

Dated:

National Officers Academy

Mock - 6 for CSS 2025

December 2024

General Knowledge - I

General Science and Ability

Part - II

Section - I

Q.No.4

2. What is hepatitis? Explain its causes, symptoms, and prevention.

Hepatitis is an inflammation of the liver, which can impair its functions. It may be acute (short-term) or chronic (long-term) and is caused by various factors, including infections, toxins, or autoimmune conditions.

Causes of Hepatitis:

1. Viral Infections:

- Hepatitis Viruses (A, B, C, D, E):

A & E: Spread through contaminated food or water.

- B, C & D: Transmitted via blood, sexual contact, or from mother to child.

2. Non-Infectious Causes:

- Alcohol Consumption: Excessive intake damages liver cells.

- Medications / Toxins: Overdose or prolonged use of drugs like acetaminophen.



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- Autoimmune Diseases: The immune system attacks liver cells.

### Symptoms of Hepatitis

- General Symptoms:

- Fatigue

- Fever

- Nausea/vomiting

- Loss of appetite

- Joint or muscle pain

- Liver-Specific Symptoms:

- Jaundice (yellowing of skin/eyes)

- Dark urine

- Pale stools

- Abdominal pain (especially in the upper right side)

- Swelling in the abdomen or legs (in severe cases).

### Prevention of Hepatitis

1. For Viral Hepatitis:

- Vaccination: Hepatitis A and B vaccines are available.

- Safe Hygiene: Avoid contaminated food, water, and unsanitary conditions.

- Safe Practices: Use sterilized needles and practice safe sex.

2. For Non-Viral Hepatitis:

- Limit Alcohol: Avoid excessive drinking.

- Medication Safety: Use drugs only as prescribed.



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- Avoid Toxins: Reduce exposure to harmful chemicals.
- Healthy lifestyle: Maintain a balanced diet and exercise.

Regular health check-ups and early treatment can also prevent complications like liver failure or cancer.

b. Elaborate a few methods of food preservation. Food preservation methods prevent spoilage, extend shelf life, and retain nutritional value. Key methods include:

1. Refrigeration and Freezing: Slows or halts microbial growth by lowering temperatures.
2. Canning: Seals and heats food in airtight containers to kill microorganisms.
3. Drying: Removes water to inhibit microbes (e.g., sun-drying, freeze-drying)
4. Pasteurization: Heat treatment to kill pathogens in liquid like milk.
5. Fermentation: Use microbes to convert sugars into natural preservatives (e.g., yogurt, pickles)
6. Salting and curing: Draws out moisture to prevent spoilage (e.g., cured meat).
7. Vacuum Sealing: Removes air to reduce oxidation and bacterial growth.
8. Irradiation: Uses radiation to kill bacteria and pests.



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9. Chemical Preservation: Adds substances like vinegar or artificial preservatives.
10. Smoking: Reduces moisture and adds flavour, preserving meat and fish.

These techniques are tailored to specific food types and needs.

- c. Explain fertilizers. What are their types?
- Fertilizers are substances added to soil or plants to supply essential nutrients, enhancing growth and crop yield. They can be organic (natural sources like compost, manure) or inorganic (synthetic chemicals like urea, ammonium nitrate).

### Types of Fertilizers

#### 1. By Nutrient Composition

- Nitrogen (N): Promotes leaf growth (e.g., urea).
- Phosphorus (P): Aids root and flower development (e.g., superphosphate).
- Potassium (K): Enhances disease resistance (e.g., potash).
- Micronutrient: Supplies trace elements like zinc, iron.

#### 2. By Application Method:

- Solid: Granules or powders applied to soil.
- Liquid: Sprayed or applied through irrigation.
- Foliar: Directly sprayed on leaves.



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### 3. Specialized Types

- Slow-Release: Gradual nutrient release.
- Biofertilizers: Contain beneficial microorganisms.

### Environmental Considerations

Overuse can harm ecosystems, so sustainable practices like balanced fertilization and organic alternatives are recommended.

### d. What is the anatomy of a human tooth?

A tooth consists of two main structures:

#### Crown:

This is the part of your tooth that you can see - the portion above your gums. Enamel - a hard, protective substance - covers your tooth crown.

#### Root:

This is the part of your tooth that holds it in your jaw. You can't see the root because your gums cover it. The root anchors your tooth to your periodontal ligament (the soft connective tissue that lines your tooth socket).

Q.No. 5

- a. Differentiate between a eukaryotic and a prokaryotic cell.

The defining characteristic feature that distinguishes between prokaryotic and eukaryotic cell is the nucleus.

In prokaryotic cells, the true nucleus is absent,



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moreover, membrane-bound organelles are present only in eukaryotic cells.

Another major difference between prokaryotic and eukaryotic cells is that prokaryotic cells are exclusively unicellular, while the same does not apply to eukaryotic cells.

b. What is global warming? What is Kyoto Protocol?

Global warming is the phenomenon of gradual increase in the average temperature of earth.

It is caused by the release of greenhouse gases like Carbon dioxide, Methane, CFCs into the atmosphere.

What is Kyoto Protocol?

It is an international treaty to reduce greenhouse gas emissions. Kyoto protocol applies to 6 greenhouse gases; carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

c. Write a detailed note on GIS.

A geographic information system (GIS) is a computer-based tool for mapping and analyzing things that exist and events that happen on Earth. GIS technology integrates common database operations such as querying and statistical analysis with the unique visualization and geographic analysis benefits offered by maps.



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d. Briefly describe antioxidants.

Antioxidants are man-made or natural substances that may prevent or delay some types of cell damage. Antioxidants are found in many foods, including fruits and vegetables. They are also available as dietary supplements.

### Section - II

Q. No. 7

a. Distinguish I.Q and E.Q

I.Q. (Intelligence Quotient) and E.Q. (Emotional Quotient) measure different aspects of human abilities and intelligence. Below is a comparison:

Aspect	I.Q. (Intelligence Quotient)	E.Q. (Emotional Quotient)
Definition	Measures cognitive abilities like logic, reasoning, and problem-solving.	Measures emotional awareness, control, and interpersonal skills.
Focus	Intellectual Intelligence and academic performance.	Emotional intelligence and social interactions.
Skills Measured	Memory, analytical thinking, mathematical ability, and spatial reasoning.	Empathy, emotional regulation, relationship management, and self-awareness.



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Key Area	"What you know" - mental capacity to process information.	"How you feel and connect" - understanding and managing emotions.
Role in success	Contributes to technical and academic achievements.	Plays a key role in personal and professional relationships.
Examples	Solving puzzles, logical reasoning tests, and academic performance.	Handling conflict, understanding others' feelings, and teamwork.
Improvement	Can be enhanced through education and practice in cognitive tasks.	Can be developed through self-awareness, empathy, and social training.

In summary, I.Q. relates to intellectual abilities, while E.Q. emphasizes emotional and social competencies, both of which are vital for overall success.

b. What is the present age of Aman, if after 20 years, his age will be 10 times his age 10 years back?

Let Aman's present age be  $x$ .

Given:

- After 20 years, Aman's age will be  $x + 20$ .
- 10 years ago, Aman's age was  $x - 10$ .



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- According to the problem:

$$x + 20 = 10x(x - 10)$$

Solve:

1. Expand the equation:

$$x + 20 = 10x - 100$$

1. Simplify:

$$20 + 100 = 10x - x$$

$$120 = 9x$$

1. Solve for x:

$$x = \frac{120}{9} = 13.33$$

Answer: Aman's present age is 13.33 years  
(or 13 years and 4 months).

- c. Peter can mow the lawn in 40 minutes and John can mow the lawn in 60 minutes. How long will it take for them to mow the lawn together?

To find the time it takes for Peter and John to mow the lawn together, we calculate their combined work rate and use it to determine the total time.

Step 1: Individual work rates

- Peter's rate: He mows the lawn in 40 minutes, so his rate is

$\frac{1}{40}$  of the lawn per minute.

- John's rate: He mows the lawn in 60 minutes, so his rate is

$\frac{1}{60}$  of the lawn per minute.



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Step 2: Combined work rate

Add their rates to find their combined rate:

$$\text{Combined rate} = \frac{1}{40} + \frac{1}{60}$$

To add these fractions, find the least common denominator (LCM of 40 and 60 is 120):

$$\frac{1}{40} = \frac{3}{120}, \quad \frac{1}{60} = \frac{2}{120}$$

$$\text{Combined rate} = \frac{3}{120} + \frac{2}{120} = \frac{5}{120}$$

Step 3: Time taken together

The time it takes for them to mow the lawn together is the reciprocal of their combined rate:

$$\text{Time} = \frac{1}{\frac{5}{120}} = \frac{120}{5} = 24 \text{ minutes}$$

Final Answer:

It will take 24 minutes for Peter and John to mow the lawn together.

- d. A person multiplied a number by  $\frac{3}{5}$  instead of  $\frac{5}{3}$ . What is the percentage error in the calculation?

Let the correct number be  $x$ .

Step 1: Correct Calculation

The correct multiplication should be:

$$x \times \frac{5}{3} = \frac{5x}{3}$$

Step 2: Incorrect Calculation

The incorrect multiplication is:

$$x \times \frac{3}{5} = \frac{3x}{5}$$



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Step 3: Difference between Correct and Incorrect Values

The error in the result is:

$$\text{Error} = \frac{5x}{3} - \frac{3x}{5}$$

Find a common denominator (LCM of 3 and 5 is 5):

$$\frac{5x}{3} = \frac{25x}{15}, \quad \frac{3x}{5} = \frac{9x}{15}$$

$$\text{Error} = \frac{25x - 9x}{15} = \frac{16x}{15}$$

Step 4: Percentage Error

The percentage error is given by:

$$\text{Percentage Error} = \frac{\text{Error}}{\text{Correct Value}} \times 100$$

Substitute the values:

$$\text{Percentage Error} = \frac{\frac{16x}{15}}{\frac{5x}{3}} \times 100$$

Simplify:

$$\text{Percentage Error} = \frac{16x}{15} \times \frac{3}{5x} \times 100 = \frac{16 \times 3}{15 \times 5} \times 100 = \frac{48}{75} \times 100 = 64\%$$

Final Answer:

The percentage error in the calculation is 64%.

Q.No.6 If sum of the 3-digit number is 15. Sum of 10th and unit digit is 12. The difference of the unit digit from 10th digit is equal to 2. What is the three digit number?



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Let the three-digit number be represented as  $abc$ ,  
where:

- $a$  is the hundreds digit,
- $b$  is the tens digit, and
- $c$  is the units digit.

Given:

1. The sum of the digits is 15:

$$a + b + c = 15$$

$$b + c = 12$$

$$b - c = 2$$

Step 1: Solve for  $b$  and  $c$

From the second equation,

$b + c = 12$ , and the third equation,

$b - c = 2$ , add these two equations:

$$(b + c) + (b - c) = 12 + 2$$

$$2b = 14$$

$$b = 7$$

Now, substitute  $b = 7$  into:

$$b + c = 12$$

$$7 + c = 12$$

$$c = 5$$

Step 2: Solve for  $a$

Substitute  $b = 7$  and  $c = 5$  into the first equation,

$$a + b + c = 15:$$

$$a + 7 + 5 = 15$$

$$a + 12 = 15$$

$$a = 3$$

Step 3: Final Answer:

The three-digit number is  $abc = 375$



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- b. A man ordered pizzas of small, medium and large sizes for 18 persons, one slice per person. Each size contains different numbers of slices and the ratio of their slices is 2:3:4. If each slice is of 40 gm and the price of a smaller pizza is Rs. 320, find the price and weight of a total pizza.

Let's break down the problem step by step to find the price and weight of the total pizza.

Step 1: Understand the ratios of the pizza slices

The ratio of the slices for small, medium, and large pizzas is 2:3:4. Let the number of slices in the small, medium, and large pizzas be  $2x$ ,  $3x$ , and  $4x$  respectively.

Step 2: Total number of slices

The total number of slices is given as 18. (since one slice is for each person):

$$2x + 3x + 4x = 18$$

$$9x = 18$$

$$x = 2$$

Now, we can calculate of slices in each pizza:

• Small pizza:  $2x = 2 \times 2 = 4$   
slices

• Medium pizza:  $3x = 3 \times 2 = 6$   
slices

• Large pizza:  $4x = 4 \times 2 = 8$   
slices



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Step 3: Calculate the price of each pizza

We are told the price of the smaller pizza is Rs. 320, which corresponds to the pizza with 4 slices.

Now, to calculate the prices of the medium and large pizzas:

- The price of each slice for the small pizza is:  
$$\frac{320}{4} = 80 \text{ Rs. per slice.}$$

- The price of the medium pizza (which has 6 slices) will be:

$$80 \times 6 = 480 \text{ Rs.}$$

- The price of the large pizza (which has 8 slices) will be:

$$80 \times 8 = 640 \text{ Rs.}$$

Step 4: Calculate the weight of each pizza

Each slice weighs 40 gm. Therefore, the weight of each pizza is:

- Small pizza (4 slices):

$$4 \times 40 = 160 \text{ gm.}$$

- Medium pizza (6 slices):

$$6 \times 40 = 240 \text{ gm.}$$

- Large pizza (8 slices):

$$8 \times 40 = 320 \text{ gm.}$$

Step 5: Total price and weight of the pizza



Dated:

Now, to find the total price and total weight of the pizzas:

- Total price:  
 $320 + 480 + 640 = 1440$  Rs..
- Total weight:  
 $160 + 240 + 320 = 720$  gm.

Final Answer:

- Total price of the Pizzas: Rs. 1440
- Total weight of the pizzas: 720 gm.

c. Diameter of a circle is 6 cm. Find circumference and area of circle.

Given the diameter of the circle is 6 cm:

Step 1: Radius of the circle

The radius  $r$  is half of the diameter:

$$r = \frac{6}{2} = 3 \text{ cm.}$$

Step 2: Circumference of the circle

The formula for the circumference  $C$  of a circle is:

$$C = 2\pi r$$

Substitute  $r = 3$  cm:

$$C = 2 \times \pi \times 3 = 6\pi \text{ cm.}$$

Using  $\pi \approx 3.1416$ :

$$C = 6 \times 3.1416 = 18.8496 \text{ cm.}$$

So, the circumference is approximately 18.85 cm.

Step 3: Area of the circle

The formula for the area  $A$  of a circle is:



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$$A = \pi r^2$$

Substitute  $r = 3 \text{ cm}$ :

$$A = \pi \times 3^2 = 9\pi \text{ cm}^2$$

Using  $\pi \approx 3.1416$ :

$$A \approx 9 \times 3.1416 = 28.2744 \text{ cm}^2$$

So, the area is approximately  $28.27 \text{ cm}^2$ .

Final Answers:

- Circumference:  $18.85 \text{ cm}$
- Area:  $28.27 \text{ cm}^2$

d. Identify the missing:

- i. 13, 24, 46, 90, 178, \_\_\_\_\_      ii. 5, 6, 9, 14, 21, \_\_\_\_\_

Let's analyze and solve each sequence step by step:

- i. 13, 24, 46, 90, 178, \_\_\_\_\_

Step 1: Find the pattern

Calculate the difference between consecutive terms:

$$24 - 13 = 11, \quad 46 - 24 = 22, \quad 90 - 46 = 44, \quad 178 - 90 = 88$$

Step 2: Observe the differences

The differences are:

$$11, 22, 44, 88$$

The differences double each time. Following this pattern, the next difference will be:

$$88 \times 2 = 176$$

Step 3: Find the next term

Add this difference to the last term (178):

$$178 + 176 = 354$$

Answer: The missing term is 354.



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ii. 5, 6, 9, 14, 21, \_\_\_\_\_

Step 1: Find the pattern

Calculate the difference between consecutive terms:

$$6 - 5 = 1, \quad 9 - 6 = 3, \quad 14 - 9 = 5, \quad 21 - 14 = 7$$

Step 2: Observe the differences

The differences are:

$$1, 3, 5, 7$$

The differences increase by 2 each time.

Following this pattern, the next difference will be:

$$7 + 2 = 9$$

Step 3: Find the next term

Add this difference to the last term (21):

$$21 + 9 = 30$$

Answer: The missing term is 30.

Final Answers:

1. 354

2. 30