

CUET Practice Exam — Solutions Report

MM-20260721 · Sets · Units & Dimensions · Mole Concept

Student: h | Date: 21/07/2026 | Time: 0m 4s

0 / 125 (0.0%)

Grade: Needs Improvement | Unanswered: 125

Sets (Math): 0/75 (0%)	
Units & Dimensions: 0/25 (0%)	
Mole Concept: 0/25 (0%)	

Topic-wise Breakdown

Set Laws	0/7 (0%)	
Roster Form	0/5 (0%)	
Venn Diagrams	0/9 (0%)	
De Morgan's Laws	0/6 (0%)	
Intervals	0/5 (0%)	
Subsets & Power Set	0/9 (0%)	
Cartesian Product	0/5 (0%)	
Set Calculations	0/6 (0%)	
Types of Sets	0/7 (0%)	
Set-builder Form	0/2 (0%)	
Union & Intersection	0/9 (0%)	
Counting with Sets	0/3 (0%)	
Relations	0/2 (0%)	
SI Units	0/3 (0%)	
Dimensional Formula	0/6 (0%)	
Unit Conversions	0/3 (0%)	
Dimensional Derivation	0/5 (0%)	
Significant Figures	0/2 (0%)	
Dimensional Analysis	0/5 (0%)	
Errors	0/1 (0%)	
Percentage Composition	0/2 (0%)	
Gas Laws & Moles	0/1 (0%)	
Gas at STP	0/1 (0%)	

Stoichiometry	0/3 (0%)	
Limiting Reagent	0/1 (0%)	
Moles from Mass	0/3 (0%)	
Avogadro's Number	0/1 (0%)	
Molarity	0/2 (0%)	
Normality	0/1 (0%)	
Molar Mass	0/2 (0%)	
Number of Particles	0/2 (0%)	
Atomic Mass	0/1 (0%)	
Empirical Formula	0/2 (0%)	
Vapour Density	0/1 (0%)	
Molality	0/1 (0%)	
Equivalent Concept	0/1 (0%)	

DETAILED SOLUTIONS — ALL 125 QUESTIONS

 Correct  Wrong  Unanswered

Q1 [Set Laws] — UNANSWERED

$A \cap \emptyset$ equals:

Correct: C) A

Not answered

Solution: Step 1: $\emptyset$ has no elements. Step 2: $A \cap \emptyset$ = all elements in A or $\emptyset$ = just elements in A . Step 3: $A \cap \emptyset$ = A (empty set is an element for union).

Q2 [Set Laws] — UNANSWERED

$A \cap (A \cup B)$ equals:

Correct: B) A

Not answered

Solution: Step 1: $A \cap B \subseteq A$ (intersection is always a subset of each set). Step 2: So $A \cap (A \cup B) = A \cap A$ (something about absorption law: $A \cap (A \cup B) = A$).

Q3 [Roster Form] — UNANSWERED

The set of vowels in the English alphabet in roster form is:

Correct: B) $\{a, e, i, o, u\}$

Not answered

Solution: Step 1: Identify all vowels in the English alphabet — they are a, e, i, o, u (5 vowels). Step 2: Write them in roster (listing) form: $\{a, e, i, o, u\}$. Option A lists the first 5 letters, not vowels. Option D misses o and u.

Q4 [Venn Diagrams] — UNANSWERED

If $n(U) = 50$, $n(A) = 30$, $n(A^c)$ equals:

Correct: B) 20

Not answered

Solution: Step 1: A^c = complement of A = elements in U but not in A . Step 2: $n(A^c) = n(U) - n(A) = 50 - 30 = 20$.

Q5 [De Morgan's Laws] — UNANSWERED

$(A \cap B)^c$ equals:

Correct: C) $A^c \cup B^c$

Not answered

Solution: Step 1: De Morgan's Second Law states: $(A \cap B)^c = A^c \cup B^c$. Step 2: Intuition — an element is NOT in B (or both). Step 3: So the complement of an intersection = union of complements.

Q6 [De Morgan's Laws] — UNANSWERED

Using the same U , A , B as above, $(A \cap B)^c$ is:

Correct: C) $\{6, 7, 8\}$

Not answered

Solution: Step 1: $A^c = U - A = \{4, 5, 6, 7, 8\}$. $B^c = U - B = \{1, 2, 6, 7, 8\}$. Step 2: $(A \cap B)^c$ = elements in both: $\{4, 5, 6, 7, 8\}$ and $\{1, 2, 6, 7, 8\}$ from the previous question, confirming De Morgan's law.

Q7 [Roster Form] — UNANSWERED

The set $\{2, 4, 6, 8, \dots\}$ in set-builder form is:

Correct: B) $\{x : x = 2n, n \in \mathbb{N}\}$

Not answered

Solution: Step 1: The pattern is 2, 4, 6, 8, ... — these are positive even numbers. Step 2: Each term = $2 \times (\text{position})$: $2 \times 1 = 2$, $2 \times 2 = 4$, $2 \times 3 = 6$, etc. So $x = 2n$ where $n \in \mathbb{N}$. Step 3: Option A describes odd numbers (wrong). Option C stops at 10 but the set is infinite. Option D gives a finite set.

Q8 [De Morgan's Laws] — UNANSWERED

If $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$, $A = \{1, 2, 3\}$, $B = \{3, 4, 5\}$, then $(A \cap B)^c$ is:

Correct: A) $\{6, 7, 8\}$

Not answered

Solution: Step 1: $A \cap B = \{1, 2, 3\} \cap \{3, 4, 5\} = \{3\}$. Step 2: $(A \cap B)^c = U - (A \cap B) = \{1, 2, 3, 4, 5, 6, 7, 8\} - \{3\} = \{1, 2, 4, 5, 6, 7, 8\}$.

Q9 [Intervals] — UNANSWERED

The interval notation for $\{x : 3 \leq x < 5\}$ is:

Correct: B) $[3, 5)$

Not answered

Solution: Step 1: $3 \leq x$ means 3 is included! square bracket $[$. Step 2: $x < 5$ means 5 is excluded! round bracket $)$.

Q10 [Subsets & Power Set] — UNANSWERED

If A has 3 elements and B has 2 elements, then $A \times B$ has how many elements?

Correct: B) 6

Not answered

Solution: Step 1: $A \times B = \{(a, b) : a \in A, b \in B\}$ is the set of all ordered pairs. Step 2: $|A \times B| = |A| \times |B| = 3 \times 2 = 6$. Step 3: then $A \times B = \{(1,x),(1,y),(2,x),(2,y),(3,x),(3,y)\}$ — 6 pairs.

Q11 [Cartesian Product] — UNANSWERED

If $A = \{1\}$ and $B = \{2,3\}$, then $A \times B$ is:

Correct: A) $\{(1,2), (1,3)\}$

Not answered

Solution: Step 1: $A \times B = \{(a,b) : a \in A, b \in B\}$. Step 2: a can only be 1. b can be 2 or 3. Step 3: $A \times B = \{(1,2), (1,3)\}$.

Q12 [Subsets & Power Set] — UNANSWERED

Every set is a subset of:

Correct: B) Itself

Not answered

Solution: Step 1: By definition, $A \subseteq A$ means every element of A is in A — this is trivially true. Step 2: So every set is a subset of itself. Step 3: of its power set (it is an ELEMENT of its power set). And $\subseteq$ is a subset of every set, not the other way around.

Q13 [Subsets & Power Set] — UNANSWERED

$P(A)$ denotes the power set of A. If $A = \{1, 2\}$, then $P(A)$ is:

Correct: B) $\{\emptyset, \{1\}, \{2\}, \{1, 2\}\}$

Not answered

Solution: Step 1: The power set $P(A)$ is the set of ALL subsets of A. Step 2: Subsets of $\{1, 2\}$: the empty set $\emptyset$, $\{1\}$, $\{2\}$, and $\{1, 2\}$. Step 3: It has $2^2 = 4$ elements.

Q14 [Intervals] — UNANSWERED

$[2, 5] \cap (3, 5]$ equals:

Correct: A) $[2, 3]$

Not answered

Solution: Step 1: $[2, 5] \cap (3, 5] =$ elements in $[2, 5]$ but NOT in $(3, 5]$. Step 2: $(3, 5] = \{x : 3 < x \leq 5\}$. Step 3: Remaining elements are $\{x : 2 \leq x \leq 3\}$. Step 4: $= [2, 3]$ since 3 is excluded, so 3 stays.)

Q15 [Set Calculations] — UNANSWERED

If $n(A \cap B) = 18$, $n(A \setminus B) = 7$, then $n(A)$ is:

Correct: B) 25

Not answered

Solution: Step 1: A can be split into two disjoint parts: $(A \cap B)$ and $(A \setminus B)$. Step 2: $n(A) = n(A \cap B) + n(A \setminus B) = 18 + 7 = 25$.

Q16 [Roster Form] — UNANSWERED

$\{x \in \mathbb{R} : x^2 - 5x + 6 = 0\}$ equals:

Correct: A) $\{2, 3\}$

Not answered

Solution: Step 1: Factorise: $x^2 - 5x + 6 = (x - 2)(x - 3) = 0$. Step 2: Solutions: $x = 2$ or $x = 3$. Step 3: Check domain: $x \in \mathbb{R}$. Step 4: Set = $\{2, 3\}$.

Q17 [Types of Sets] — UNANSWERED

Two sets are equivalent if they have:

Correct: B) Same number of elements

Not answered

Solution: Step 1: Equal sets have the same elements (e.g., $\{1,2\} = \{2,1\}$). Step 2: Equivalent sets have the same cardinality (number of elements), even if elements differ. Example: $\{a, b, c\}$ and $\{1, 2, 3\}$ are equivalent (both have 3 elements) but not equal.

Q18 [Venn Diagrams] — UNANSWERED

In a class, 75% passed Maths, 65% passed Science, 50% passed both. What % failed both?

Correct: A) 10%

Not answered

Solution: Step 1: % passed at least one = $n(M) + n(S) - n(M \cap S) = 75 + 65 - 50 = 90\%$. Step 2: % failed both = $100 - 90 = 10\%$.

Q19 [De Morgan's Laws] — UNANSWERED

If $A = \{4, 5, 6\}$ and $B = \{1, 2, 6\}$, $U = \{1, \dots, 6\}$, then $(A \cap B)^c$ is:

Correct: A) $\{1, 2, 4, 5, 6\}$

Not answered

Solution: Step 1: By De Morgan: $(A \cap B)^c = A^c \cup B^c$. Step 2: $A^c \cup B^c = \{4, 5, 6\}^c \cup \{1, 2, 6\}^c = \{1, 2, 4, 5, 6\}$. Step 3: $(A \cap B)^c = \{1, 2, 4, 5, 6\}$.

Q20 [Subsets & Power Set] — UNANSWERED

If $|P(A)| = 64$, then $|A|$ is:

Correct: B) 6

Not answered

Solution: Step 1: $|P(A)| = 2^n$ where $n = |A|$. Step 2: $2^n = 64$. Step 3: $2^n = 64$, so $n = 6$. Step 4: The set A has 6 elements.

Q21 [Venn Diagrams] — UNANSWERED

A school has 120 students. 70 study Hindi, 60 study English, 30 study both. Students studying only Hindi:

Correct: A) 40

Not answered

Solution: Step 1: Only Hindi = students in Hindi but NOT in English. Step 2: Only Hindi = $n(H) - n(H \cap E) = 70 - 30 = 40$.

Q22 [Subsets & Power Set] — UNANSWERED

The number of proper subsets of $\{1, 2, 3, 4\}$ is:

Correct: B) 15

Not answered

Solution: Step 1: Total subsets = $2^t = 16$. Step 2: A proper subset is any subset that is NOT equal to the set. $16 - 1 = 15$. (We remove only $\{1, 2, 3, 4\}$ itself.)

Q23 [Venn Diagrams] — UNANSWERED

If $n(A) = 20$, $n(B) = 30$, $n(C) = 25$, $n(A \cap B) = 10$, $n(B \cap C) = 8$, $n(A \cap C) = 5$, $n(A \cap B \cap C) = 3$, then $n(A \cup B \cup C)$:

Correct: A) 55

Not answered

Solution: Step 1: Inclusion-exclusion for 3 sets: $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$. Step 2: $20 + 30 + 25 - 10 - 8 - 5 + 3 = 55$.

Q24 [Venn Diagrams] — UNANSWERED

In a survey of 100 people, 60 drink tea, 40 drink coffee, 20 drink both. How many drink only tea?

Correct: B) 40

Not answered

Solution: Step 1: 'Only tea' means tea but NOT coffee. Step 2: Only tea = $n(T) - n(T \cap C) = 60 - 20 = 40$. Step 3: Result = 40.

Q25 [Set-builder Form] — UNANSWERED

$\{1, 4, 9, 16, 25\}$ in set-builder notation is:

Correct: B) $\{x : x = n^2, 1 \leq n \leq 5, n \in \mathbb{N}\}$

Not answered

Solution: Step 1: Identify the pattern: $1 = 1^2, 4 = 2^2, 9 = 3^2, 16 = 4^2, 25 = 5^2$. Step 2: These are perfect squares of natural numbers from 1 to 5. Step 3: Set-builder form: $\{x : x = n^2, 1 \leq n \leq 5, n \in \mathbb{N}\}$.

Q26 [Intervals] — UNANSWERED

$(1, 4) \cap [3, 6]$ equals:

Correct: A) $[3, 4)$

Not answered

Solution: Step 1: $(1, 4) = \{x : 1 < x < 4\}$. $[3, 6] = \{x : 3 \leq x \leq 6\}$. Step 2: Intersection: left endpoint = $\max(1, 3) = 3$ so 3 is in $(1, 4)$. Step 3: Right endpoint = $\min(4, 6) = 4$ (excluded because $(1, 4)$ excludes 4). Step 4: Result = $[3, 4)$.

Q27 [Types of Sets] — UNANSWERED

If $A = \{1, 2\}$ and $B = \{2, 1\}$, then:

Correct: B) $A = B$

Not answered

Solution: Step 1: Two sets are equal if they contain exactly the same elements, regardless of order. Step 2: $A = \{1, 2\}$ and $B = \{2, 1\}$ — both contain exactly the elements 1 and 2. Step 3: Therefore $A = B$. Order does not matter in sets.

Q28 [Types of Sets] — UNANSWERED

If $A = \{1, \{2, 3\}, 4\}$, then the number of elements in A is:

Correct: C) 3

Not answered

Solution: Step 1: List the elements of A carefully: Element 1: the number 1. Element 2: the set $\{2, 3\}$ (this is ONE element, even though it contains two numbers). Element 3: the number 4. Step 2: Total = 3 elements. The set $\{2, 3\}$ is treated as a single object.

Q29 [Subsets & Power Set] — UNANSWERED

How many subsets of $\{1, 2, 3, 4, 5\}$ contain exactly 2 elements?

Correct: B) 10

Not answered

Solution: Step 1: We need to choose 2 elements from 5. Step 2: This is ${}^5C_2 = 5! / (2! \times 3!) = (5 \times 4) / (2 \times 1) = 10$. The subsets are $\{1, 2\}, \{1, 3\}, \{1, 4\}, \{1, 5\}, \{2, 3\}, \{2, 4\}, \{2, 5\}, \{3, 4\}, \{3, 5\}, \{4, 5\}$.

Q30 [Set Calculations] — UNANSWERED

If $n(U) = 100$, $n(A) = 65$, $n(B) = 45$, $n(A \cap B) = 20$, then $n(A \cup B)$ is:

Correct: C) 10

Not answered

Solution: Step 1: $n(A \cup B) = n(A) + n(B) - n(A \cap B) = 65 + 45 - 20 = 90$. Step 2: $n(A \cup B) = 90$. Step 3: $n(A \cup B) = 90$.

Q31 [Union & Intersection] — UNANSWERED

If $n(A \cap B) = 40$, $n(A) = 25$, $n(B) = 20$, then $n(A \cup B)$ is:

Correct: A) 5

Not answered

Solution: Step 1: Rearrange inclusion-exclusion: $n(A \cup B) = n(A) + n(B) - n(A \cap B)$. Step 2: $n(A \cup B) = 25 + 20 - 40 = 5$.

Q32 [Counting with Sets] — UNANSWERED

If $n(A) = 15$, $n(B) = 12$, $n(A \cap B) = 22$, then $n(A \cup B)$ is:

Correct: A) 5

Not answered

Solution: Step 1: $n(A \cup B) = n(A) + n(B) - n(A \cap B)$. Step 2: $n(A \cup B) = 15 + 12 - 22 = 5$.

Q33 [Roster Form] — UNANSWERED

The set $\{x : x \text{ is a prime number between 10 and 20}\}$ is:

Correct: A) $\{11, 13, 17, 19\}$

Not answered

Solution: Step 1: List integers from 11 to 19 (strictly between 10 and 20). Step 2: Check each for primality: 11 is prime, 12 is not, 13 is prime, 14 is not, 15 is not, 16 is not, 17 is prime, 18 is not, 19 is prime. Step 3: Set = $\{11, 13, 17, 19\}$. Option B wrongly includes 15.

Q34 [Union & Intersection] — UNANSWERED

$A \cap A^c$ equals:

Correct: C) $\emptyset$

Not answered

Solution: Step 1: Every element in the universal set U is either in A or in A^c (the complement of A). Step 2: $A \cap A^c = \emptyset$. This is the complement law for intersection.

Q35 [Set Laws] — UNANSWERED

$(A^c)^c$ equals:

Correct: C) A

Not answered

Solution: Step 1: A^c = elements in U but not in A . Step 2: $(A^c)^c$ = elements in U but not in A^c . Step 3: Elements not in A^c are in A . This is the involution law / double complement.

Q36 [Subsets & Power Set] — UNANSWERED

The number of subsets of $\{a, b, c\}$ is:

Correct: C) 8

Not answered

Solution: Step 1: The set has $n = 3$ elements. Step 2: Number of subsets = $2^n = 2^3 = 8$. Step 3: They are: $\emptyset, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\}$.

Q37 [Cartesian Product] — UNANSWERED

$A \times B = B \times A$ if and only if:

Correct: B) $A = B$

Not answered

Solution: Step 1: In general, $(a,b) \neq (b,a)$ for $a \neq b$, so $A \times B \neq B \times A$. Step 2: If $A = B$, then $A \times B = A \times A = B \times B$ or $b \times b$ making the products different. Step 4: So $A \times B = B \times A \iff A = B$.

Q38 [Types of Sets] — UNANSWERED

If $A \subseteq B$ and $B \subseteq A$, then:

Correct: B) $A = B$

Not answered

Solution: Step 1: $A \subseteq B$ means every element of A is in B . Step 2: $B \subseteq A$ means every element of B is in A . Step 3: Therefore, A and B contain the same elements. Step 4: By definition of set equality, $A = B$. This is actually one standard way to prove two sets are equal.

Q39 [Set-builder Form] — UNANSWERED

$\{x : x \text{ is a natural number less than } 6\}$ in roster form is:

Correct: B) $\{1,2,3,4,5\}$

Not answered

Solution: Step 1: Natural numbers are positive integers starting from 1 ($\mathbb{N} = \{1,2,3,\dots\}$). Note: 0 is NOT a natural number. Step 2: Elements less than 6 are 1, 2, 3, 4, 5. Step 3: Roster form = $\{1, 2, 3, 4, 5\}$. Option A wrongly includes 0, Option C wrongly includes 6.

Q40 [Set Laws] — UNANSWERED

$A \cap (B \cup C) = (A \cap B) \cup C$ is the:

Correct: B) Associative law

Not answered

Solution: Step 1: When grouping (parentheses) can be changed without affecting the result, it is associativity. Step 2: The given equation is not a standard set law. Step 3: The correct law for grouping is the associative law of union.

Q41 [Union & Intersection] — UNANSWERED

If $n(A) = 10$, $n(B) = 15$, $n(A \cap B) = 5$, then $n(A \cup B)$ is:

Correct: B) 20

Not answered

Solution: Step 1: Apply the inclusion-exclusion principle: $n(A \cup B) = n(A) + n(B) - n(A \cap B)$. Step 2: $n(A \cup B) = 10 + 15 - 5 = 20$ because those 5 elements are counted once in $n(A)$ and once in $n(B)$, so we remove the double-count.

Q42 [Roster Form] — UNANSWERED

The set of letters in the word 'MISSISSIPPI' is:

Correct: A) $\{M, I, S, P\}$

Not answered

Solution: Step 1: A set contains only distinct (unique) elements — no repetitions. Step 2: Letters in MISSISSIPPI: M, I, S, S, I, S, S, I, P, P, I. Step 3: Remove duplicates: M, I, S, P. Step 4: Set = $\{M, I, S, P\}$.

Q43 [Union & Intersection] — UNANSWERED

If $A = \{1,2,3,4\}$ and $B = \{2,4,6\}$, then $A \cap B$ is:

Correct: B) $\{2,4\}$

Not answered

Solution: Step 1: $A \cap B$ contains elements common to both A and B . Step 2: Check each element: 1 is in A but not in B ; 2 is in both; 3 is in A but not in B ; 4 is in both; 6 is in B but not in A . Step 3: $A \cap B = \{2, 4\}$.

Q44 [Union & Intersection] — UNANSWERED

$A \cap A^c$ (A intersect A-complement) equals:

Correct: D) $\emptyset$

Not answered

Solution: Step 1: A^c contains all elements NOT in A . Step 2: $A \cap A^c$ = elements in both A and not- A simultaneously. Step 3: This is an impossible condition. Step 4: Therefore $A \cap A^c = \emptyset$ (empty set). This is the complement law.

Q45 [Set Calculations] — UNANSWERED

The maximum possible value of $n(A \cap B)$ if $n(A) = 8$ and $n(B) = 5$ is:

Correct: C) 5

Not answered

Solution: Step 1: $A \cap B \subseteq A$ and $A \cap B \subseteq B$. Step 2: So $n(A \cap B) \leq n(A) = 8$ and $n(A \cap B) \leq n(B) = 5$. Step 3: Maximum possible value is the minimum of 8 and 5, which is 5.

Q46 [Types of Sets] — UNANSWERED

The set $\{x : x \in \mathbb{N}, 3 < x < 4\}$ is:

Correct: C) Empty set

Not answered

Solution: Step 1: We need natural numbers strictly between 3 and 4. Step 2: Natural numbers are 1, 2, 3, 4, 5, ... — there is NO natural number between 3 and 4 (3.5 is not a natural number). Step 3: The set has no elements, so it is the empty set.

Q47 [Venn Diagrams] — UNANSWERED

In a group of 200 people, 80 like A, 60 like B, and 30 like both. How many like only B?

Correct: A) 30

Not answered

Solution: Step 1: Only B = $n(B) - n(A \cap B) = 60 - 30 = 30$. Step 2: These 30 people like B but not A.

Q48 [Set Calculations] — UNANSWERED

If $|P(A)| = 256$, how many proper subsets does A have?

Correct: B) 255

Not answered

Solution: Step 1: $|P(A)| = 2^n = 256$. Step 2: $2^n = 256$, so $n = 8$ (A has 8 elements). Step 3: Proper subsets = $2^n - 1 = 255$.

Q49 [Union & Intersection] — UNANSWERED

If $A = \{1, 2, 3\}$ and $B = \{3, 4, 5\}$, then $A \cup B$ is:

Correct: C) $\{1, 2, 3, 4, 5\}$

Not answered

Solution: Step 1: $A \cup B$ includes all elements in A or B (or both), without repetition. Step 2: From A: 1, 2, 3. From B: 3, 4, 5. Note: 3 appears once, not twice.

Q50 [Counting with Sets] — UNANSWERED

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$ is called the:

Correct: C) Inclusion-exclusion principle

Not answered

Solution: Step 1: This formula corrects for double-counting of elements in $A \cap B$. Step 2: It is called the inclusion-exclusion principle. Step 3: It generalises to 3 or more sets with alternating signs.

Q51 [Cartesian Product] — UNANSWERED

If $n(A) = 3$ and $n(A \times B) = 12$, then $n(B)$ is:

Correct: A) 4

Not answered

Solution: Step 1: $n(A \times B) = n(A) \times n(B)$. Step 2: $12 = 3 \times n(B)$. Step 3: $n(B) = 12 \div 3 = 4$.

Q52 [Subsets & Power Set] — UNANSWERED

The number of subsets of a set with n elements is:

Correct: C) 2^n

Not answered

Solution: Step 1: For each element, we have 2 choices — include it in the subset or exclude it. Step 2: With n elements, total choices = $2 \times 2 \times \dots \times 2$ (n times) = 2^n . Step 3: Therefore, a set with n elements has exactly 2^n subsets.

Q53 [Cartesian Product] — UNANSWERED

$A \times \emptyset$ equals:

Correct: B) $\emptyset$

Not answered

Solution: Step 1: $A \times \emptyset = \{(a, b) : a \in A, b \in \emptyset\}$. Step 2: Since $\emptyset$ has no elements, there is no valid b . Step 3: $A \times \emptyset = \emptyset$.

Q54 [Venn Diagrams] — UNANSWERED

In a class of 60 students, 35 like Maths, 30 like Science, 10 like both. How many like neither?

Correct: A) 5

Not answered

Solution: Step 1: $n(M \cup S) = n(M) + n(S) - n(M \cap S) = 35 + 30 - 10 = 55$. Step 2: Students who like at least one subject = 55. Step 3: Students who like neither = $60 - 55 = 5$.

Q55 [Subsets & Power Set] — UNANSWERED

The number of non-empty subsets of $\{p, q, r, s, t\}$ is:

Correct: B) 31

Not answered

Solution: Step 1: Total subsets = $2^5 = 32$. Step 2: Non-empty means we exclude the empty set. Step 3: Non-

Q56 [Venn Diagrams] — UNANSWERED

In the above school, students studying exactly one subject:

Correct: A) 70

Not answered

Solution: Step 1: Only Hindi = $70 - 30 = 40$. Only English = $60 - 30 = 30$. Step 2: Exactly one = $40 + 30 = 70$.

Q57 [Relations] — UNANSWERED

The maximum number of relations from A to B where $|A|=2$, $|B|=3$ is:

Correct: B) 64

Not answered

Solution: Step 1: A relation from A to B is any subset of $A \times B$. Step 2: $|A \times B| = 2 \times 3 = 6$ elements. Step 3: there are 64 possible relations.

Q58 [Intervals] — UNANSWERED

$(-\infty, 3) \cap [3, \infty)$ equals:

Correct: A) $(-\infty, \infty)$

Not answered

Solution: Step 1: $(-\infty, 3)$ covers all real numbers less than 3. $[3, \infty)$ covers 3 and all numbers greater than 3. Step 2: $(-\infty, 3) \cap [3, \infty) = (-\infty, \infty) = \mathbb{R}$.

Q59 [Venn Diagrams] — UNANSWERED

In the above survey, how many drink at least one beverage?

Correct: B) 80

Not answered

Solution: Step 1: 'At least one' = $n(T \cup C)$. Step 2: $n(T \cup C) = n(T) + n(C) - n(T \cap C) = 60 + 40 - 20 = 80$.

Q60 [Set Calculations] — UNANSWERED

If $A = \{x : x \text{ is a multiple of } 3, x < 20\}$ and $B = \{x : x \text{ is a multiple of } 5, x < 20\}$, then $n(A \cap B)$ is:

Correct: A) 1

Not answered

Solution: Step 1: $A = \{3, 6, 9, 12, 15, 18\}$ (multiples of 3 less than 20). Step 2: $B = \{5, 10, 15\}$ (multiples of 5 less than 20). Step 3: $A \cap B = \{15\}$ (only 15 is a multiple of both 3 and 5, i.e., a multiple of 15, that is < 20). Step 4: $n(A \cap B) = 1$.

Q61 [De Morgan's Laws] — UNANSWERED

Which of the following is NOT a valid set identity?

Correct: C) $(A \cap B)^c = A^c \cap B^c$

Not answered

Solution: Step 1: Option A is De Morgan's first law. Option B is the distributive law of union over intersection. Option C claims $(A \cap B)^c = A^c \cap B^c$. But De Morgan's second law says $(A \cap B)^c = A^c \cup B^c$. INVALID.

Q62 [Set Calculations] — UNANSWERED

In a group of 50 students, 30 take Physics, 25 take Chemistry, and 10 take both. How many take Physics only?

Correct: A) 20

Not answered

Solution: Step 1: Physics only = students in Physics but NOT in Chemistry. Step 2: Physics only = $n(P) - n(P \cap C) = 30 - 10 = 20$.

Q63 [Union & Intersection] — UNANSWERED

If A and B are disjoint sets with $n(A) = 8$ and $n(B) = 12$, then $n(A \cap B)$ is:

Correct: C) 0

Not answered

Solution: Step 1: Disjoint sets have no common elements, so $A \cap B = \emptyset$ and $n(A \cap B) = 0$. Step 2: $n(A \cap B) = n(\emptyset) = 0$.

Q64 [Set Laws] — UNANSWERED

$A \cap A$ equals:

Correct: C) A

Not answered

Solution: Step 1: $A \cap A = \text{all elements in } A \text{ or } A = \text{elements in } A$. Step 2: $A \cap A = A$. This is the idempotent law for set.

Q65 [Set Laws] — UNANSWERED

$A \cap \emptyset$ equals:

Correct: D) $\emptyset$

Not answered

Solution: Step 1: $\emptyset$ has no elements. Step 2: $A \cap \emptyset = \text{elements common to } A \text{ and } \emptyset$. Since $\emptyset$ has nothing, nothing is common.

Q66 [Union & Intersection] — UNANSWERED

If $A \subseteq B$, then $A \cap B$ equals:

Correct: B) A

Not answered

Solution: Step 1: $A \subseteq B$ means every element of A is also in B. Step 2: $A \cap B = \text{elements common to both}$. Since A is a subset of B, all elements of A are common. Step 3: And no element outside A can be in $A \cap B$. Step 4: Therefore $A \cap B = A$.

Q67 [Intervals] — UNANSWERED

If $A = [1, 5]$ and $B = [3, 8]$, then $A \cap B$ is:

Correct: B) $[3, 5]$

Not answered

Solution: Step 1: Intersection of intervals: left = $\max(1, 3) = 3$ (both include their endpoints, so 3 is included). Step 2: Right = $\min(5, 8) = 5$ (both include their endpoints, so 5 is included). Step 3: $A \cap B = [3, 5]$.

Q68 [Set Laws] — UNANSWERED

$A \cap U$ equals:

Correct: C) A

Not answered

Solution: Step 1: U contains everything. Step 2: $A \cap U = \text{elements in both } A \text{ and } U$. Since $A \subseteq U$, every element of A is in U. Step 3: Therefore $A \cap U = A$.

Q69 [Relations] — UNANSWERED

A relation R on set A is reflexive if:

Correct: B) $(a, a) \in R$ for all $a \in A$

Not answered

Solution: Step 1: Reflexive means every element is related to itself. Step 2: Formally: $(a, a) \in R$ for every $a \in A$. Step 3: This describes reflexivity.

Q70 [Types of Sets] — UNANSWERED

Which of these is an infinite set?

Correct: D) $\{x : x \text{ is a prime number}\}$

Not answered

Solution: Step 1: Option A has 7 elements (Mon–Sun). Option B has 3 elements {C, A, T}. Step 2: Option C: $\{x : x \leq 10\}$ has 10 elements (finite). Step 3: Option D: By Euclid's theorem, there are infinitely many prime numbers. So D is infinite.

Q71 [Union & Intersection] — UNANSWERED

The symmetric difference $A \oplus B$ is defined as:

Correct: C) $(A \cap B^c) \cup (B \cap A^c)$

Not answered

Solution: Step 1: The symmetric difference $A \oplus B$ contains elements in exactly one of A or B, but not both. Step 2: This is $(A \cap B^c) \cup (B \cap A^c)$. Step 3: Their union = elements in exactly one set = $(A \cap B^c) \cup (B \cap A^c)$. Equivalently, $A \oplus B = (A \cup B) \setminus (A \cap B)$.

Q72 [De Morgan's Laws] — UNANSWERED

$(A \cap B)^c$ equals:

Correct: B) $A^c \cup B^c$

Not answered

Solution: Step 1: De Morgan's First Law states: $(A \cap B)^c = A^c \cup B^c$. Step 2: Intuition — an element is NOT in both A and B if it is NOT in A OR NOT in B. Step 3: So the complement of a union = intersection of complements.

Q73 [Cartesian Product] — UNANSWERED

If $A = \{1,2\}$ and $B = \{a,b,c\}$, then $n(A \times B)$ is:

Correct: B) 6

Not answered

Solution: Step 1: $A \times B =$ set of all ordered pairs (x, y) where $x \in A$ and $y \in B$. Step 2: $|A \times B| = |A| \times |B| = 2 \times 3 = 6$. The pairs are $(1,a), (1,b), (1,c), (2,a), (2,b), (2,c)$.

Q74 [Types of Sets] — UNANSWERED

The empty set is a subset of:

Correct: B) Every set

Not answered

Solution: Step 1: By the vacuous truth principle, the statement 'every element of $\emptyset$ is in A ' is vacuously true for any set A . Step 2: Therefore $\emptyset \subseteq A$ for every set A . This is a fundamental axiom of set theory.

Q75 [Counting with Sets] — UNANSWERED

If all elements of A are in B and $n(A) < n(B)$, then A is a _____ of B .

Correct: A) Proper subset

Not answered

Solution: Step 1: $A \subset B$ (all elements of A are in B). Step 2: $n(A) < n(B)$ means A is a proper subset of B (B has extra elements). Step 3: Therefore A is a proper subset of B .

Q76 [SI Units] — UNANSWERED

The SI unit of pressure is:

Correct: B) Pascal

Not answered

Solution: Step 1: Pressure = Force / Area. Step 2: SI unit = N/m^2 = Pascal (Pa). Step 3: Bar is a non-SI unit.

Q77 [Dimensional Formula] — UNANSWERED

The dimensional formula of pressure is:

Correct: B) $[ML^{-1}T^{-2}]$

Not answered

Solution: Step 1: Pressure = Force / Area. Step 2: $[Force] = [MLT^{-2}]$, $[Area] = [L^2]$. Step 3: $[Pressure] = [MLT^{-2}] / [L^2] = [ML^{-1}T^{-2}]$.

Q78 [Unit Conversions] — UNANSWERED

1 Newton equals how many dynes?

Correct: B) 10^5

Not answered

Solution: Step 1: $1 N = 1 kg \cdot m/s^2$. Step 2: Convert: $1 kg = 10^3 g$, $1 m = 10^2 cm$. Step 3: $1 N = 10^3 g \times 10^2 cm/s^2 = 10^5 dynes$.

Q79 [Dimensional Derivation] — UNANSWERED

The dimensional formula of coefficient of viscosity is:

Correct: A) $[ML^{-1}T^{-1}]$

Not answered

Solution: Step 1: From $F = \eta A (dv/dx)$, we get $\eta = F / (A \cdot dv/dx)$. Step 2: $[F] = [MLT^{-2}]$, $[A] = [L^2]$, $[dv/dx] = [LT^{-1}] / [L] = [T^{-1}]$. Step 3: $[\eta] = [MLT^{-2}] / [L^2 T^{-1}] = [ML^{-1}T^{-1}]$.

Q80 [Significant Figures] — UNANSWERED

The number of significant figures in 2.00×10^3 is:

Correct: C) 3

Not answered

Solution: Step 1: In scientific notation, ALL digits in the coefficient are significant. Step 2: Coefficient = 2.00 — digits are 2, 0, 0 = 3 significant figures. Step 3: The power of 10 does not affect significant figure count.

Q81 [Dimensional Analysis] — UNANSWERED

The equation $v = u + at$ is dimensionally correct because:

Correct: B) All terms have dimension $[MLT^{-1}]$

Not answered

Solution: Step 1: $[v] = [MLT^{-1}]$ (velocity). Step 2: $[u] = [MLT^{-1}]$ (velocity). Step 3: $[at] = [MLT^{-2}] \times [T] = [MLT^{-1}]$. All terms have the same dimension. Dimensionally consistent.

Q82 [Dimensional Formula] — UNANSWERED

The dimensional formula of the universal gravitational constant G is:

Correct: A) $[M^{-1}L^3T^{-2}]$

Not answered

Solution: Step 1: From $F = Gm \cdot m / r^2$, we get $G = Fr^2 / (m \cdot m)$. Step 2: $[G] = [MLT^{-2}][L^2] / [M^2] = [ML^3T^{-2}] / [M^2]$.

Q83 [Dimensional Formula] — UNANSWERED

The dimensional formula of acceleration is:

Correct: B) $[MpLT^{-2}]$

Not answered

Solution: Step 1: Acceleration = velocity / time = $(L/T) / T = L/T^2$. Step 2: No mass dependence: Mp. Step 3: $[L/T^2]$.

Q84 [Unit Conversions] — UNANSWERED

1 Joule equals how many ergs?

Correct: B) 10w

Not answered

Solution: Step 1: $1 J = 1 N \cdot m = 1 kg \cdot m^2/s^2$. Step 2: Convert: $1 kg = 10^3 g$, $1 m = 10^2 cm$. Step 3: $1 J = 10^3 g \times 10^2 cm^2/s^2 = 10^5 erg$.

Q85 [Dimensional Formula] — UNANSWERED

The dimensional formula of work/energy is:

Correct: B) $[ML^2T^{-2}]$

Not answered

Solution: Step 1: Work = Force $\times$ displacement. Step 2: $[Force] = [MLT^{-2}]$, $[displacement] = [L]$. Step 3: $[Work] = [MLT^{-2}][L] = [ML^2T^{-2}]$.

Q86 [Dimensional Analysis] — UNANSWERED

Which of the following is dimensionless?

Correct: B) Strain

Not answered

Solution: Step 1: Strain = Change in length / Original length = L/L . Step 2: $[Strain] = [L] / [L] = [MpLpTp] = 1$. Step 3: Pressure $[ML^{-1}T^{-2}]$, and Torque $[ML^2T^{-2}]$ all have dimensions.

Q87 [Dimensional Analysis] — UNANSWERED

Which formula is dimensionally incorrect?

Correct: D) $F = mv^2$

Not answered

Solution: Step 1: $[F] = [MLT^{-2}]$. $[mv^2] = [M][L^2T^{-2}] = [ML^2T^{-2}]$. Step 2: $[MLT^{-2}] \neq [ML^2T^{-2}]$ — the L powers differ. Step 3: The correct formula is $F = mv/t$: $[M][LT^{-1}]/[T] = [MLT^{-2}]$.

Q88 [SI Units] — UNANSWERED

The SI unit of electric current is:

Correct: C) Ampere

Not answered

Solution: Step 1: Electric current is one of the 7 base quantities in SI. Step 2: Its base unit is the Ampere (A). Step 3: Coulomb is charge ($C = A \cdot s$), Volt is potential, Ohm is resistance.

Q89 [Dimensional Formula] — UNANSWERED

The dimensional formula of Planck's constant h is:

Correct: A) $[ML^2T^{-1}]$

Not answered

Solution: Step 1: From $E = h\nu$, we get $h = E/\nu$. Step 2: $[E] = [ML^2T^{-2}]$, $[\nu] = [T^{-1}]$. Step 3: $[h] = [ML^2T^{-2}] / [T^{-1}] = [ML^2T^{-1}]$.

Q90 [Dimensional Analysis] — UNANSWERED

If force F, length L, and time T are taken as fundamental quantities, the dimension of mass is:

Correct: A) $[FL^{-1}T^2]$

Not answered

Solution: Step 1: From $F = ma$, mass $m = F/a$. Step 2: Acceleration $a = L/T^2$ (length per time squared). Step 3: $[m] = [FL^{-1}T^2]$.

Q91 [Dimensional Formula] — UNANSWERED

The dimensional formula of velocity is:

Correct: B) $[MpLT^{-1}]$

Not answered

Solution: Step 1: Velocity = displacement / time = L / T . Step 2: Mass is not involved, so Mp. Step 3: Dimensional formula is $[MpLT^{-1}]$.

Q92 [Dimensional Derivation] — UNANSWERED

The dimensional formula of torque is:

Correct: A) $[ML^2T\{^2}]$

Not answered

Solution: Step 1: Torque $\ddot{A}$ = Force $\times$ perpendicular distance = $r \times F$. Step 2: $[\ddot{A}] = [L] \times [MLT\{^2\}] = [ML^2T\{^2}]$. So energy $[ML^2T\{^2\}]$, but they are physically different quantities.

Q93 [Unit Conversions] — UNANSWERED

1 atmospheric pressure in Pascals is approximately:

Correct: B) $1.013 \times 10^5 \text{ Pa}$

Not answered

Solution: Step 1: Standard atmospheric pressure = 1 atm = 101325 Pa "H $1.013 \times 10^5 \text{ Pa}$. Step 2: This equals mercury.

Q94 [Dimensional Analysis] — UNANSWERED

Two quantities can be added only if they have:

Correct: B) Same dimensions

Not answered

Solution: Step 1: The principle of dimensional homogeneity states that only quantities with the same dimensions can be added, subtracted, or equated. Step 2: For example, you cannot add 5 metres + 3 seconds — the dimensions are incompatible.

Q95 [Errors] — UNANSWERED

Percentage error equals:

Correct: A) $(\text{Absolute error} / \text{True value}) \times 100$

Not answered

Solution: Step 1: Relative error = Absolute error / True value = $|x|/x$. Step 2: Percentage error = Relative error $\times 100$.

Q96 [Dimensional Derivation] — UNANSWERED

Angular momentum has the same dimensions as:

Correct: B) Planck's constant

Not answered

Solution: Step 1: Angular momentum $L = mvr$. $[L] = [M][LT\{^1\}][L] = [ML^2T\{^1\}]$. Step 2: Planck's constant h : from $E = hf$. Both have $[ML^2T\{^1\}]$. ' (Work and torque are $[ML^2T\{^2\}]$; momentum is $[MLT\{^1\}]$.)

Q97 [Dimensional Derivation] — UNANSWERED

The dimensional formula of surface tension is:

Correct: A) $[MT\{^2\}]$

Not answered

Solution: Step 1: Surface tension = Force per unit length = F/L . Step 2: $[F/L] = [MLT\{^2\}]/[L] = [MT\{^2\}]$. Step 3: $[ML^2T\{^2\}]/[L^2] = [MT\{^2\}]$. Same result.

Q98 [SI Units] — UNANSWERED

How many base SI units are there?

Correct: C) 7

Not answered

Solution: Step 1: The 7 base SI units are: metre (length), kilogram (mass), second (time), ampere (current), kelvin (temperature), mole (amount of substance), candela (luminous intensity). Step 2: All other SI units are derived from these seven.

Q99 [Dimensional Derivation] — UNANSWERED

Using dimensional analysis, the time period T of a pendulum depends on l and g as:

Correct: A) $T \propto \sqrt{l/g}$

Not answered

Solution: Step 1: Let $T = k \cdot l^a \cdot g^b$. Step 2: Dimensions: $[T] = [L]^a \cdot [LT\{^2\}]^b = [L]^a [T]^{2b}$. Step 3: Comparing dimensions, $a = \frac{1}{2}$. Step 4: $T \propto l^{1/2} \cdot g^{-1/2} = \sqrt{l/g}$.

Q100 [Significant Figures] — UNANSWERED

The number of significant figures in 0.00340 is:

Correct: B) 3

Not answered

Solution: Step 1: Leading zeros (0.00) are NOT significant — they just fix the decimal position. Step 2: The digits 3, 4, 0 ARE significant. The trailing zero after 4 counts because it comes after the decimal point. Step 3: Total = 3 significant figures.

Q101 [Percentage Composition] — UNANSWERED

The mass percentage of Na in NaCl is:

Correct: B) 39.3%

Not answered

Solution: Step 1: $M(\text{NaCl}) = 23 + 35.5 = 58.5 \text{ g/mol}$. Step 2: $\% \text{Na} = (23/58.5) \times 100 = 39.32\%$ "H 39.3%.

Q102 [Gas Laws & Moles] — UNANSWERED

Equal volumes of all gases at the same T and P contain equal number of:

Correct: B) Molecules

Not answered

Solution: Step 1: This is Avogadro's law: $V \propto n$ at constant T, P. Step 2: Equal volumes of equal moles of equal gases (e.g., H_2 has 2 atoms but O_2 has 2 per molecule), not electrons or protons.

Q103 [Gas at STP] — UNANSWERED

The volume occupied by 2 moles of an ideal gas at STP is:

Correct: C) 44.8 L

Not answered

Solution: Step 1: At STP, 1 mole of any ideal gas occupies 22.4 L (molar volume). Step 2: 2 moles = $2 \times 22.4 = 44.8 \text{ L}$.

Q104 [Stoichiometry] — UNANSWERED

What volume of CO_2 at STP is produced from 50 g CaCO_3 ?

Correct: B) 11.2 L

Not answered

Solution: Step 1: Moles of $\text{CaCO}_3 = 50/100 = 0.5 \text{ mol}$. Step 2: $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ (1:1 ratio), so moles of $\text{CO}_2 = 0.5 \text{ mol}$. Step 3: Volume of CO_2 at STP = $0.5 \times 22.4 = 11.2 \text{ L}$.

Q105 [Limiting Reagent] — UNANSWERED

In $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, if 3 mol H_2 and 2 mol O_2 are mixed, the limiting reagent is:

Correct: B) H_2

Not answered

Solution: Step 1: From stoichiometry, 2 mol H_2 requires 1 mol O_2 . Step 2: 3 mol H_2 requires $3/2 = 1.5 \text{ mol O}_2$. Step 3: Check the other way: 2 mol O_2 requires 4 mol H_2 , but only 3 available. Step 4: H_2 runs out first! H_2 is the limiting reagent.

Q106 [Moles from Mass] — UNANSWERED

The mass of 0.5 moles of NaOH (M = 40) is:

Correct: C) 20 g

Not answered

Solution: Step 1: Mass = moles $\times$ molar mass. Step 2: Mass = $0.5 \times 40 = 20 \text{ g}$.

Q107 [Avogadro's Number] — UNANSWERED

Avogadro's number is approximately:

Correct: B) 6.022×10^{23}

Not answered

Solution: Step 1: Avogadro's number $N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$. Step 2: It represents the number of particles (atoms or molecules) in one mole of a substance. Step 3: This is also the number of atoms in exactly 12 g of carbon-12.

Q108 [Molarity] — UNANSWERED

How many grams of HCl (M=36.5) are needed to make 250 mL of 0.5 M solution?

Correct: A) 4.56 g

Not answered

Solution: Step 1: Moles needed = Molarity $\times$ Volume(L) = $0.5 \times 0.25 = 0.125 \text{ mol}$. Step 2: Mass = moles $\times$ molar mass = $0.125 \times 36.5 = 4.56 \text{ g}$.

Q109 [Normality] — UNANSWERED

The normality of 0.5 M H_2SO_4 is:

Correct: B) 1 N

Not answered

Solution: Step 1: H_2SO_4 is diprotic — it donates 2 H^+ ions per molecule. So n-factor = 2. Step 2: Normality = Molarity $\times$ n-factor = $0.5 \times 2 = 1 \text{ N}$.

Q110 [Molar Mass] — UNANSWERED

The molar mass of water (H₂O) is:

Correct: C) 18 g/mol

Not answered

Solution: Step 1: H₂O has 2 hydrogen atoms and 1 oxygen atom. Step 2: Molar mass = 2 × M(H) + M(O) = 2(1) + 16 = 18 g/mol.

Q111 [Percentage Composition] — UNANSWERED

The percentage of oxygen in Al₂O₃ is:

Correct: A) 47.1%

Not answered

Solution: Step 1: M(Al₂O₃) = 2(27) + 3(16) = 54 + 48 = 102 g/mol. Step 2: Mass of O = 48 g in 102 g of compound. Step 3: Percentage = (48/102) × 100 = 47.1%.

Q112 [Number of Particles] — UNANSWERED

The number of atoms in 32 g of sulphur (atomic mass 32) is:

Correct: A) 6.022 × 10²³

Not answered

Solution: Step 1: Moles of S atoms = mass/atomic mass = 32/32 = 1 mol. Step 2: Number of atoms = 1 × N_A = 6.022 × 10²³.

Q113 [Atomic Mass] — UNANSWERED

If the atomic mass of an element is 27 u, the mass of one atom in grams is:

Correct: C) 4.48 × 10⁻²³ g

Not answered

Solution: Step 1: Mass of 1 atom = Atomic mass / N_A. Step 2: = 27 / (6.022 × 10²³) g. Step 3: = 4.48 × 10⁻²³ g.

Q114 [Empirical Formula] — UNANSWERED

If the empirical formula is CH₂O and molar mass is 180, the molecular formula is:

Correct: B) C₆H₁₂O₆

Not answered

Solution: Step 1: Empirical formula mass = 12 + 2(1) + 16 = 30 g/mol. Step 2: Multiplication factor = Molar mass / EF mass = 180/30 = 6. Step 3: Molecular formula = 6 × (CH₂O) = C₆H₁₂O₆ (this is glucose).

Q115 [Empirical Formula] — UNANSWERED

A compound has 40% C, 6.7% H, 53.3% O. Its empirical formula is:

Correct: B) CH₂O

Not answered

Solution: Step 1: Assume 100 g sample: C = 40 g, H = 6.7 g, O = 53.3 g. Step 2: Moles: C = 40/12 = 3.33, H = 6.7/1 = 6.7, O = 53.3/16 = 3.33. Step 3: Divide by smallest (3.33): C = 1, H = 2, O = 1. Step 4: Empirical formula = CH₂O.

Q116 [Stoichiometry] — UNANSWERED

In 2H₂ + O₂ → 2H₂O, moles of water from 4 moles H₂ and excess O₂ is:

Correct: B) 4

Not answered

Solution: Step 1: The balanced equation shows 2 mol H₂ → 2 mol H₂O (1:1 ratio). Step 2: 4 mol H₂ → 4 mol H₂O.

Q117 [Molarity] — UNANSWERED

The molarity of a solution containing 4 g of NaOH (M=40) in 500 mL of solution is:

Correct: B) 0.2 M

Not answered

Solution: Step 1: Moles of NaOH = mass/molar mass = 4/40 = 0.1 mol. Step 2: Volume = 500 mL = 0.5 L. Step 3: Molarity = moles/volume(L) = 0.1/0.5 = 0.2 M.

Q118 [Number of Particles] — UNANSWERED

Total atoms in 1 mole of CH₄:

Correct: B) 5 × 6.022 × 10²³

Not answered

Solution: Step 1: 1 molecule of CH₄ has 1 C + 4 H = 5 atoms total. Step 2: 1 mole of CH₄ = 6.022 × 10²³ molecules. Step 3: Total atoms = 5 × 6.022 × 10²³.

Q119 [Moles from Mass] — UNANSWERED

How many moles are in 4.9 g of H_2SO_4 ?

Correct: B) 0.05

Not answered

Solution: Step 1: $M(\text{H}_2\text{SO}_4) = 98 \text{ g/mol}$. Step 2: $\text{Moles} = 4.9/98 = 0.05 \text{ mol}$.

Q120 [Moles from Mass] — UNANSWERED

The number of moles in 44 g of CO_2 is:

Correct: B) 1

Not answered

Solution: Step 1: Molar mass of $\text{CO}_2 = 12 + 2(16) = 44 \text{ g/mol}$. Step 2: $\text{Moles} = \text{mass} / \text{molar mass} = 44/44 = 1 \text{ mol}$.

Q121 [Vapour Density] — UNANSWERED

The molar mass of a gas with vapour density 16 is:

Correct: B) 32 g/mol

Not answered

Solution: Step 1: Vapour density (VD) = Molar mass / Molar mass of $\text{H}_2 = M / 2$. Step 2: Therefore $M = 2 \times \text{VD}$.

Q122 [Molality] — UNANSWERED

Molality of a solution with 5.85 g NaCl ($M=58.5$) in 500 g water is:

Correct: B) 0.2 m

Not answered

Solution: Step 1: $\text{Moles of NaCl} = 5.85/58.5 = 0.1 \text{ mol}$. Step 2: $\text{Mass of solvent} = 500 \text{ g} = 0.5 \text{ kg}$. Step 3: $\text{Molality} = \text{moles of solute} / \text{mass of solvent (kg)} = 0.1/0.5 = 0.2 \text{ m}$.

Q123 [Stoichiometry] — UNANSWERED

In $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$, the volume of NH_3 from 10 L N_2 , at same conditions is:

Correct: B) 20 L

Not answered

Solution: Step 1: By Avogadro's law, at same T and P, volume ratios = mole ratios. Step 2: 1 vol N_2 , 3 vol H_2 gives 2 vol NH_3 .

Q124 [Equivalent Concept] — UNANSWERED

The number of moles of electrons in 1 Faraday is:

Correct: B) 1

Not answered

Solution: Step 1: 1 Faraday = charge carried by 1 mole of electrons. Step 2: $Q = n \times e = 6.022 \times 10^{23} \times 1.6 \times 10^{19} \text{ C}$ corresponds to 1 mole of electrons.

Q125 [Molar Mass] — UNANSWERED

The molar mass of CaCO_3 is:

Correct: A) 100 g/mol

Not answered

Solution: Step 1: CaCO_3 contains Ca, C, and 3 O atoms. Step 2: $M = M(\text{Ca}) + M(\text{C}) + 3 \times M(\text{O}) = 40 + 12 + 3(16) = 100 \text{ g/mol}$.