

Part I (Section - I)

Q3

(part a.)

Ans **Global Warming:**

IPCC (Intergovernmental panel on climate change) defines global warming as:
"increase in combined surface air and ^{sea} surface temperature average over the globe over a 30-year period."

Global warming is threat which is continued more than a decade and yet mitigation measure for adaptation are not necessary.

2- Global Warming as Wild Beast:

Wild beast is used as a metaphor to define the effect of climate change. The impacts of climate change are disastrous as recent events are the proof of it. For instance, Storm Daniel in Libya destroyed lot of buildings in different cities according to British Red Cross. Similarly, the flood in 2022 caused deaths of several thousands people in Pakistan. UNICEF has quoted that 33 million people in Pakistan were affected by the floods of 2022. Therefore, it is true to consider global warming as a wild beast.

3. Analyzing "We all are Poking with Sticks" :

The above statement is used as a metaphor to address the fact that mitigatory and adaptive measure to curb climate change are not enough. According to Pakistan Forest Institute, Pakistan has improved its forest cover up to 6% through "Billion Tree Tsunami Project" and other campaigns. Though, Pakistan is contributing around 1% of global greenhouse gases yet it is 7th most vulnerable country to climate change. The important point is that global effort is needed to increase climate resilience as mentioned by article published in "Nature Journal."

4. Conclusion:

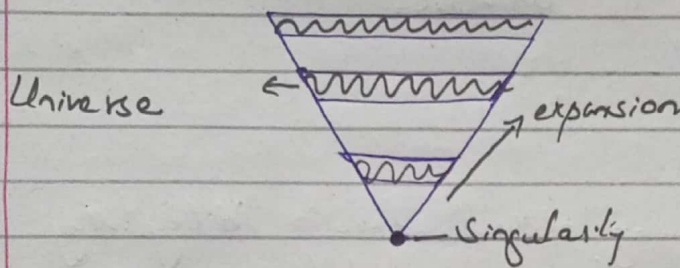
National efforts are insignificant to curb climate change and do require collective effort globally. Current developments related to climate including COP-27 and COP-28 provides theoretical framework which needed to be implemented seriously.

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(part b)

1. Origin of Universe :

The origin of universe is explained by Big Bang Theory which states that :

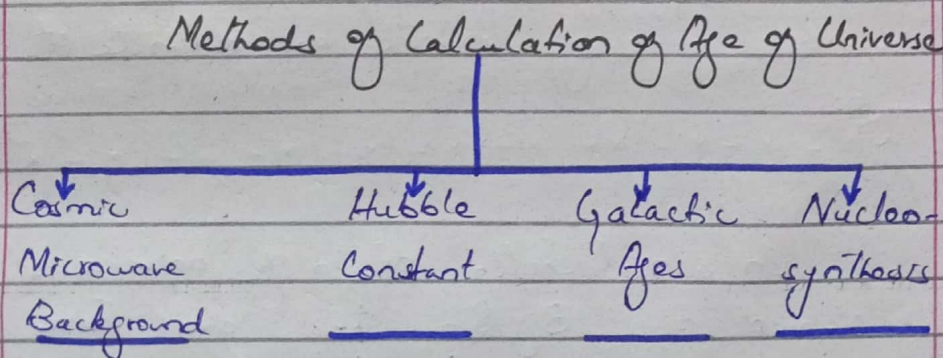
" Universe is created from a single point called singularity. An explosion in singularity resulted into formation of universe. Universe is still expanding "



Big Bang theory explains that around 13.8 billion years ago it began hot and dense.

2- Methods of Calculating Age of Earth:

There are different methods through which age of the universe can be calculated and are as follows:



i- Cosmic Microwave Background (CMB):

These are the radiations left over from Big Bang and scientists are studying their

temperature fluctuations to study age of universe. For Example, Planck's satellite is used for such measurements.

ii- Hubble's Constant:

Observation of distant galaxies reveal that universe is expanding. Hubble's constant reveals the rate of this observation to estimate age of universe.

$$V_0 = H_0 r$$

iii- Galactic Ages:

By studying oldest stars in Milky Way and nearby galaxies, scientists can infer a minimum age for universe. Since these stars are formed after Big Bang, so their ages provide a lower limit on universe age.

iv- Nucleosynthesis:

The abundance of elements like Helium and Deuterium formed during first few minutes after Big Bang. By measuring these abundances, scientists can infer the conditions of early universe and estimate its age.

3- Conclusion:

In a nutshell, origin of universe is explained by Big Bang theory and there are different ways to estimate age of universe. When these methods are used in combination, provide a consistent picture of universe approximately 13.8 billions years old.

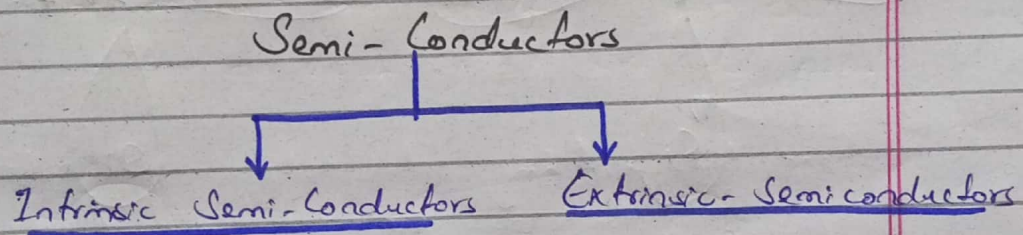
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Part (c)

1- Semi-Conductors :

Materials which have the property between conductors and non-conductors are termed as semi-conductors. They are used in electronics and two best semiconductors are Silicon and Germanium.

2- Types of Semiconductors :



a- Intrinsic Semi-Conductors :

Intrinsic Semi-conductors are defined as

“Semi-conductor in its pure form.”
For instance, semi conductors of pure silicon and germanium.

b- Extrinsic Semi-conductors :

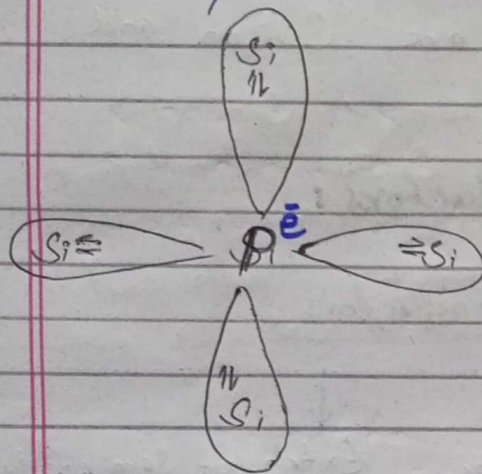
When an impurity is added to the pure semi-conductor, it becomes extrinsic semi-conductor. This process is called doping.

Extrinsic Semi-conductor has divided into further two types :-

Extrinsic Semi-Conductors

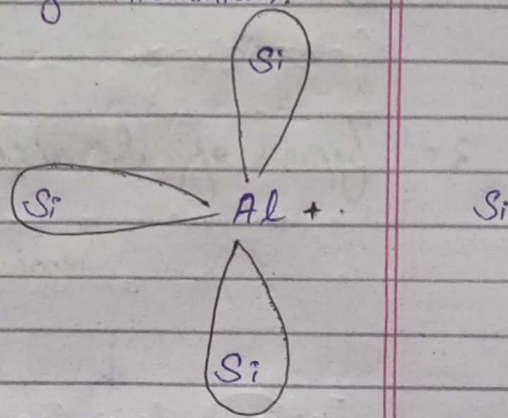
N-type Semi-Conductor

Doping is done from members of group V of periodic table. i.e. Phosphorous.

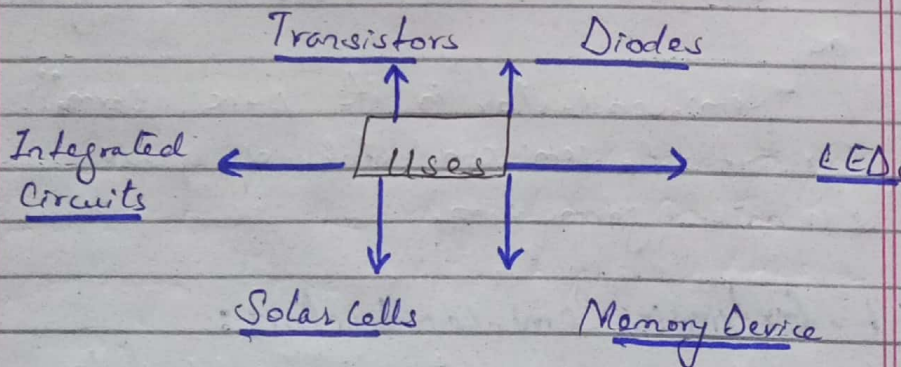


P-type Semi-Conductor

Doping is done from group III of periodic table leaving a positive charge or hole. e.g. Aluminium.



3. Uses of Semi-Conductors :



4. Conclusion :

Semi-conductors have their properties between conductors and non-conductors. They have multiple uses and have significantly contributed to the advancement of modern technology.

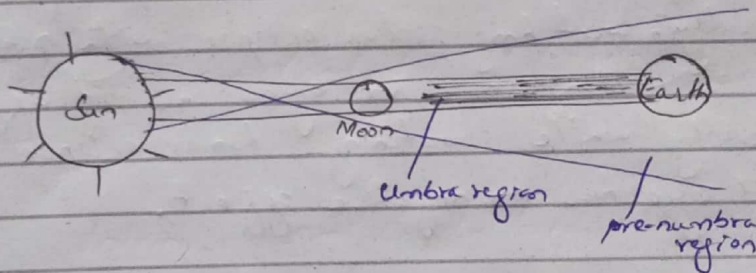
Part (d)

1. Eclipse :

Eclipse is defined as:
"When one astronomical object goes into shade of other astronomical object, it is termed as eclipse."

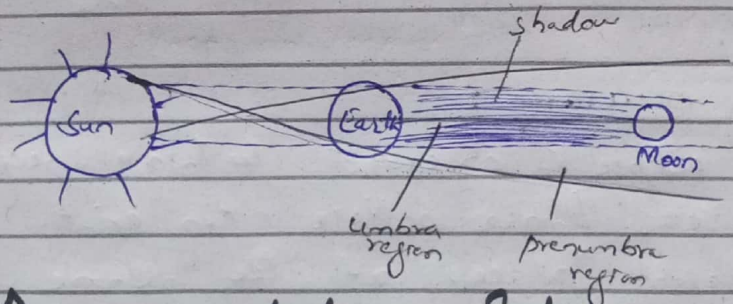
2. Solar Eclipse :

As Earth revolves around Sun and moon revolves around Earth. Sometimes, moon cause blockage of shadow by coming in between sun and earth. Moon cast a shadow on earth called Solar Eclipse.



3. Lunar Eclipse :

When Earth comes between Moon and Sun and casts shadow on Moon, it is termed as lunar eclipse.



4. Difference between Solar and Lunar Eclipse :

The points of difference between solar and lunar eclipse are as follows:

1- Process of formation :

In lunar eclipse, earth is between sun and moon while in solar eclipse, moon is in central position.

2- Difference in Timings :

Lunar eclipse is visible during entire night, while solar eclipse is visible only for few minutes.

3- Difference in danger of visibility :

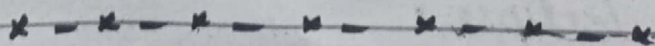
Generally, watching solar eclipse with naked eye is dangerous for eyes as it affects visibility while watching lunar eclipse with naked eye has no negative effect.

4- Time of Occurance :

Solar eclipse is observed once in few months during the day time. On the contrary, lunar eclipse happened twice a year.

5- Place of occurrence :

Solar eclipse is observed within a specific area whereas lunar eclipse can exist at different places at the same time.



Question No. 4

(part a)

i. Define Pesticides :

Pesticides are mixture of substances which are used to prevent, control or mitigate pests. They includes insecticides, fungicides, herbicides, rodenticides etc. They are used in agriculture to protect the crop from pests that can damage and destroy the crops.

ii. Herbicides :

Herbicides are the type of pesticides which is used to control or kill the unwanted plants, For Example, Weeds and grasses. Herbicides are used in agriculture, forestry and landscaping to manage vegetation. They are crucial for weed control in crop fields, preventing competition for nutrients.

iii. Insecticides :

Insecticides are also type of pesticides used to target and control pests and insects. Insecticides are used in agriculture & public health sectors and in house holds to protect against infestations. They come in various forms like sprays, powders and baits.

iv. Ceramics :

Ceramics are non-metallic & inorganic materials that are typically hard and brittle. They include products made from clay, porcelain and other materials which are fired at high temperature.

Ceramics have diverse applications ranging from traditional pottery and bricks to advance uses.

v. Green house Effect :

Greenhouse effect is a natural phenomena where certain gases like CO_2 , CH_4 , NO_2 in the earth atmosphere trap heat from the sun, preventing it from escaping into space. This trap heat warms the planet.

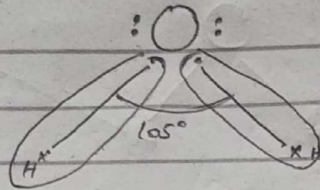
While greenhouse effect is essential for maintaining human activities, increased Greenhouse effect leads to global warming and climate changes.

(part b)

1 Water Molecule :

Water molecule has an angular structure in which a single electronegative oxygen atom has shared its lone pairs of electrons with two others hydrogen

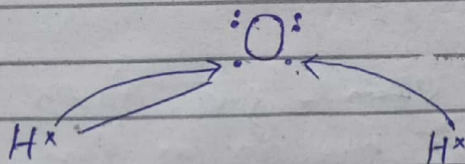
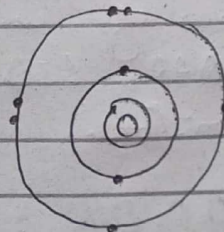
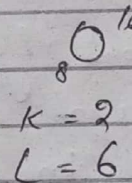
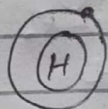
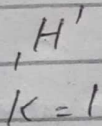
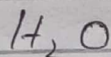
atoms. Oxygen is amongst the most electronegative elements in periodic table. Due to lone pair of electron it shows angular structure.



angular structure of water

2. Bonding in Water Molecule :

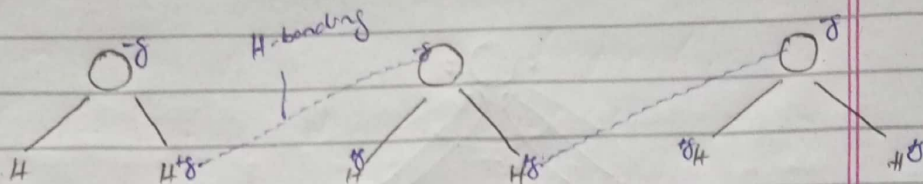
Water molecule shows covalent bonding which is type of bonding in which bond is formed by mutual sharing of electrons.



3. Bonding among Water Molecules :

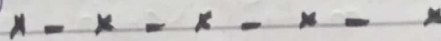
Intermolecular bond among water

molecules is called hydrogen bonding which is formed between hydrogen atom of one molecule and most electronegative atom of other molecule.



4. Conclusion :

In a nutshell, water molecule is formed by covalent bonding. Whereas, among the water molecules another bonding may also exist which is hydrogen bonding.



(Part c)

Ans Various types of waves are used in different technologies for communication, detection and sensing. Following types of waves are used in SONAR, RADAR, LIDAR, Mobile phones and thermistors.

1- RADAR:

RADAR stands for Radio Detecting and Ranging.

Type of Wave:

RADAR primarily use radiowaves in the

microwave frequency range.

Purpose:

Radiowaves are emitted and their reflection of objects are detected. The time delay and Doppler shift of returning waves provide information about speed, location and characteristics of objects.

2. SONAR:

SONAR stands for "Sound Navigation and Ranging."

Type of Wave: SONAR used sound waves, typically in the ultrasonic frequency range to detect sounds.

Purpose: Ultrasonic waves are emitted underwater, and the returning echoes are used to map the seafloor, locate underwater objects, or detect presence of underwater organisms.

3. LIDAR:

LIDAR stands for Light Emitting and Ranging.

Type of Wave: LIDAR use light waves, typically in the form of pulsed laser beams.

Purpose: Laser beams are emitted and the

reflections off surfaces are measured. LIDAR is commonly used for mapping terrain, creating 3D models and in autonomous vehicles systems for obstacle detection.

4. Mobile Phones:

Mobile Phones are the wireless devices used for the communication.

Type of Wave: Mobile phones used electromagnetic waves, especially radio waves for wireless communication.

Purpose: Mobile phone used frequency bands for communication including radio and microwave frequencies. It is mobile phone which has connected the world globally.

5- Thermistors:

Thermistors are temperature sensors to measure temperature or change in temperature.

Type of Wave: Thermistors do not use any wave and work on electrical resistance.

Purpose: Thermistors are temperature sensitive resistors. Their electrical resistance changes with temperature.

6- Conclusion :

In a nutshell, all of above devices have their unique characteristics and observe specific type of process. They used different waves which helps them in performing their functions smoothly.

(part d)

1. AI :

AI stands for Artificial Intelligence. AI refers to the stimulation of human intelligence in machines that are programmed to learn, think and perform tasks that typically requires human intelligence.

Alan Turing published his work "Computer Machinery and Intelligence" which eventually becomes Turing Test to measure computer intelligence. The term "AI" was coined and came into popular use.

2. Advantages of AI :

Some of the advantages of AI are as follows :

i- Efficiency : AI can perform tasks without fatigue and thus has improved efficiency and productivity. It can even replace humans in future.

ii- **Accuracy** : AI system can process vast amount of data with precision, reducing the likelihood of errors common in human tasks.

iii- **24/7 Availability** : AI is not time bound and it is available 24 hours and 7 days a week. It also does not require coffee breaks and lunches to revive its energy.

iv- **Innovative Applications** : AI powers application innovators such as autonomous vehicles, medical diagnosis and language translation contributing to technological advancements.

3. **Disadvantages of AI :**

Despite of its limitless advantages, the disadvantages of AI are as follows

i- **Job Displacement :**

As AI is not time bound, so it has ability to replace human which would result into loss of jobs.

ii- **Bias and Fairness :**

AI can inherit biases present in the data used to train them, which may lead to unfair or discriminatory outcomes.

iii. Ethical Concerns:

There are ethical considerations regarding AI, including issues related to privacy and potential misuse of advanced technology.

iv. Threat of Human Extinction:

Critics often declared AI as a threat to human extinction. They argue that if machines learn to think like humans they will try to dominate humans.

4. Conclusion:

AI has modified human life however, the point of concern is that it should be used for positive use. International organizations should play their part in minimizing disadvantages and threats to AI.

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Section II

(Q8)

BROTHER is written as QDGSNQA
SISTER would be = ?

B R O T H E R
-1↓ -1↓ -1↓ -1↓ -1↓ -1↓ -1↓
A Q N S G D Q

(written the code from last)

S I S T E R
 \downarrow \downarrow \downarrow \downarrow \downarrow \downarrow
 R H R S D Q

Start writing it from left and code for
 SISTER will be QDSRHR.

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Part (b)

Cards in box = 12
 from 1 ---- 12

i- probability of 8.

Probability (8) = $\frac{\text{No. of events of occurring of 8}}{\text{Total number of outcomes}}$

$$P(8) = \frac{1}{12}$$

ii- an even number

$$P(\text{even}) = \frac{6}{12} = \frac{1}{2}$$

iii- a perfect square :

$$P(\text{perfect square}) = \frac{2}{12} = \frac{1}{6}$$

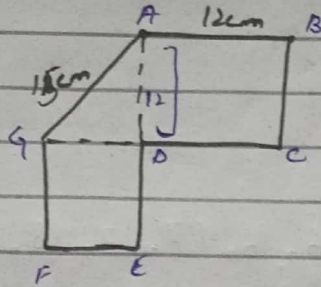
iv- a negative number

$$P(\text{negative number}) = \frac{0}{12} = 0$$

v- number less than 13.

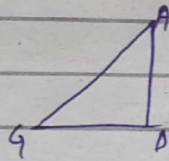
$$P(13) = \frac{12}{12} = 1$$

Part (c)



Find perimeter.

Perimeter = Sum of all sides
Here all sides are not given.



In $\triangle ADG$

$$(c)^2 = (b)^2 + (a)^2$$

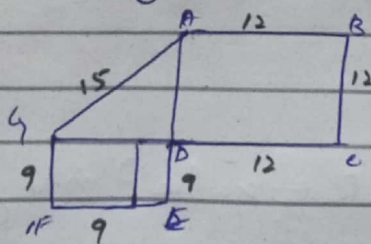
$$(15)^2 = (b)^2 + (12)^2$$

$$225 - 144 = b^2$$

$$b^2 = 81$$

$$\boxed{b = 9}$$

Now according to given value of b



$$\text{Perimeter} = AB + BC + CD + DE + EF + FG + GA$$

$$= 12 + 12 + 12 + 9 + 9 + 9 + 15$$
$$= 36 + 27 + 15$$

$$\boxed{\text{Perimeter} = 78 \text{ cm.}}$$

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part (d)

Total students = 9

Values = 15, 15, 16, 16, 16, 17, 17, 18, 19

Mean = ?

Median = ?

Mode = ?

Range = ?

i. Mean :

$$\text{Mean} = \frac{\text{Sum of numbers}}{\text{Total number}}$$

$$= \frac{15 + 15 + 16 + 16 + 16 + 17 + 17 + 18 + 19}{9}$$

$$= \frac{149}{9}$$

$$\boxed{\text{Mean} = 16.5}$$

ii. Median : Central value in organized data is called median.

15, 15, 16, 16, 16, 17, 17, 18, 19

$$\boxed{\text{Median} = 16}$$

iii. Mode : Most repeated value in a given

data is called mode.

15, 15, 16, 16, 16, 17, 17, 18, 19

$$\boxed{\text{Mode} = 16}$$

iv. **Range:** The difference between maximum and minimum value in a given data is called range.

$$\text{Range} = \text{Max. value} - \text{Minimum value}$$
$$= 19 - 15$$

$$\boxed{\text{Range} = 4}$$

Question 7

Part (a)

Total seats in hall = 400

Occupied seats = 325

Attendance at percent of capacity = ?

$$\text{Attendance at \% of capacity} = \frac{\text{Occupied seats} \times 100}{\text{Total seats}}$$

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

$$\boxed{\text{Attendance \%} = 81.25\%}$$

Part (b)

30 person used 40kg sugar in 10 days.
 80 person used 320kg of sugar in
 x days.

| Person | Sugar | Days |
|--------|-------|------|
| 30 | 40 | 10 |
| 80 | 320 | x |

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

$$x \left[\frac{x}{10} = \frac{16}{1} \times \frac{3}{8} \right]$$

$$\frac{x}{10} = \frac{48}{8}$$

$$\frac{x}{10} = \frac{16}{4} \times \frac{3}{8}$$

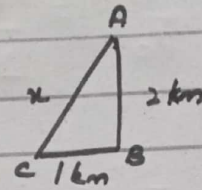
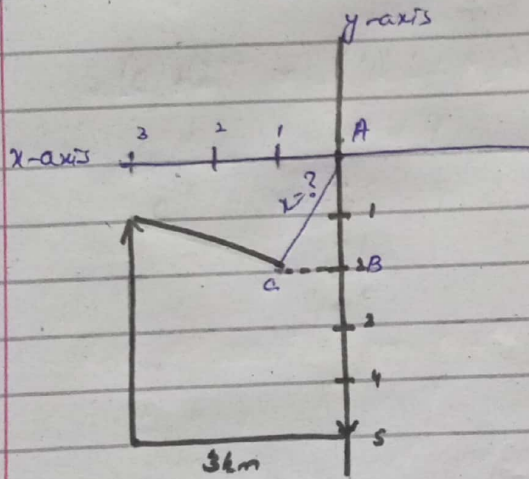
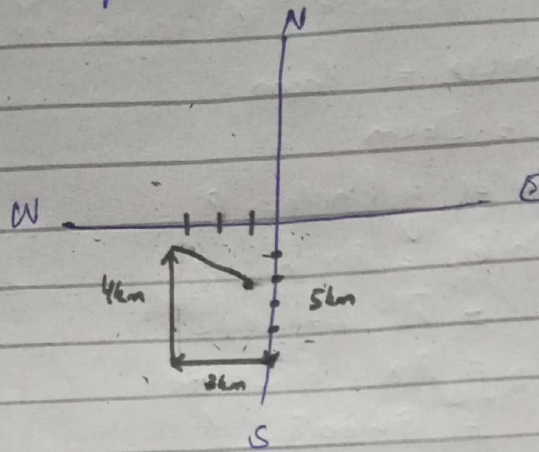
$$\frac{x}{10} = 4 \times \frac{3}{8}$$

$$\frac{x}{10} = \frac{12}{8}$$

$$x = \frac{12}{8} \times 10$$

$$x = 15 \text{ days}$$

part (c)



In $\triangle ABC$, the side y-axis is 2 km, side BC is equivalent to 1 according to vertices on x-axis.

So using pythagorons theorem.

$$c^2 = b^2 + a^2$$

$$c^2 = (1)^2 + (2)^2$$

$$c^2 = 1 + 4$$

$$c^2 = 5$$

$$c = \sqrt{5} \text{ km}$$

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Part (d)

radius of cylinder = 10cm

height = 36cm

find volume of cylinder = ?

$$\begin{aligned}\text{Volume of cylinder} &= \pi r^2 h \\ &= \pi \times (10)^2 \times (36) \\ &= \pi \times 100 \times 36 \\ &= 3600\pi.\end{aligned}$$

$$\boxed{\text{Volume of cylinder} = 11,304 \text{ cm}^3}$$

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