

LPUNEST 2026 Question Paper with Solution

1. 1.0×10^{-4} M HCl is diluted 10 times. The pH of the final solution is:

- (A) between 3 and 4
- (B) between 4 and 5
- (C) between 6 and 7
- (D) equal to 7

Correct Answer: (B) between 4 and 5

Solution:

The initial concentration of the strong acid HCl is $[\text{H}^+]_{\text{initial}} = 1.0 \times 10^{-4}$ M.

When diluted 10 times, the final concentration $[\text{H}^+]_{\text{final}}$ is:

$$[\text{H}^+]_{\text{final}} = \frac{10^{-4}}{10} = 1.0 \times 10^{-5} \text{ M.}$$

The pH is calculated as $\text{pH} = -\log[\text{H}^+]$.

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

The pH of the final solution is 5, which falls between 4 and 5.

💡 Quick Tip

Dilution reduces the concentration proportionally. A 10-fold dilution increases the pH by $\log(10) = 1$ unit for strong acids and bases, provided the resulting concentration is significantly greater than 10^{-7} M.

2. 10^{-6} M NaOH is diluted 100 times. The pH of the diluted base is:

- (A) between 7 and 8
- (B) between 5 and 6
- (C) between 6 and 7
- (D) between 10 and 11

Correct Answer: (A) between 7 and 8

Solution:

The initial concentration of OH^- is $[\text{OH}^-]_{\text{initial}} = 10^{-6}$ M.

After 100 times dilution, the $[\text{OH}^-]$ from the base is:

$$[\text{OH}^-]_{\text{base}} = \frac{10^{-6}}{100} = 10^{-8} \text{ M}.$$

Since this concentration is comparable to $[\text{OH}^-]$ from water auto-ionization (10^{-7} M), the total $[\text{OH}^-]$ must be considered.

Total $[\text{OH}^-]$ will be slightly greater than 10^{-7} M .

If $[\text{OH}^-] = 10^{-7} \text{ M}$, $\text{pOH} = 7$ and $\text{pH} = 7$.

Since the total $[\text{OH}^-]$ is greater than 10^{-7} M (due to the added base), the pOH will be slightly less than 7.

Therefore, the $\text{pH} = 14 - \text{pOH}$ will be slightly greater than 7.

The pH of the diluted solution is between 7 and 8.

Quick Tip

When the acid or base concentration falls below 10^{-6} M , the self-ionization of water must be accounted for. The final pH of any aqueous solution at 25°C cannot exceed the range $[0, 14]$ and cannot be far from 7 for ultra-dilute solutions.

3. The pH of a solution with $[\text{H}^+] = 3.2 \times 10^{-3} \text{ M}$ is closest to:

- (A) 2.5
- (B) 3.0
- (C) 3.5
- (D) 4.0

Correct Answer: (A) 2.5

Solution:

We use the definition $\text{pH} = -\log[\text{H}^+]$.

Given $[\text{H}^+] = 3.2 \times 10^{-3} \text{ M}$.

$$\text{pH} = -\log(3.2 \times 10^{-3}).$$

$$\text{pH} = -(\log(3.2) + \log(10^{-3})).$$

$$\text{pH} = -(\log(3.2) - 3) = 3 - \log(3.2).$$

We use the approximation $\log(3.2) \approx 0.5$.

$$\text{pH} \approx 3 - 0.5 = 2.5.$$

The exact value is $3 - 0.505 = 2.495$, which is closest to 2.5.

 Quick Tip

To estimate pH without a calculator for $[\text{H}^+] = C \times 10^{-N}$, remember $\text{pH} = N - \log(C)$. Since $\log(C)$ is positive, the pH must be slightly less than N .

4. The pH of pure water at 25°C is:

- (A) 0
- (B) 5
- (C) 7
- (D) 14

Correct Answer: (C) 7

Solution:

At 25°C, the ion product of water K_w is 1.0×10^{-14} .

In pure water, the concentrations of H^+ and OH^- are equal.

$$[\text{H}^+] = \sqrt{K_w} = \sqrt{1.0 \times 10^{-14}}.$$

$$[\text{H}^+] = 1.0 \times 10^{-7} \text{ M}.$$

The pH is calculated as:

$$\text{pH} = -\log(10^{-7}) = 7.$$

Pure water is neutral, and at 25°C, its pH is 7.

 Quick Tip

Neutrality means $[\text{H}^+] = [\text{OH}^-]$. This condition occurs when $\text{pH} = \text{pOH} = 7$ at 25°C. Remember that pH is temperature-dependent because K_w is temperature-dependent.

5. Which of the following solutions is the most acidic?

- (A) pH = 6
- (B) pH = 4
- (C) pH = 9

(D) $\text{pH} = 7$

Correct Answer: (B) $\text{pH} = 4$

Solution:

Acidity is inversely related to the pH value.

A lower pH corresponds to a higher concentration of hydrogen ions $[\text{H}^+]$ and thus greater acidity.

The options are compared: $4 < 6 < 7 < 9$.

The smallest pH value listed is $\text{pH} = 4$.

Therefore, the solution with $\text{pH} = 4$ is the most acidic.

 Quick Tip

Solutions with $\text{pH} < 7$ are acidic, $\text{pH} > 7$ are basic, and $\text{pH} = 7$ is neutral. Acidity increases exponentially as pH approaches 0.

6. Choose the correct synonym of the word "Abundant".

(A) Scarce

(B) Plentiful

(C) Rare

(D) Limited

Correct Answer: (B) Plentiful

Solution:

"Abundant" means existing or available in large quantities; ample.

We look for the word with the same meaning (synonym).

(A) Scarce, (C) Rare, and (D) Limited all imply a small or restricted quantity (antonyms).

(B) Plentiful means existing in great abundance.

Plentiful is the correct synonym.

 Quick Tip

Focus on the core definition of the word. "Abundant" implies high quantity; "Plentiful" confirms this meaning.

7. Choose the correct antonym of the word "Expand".

- (A) Increase
- (B) Enlarge
- (C) Spread
- (D) Contract

Correct Answer: (D) Contract

Solution:

"Expand" means to increase in size, extent, or volume.

We look for the word with the opposite meaning (antonym).

(A) Increase, (B) Enlarge, and (C) Spread are synonyms for "Expand".

(D) Contract means to decrease in size or draw together.

Contract is the correct antonym.

 Quick Tip

In selecting antonyms, first identify the action/state implied by the word (e.g., expansion/growth) and then seek the direct opposite (e.g., contraction/reduction).

8. Identify the correctly spelled word.

- (A) Accomodation
- (B) Acommodation
- (C) Accommodation
- (D) Accomadation

Correct Answer: (C) Accommodation

Solution:

The word "Accommodation" is often misspelled regarding the number of 'c's and 'm's.

The correct spelling is A-C-C-O-M-M-O-D-A-T-I-O-N, containing double C and double M.

Option (C) matches this spelling.

 Quick Tip

Memorize the tricky parts of commonly misspelled words. For "accommodation," remember the structure ACC...OMM...

9. Choose the correct option to fill in the blank: She is good ... mathematics.

- (A) in
- (B) on
- (C) at
- (D) with

Correct Answer: (C) at

Solution:

The phrase "good at" is the standard idiomatic expression used to indicate proficiency or skill in a particular subject or activity.

The correct grammatical usage is: Subject + is/are + good/bad + at + skill/subject.

Therefore, the correct preposition is "at".

 Quick Tip

Phrasal verbs and idiomatic expressions often dictate preposition usage. Skill or competence always takes the preposition 'at' (e.g., adept at, talented at, poor at).

10. Choose the correct passive voice of the sentence: "The teacher explained the lesson."

- (A) The lesson explains the teacher.
- (B) The lesson was explained by the teacher.
- (C) The teacher was explained by the lesson.
- (D) The lesson is explained by the teacher.

Correct Answer: (B) The lesson was explained by the teacher.

Solution:

The active sentence is: "The teacher (Subject) explained (Verb: Simple Past) the lesson (Object)."

To convert to passive voice, the object becomes the subject: "The lesson".

The verb tense (Simple Past) changes to the passive structure: was/were + past participle. "The lesson was explained".

The original subject becomes the agent: "by the teacher".

The correct passive sentence is: "The lesson was explained by the teacher."

 Quick Tip

Always match the tense of the auxiliary verb ('to be') in the passive voice to the tense of the main verb in the active voice. Since 'explained' is Simple Past, we use 'was explained'.

11. If the average of 5 numbers is 18, what is their total sum?

- (A) 72
- (B) 85
- (C) 90
- (D) 95

Correct Answer: (C) 90

Solution:

The formula relating average, sum, and count is: $\text{Sum} = \text{Average} \times \text{Count}$.

Given: Average = 18.

Given: Count = 5.

Total Sum = 18×5 .

Total Sum = 90.

 Quick Tip

Multiplication is the fastest route to finding the total sum when the average and count are known. $18 \times 5 = (20 - 2) \times 5 = 100 - 10 = 90$.

12. A train travels 120 km in 2 hours. What is its speed?

- (A) 40 km/h

(B) 50 km/h

(C) 60 km/h

(D) 80 km/h

Correct Answer: (C) 60 km/h

Solution:

Speed is calculated by dividing distance by time.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}.$$

Given: Distance = 120 km.

Given: Time = 2 hours.

$$\text{Speed} = \frac{120 \text{ km}}{2 \text{ hours}}.$$

Speed = 60 km/h.

 Quick Tip

Ensure units are correct. If the distance unit is kilometer (km) and time unit is hour (h), the resulting speed is in km/h.

13. If the cost price of an article is 500 and it is sold at a profit of 10%, what is the selling price?

(A) 525

(B) 540

(C) 550

(D) 600

Correct Answer: (C) 550

Solution:

Cost Price (CP) = 500.

Profit percentage (P%) = 10%.

The selling price (SP) is the CP plus the profit amount.

Profit amount = 10% of 500 = $0.10 \times 500 = 50$.

SP = CP + Profit.

SP = 500 + 50.

$$SP = 550.$$

 Quick Tip

A profit of 10% means the selling price is 110% of the cost price. $SP = 500 \times 1.10 = 550$.

14. What is the simple interest on 2000 at 5% per annum for 2 years?

- (A) 100
- (B) 150
- (C) 200
- (D) 250

Correct Answer: (C) 200

Solution:

We use the Simple Interest (SI) formula: $SI = \frac{P \times R \times T}{100}$.

Given: Principal (P) = 2000.

Rate (R) = 5.

Time (T) = 2.

$$SI = \frac{2000 \times 5 \times 2}{100}.$$

$$SI = \frac{20000}{100}.$$

$$SI = 200.$$

 Quick Tip

Simple interest calculations are straightforward multiplication. 5% per year for 2 years means a total interest rate of 10%. 10% of 2000 is 200.

15. If 3 pens cost 45, what is the cost of 10 pens?

- (A) 100
- (B) 120
- (C) 150
- (D) 180

Correct Answer: (C) 150

Solution:

First, we find the cost of a single pen (unit cost).

$$\text{Cost of 1 pen} = \frac{\text{Total Cost}}{\text{Quantity}} = \frac{45}{3}.$$

$$\text{Cost of 1 pen} = 15.$$

Now, calculate the cost of 10 pens.

$$\text{Cost of 10 pens} = 10 \times 15.$$

$$\text{Cost of 10 pens} = 150.$$

💡 Quick Tip

Proportionality problems require establishing the unit rate first. $3 : 45$ implies a ratio of $1 : 15$. Therefore, 10 pens correspond to $10 \times 15 = 150$.
