

General Science & Ability

①

SECTION-II

Question 6

(a) Age of father was thrice of the age of the son 5 years ago. If son is 30 YO now. What is current age of father

Solution

$$\text{let age of father} = x$$

$$\text{age of son} = y = 30$$

According to given condition.

$$(x-5) = 3(y-5)$$

$$x-5 = 3(25)$$

$$x-5 = 75$$

$$\boxed{x=80}$$

So the current age of father is 80 years.

(b) Mean of 10, 30, Y and 50 is 50. What is Y.

$$\text{Mean} = \frac{\text{sum of values}}{\text{No. of values}}$$

$$\text{Mean} = \frac{10+30+Y+50}{4}$$

$$\text{Given: mean} = 50$$

so

$$50 = \frac{90+Y}{4}$$

$$200 - 90 = Y$$

$$14 = 110$$

C. Find the missing terms

(i) 2, 6, 18, 54, ...

NOW $\overset{\times 3}{2}, \overset{\times 3}{6}, \overset{\times 3}{18}, 54, \dots$

So next term = 54×3
= 160

The missing term is 160.

(ii) 3125, 256, _____, 4, 1

$$1 = 1$$

$$4 = 2^2$$

$$256 = 16^2 \text{ or } (4^2)^2$$

$$= 4^4$$

$$3125 = 5^5$$

so

Series becomes

$$5^5, 4^4, _, 2^2, 1^1$$

Hence the missing number = $3^3 = 27$

d) If product of two numbers is 320 and ratio is 1:5, Find difference b/w sq of them

let the numbers are x and y

Given:

$$x \times y = 320 \quad \text{--- (i)}$$

$$x : y = 1 : 5$$

$$x^2 - y^2 = ? \quad y^2 - x^2 = ?$$

from the given ratio we can say that

$$y = 5x \quad \text{--- (ii)}$$

so put in (i)

$$x \times 5x = 320$$

$$5x^2 = 320$$

$$x^2 = 64$$

$$\boxed{x = 8} \quad \text{so from (ii)}$$

$$\boxed{y = 40}$$

Now

$$x^2 - y^2 = (8)^2 - (40)^2$$

$$= 64 - 1600$$

$$=$$

$$y^2 - x^2 = 40^2 - 8^2$$

$$= 1600 - 64$$

$$\boxed{y^2 - x^2 = 1536}$$

Hence required answer is 1536

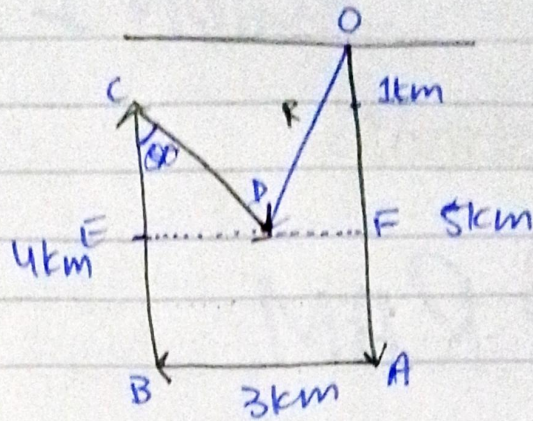
$$\begin{array}{r} 64 \ 5 \ \sqrt{320} \\ 320 \ \cancel{160} \\ \hline 160 \end{array}$$

$$\begin{array}{r} 40 \\ 40 \\ \hline 00 \\ 1600 \end{array}$$

QUESTION 8

To find $\vec{OD} = \vec{R}$

Take point E and F on BC and OA respectively such that EF passes through D and is parallel to BA



Angle at C = 45° as crow moves south-eastward.

Now in $\triangle ECD$

$$\sin \theta = \frac{ED}{CD} \quad \text{and} \quad \cos \theta = \frac{CE}{CD}$$

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$$\sin \theta = \frac{ED}{2}$$

$$ED = 2 \sin 45^\circ, \quad CE = 2 \cos 45^\circ$$

$$ED = 2 \left(\frac{1}{\sqrt{2}} \right), \quad CE = 2 \left(\frac{1}{\sqrt{2}} \right) \quad \left\{ \because \cos 45^\circ = \sin 45^\circ = \frac{1}{\sqrt{2}} \right\}$$

$$ED = \sqrt{2}, \quad CE = \sqrt{2} \quad \text{Also } \frac{2}{\sqrt{2}} = \sqrt{2}$$

Now for \vec{DF} and \vec{OF}

$$\vec{DF} = \vec{AB} - \vec{ED}$$

$$|\vec{DF}| = 3 - \sqrt{2}$$

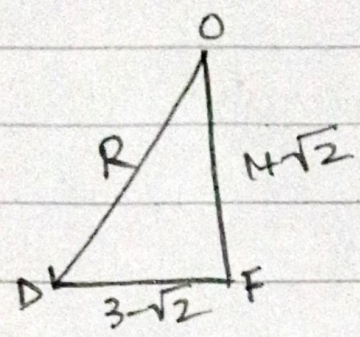
$$\vec{OF} = 1 + \vec{CE}$$

$$\text{and } |\vec{OF}| = 1 + \sqrt{2} \quad \left\{ \begin{array}{l} \text{As } OA - BC = 1 \\ \text{BC} = \vec{OA} \end{array} \right\}$$

$$\sqrt{AE} = \sqrt{\quad}$$

5

Now



By Hypo pythagoreus theorem

$$R^2 = \sqrt{(1 + \sqrt{2})^2 + (3 - \sqrt{2})^2}$$

$$\begin{aligned} R^2 &= 1^2 + (\sqrt{2})^2 + 2\sqrt{2} + 3^2 + \sqrt{2}^2 - (2)(3)(\sqrt{2}) \\ &= 1 + 2 + 2\sqrt{2} + 9 + 2 - 6\sqrt{2} \\ &= 14 - 4\sqrt{2} \end{aligned}$$

$$= 14 - 5.6$$

$$R^2 = 8.4$$

$$R = \sqrt{8.4}$$

$$R = 2.89$$

$$\left\{ \begin{array}{l} \sqrt{2} = 1.41 \\ 4 \times 1.41 \\ 5.6 \end{array} \right.$$

Hence the crow travelled 2.89 km

(b)

Total slices of pizza = 8

Slices with raisin = 3

Solution:

$$\text{probability of raisin pizza} = \frac{3}{8}$$

(c) Find no. of triangles

Solution:

Here the figure has two diagonals with 8 basic divisions (triangles).

so

$$\begin{aligned} \text{no. of triangles} &= 2 \times 8 \\ &= 16 \end{aligned}$$

d).

Factors that can effect IQ

- ⇒ Education standard
- ⇒ Mental presence
- ⇒ Focus
- ⇒ Ability to comprehend question
- ⇒ Analytical skills
- ⇒ Mental math.
- ⇒ recognizing and identifying patterns.

SECTION I

Questions:-

(a) RAM

ROM

1. It stands for random access memory

2. It is very fast

3. It is volatile memory

4. Programs required frequently are stored in RAM

5. It is written and rewritten frequently

It stands for read only memory.

It is rather slow

It is non volatile

It stores kernel and operating system of the computer

Data in ROM is written at the time of manufacturing and cannot be rewritten.

Nibble:

It is the smallest unit of data storage and is equal to half byte, i.e. 4 bits.

USB: It stands for universal serial bus. It is a portable storage device and can store large amounts of data.

(b)

AI:

Artificial intelligence or 'AI' for short is computer intelligence created by the means of programs. An AI model is created and then trained on millions of data sets until it develops the ability required. Similarly in this way when an AI 'sees' photos of cats, it knows what a cat is and would then be able to identify a cat in the future.

THE AI Revolution:

In the present time, AI has become so advanced that it is like an assistant to human beings. Now people can assign an AI to do laborious and repetitive, time consuming tasks. Much like in the early days when the calculator was first invented and people started using calculators to solve problems more quickly and efficiently.

It must be noted that AI is far bigger than calculators.

This AI revolution is like the industrial revolution or how a Stanford professor put it, "AI is the new electricity".

AI has revolutionized many spheres of life such as.

1. Transportation:

AI can now drive cars and other vehicles. This minimizes chance of road accidents caused by human error.

2. Rendering and Simulation.

AI can render images and simulations of things that were not even imagined by human. It brings creativity to a whole new level.

3. Job market

It will take over ~~redundant~~ jobs while making new high end jobs

4. Efficiency of time.

If people start using AI assistants, they will become more time efficient.

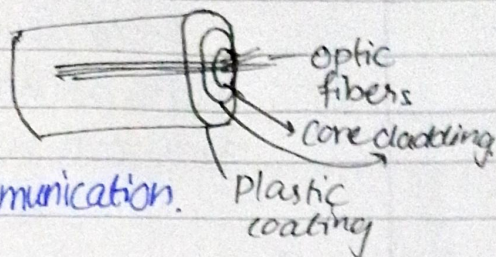
5. Others

Wherever there is danger and human cannot go, the AI can as it can, with some time, almost do everything a common man could. It can guard houses, serve as a writer, a cleaner and many other things

(c)

Optical fiber

It is a fine hairlike structure used to transfer light quickly over long distances in telecommunication.



Core: It is the highly dense central part

- It has high refractive index

cladding: It is the outer part

It has low refractive index

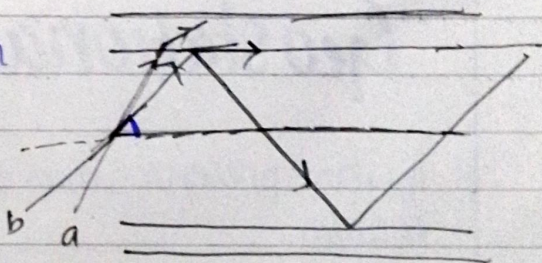
Working:-

It works on the principle of ~~refraction of light~~ or Total internal reflection

- Let 's' is any source of light from where a ray is emitted.

- When light is ~~from the sun~~ at a certain angle θ with the normal

total internal reflection occurs. This angle is called critical angle.



Now if ray 'a' is thrown it reaches the core-cladding boundary and it refracts at an angle because it was not thrown at the critical angle while ray 'b' which is thrown at the critical angle will reflect back at a certain angle and will continue to zigzag along the optic fiber until it reaches its destination

Advantages

1. It can transmit data with very high speed.
2. It minimizes transfer losses.
3. It can transmit data over very long distances.

d) Critical Speed of a Satellite

⇒ It is the minimum speed required to move around a planet (Earth).

⇒ And it is calculated using centripetal force

⇒ In low earth orbit this speed is 28000 km/hour.

⇒ The higher you go the less speed you require.

Geo stationary

They are present above the equator

They appear stationary from earth

They are present in high earth orbit

3 satellites are required to cover the globe

Polar

They are present ^{above} in polar regions

They are not stationary to the earth

They are present in low earth orbit

since they orbit from pole to pole a satellite has greater coverage.

They are used for communication and tracking purposes

They are used for observational purposes

Question 4:

(d) Doping in Semiconductor

Adding impurities to semiconductors is called doping.

⇒ Semiconductors are generally from Group IV of the periodic table and are doped by mixing them with Group V or Group III.

⇒ The semiconductor formed as a result of doping with Group III is called N-type Semiconductor while by adding Group V it is called P-type Semiconductor.

Types of Ceramics

1. Stoneware

⇒ Oldest form of ceramic.

⇒ They are fired at temperature range of $2000-2400^{\circ}\text{F}$

⇒ It is white in ~~color~~ color

⇒ They are durable non porous and robust

2. Porcelain

⇒ A type of pottery

⇒ Very durable

⇒ Fired at around 2600°F

⇒ It is made with white clay.

3. Bricks

- ⇒ They are the most common type of ceramic
- ⇒ Made by a mixture of clay and sand
- ⇒ It is robust and brittle and can stand high temperatures.

4. Silicon

- ⇒ Most abundant as 90% earth's crust is silicon
- ⇒ Solar panel and microchips are made with this ceramic
- ⇒ It has a brittle and rigid crystalline structure

(C)

Solar Eclipse

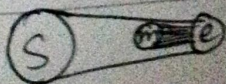
The moon moves between the earth and the sun.

Sun is partially or completely non-visible

Namaz-e-Khasuf is prayed

It has three types

1. Total solar eclipse
2. Partial
0. Annular



Lunar Eclipse

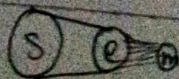
The earth moves in between the sun and the moon.

The moon loses its glow because of being in earth's shadow.

Namaz-e-Khasuf is prayed.

It has two types

1. Total lunar eclipse (umbra)
2. Partial (penumbra)



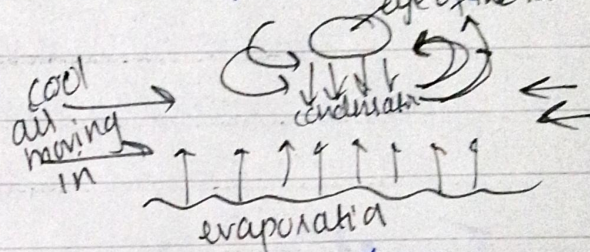
(b) Coriolis force.

It is a force that moves objects towards the right in northern hemisphere and towards left in the southern hemisphere.

Hurricane:

They are formed because of two principles

1. Pressure gradient
2. Coriolis effect.



Change of pressure:

Hurricane requires a water body to form.

At a certain temperature water molecules begin evaporating from the surface of the water body. Cold wind moves in which then creates a pressure gradient with the center part having high pressure.

At a certain height, due to decrease in temperature the air gets liquified (vapours) and heat is released. This is called heat of condensation.

Most of the air rises up creating a pressure deficit and air flows in. which then because of Coriolis effect ends up spinning the entire system. and thus a hurricane is formed.

a) EARTHQUAKE

⇒ Earthquake are formed due to plate tectonics or movement of tectonic plates.

⇒ These plates move due to gravity.

⇒ When one plate in the oceanic lithosphere meets another plate the the dense plate drags the one underneath. This is called Subduction

⇒ When two such plates collide they release large amounts of energy in form of seismic waves.

Earthquake

Occurs due to tectonic plates underground

It is the movement of ground

It causes tsunami

Energy is transferred in form of seismic wave.

less predictable

Tsunami

Occurs due to plate activity below ocean floor.

It is the movement of water

It is caused by an earthquake

energy is transferred in form of water waves

more predictable