Aakash

Medical | IIT-JEE | Foundations

KNOWLEDGE BYTES

JULY 2024

CLASS 8

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

Algebraic Expressions and Identities

Division of Polynomials

According to euclid's division of polynomials

$$\text{Dividend} = \text{Divisor} \times \text{Quotient} + \text{Remainder}$$

Polynomials can be denoted by f(x), g(x), h(x), p(x) etc.

$\Rightarrow$ $f(x) = g(x) \times q(x) + r(x)$

where, f(x) is dividend

g(x) is divisor

q(x) is quotient

r(x) is remainder

NOTE

1. $0 \leq$ degree of $\mathbf{r}(x) <$ degree of $g(\mathbf{x})$
   (r(x): remainder; g(x): divisor)
2. degree of $\mathbf{g}(x) \leq$ degree of $f(\mathbf{x})$
   (g(x): divisor; f(x): dividend)

Divide $9x - 3x^2 + x^3 - 4$ by $(x - 2)$

Remember, we have to continue the process till we get degree of remainder less than degree of divisor.

Step-1

Write the dividend in the standard form i.e. either in the ascending order or descending order of exponents of 'x'.

i.e. $x^3 - 3x^2 + 9x - 4 \Rightarrow$ $x - 2\overline{)x^3 - 3x^2 + 9x - 4}$

Step-2

Divide x^3 by x to get the first term of the quotient.

i.e. $\frac{x^3}{x} = x^2$

Multiply x^2 by $(x - 2)$ and subtract the answer from dividend of step 1.

$$\begin{array}{r|l} x - 2 & x^3 - 3x^2 + 9x - 4 \quad \Big) x^2 \\ & \underline{x^3 - 2x^2} \\ & \quad - \quad + \\ \hline & -x^2 + 9x - 4 \end{array}$$

Step-3

Resultant of step 2 is dividend of next step.

Again divide first term of dividend by x to find next term of the quotient.

i.e. $\frac{-x^2}{x} = -x$

Multiply $-x$ by $(x - 2)$ and subtract the answer from dividend of step-3.

$$\begin{array}{r|l} x - 2 & -x^2 + 9x - 4 \quad \Big) -x \\ & \underline{-x^2 + 2x} \\ & \quad + \quad - \\ \hline & 7x - 4 \end{array}$$

Step-4

Now, divide $7x - 4$ by $x - 2$

For quotient, divide $7x$ by x

i.e. $\frac{7x}{x} = 7$ (next term of quotient)

$x - 2 \overline{)\ 7x - 4\ (}\ 7$
$7x - 14$
$-\quad +$
10

Product of 7 and $(x - 2)$ subtracted from dividend of step 4

As degree of remainder is less than degree of divisor, so we will stop the process.

Complete Process

$x - 2 \overline{)\ x^3 - 3x^2 + 9x - 4\ (}\ x^2 - x + 7$
$x^3 - 2x^2$
$-\quad +$
$-x^2 + 9x - 4$
$-x^2 + 2x$
$+\quad -$
$7x - 4$
$7x - 14$
$-\quad +$
10

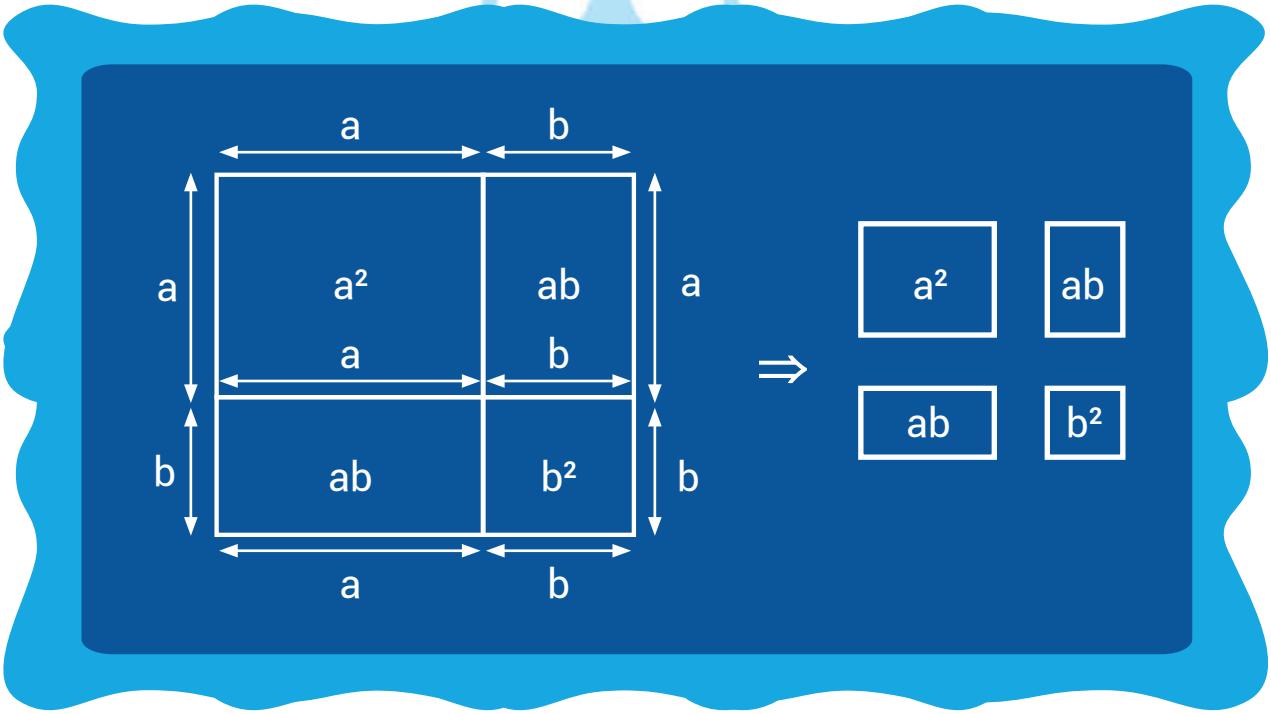
Quotient : $x^2 - x + 7$

Remainder : 10

Geometric Proof of Some algebraic Identities

(i) $(a + b)^2 = a^2 + 2ab + b^2$

In this square, we will draw two squares of side 'a' and 'b' units.



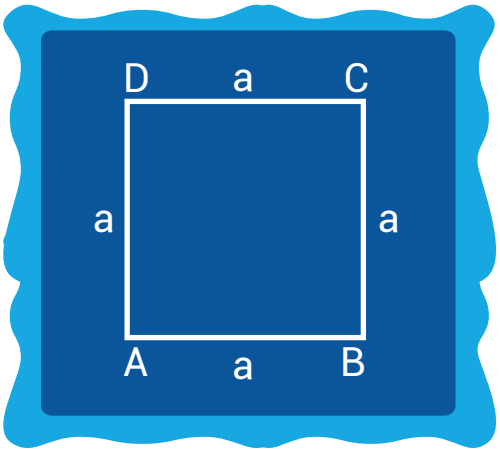
From the figure, we see that there are two squares of area a^2 and b^2 and two rectangles with area ab and ab.

So, $(a + b)^2 = a^2 + ab + ab + b^2$

$\therefore (a + b)^2 = a^2 + 2ab + b^2$

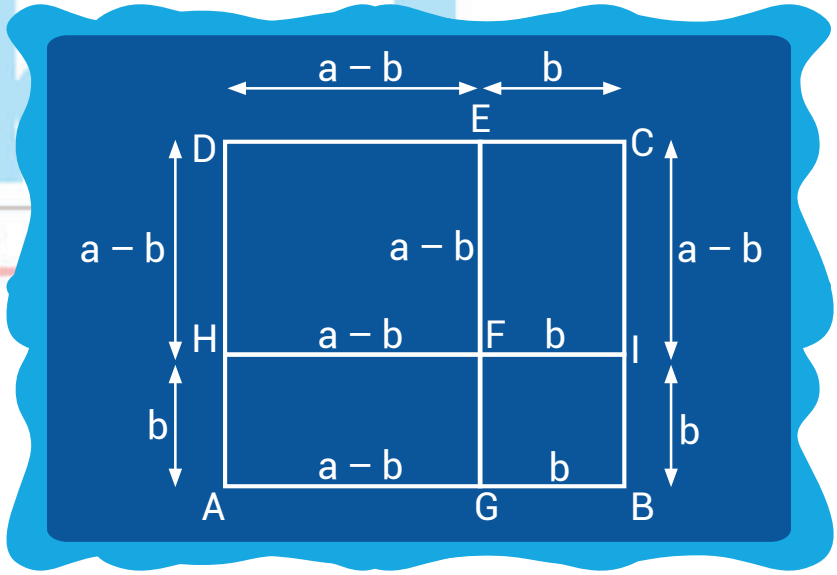
(ii) $(a - b)^2 = a^2 - 2ab + b^2$

- Draw a square of side 'a' units.



Area of ABCD = a^2

- Cut each side of this square taking 'b' units. Such that EC = b units so DE = a – b units.



Area of EDHF = $(a - b)^2$

Area of ECIF = $(a - b)b$

Area of AGFH = $(a - b)b$

Area of BGFI = b^2

- Area of EDHF = Area of ABCD – Area of ECIF – Area of AGFH – Area of BGFI

So, $(a - b)^2$

$= a^2 - (a - b)b - (a - b)b - b^2$

$= a^2 - ab + b^2 - ab + b^2 - b^2$

$= a^2 - 2ab + b^2$

Chemical Effects of Electric Current

History of Electroplating

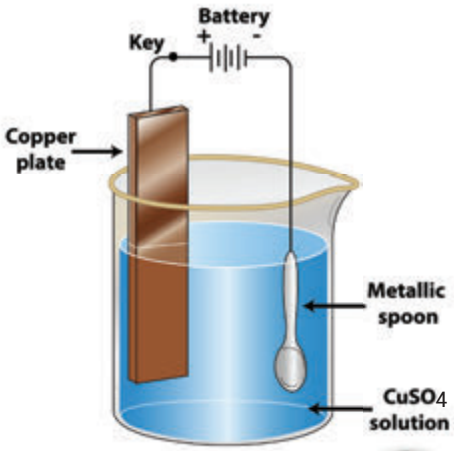
1. Modern electrochemistry was invented by Italian chemist Luigi Valentino Brugnatelli in 1805.

2. Luigi Valentino Brugnatelli's inventions were suppressed by the French Academy of Sciences and did not become in use in general industry for the following thirty years.

3. By 1839, scientists in Britain and Russia had independently devised metal deposition processes similar to Brugnatelli's for the copper electroplating of printing press plates.

4. John wright of England discovered that potassium cyanide was suitable electrolyte for gold and silver electroplating.

5. Wright's associates, George Elkington and Henry Elkington were awarded the first patents for electroplating in 1840. They founded the electroplating industry in Birmingham from where it spread around the world.



Interesting Facts

The brain and the heart function by means of tiny electric currents.

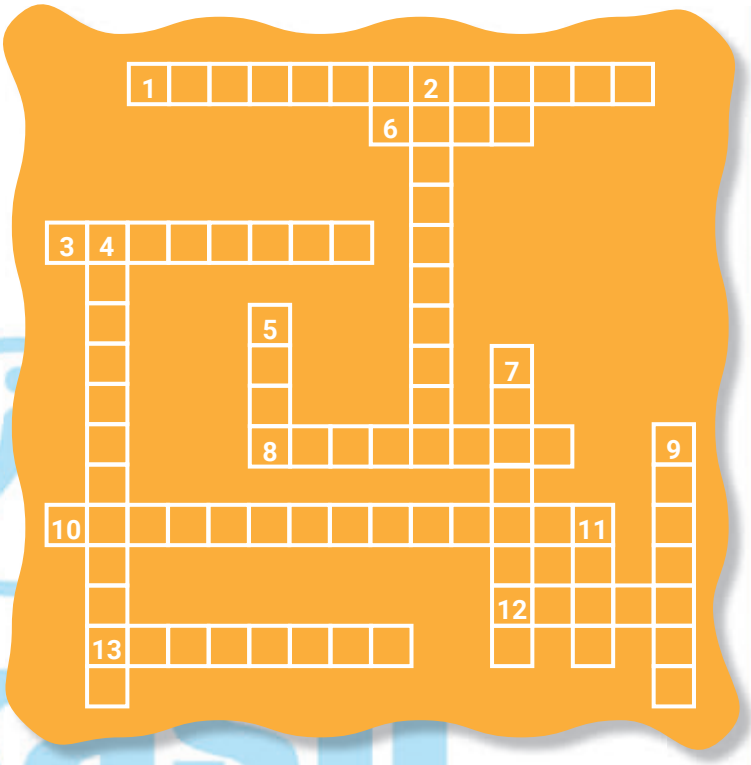
Fact-1

Graphical recording of electrical activity of the heart, as detected by electrodes placed on the skin is called electrocardiograph (ECG). This is used to diagnose heart diseases.

Fact-2

Graphical recording of the electrical activity of the brain as detected by the electrodes placed on the scalp is called electroencephalography (EEG). This is helpful to diagnose brain disorders, particularly epilepsy.

Crossword



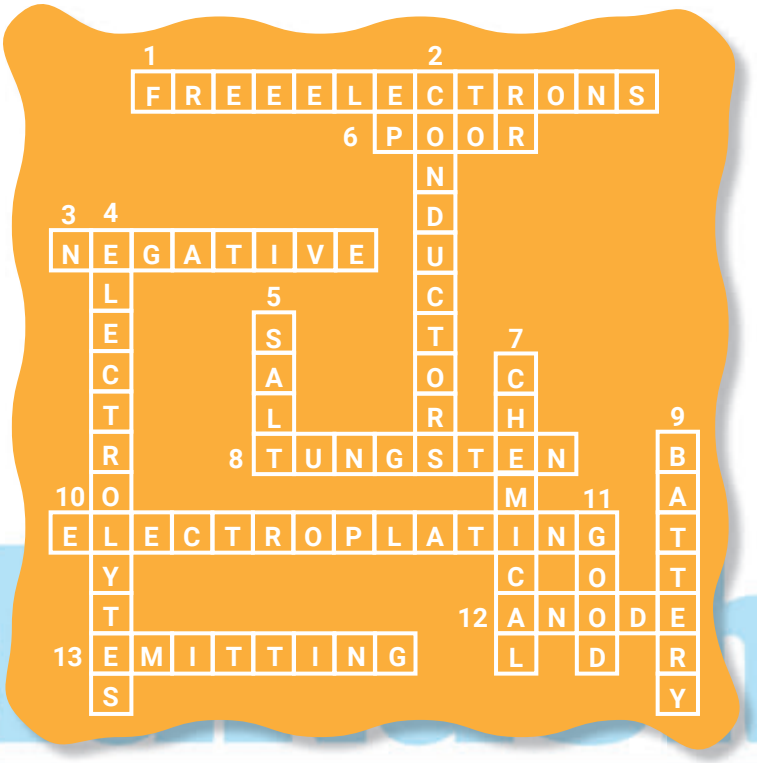
ACROSS

1. In metals, ____ are responsible for the conduction of electricity. [4, 9]
3. Anions carry ____ charge. [8]
6. Kerosene is a ____ conductor of electricity. [4]
8. The filament of a bulb is made of ____. [8]
10. The process of depositing a layer of a desired metal on another metal by means of electricity is called ____. [14]
12. ____ is the rod connected to the positive terminal of the battery. [5]
13. LED means light ____ diode. [8]

DOWN

2. Metals are good ____ of electricity. [10]
4. Liquids that conduct electricity are called ____. [12]
5. Pure water can be made conducting by adding ____ to it. [4]
7. The passage of electric current through a solution causes ____ effect. [8]
9. A bulb in a circuit does not glow if the ____ is discharged. [7]
11. Graphite is a ____ conductor of electricity. [4]

Answer (Crossword)



Coal and Petroleum

Advantages and Disadvantages of Coal

Advantages of Coal

1. Coal is a reliable energy source. You may use it wherever and whenever it is required. It suffers less from seasonal fluctuations.
2. Coal is the largest source of energy for the generation of electricity worldwide. Even the products obtained by its processing have amazing uses.
3. Coal is easy to burn and it produces high energy upon combustion.
4. Coal is an affordable energy source because of its stable prices as compared to other fuels.

Disadvantages of Coal

1. Coal produces a large amount of carbon dioxide on burning, which leads to global warming and climate change.

2. The burning of coal is not environment friendly because it produces harmful byproducts and gaseous emissions such as sulphur dioxide, carbon dioxide and nitrogen oxides that cause pollution in the environment including acid rain.

3. Coal is a non-renewable energy source. Coal is depleting fast because we consume too much of it.

4. Coal mining ruins the environment and puts the lives of people specially the coal miners in danger.

Quiz on Coal and Petroleum

1. Which of the following is used in the extraction of metals?

(a) Coke (b) Petroleum
(c) Natural Gas (d) Coal

2. Which of the following products of destructive distillation of coal is used in making perfumes?

(a) Coke (b) Coal tar
(c) Coal gas (D) Ammoniacal Liquor

3. Naphthalene balls used to repel insects and moths are obtained from

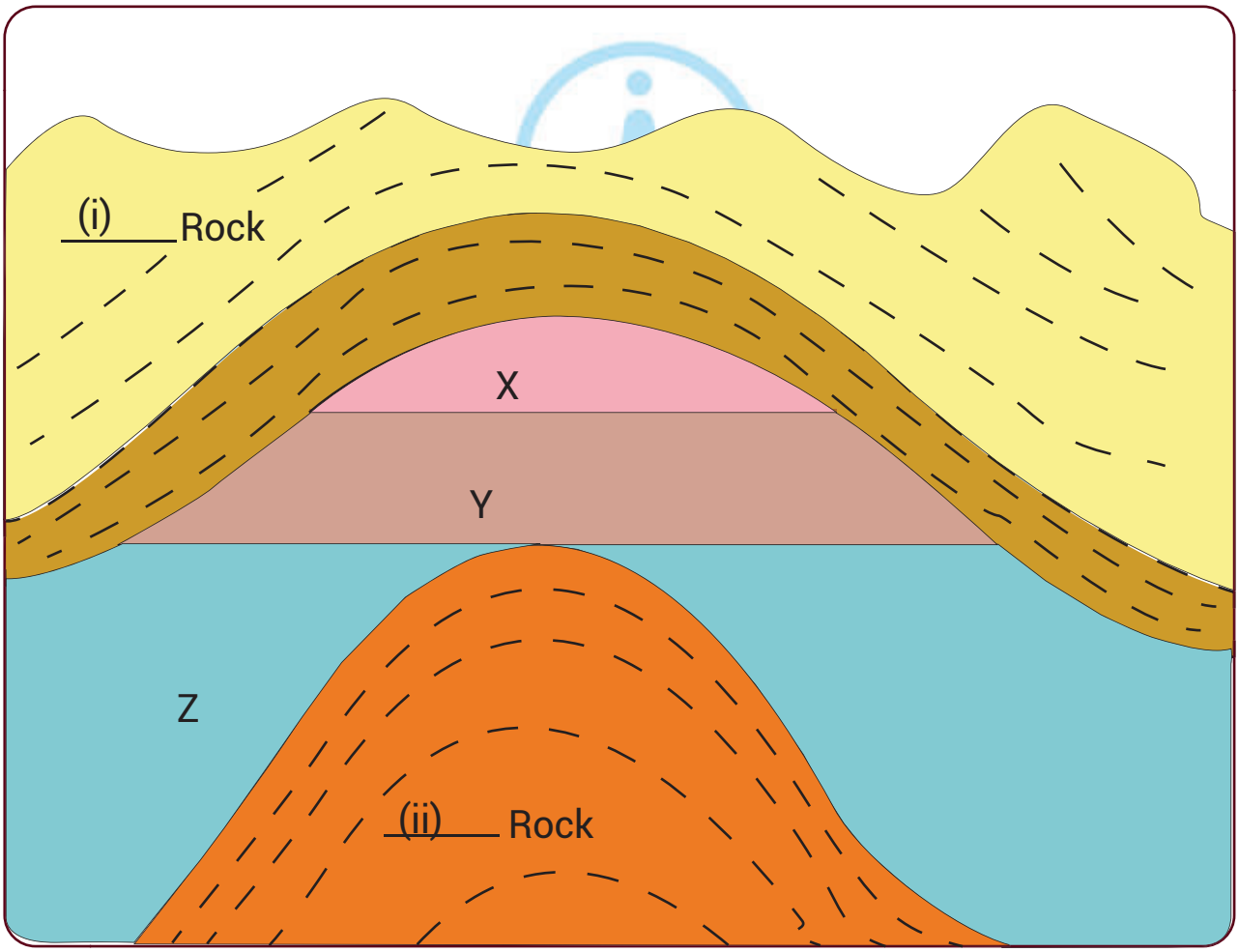
(a) Coke (b) Petroleum
(c) Natural gas (d) Coal tar

4. Kerosene is used in

(a) Ointments (b) Road surfacing
(c) Jet aircrafts fuel (d) Dry-cleaning

Puzzle

Q. This picture is showing the petroleum and natural gas deposits. Have a careful look and answer the below mentioned questions.



1. Tell the name of Rock (i) and (ii).
2. Which method is used for separating the components of "Y".
3. "Z" is called Universal solvent. What is "Z"?
4. "X" is stored under high pressure as _____.

Quiz

Answer (Quiz on Coal and Petroleum)

1. (a) Coke

2. (b) Coal tar

3. (d) Coal tar

4. (c) Jet aircrafts fuel

Answer (Puzzle)

1. (i) Impervious rock and (ii) Reservoir rock

2. Fractional distillation

3. Water

4. CNG

Reproduction in Animals

Riddle

I like to hop around
I'm a tadpole when I'm young
I am green and I croak
And catch flies with my long tongue

Ans

Legend of Silkworm

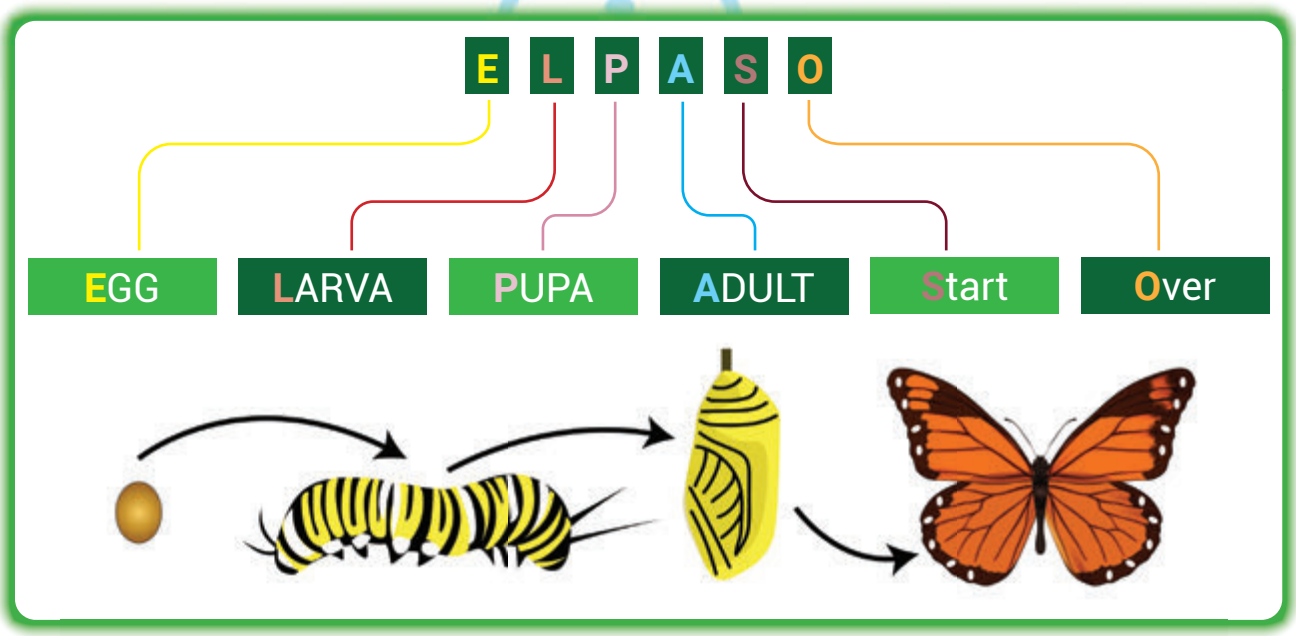
In China, there is a legend that the silkworm's silk was first discovered by the wife of the Yellow Emperor, Leizu around the year 2696 BC. According to the book written in the 13th century, she was drinking tea under a tree when a cocoon fell into her tea. She picked it out and as it started to wrap around her finger, she slowly felt something warm. When the silk ran out, she saw a small cocoon. In an instant, she realized that this cocoon was the source of the silk. She taught this to the people and it became common. There are many more legends about the silkworm.

Mnemonics

Metamorphosis is of Two Types

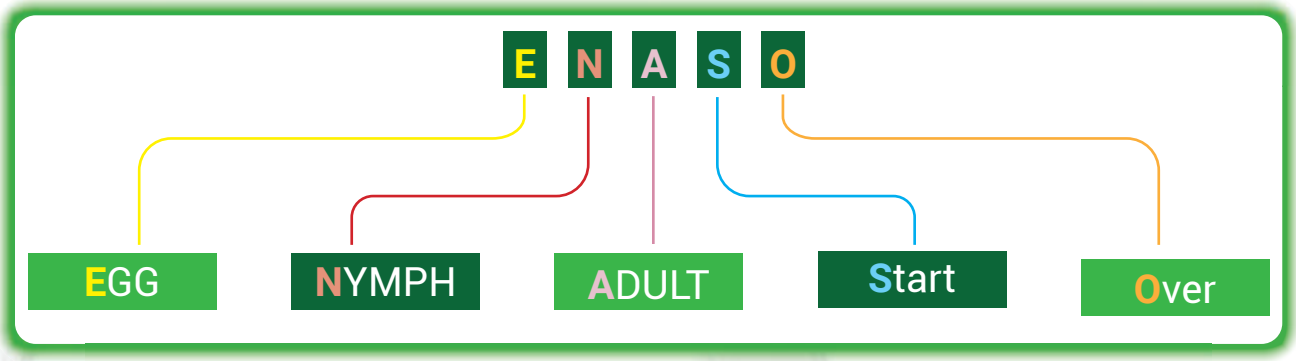
1. Complete – In this, stages are egg, larva, pupa, adult

Mnemonic for complete metamorphosis - E.L.P.A.S.O



2. Incomplete- In this, stages are egg, nymph, adult

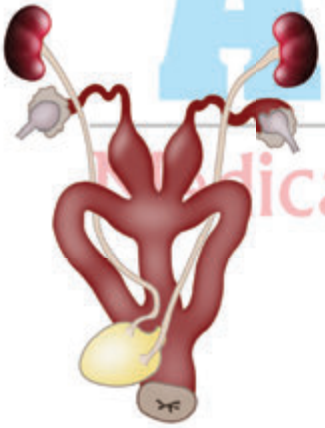
Mnemonic for incomplete metamorphosis- E.N.A.S.O



Interesting Facts

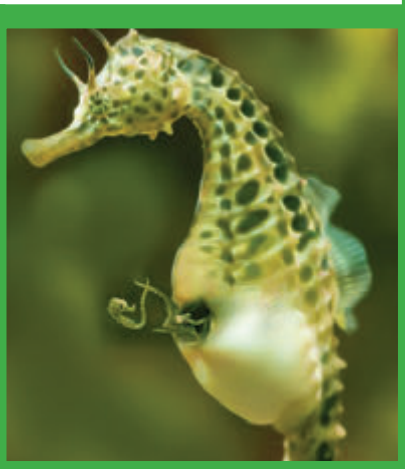
Banana slugs mate using penises on their heads

Elephants are pregnant for two years

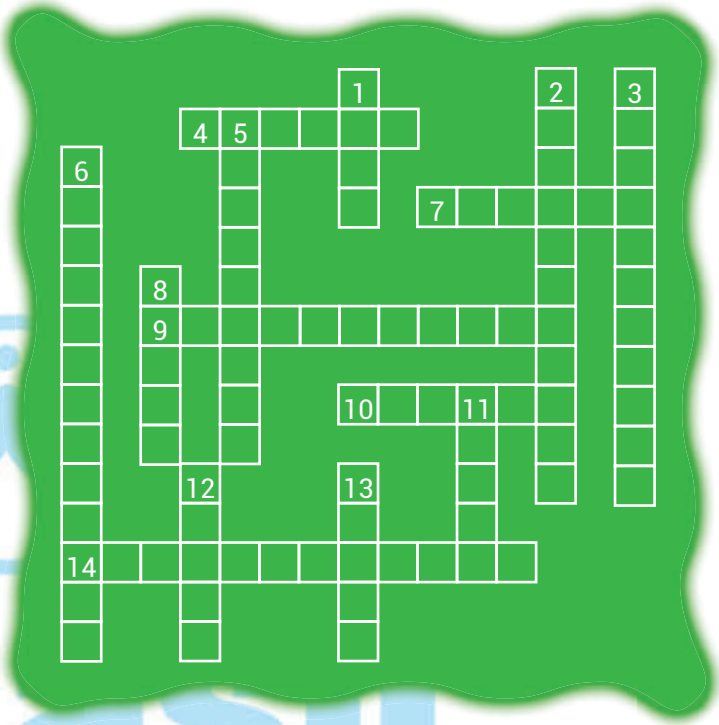


Kangaroos have three vagina and two uterus

Male seahorses give birth to young ones



Crossword



Across

4. The stage of embryo in which all the body parts can be identified is called _____. [6]

7. Another term for fertilized egg. [6]

9. The act of expelling the fully grown young one from the mother's uterus in known as _____. [11]

10. Sperms are produced in these male reproductive organs. [6]

14. The process of embedding of embryo in the wall of uterus is _____. [12]

Down

1. The term used for bulges observed on the side of the body of *Hydra*. [4]

2. Division of cytoplasm is known as _____. [11]

3. The larval stage of silkmoth is _____. [11]

5. These animals lay eggs. [9]

6. The process of the fusion of gametes. [13]

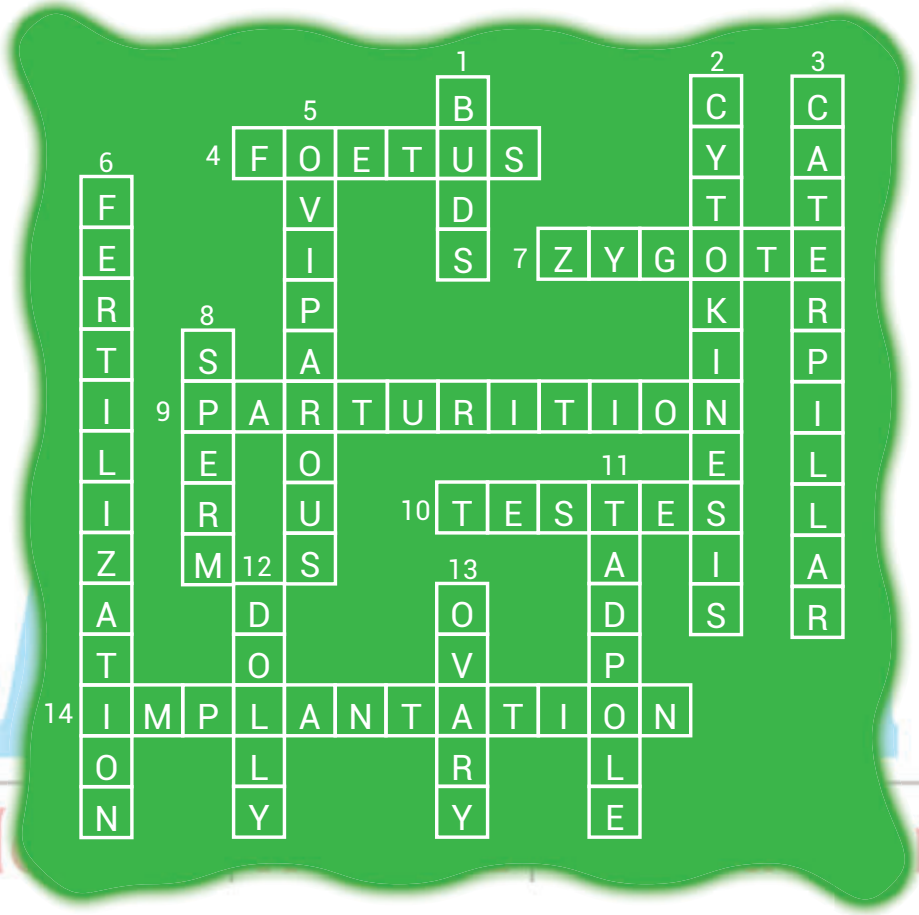
8. The name of motile gamete of human being . [5]

11. The larval stage of frog is _____. [7]

12. Name of the first cloned mammal is [5]

13. Eggs are produced in this female reproductive organ. [5]

Answers (Crossword)

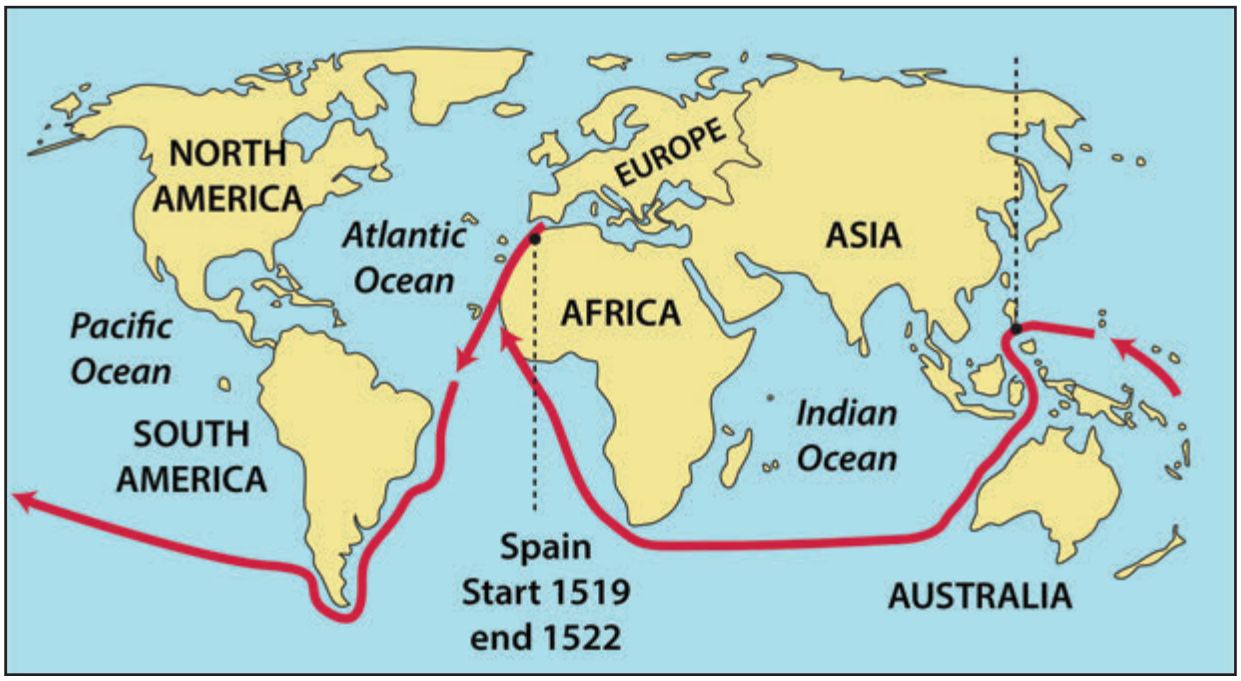


Famous First in History

The First Man Made Fire

12 Million Years ago

The First Circumnavigation of the Globe (1522)



The First Man Made flight (1903)

The wright brothers, Orville and Wilbur wright, built the first aeroplane.

The First Animation Film (1908)

French director Emile Cohl made the first cartoon, Fantasmagorie.

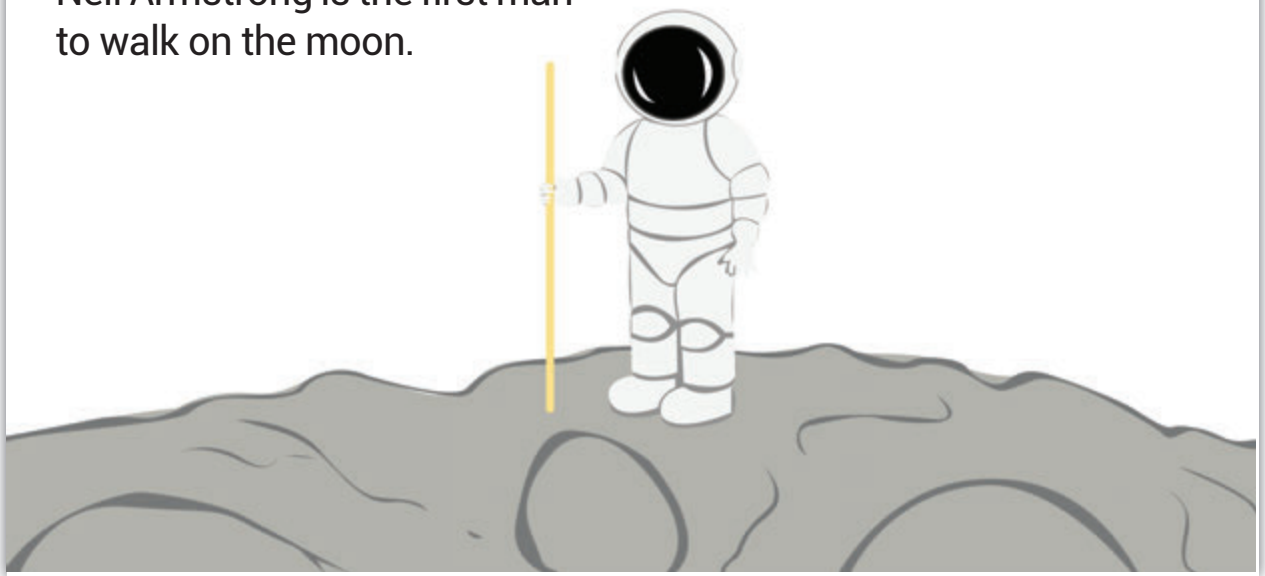
The cartoon had 700 drawings, but was a little more than a minute in length.

The First Video Game (1958)

Physicist William Higinbotham invented the first video game.

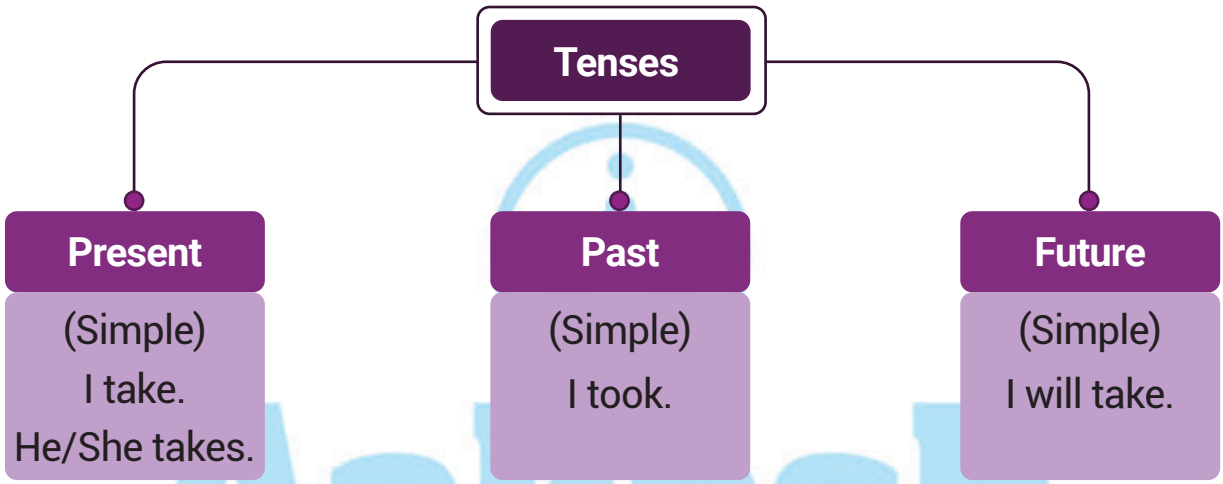
The First Step on the Moon (1969)

Neil Armstrong is the first man to walk on the moon.



Tenses

The tense of a verb tells us when the action is, was or will be carried out.



Simple Present/Present Indefinite Tense

(i) To describe repeated actions and habits; as

(a) I go for a morning walk daily.

(b) Ishani reads the newspaper every day.

(ii) To express facts which are true of all times; as,

(a) The Sun rises in the East.

(b) This road leads to Jaipur.

(iii) To describe a future planned/scheduled action; as,

(a) The president arrives tomorrow at 10.00 a.m.

(b) The train leaves to Karnataka at 9.00 p.m.

(iv) To express a fact of something which is true at present; as,

(a) All trains halt at Rampur.

(b) Priyanka teaches English in Hindu College, Sonepat.

(v) To introduce quotations; as,

(a) Wordsworth says, "Nature heals our negative mood."

(b) Shakespeare says, "Frailty, thy name is a woman."

(vi) In running commentaries on matches; as,

(a) Kumble runs up to the wicket. He bowls.

(b) The batsman steps forward and drives the ball to the boundary.

(vii) In time and conditional clauses; as,

(a) We will wait until Murti *sings*.

(b) If he *works* hard, he will succeed.

Questions (Identify the correct tense form.)

1. The new Chief Minister will take vows today at Ramlila maidan.
2. The teacher said to the boys, "Slow and steady win the race."
3. If the government will be strict, corruption will definitely cease to exist.
4. The class will be starting at 8:00 am tomorrow.
5. If you will smuggle goods into the country, they will be confiscated by the customs authority.

Answers

1. 'takes' instead of 'will take'
2. 'wins' instead of 'win'
3. 'is' instead of 'will be'
4. 'starts' instead of 'will be starting'
5. 'smuggle' instead of 'will smuggle'

Missing Number

Many missing numbers can be obtained using the pattern in given figures. Some common patterns are :

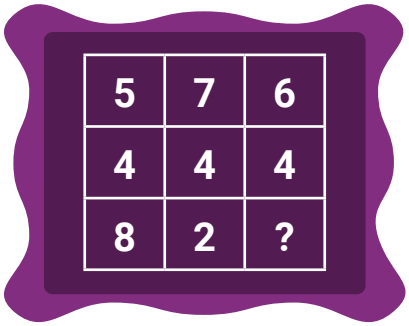
1. It could be sum of two numbers divided by a constant
2. It could be average of numbers
3. It could be the difference of product of two diagonally opposite number.
4. It could be the difference of sum of adjacent numbers
5. The difference of numbers could be prime number or difference of numbers could be square of prime numbers.

Medical | IIT-JEE | Foundations

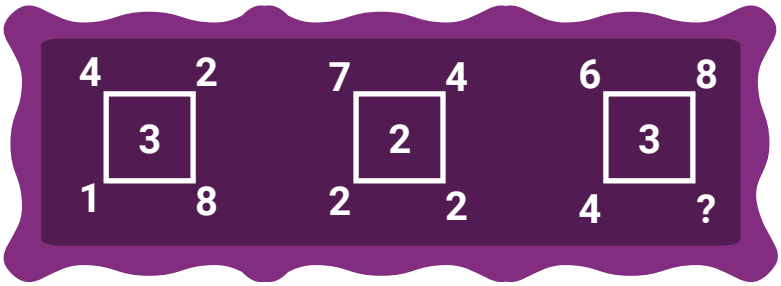
Question-1 Find missing number.

2	3	6
6	5	?
7	9	5
26	42	48

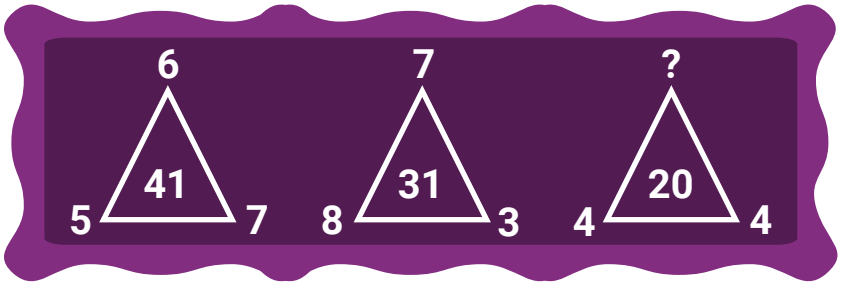
Question-2



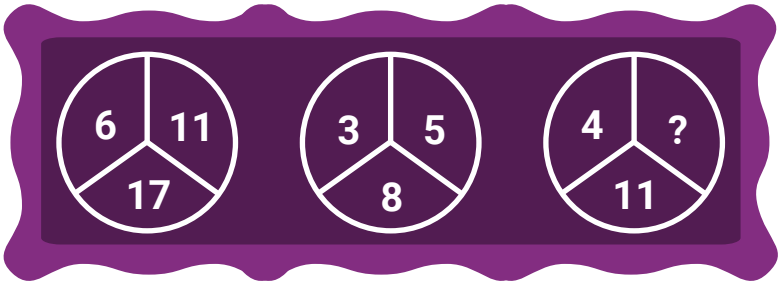
Question-3



Question-4



Question-5



Puzzle (Answer)

Solution-1

In the given diagram consider column-I. Add the number of 2nd and 3rd row and multiply the sum with the number in row-I. We will get 26.

like $(6 + 7) \times 2 = 26$

$(5 + 9) \times 3 = 42$

$(5 + x) \times 6 = 48$

$5 + x = \frac{48}{6} = 8$

$x = 8 - 5$

Hence, answer is **x = 3**

Solution-2

In this question take average of the numbers of first and second column to get the number in third column.

$(5 + 7) \div 2 = 6$

$(4 + 4) \div 2 = 4$

$(8 + 2) \div 2 = 5$

Hence, answer is **5**

Solution-3

Here in each rectangular figure add the top 2 digits in each figure and multiply it with the central numer given in the figure, then result is written in the bottom.

$(4 + 2) \times 3 = 18$

$(7 + 4) \times 2 = 22$

$(6 + 8) \times 3 = 42$

Hence, answer is **2**

Solution-4

Here in each triangle, the number in the centre of each triangle equal to the the product of bottom two digits plus the top digit.

hence, answer is $4 \times 4 + 4 = 20$

Hence, answer is **4**

Solution-5

Two Tricks :

Tricks I :

Sum of upper two numbers is equal to lower number

$6 + 11 = 17$, $3 + 5 = 8$, $4 + 7 = 11$

Tricks II :

$(6 \times 2) - 1 = 11$ and $(6 \times 3) - 1 = 17$

$(3 \times 2) - 1 = 5$ and $(3 \times 3) - 1 = 8$

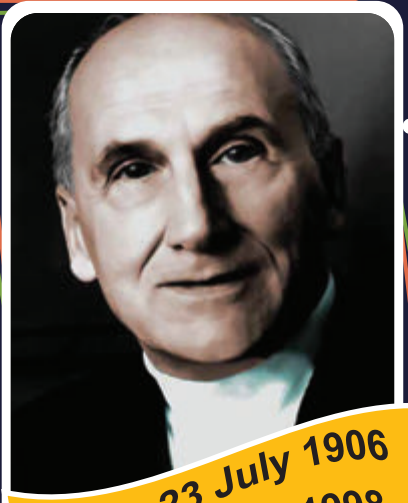
$(4 \times 2) - 1 = 7$ and $(4 \times 3) - 1 = 11$

Hence, answer is **7**

NOBEL PRIZE FOR CHEMISTRY

Happy Birthday

Vladimir Prelog



Born - 23 July 1906
Died - 07 Jan 1998

Yugoslavian-Swiss chemist who shared the 1975 Nobel Prize for chemistry with john W. Comforth for his work on the stereochemisty of organic molecules and reactions. Stereochemistry is the study of the three-dimensional arrangements of atoms within molecules. He authored systematic naming rules for molecules and their mirror-image version, that is, which configuration will be referred to as “dextro” and which will be the “levo” (right or left). Also, by X-ray diffraction, he elucidated the structure of several antibiotics.

NSEs
National Standard Examinations
2023-24 Result

Aakash

1430 Students Scored Above MAS

344 Students Qualified for *INO-2024

(Group A & B)
34+30
NSEA*

156
NSEB*

72
NSEC*

23
NSEP*

29
NSEJS*

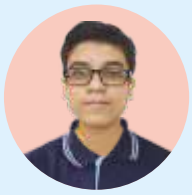
Our Toppers from Classroom Programs

Diptanshu Sharma
NSEB | NSEC | NSEP

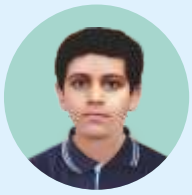
Priyanshu Sarkar
NSEB | NSEC | NSEP

Mridul Garg
NSEB | NSEC | NSEP

Zaman Husain
NSEA | NSEC | NSEP



Shubhradeep Paul
NSEA | NSEC | NSEP



Samvit Shandilya
NSEA | NSEC | NSEP

Ujjwal Singh
NSEA | NSEC | NSEP

Krishna S S Vuppala
NSEA | NSEC | NSEP

Utkarsh Awadhiya
NSEA | NSEB

V Koushik Raghavan
NSEA | NSEB

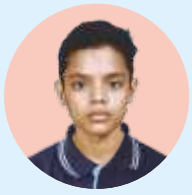
Om Amrit Mohanty
NSEB | NSEC

Aditya Dagwar
NSEB | NSEC

Aadesh Nichat
NSEB | NSEC

Harsh Raj
NSEB | NSEC

Rishi S Shukla
NSEC | NSEP



Keshaw Ranjan
NSEA | NSEC

Piyush Dhakar
NSEJS

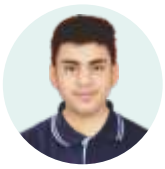
Sushant Agarwal
NSEJS

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 | NESJS- National Standard Examination in Junior Science | INO-Indian National Olympiad

Our Top Performers

39
INO* Qualified Students for OCSCs/IMOTC APMO-2023


Lakshya Sharma
Qualified INBO


V Koushik Raghavan
Qualified INJSO


Anoop Singh
Qualified INPhO


Amritanshu Singh
Qualified INAO


Souptik Das
Qualified INChO


Harsh Raj
Qualified INBO


Mohit Shekher Shukla
Qualified INJSO


Aakash Gupta
Qualified INChO


Mridul Manya Anand
Qualified INBO

and many more...

Our Top Performers

108
Classroom Students
Qualified in RMO* 2023


Sahil Rai
4 Year Classroom


Zaman Hussain
2 Year Classroom


Samvit Shandilya
2 Year Classroom


Arnav Jindal
4 Year Classroom


Adithyan K
2 Year Classroom


Rishi S Shukla
2 Year Classroom


Deekshant Sharma
2 Year Classroom


Rujul Garg
2 Year Classroom


Aayush Agarwal
3 Year Classroom

and many more...

Our Top Performers

698
Classroom Students
Qualified in IOQM* 2023


Madhav Manu
Class XII


Zaman Hussain
Class XII


Gautham P A
Class XII

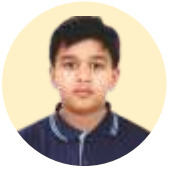

Samvit Shandilya
Class XI


Sahil Rai
Class XI


Arnav Jindal
Class XI


Rujul Garg
Class XI


Mohit S Shukla
Class X


Atiksh Jain
Class X

and many more...

*RMO -Regional Mathematical Olympiad | **IOQM -** Indian Olympiad Qualifier in Mathematics
INOs - Indian National Olympiads | **OCSCs** - Orientation cum Selection Camps
IMOTC - International Mathematical Olympiad Training Camp | **APMO -** Asian Pacific Mathematics Olympiad