KNOWLEDGE BYTES

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CLASS 9

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

Surface Areas and Volumes

Crossword

ACROSS

1. The volume of a cuboid is equal to the product of the area of the base and the _____. [6]

3. A birthday cap has the shape of a _____.[4]

6. Number of circular base(s) in a cone is _____. [3]

7. The volume of a cone is one-third of the volume of a _____ with the same height and the same radius. [8]

8. _____ surface area of a right circular cone is $\pi r l$. [7]

10. A cuboid has 8 _____. [8]

DOWN

2. If inner radius of a hemispherical shell is r_1 and outer radius is r_2, then _____ of shell is $r_2 - r_1$. [9]

3. A cylinder has two _____ bases. [8]

4. A dice is _____ in shape. [7]

5. The volume of a _____ is half the volume of the sphere with same radius. [10]

9. A cube has 12 _____. [5]
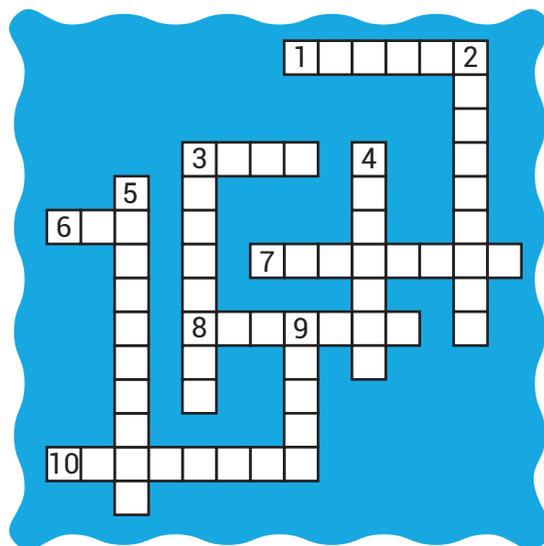
Applications of Surface Area and Volume

In Chemistry

One daily activity where surface area is of good consideration is in heating or cooking. Suppose you are going to boil some water. You have two containers: one that is short but wide (like a pan) and another that is high but narrow (like a boiling pot). In which container would water boil faster? The answer is the first pan. The reason is surface area. The wider the container, the faster is the boiling.

In guitars, different volumes of guitars basically create different amplitudes of sound.

Surface area is important in chemical kinetics. Increasing the surface area of a substance generally increases the rate of a chemical reaction. For example, iron as fine powder will combust, while as solid blocks it is stable enough to use in structures.

In Biology

The surface area of an organism is important in several body functions, such as regulation of body temperature and digestion. Animals use their teeth to grind food down into smaller particles, increasing the surface area available for digestion.

Elephants have large ears, allowing them to regulate their own body temperature.

In other instances, animals will need to minimize surface area; for example, people will fold their arms over their chest when cold to minimize heat loss.
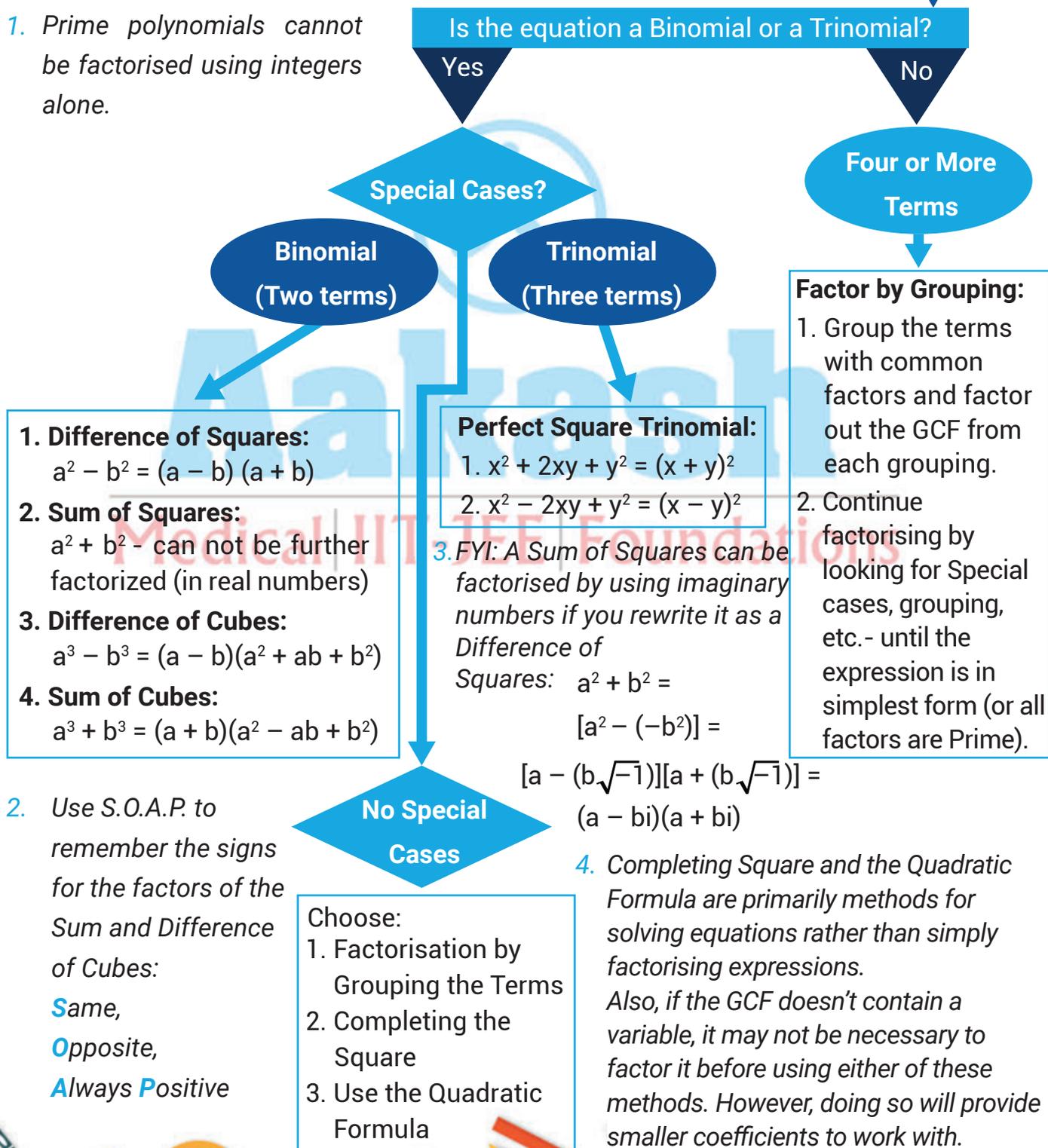
Factorization

The flowchart below illustrates a sequence of steps for factorization of polynomials.

First, always factor out the Greatest Common Factor (GCF), if one exists.

1. Prime polynomials cannot be factorised using integers alone.

Is the equation a Binomial or a Trinomial?

Yes

No

Special Cases?

Four or More Terms

Binomial (Two terms)

Trinomial (Three terms)

Factor by Grouping:
1. Group the terms with common factors and factor out the GCF from each grouping.
2. Continue factorising by looking for Special cases, grouping, etc.- until the expression is in simplest form (or all factors are Prime).

1. Difference of Squares:
$a^2 - b^2 = (a - b)(a + b)$

2. Sum of Squares:
$a^2 + b^2$ - can not be further factorized (in real numbers)

3. Difference of Cubes:
$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

4. Sum of Cubes:
$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

Perfect Square Trinomial:
1. $x^2 + 2xy + y^2 = (x + y)^2$
2. $x^2 - 2xy + y^2 = (x - y)^2$

3. FYI: A Sum of Squares can be factorised by using imaginary numbers if you rewrite it as a Difference of Squares: $a^2 + b^2 =$

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

$[a - (b\sqrt{-1})][a + (b\sqrt{-1})] =$

$(a - bi)(a + bi)$

2. Use S.O.A.P. to remember the signs for the factors of the Sum and Difference of Cubes:
Same,
Opposite,
Always **P**ositive

No Special Cases

Choose:
1. Factorisation by Grouping the Terms
2. Completing the Square
3. Use the Quadratic Formula

4. Completing Square and the Quadratic Formula are primarily methods for solving equations rather than simply factorising expressions.
Also, if the GCF doesn't contain a variable, it may not be necessary to factor it before using either of these methods. However, doing so will provide smaller coefficients to work with.

Examples Based on Factorization Techniques

Example 1 (Difference of Squares)

$$4x^2 - 9 = (2x)^2 - (3)^2$$
$$= (2x - 3)(2x + 3)$$

Example 2 (Sum of Squares)

$$25y^2 + 49 = (5y)^2 + (7)^2$$
$$= \text{Can not be further factorized}$$

Example 3 (Difference of Cubes)

$$27t^3 - 8 = (3t)^3 - (2)^3$$
$$= (3t - 2)[(3t)^2 + (3t)(2) + (2)^2]$$
$$= (3t - 2)(9t^2 + 6t + 4)$$

Example 4 (Sum of Cubes)

$$64w^3 + 125z^3 = (4w)^3 + (5z)^3$$
$$= (4w + 5z)[(4w)^2 - (4w)(5z) + (5z)^2]$$
$$= (4w + 5z)(16w^2 - 20wz + 25z^2)$$

Factorization of Four terms: Attempt to factor first by using Grouping or second by using Synthetic Division if Grouping does not work.

Grouping

$$x^3 - 3x^2 - 4x + 12 = x^2(x - 3) - 4(x - 3)$$
$$= (x^2 - 4)(x - 3)$$
$$= (x + 2)(x - 2)(x - 3)$$

4

Most Common Identities Used in Factorization

Some algebraic Identities useful in factorization:

1. $(x + y)^2 = x^2 + 2xy + y^2$

2. $(x - y)^2 = x^2 - 2xy + y^2$

3. $x^2 - y^2 = (x - y)(x + y)$

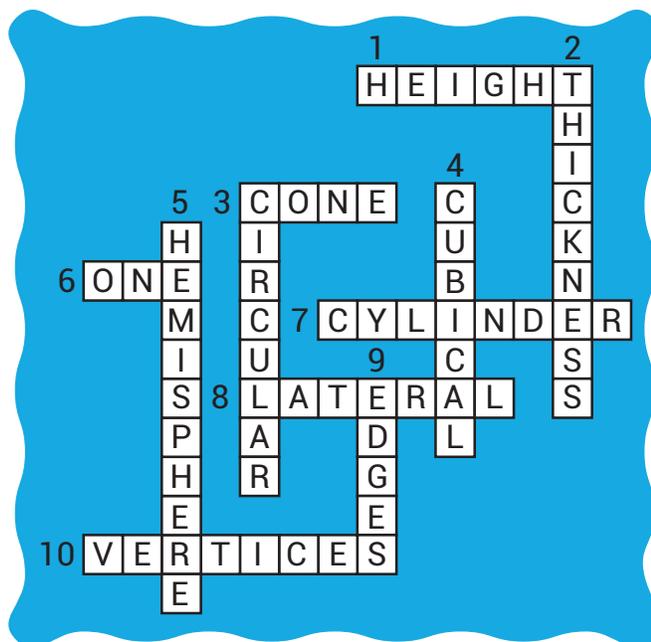**4.** $(x + a)(x + b) = x^2 + (a + b)x + ab$

5. $(x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$

6. $(x + y)^3 = x^3 + y^3 + 3xy(x + y)$

7. $(x - y)^3 = x^3 - y^3 - 3xy(x - y)$

8. $x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$

$x^3 + y^3 + z^3 = 3xyz$ if $x + y + z = 0$

Answer (Crossword)

Crossword grid answers:

1. HEIGHT
2. THICKNESS
3. CIRCUCULAR (CIRCUMCUS column letters: C I R C U C U S)
4. CUBE
5. HEMISPHERE
6. ONE
7. CYLINDER
8. LATERAL
9. CADGE
10. VERTICES

Crossword

ACROSS

2 An observed change in the frequency of a wave when the source or observer is moving

3 Complete back-and-forth motion of an object

5 Hearing loss. Causes ringing in the ear

6 A device that graphs sound waves

8 A measure of how well a sound can be heard

9 Material through which sound can propagate

10 A measure of how high or low a sound is perceived to be
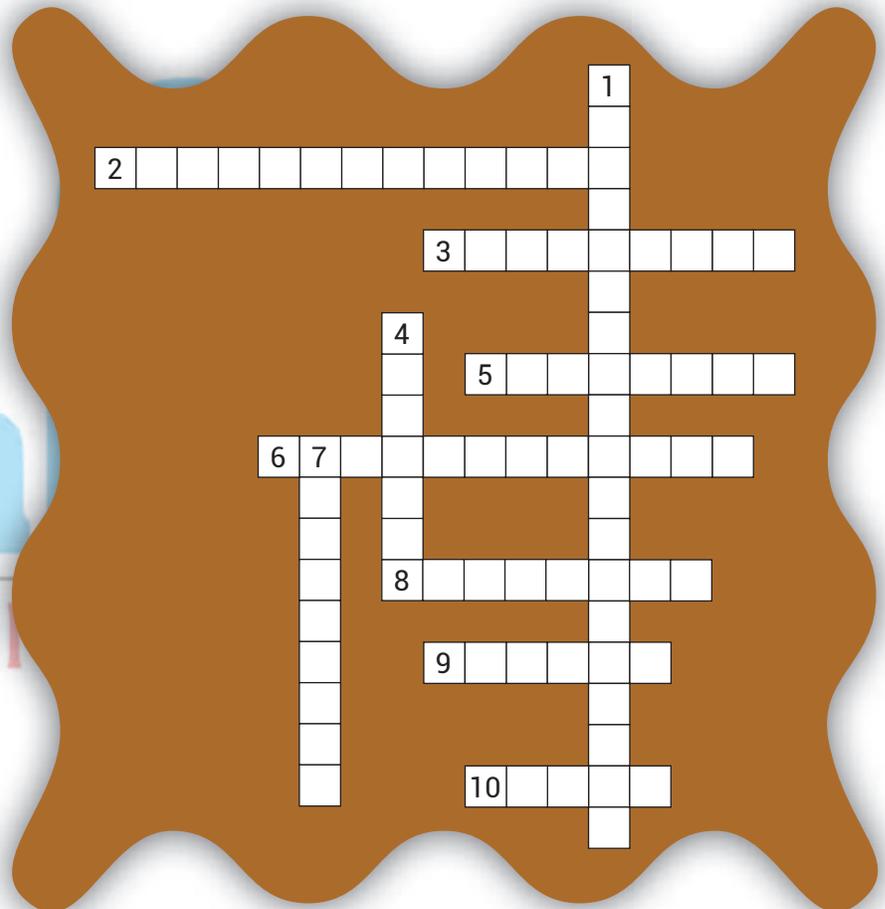
DOWN

1 Sounds that are too high for people to hear

4 The most common unit used to measure loudness

7 A longitudinal wave that is caused by vibrations and that travels through a medium

Do You Know?

- What is louder than a car horn? The cry of a human baby, which is about 115 decibels.

- Flies can not hear any kind of sound. Not even their own buzzing.

- If you clap in front of Chichen Itza's El Castillo pyramid, the echo will sound like a chirping bird.

- Horror films like to use infrasound, which is below the range of human hearing. It creates shivering, anxiety and even heart palpitations in humans when it is being played. The fear of music is called melophobia.

- Scientists of Minnesota have developed the world's quietest room. It is so quiet, people cannot stand more than 45 minutes in the room, because you can hear your internal organs, and people have even been said to begin hallucinating.

- Our ears even pick up on sounds while we are asleep, but our brain does not 'hear' it.

- Sound is currently being used to aid historical research. Thanks to archaeoacoustics, every site has a specific sound or echo unique to itself.

- The Maaban people in Africa live in such a quiet environment, that they can hear a whisper made from hundreds of feet away.

- If you shout or make a sound that is 1,100 dB, it will create a black hole destroying our galaxy.

Joke of the day Sound

According to the researchers, children understand and remember what is being said much better when they listen with their right ear.

Now I know why i could not remember what has been taught in class , my left ear was working more.

The Dentist: "Woah, that's a HUGE cavity - a HUGE cavity!"

The Man: "Enough, Doc, I heard you the first time!"

The Dentist: "Sorry, that was an ....ECHO!!!

Answer (Crossword)

```
                                    1
                                    U
                                    L
  2 D O P P L E R E F F E C T       R
                                    A
              3 V I B R A T I O N
              4                     S
                D             5 T I N N I T U S
              7 C                   I
  6 O S C I L L O S C O P E
    O     B                   F
    U     E                   R
    N   8 L O U D N E S S
    D     E                   Q
    W   9 M E D I U M         U
    A                         E
    V                         N
    E   10 P I T C H          Y
```

8

# Matter in Our Surroundings, Atoms and Molecules

Crossword

ACROSS

4. A monoatomic gas which is used for lasers and cryogenic refrigerant is ____ . [4]

5. Number of atoms present in a molecule is called ____. [9]

6. Latin name of sodium is _____ . [7]

10. The reactant which is completely consumed in a reaction is called _____ reagent. [8]

11. Gram molecular mass of calcium carbonate is _____ gram.[7]

DOWN

1. Ozone is a _____ molecule. [9]

2. Combining capacity of an element is called ____. [7]

3. Law of conservation of mass was given by ____. [9]

7. Charged species is called ____. [3]

8. The smallest particle of an element or a compound capable of independent existence is _____ . [8]

9. The number of moles of the solute present in one litre of the solution is called ____ . [8]
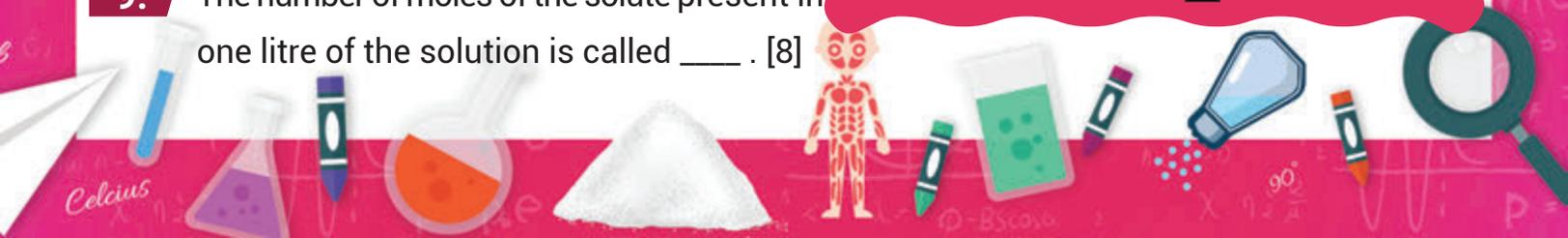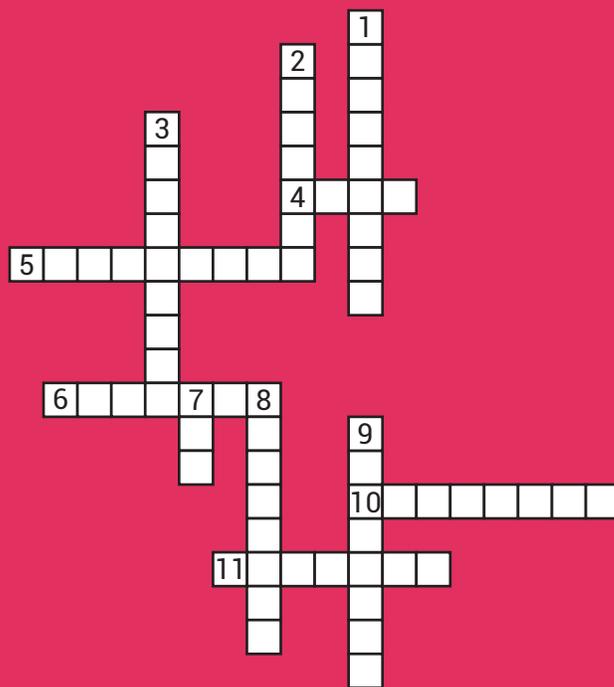
Jumbled Words

The underlined word in the following sentences have been jumbled up. Write them in correct form.

1. Clusters of atoms that act as an ion are called ytopicomla ions.

2. In a pure chemical compound, elements are always present in a noatncst proportion by mass.

3. The phenomenon of change of a liquid into vapours at any temperature below its boiling point is called vopraeniota

4. tentla taeh of fusion is the amount of heat energy required to change 1 kg of solid into liquid at its melting point.

5. The state of matter can be changed by changing its rmeeeatutpr

6. ytidimuh is the amount of water vapour present in air.

7. The intermixing of particles of two different types of matter on their own is called usiidnoff

8. posiitonde is the change of gaseous state directly to solid state without going through liquid state.

Match the following

1.	Atoms are indivisible particles which cannot be created or destroyed in a chemical reaction.	a.	Wilhelm Ostwald	p.	
2.	Parmanu is an indestructible particle of matter.	b.	Joseph Proust	q.	
3.	Greek philosopher who introduced the idea of an atom.	c.	John Dalton	r.	
4.	Mass can neither be created nor be destroyed in a chemical reaction.	d.	Maharishi Kanad	s.	
5.	Every chemical compound contains fixed and constant proportions (by mass) of its constituent elements.	e.	Democritus	t.	
6.	The word mole is coined by	f.	Antoine Lavoisier	u.	

Quiz Time?

1. All noble gas molecules are

A. Monoatomic

B. Diatomic

C. Triatomic

D. Both A and B

2. If the molecular mass of a compound is 106u, then the compound can be

A. $CaCO_3$

B. SO_3

C. Na_2CO_3

D. $NaCl$

3. If one mole of oxygen gas has x atoms then number of atoms in one mole of ozone will be

A. x

B. 2x/3

C. 3x/2

D. 2x

4. Mass of half mole of hydrogen atom is

A. 2 gram

B. 1 gram

C. 0.5 gram

D. 0.25 gram

5. The mass of 3 gram atoms of phosphorous is

A. 93 gram

B. 3 gram

C. 372 gram

D. 41.33 gram

6. Number of oxygen atoms in a single molecule of aluminium oxalate is

A 2

B 3

C 6

D 12

7. Which of the following processes is accompanied by lowering the temperature?

A Condensation

B Boiling

C Vaporisation

D Sublimation

8. Dry ice is chemically

A Solid CO

B Solid water

C Solid CO_2

D Solid SO_2

9. Liquefaction occurs under

A High temperature and high pressure

B Low temperature and low pressure

C High temperature and low pressure

D Low temperature and high pressure

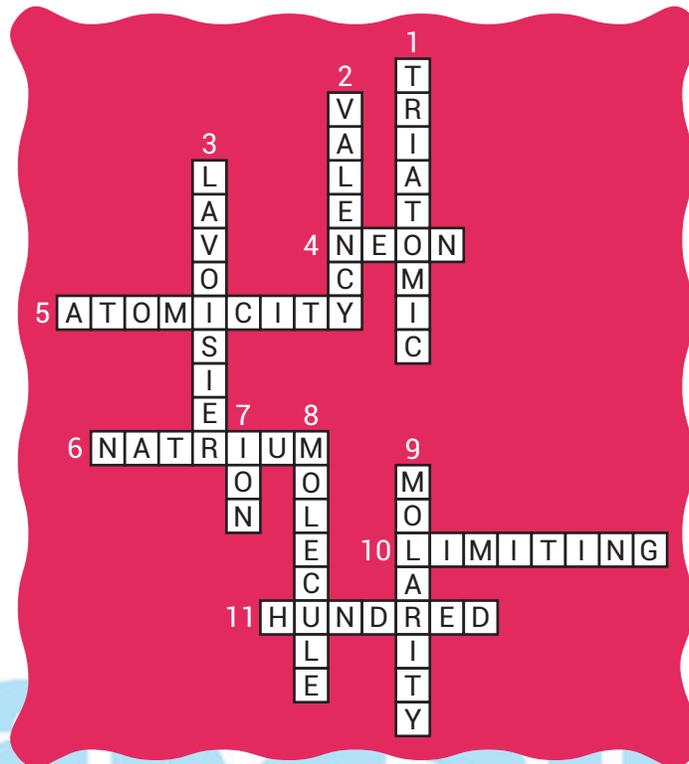**10.** Which of the following states of matter has minimum kinetic energy?

A Solid

B Liquid

C Gaseous

D Plasma

Answer (Crossword)

```
                                    1
                              2     T
                              V     R
                  3           A     I
                  L           L     A
                  A           E     T
                  V         4 N E O N
                  O           C     O
              5 A T O M I C I T Y   M
                  S           Y     I
                  I                 C
                  E   7   8
              6 N A T R I U M
                  E   O   O       9
                  N   N   L       M
                          E   10 O L I M I T I N G
                          C       L
                       11 H U N D R E D
                          U       R
                          L       I
                          E       T
                                  Y
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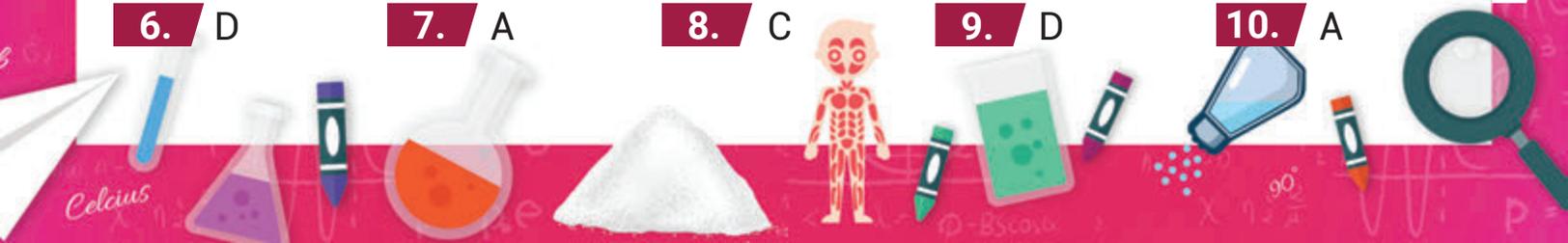
Answer (Jumble Word)

1. Polyatomic   **2.** Constant   **3.** Evaporation   **4.** Latent heat

5. Temperature   **6.** Humidity   **7.** Diffusion   **8.** Deposition

Answer (Match the following)

1. c. q.   **2.** d. u.   **3.** e. r.   **4.** f. s.

5. b. p.   **6.** a. t.

Answer (Quiz Time)

1. A   **2.** C   **3.** C   **4.** C   **5.** A

6. D   **7.** A   **8.** C   **9.** D   **10.** A

The Fundamental Unit of Life, Tissues and Why do We Fall Ill?

Crossword

ACROSS

1 Present at the growing tips of root and stem.

4 Receive stimuli from within or outside the body and conduct impulses to different parts of the body.

6 Loosely packed, living, thin and cellulosic cell wall.

7 Muscles have alternate light and dark stripes and are responsible for voluntary body movements.

DOWN

2 Responsible for water and mineral conduction in plants.

3 Fluid connective tissue.

5 Helps in transpiration.

8 Provides cushion around the eyes, heart, kidneys and blood vessels.

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Atypical Ailments

Tennis elbow
(Over exertion of Elbow tendon)

Spider angioma
(Vessels radiating like spider's web-due to liver disease)

Scrofula
(Tuberculosis of lymph nodes in neck)

Haemolacria
(Bleeding from eyes due to a tear in the tear duct)

Cell Riddles

I'm the real "powerhouse of cell".
I break down food
and release energy.
Who am I ?

I found only in the plant cells.
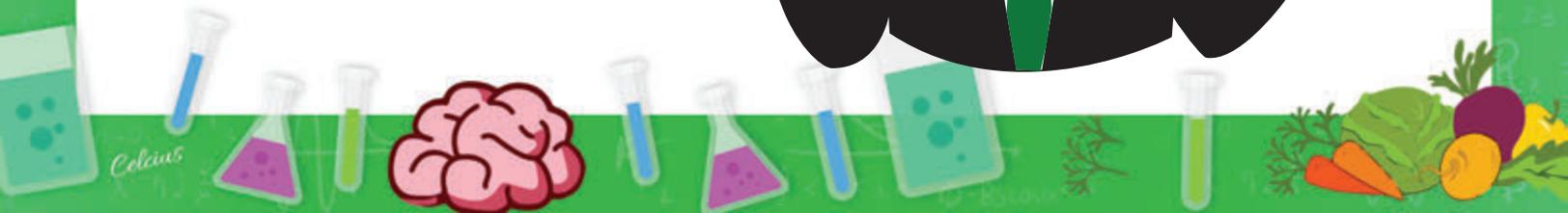I look green.
I make food for the plants.
Who am I ?

I'm the brain of the cell.
I regulate day to day
activities.
Who am I ?

I've been called the storage tank
of the cell.
I'm a sack filled with food,
enzymes and water.
Who am I ?

My name means "green leaf".
I'm the pigment in a plant cell
that causes its green color
and absorbs the Sun's energy.
Who am I ?

Mysterious Maladies

Disorders of the decades have been shocking us till date. Some have altered lives of a few while some have turned our lives to a full 360°. You may have seen or heard of some of them yourself. Guess the names of these incredible infirmities with the help of hints given below:

1. Children with moon face have this protein malnutrition.
2. American sailors came to be known as Limeys because of this vitamin deficiency.
3. I have multiple causes but pathogen isn't one of them, I make your cells multiply uncontrollably and then spread to whole body.
4. The person keeps saying Ouch Ouch in Japanese, when they get this disease of cadmium poisoning.
5. A mosquito with striped legs bites you and gives you this fever with low platelets.
6. Sandfly spreads this disease caused by protozoa with leash (Flagella).
7. Wash the wound with a carbolic soap and get five shots of vaccine if any dog bites you. You may develop a fatal disease like this one, even if the dog likes you.
8. The name of the disease may say otherwise but it is caused by the largest virus.
9. The bacteria release a toxin that locks your jaw tightly, get that shot within 24 hrs, just don't take it lightly.
10. Once upon a time, a bacterial disease spread by rat fleas became an epidemic called Black Death.

Answer (Crossword)

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

Crossword:

1 APICALMERISTEM
8 ADIPOSETISSUE (down, with BLOOD at 3)
3 BLOOD (down)
4 NEURONS
6 PARENCHYMA
2 XYLEM (down)
5 STOMATA (down)
7 STRIATEDMUSCLE

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Answer (Riddles)

1	Mitochondria

2	Chloroplast

3	Nucleus

4	Vacuole

5	Chlorophyll

Answer (Mysterious Maladies)

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

Drainage Pattern

Dendritic Pattern

This drainage pattern looks like the branches of a tree. This type of drainage pattern develops in a terrain which has uniform rock structure, and where faulting and jointing are insignificant. Example: Rivers in Northern Plains (Ganga, Indus etc..)

Trellis Pattern

In this type of pattern, the short subsequent streams (tributaries) meet the main stream at right angles. This drainage pattern form in an area where hard rock and soft rock exist together. Eg: The old folded mountains of the Singhbhum (Chotanagpur Plateau) have trellis pattern.
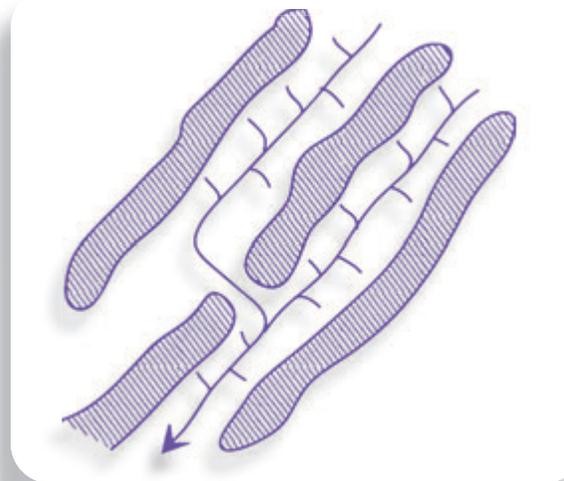
Rectangular Pattern
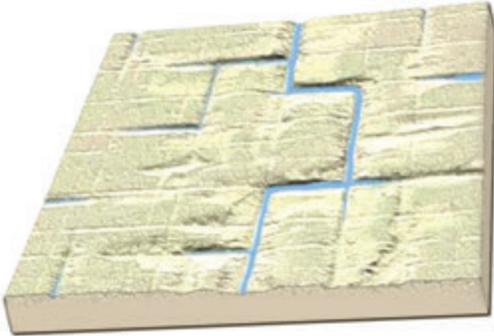
The main stream bends at right angle and the tributaries join at right angle creating rectangular patterns. This drainage pattern develops where there is a strongly joined rocky terrain.

Eg.: Colorado River USA, Streams found in Vindhyan Ranges

Radial Pattern

The tributaries from an upland follow the slope downwards and drain down in all directions.

Eg.: Narmada, Son etc..
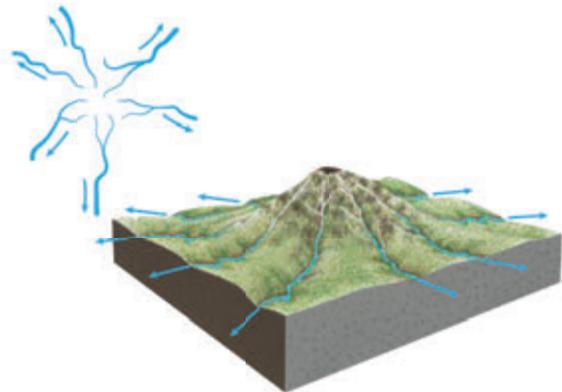
The Himalayas

These are the loftiest mountain ranges in South Asia which separates the plains of Indian Subcontinent and the Tibetan Plateau.

Formation of Himalayas

The subduction of Indo-Australian Plate/ Indian Plate under the Eurasian Plate led to the subsiding of the crust and upliftment of the geosynchline of the Tethys sea leading to the formation of the Himalayas. It is the Young fold mountain. It ranges from Nanga Parbat in the West to Namcha Barwa in the East.

The Himalayas are made up of three parallel ranges

1. Himadri or The Greater Himalayas or the Inner Himalayas
2. Himachal or The Lesser Himalayas or The Middle Himalayas
3. Shiwaliks or The Outer Himalayas

Himadri Himalayas

(a) Average Height: 6,000 m
(b) Width varies from 400 Km in Kashmir to 150 Km in Arunachal Pradesh
(c) Core of this part of Himalayas is composed of granite

Eg: Mount Everest, Kanchenjunga, Nanga Parbat etc.

Himachal Himalayas

(a) Lies between the greater Himalayas in North and the Shiwaliks in the South
(b) The altitude varies between 3,700 and 4,500 metres
(c) Are well-known for its hill stations.

Eg: Mussoorie, Nag Tibba Ranges (Uttarakhand), Dhaula Dhar (Himachal Pradesh), Pirpanjal Ranges (Jammu and Kashmir) etc..
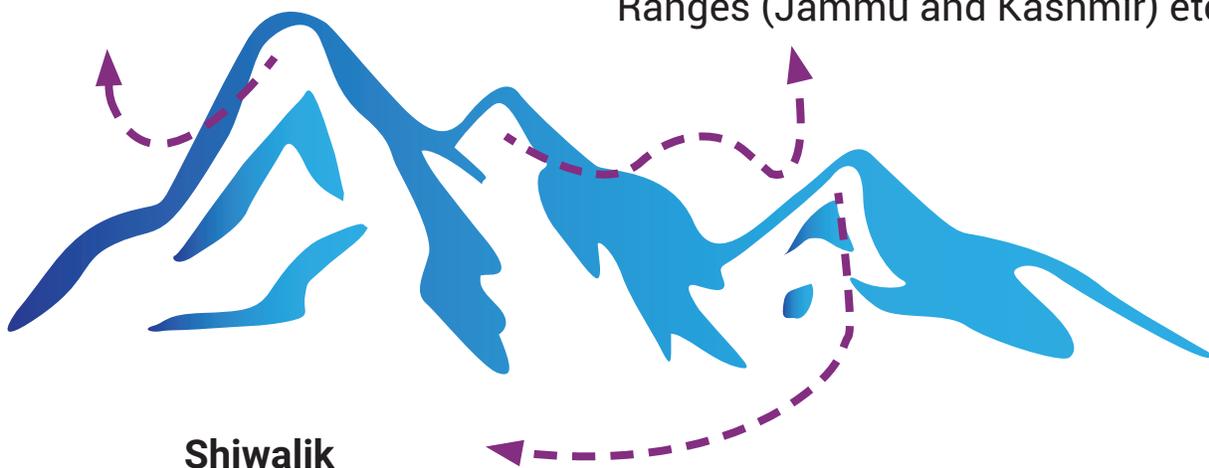
Shiwalik

(a) Located between the Great Plains and the Lesser Himalayas
(b) Average Height: 900 and 1100 metres
(c) Southern slopes are steep and Northern slopes are gentle
(d) Width of Shiwalik varies from 50 km in Himachal Pradesh and 15 km in Arunachal Pradesh
(e) Formed of the unconsolidated material

Duns/ Duars

The longitudinal valley between the Lesser Himalayas and the Shiwaliks is known as the Duns in the west and Duars in the east.

Eg.: Dehradun, Patlidun, Kotlidun etc…
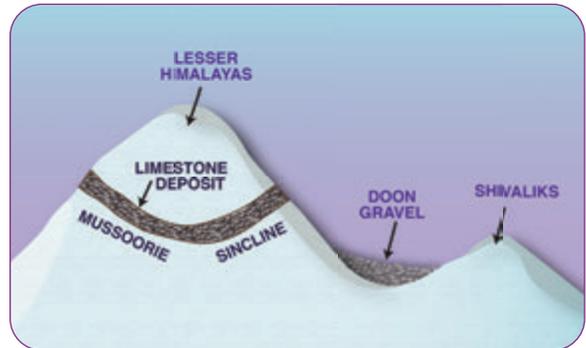
Regional Classification of Himalayas

CLASSIFICATION OF HIMALAYA ON THE BASIS OF GEOGRAPHICAL LOCATION

- ✦ Between Rivers Indus and Satluj: Punjab Himalayas
- ✦ Between Satluj and Kali: Kumaon Himalayas
- ✦ Between Kali and Tista: Nepal Himalayas
- ✦ Between Teesta and Dihang: Assam Himalayas

Quiz Time?

1. Arrange the following Himalayan ranges from North to South:

(i) Karakoram Range (ii) Ladakh Range
(iii) Zaskar Range (iv) Pir Panjal Range

(a) iv, iii, ii, i (b) i, iii, ii, iv
(c) i, ii, iii, iv (d) i, ii, iv, iii

2. Which of the following mountain range belong to the Himachal Himalayas?

(a) Mussoorie Range (b) Nag Tibba Range
(c) Pir Panjal Range (d) All of these

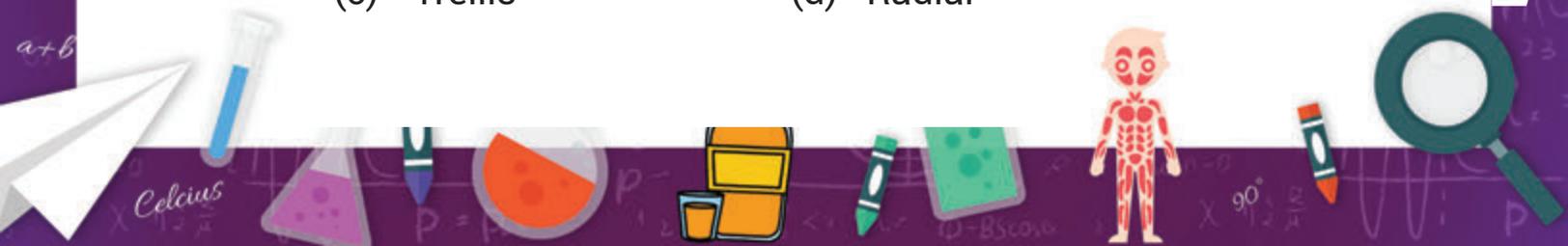**3.** River Narmada, Son form which type of Drainage Pattern?

(a) Dendritic Pattern (b) Trellis Pattern
(c) Rectangular Pattern (d) Radial Drainage Pattern

4. This type of drainage pattern forms his type of drainage pattern develops in a terrain which has uniform rock structure. Identify the drainage pattern.

(a) Rectangular (b) Dendritic
(c) Trellis (d) Radial
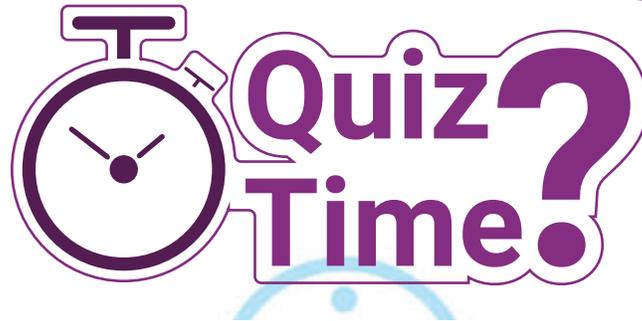
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Answer (Quiz Time)

1. **(c)** i, ii, iii, iv

AFGHANISTAN

K2 (8611 m)

Karakoram Range

Hindu Kush

Kabul

Srinagar

Ladakh Range

Zanskar Range

Islamabad

Pir Panjal

Jhelum River

Dhaula Dhar Range

CHINA (TIBET)

Mt Kailash (6714m)

0 _____ 500 km
0 _____ 300 miles
1:25,000,000

The external boundaries of India on this map have not been authenticated and may not be correct

Chenab River

Ravi River

Siwalik Hills

PAKISTAN

River

Sutlej River

Indus

Delhi

Ganger

GREAT HIMALAYA RANGE

Tsangpo (Brahmaputra)

Mt Exerest (8849 m)

Kangchenjunga (8586 m)

NEPAL

Kathmandu

BHUTAN

Darjeeling

IND

INDIA

Varanasi

BANGLADESH

2. **(d)** All of these

3. **(d)** Radial Drainage Pattern

4. **(b)** Dendritic

Quiz Time?

1 Unlike last week I worked from home,

A.   At my office closer to downtown Fort Wayne I have

B.   a standing desk. That was the longest I'd worked while

C.   where I do not have a standing desk

D.   sitting in more than two years

I had no idea how bad I would feel.

(a) CABD   (b) BCAD

(c) BDCA   (d) ABCD

2 Societal change to an information society

A.   will demand the development of information-related industries

B.   automation technology will require re-education of displaced labour

C.   centred around micro-electronics, communications, computers, etc.

D.   moreover, reducing the labour component of production systems through

(a) ABCD   (b) ACDB

(c) DABC   (d) CADB

3 Continuous anxiety or stress can

    A.   health issues and in such situations, yoga can help us to stay calm

    B.   muscle tension, breathing issues, etc. Stress is the element that

    C.   triggers our sympathetic nervous system causing all these

    D.   manifest many health conditions such as high blood pressure,

    (a) ABCD   (b) DBAC

    (c) DBCA   (d) CABD

4 Rather than going with the flow,

    A.   having good time management skills lets you control your life

    B.   and take the lead at work. By getting enough quality rest and sleep, you'll be

    C.   better placed to make sound decisions at work. Others will notice

    D.   and this will help increase your opportunities for career growth

    (a) CDBA   (b) DBAC

    (c) ABCD   (d) ABDC

Answer (Quiz Time)

1 (a)   **2** (b)   **3** (c)   **4** (c)

Tricks to Solve MAT Questions Easily

A. **Clock**

It is 4 hrs 40 min in a clock. Find the angle between the hour and minute hands of a clock.
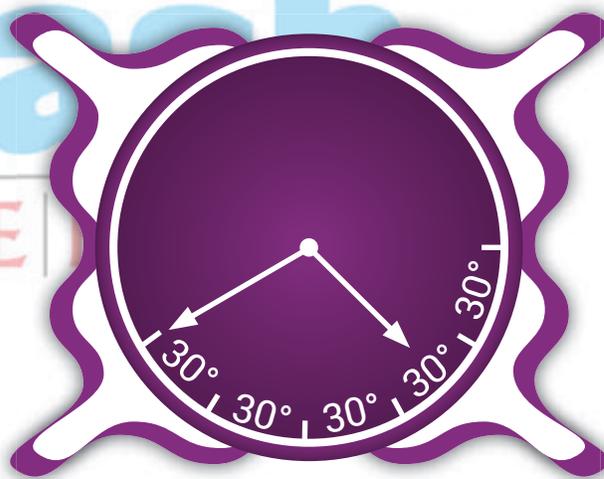
Method 1

1 Division = 30º

So, 4 division = 30º × 4 = 120º

But, the hour hand has already coverd the distance for 40 min. From 4, so the angle covered in these
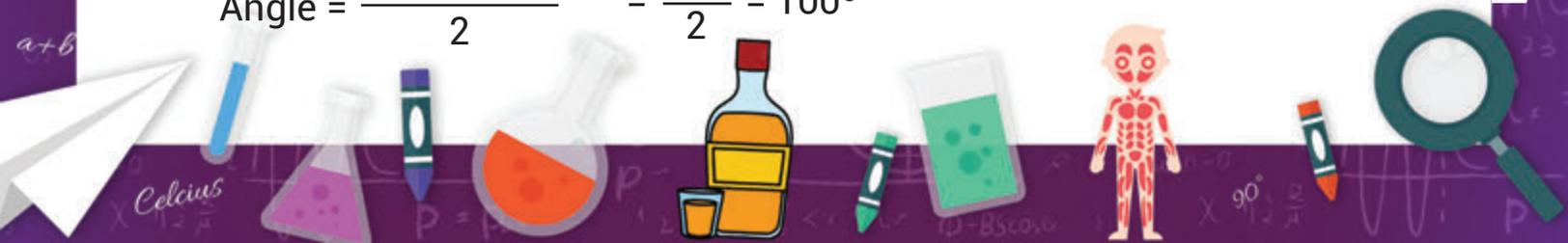
40 min = $\dfrac{1}{2}$ × 40 = 20º

Now, the angle between both hands = 120º − 20º = 100º

Method 2

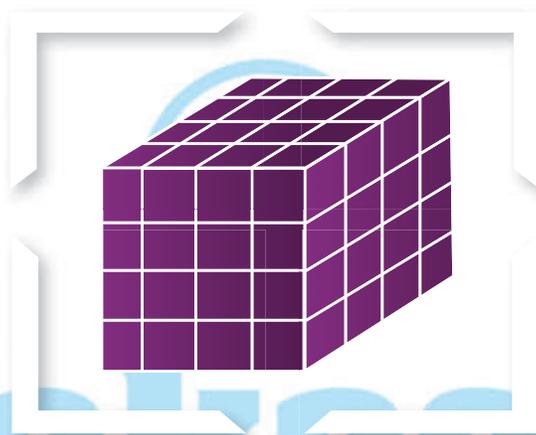Angle = $\dfrac{(11\ m - 60\ h)}{2}$ = $\dfrac{(11 \times 40 - 60 \times 4)}{2}$

Angle = $\dfrac{(440 - 240)}{2}$ = $\dfrac{200}{2}$ = 100º

B. Cube Trick

The most common type of questions based on cube are painting of cube and then cut it into smaller cubes of equal size. Let us say, a cube is painted black on all of its surfaces, then it is cut into 64 small cubes of equal size by 3 cuts is each directions.

As we can see there are 4 rows of 16 pieces (small cubes) each.

▣   Number of cubes with 3 faces painted black = all the corner cubes = 8

▣   Number of cubes with exactly 2 faces painted = $(n - 2) \times$ (number of edges)

[n = length of edge = 4 unit]

$= (4 - 2) \times 12 = 2 \times 12 = 24$

▣   Number of cubes with exactly 1 face painted = Cubes on the faces (except on the edge and the corner)

$= (n - 2)^2 \times 6 = 24$, where n = 4.

▣   Number of cubes with zero face painted

$= (n - 2)^3 = 8$, where n = 4.

Dice Trick

Assume there are 1 to 6 digits in this dice. When number is same but position is different, we use clockwise rule.

The same number is opposite to that number which is not given in these two dice.

Number is same but position different

Step-2

Step-1
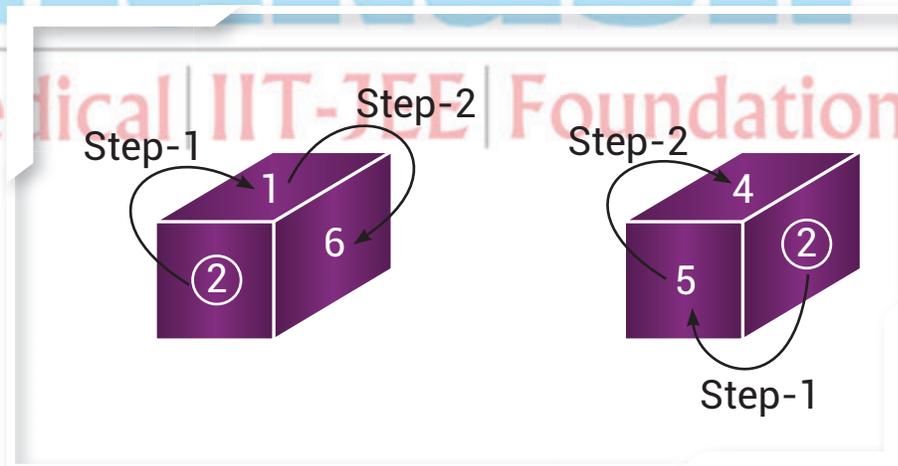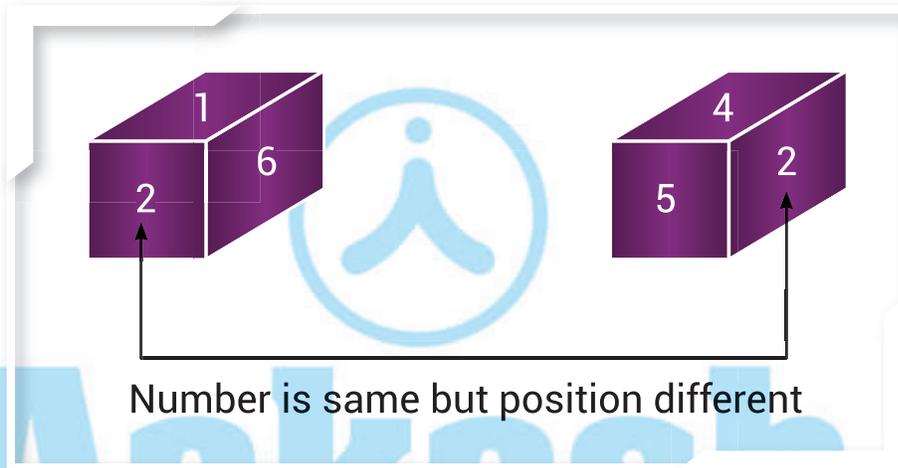
Step-2

Step-2

Step-1

Step-1	5 is opposite to 1
Step-2	4 is opposite to 6
Step-3	2 is opposite to 3

Happy Birthday

Marie Curie

Born - 7 Nov 1867
Died - 4 July 1934

Marie Curie was born on November 7, 1867 in warsow, capital of Poland. She died in 1934 from Leukemia in Paris.

- She studied physical at the Sorbonne, in Paris.
- She was the discover of Polonium and Radium.

Marie Curie is famous for her work on radioactivity. She was the first woman to win a Nobel Prize, the only woman to win in two fields, and the only person to win in multiple sciences. She was also the first woman to become a professor at the University of Paris.

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