	Marks 495/500
CBSE	CBSE	CBSE

and many more...

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