Aakash

Medical | IIT-JEE | Foundations

KNOWLEDGE BYTES

MAY 2026

CLASS 10

Aakash

Medical | IIT-JEE | Foundations

Edition: 2026-27

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

Pair of Linear Equations in Two Variables, Quadratic Equations

Slope

Definition :- Slope of a line describes the direction and steepness of a line. It is also called gradient.

General form of linear equation in two variables :

$$ax + by + c = 0$$

$$\Rightarrow \quad by = -ax - c$$

$$\Rightarrow \quad y = \frac{-a}{b}x - \frac{c}{b}$$

$$m = \frac{-a}{b}$$

Slope of a line = $\frac{-a}{b}$; y-intercept = $-\frac{c}{b}$

as in equation y = mx + c m represents slope and 'c' represents y-intercept.

y-intercept (y-coordinate of intersection with y-axis)

y-intercept (also called vertical intercept) is a point where the graph of a linear equation or any other function or equation intersects y-axis.

Slope is usually denoted by 'm'. It is calculated by finding ratio of 'vertical change' to 'horizontal change' between any two distinct points on a line or a curve.

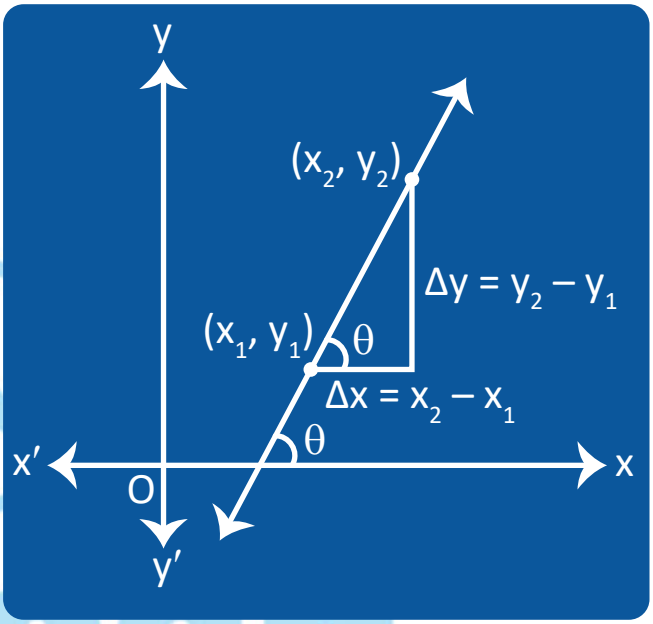
Mathematically,

It is also represented by Δ → delta which represents change in a certain quantity.

$$m = \frac{\Delta y}{\Delta x}$$

OR

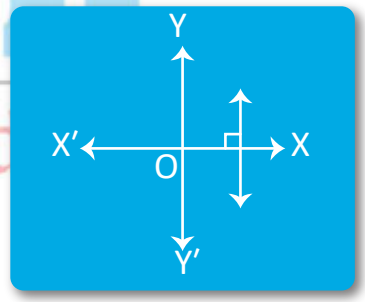
$m = \frac{y_2 - y_1}{x_2 - x_1}$; where (x_1, y_1) and (x_2, y_2) are any two points on the line whose slope is to be calculated.



Also, the slope of a line, can be calculated by 'tan θ', where 'θ' is the angle of inclination which the line makes with x-axis.

The angle θ is the angle made by the line with positive direction of x-axis and measured anti clockwise.

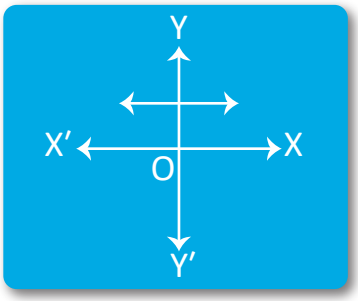
1. Vertical line (line parallel to y-axis)



Angle made by vertical line with x-axis is 90°.

Slope = tan θ = tan 90° = (Not defined)

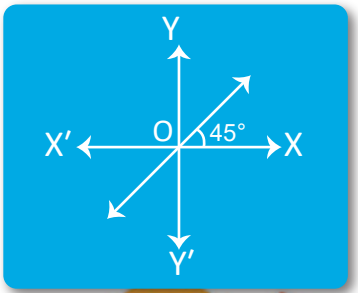
2. Horizontal line (line parallel to x-axis)



Angle made by horizontal line with x-axis is 0°.

Slope = tan θ = tan 0° = 0

3. A line has slope = 1; when it makes angle with x-axis as 45°



Slope = tan θ = tan 45° = 1

Solutions of Some Important Inequalities

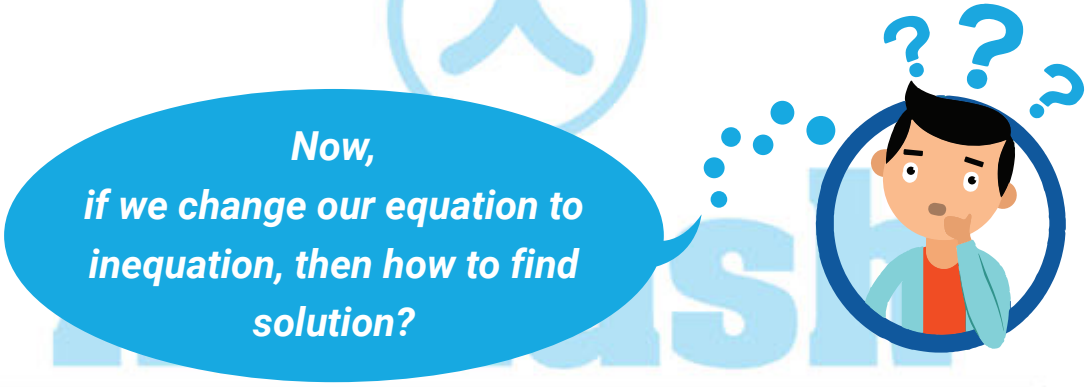
If we are given an equation like

$$(x - a)(x - b) = 0$$

Finding the solution is quite easy, equate each factor to zero.

i.e. $(x - a) = 0$ or $(x - b) = 0$

$\Rightarrow$ $x = a$ or $x = b$ is the solution.



(i) $(x - a)(x - b) > 0$; $a < b$ (say)

To solve this inequality, we will learn **wavy curve method**.

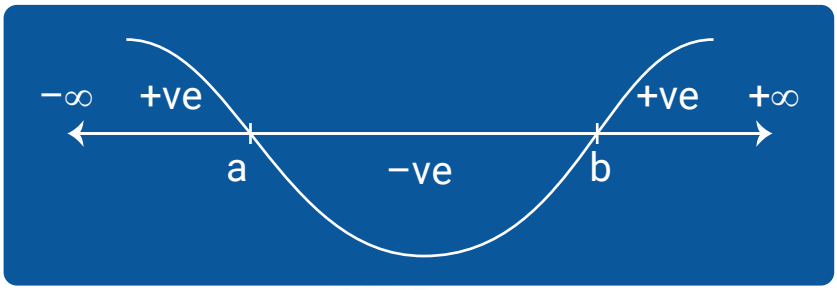
Inequalities can be of the form < 0, > 0, ≤ 0, ≥ 0

- First step is to find critical points i.e. points at which value of given inequality will become zero.

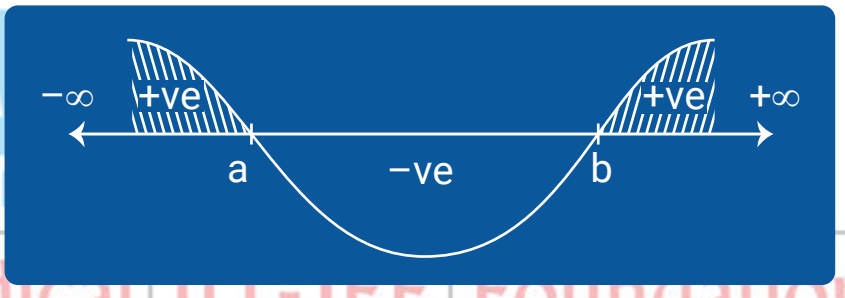
  So, in the above equation critical points are 'a' and 'b'.

- Plot these points on the number line.

- Mark intervals and put +ve and −ve marks on alternate interval starting from right of b.



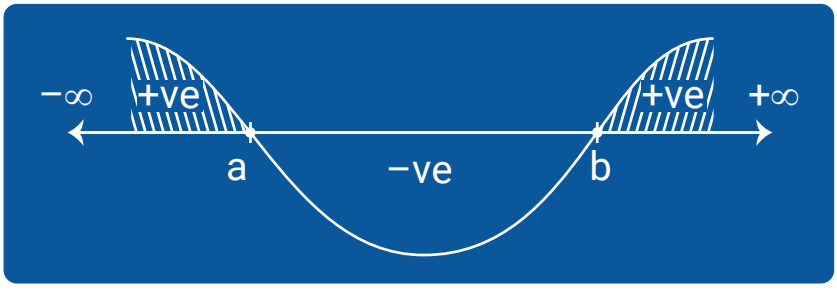
- Let us look at the given inequality $(x - a)(x - b) > 0$. It is greater than zero. So, we have to find the solution at which the value is greater than zero. Clearly, the intervals with the +ve sign gives positive value. Mark those intervals.



- Solution of $(x - a)(x - b) > 0, a < b$ is $\boxed{x < a \text{ or } x > b}$

(ii) $(x - a)(x - b) \geq 0, a < b$

To find the solution where the value is greater than equal to zero.



Solution will be $\boxed{x \leq a \text{ or } x \geq b}$, as the inequality is ≥ 0, so critical points will also be included.

(iii) $(x - a)(x - b) < 0, a < b$

To find the solution where the value is less than zero.

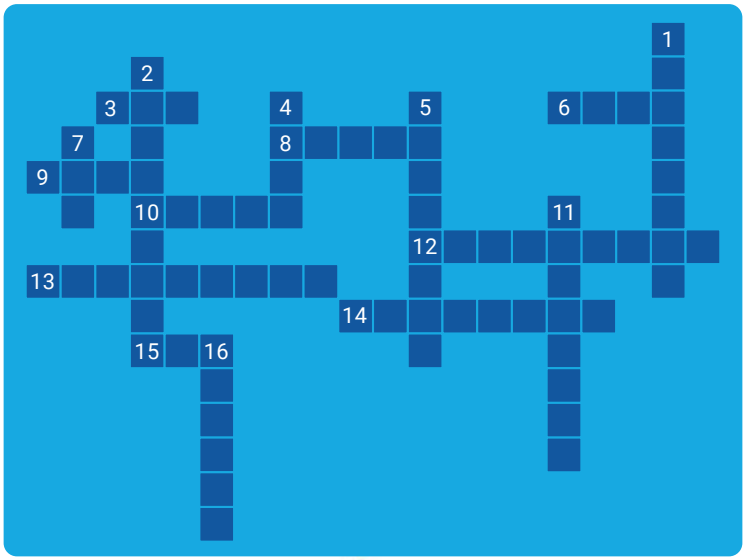
Same steps have to be followed, mark the critical points and intervals with the +ve & −ve sign alternatively starting from right of b.

Shaded part is the solution, which gives −ve value.

So, solution of $(x - a)(x - b) < 0, a < b$ is $a < x < b$

$(x - a)(x - b) \leq 0, \ a < b$

Crossword



Across

3. The product of the slopes of a pair of perpendicular lines is minus _____. [3]

6. The slope of the line with equation $y = 4x + 1$ is _____. [4]

8. The y-intercept of the line with equation $y = 3x + 8$ is _____. [5]

9. The slope of the line with equation $-10x + 2y = 14$ is _____. [4]

10. The slope of a line is the _____ of its rise and run. [5]

12. In the equation $y = -4x + 1$, as x increases, y ____ because slope is negative. [9]

13. The slope of a vertical line is _____. [9]

14. The line with equation $x = 3$ is parallel to y-axis. Therefore, it is a _____ line. [8]

15. The slope of line that passes through the points (2, 4) & (−1, −2) is _____. [3]

Down

1. _____ lines have the same slope. [8]

2. The equation $y = 3x - 2$ is in slope _____ form. [9]

4. A horizontal line has a slope of _____. [4]

5. The equation $4x + 2y + 9 = 0$ is in _____ form. [8]

7. The y-intercept of the line in the equation $5x + 2y = 12$ is _____. [3]

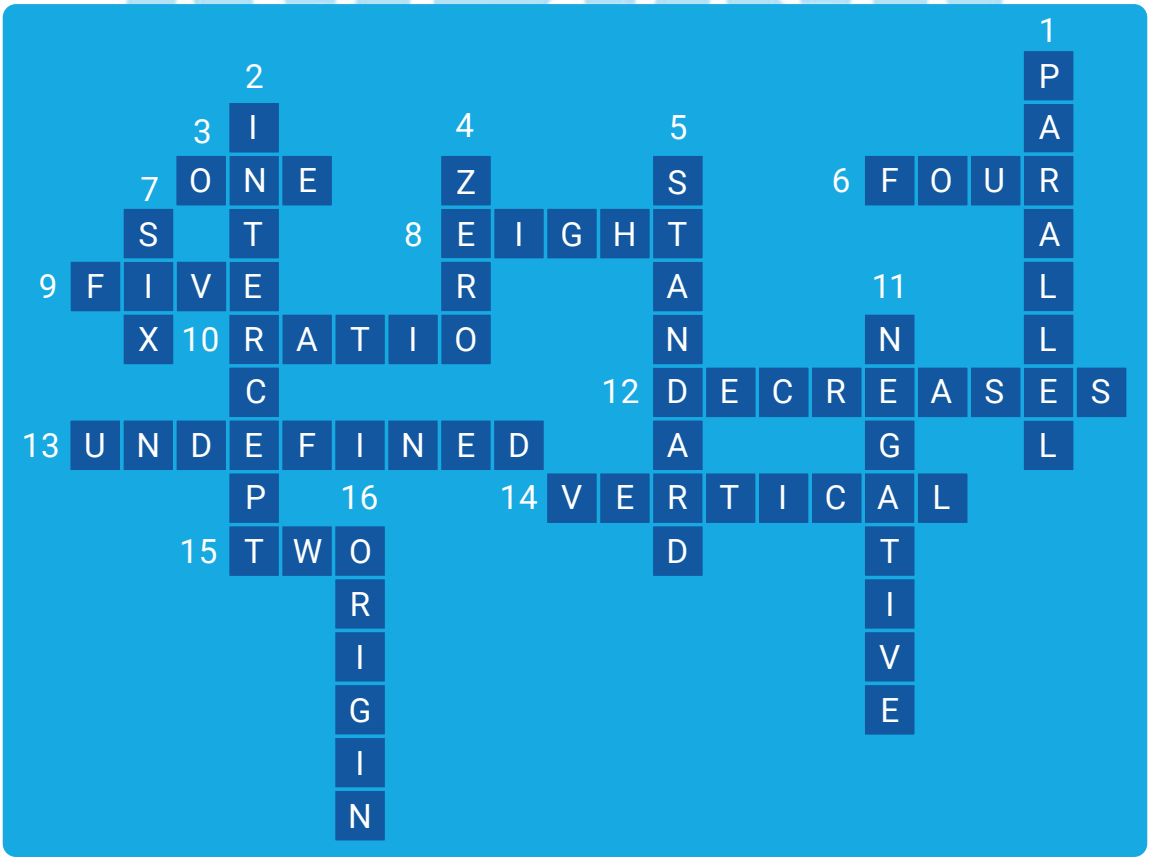
11. A _____ slope indicates that the line falls from left to right. [8]

16. The line with equation $y = -2x$ passes through the _____. [6]

Answer (Do It Yourself)

$a \leq x \leq b$

Answer (Crossword)

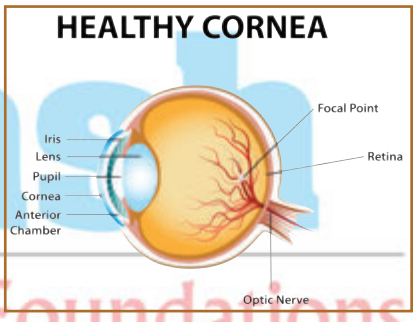


Light: Reflection and Refraction

Real Life Refraction Examples

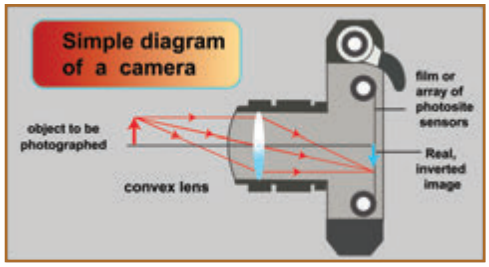
1. The lenses of glasses or contacts are made of a plastic that purposely bends light in specific ways. This is used to improve vision.

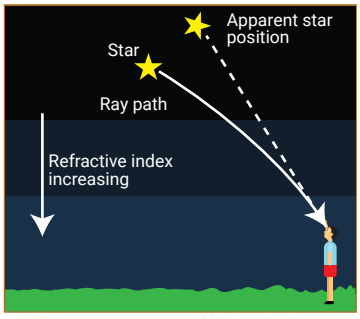
2. Human eye have a lens. Lens or cornea works to refract light onto the retina. The image is then sent through your optic nerve to brain. Without refraction, you wouldn't be able to see.



3. The lens of a telescope or microscope uses a refraction of light to make things look closer than they really are.

4. Cameras use refraction to capture pictures.



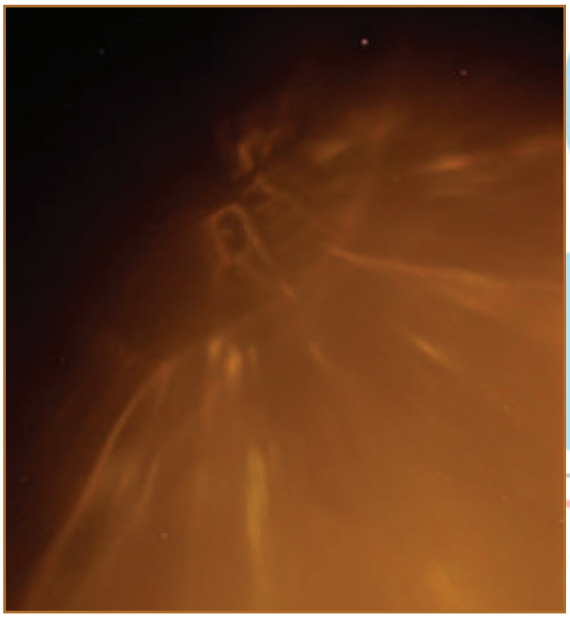


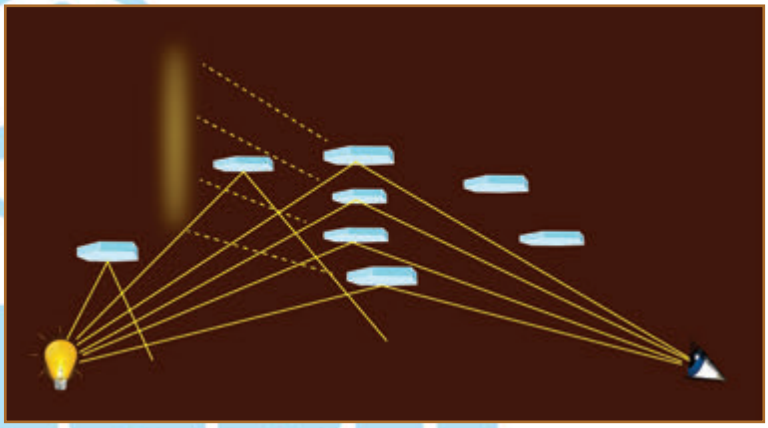
5. The twinkling of stars is due to atmospheric refraction.

A Map of The City in The Sky - Light Pillars

Mia Heikkilä

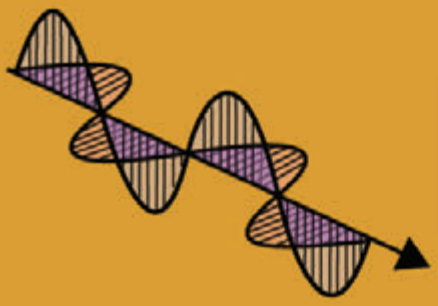
On Jan 13, 2016, by Mia Heikkilä in Eura, Finland shared a photo of reflection of city into the sky. This splendid phenomenon happens due to light pillars which contains the ice crystal suspended in the sky. These ice crystals which has reflecting surface act as a group of tiny mirrors.





Light pillars : Light pillars are optical illusions caused by ice crystals suspended in the air. These crystals can take on a variety of shapes as water freezes, but a common one is a flat, hexagonal crystal. They're heavier than air, so they fall, but if they're the right size (bigger than about 20 microns across, 1/5th the width of a typical human hair), they fall slowly and stay oriented flat, parallel to the ground.

Facts About Light

1. 

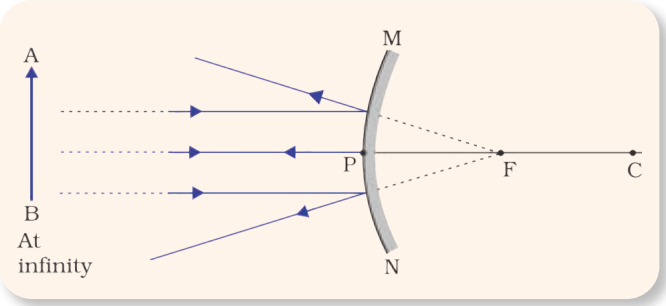
Light is a transverse, non-mechanical electromagnetic wave.

2. Travelling at the speed of light, you could travel around the Earth 7.5 times in a second.

3. 

Angler fish hypnotized its prey with bioluminescent light before devouring it.

4. Sunlight is the ultimate source of energy and responsible for earth's weather system, wind system, photosynthesis by plants, thus essential for life on the earth.



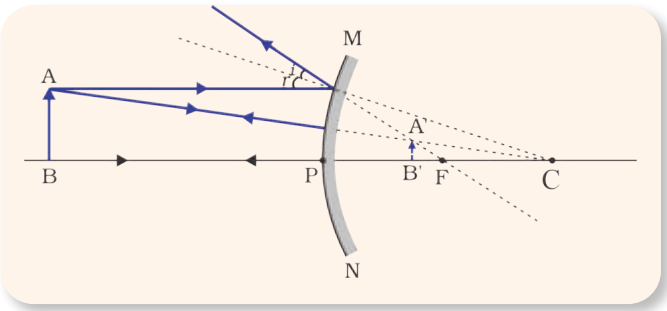
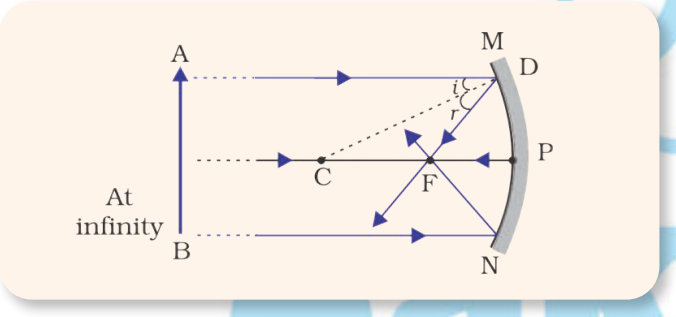
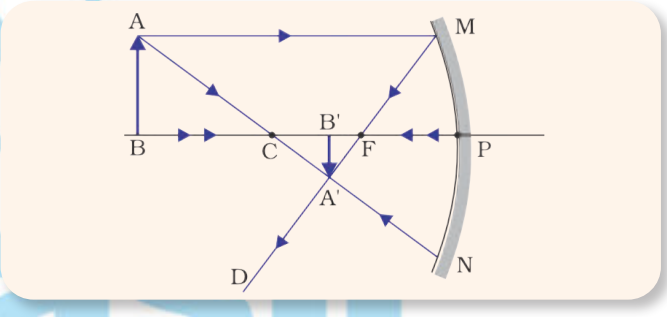
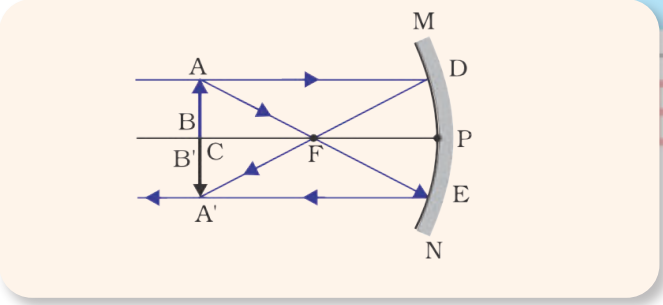
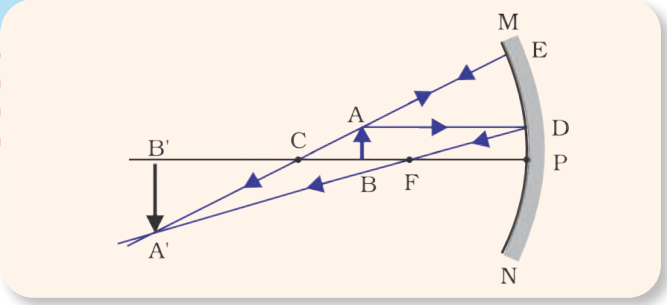


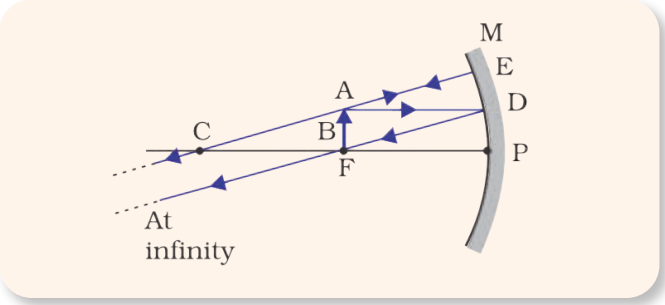
Image formed by a convex mirror











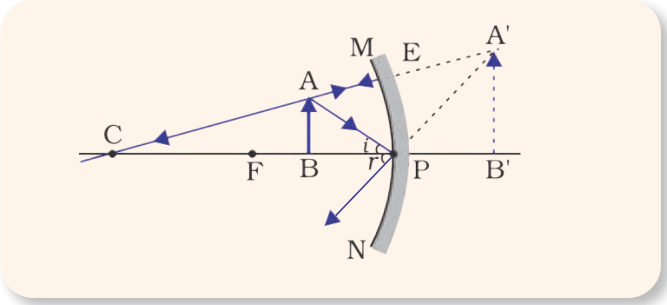
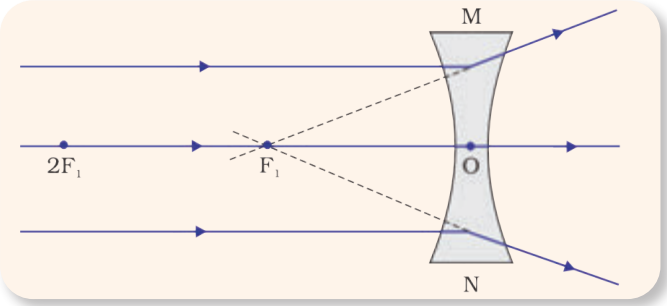


Image formed by a concave mirror



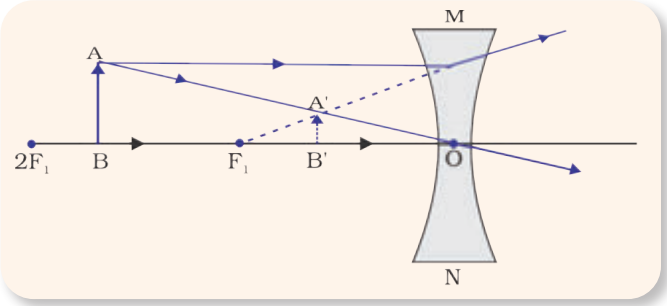
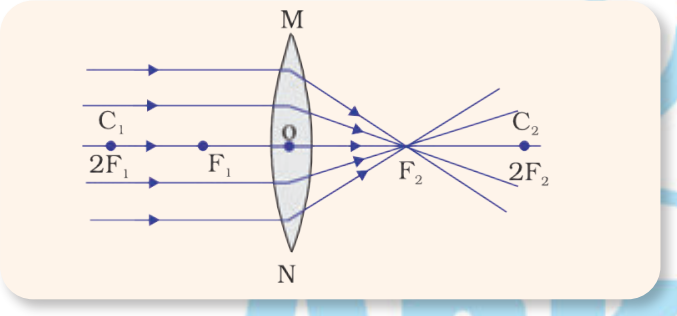
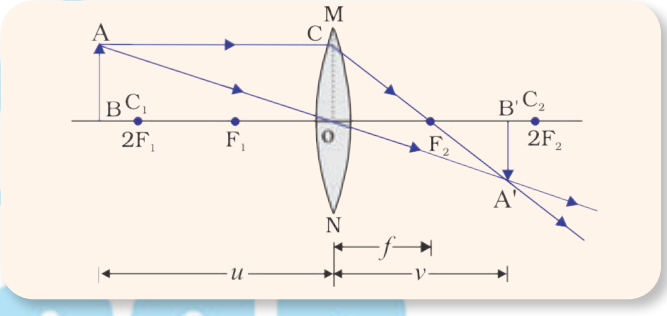
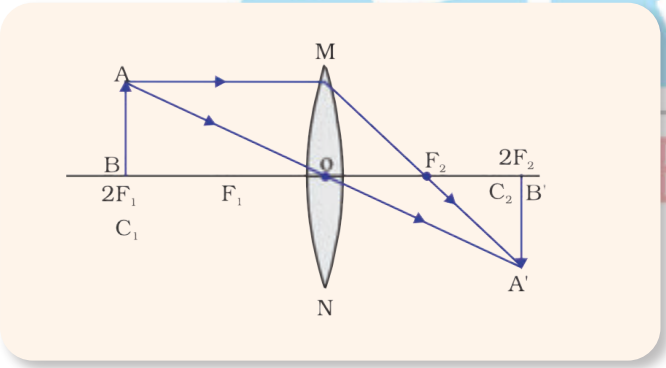
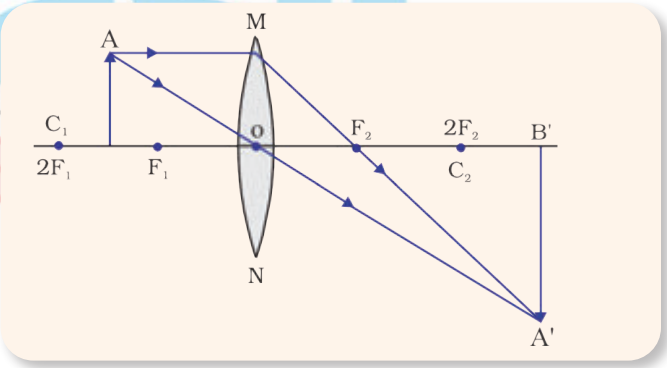


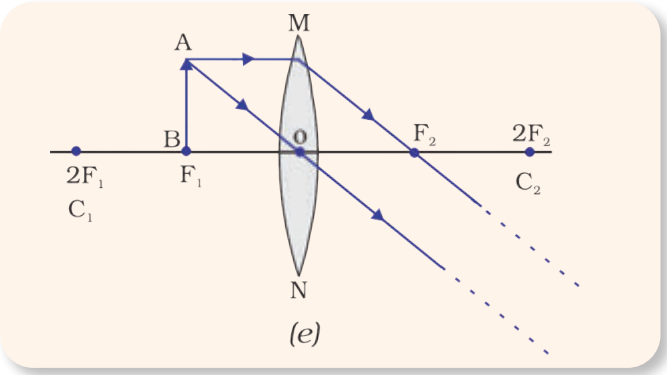
Image formed by a concave lens











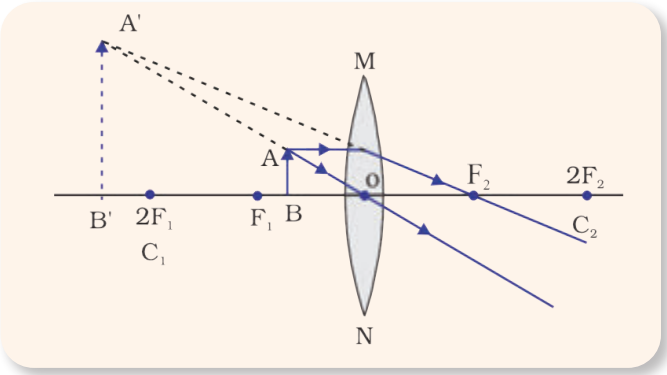


Image formed by a convex lens

Acids, Bases and Salts

Crossword

Across

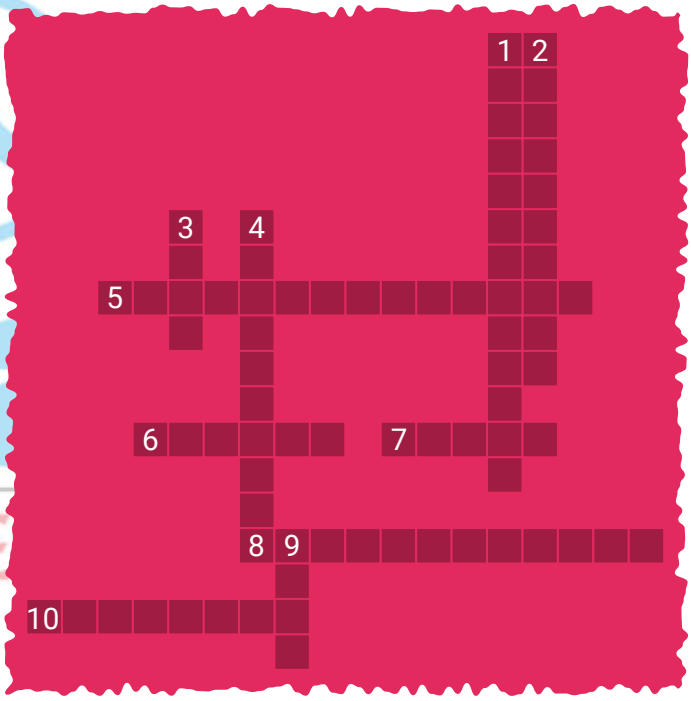
5. Reaction of an acid with base is called _____ reaction. (14)

6. Water soluble base is called _____. (6)

7. Acid present in apple is _____ acid. (5)

8. Strength of an acid is measured in terms of degree of _____. (12)

10. Reaction of a highly reactive metal with acid releases _____ gas. (8)



Down

1. The atmosphere of venus is made up of thick and yellowish clouds of _____. (13)

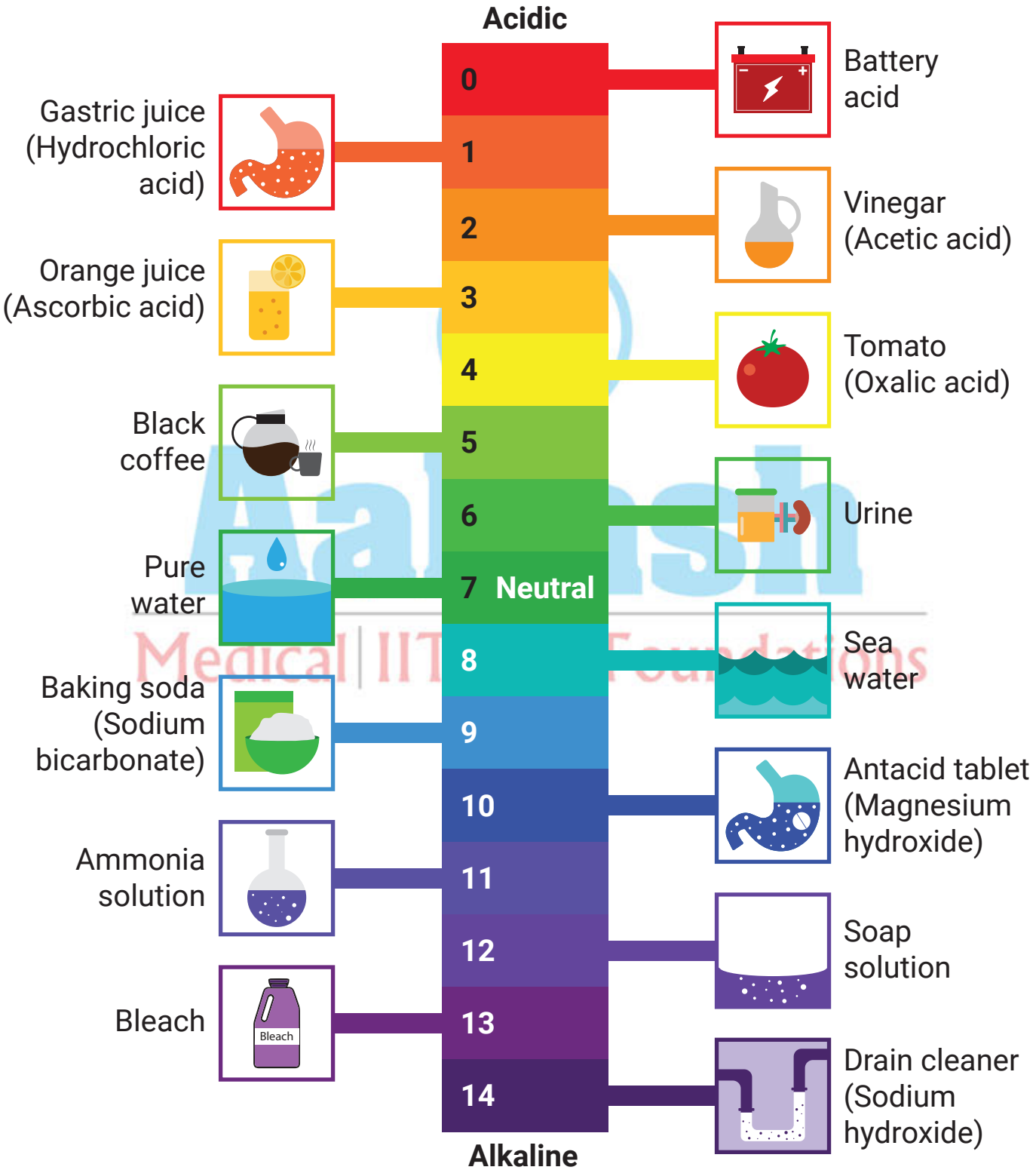
2. Chemicals which are used for the identification of an acid or base are called _____. (10)

3. Acids are _____ in taste. (4)

4. Methanoic acid is present in red ants. It is also known as _____. (10)

9. Aqueous solution of an acid or a base is a good conductor of electricity due to the presence of free _____. (4)

Universal Indicator pH Colour Chart



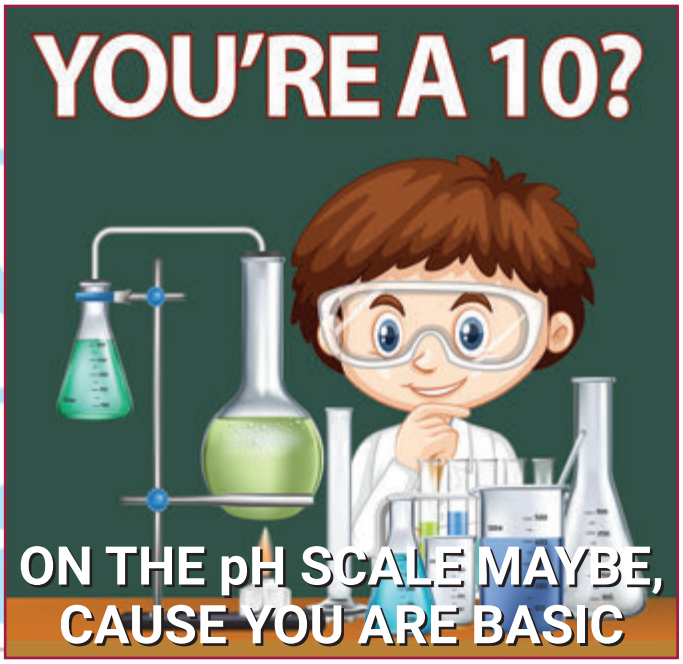
SUMMARY OF ACID-BASE THEORIES

Theory	Acid Definition	Base Definition
Arrhenius Theory	Any substance which releases H^+ ions in aqueous solution.	Any substance which releases OH^- ions in aqueous solution.
Bronsted-Lowry Theory	Any substance which donates a proton (H^+).	Any substance which accepts a proton (H^+).
Lewis Theory	Any substance which can accept an electron pair.	Any substance which can donate an electron pair.

Indicators in Different Medium

Indicator	Original Colour	Acid	Base
Red litmus	Red	No change	Turns blue
Blue litmus	Blue	Turns red	No change
Turmeric	Yellow	No change	Turns reddish brown
Red cabbage juice	Purple	Reddish	Greenish-yellow
Phenolphthalein	Colourless	Colourless	Turns pink
Methyl orange	Orange	Turns red	Turns yellow

FunTime



1

What do you call an acid with an attitude?

2

What do heart burn chewables and formic acid have in common?

3

What is the pH of the most acidic soup?

Quiz Time?

1. What is the nature of a solution that has an excess of H^+(hydrogen) ions?

   A Alkaline
   B Acidic
   C Neutral
   D Basic

2. _____ solution has a pH of 7.

   A An acidic
   B A basic
   C A neutral
   D None of these

3. Distilled water is _____ in nature.

   A Acidic
   B Basic
   C Neutral
   D Salty

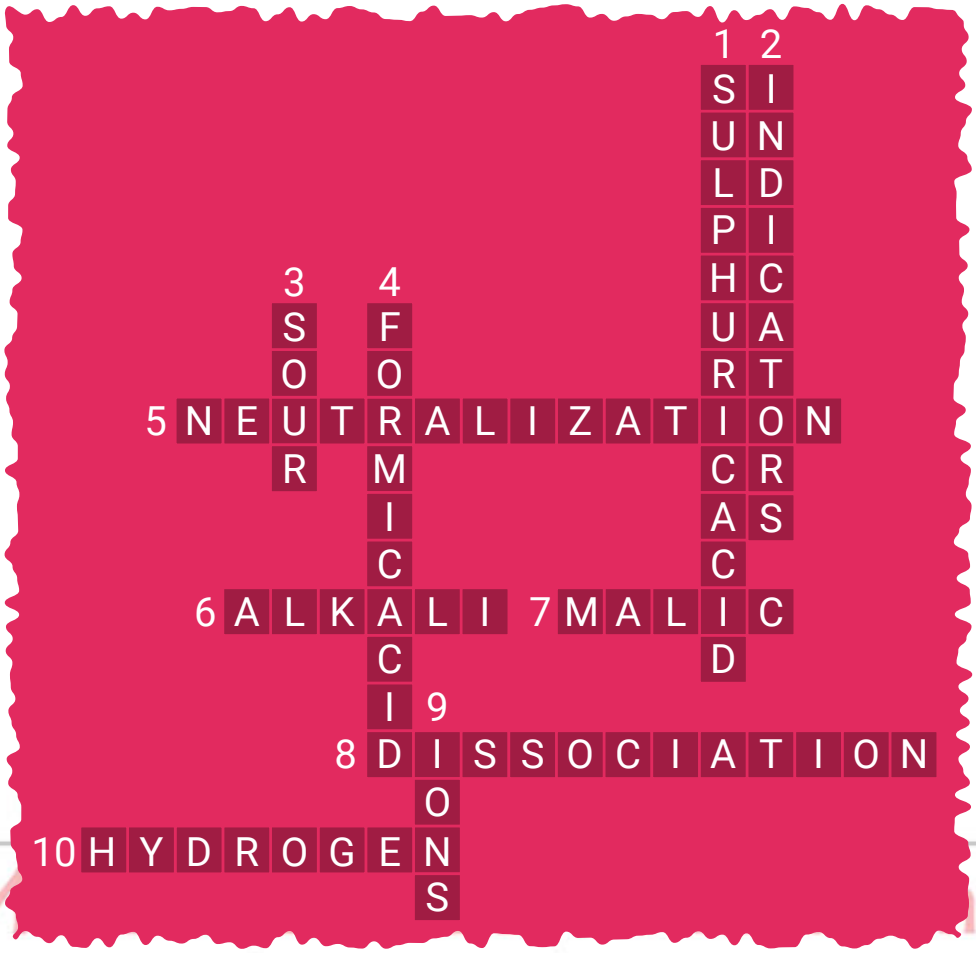
4. _____ feel slippery to touch

   A Acids
   B Bases
   C Salts
   D All

5. An acid-base reaction always produces

   A H_2
   B H_2O
   C NaCl
   D H_3O^+

Answer (Crossword)



Answer (Fun Time)

1. A-Mean-Oh Acid
2. They're both ant acids.
3. pH = 0

Answer (Quiz Time)

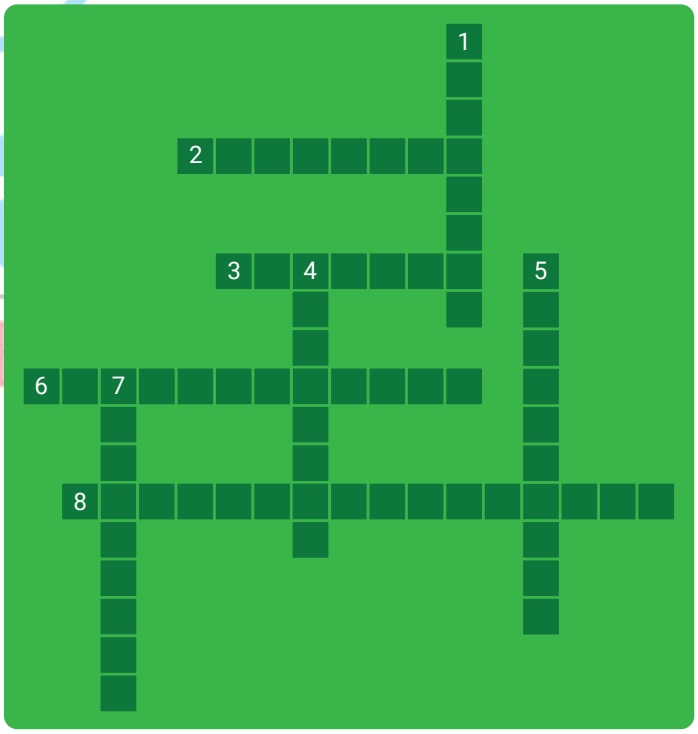
1. Acidic
2. A neutral
3. Neutral
4. Bases
5. H_2O

Control and Coordination

Crossword

Across

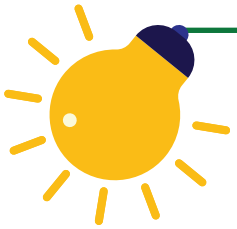
2. Largest part of the brain.
3. Self propagated current that runs along the surface of the nerve fibre for passage of information.
6. Automatic response to a stimulus which is not under the voluntary control of the brain.
8. Cardiac, respiratory and salivary centre.



Down

1. Non-nutrient chemical substances secreted by endocrine gland.
4. Works as both exocrine and endocrine gland.
5. Caused by over secretion of growth hormone after adult size is reached.
7. Part of the brain specialised for hearing, smell, sight and so on.

Interesting Facts



1. People who consume too much alcohol cannot coordinate movement with their senses (Example: cannot touch tip of nose with their fingers, have abnormal walking movements & staggers). This is because alcohol inhibits the activity of cerebellum which results in a loss of ability to coordinate muscular movements.

2. Injury to the vestibular branch of the VIII Cranial Nerve may cause vertigo (a subjective feeling that one's own body or the environment is rotating).

3. We cry when we are very happy because our hypothalamus in our brain can't distinguish the difference between strong happiness and strong sadness.

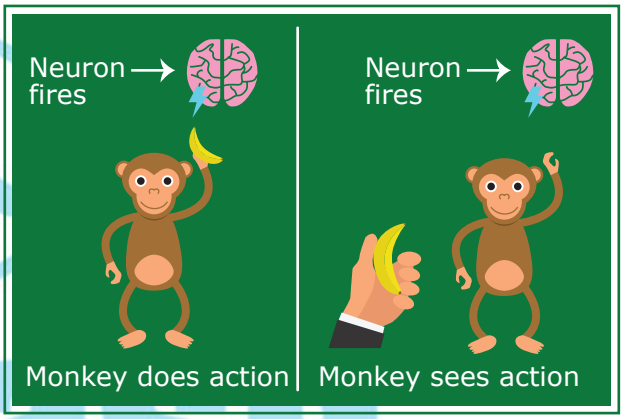
4. Diabetes mellitus (Type-I): It is insulin dependent diabetes mellitus (IDDM) and also known as juvenile onset diabetes because it most commonly develops in people younger than 20. It is an autoimmune disorder in which immune system destroys β cells.

Diabetes mellitus (Type-II): It is non-insulin dependent diabetes mellitus (NIDDM). It is also known as maturity onset diabetes because it occurs later in life. It arises not from shortage of insulin but because of target cells became less sensitive to insulin. Obesity may be a cause & insulin resistance occurs.

5. Babies are capable of reproducing facial expressions, and as adults, we imitate basic behaviour. Laughter can be spread, we can cry while watching a sad movie. It seems like we have the capacity to feel what others feel, empathize with them and understand their feelings. What happens in the brain for this to happen?

The answer is mirror neurons.

Mirror neurons can be defined as a group of neurons that activate when we perform an action or when we see an action being performed. For example, when a chimpanzee sees its mother opening a nut with a rock and then tries to imitate her with another nut. Mirror neurons are related with empathic, social and imitations behaviour. They are a fundamental tool for learning.



Mnemonics

1. **Brain : 4 Lobes**

Olive **P**asta **T**astes **F**abulous: Occipital, Parietal, Temporal, Frontal

2. Mnemonic on the neurotransmitters released:

SAD: Serotonin, **A**cetylcholine , **D**opamine

Choose the Correct Word From the Word Box

Word Box

- Somatic neural system
- Cranium
- Cerebellum
- Hypothalamus
- Cerebrospinal fluid
- Autonomic neural system
- 12 pairs

1

_____ present in the brain and spinal cord serves as a pad to cushion the central nervous system from shock.

2

_____ is called the thermoregulatory centre of the body.

3

_____ is the second largest part of the brain.

4

Brain is protected by the _____ in the skull.

5

_____ of cranial nerves arise from the brain.

6

PNS is divided into two divisions called _____ & _____.

Scratch Your Brain

Q1

Which part of diencephalon is referred to as "relay centre" of the cerebral cortex ?

(A) Hypothalamus

(B) Epithalamus

(C) Thalamus

(D) Cerebellum

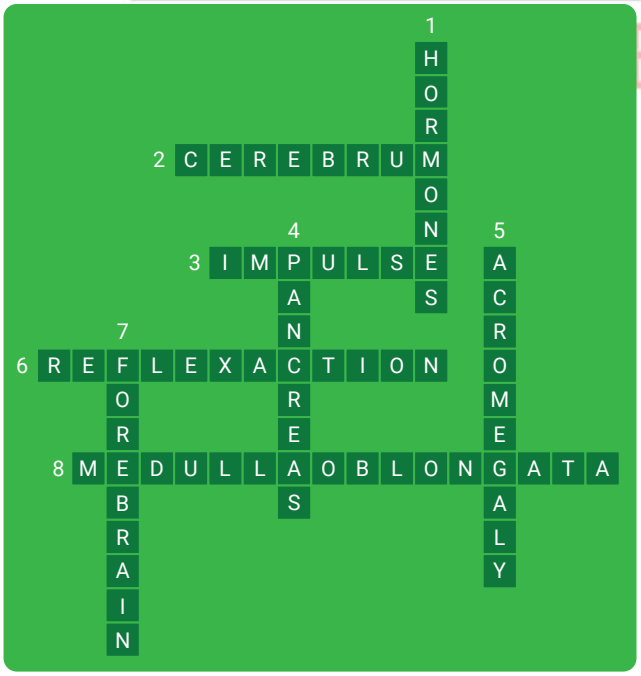
Q2

Which of the following parts of brain is concerned with regulating body posture, equilibrium and coordinated rapid muscular activity?

(A) Diencephalon (B) Pons

(C) Medulla (D) Cerebellum

Answer (Crossword)



Answer (Choose the correct word)

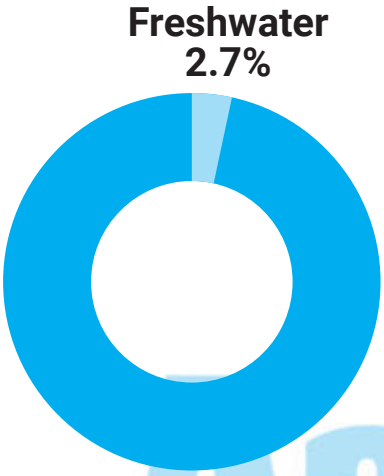
1. Cerebrospinal fluid
2. Hypothalamus
3. Cerebellum
4. Cranium
5. 12 pairs
6. Somatic Neural System and Autonomic Neural System

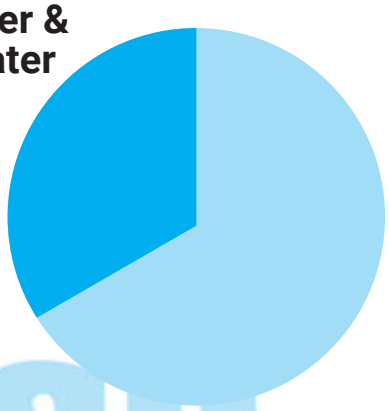
Answer (Scratch Your Brain)

Q.1 (C) **Q.2** (D)

Water Resources

Water



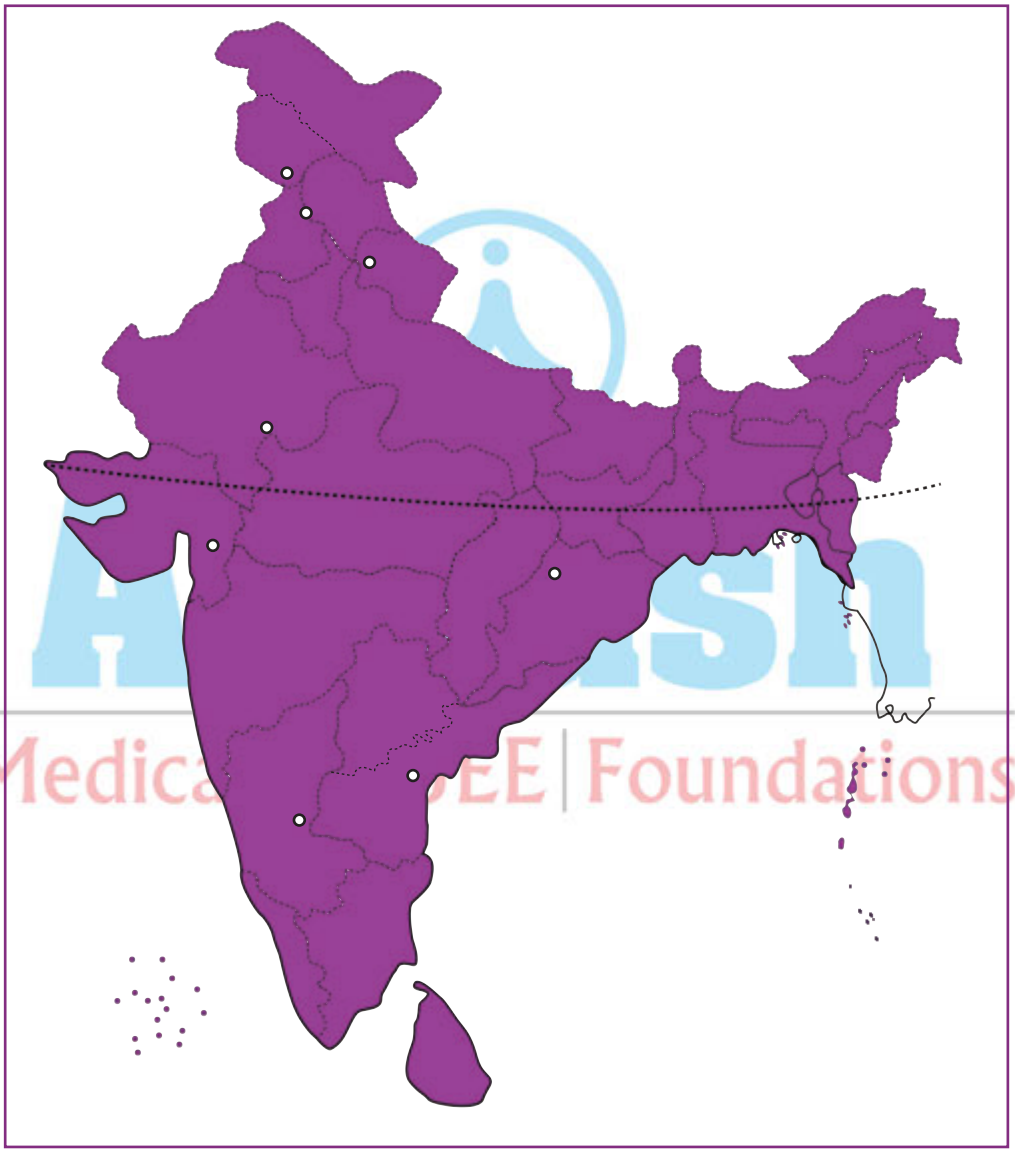


Out of total water on the Earth, **97.3%** is saline water and **2.7%** is freshwater

Out of total freshwater on Earth, **70%** is frozen as ice and less than **30%** is available as Ground water & Surface water

Map Work

Mark the following dams on the map.



1. Salal	**5.** Sardar Sarovar
2. Bhakra Nangal	**6.** Hirakud
3. Tehri	**7.** Nagarjuna Sagar
4. Rana Pratap Sagar	**8.** Tungabhadra

Quiz

1. Rooftop rain water harvesting is compulsory structure in which state ?

(A) Bihar (B) Meghalaya

(C) Tamil Nadu (D) Karnataka

2. Which of the following factor is responsible for gully erosion of soil ?

(A) Wind (B) Snowfall

(C) Rainfall (D) Drought

3. "Renigaon" is famous for

(A) Water Conservation (B) Organic Agriculture

(C) Environment Conservation (D) Chipko Movement

4. Hirakud Dam is situated on the river

(A) Godavari (B) Tapi

(C) Mahanadi (D) Yamuna

5. In which state did Narmada Bachao Andolan, an NGO, launch movement against river valley project?

(A) Madhya Pradesh (B) Maharashtra

(C) Karnataka (D) Gujarat

6. The state prone to flood is

(A) Rajasthan (B) Madhya Pradesh

(C) Assam (D) Delhi

Answer (Quiz)

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

Subject-Verb Agreement

Fundamental Rule of Subject-Verb Agreement:

'Verb should be as per the Number and the Person of its Subject.'

- Singular Subject carries Singular Verb.
- Plural Subject carries Plural Verb.

Ex.:- He goes to his office every day. | We help our parents in everything.

Subject Verb Agreement is of Two Types

Formal Subject Verb Agreement

As discussed, Verb must be singular if the subject is Singular and it must be Plural if the Subject is Plural.

E.g. He is eating lunch.

They are eating lunch.

Notional Subject Verb Agreement

Several Subjects look plural but they are singular or uncountable in meaning. So Singular verbs are used.

E.g. News is good.

For Example:

1. The Professor and the scientist _____ coming. [be]

2. The Professor and scientist _____ coming. [be]

Ans. 1. are 2. is

Explanation : Q 1

- If **both the subjects** have a/an/the, then Plural verb is used.
- There are two subjects.

Explanation : Q 2

- If out of the two nouns, the first one carries article a/an/the, then Singular verb is used.
- There is only one subject here.

3. Rice and Curry _____ my favourite food.

4. Bread and butter _____ our essential commodities.

Ans. 3. is 4. are

Explanation : Q 3

- If two Singular Subjects are connected with 'and' BUT express **SINGLE IDEA** or **ENTITY** then Singular Verb is used.

Explanation : Q 4

- Two singular subjects connected with 'and' showing different nouns carry Plural Verb.

Fill in the blanks using the correct verb form.

1. Many an inkpot _____ (be) empty.
2. The congregation _____ issued its report.
3. Neither we nor he _____ (be) guilty.
4. Riddhi along with her parents _____ (arrive) recently.
5. Not only Kiran but also her cousins _____ (be) responsible for the project.

Answers 1. is 2. has 3. is 4. has arrived 5. are

Alphabetic, Alphanumeric and Pattern Series

Choose the missing term out of the given options.

1 25Z, 24Y, 22W, 19T, ?

(A) 15P (B) 16Q

(C) 16P (D) 17Q

2 Z2J, X4L, V7N, T11P, R16R, ?

(A) T11Q (B) P20R

(C) P22T (D) P21M

3 0B4, 0D8, ?, 2N8, 4V4

(A) 4W6 (B) 1H6

(C) 6H1 (D) 1H5

4 1 __ m 2 n __ __ 3 o o __ __

(A) nmoon (B) mnooo

(C) mnonn (D) mnnoo

5 AB, BA, ABC, CBA, ?, DCBA

(A) ABCE (B) ABCD

(C) BCDA (D) ABDC

Answers

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

5. (B)

NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE

Happy Birthday

Ronald Ross

Born - 13 May 1857
Died - 16 Sep 1932

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

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

& many more...

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

Our Top 100 AIR

Aakashians Create History in International Olympiads

(Classroom Program Students)

IBO 2023

Gold Medalists

34th International Biology Olympiad

Dhruv Advani | **Rohit Panda**

Chirag Falor

IOAA 2019 Gold Medalist

International Olympiad on Astronomy & Astrophysics

Dhiren Bhardwaj

IBO 2021 Silver Medalist

32nd International Biology Olympiad

Anshul

IBO 2021 Silver Medalist

32nd International Biology Olympiad

Amritansh Nigam

IBO 2022 Silver Medalist

33rd International Biology Olympiad

Prachi Jindal

IBO 2022 Silver Medalist

33rd International Biology Olympiad

Tanishka Kabra

IChO 2022 Silver Medalist

54th International Chemistry Olympiad

420 Classroom Students Qualified in NSEs* 2024-25

1484 Students Scored Above MAS

(Group A & B)	(Group A & B)	(Group A & B)	(Group A & B)	
49 NSEA*	229 NSEB*	70 NSEC*	38 NSEP*	34 NSEJS*

Aakashians Qualified for INO-2025

Krishna Agrawal
NSEA | NSEP | NSEC

Mohit Shekher Shukla
NSEA | NSEP | NSEC

Utkarsh Awadhiya
NSEB | NSEP | NSEC

Rupayan Pal
NSEC | NSEB | 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...

* **RMO** -Regional Mathematical Olympiad | **INMO**-Indian National Mathematical Olympiad | **IOQM -** Indian Olympiad Qualifier in Mathematics | **NSO** - National Science Olympiad
IMO - International Mathematics Olympiad | **INOs** - Indian National Olympiads | **OCSCs** - Orientation cum Selection Camps | **IMOTC** - International Mathematical Olympiad Training Camp