

Section-I

QNO: 2

Good for math  
Keep length equal for all parts  
Paper presentation is fine  
Fine diagrams

a) How volcanos are erupted?

Volcano:-

A volcano is an opening or a vent in the surface of the Earth through which molten lava rises and escapes on to the Earth's surface.

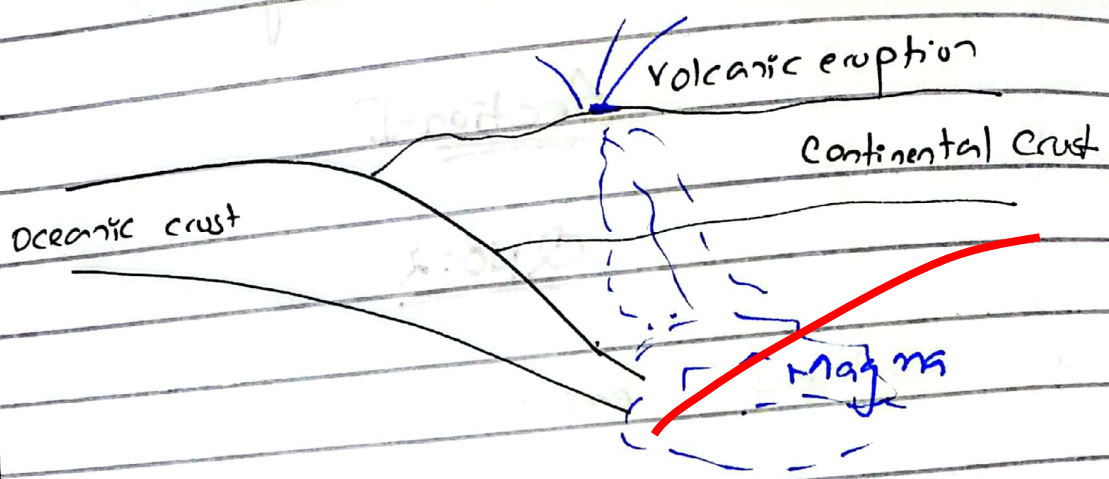
How volcanos erupt:-

Molten rocks inside the Earth makes up a hot-thick liquid called magma. Its pressure builds up inside the earth and eventually explodes. When magma burst out it is called lava. Volcanos are erupted in three ways.

1. Eruption via subduction:-

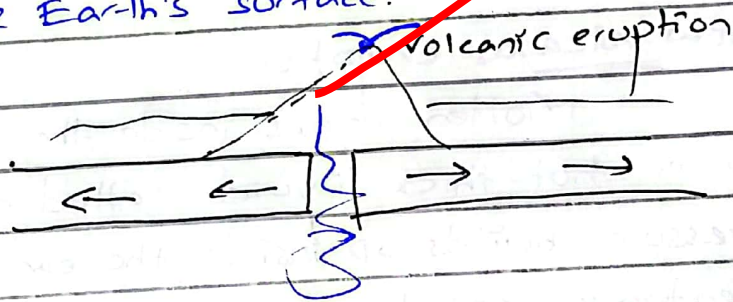
A subduction volcano is formed when continental and oceanic crust converges. The oceanic crust sinks while the continental crust overrides it. The oceanic crust melts and migrate upwards until it erupts from on the surface of the earth, thus creating a volcano.





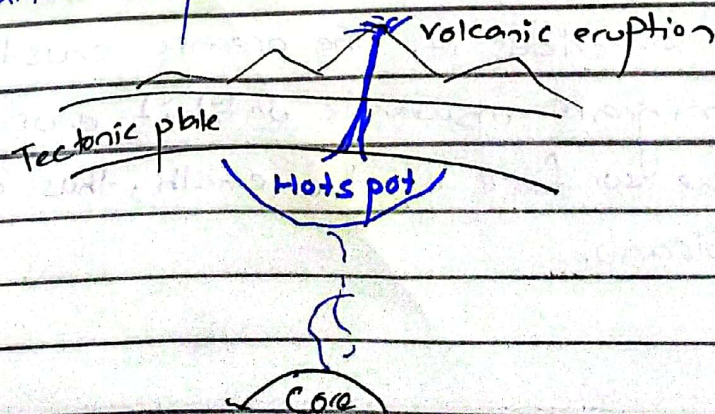
## 2- Volcanic eruption via rifting

It so happens that the plates are pulled apart. This causes magma to rise and cause volcanic eruption on the Earth's surface.



## 3- Volcanic eruption at Hotspots:

A hotspot is an area where heat rises from Earth's core. They do not need plate boundary, but erupt from the middle of the plate. The hot mantle plumes rise to the surface forming volcanic eruption.

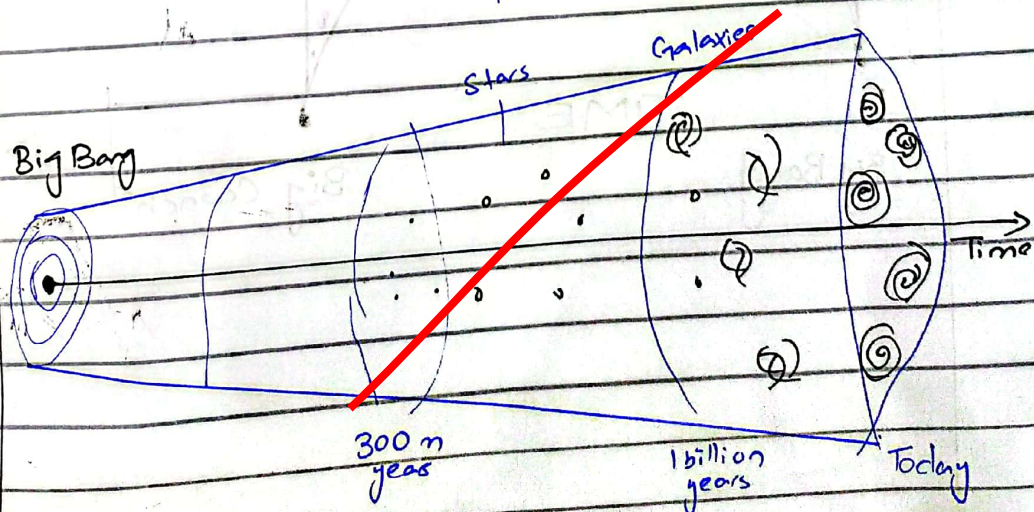




b. What is Big Bang and Big Crunch? How the age of universe is determined?

### Big Bang :-

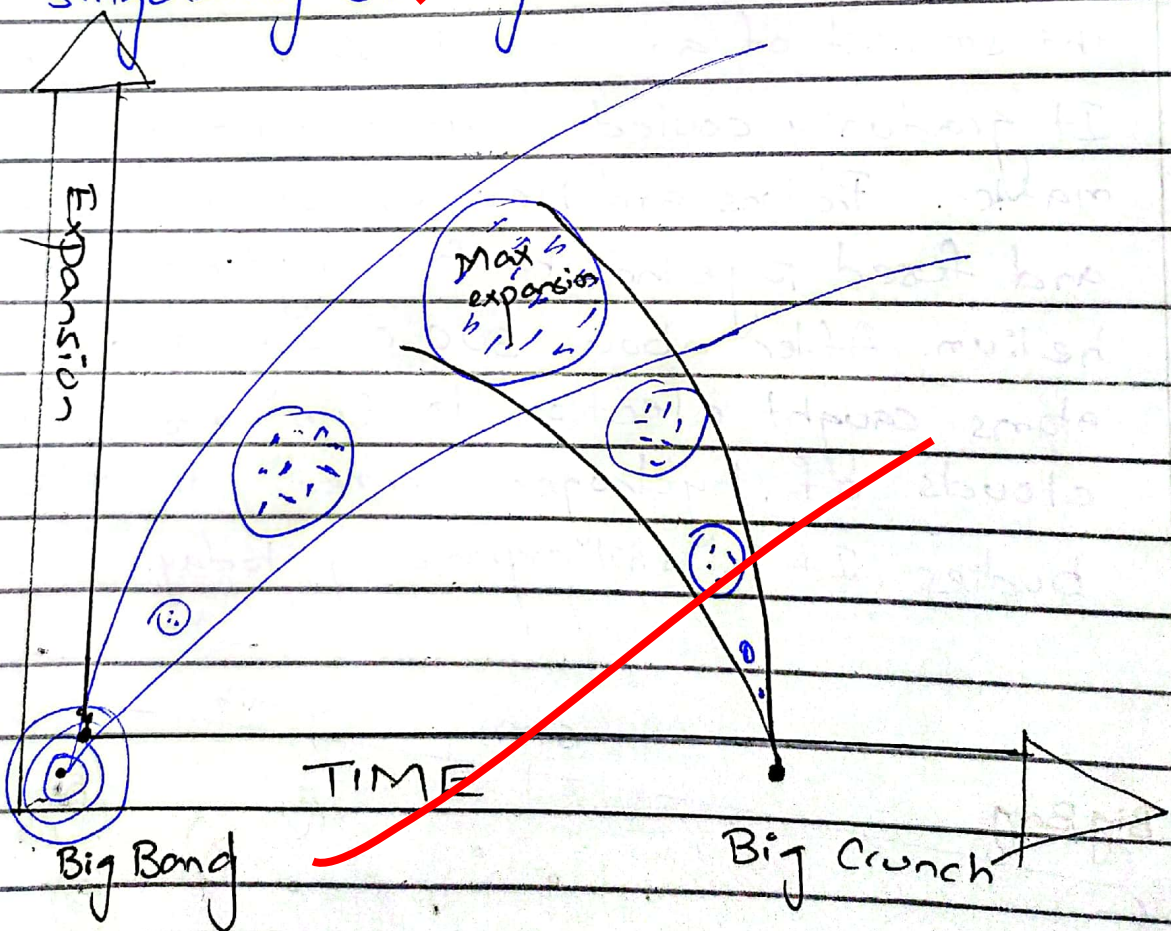
Big Bang is the leading theory about how the universe began. According to this theory, about 13.7 billion years ago universe was inside a single point which was hotter and denser than anything. It is called as singularity. It exploded and the universe was born. Time, space and matter began to form. Within seconds, it grew from the smallest of an atom to bigger than galaxies. It gradually cooled down and energy formed matter. Protons and Neutrons started to form and fused together to form hydrogen and helium. After about 300,000 years, the atoms caught electron to form atoms. The clouds of hydrogen formed all celestial bodies. It is still expanding today.





## Big Crunch:-

Big Crunch is a theory about the ultimate fate of the universe. According to this theory, universe will stop expanding and the universe will begin to contract. The gravity pulls on matter, the universe will fall and collapse back into the super hot and dense singularity. So, when the universe will reach maximum expansion, it will collapse upon itself and become singularity once again.





## Determining the age of the universe—

Astronomers do not exactly know the age of the universe, but they can estimate it in two ways.

### a) By looking for the oldest stars

Astronomers look at cluster of stars to determine age of the universe. The age of stars is determined by their lifecycle which depends on its mass. High mass stars are brighter than low mass star.

These stars are than compared to the sun.

A brighter star is more massive than sun and will run out of its fuel faster.

and vice versa. The oldest stars are approximately 11 to 12 billion years old (Nasa, 2023).

### b) By measuring the rate of expansion

Hubble constant is used to measure the expansion rate of the universe. This rate is extrapolated back to the Big Bang. This depends on the current density and composition of the universe. If the expansion is decelerating, universe is young and if it is accelerating, it is older.

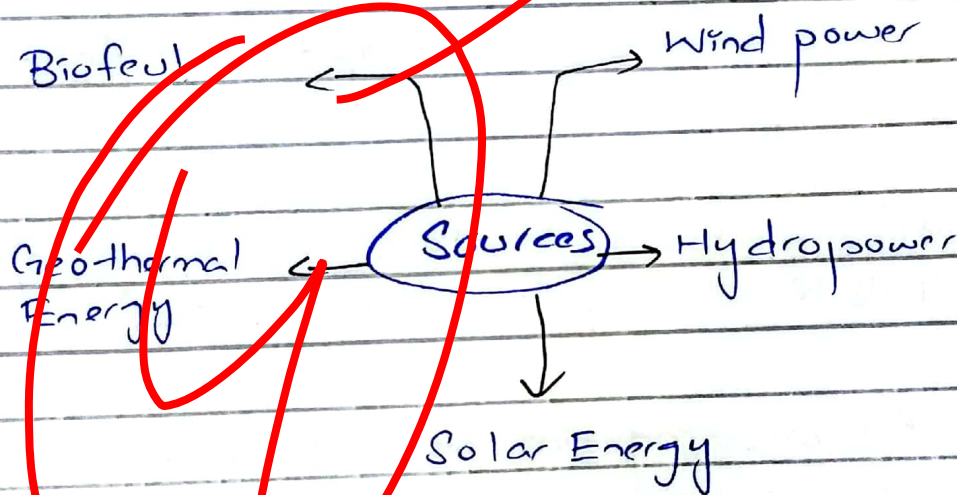


c) Discuss five sources of renewable energy.

### Renewable Energy :-

Renewable energy is a type of energy collected from resources which can be naturally replenished with time.

### Sources of Renewable Energy



#### 1- Wind power :-

Air can run wind turbines. Stronger winds increase power output. Air and winds are constant and can run wind turbines continuously. The areas where stronger and constant winds occur are used to make wind farms that produce electricity from energy. Modern wind turbines produce 600kw to 5 MW power.



## 2- Hydropower

Energy in water can also be used to run turbines. It is denser than air, and can yield large amount of energy. Large-scale hydroelectric dams like Mangla and Tarbela dam produce large amount of energy. Micro-hydro system produce lesser energy, but is essential for remote-area power supply. Similarly, Tidal power is produced when tides produce energy which is used to generate electricity.

## 3- Solar Energy:-

Sun's solar energy maintains life on Earth. It can also be used to produce electricity. Solar-powered photovoltaic cells collect and harness solar energy which is used to power homes and offices.

## 4- Geothermal Energy:-

Hot water or steam from underground water can be used to run turbines. The hot rocks warm the underground water which rises on the surface as hot water and steam which is used to produce electricity.



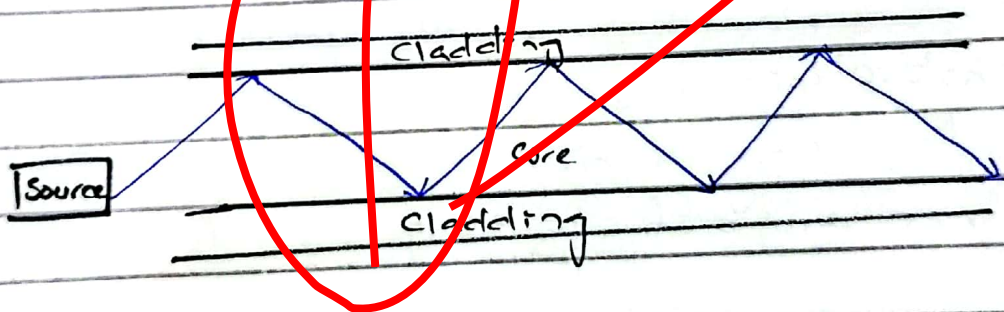
## 5- Bio-fuel :-

Biological material is derived from living organisms mainly from plants and animals. Animal excreta can be burn to produce energy.

d. How optical fibres work?

### Working of Optical fiber :-

Optical fiber works by transmission of light signals from one point to another. If light hits the glass at an angle below  $42^\circ$ , it reflects back again.



This process is called total internal reflection. It keeps the light inside the optical fiber. A transmitter converts electrical signal into light which is transmitted to the destination where the receiver converts it into electrical signal again.



## Section-II

QNO: 6

- a) votes received by candidate A = 15,000  
" B = 10,000  
" C = 8,000

Percentage of winning candidate = ?

Candidate A received the highest numbers of vote, so he is a winning candidate.

$$\% \text{ age of winning candidate} = \frac{\text{Votes received by winner}}{\text{Total number of votes}} \times 100$$

$$\begin{aligned} \text{Total votes} &= 15,000 + 10,000 + 8,000 \\ &= 33,000 \text{ votes} \end{aligned}$$

$$\% \text{ of winning candidate} = \frac{15,000}{33,000} \times 100$$

$$\text{Percentage of winning candidate} = 45.45\%$$

- b) Ratio of angle of triangle = 3 : 4 : 5  
Each angle = ?

Let the angles be =  $3x$ ,  $4x$ ,  $5x$

Then,

$$3x + 4x + 5x = 180$$

( $180^\circ$  = sum of all angles)

$$12x = 180$$

$$x = \frac{180}{12}$$

$$x = 15$$



$$x = 15$$

Multiply  $3x$ ,  $4x$  and  
Add Putting value of  $x$

$$3x = 3(15) = 45^\circ$$

$$4x = 4(15) = 60^\circ$$

$$5x = 5(15) = 75^\circ$$

Hence, the angles of the ratio 3:4:5 are  
 $45^\circ$ ,  $60^\circ$  and  $75^\circ$ .

c) Each group = 4 boys + 6 girls  
Required no. of boys = ?

$$\text{Girls} = 102$$

$$\frac{4}{3} = \frac{4x}{6 \times 102}$$

$$\frac{2}{3} = \frac{x}{102}$$

$$2 = \frac{3x}{102}$$

$$2 = \frac{x}{34}$$

$$x = 34(2)$$

$$x = 68$$

So, required no. of boys are 64.



d. Present ages ratio of A & B = 6:7  
Future age ratio = 7:8  
Present ages = ?

Present age of A =  $6x$

Present age of B =  $7x$

Future age of ~~A~~ =  $x + 5$

~~Future age of B =  $x + 5$~~

$6x = \text{Future age of A} = 6x + 5$

Future age of B =  $7x + 5$

$$\frac{6x+5}{7x+5} = \frac{7}{8}$$

$$(6x+5)8 = 7(7x+5)$$

$$48x + 40 = 49x + 35$$

$$40 - 35 = 49x - 48x$$

$$x = 5$$

Present age of A =  $6x$   
=  $6(5)$   
= 30 years

Present age of B =  $7x$   
=  $7(5)$   
= 35 years

The present age of A and B is 30 years and 35 years respectively.



QNO: 8

The sum of three consecutive odd numbers = 273  
Three numbers = ?

First odd integer =  $i$

Second odd integer =  $i + 2$

Third odd integer =  $i + 4$

The sum of these numbers = 273

$$i + i + 2 + i + 4 = 273$$

$$3i + 6 = 273$$

$$3i = 273 - 6$$

$$3i = 267$$

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

$$i = 89$$

Putting value of  $i$

$$i + 2 = 89 + 2 = 91$$

$$i + 4 = 89 + 4 = 93$$

So, the consecutive odd numbers are 89, 91, 93

$$89 + 91 + 93 = 273$$



b. Missing numbers

(i) 4, 16, 36, 64, ?, 144

$$2^2 = 4$$

$$4^2 = 16$$

$$6^2 = 36$$

$$8^2 = 64$$

$$10^2 = 100$$

$$12^2 = 144$$

All the numbers are squares of even numbers.  
The missing number is square of 10 (i.e. 100).

4, 16, 36, 64, 100, 144

(ii) 30, 29, 27, ?, 20, 15

$$30 - 1 = 29$$

$$29 - 2 = 27$$

$$27 - 3 = 24$$

$$24 - 4 = 20$$

$$20 - 5 = 15$$

All the numbers are being subtracted by consecutive numbers.

30, 29, 27, 24, 20, 15



(iii) 1, 7, 15, 25, ?, 51

$$1 + 6 = 7$$

$$7 + 8 = 15$$

$$15 + 10 = 25$$

$$25 + 12 = 37$$

$$37 + 14 = 51$$

All the numbers are obtained by adding consecutive even numbers starting from six.  
So, the missing number is 37.

1, 7, 15, 25, ~~37~~, 51

(iv) 0, 2, 6, 12, 20, 30, ?

$$0 + 2 = 2$$

$$\overset{6}{\cancel{2}} + 6$$

$$2 + 4 = 6$$

$$6 + 6 = 12$$

$$12 + 8 = 20$$

$$20 + 10 = 30$$

$$30 + 12 = 42$$

All numbers are sum of even consecutive numbers. Missing number is 42.

0, 2, 6, 12, 20, 30, ~~42~~.



v) 48, 24, 72, 36, 108, ?

$$48 \div 2 = 24$$

$$24 \times 3 = 72$$

$$72 \div 2 = 36$$

$$36 \times 3 = 108$$

$$108 \div 2 = 54$$

First number is divided by two and the second number is multiplied by 3 to get third number which is again divided by 2 and so on.

48, 24, 72, 36, ~~108~~, 54.

c. Find correct word

(i) THRSI

SHIRT

(ii) GNDREA

GARDEN

(iii) SCHAMOT

STOMACH

(iv) ONLNDO

LONDON

(v) HIODALY

HOLIDAY



$$\text{Sara's age} = x$$

$$\text{Sarah's Mother's age} = y$$

$$\text{Sarah's mother age} = 6x$$

$$\text{Sarah's brother age} = 2x$$

Future (3 years)

$$x + 6x + 2x = 72$$

Present age = ?

In three years, their age will be

$$\text{Sarah's age} = 3 + x$$

$$\text{Mother's age} = 3 + 6x$$

$$\text{Brother's age} = 3 + 2x$$

$$\text{or } 3 + x + 3 + 6x + 3 + 2x = 72$$

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

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

$$9x + 9 = 72$$

$$9x = 72 - 9$$

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

$$x = 7 \text{ years}$$

$$\text{Sarah's age} = 7 \text{ years old}$$

$$\text{Mother's age} = 6x = 6(7) = 42 \text{ years}$$

$$\text{Brother's age} = 2x = 2(7) = 14 \text{ years}$$

Their present ages are: Sara's age = 7 years,  
Mother's age = 42 years, Brother's age = 14 years.