GSA Mock

Date: Day:

Very good
Perfect answers
Enough headings
Enough length
Fine diagrams
Good for math portion

SECTION - I

Question # 3 (a)

Global warming is a blast and we all are poking at it with sticks, justify.

DEFINITION:

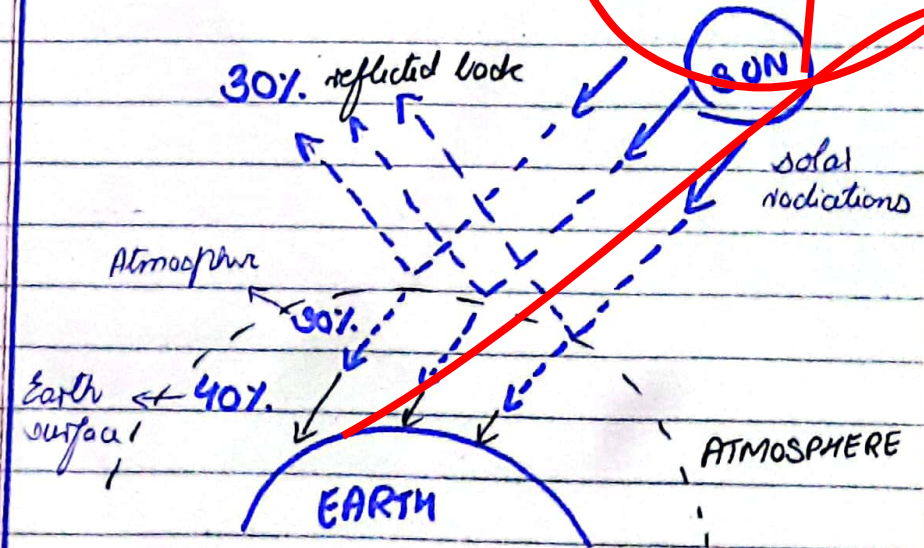
"Global warming is the gradual increase in the temperature of Earth due to absorption of solar radiation."

PHENOMENON:

Global warming happens due to the absorption of heat by the gases present in atmosphere like CO_2, CFCs, water vapours, etc.

GREENHOUSE EFFECT:

The distribution of energy on Earth is:



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Out of the total energy that comes from Sun:

- 30% is reflected back.
- 30% absorbed by atmosphere.
- 40% absorbed by Earth surface.

Hence, due to GHE, the temperature increases.

CAUSES OF GLOBAL WARMING:

(1) Natural increase due to solar rays.
(2) The man-made vehicles emitting harmful radiations.
(3) Factories emitting exhaust into the atmosphere.
(4) Burning of fossil fuels.

CURRENT STATUS:

According to the IPCC report of March 2023, the Earth's temperature has reached 1.0°C above pre-industrial levels. While, at the current rate of emission, the world will reach 1.5°C by 2028, which is the climate threshold. At 1.5°C, there will be permanent damage to the climate that will be irreversible.

Hence, the man-made interventions are overwhelming the climate.

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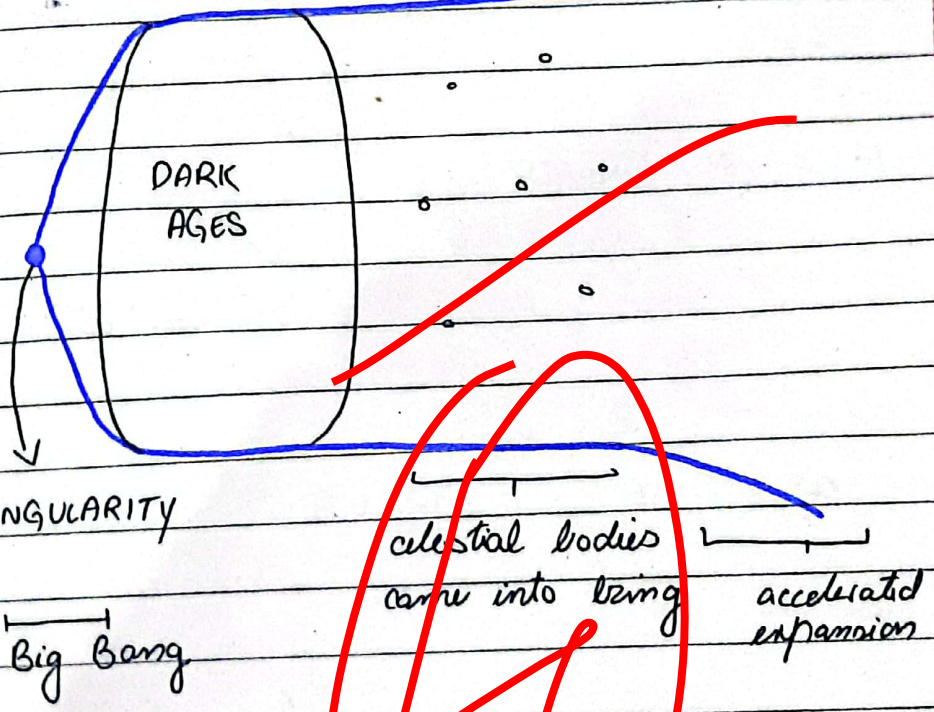
Question 3(b)

What is the origin of universe? How age of universe was calculated?

ORIGIN OF UNIVERSE:

The most accepted theory of universe's origin is Big Bang. According to this, the universe came into being with a big explosion.



(a) SINGULARITY:

The initial energy state where gravity was holding matter and energy together. It was incomprehensibly dense and hot. The whole universe was united at one point.

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(b) BIG BANG:

The explosion of singularity led to a cosmic inflation as universe went from smaller than atom to bigger than a galaxy.

(c) AFTERMATH OF EXPASION:

As universe expanded, it started cooling and gave rise to matter and anti-matter. After the dark ages when anti-matter cancelled matter, the leftover matter gave rise to celestial bodies like galaxies.

AGE OF UNIVERSE:

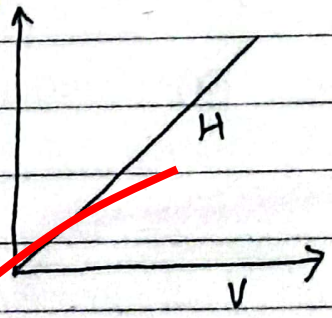
Astronomers have calculated the age of universe to be 13.7 billion years. There are two methods to calculate the age:

a) HUBBLE'S FORMULA

This formula states that the rate of expansion of universe stays constant.

$$V = Hd$$

$$H = \frac{V}{d}$$



By calculating back, it can find the time till the Big Bang:

$$T = \frac{1}{H}$$

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(b) ANCESTRAL STARS:

The age of the oldest stars can also be used to find the age of universe. The age of star depends on its mass

star mass $\propto \frac{1}{\text{star age}}$

The oldest star Methuselah's age is found in this way to be 13.7 billion years.

Question # 3 (c)
Short note on semi-conductors.

DEFINITION:

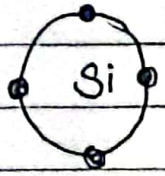
"Semi-conductors are the materials that have conduction between conductors and insulators."

EXAMPLES:

The elements like Silicon (Si) and Germanium (Ge) act as semi-conductors.

PHENOMENON:

Silicon is an element that has four valence electrons in its outermost shell.



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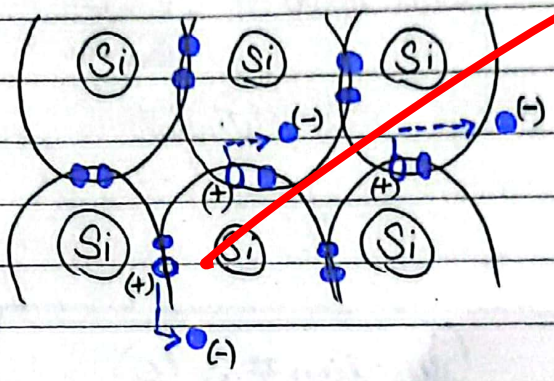
When it is connected with electricity, the valence electrons become free electrons and leave behind a hole which acts as a positive charge.



These positive and negative charges created by the hole and free electron respectively, help in the electricity conduction.

APPLICATION:

Semi-conductors are the most basic building blocks of the electronics industry. They are used in:

(1) calculators
(2) solar panels
(3) smart phones, computers, laptops
(4) Temperature sensors.

Hence, the unique properties of semi-conductors make the smooth running of technology possible.

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Question 3 (d)

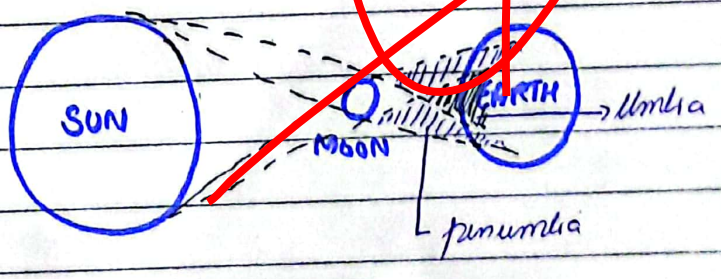
What is eclipse? What are solar and lunar eclipse?

ECLIPSE:

"Eclipse is the phenomenon which occurs when one celestial body comes between two other celestial objects and block the flow of light."

The types of eclipse that affect the Earth include Solar and lunar eclipse.

SOLAR ECLIPSE:



"Solar eclipse happens when moon comes between Sun and Earth."

As the moon covers the Sun, on some regions on Earth, Sun's rays do not fall directly and they cast a shadow. There are two regions:

(a) Umbra:

The region where total

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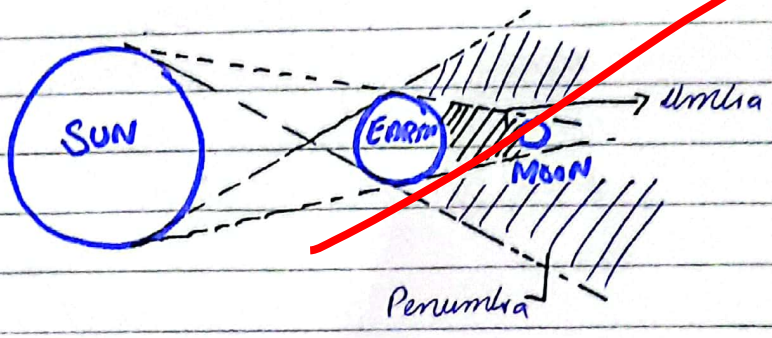
Solar eclipse occurs at moon covers the sun.

(b) Penumbra:

The region where partial solar eclipse occurs as moon does not cover the sun completely.

LUNAR ECLIPSE:



" A Lunar eclipse occurs when Earth comes between sun and Moon, and blocks the light from reaching moon."

The moon becomes over-shadowed by the Earth and two regions are formed:

(a) Umbra:

The region where the moon is totally shadowed leading to Total eclipse.

(b) Pen-umbra:

The region where moon will partially receive the Solar radiations.

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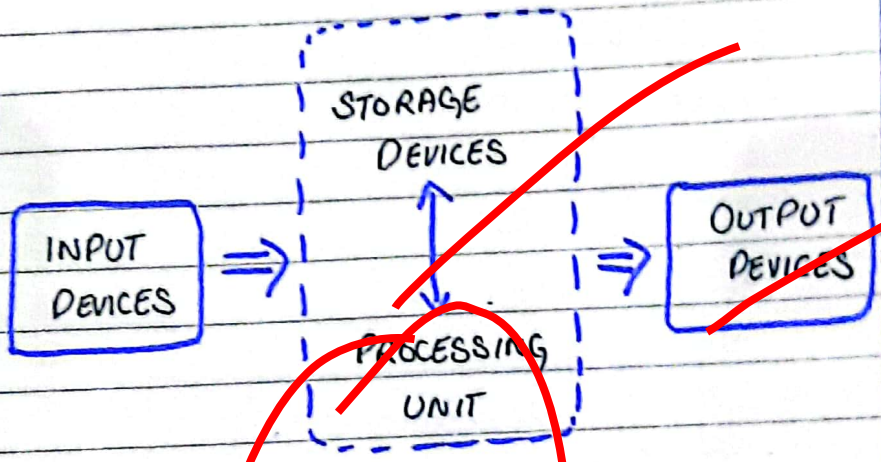
Question # 5 (a)

Block diagram of input and output devices of computer.

BLOCK DIAGRAM:



INPUT DEVICES:

"The devices which are used to send raw data into the processing unit are called input devices."

These include mouse, keyboard, scanner, mic, etc.

OUTPUT DEVICES:

"The output devices are used to display or present the processed data to the user."

These include monitor, speaker, printer, etc.

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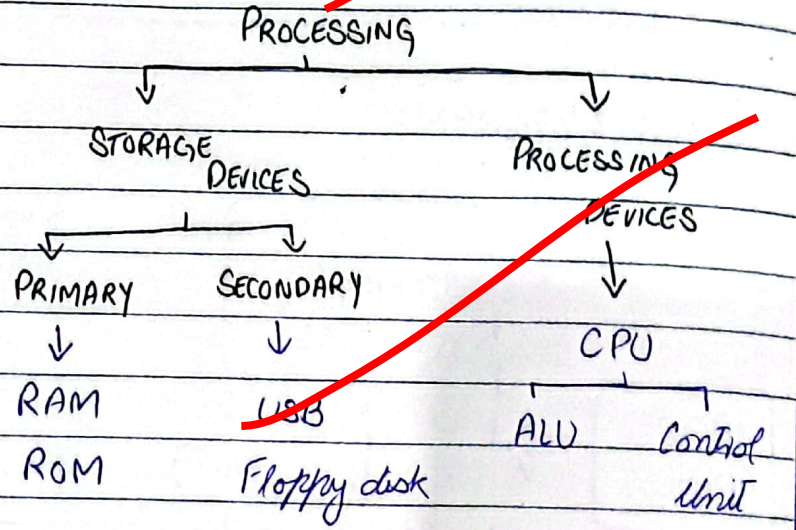
PROCESSING UNIT:

Storage and the processing devices collectively called processing unit.



Question 5 (b)
Optics and how does Fibre Optic work?

OPTICS:

"Optics is the study and the use of light for the transmission of information."

FIBRE OPTIC CABLE:

"Optical fibre works by the transmission of light through thin strands of glass."

WORKING PRINCIPLE:

Optical fibre works on the

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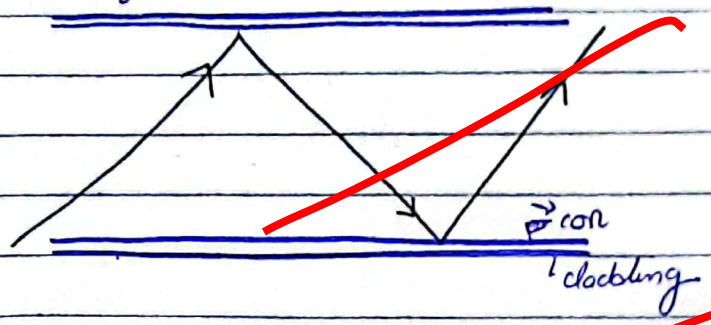
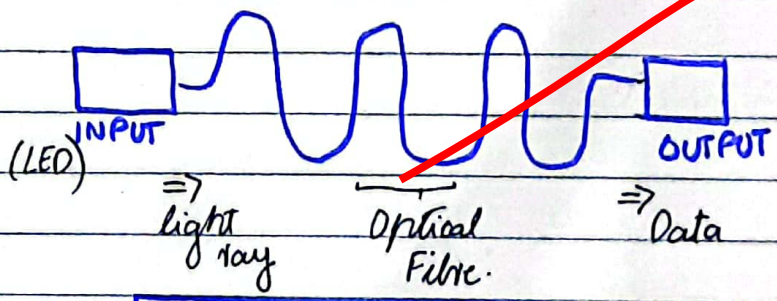
principle of Total internal reflection.



Total internal reflection occurs when the light ray reflected inside the tube at the core - cladding boundary. This ensures the higher efficiency of ray Transmitted.



Question # 5 (c)
Methods of Solid Waste Management.

SOLID WASTE MANAGEMENT:

"Solid Waste Management is the system of safe disposal of waste from the source to the disposal site."

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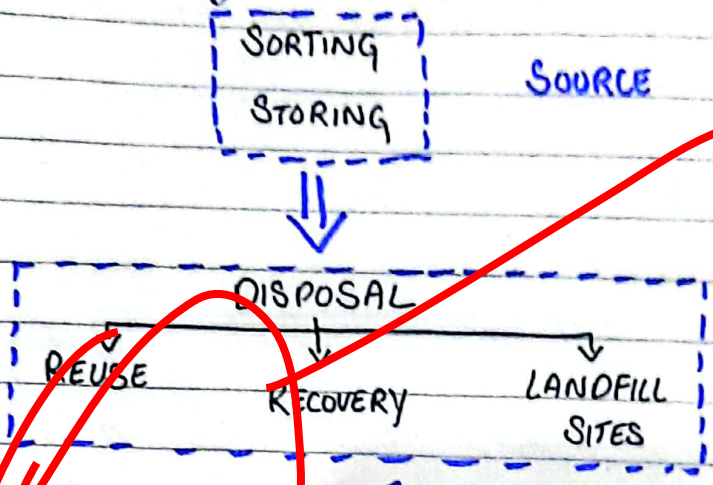
The SWM cycle includes



SOLID WASTE MANAGEMENT

METHODS OF SWD:

There are several methods of SWM:

a) REUSE:

The most environmentally feasible method of waste management is to reuse the wasted material. These include:

(1) bottle caps
(2) plastic and glass bottles and cans
(3) plastic and glass utensils.

The material are sterilized and cleaned before use.

(b) RECOVERY

The second method is to recover

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the wasted materials. The waste can be sorted for the recoverable material. These include:

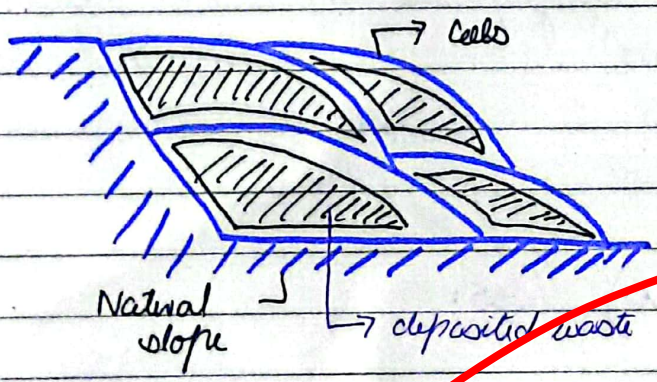
(1) the textile products like clothes
(2) thermoplastics that can be melted into new products

However, the products that can be recovered are less.

(3) wood pieces and slabs
(4) metal

(C) LANDFILL SITES:

The engineered landfill sites are used to safely dispose-off the waste that cannot be reused or recovered.



After the proper lining on the bottom, the waste is dumped and covered. The loading trucks are used to press the waste. This way the waste does not pollute the land, water & other natural landscape and can be made to biodegrade.

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Question 5 (d)
Differentiate GPS and GIS.

DIFFERENCE BETWEEN GPS AND GIS:

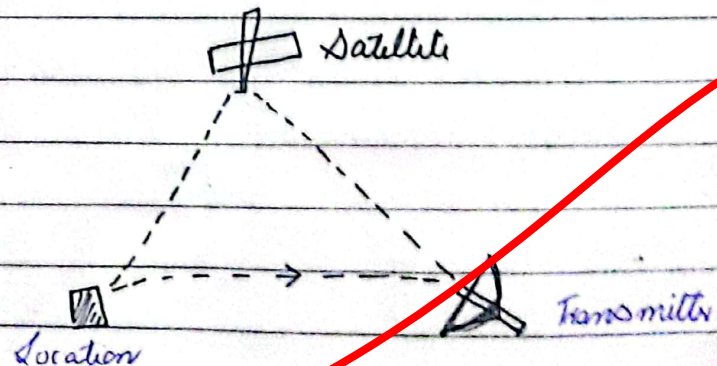
GPS and GIS are two important system in information and technology industry.

a) Definitions:

Global Positioning System (GPS) is the satellite system used to navigate and locate the regions on Earth.

Geographical Information System (GIS) is the system of softwares that is used to analyze and visualize the data related to geography.

b) Uses:



GPS uses the satellite to locate the

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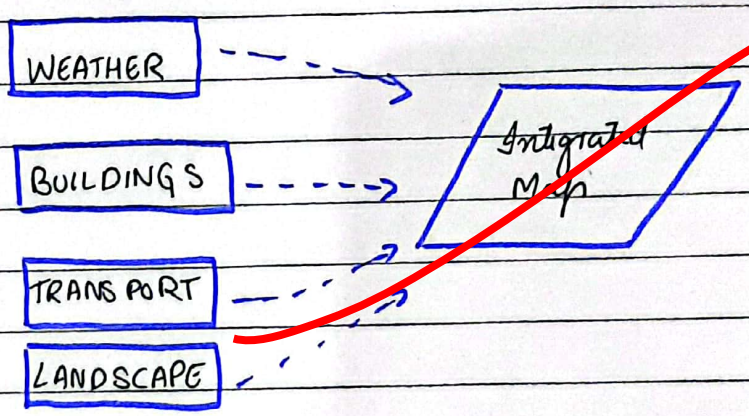
object on earth and transmitter acts as the communicating and interpreting device. This is used for:

(1) Locate: to locate specific location of users.

(2) Navigate: during travelling and transportation, it can used to navigate the address.



GIS softwares collect all the information related to the geography of a specific location and creates an integrated map.

(c) Application:

GPS is used in Google maps, NAVSTAR navigation and other private users.

GIS is used by urban planners, engineers, and other government agencies to make use of available data.

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Question # 6 (a)

DATA:

Total area of fence = A = 300 ft

Let:

the longer piece = x, shorter = y

FIND:

The length of pieces = ?

SOLUTION:

As the longer piece is four times as long as the shorter piece:

$$x = 4y$$

$$A = x + y$$

$$300 = 4y + y$$

$$\frac{300}{5} = y$$

$$\Rightarrow \boxed{\begin{aligned} y &= 60 \text{ ft} \\ x &= 240 \text{ ft} \end{aligned}}$$

Question # 6 (b)

DATA:

Perimeter of triangle = P = 20 in

Let:

length = ℓ X = ?

width = y = ?

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SOLUTION:

$$x = 2y + 3$$

Perimeter $= P = 2(x + y)$

$$20 = 2(2y + 3) + 2y$$

$$20 = 4y + 6 + 2y$$

$$20 = 6y + 6$$

$$14 = 6y$$

$$2.33 = y$$

$$\Rightarrow x = 2(2.33) + 3$$

$$x = 7.33$$

$$\Rightarrow \boxed{\begin{array}{l}\text{Length} = x = 7.33 \text{ in} \\ \text{Width} = y = 2.33 \text{ in}\end{array}}$$

Question 6 (c)

DATA:

Let total no. of matches $= x$

won matches $= 60\%$ of x

lost matches $= 24$

FIND:

Total matches $= x = ?$

SOLUTION:

$$x = \frac{60}{100}(x) + 24$$

$$x = \frac{6x + 240}{10}$$

$$10x = 6x + 240$$

$$4x = 240$$

$$\boxed{x = 60}$$

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Question # 6 (d)

DATA:

Let the two numbers = x, y

$$x/y = 3/2$$

SOLUTION:

$$\frac{x+2}{y+6} = \frac{4}{5}$$

$$5(x+2) = (y+6)\,4$$

$$5x + 10 = 4y + 24$$

$$5x = 4y + 14$$

As: $x = \frac{3}{2}y$

$$5\left(\frac{3}{2}y\right) = 4y + 14$$

$$15y = 8y + 28$$

$$7y = 28$$

$$y = 4$$

$$\Rightarrow x = 6$$

Question # 7 (a)

DATA:

Total seats = 400

occupied seats = 325

attendance %age = ?

SOLUTION:

$$\text{Attendance} = \frac{\text{occupied}}{\text{total}} \times 100$$

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Attendance Avg = $\frac{325}{400} \times 100$

$$\begin{array}{r} 81.25 \\ 4\overline{)325} \\ 32 \\ \hline 5 \\ 4 \\ \hline 10 \\ 8 \\ \hline 20 \\ 20 \\ \hline 0 \end{array}$$

Attendance Avg = 81.25 %

Question # 7 (b)

DATA:

Find the days = x = ?

SOLUTION:

People	:	Sugar (kg)	:	Days
30	:	40	:	10
80	:	320	:	x

$$\frac{x}{10} = \frac{30}{80} \times \frac{320}{40}$$

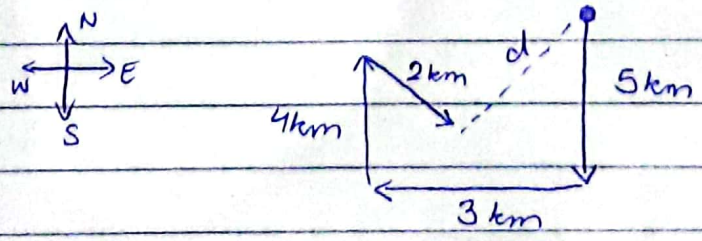
x = 30 days

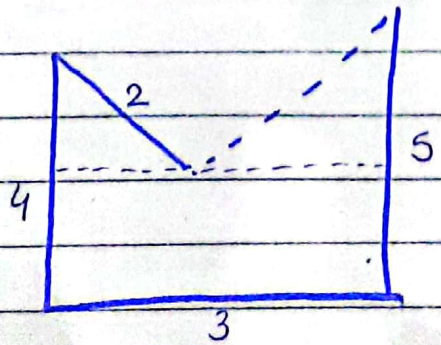
Question # 7 (c)

DATA:

How far is the crow = ?

SOLUTION:





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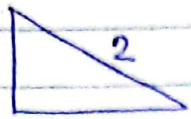

Pathagoras theorem

Question # 7(d)

DATA:

radius = 10cm

height = 36cm

V = ?

SOLUTION:

Volume = $V = \pi r^2 h$

$= \pi (10)^2 (36)$

$= 100 \times \pi (36)$

$= 3600\pi$

$= 3600 (3.142)$

$= 11311.2\ cm^2$

$V = 11311.2\ cm^2$

3142
× 36
18852
94260
113112