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GSA

Q8) a) . Solution:

Let the three odd numbers be:

$$x, x+2, x+4$$

Since, the sum of three consecutive odd numbers is 273,

Therefore,

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

Solving,

$$x + x + 2 + x + 4 = 273$$

$$3x + 6 = 273$$

$$3x = 273 - 6$$

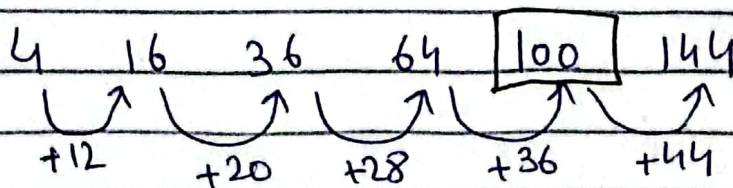
$$3x = 267$$

Dividing by 3, we get

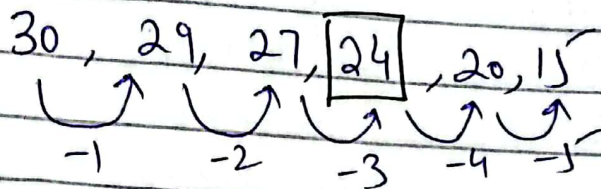
$$x = 89$$

So, the three consecutive odd numbers are $\boxed{89, 91, 93}$

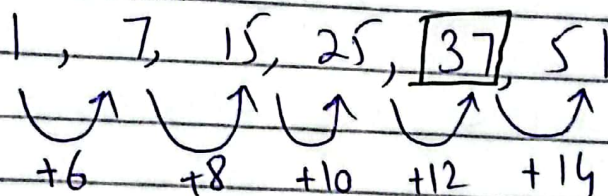
b) i) 4, 16, 36, 64, ?, 144



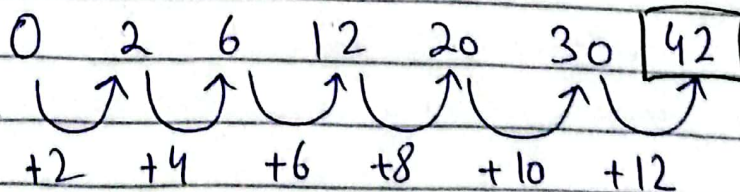
ii) 30, 29, 27, ?, 20, 15



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

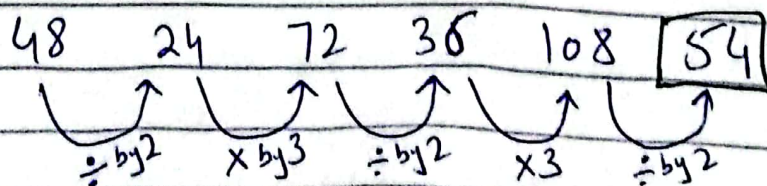


iv) 0, 2, 6, 12, 20, 30, ?



In this numeric series, each term is obtained by successive addition of 2 in next terms.

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



In this numeric series, each term is obtained by dividing by 2 and next term multiplying by 3 and so on alternatively.

c) i)	THRSI	SHIRT
ii)	GNDREA	DANGER
iii)	SCHAMOT	STOMACH
iv)	ONLNDO	LONDON
v)	HIODALY	HOLIDAY

d) Solution

Present Age, Let Sara = x

Ali = y

mother = z.

Future Age,

Sara = x + 3

Ali = y + 3

mother = z + 3

Now, from question, we have,

$$z = 6(x) \quad \text{--- (1)}$$

$$y = 2(x) \quad \text{--- (2)}$$

In 3 years time, sum of their ages will be 72,

so,

$$(x+3) + (y+3) + (z+3) = 72$$

$$x+3 + y+3 + z+3 = 72$$

$$x+y+z = 63 \quad \text{--- (3)}$$

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Now, putting value of z and y from eq (1) & (2) in eq (3), we have

$$x + 2x + 6x = 63.$$

$$9x = 63$$

$$x = \frac{63}{9} \Rightarrow \boxed{x = 7}$$

Putting x in (1) & (2), we get

$$z = 6(7) \Rightarrow \boxed{z = 42}$$

$$\text{and } y = 2(7) \Rightarrow \boxed{y = 14}$$

So, Ages now are:-

Sara	=	7 years old
Ali	=	14 years old
Their mother	=	42 years old.

Q7) a). Solution:

To Find:-

$$QR = ?$$

Given:-

$$OP = 300 \text{ km}$$

$$OQ = 400 \text{ km}$$

R is exactly in the middle of Q and P,

First we have to find PQ.

For this,

we use Pythagoras Theorem,

$$(PQ)^2 = (OP)^2 + (OQ)^2$$

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

$$= 90000 + 160000$$

$$(PQ)^2 = 250000$$

Taking square root, we have

$$PQ = 500$$

Since, R is exactly in the middle of Q and P,

so,

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

c) Solution

To Find:-

$$IQ = ?$$

Given:-

Mental age = 11 years

Actual age = 9 years.

We can find IQ using the formula,

$$I.Q = \frac{\text{Mental age} \times 100}{\text{Actual age}}$$

$$I.Q = \frac{11 \times 100}{9}$$

$$I.Q = \frac{1100}{9}$$

$$I.Q = 122.22$$

d) Solution

Average age of 3 boys = 15 years
if their ages are in the ratio 3:5:7

To Find:

Age of youngest boy.

Since ratio of ages is 3:5:7

so,

$$3 + 5 + 7 = 15 \text{ parts.}$$

We know, formula of average,

$$\text{Average / Mean} = \frac{\text{Sum of obs}}{\text{No. of obs.}}$$

In this case,

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

~~we~~

$$\text{Sum of ages} = \text{Average age} \times \text{No. of boys}$$

$$= 15 \times 3$$

$$\text{Sum of ages} = 45$$

Now, using above ratios to calculate age of each boy,

$$\text{Boy 1} = \frac{3}{15} (45) = \boxed{9 \text{ years old.}}$$

$$\text{Boy 2} = \frac{5}{15} (45) = 15 \text{ years old.}$$

$$\text{Boy 3} = \frac{7}{15} (45) = 21 \text{ years old.}$$

Hence, the age of youngest boy is $\boxed{9 \text{ years old}}$

A regular Pentagon has all its five sides equal and all five angles are equal. Hence, we can find the measure of each interior angle of a regular pentagon with following formula:

$$\text{Interior angle} = \frac{(n-2) \times 180^\circ}{n}$$

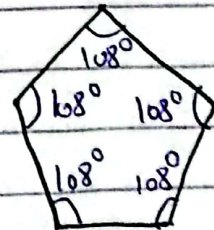
where n is the number of sides,
here, $n = 5$.

So,

$$\text{Interior angle} = \frac{(5-2) \times 180^\circ}{5}$$

$$= \frac{3 \times 180^\circ}{5}$$

$$= \frac{540}{5}$$



$$\boxed{\text{Interior angle} = 108^\circ}$$

Therefore, each interior angle of a regular pentagon is 108° .

Since, opposite angles in a regular pentagon are equal, so, each exterior angle would be $180^\circ - 108^\circ = 72^\circ$

$$\boxed{\text{Exterior angle} = 72^\circ}$$

Q2) a) Volcanoes

Volcano is a vent in the earth's crust through which Lava or steam is expelled.

i) Lava

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

How Volcanoes erupt

Volcanic eruptions ~~result~~ result from the release of magma, gas, and volcanic materials from within the Earth.

Magma forms beneath the surface, creating pressure, rises due to its buoyancy and pressure from below. As magma rises, gas expansion, contributes to the eruption.

The Type of eruption depends on factors like magma/lava viscosity.

Types of Eruption

• Explosive Eruption

High-viscosity magma and trapped gases lead to violent explosions, ejecting ash, rocks and volcanic debris

• Effusive Eruption

Low-viscosity magma allows for a more gradual flow of lava.

Lava flows down the volcano's slopes and the type of lava influences the flow dynamics. Solidified lava forms volcanic rocks and landscapes.

Besides direct eruption effects, secondary hazards like mudflows, pyroclastic flows and volcanic gases can pose dangers to nearby communities.

b) Big bang

Big bang theory is a cosmological model that explains the origin of the universe. It suggests that the universe began as an extremely hot and dense point, or singularity, around 13.8 billion years ago. At this moment, the universe rapidly expanded and cooled, leading to the formation of matter, galaxies, and the modern structure.

Evidence supporting Big bang theory includes the cosmic microwave background radiation and the observed abundance of light elements.

Big Crunch

The Big Crunch is a speculative scenario in the evolution of the universe. It proposes that after a period of expansion, the gravitational forces acting on the matter

in the universe could potentially slow down and reverse the expansion. In this scenario, the universe would contract, leading to a collapse known as the Big Crunch.

However, current evidence suggests that the expansion of the universe is accelerating rather than slowing down, and the Big Crunch is not the most likely fate.

Age of the universe

The universe's age, approximately 13.8 billion years, is determined through various methods like analyzing cosmic microwave background radiation, observing distant celestial objects, and studying the oldest stars and isotopic decay.

c) Sources of Renewable Energy

1) Solar Energy

Sunlight is harnessed using photovoltaic cells or solar panels to generate electricity. Electrons eject and move through circuit, electric current is stored and transmitted through inverter, which converts DC into AC current, to the appliances connected with solar panel system. Solar cells are black as they

are best absorbers.

Examples in Pakistan include Quaid-e-Azam solar power plant in Bahawalpur.

2) Wind Energy

Another form of renewable source where wind turbines convert kinetic energy from the winds into electrical energy.

3) HydroPower / Hydel energy

In this source, flowing or falling water (from rivers or dams) is used to generate mechanical power, which is then converted into electricity.

4) Geothermal Energy

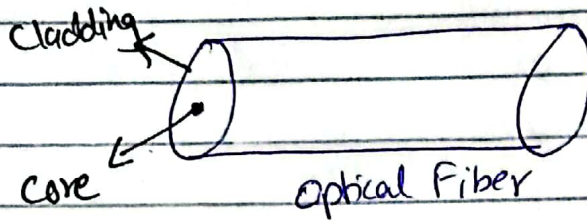
In geothermal energy, heat from the Earth's interior is utilized to produce steam, which drives turbines to generate electricity.

5) Biomass Energy

Organic materials such as wood, agricultural residues, and waste are burned or converted into biofuels to produce heat or electricity.

d) Optical Fiber

The strands of glass used to transmit light signal from one point to another point in telecommunication.



How Optical Fibers work

Optical Fibers work on the principle of total internal reflection and the transmission of light signals through the core of the fiber.

Core

It is the central part and has high density. It has high refractive index meaning more bending of light in core.

Cladding

It surrounds the core and has low density as well as low refractive index.

Total Internal Reflection

When light enters the core of the optical fiber, it can undergo total internal reflection. The key is that the light strikes

the core-cladding interface at an angle greater than the critical angle. This reflection keeps the light confined within the core, preventing significant loss of signal.

Light signals

Light signals are used to transmit data, typically in the form of laser or LED-generated pulses. These light signals bounce off the core-cladding interface, effectively travelling through the length of the fiber.

Fiber Optic Cables

Multiple optical fibers are often bundled together in a protective covering, forming a fiber optic cable. The cables can transmit a vast amount of data over long distances with minimal signal loss.

Signal Amplification and Transmission

As light signals travel through the optical fiber, amplifiers may be used to boost the signal strength. This enables transmission of data over long distances without degradation.

Data Transmission

The light signals carry data in form of binary codes (0s and 1s), representing information such as voice, video, or internet data. The rapid

on-off switching of the light signals translates into digital information.

Advantages

High Bandwidth

Low Signal Loss

Light weight and Flexible

Immunity to Electromagnetic Interference

Optical fibers are widely used in telecommunication, internet communication, and various data transmission applications due to their efficiency and reliability in carrying information over extended distances.