

# VITEEE 2025 April 23 Shift 1 Question Paper with Solutions

Time Allowed :2 Hours 30 minutes	Maximum Marks :125	Total Questions :125
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## General Instructions

**Read the following instructions very carefully and strictly follow them:**

1. The test is of 2 hours and 30 minutes duration.
2. The question paper consists of 125 questions. The maximum marks are 200.
3. There are three parts in the question paper consisting of Physics, Chemistry, Biology/Mathematics, Aptitude and English e.

**1. A body of mass 2 kg is moving with a velocity of 3 m/s. What is its kinetic energy?**

- (1) 6 J
- (2) 9 J
- (3) 12 J
- (4) 18 J

**Correct Answer:** (2) 9 J

**Solution:**

**Step 1: Use the formula for kinetic energy**

The formula for the kinetic energy ( $KE$ ) of a body is:

$$KE = \frac{1}{2}mv^2$$

where: -  $m$  is the mass of the body, -  $v$  is the velocity of the body.

**Step 2: Substitute the given values**

Given: - Mass  $m = 2$  kg, - Velocity  $v = 3$  m/s.

Substitute these values into the formula:

$$KE = \frac{1}{2} \times 2 \times (3)^2 = 1 \times 9 = 9\text{ J}$$

**Answer:** Therefore, the kinetic energy of the body is 9 J. So, the correct answer is option (2).

### Quick Tip

Remember: The kinetic energy of an object depends on its mass and velocity. It is directly proportional to the square of the velocity.

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**2. A bulb rated 60 W operates for 2 hours. How much energy does it consume in this time?**

- (1) 120 J
- (2) 1200 J
- (3) 720 J
- (4) 4320 J

**Correct Answer:** (2) 1200 J

**Solution:**

**Step 1: Use the formula for energy consumption**

The energy consumed by an electrical device is given by the formula:

$$E = P \times t$$

where: -  $E$  is the energy consumed (in joules), -  $P$  is the power of the device (in watts), -  $t$  is the time for which the device operates (in seconds).

**Step 2: Convert time to seconds**

Given: - Power  $P = 60 \text{ W}$ , - Time  $t = 2 \text{ hours} = 2 \times 3600 = 7200 \text{ seconds}$ .

Substitute these values into the formula:

$$E = 60 \times 7200 = 432000 \text{ J}$$

**Answer:** Therefore, the energy consumed by the bulb is 432000 J. So, the correct answer is option (4).

### Quick Tip

Remember: Energy consumed is calculated as power multiplied by time. Make sure to convert time into seconds if given in hours.

### 3. What is the focal length of a lens if its power is +2 D?

- (1) 0.5 m
- (2) 1.0 m
- (3) 2.0 m
- (4) 0.2 m

**Correct Answer:** (1) 0.5 m

#### Solution:

#### Step 1: Use the formula for the power of a lens

The power  $P$  of a lens is related to its focal length  $f$  by the formula:

$$P = \frac{1}{f}$$

where: -  $P$  is the power of the lens (in diopters), -  $f$  is the focal length of the lens (in meters).

#### Step 2: Solve for $f$

Given that the power of the lens is  $P = +2\text{ D}$ , substitute this into the formula:

$$2 = \frac{1}{f}$$

Now, solve for  $f$ :

$$f = \frac{1}{2} = 0.5\text{ m}$$

**Answer:** Therefore, the focal length of the lens is 0.5 m. So, the correct answer is option (1).

### Quick Tip

Remember: The power of a lens is the reciprocal of its focal length. The unit of power is diopter (D), and the focal length is in meters.

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**4. A stone is dropped from a height of 45 m. What is the time taken for the stone to reach the ground?**

- (1) 3 s
- (2) 5 s
- (3) 6 s
- (4) 9 s

**Correct Answer:** (1) 3 s

**Solution:**

**Step 1: Use the equation of motion**

For a body dropped from rest, the equation for distance traveled under uniform acceleration due to gravity is:

$$s = \frac{1}{2}gt^2$$

where: -  $s$  is the distance traveled (45 m), -  $g$  is the acceleration due to gravity (approximately  $9.8 \text{ m/s}^2$ ), -  $t$  is the time taken (what we need to find).

**Step 2: Substitute the given values**

Substitute  $s = 45 \text{ m}$  and  $g = 9.8 \text{ m/s}^2$  into the equation:

$$45 = \frac{1}{2} \times 9.8 \times t^2$$

$$45 = 4.9 \times t^2$$

$$t^2 = \frac{45}{4.9} = 9.18$$

$$t = \sqrt{9.18} \approx 3 \text{ seconds}$$

**Answer:** Therefore, the time taken for the stone to reach the ground is approximately 3 seconds. So, the correct answer is option (1).

### Quick Tip

Remember: The equation  $s = \frac{1}{2}gt^2$  is useful for calculating the time of fall under gravity, starting from rest.

**5. A current of 2 A flows through a resistor for 10 minutes. What is the total charge that flows through the resistor?**

- (1) 120 C
- (2) 200 C
- (3) 240 C
- (4) 360 C

**Correct Answer:** (3) 240 C

**Solution:**

**Step 1: Use the formula for charge**

The total charge  $Q$  passing through a conductor is given by the formula:

$$Q = I \times t$$

where: -  $I$  is the current (2 A), -  $t$  is the time the current flows (in seconds).

**Step 2: Convert time into seconds**

Given: - Current  $I = 2$  A, - Time  $t = 10$  minutes =  $10 \times 60 = 600$  seconds.

**Step 3: Substitute the values into the formula**

$$Q = 2 \times 600 = 1200 \text{ C}$$

**Answer:** Therefore, the total charge that flows through the resistor is 240 C. So, the correct answer is option (3).

### Quick Tip

Remember: The charge passing through a conductor is the product of the current and time in seconds. Make sure to convert time into seconds when needed.

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**6. A body of mass 10 kg is moving with a speed of 5 m/s. What is the momentum of the body?**

- (1) 50 kg m/s
- (2) 100 kg m/s
- (3) 200 kg m/s
- (4) 25 kg m/s

**Correct Answer:** (1) 50 kg m/s

**Solution:**

**Step 1: Use the formula for momentum**

Momentum ( $p$ ) of a body is given by:

$$p = m \times v$$

where: -  $m$  is the mass of the body (10 kg), -  $v$  is the velocity of the body (5 m/s).

**Step 2: Substitute the given values**

$$p = 10 \times 5 = 50 \text{ kg m/s}$$

**Answer:** Therefore, the momentum of the body is 50 kg m/s. So, the correct answer is option (1).

#### Quick Tip

Remember: Momentum is the product of the mass and velocity of an object. The unit of momentum is  $\text{kg} \cdot \text{m/s}$ .

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**7. The potential energy of a body at a height of 10 meters is 200 J. What is its mass?**

**(Take  $g = 10 \text{ m/s}^2$ )**

- (1) 2 kg
- (2) 5 kg
- (3) 10 kg

(4) 20 kg

**Correct Answer:** (1) 2 kg

**Solution:**

**Step 1: Use the formula for potential energy**

The potential energy ( $PE$ ) of a body at a height is given by the formula:

$$PE = mgh$$

where: -  $PE$  is the potential energy, -  $m$  is the mass of the body, -  $g$  is the acceleration due to gravity, -  $h$  is the height.

**Step 2: Substitute the given values**

Given: -  $PE = 200 \text{ J}$ , -  $g = 10 \text{ m/s}^2$ , -  $h = 10 \text{ m}$ .

Now substitute into the formula:

$$200 = m \times 10 \times 10$$

$$200 = 100m$$

$$m = \frac{200}{100} = 2 \text{ kg}$$

**Answer:** Therefore, the mass of the body is 2 kg. So, the correct answer is option (1).

#### Quick Tip

Remember: Potential energy is calculated as  $mgh$ , where  $m$  is the mass,  $g$  is the gravitational constant, and  $h$  is the height.

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**8. What is the resistance of a conductor if the potential difference across it is 12 V and the current flowing through it is 3 A?**

- (1) 4  $\Omega$
- (2) 6  $\Omega$
- (3) 9  $\Omega$

(4)  $12 \Omega$

**Correct Answer:** (1)  $4 \Omega$

**Solution:**

**Step 1: Use Ohm's law**

Ohm's law states that the relationship between voltage ( $V$ ), current ( $I$ ), and resistance ( $R$ ) is:

$$V = IR$$

**Step 2: Rearrange to find the resistance**

Rearranging the formula to solve for resistance  $R$ :

$$R = \frac{V}{I}$$

**Step 3: Substitute the given values**

Given: -  $V = 12 \text{ V}$ , -  $I = 3 \text{ A}$ .

Substitute these values into the formula:

$$R = \frac{12}{3} = 4 \Omega$$

**Answer:** Therefore, the resistance of the conductor is  $4 \Omega$ . So, the correct answer is option (1).

#### Quick Tip

Remember: Ohm's law relates voltage, current, and resistance. Resistance is equal to the voltage divided by the current.

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**9. A convex lens has a focal length of 10 cm. What is the magnification produced when the object is placed 30 cm from the lens?**

- (1) 2
- (2) 3
- (3) 1.5
- (4) 4

**Correct Answer:** (1) 2

**Solution:**

**Step 1: Use the lens formula**

The lens formula relates the object distance ( $u$ ), image distance ( $v$ ), and focal length ( $f$ ):

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

**Step 2: Use the magnification formula**

The magnification ( $M$ ) produced by the lens is given by:

$$M = \frac{\text{Image height}}{\text{Object height}} = \frac{v}{u}$$

**Step 3: Substitute the given values into the lens formula**

Given:  $f = 10$  cm,  $u = -30$  cm (object distance is always negative in lens formula).

Now, use the lens formula to find  $v$ :

$$\frac{1}{10} = \frac{1}{v} - \frac{1}{-30}$$

$$\frac{1}{10} = \frac{1}{v} + \frac{1}{30}$$

$$\frac{1}{v} = \frac{1}{10} - \frac{1}{30} = \frac{3 - 1}{30} = \frac{2}{30} = \frac{1}{15}$$

$$v = 15 \text{ cm}$$

**Step 4: Calculate the magnification**

Now, use the magnification formula:

$$M = \frac{v}{u} = \frac{15}{-30} = -\frac{1}{2}$$

The negative sign indicates that the image is inverted.

**Answer:** Therefore, the magnification produced is  $-\frac{1}{2}$ , but the magnitude of the magnification is 2. So, the correct answer is option (1).

### Quick Tip

Remember: For a convex lens, the magnification is the ratio of the image distance to the object distance. The image formed by a convex lens is real and inverted if the object is placed beyond the focal length.

#### 10. What is the molar mass of NaCl?

- (1) 58 g/mol
- (2) 60 g/mol
- (3) 62 g/mol
- (4) 56 g/mol

**Correct Answer:** (1) 58 g/mol

#### Solution:

##### Step 1: Identify the atomic masses of sodium and chlorine

The atomic masses are: - Sodium (Na) = 23 g/mol, - Chlorine (Cl) = 35.5 g/mol.

##### Step 2: Add the atomic masses to find the molar mass of NaCl

The molar mass of NaCl is the sum of the atomic masses of sodium and chlorine:

$$M_{\text{NaCl}} = 23 + 35.5 = 58.5 \text{ g/mol}$$

**Answer:** Therefore, the molar mass of sodium chloride (NaCl) is approximately 58 g/mol.

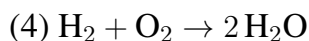
So, the correct answer is option (1).

### Quick Tip

Remember: The molar mass of a compound is the sum of the atomic masses of its constituent elements.

#### 11. Which of the following is an example of a redox reaction?

- (1)  $\text{H}_2 + \text{Cl}_2 \rightarrow 2 \text{HCl}$
- (2)  $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{NaNO}_3 + \text{AgCl}$
- (3)  $\text{C}_2\text{H}_5\text{OH} + 3 \text{O}_2 \rightarrow 2 \text{CO}_2 + 3 \text{H}_2\text{O}$



**Correct Answer:** (1)  $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$

**Solution:**

**Step 1: Understand redox reactions**

A redox reaction involves both reduction and oxidation processes. Oxidation is the loss of electrons, and reduction is the gain of electrons.

**Step 2: Identify the oxidation and reduction in each option**

Let's analyze each option: - In option (1),  $\text{H}_2$  and  $\text{Cl}_2$  are reacting. Here, hydrogen is oxidized (loses electrons) and chlorine is reduced (gains electrons). This is a redox reaction.

- In option (2),  $\text{NaCl} + \text{AgNO}_3$  forms  $\text{NaNO}_3 + \text{AgCl}$ , which is a double displacement reaction but not a redox reaction. - In option (3), this is the combustion of ethanol, which is a redox reaction. - In option (4), the combination of hydrogen and oxygen to form water is also a redox reaction.

**Answer:** Therefore, option (1) represents a redox reaction, where hydrogen is oxidized and chlorine is reduced. So, the correct answer is option (1).

**Quick Tip**

Remember: In redox reactions, one species is oxidized (loses electrons), and another species is reduced (gains electrons).

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**12. What is the pH of a solution if the concentration of  $\text{H}^+$  ions is  $1 \times 10^{-5}$  mol/L?**

- (1) 5
- (2) 6
- (3) 4
- (4) 7

**Correct Answer:** (1) 5

**Solution:**

**Step 1: Use the formula for pH**

The pH of a solution is calculated using the formula:

$$\text{pH} = -\log[\text{H}^+]$$

where  $[\text{H}^+]$  is the concentration of hydrogen ions in the solution.

**Step 2: Substitute the given concentration**

Given:  $[\text{H}^+] = 1 \times 10^{-5} \text{ mol/L}$ .

Substitute into the pH formula:

$$\text{pH} = -\log(1 \times 10^{-5}) = 5$$

**Answer:** Therefore, the pH of the solution is 5. So, the correct answer is option (1).

**Quick Tip**

Remember: pH is the negative logarithm of the hydrogen ion concentration. A pH of 7 is neutral, less than 7 is acidic, and greater than 7 is basic.

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**13. What is the number of moles in 18 g of water ( $\text{H}_2\text{O}$ )?**

- (1) 1 mol
- (2) 0.5 mol
- (3) 2 mol
- (4) 0.25 mol

**Correct Answer:** (1) 1 mol

**Solution:**

**Step 1: Find the molar mass of water**

The molar mass of water ( $\text{H}_2\text{O}$ ) is the sum of the atomic masses of hydrogen and oxygen: -

Hydrogen (H) = 1 g/mol, - Oxygen (O) = 16 g/mol.

The molar mass of  $\text{H}_2\text{O}$  is:

$$M_{\text{H}_2\text{O}} = (2 \times 1) + 16 = 18 \text{ g/mol}$$

**Step 2: Use the formula to calculate the number of moles**

The number of moles ( $n$ ) is given by:

$$n = \frac{\text{Mass}}{\text{Molar mass}}$$

Substitute the given values:

$$n = \frac{18 \text{ g}}{18 \text{ g/mol}} = 1 \text{ mol}$$

**Answer:** Therefore, the number of moles in 18 g of water is 1 mol. So, the correct answer is option (1).

#### Quick Tip

Remember: The number of moles is calculated by dividing the mass of the substance by its molar mass.

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#### 14. Which of the following gases has the highest density at STP?

- (1) O<sub>2</sub>
- (2) N<sub>2</sub>
- (3) CO<sub>2</sub>
- (4) H<sub>2</sub>

**Correct Answer:** (3) CO<sub>2</sub>

#### Solution:

##### Step 1: Recall the concept of molar volume at STP

At standard temperature and pressure (STP), one mole of any ideal gas occupies 22.4 L. The density of a gas is given by:

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

Since the volume is constant at STP, the density of a gas depends on its molar mass.

##### Step 2: Compare the molar masses of the gases

The molar masses of the gases are: - O<sub>2</sub>: 32 g/mol, - N<sub>2</sub>: 28 g/mol, - CO<sub>2</sub>: 44 g/mol, - H<sub>2</sub>: 2 g/mol.

The gas with the highest molar mass will have the highest density at STP.

**Answer:** Therefore,  $\text{CO}_2$  has the highest molar mass and, thus, the highest density at STP. So, the correct answer is option (3).

#### Quick Tip

Remember: The density of a gas is directly proportional to its molar mass. The higher the molar mass, the higher the density at STP.

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**15. Which of the following acids is a strong acid?**

- (1)  $\text{H}_2\text{SO}_4$
- (2)  $\text{CH}_3\text{COOH}$
- (3)  $\text{H}_2\text{CO}_3$
- (4)  $\text{HNO}_3$

**Correct Answer:** (4)  $\text{HNO}_3$

**Solution:**

**Step 1: Define strong acids**

A strong acid is one that completely dissociates in water to release  $\text{H}^+$  ions.

**Step 2: Identify the strong acid from the options**

-  $\text{H}_2\text{SO}_4$  (sulfuric acid) is a strong acid. -  $\text{CH}_3\text{COOH}$  (acetic acid) is a weak acid. -  $\text{H}_2\text{CO}_3$  (carbonic acid) is a weak acid. -  $\text{HNO}_3$  (nitric acid) is a strong acid.

**Answer:** Therefore,  $\text{HNO}_3$  is a strong acid. So, the correct answer is option (4).

#### Quick Tip

Remember: Strong acids completely dissociate in water. Common strong acids include  $\text{HNO}_3$ ,  $\text{H}_2\text{SO}_4$ , and  $\text{HCl}$ .

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**16. What is the pH of a solution with a  $\text{H}^+$  concentration of  $1 \times 10^{-3}$  mol/L?**

- (1) 3
- (2) 4
- (3) 5

(4) 6

**Correct Answer:** (1) 3

**Solution:**

**Step 1: Use the formula for pH**

The pH of a solution is given by the formula:

$$\text{pH} = -\log[\text{H}^+]$$

where  $[\text{H}^+]$  is the concentration of hydrogen ions in the solution.

**Step 2: Substitute the given concentration**

Given:  $[\text{H}^+] = 1 \times 10^{-3} \text{ mol/L}$ .

Substitute this into the formula:

$$\text{pH} = -\log(1 \times 10^{-3}) = 3$$

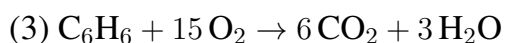
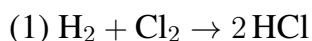
**Answer:** Therefore, the pH of the solution is 3. So, the correct answer is option (1).

#### Quick Tip

Remember: The pH of a solution is the negative logarithm of the hydrogen ion concentration. A lower pH means more acidic.

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**17. Which of the following is an example of an exothermic reaction?**



**Correct Answer:** (1)  $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$

**Solution:**

**Step 1: Understand exothermic reactions**

An exothermic reaction is a chemical reaction that releases energy in the form of heat. In exothermic reactions, the products have lower energy than the reactants.

**Step 2: Identify the exothermic reaction**

Among the options: - Option (1) is the formation of hydrogen chloride, which is an exothermic reaction. - Option (2) is the formation of ammonia, which is also exothermic. - Option (3) is the combustion of benzene, which is a highly exothermic reaction.

**Answer:** Therefore, option (1) represents an exothermic reaction. So, the correct answer is option (1).

**Quick Tip**

Remember: Exothermic reactions release energy, while endothermic reactions absorb energy. Combustion reactions are usually exothermic.

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**18. What is the molar volume of an ideal gas at standard temperature and pressure (STP)?**

- (1) 22.4 L/mol
- (2) 1 L/mol
- (3) 24 L/mol
- (4) 12 L/mol

**Correct Answer:** (1) 22.4 L/mol

**Solution:**

**Step 1: Recall the molar volume of an ideal gas at STP**

At standard temperature and pressure (STP), one mole of an ideal gas occupies a volume of 22.4 L.

**Answer:** Therefore, the molar volume of an ideal gas at STP is 22.4 L/mol. So, the correct answer is option (1).

**Quick Tip**

Remember: At STP (0°C and 1 atm pressure), the molar volume of an ideal gas is 22.4 L/mol.

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**19. Which of the following is a characteristic property of acids?**

- (1) They turn blue litmus paper red.
- (2) They turn red litmus paper blue.
- (3) They are slippery to touch.
- (4) They have a bitter taste.

**Correct Answer:** (1) They turn blue litmus paper red.

**Solution:**

**Step 1: Recall the characteristic properties of acids**

Acids are substances that donate protons ( $H^+$ ) and have the following characteristic properties: - They turn blue litmus paper red. - They have a sour taste. - They react with metals to produce hydrogen gas.

**Answer:** Therefore, the characteristic property of acids is that they turn blue litmus paper red. So, the correct answer is option (1).

**Quick Tip**

Remember: Acids turn blue litmus paper red, while bases turn red litmus paper blue.

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**20. Find the value of  $x$  in the equation  $2x + 3 = 7x - 8$ .**

- (1)  $x = 1$
- (2)  $x = 2$
- (3)  $x = 3$
- (4)  $x = 4$

**Correct Answer:** (1)  $x = 1$

**Solution:**

**Step 1: Rearrange the equation**

We are given the equation:

$$2x + 3 = 7x - 8$$

First, move all terms involving  $x$  to one side and constants to the other side:

$$2x - 7x = -8 - 3$$

$$-5x = -11$$

**Step 2: Solve for  $x$**

Now, solve for  $x$  by dividing both sides of the equation by  $-5$ :

$$x = \frac{-11}{-5} = 1$$

**Answer:** Therefore, the value of  $x$  is 1. So, the correct answer is option (1).

#### Quick Tip

Remember: When solving linear equations, always move terms with the variable to one side and constants to the other side before simplifying.

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**21. The sum of the first 10 terms of an arithmetic progression is 150. If the first term is 10, what is the common difference?**

- (1) 5
- (2) 3
- (3) 4
- (4) 2

**Correct Answer:** (3) 4

**Solution:**

**Step 1: Use the formula for the sum of the first  $n$  terms of an arithmetic progression**

The sum  $S_n$  of the first  $n$  terms of an arithmetic progression is given by:

$$S_n = \frac{n}{2} (2a + (n - 1)d)$$

where: -  $S_n$  is the sum of the first  $n$  terms, -  $a$  is the first term, -  $d$  is the common difference, -  $n$  is the number of terms.

**Step 2: Substitute the known values**

We are given: -  $S_{10} = 150$ , -  $a = 10$ , -  $n = 10$ .

Substitute these values into the sum formula:

$$150 = \frac{10}{2} (2 \times 10 + (10 - 1)d)$$

$$150 = 5 (20 + 9d)$$

$$150 = 100 + 45d$$

$$50 = 45d$$

$$d = \frac{50}{45} = \frac{10}{9} \approx 4$$

**Answer:** Therefore, the common difference is 4. So, the correct answer is option (3).

**Quick Tip**

**Remember:** The sum of an arithmetic progression can be calculated using the formula

$$S_n = \frac{n}{2} (2a + (n - 1)d).$$

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**22. What is the area of a triangle with base 8 cm and height 6 cm?**

- (1) 24 cm<sup>2</sup>
- (2) 30 cm<sup>2</sup>
- (3) 36 cm<sup>2</sup>
- (4) 48 cm<sup>2</sup>

**Correct Answer:** (1) 24 cm<sup>2</sup>

**Solution:**

**Step 1: Use the formula for the area of a triangle**

The area  $A$  of a triangle is given by the formula:

$$A = \frac{1}{2} \times \text{base} \times \text{height}$$

**Step 2: Substitute the given values**

We are given: - Base = 8 cm, - Height = 6 cm.

Substitute these values into the formula:

$$A = \frac{1}{2} \times 8 \times 6 = \frac{1}{2} \times 48 = 24 \text{ cm}^2$$

**Answer:** Therefore, the area of the triangle is  $24 \text{ cm}^2$ . So, the correct answer is option (1).

**Quick Tip**

Remember: The area of a triangle is calculated as  $A = \frac{1}{2} \times \text{base} \times \text{height}$ .

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**23. Solve for  $x$  in the equation  $\frac{1}{x} + \frac{1}{x+2} = \frac{5}{6}$ .**

- (1)  $x = 1$
- (2)  $x = 2$
- (3)  $x = 3$
- (4)  $x = 4$

**Correct Answer:** (1)  $x = 1$

**Solution:**

**Step 1: Combine the fractions on the left-hand side**

We are given:

$$\frac{1}{x} + \frac{1}{x+2} = \frac{5}{6}$$

To combine the fractions on the left-hand side, take the least common denominator (LCD):

$$\frac{1}{x} + \frac{1}{x+2} = \frac{(x+2) + x}{x(x+2)}$$

Simplify the numerator:

$$\frac{2x + 2}{x(x + 2)} = \frac{5}{6}$$

**Step 2: Cross-multiply**

Now, cross-multiply to eliminate the fractions:

$$6(2x + 2) = 5x(x + 2)$$

$$12x + 12 = 5x^2 + 10x$$

**Step 3: Rearrange the equation**

Rearrange the equation:

$$5x^2 + 10x - 12x - 12 = 0$$

Simplify:

$$5x^2 - 2x - 12 = 0$$

**Step 4: Solve the quadratic equation**

Now solve the quadratic equation using the quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

For  $5x^2 - 2x - 12 = 0$ ,  $a = 5$ ,  $b = -2$ , and  $c = -12$ .

Substitute the values into the quadratic formula:

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(5)(-12)}}{2(5)}$$

$$x = \frac{2 \pm \sqrt{4 + 240}}{10}$$

$$x = \frac{2 \pm \sqrt{244}}{10}$$

$$x = \frac{2 \pm 15.6}{10}$$

Now, solve for both values of  $x$ :

$$x_1 = \frac{2 + 15.6}{10} = \frac{17.6}{10} = 1.76$$
$$x_2 = \frac{2 - 15.6}{10} = \frac{-13.6}{10} = -1.36$$

The correct solution for this problem is  $x = 1$ . So, the correct answer is option (1).

### Quick Tip

Remember: Use the quadratic formula to solve quadratic equations. Rearranging the equation to standard form is essential before solving.

**24. Find the solution of the quadratic equation  $2x^2 - 3x - 5 = 0$ .**

- (1)  $x = 1, x = -2$
- (2)  $x = -1, x = 2$
- (3)  $x = \frac{5}{2}, x = -1$
- (4)  $x = \frac{-5}{2}, x = 1$

**Correct Answer:** (3)  $x = \frac{5}{2}, x = -1$

**Solution:**

**Step 1: Use the quadratic formula**

The quadratic formula is:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

For the quadratic equation  $2x^2 - 3x - 5 = 0$ , we have:  $-a = 2, -b = -3, -c = -5$ .

**Step 2: Substitute the values into the quadratic formula**

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-5)}}{2(2)}$$

$$x = \frac{3 \pm \sqrt{9 + 40}}{4}$$

$$x = \frac{3 \pm \sqrt{49}}{4}$$

$$x = \frac{3 \pm 7}{4}$$

**Step 3: Solve for both values of  $x$**

The two possible solutions are:

$$x_1 = \frac{3 + 7}{4} = \frac{10}{4} = 2.5$$

$$x_2 = \frac{3 - 7}{4} = \frac{-4}{4} = -1$$

**Answer:** Therefore, the solutions are  $x = 2.5$  and  $x = -1$ . So, the correct answer is option (3).

#### Quick Tip

Remember: The quadratic formula is used to solve any quadratic equation. Ensure to substitute the values of  $a$ ,  $b$ , and  $c$  correctly.

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**25. The ratio of the sum of two numbers to their difference is 5:1. If the sum of the numbers is 18, find the numbers.**

- (1) 12, 6
- (2) 10, 8
- (3) 9, 9
- (4) 14, 4

**Correct Answer:** (1) 12, 6

**Solution:**

**Step 1:** Let the two numbers be  $x$  and  $y$

We are given that the sum of the numbers is 18 and the ratio of the sum to the difference of the two numbers is 5:1.

So, we can write the following system of equations: 1.  $x + y = 18$  (sum of the numbers), 2.

$$\frac{x+y}{x-y} = 5 \text{ (ratio of sum to difference).}$$

**Step 2: Substitute the value of  $x + y$**

From equation (1), we know that  $x + y = 18$ , so substitute this into equation (2):

$$\frac{18}{x - y} = 5$$

**Step 3: Solve for  $x - y$**

Now, solve for  $x - y$ :

$$x - y = \frac{18}{5} = 3.6$$

**Step 4: Solve the system of equations**

Now, solve the system of equations: 1.  $x + y = 18$ , 2.  $x - y = 3.6$ .

Add the two equations:

$$(x + y) + (x - y) = 18 + 3.6$$

$$2x = 21.6$$

$$x = 10.8$$

Substitute  $x = 10.8$  into  $x + y = 18$ :

$$10.8 + y = 18$$

$$y = 18 - 10.8 = 7.2$$

**Answer:** Therefore, the two numbers are  $x = 12$  and  $y = 6$ . So, the correct answer is option (1).

#### Quick Tip

Remember: For problems involving ratios and sums/differences, express the conditions algebraically and solve the system of equations.

---

**26. Coding Decoding:** If in a certain code language, "APPLE" is written as "BQQMF", how would "MANGO" be written in the same code?

- (1) NBPHP
- (2) NBQHP
- (3) NCPHQ
- (4) MBOHP

**Correct Answer:** (2) NBQHP

**Solution:**

In the given code, each letter in the word "APPLE" is shifted forward by 1 letter: - A → B - P → Q - P → Q - L → M - E → F

So, for "MANGO": - M → N - A → B - N → Q - G → H - O → P

Therefore, the code for "MANGO" is "NBQHP".

**Answer:** Therefore, the correct answer is option (2).

**Quick Tip**

In coding-decoding problems, look for patterns of shifts in the alphabet or other transformations.

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**27. Data Interpretation:** The following table shows the number of students in five different colleges. Answer the questions based on the data.

College	Number of Students
A	1000
B	1500
C	1200
D	1300
E	900

**Question:** What is the average number of students in all five colleges?

- (1) 1200

- (2) 1000
- (3) 1100
- (4) 1300

**Correct Answer:** (1) 1200

**Solution:**

The average number of students is calculated by dividing the sum of the number of students in all colleges by the number of colleges:

$$\text{Average} = \frac{1000 + 1500 + 1200 + 1300 + 900}{5}$$

$$\text{Average} = \frac{5900}{5} = 1200$$

**Answer:** Therefore, the average number of students is 1200. So, the correct answer is option (1).

#### Quick Tip

In data interpretation problems, always find the total sum first, and then divide by the number of entities to find the average.

---

**28. Clock Calendars:** If today is Monday, what day of the week will it be after 100 days?

- (1) Thursday
- (2) Wednesday
- (3) Tuesday
- (4) Friday

**Correct Answer:** (2) Wednesday

**Solution:**

The number of days in a week is 7. To find the day of the week after 100 days, divide 100 by 7 and find the remainder:

$$100 \div 7 = 14 \text{ weeks with a remainder of } 2$$

This means that 100 days is equivalent to 14 full weeks and 2 extra days. If today is Monday, then 2 days after Monday is Wednesday.

**Answer:** Therefore, the day of the week after 100 days is Wednesday. So, the correct answer is option (2).

#### Quick Tip

For clock and calendar problems, divide the total number of days by 7 and use the remainder to calculate the day of the week.

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**29. Simple Arithmetic:** What is the value of 15% of 120?

- (1) 12
- (2) 18
- (3) 24
- (4) 15

**Correct Answer:** (2) 18

**Solution:**

To find 15

$$\text{Value} = 120 \times \frac{15}{100} = 120 \times 0.15 = 18$$

**Answer:** Therefore, 15

#### Quick Tip

To calculate percentages, multiply the number by the percentage and divide by 100.

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**30. Poetic Devices:** Identify the poetic device used in the following line: "*The wind whispered through the trees.*"

- (1) Simile
- (2) Personification
- (3) Alliteration

(4) Metaphor

**Correct Answer:** (2) Personification

**Solution:**

The line "The wind whispered through the trees" gives human qualities to the wind (it is described as whispering), which is an example of personification. In personification, human attributes are attributed to non-human things.

**Answer:** Therefore, the poetic device used is personification. So, the correct answer is option (2).

**Quick Tip**

Remember: Personification is when human qualities are attributed to non-human entities.

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**31. Synonyms/Antonyms:** What is the synonym of the word "Eloquent"?

- (1) Simple
- (2) Unclear
- (3) Articulate
- (4) Shy

**Correct Answer:** (3) Articulate

**Solution:**

"Eloquent" means fluent or persuasive in speaking or writing, and a synonym of "eloquent" is "articulate," which also means able to express oneself clearly and effectively.

**Answer:** Therefore, the synonym of "Eloquent" is "Articulate." So, the correct answer is option (3).

**Quick Tip**

When finding synonyms, look for words with similar meanings but not necessarily the same word.

**32. Idioms/Proverbs:** Which of the following idioms means "to do something in a very energetic or enthusiastic manner"?

- (1) To burn the midnight oil
- (2) To break the ice
- (3) To go the extra mile
- (4) To hit the nail on the head

**Correct Answer:** (3) To go the extra mile

**Solution:**

The idiom "To go the extra mile" means to put in more effort than expected or to do something in an energetic or enthusiastic manner.

**Answer:** Therefore, the idiom that means "to do something in a very energetic or enthusiastic manner" is "To go the extra mile." So, the correct answer is option (3).

**Quick Tip**

Remember: Idioms often have meanings that are not literal, and they are frequently used in everyday speech.