



Aakash

Medical | IIT-JEE | Foundations

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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

EXPLORE

- | | |
|-------------------------------------|-------|
| 1. Linear Equations in One Variable | 1-7 |
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| 3. Synthetic Fibres and Plastics | 12-15 |
| 4. Microorganisms - Friend and Foe | 16-23 |
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Linear Equations in One Variable

Algebraic Equation

1 It is equality involving variables and constants

2 For example

$4x + 5$	=	$3x - 2$
Left Hand Side (LHS)	Equality	Right Hand Side (RHS)

3 The value of the variable which satisfies the equation is its solution

Linear Equation in One Variable

An algebraic equation with only one variable having highest power as one



Solving Linear Equation in One Variable

Type-1

Variable on one side and number on the other side. For e.g. $4x + 5 = 9$

Balancing Method

$4x + 5 = 9$; write the equation

$4x + 5 - 5 = 9 - 5$; Subtracting 5 on both sides, hence not disturbing the balance.

$4x = 4$; Simplifying

$\frac{4x}{4} = \frac{4}{4}$; Dividing by 4 on both sides, hence not disturbing the balance

$x = 1$; Simplifying

Transposing Method

In this method, the numbers are moved from one side of equation to other side such that + changes to -, - changes to +, \times changes to \div and \div changes to \times . The changes are as follows.

For e.g. $4x + 5 = 9$

Taking 5 to RHS

$$4x = 9 - 5$$

$$4x = 4$$

Taking 4 to RHS

$$x = \frac{4}{4}$$

$$x = 1$$

Type-2

Variable and number on both sides.

For e.g. $2x - 3 = x + 2$

- a** These type of equations can be solved by either of the two methods mentioned.
- b** The rules of transposing numbers are also applicable for variables

Taking 3 to RHS

$$2x = x + 2 + 3$$

$$2x = x + 5$$

Taking x to LHS

$$2x - x = 5$$

$$x = 5$$

Equations Reducible to Simpler Form

Equations of type $\frac{4x + 3}{3x + 7} = \frac{3}{2}$ [$x \neq -7/3$]

are not linear equations but can be reduced to linear equation by cross multiplication

$$\frac{4x + 3}{3x + 7} = \frac{3}{2}$$

$$2(4x + 3) = 3(3x + 7)$$

$$8x + 6 = 9x + 21$$

And this can be further solved by transposition

$$8x = 9x + 21 - 6$$

$$8x = 9x + 15$$

$$-15 = 9x - 8x$$

$$x = -15$$

Quiz Time

Q.1

If the sum of two consecutive numbers is 11, find the numbers.

Q.2

The sum of a two-digit number and the number obtained by reversing its digits is 121. Find the number if its units place digit is 5.

Q.3

The numerator of a rational number is less than its denominator by 3. If the numerator becomes three times and the denominator is increased by 20, the new rational number becomes $\frac{1}{8}$. Find the original number.

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Q.4

A fruit seller buys some oranges at the rate of ₹ 5 per orange. He also buys an equal number of bananas at the rate of ₹ 2 per banana. He makes a profit of 20% on oranges and a profit of 15% on bananas. In the end, he sold all the fruits. If he earned a profit of ₹ 390, find the number of oranges.

Answer (Quiz Time)

A.1

Let the two consecutive numbers be x and $x + 1$

As per the conditions, we have

$$x + x + 1 = 11$$

$$\Rightarrow 2x + 1 = 11$$

$$\Rightarrow 2x = 11 - 1 \text{ (Transposing 1 to RHS)}$$

$$\Rightarrow 2x = 10$$

$$x = 5$$

Hence, the required numbers are 5 and $5 + 1 = 6$

A.2

Units place digit is given as 5

Let x be the tens place digit

Number formed = $10x + 5$

Number obtained by reversing the digits = $5 \times 10 + x = 50 + x$

As per the given conditions, we have

$$\Rightarrow 5 + 10x + 50 + x = 121$$

$$\Rightarrow 11x + 55 = 121$$

$$\Rightarrow 11x = 66$$

$$\Rightarrow x = 6$$

Thus, the tens place digit = 6

Hence, the required number = $5 + 6 \times 10 = 5 + 60 = 65$

A.3

Let the denominator be x .

then the numerator will be $x - 3$

Thus, the given rational number = $\frac{x - 3}{x}$

By the given condition, we have $\frac{3(x - 3)}{x + 20} = \frac{1}{8}$

$$\Rightarrow \frac{3x - 9}{x + 20} = \frac{1}{8}$$

By cross multiplication, we have

$$8(3x - 9) = 1(x + 20)$$

$$24x - 72 = x + 20$$

$$24x - x = 20 + 72 \text{ (Transposing } x \text{ and } -72)$$

$$23x = 92$$

$$\frac{23x}{23} = \frac{92}{23} \text{ (Dividing both sides by 23)}$$

$$x = \frac{92}{23}$$

$$\Rightarrow x = 4$$

Therefore, the original number = $\frac{x - 3}{x} = \frac{4 - 3}{4} = \frac{1}{4}$

A.4

Let the number of oranges and number of bananas bought by him be x

Cost of x oranges at the rate ₹ 5 per orange = ₹ $5x$

Cost of x bananas at the rate of ₹ 2 per banana = ₹ $2x$

$$\text{Profit earned on oranges} = \frac{20}{100} \times 5x = ₹ x$$

$$\text{Profit earned on bananas} = \frac{15}{100} \times 2x = ₹ \frac{3}{10} x$$

As per the conditions, we have

$$x + \frac{3}{10} x = 390$$

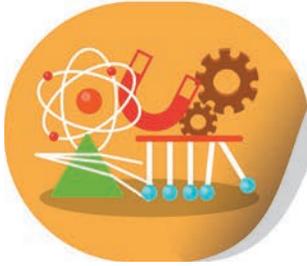
$$\Rightarrow \frac{10x + 3x}{10} = 390$$

$$\Rightarrow \frac{13x}{10} = 390$$

$$\Rightarrow x = 390 \times \frac{10}{13} \quad \left(\text{Transposing } \frac{13}{10} \text{ to RHS} \right)$$

$$\Rightarrow x = 30 \times 10 = 300$$

Hence, the number of oranges = 300



Force and Pressure

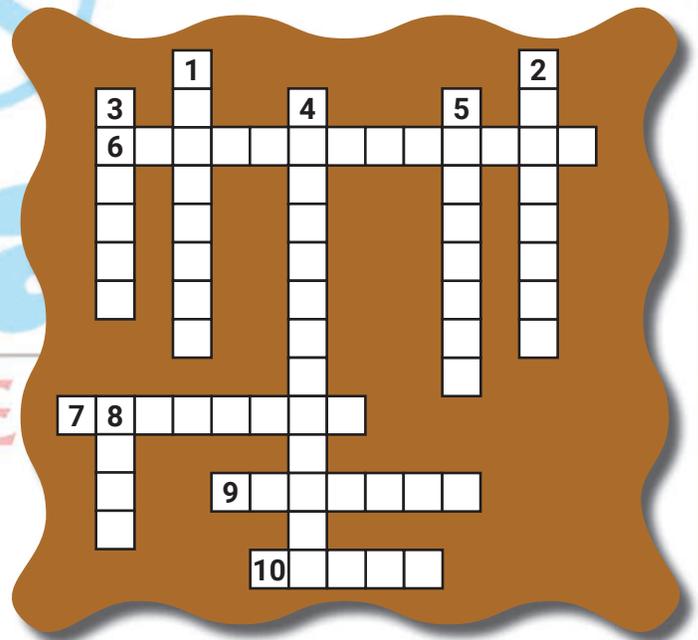
Crossword

ACROSS

- 6 Force between two charged objects. [13]
- 7 The force acting between two poles of a magnet. [8]
- 9 Force applied by direct touching an object. [7]
- 10 Collective term used for liquids and gases. [5]

DOWN

- 1 Force applied per unit area. [8]
- 2 The force necessary for our smooth motion. [8]
- 3 Unit of force. [6]
- 4 Force with which Earth revolves around the sun. [13]
- 5 The net resultant of forces acting on an object is zero, the forces are [8]
- 8 Pressure depends upon thrust and [4]



Group Them Accordingly To Application

Knife, Camel's foot, Saw, Wide bag pad, Iron nail , Spade, Studs on shoes, Skies on snow, Injection needle, High heel, More tyre truck, Railway track on wooden block

S.No.	Pressure is more area is less	Pressure is less area is more
1.		
2.		
3.		
4.		
5.		
6.		
7.		

Answer (Group Them Accordingly To Application)

S.No.	Pressure is more area is less	Pressure is less area is more
1.	Knife	Camel's foot
2.	Saw	Wide bag pad
3.	Iron nail	Skies on snow
4.	Spade	More tyre truck
5.	Studs on shoes	Railway track wooden block
6.	Injection needle	
7.	High heel	

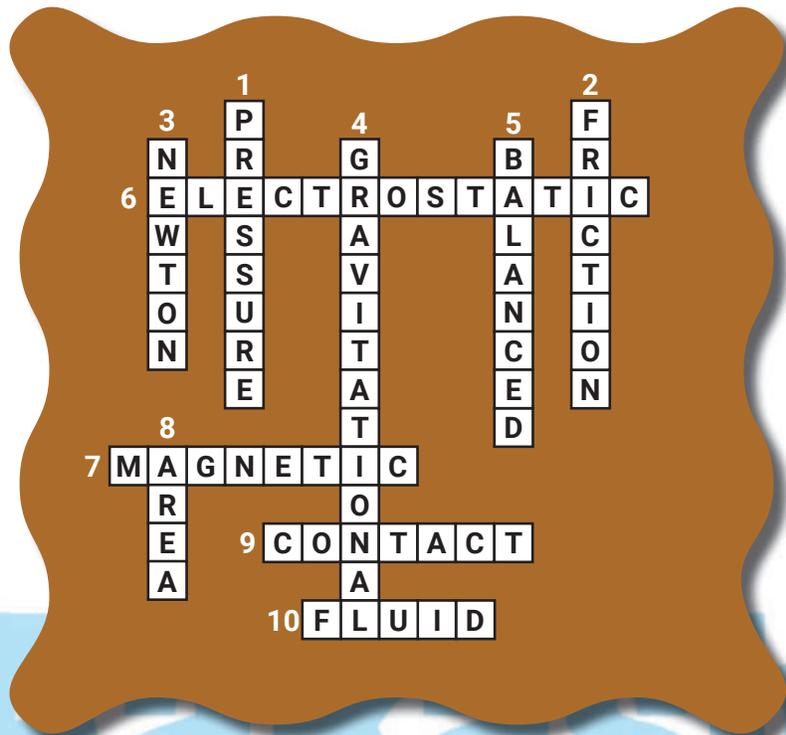


Match the following

A 	1 Drag force
B 	2 Friction force
C 	3 Magnetic force
D 	4 Buoyancy force
E 	5 Gravitational force
F 	6 Tension force
G 	7 Spring force

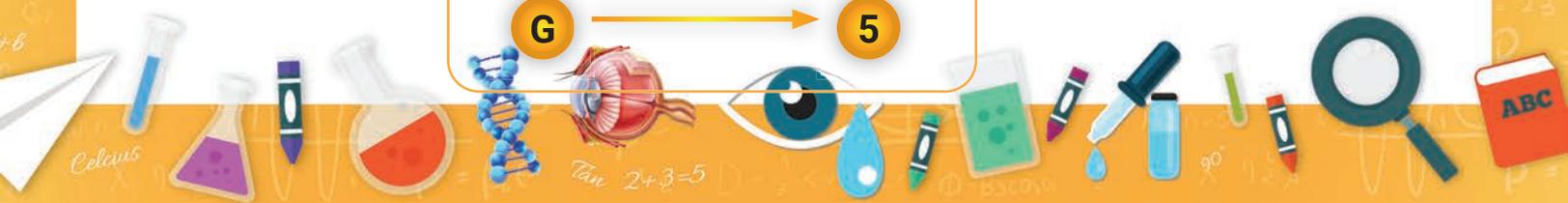


Answer (Crossword)



Answer (Match the following)

A	→	2
B	→	3
C	→	7
D	→	6
E	→	1
F	→	4
G	→	5





Synthetic Fibres and Plastics

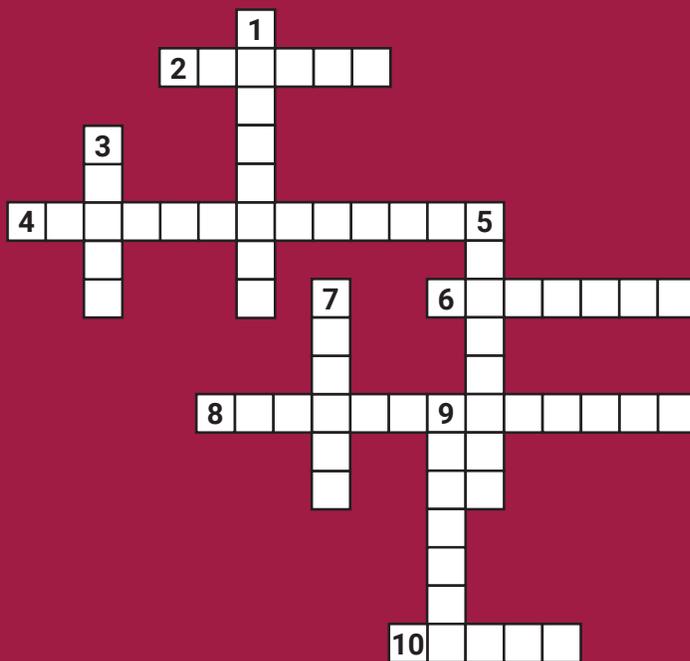
Crossword

ACROSS

- 2 An example of branched chain polymer is _____. [6]
- 4 Heating a mixture of raw rubber with filler material to make it stiffer is called _____. [13]
- 6 Fabric which is prepared by the blending of polyester and cotton is _____. [7]
- 8 Plastics that can be moulded only once and can not be reshaped again are called _____ plastics. [13]
- 10 Synthetic fibre which can be used in place of wool to make sweater in winter season is _____. [5]

DOWN

- 1 Plastic that is most commonly used for making handles of utensils and electrical fittings is _____. [8]
- 3 Fully synthetic fibre that is used for making bristles of toothbrush is _____. [5]
- 5 An example of synthetic rubber is _____. [8]
- 7 Terylene is a popular polyester which was invented in Britain but in the USA it was termed as _____. [6]
- 9 For the hardening of rubber _____ is used. [7]



Facts About Synthetic fibres and Plastics

1

Silk fibre obtained from silk worm was discovered in China and China is the largest producer and exporter of silk in the world.

2

World's plastic production has increased exponentially from 2.1 million tonnes in 1950 to 147 million tonnes in 1993 to 406 million tonnes by 2015.

3

Nylon was the first fully synthetic fibre and was discovered in 1931. Nylon was first used commercially for making toothbrush bristles. It also replaced silk fibre at different times like in parachutes used in World War-II.

4

Acrylic fibres are polymers made of monomeric unit acrylonitrile or vinyl cyanide. Acrylics can be sold at a fraction of the cost of the natural fibre and they offer better light resistance, mildew resistance, and resistance to attack by moths.

5

Countries like Canada, U.S. and UK export plastic waste to various countries in Asia and Africa, offloading their trash problem to other communities.

6

Only about 9% of total plastic used is recycled, about 12% is burned and the remaining 79% ends up in landfills or remains in the environment.



A Musical Instrument Out of Plastic Rubbish

In 2018, Shady Rabab from Egypt won the United Nations Environment Programme's (UNEP) prestigious Young Champion of the Earth Prize for spotting an opportunity to get children off the streets and stop plastic from being wasted. He started the Garbage Conservatoire, touring with his band of children and their instruments made from plastic waste showing the world that it's not waste, until it is wasted.



Shady Rabab with a flute made from an old plastic bottle.

Photo by UNEP

Quiz Time

- Q.1** Which of the following materials is a mixture of two fibres ?
(a) Jute (b) Polywool (c) Polyester (d) Nylon
- Q.2** _____ is an example of natural polymer.
(a) Rayon (b) Cellulose (c) Nylon (d) Acrylic
- Q.3** Terylene is a popular form of
(a) Polyester (b) Monomer (c) Plastic (d) Nylon
- Q.4** Which of the following is a natural fibre ?
(a) Wool (b) Terylene (c) PVC (d) Dacron
- Q.5** Name of the polymer made up of a large number of glucose units is
(a) Protein (b) Fructose (c) Cellulose (d) Polyester

Answer (Crossword)



Answer (Quiz Time)

Q.1 (b) Polywool

Q.2 (b) Cellulose

Q.3 (a) Polyester

Q.4 (a) Wool

Q.5 (c) Cellulose





Microorganisms- Friend and Foe

Interesting Facts

SOME BACTERIA TALK.....

Bacteria communicate among each other with the help of electrical signals. In this way, a single-celled bacterium can act as a multicellular organism. A colony of billions of such cells can communicate and work together like a **“Microbial Brain”**. This is especially true for biofilms (a community of micro-organisms irreversibly attached to a surface), which are collections of bacteria; these build up on rocks in rivers. They can also build nanotubes to bridge between different cells to exchange small molecule such as proteins.



ARE MICROBES ZONOTIC?

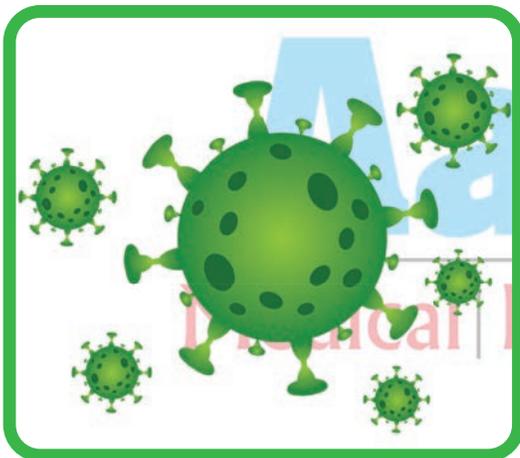
Zoonotic means diseases transmitted from animals, and yes, they are passed between humans and animals. If you sample microbiomes of people who live in the same house, if you have a dog, everyone in the house has more microbiomes in common because everyone is loving on the dog.



Interesting Facts

HOW QUICKLY CAN MICROBES REPRODUCE?

They are fast, but some of them are really slow. *E. coli* reproduces every 20 minutes whereas *Mycobacterium tuberculosis* reproduces very slow. That is why TB tests take a lot longer than your usual *E. coli* test.



VIRUSES ARE BEAUTIFUL PHYSICAL OBJECTS

Despite their destructiveness as disease causing agents, viruses are very beautiful as physical objects when seen under the microscope. "Viruses have higher symmetry than any other thing in nature," Gelbart said. Most viruses have symmetry, like an old-fashioned soccer ball with its 12 black pentagons and 20 white hexagons.

TYPHOID MARY

A classic case in medicine, is that of Mary Mallon nicknamed Typhoid Mary. She was a cook by profession and was a typhoid carrier who continued to spread typhoid for several years through the food she prepared.



Match the following

With the Scientists match the one which is related to their respective discovery

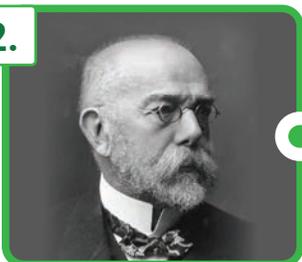
1.



A



2.



B



3.



C



4.



D

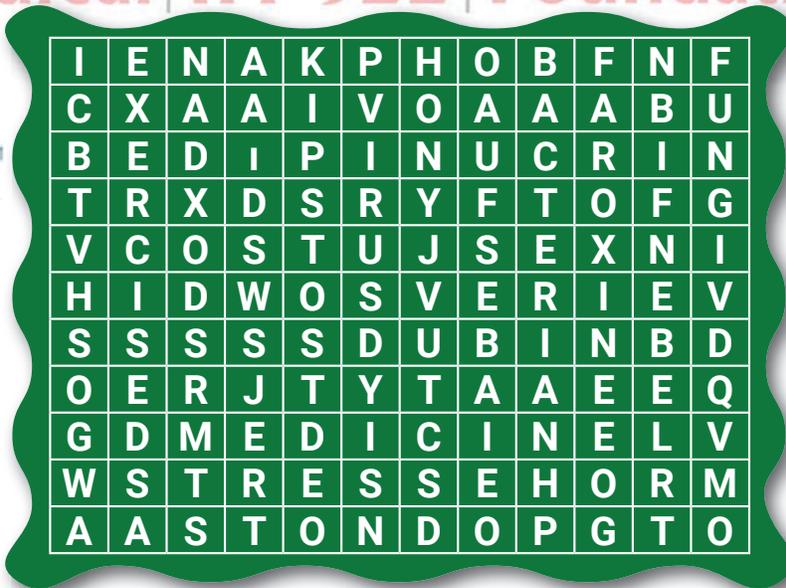
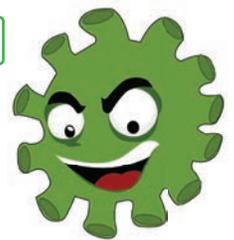


Classification of Cocci

NAME	DESCRIPTION	ILLUSTRATION
<i>Coccus</i> (pl. <i>Cocci</i>)	Single coccus	
<i>Diplococcus</i> (pl. <i>Diplococci</i>)	Pair of two cocci	
<i>Tetrad</i> (pl. <i>Tetrads</i>)	Grouping of four cells arranged in a square	
<i>Streptococcus</i> (pl. <i>Streptococci</i>)	Chain of cocci	
<i>Staphylococcus</i> (pl. <i>Staphylococci</i>)	Cluster of cocci	

Health word search using given images

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Fill in the blanks using word box

Microorganism used to make curd is _____.

1.

The process of conversion of sugar into alcohol is called _____.

2.

_____ is used in the baking industry.

3.

_____ was the first antibiotic discovered by Alexander Fleming.

4.

_____ helps in nitrogen fixation in the soil.

5.

_____ is the vaccine used for tuberculosis.

6.

WORD BOX

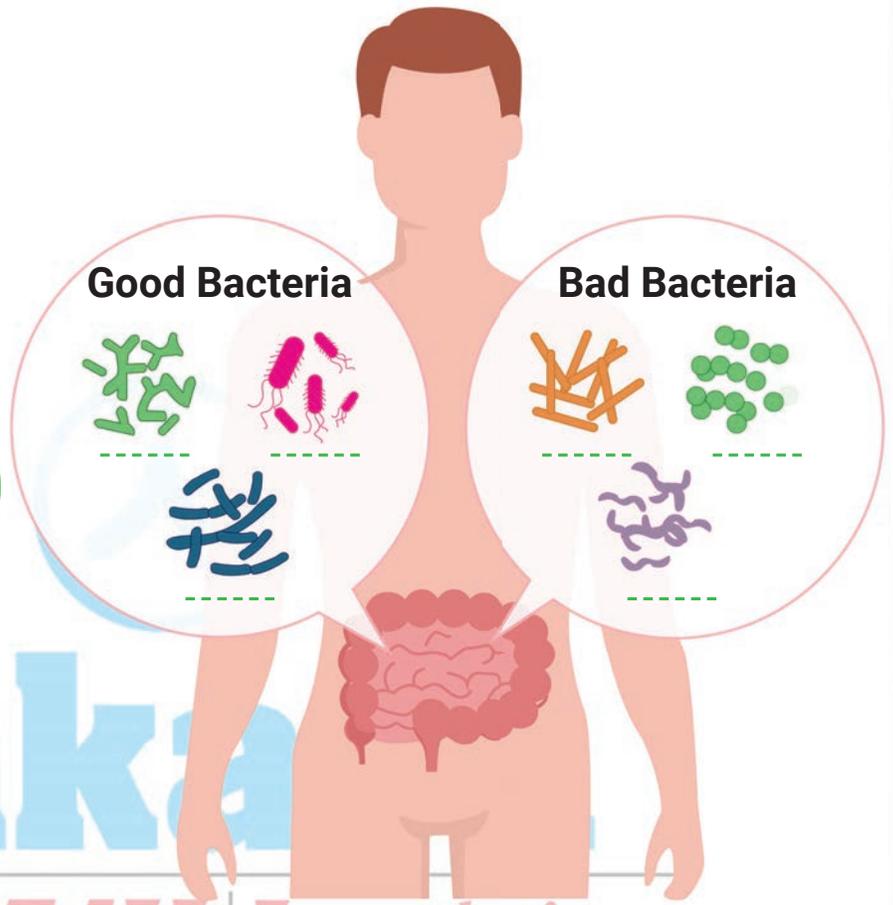
- BCG vaccine
- Yeast
- Fermentation
- Penicillin
- *Rhizobium*
- *Lactobacillus*



Quiz Time



Guess the names of the Good bacteria and Bad bacteria from the diagram given:



Answer (Match the following)

1.	→	C
2.	→	A
3.	→	D
4.	→	B



Answer (Health word search using given images)



1. EXERCISE



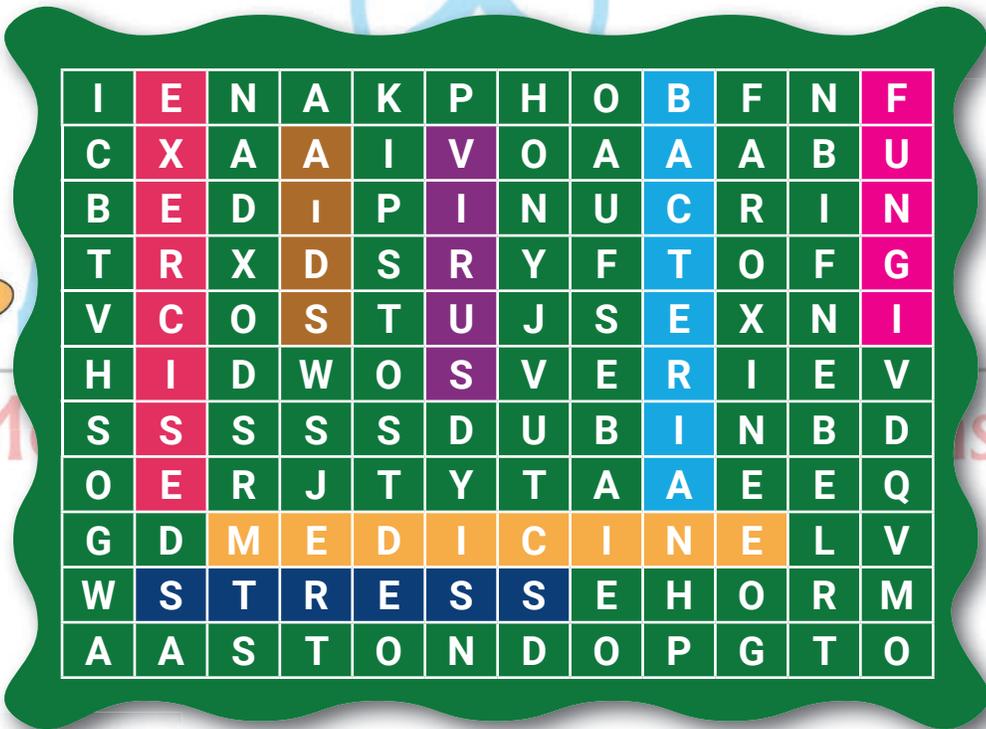
2. MEDICINE



3. VIRUS



7. STRESS



4. AIDS



6. BACTERIA



5. FUNGI



Answer (Fill in the blanks using word box)

Lactobacillus

1.

Fermentation

2.

Yeast

3.

Penicillin

4.

Rhizobium

5.

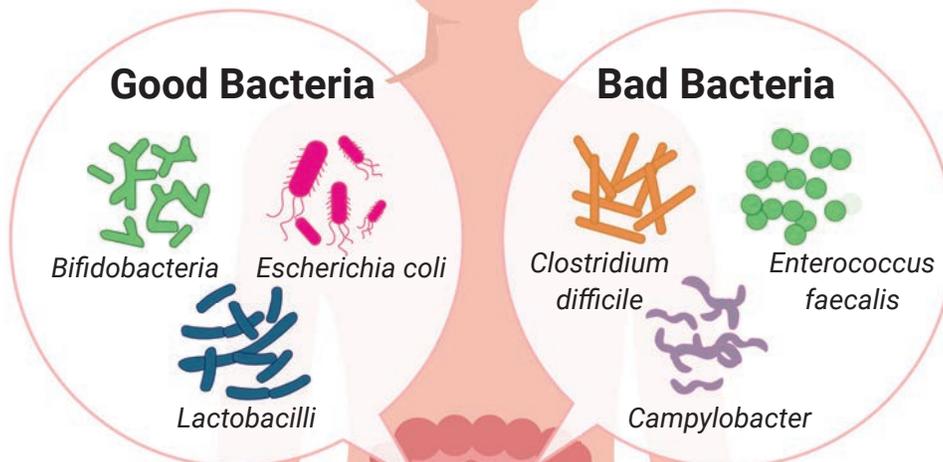
BCG vaccine

6.

Answer (Quiz Time)

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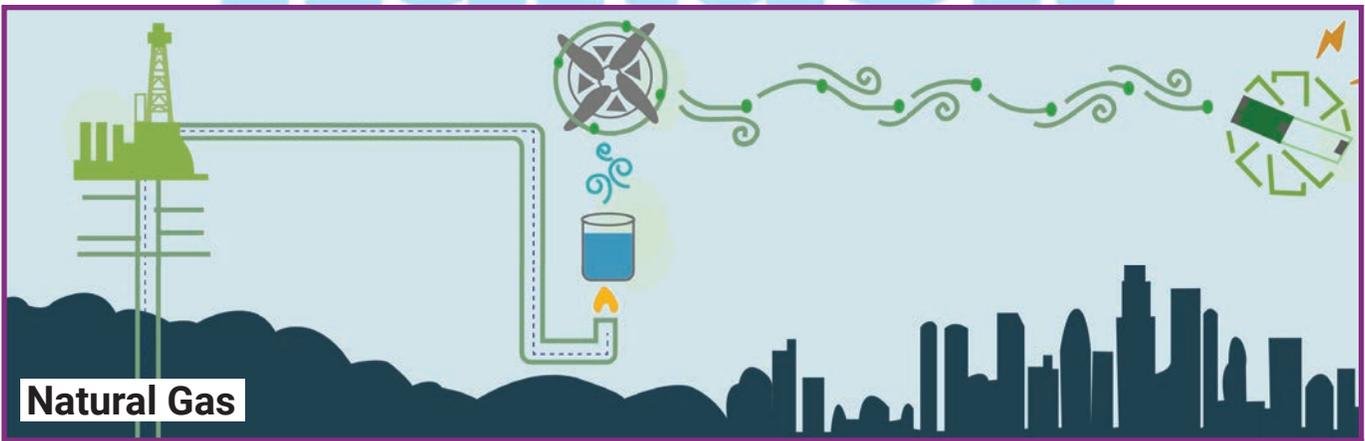
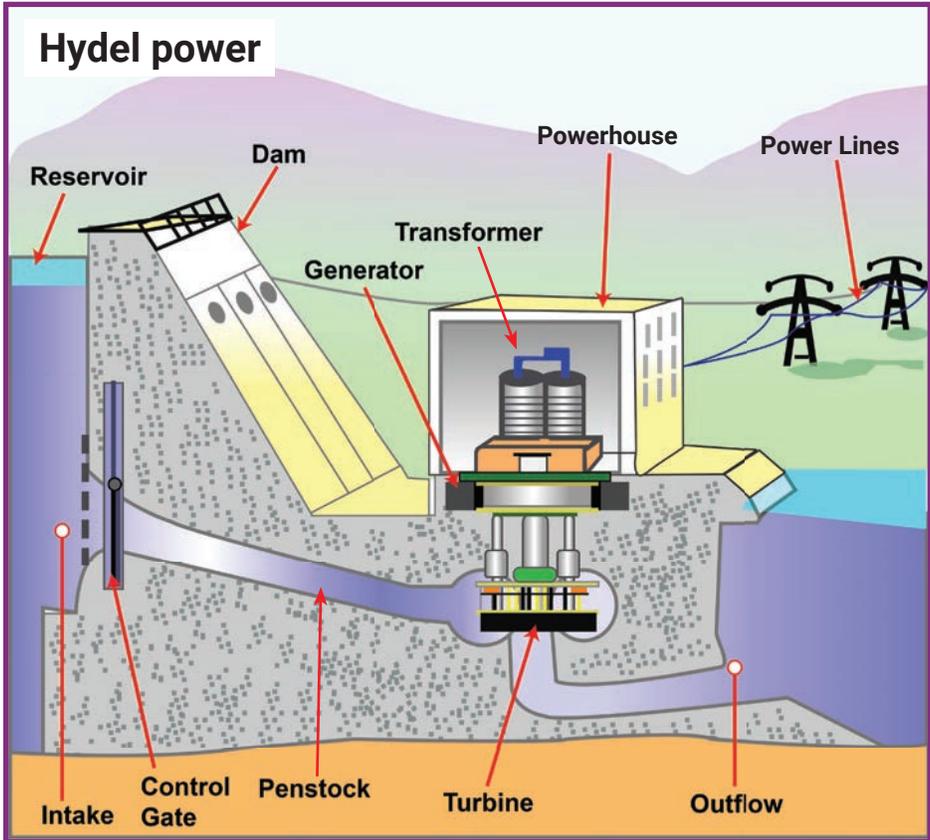


Mineral and Power Resources

Conventional Sources of Energy

- Firewood
- Coal
- Petroleum
- Hydel Power
- Natural Gas





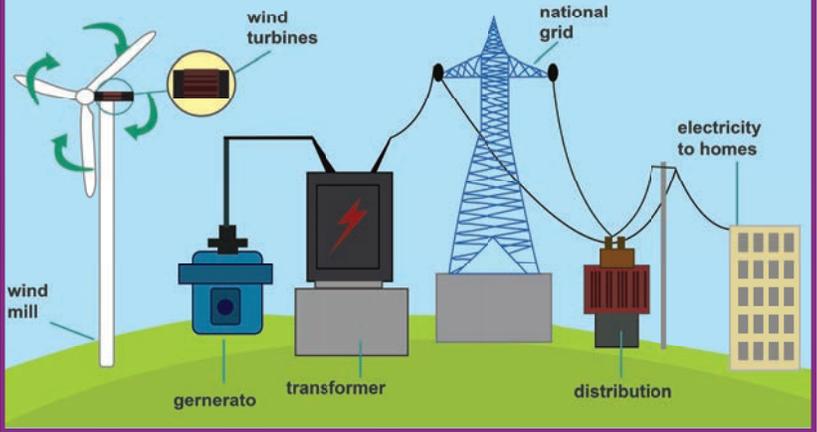
Non-conventional Sources of Energy

- Solar
- Wind
- Nuclear
- Geothermal
- Tidal
- Biogas

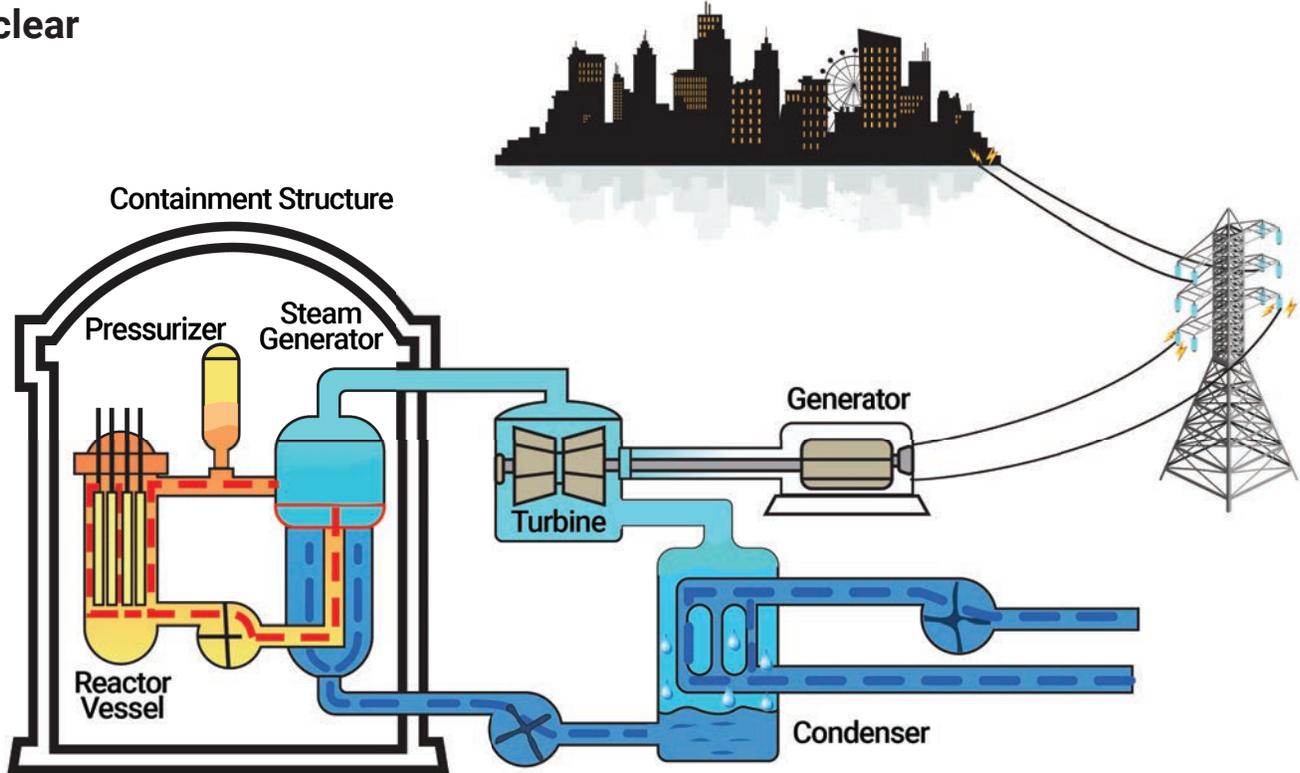
Solar



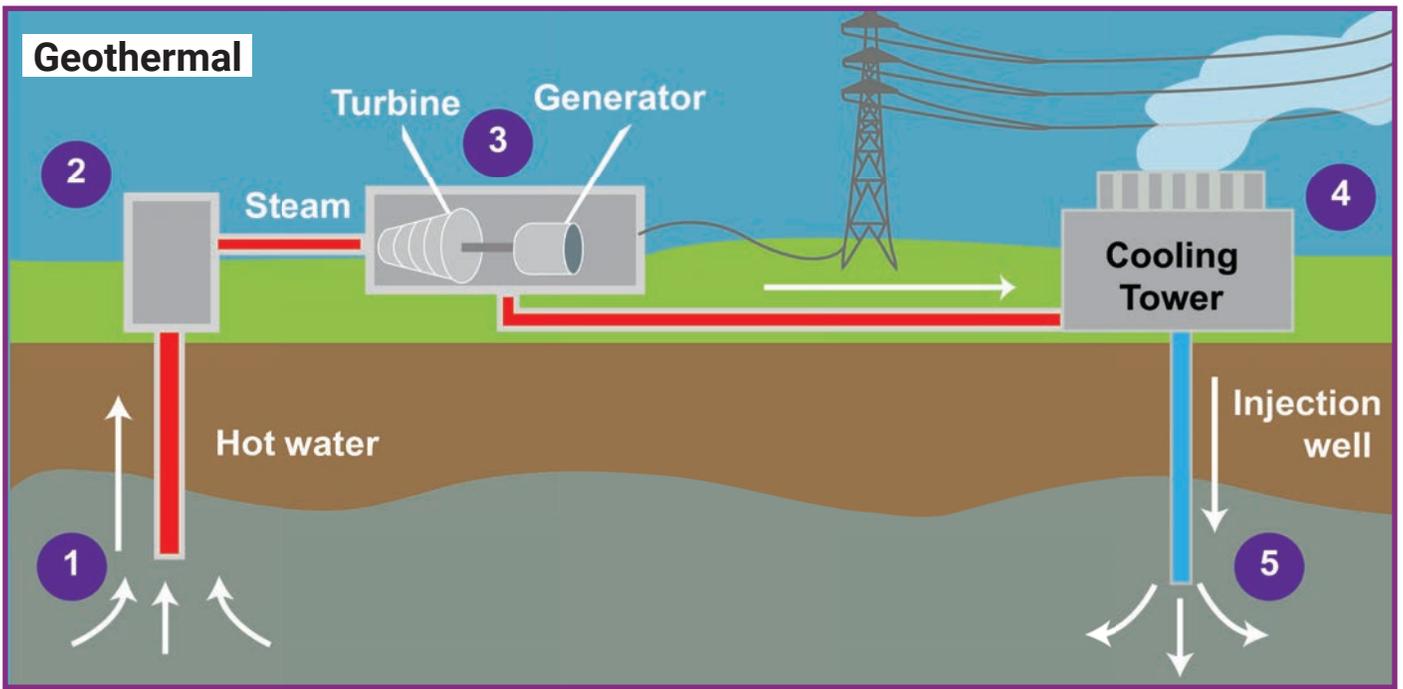
Wind



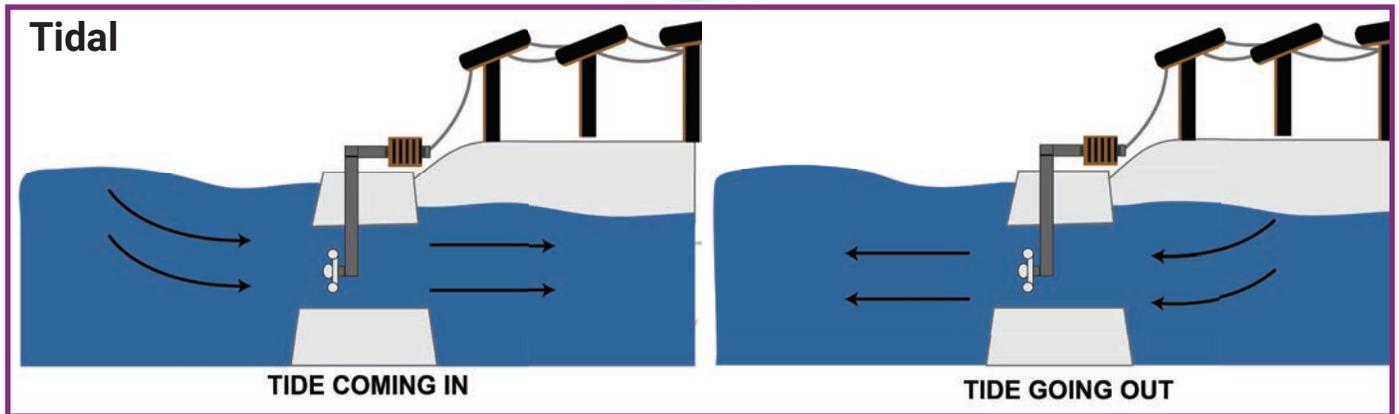
Nuclear



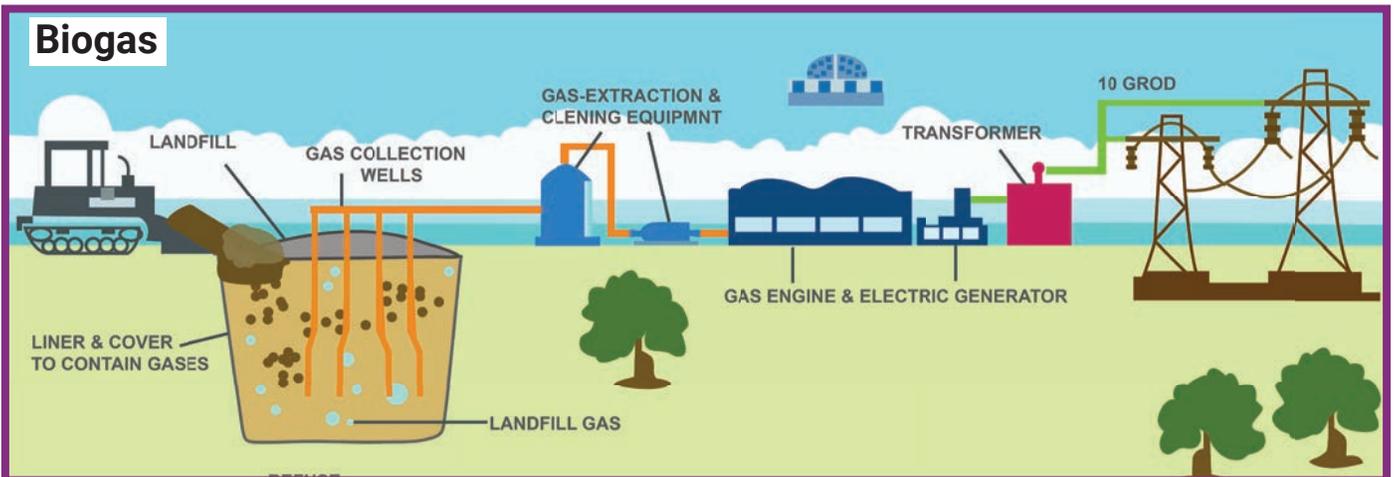
Geothermal



Tidal



Biogas





Phonetics

Choose the correct phonetics of the words given below:-

1. Baby

(a) /'berbi/

(b) /baby/



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2. Crown

(a) /kraʊn/

(b) /craʊn/



3. Ball

(a) /bɔ:l/

(b) /ba:l/



4. **Bottle**

(a) /'bɒt(ə)l/

(b) /'bɒt(ə)l/



5. **Room**

(a) /ru:m,rʊm/

(b) /rum,rʊm/



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6. **Buzz**

(a) /buz/

(b) /bʌz/

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7. **Kitchen**

(a) /kɪtʃɪn,'kɪtʃ(ə)n/

(b) /kɪtʃen,'kɪtʃeɪn/



Answer



1. Baby

(a) /'beɪbi/

2. Crown

(a) /kraʊn/



3. Ball

(a) /bɔ:l/

4. Bottle

(b) /'bɒt(ə)l/



5. Room

(a) /ru:m,rʊm/

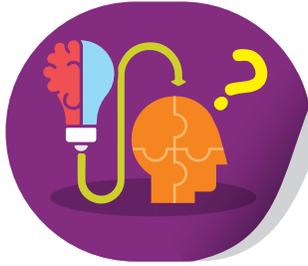
6. Buzz

(b) /bʌz/

7. Kitchen

(a) /kɪtʃɪn, 'kɪtʃ(ə)n/





Number and Alphabet Test

Quiz Time

Given sequence : 765 389 467 598

Q.1 If 2 is added to the second digit of each number and then the position of the first and last digit are interchanged then, which of the following will be the highest number ?

- (a) 765 (b) 467
(c) 389 (d) 598

Given sequence : MEN BOY RAM CAR

Q.2 If the position of second and third letter of each word are interchanged – and then each word is reversed and now the new words are arranged in dictionary order then which word comes last ?

- (a) CAR (b) BOY
(c) MEN (d) RAM

Given sequence : A M 8 P % Z @ X ? # L N

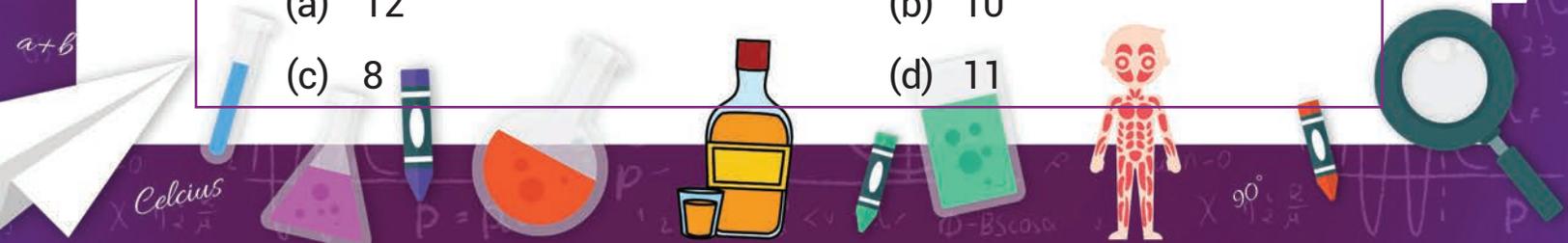
Q.3 Which element is 6th to the right of the 5th element from the left end ?

- (a) N (b) X
(c) L (d) ?

Given sequence : 2 5 2 1 4 1 6 3 8 9 6 2 4 1 4 7 3 2 5 9 6

Q.4 How many pairs of consecutive numbers have a difference of 3 ?

- (a) 12 (b) 10
(c) 8 (d) 11



Given sequence : 7 4 9 4 3 2 7 1 9 4 9 9 9 1 3 4 9 9 7 9 4 3 1 3 4 8 4

Q.5 How many 4's are there in the above sequence which are immediately followed by 3 and immediately preceded by 9 ?

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

Answer (Quiz Time)

A.1 (c) 389

765 389 467 598

785 3109 487 5118

587 9103 784 8115

highest number = 9103 comes from 389

A.2 (b) BOY | IIT-JEE | Foundations

MEN, BOY, RAM, CAR,

MNE, BYO, RMA, CRA,

ENM, OYB, AMR, ARC,

AMR, ARC, ENM, OYB

A.3 (c) L (11th element from left end)

A.4 (d) 11

25, 52, 14, 41, 63, 96, 41, 14, 47, 25, 96

A.5 (d) 2



Happy Birthday

Stephen Hawking

“ The greatest enemy of knowledge is not **IGNORANCE**, it is the **ILLUSION** of knowledge. ”



Born - 8 Jan 1942
Died - 14 Mar 2018

Stephen Hawking was born in Oxford, England on January 8, 1942. He grew up in a highly educated family. Both of his parents had attended Oxford University and his father, Frank, was a medical researcher.

Hawking's contributions to physics earned him many exceptional honours. In 1974 the Royal Society elected him one of its youngest fellows. He became professor of gravitational physics at Cambridge in 1977, and in 1979 he was appointed to Cambridge's Lucasian professorship of mathematics, a post once held by Isaac Newton.

OUR RESULTS 2024

AIR 1

NEET (UG) 2024

State Topper Delhi	State Topper Uttar Pradesh	State Topper West Bengal	State Topper Uttar Pradesh	State Topper Maharashtra	State Topper Rajasthan
Mridul M Anand 3 Year Classroom	Ayush Naugraiya 4 Year Classroom	Arghyadeep Dutta 2 Year Classroom	Aryan Yadav 1 Year Classroom	Palansha Agarwal 2 Year Classroom	Iram Quazi 1 Year Classroom

JEE (Advanced) 2024

AIR 25	AIR 67	AIR 78	AIR 93	AIR 95
Rishi Shekher Shukla 2 Year Classroom	Krishna Sai Shishir 4 Year Classroom	Abhishek Jain 4 Year Classroom	Hardik Aggarwal 2 Year Classroom	Ujjwal Singh 4 Year Classroom

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
NSEB | NSEC | NSEP



Priyanshu Sarkar
NSEB | NSEC | NSEP



Mridul Garg
NSEB | NSEC | NSEP



Zaman Hussain
NSEA | NSEC | NSEP



Shubhradeep Paul
NSEA | NSEC | NSEP



Samvit Shandilya
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
Qualified INAO



Sanvi Jain
Qualified INChO



Mridul M Anand
Qualified INBO



Zaman Hussain
Qualified INMO



Sushant Agarwal
Qualified INJSO



Archit Kumar
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
2 Year Classroom



Class VIII Pranava NS
3 Year Classroom



Class VIII Bruteshwar Rajguru
3 Year Classroom



Class VIII Hardik Mishra
2 Year Classroom



Class VIII Hardik Dhariwal
2 Year Classroom



Class IX Dhanush Damu
4 Year Classroom

IOQM - Indian Olympiad Qualifier in Mathematics

and many more...

Board Exam Results 2024

Top Performers from Class X



Marks
500
500

Devidyuti K Pisharody
CBSE



Marks
499
500

P Harini
CBSE



Marks
498
500

Jiya Dugar V
CBSE

and many more...

Top Performers from Class XII



Marks
496
500

Ananthan R
CBSE



Marks
495
500

Ansh Agrawal
CBSE



Marks
495
500

Himanshu Agarwal
CBSE

and many more...



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