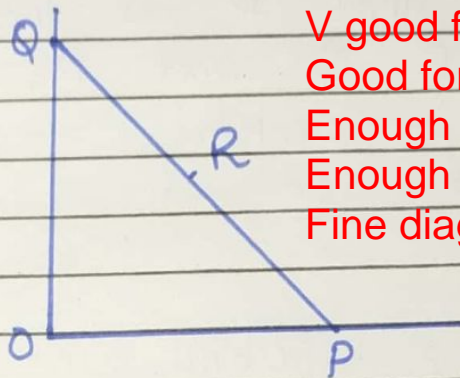


DATE: 03/02/2024

01

SECTION-II

QNO7:
(a)

V good for math portion
Good for theory portion
Enough length
Enough headings
Fine diagrams

Given Data :

Distance between O and P = 300km

Distance between O and Q = 400km

To find :

Distance between Q and R = ?

Solution :

As we know that it shows a right-angled triangle. So, by Pythagoras Theorem

$$(\text{hypotenuse})^2 = (\text{base})^2 + (\text{altitude})^2$$

$$(\overline{PQ})^2 = (\overline{OP})^2 + (\overline{OQ})^2$$

$$= (300)^2 + (400)^2$$

$$(\overline{PQ})^2 = 90000 + 160000$$

$$(\overline{PQ})^2 = 250000$$

Taking $\sqrt{\quad}$ on both sides.

$$\sqrt{(\overline{PQ})^2} = \sqrt{250000}$$

$$\overline{PQ} = 500 \text{ km}$$

The distance between Q and P is 500 km.

It is evident from the given statement that R is the exactly middle of Q and P.

$$\text{So, } \overline{QP} = 500 \text{ km}$$

$$\overline{QR} = \frac{500}{2}$$

$$\overline{QR} = 250 \text{ km.}$$

Result:

The distance between Q and R is 250 km.

(b)

Given Data:

A regular pentagon having each side = 5 cm.

To Find:

$$\text{Perimeter} = ?$$

$$\text{Angles} = ?$$

Solution:

Pentagon:

A pentagon is a geometrical figure having 5 sides.

Regular Pentagon:

When a pentagon has all the five sides equal, it is called regular pentagon.

Perimeter:

The total distance around the outside of the shape is called perimeter.

Calculation of perimeter:

$$\text{Pentagon Perimeter} = 5x$$

$$x = \text{each side} = 5\text{cm}$$

$$\text{Perimeter} = 5 \times 5$$

$$\text{Perimeter} = 25\text{cm}$$

Result:

The perimeter of given regular pentagon is 25 cm.

Angles:

Any geometrical figure such as pentagon has two types of angles:

(i) exterior angles

The sum of exterior angles of regular pentagon = 360°

$$\text{Each exterior angle} = \frac{360^\circ}{5}$$

$$\text{Each exterior angle} = 72^\circ$$

(ii) Interior Angles:

It has 5 interior angles.
The sum of interior angles
of regular pentagon = 540°

$$\text{Each interior angle} = \frac{540^\circ}{5}$$

$$\text{Each interior angle of regular pentagon} = 108^\circ$$

Result:

$$\text{Perimeter} = 25 \text{ cm}$$

$$\text{Exterior angle (each)} = 72^\circ$$

$$\text{Interior angle (each)} = 108^\circ$$

(c) Given Data:

Mental Age = 11 years

Person Age = 9 years

To find:

$$\text{IQ} = ?$$

Solution:

First of all, we will
define IQ i.e Intelligence
Quotient

IQ:

The term IQ was coined in 1912 by psychologist "William Stern." It is often used as a measure of person's intelligence.

Calculation of IQ:

We use the formula as:

$$IQ = \frac{\text{Mental age}}{\text{Chronological age}} \times 100$$

Putting the values given in question:

$$IQ = \frac{11}{9} \times 100$$

$$IQ = 122$$

Result:

So, if the mental age of a person is 11 years and chronological age is 9 years, his/her IQ will be 122.

(d) Given Data:

Average age = 15 years

No. of boys = 3

Ratio of ages = 3:5:7

To find:

Age of youngest boy = ?

Solution:

Let's denote the ages of the three boys as:

$$3x, 5x, 7x$$

As we know that

$$\text{Average} = \frac{\text{Sum of all ages}}{\text{No. of boys}}$$

$$15 = \frac{3x + 5x + 7x}{3}$$

$$x(3 + 5 + 7) = 15 \times 3$$

$$15x = 45$$

$$x = \frac{45}{15}$$

$$x = 3$$

Now putting the value of x .

$$3x = 3(3) = 9 \text{ years}$$

$$5x = 5(3) = 15 \text{ years}$$

$$7x = 7(3) = 21 \text{ years.}$$

Result:

The age of the youngest boy is 9 years.

QNO8:

(a) Given Data :

Consecutive odd numbers = 3

Sum of consecutive odd numbers
= 273

To find :

Three odd numbers = ?

Solution:

What are odd numbers ?

In a number system, the numbers which cannot be divided by "2" are called odd numbers

e.g: 1, 3, 5, 7 ...

Now,

according to question,

There are 3 ^{consecutive} odd numbers and odd numbers have one even number in between so

if one number is x , 2nd one is $x+2$ and 3rd is $x+4$.

Three odd numbers are

$x, x+2, x+4$. → ①

Sum of 3 consecutive odd numbers = 273

$$(x) + x + 2 + x + 4 = 273$$

$$3x + 6 = 273$$

$$3x = 273 - 6$$

$$3x = 267$$

$$x = \frac{267}{3}$$

$$x = 89$$

Now putting the value of x in expression (1) as:

$$\Rightarrow \text{1st number} = 89$$

$$\text{2nd number} = 89 + 2 = 91$$

$$\text{3rd number} = 89 + 4 = 93$$

$$\text{Sum} = 89 + 91 + 93 = 273.$$

Result:

The three consecutive odd numbers whose sum is 273 are : 89, 91 and 93.

(b)

Missing number in series :

(i)

4, 16, 36, 64, 100, 144Explanation:

The series consists of the perfect squares of even numbers as:

$$2^2 = 4$$

$$4^2 = 16$$

$$6^2 = 36$$

$$8^2 = 64$$

$$10^2 = 100$$

$$12^2 = 144$$

Therefore ~~missing~~ number will be 100

(ii) 30, 29, 27, 24, 20, 15.Explanation:

The series consists of backward counting with the difference of 0, 1, 2, 3, 4 numbers as:

$$30, 29 \rightarrow \text{no difference} = 0$$

$$29, \underline{28}, 27 \rightarrow \text{difference} = 1 \text{ num}$$

$$27, \underline{26}, \underline{25}, 24 \rightarrow \text{difference} = 2 \text{ numbers}$$

24, 23, 22, 21, 20 = 3 numbers
in between

20, 19, 18, 17, 16, 15 = 4 numbers
in between

So, the missing number is
24

(ii) 1, 7, 15, 25, 37, 51.

Explanation:

The series consists of the numbers with addition of each consecutive even number starting from 6.

$$1 + 6 = 7$$

$$7 + 8 = 15$$

$$15 + 10 = 25$$

$$25 + 12 = 37$$

$$37 + 14 = 51$$

Therefore, the missing number in the series is 37.

(iv) 0, 2, 6, 12, 20, 30, 42.

Explanation:

The series consists of the

numbers got by the addition of consecutive even numbers starting from 2.

$$0 + 2 = 2$$

$$2 + 4 = 6$$

$$6 + 6 = 12$$

$$12 + 8 = 20$$

$$20 + 10 = 30$$

$$30 + 12 = \underline{\underline{42}}$$

Therefore, the missing number in series is 42.

(v) 48, 24, 72, 36, 108, 54.

Explanation:

$$48 \div 2 = 24$$

$$24 \times 3 = 72$$

$$72 \div 2 = 36$$

$$36 \times 3 = 108$$

$$108 \div 2 = 54$$

So, the missing number is "54".

(c) Correct words :

(i) THRS I

↳ SHIRT

(ii) GNDREA

↳ GARDEN

(iii) SCHAMOT

↳ STOMACH

(iv) ONLNDO

↳ LONDON

(v) HIODALY

↳ HOLIDAY

(d) Given Data :-

Mother age = 6 times of Sara's age
Brothers' age (Ali) = 2 times of " "

After 3 years sum of age = 72.

To find :-

Mother's age = ?

Age of Ali = ?

Age of Sara = ?

Solution:

Present Ages:

Let Sara's age = x .

Mother's age = $6x$

Ali's age = $2x$.

Future Ages:

After 3 years

Sara's age = $x + 3$

Mother's age = $6x + 3$

Ali's age = $2x + 3$

By statement Given:

Sum of ages after 3 years = 72

$$(x + 3 + 6x + 3 + 2x + 3) = 72$$

$$9x + 9 = 72$$

$$9x = 72 - 9$$

$$9x = 63$$

$$x = \frac{63}{9}$$

$$x = 7$$

Now, ages are:

Sara's age = 7 years

Mother's age = $6 \times 7 =$ 42 years

Ali's age = $2 \times 7 =$ 14 years

Result:

The ages of Sara, her brother and her mother are 7 years, 14 years and 42 years respectively.

SECTION I

QNO2:

(a) How volcanoes are erupted?

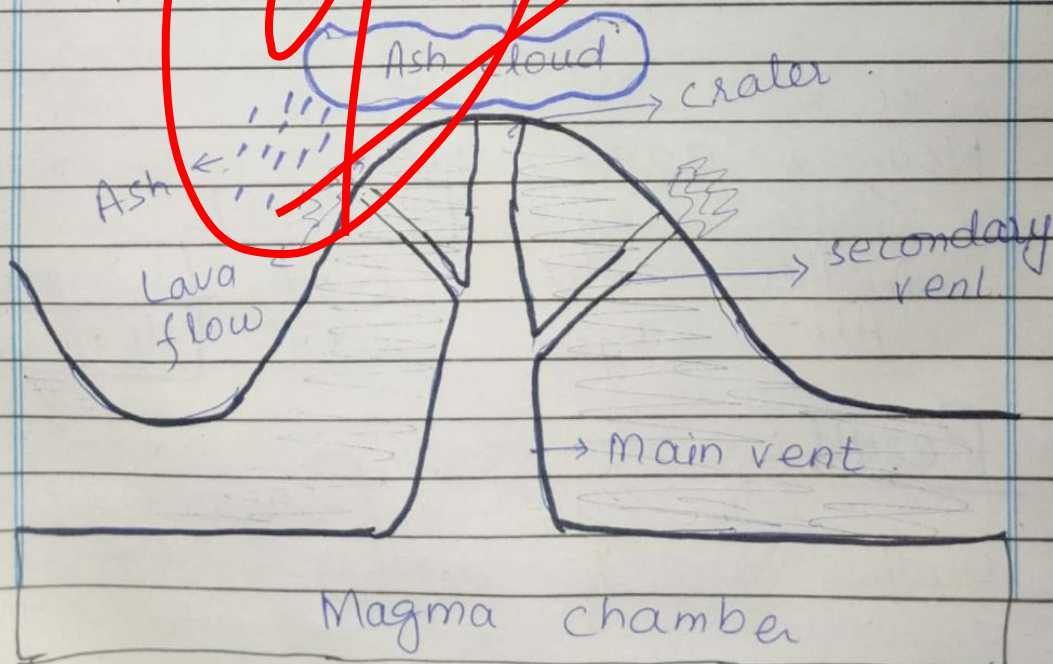
What is Volcano?

"It is a vent in earth's crust through which lava or steam is expelled."

Lava is the mixture of molten and semi-molten rocks on the surface of earth.

What is volcanic eruption?

"The sudden occurrence of violent discharge of steam, gases and rock fragments at earth surface is known as volcanic eruption."



How volcanoes erupted?

Temperature inside the earth is non-uniform.

Consider two regions, one have more temperature, so rocks are in more molten state and less dense. These rocks flow towards the surface of earth i.e magma. Now, the other region has low temperature so it is more rigid and push the magma with a force called "force of buoyancy". Due to this push, magma reaches the earth surface as lava. The lava may be in the form of:

- viscous lava
- non-viscous lava

Viscous lava is more disastrous as more heat is trapped in it.

Some of the main causes of volcanic eruption are as follows:

(i) Sea-Floor Spreading :

Sea floor is broken when plates separated. Fissure extends down to asthenosphere. The magma rises in the gap to form ocean ridges and volcanoes.

(ii) Convergence of tectonic plates :

The convergence may be ocean-ocean plate or ocean-continental plate.

(iii) Percolation of cold water

When cold water come in contact with molten rock, it become lava —

(iv) Orogenic movements :

The movement of mountains decreases pressure on magma, which melts and rises up. Therefore, many volcanoes are found near to mountains.

18th december 2023, volcanic eruption in Iceland :

As this eruption took place after small earthquakes so we may say that it was due to convergence of tectonic plates.

Measurement : It is measured in VEI scale.
min = 0 to max = 8

(b)

BIG BANG

This theory is about the beginning of the universe. This theory was proposed by George Lemaître and advocated by George Gamow.

According to this theory, universe was created in gigantic explosion called big bang. The universe came into existence some 15-20 billion years ago. There was no time and space before that.

This theory advocates that universe is expanded and stretched to grow as large as it is now.

BIG CRUNCH

This theory is about the ultimate fate of the universe.

The theory dates back to Alexander Friedmann (1922)

According to this theory, when force of gravity and attraction between things would take over, the universe

starts contracting, eventually collapsing into a big crunch. The universe ended as it began, with everything crushed into a single speck.

• METHODS TO DETERMINE AGE OF UNIVERSE •

Astronomers estimate the age of the universe in two ways:

(i) By looking for the oldest stars:

They study globular clusters. Then by looking at their mass and brightness, can estimate the age of universe. It has some uncertainty.

(ii) Extrapolating back to Big Bang:

They measure the rate of expansion of the universe and extrapolating back to the Big Bang.

Hubble constant (H_0). This measurement depends upon current density and composition of the universe.

C-

Sources of Renewable Energy

RENEWABLE ENERGY:

The type or form of energy that are naturally replenished and won't be run out is called renewable energy.

Sources:

Five main sources of renewable energy are as follows:

(i) Sun:

The energy coming from sun is solar energy. It is most abundant of all energy resources and can be harnessed in cloudy weather. The solar panel sun energy is converted into electrical energy by using solar cells and solar panels.

Uses: This electrical energy is used for household works, run offices, factories etc.

(ii)

WIND :

The energy coming from wind is wind energy. It is a mechanical energy.

Wind turbines:

These are devices to convert mechanical energy into electrical energy which is used for many purposes.

(iii)

TIDES :

Tides are the waves generated on the surface of water due to gravitational pull of moon.

Device used: Salter's duck is used to convert tidal energy to electrical energy.

(iv)

~~HYDAL ENERGY WATER~~

The energy coming from flowing water is hydal energy. The dams are constructed and turbines are built to convert it into electrical energy which is the main source of electricity.

(v)

EARTH HEAT :

It is called geothermal energy. Water is entered through wells to touch magma & converted into

steam, which is used to run turbines to generate electricity.

Q NOS: (a)

± METHODS OF FOOD PRESERVATION ±

What is food preservation?

The process of treating and handling food in such a way as to stop or greatly slow down spoilage and prevent foodborne illness while maintaining nutritional value, texture and flavour is known as food preservation.

★ Why is food preserved?

Food is preserved for later use and is done for three reasons:

- (i) To preserve natural characteristics of food.
- (ii) To preserve appearance of food.
- (iii) To increase the shelf value of food for storage.

Methods:

There are three main methods:

- (i) Natural Food Preservatives
- (ii) Chemical Food Preservatives
- (iii) Artificial Food Preservatives.

Preservative:

It is a substance that is added to products to prevent decomposition by microbes or chemical changes.

(i) Natural Method:

Natural methods include drying, refrigeration and fermentation. The natural food preservatives comes the salt, sugar, alcohol, vinegar etc, these are used at home while making pickles, jams etc. Boiling and smoking are also natural methods to preserve food.

(ii) Artificial Method:

The artificial preservatives such as antimicrobial agents (benzoates etc), antioxidants (vitamins) and chelating agents are used to preserve food. They are added or sprayed on food to prevent from spoilage.

(iii) Chemical Methods:

The method of food preservation such as canning, sterilization, salting in which chemical preservatives are used. such as nitrates, sulphites etc are chemical methods.

(b)

MILKY WAY :

It is a huge collection of stars, dust and gas. It is a spiral galaxy.

Our earth or more commonly our solar system is a part of this Milky Way galaxy.

How Dark Matter is related to Galaxies.

Dark Matter :

It is also called cosmological cements. It consists of non-interacting particles. 27% of the universe is made up of dark matter. It makes up most of the mass of galaxies and is responsible for the way galaxies are organized.

Relation with Galaxies:

It is related to galaxies as it makes up most of the mass of galaxies and is responsible for the way galaxies are organized.

Parts of a Galaxy:

It has six parts:

- (i) nucleus
- (ii) central bulge
- (iii) a disk (thin, thick)
- (iv) arms
- (v) a spherical component
- (vi) a massive halo.

(c) Solar and Lunar Eclipse Differences are as follows:

① Definition:

Solar Eclipse: When ~~sun~~ ~~on~~ the moon comes in between the earth and the sun, the light from the sun is blocked to reach the earth.

Lunar Eclipse: When earth comes in between sun and moon and blocks the sunlight reflected by the moon, lunar eclipse occurs.

② Types of solar eclipse:

- ① Partial eclipse
- ② Total eclipse
- ③ Annular solar eclipse

Types of lunar eclipse

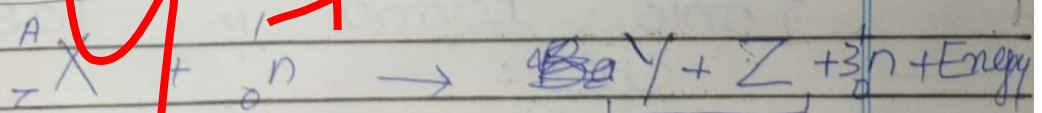
- ① Penumbral lunar eclipse
- ② Partial lunar eclipse
- ③ Total lunar eclipse

③ (d) Nuclear Fission and Fusion

Nuclear Fission:

It is a nuclear reaction in which the nucleus of the atom splits into smaller parts. It releases a large amount of energy.

Reaction:



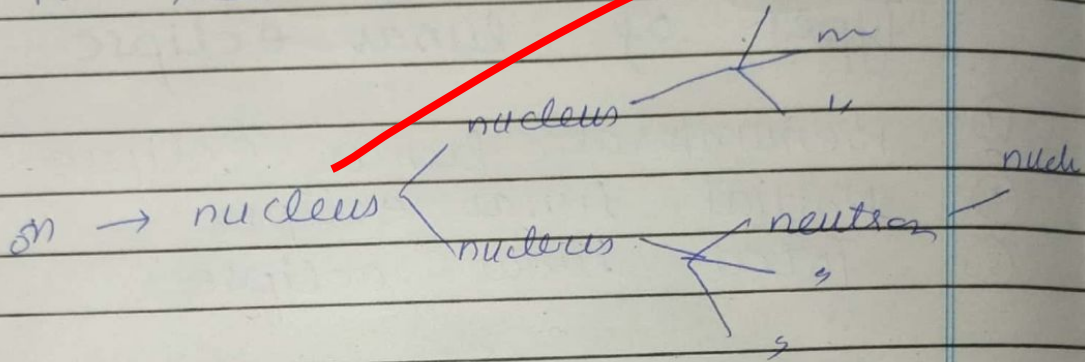
$A =$ less than original.

Types:

- ① Spontaneous Fission
- ② Induced Fission

Fission Chain Reaction:

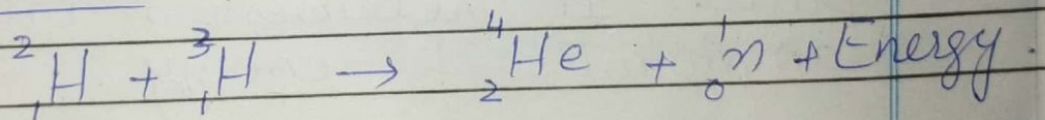
The neutrons produced in the reaction produce an additional reaction and it leads to a chain.



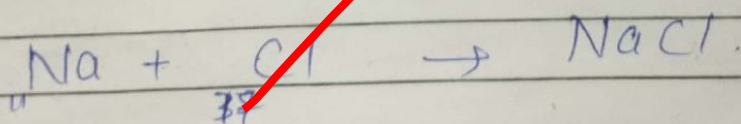
Nuclear Fusion:

A nuclear reaction in which two nuclei combine to produce a single nucleus with a higher mass number.

Reaction:

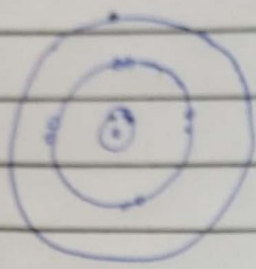


Ionic Bond in Table Salt:

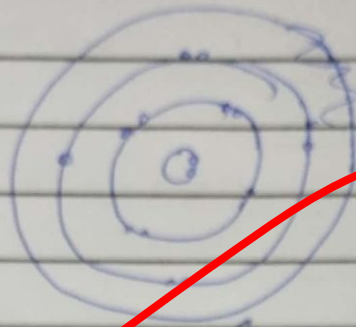


Ionic bond is formed by complete transfer of electrons from one species to another or the combination

of anions and cations.

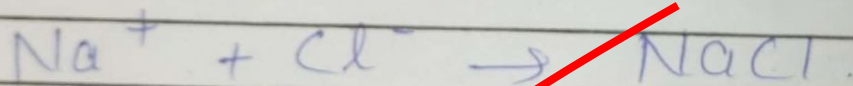
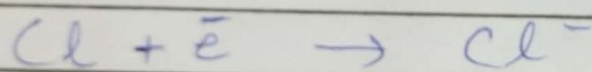
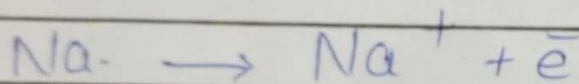


Na



Cl

Na has one electron in outermost shell and Cl has seven electrons.



Na loses the e^- to become Na^+ and Cl^- gains it to become Cl^- and it becomes ionic bond.