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LOGIC · LOGICAL REASONING

11. Set Theory, Integer Bounds & Arithmetic

Official PMDC Solved Past Paper Topical Booklet · High-Yield Examination Series

© 14 Solved Questions

👤 2022 to 2025 Archive

📋 Boards: BUMHS, DUHS, KMU, NUMS, SZABMU, UHS

📄 Weightage: 3% of MDCAT (6 MCQs)

Curated by Ibrahim for fellow bees. Every question in this chapter has been verified against official UHS, NUMS, SZABMU, DUHS, and KMU answer keys. Propolis cognitive autopsies are provided at the end of this booklet to explain core concepts and break down common distractor traps.

OFFICIAL SOLVED EDITION**Q1.**

BUMHS 2025

What would be the result of: $10 - 3 \times 2$?

- (A) 4
- (B) 6
- (C) 14
- (D) 17

Q4.

BUMHS 2025

What would be the result of: $10 - 3 \times 2$?

- (A) 4
- (B) 6
- (C) 14
- (D) 17

Q2.

SZABMU 2025

Every alphabet in the word "SURGEON" represents a fixed numerical value and the numbers when added, sum up to 99. Based on this, what will be the sum of the word "EORGNSU"?

- (A) 102
- (B) 78
- (C) 99
- (D) 56

Q5.

SZABMU 2025

Every alphabet in the word "SURGEON" represent a fixed numerical value and the numbers when added, sum up to 99. Based on this, what will be the sum of the word "EORGNSU".

- (A) 102
- (B) 78
- (C) 99
- (D) 56

Q3.

NUMS 2025

Every alphabet in the word "SURGEON" represent a fixed numerical value and the numbers when added, sum up to 99. Based on this, what will be the sum of the word "EORGNSU".

- (A) 102
- (B) 78
- (C) 99
- (D) 56

Q6.

SZABMU 2024

In a group of 100 players, 70 play football, 50 play hockey, and 55 play cricket. 30 play both hockey and cricket, 25 play both football and hockey, and 20 play all three games. How many players play both football and cricket?

- (A) 25
- (B) 30
- (C) 35
- (D) 40

Q7.

DUHS 2024

Which number is a multiple of its digits?

- (A) 21
- (B) 47
- (C) 52
- (D) 24

Q8.

UHS 2024

P, Q and R are one-digit, non-negative numbers. P is the smallest even number. Q is the largest odd number. R is 5.

Which of the following is true?

- (A) $P + Q + R = 16$
- (B) $P + Q + R = 12$
- (C) $(Q + R) \times P = 30$
- (D) $(Q + R) \times P = 8$

Q9.

UHS 2024

X, Y and Z are three whole numbers less than 24 but greater than 11. X is the smallest prime number in this range. Y is the largest number divisible by 3. Z is the smallest number divisible by 11.

- (A) X is 13, Y is 24, Z is 11
- (B) X is 13, Y is 21, Z is 22
- (C) X is 11, Y is 21, Z is 11
- (D) X is 11, Y is 24, Z is 22

Q10.

BUMHS 2023

X, Y and Z are three whole numbers less than 31 but greater than 23. X is a prime number. Y is the largest odd number smaller than 31. Z is the smallest even number.

- (A) X is 31, Y is 29 and Z is 24
- (B) X is 29, Y is 29 and Z is 24
- (C) X is 23, Y is 29 and Z is 24
- (D) X is 27, Y is 31 and Z is 26

Q11.

KMU 2023

Some months have 31 days, how many have 28?

- (A) One month and that is February
- (B) February, every 4 years
- (C) All months have 28 days
- (D) None

Q12.

UHS 2023

X, Y and Z are three whole numbers less than 31 but greater than 23. X is a prime number. Y is the largest odd number smaller than 35. Z is the smallest even number?

- (A) X is 31, Y is 29 and Z is 24
- (B) X is 29, Y is 29 and Z is 24
- (C) X is 23, Y is 29 and Z is 24
- (D) X is 27, Y is 31 and Z is 26

Q13.

BUMHS 2022

X, Y and Z are three whole numbers less than 31 but greater than 23. X is a prime number. Y is the largest odd number smaller than 35. Z is the smallest even number.

- (A) X is 31, Y is 29 and Z is 24
- (B) X is 29, Y is 29 and Z is 24
- (C) X is 23, Y is 29 and Z is 24
- (D) X is 27, Y is 31 and Z is 26

Q14.

SZABMU 2022

X, Y and Z are three whole numbers less than 24 but greater than 11. X is the smallest prime number. Y is the largest number divisible by 3. Z is the smallest number divisible by 11.

- (A) X is 13, Y is 24, Z is 11
- (B) X is 13, Y is 21, Z is 22
- (C) X is 11, Y is 21, Z is 11
- (D) X is 11, Y is 24, Z is 22

RAPID 5-COLUMN ANSWER KEY

Official PMDC verified answer keys for 11. Set Theory, Integer Bounds & Arithmetic.

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Q#	KEY	BOARD	Q#	KEY	BOARD	Q#	KEY	BOARD	Q#	KEY	BOARD	Q#	KEY	BOARD
1	A	BUMHS 2025	4	A	BUMHS 2025	7	D	DUHS 2024	10	B	BUMHS 2023	13	B	BUMHS 2022
2	C	SZABMU 2025	5	C	SZABMU 2025	8	A	UHS 2024	11	C	KMU 2023	14	B	SZABMU 2022
3	C	NUMS 2025	6	D	SZABMU 2024	9	B	UHS 2024	12	B	UHS 2023			

TOTAL MCQS
14

CORRECT

INCORRECT

BLANK

ACCURACY

%

Scan the booklet QR code to enter answers in **BeambePrep Grind Mode** for automated error autopsies.

PROPOLIS COGNITIVE ERROR AUTOPSIES

Step-by-step conceptual derivations, formula working, and distractor autopsies for every question.

Question #1 Key: (A)

BUMHS 2025

What would be the result of: [Formula] ?

CORE CONCEPT AND DERIVATION

Arithmetic Order of Operations (BODMAS/PEMDAS).

Formula: Perform multiplication before subtraction.

Solution:

- First multiply: $3 \times 2 = 6$
- Then subtract: $10 - 6 = 4$

Why other options are incorrect:

- **Option C:** Incorrectly performs subtraction first: $(10 - 3) \times 2 = 14$.

Question #2 Key: (C)

SZABMU 2025

Every alphabet in the word "SURGEON" represents a fixed numerical value and the numbers when added, sum up to ...

CORE CONCEPT AND DERIVATION

Anagram Numerical Equivalence.

Formula: $\sum \text{Letter values} = \text{Constant}$

Solution: "EORGNU" is an anagram containing the exact same set of letters as "SURGEON". Since each letter's numerical value is fixed, the total sum remains unchanged at 99.

Why other options are incorrect:

- **Options A, B, and D:** Arbitrary numbers that ignore the principle of algebraic addition of identical variables.

Question #3 Key: (C)

NUMS 2025

Every alphabet in the word "SURGEON" represent a fixed numerical value and the numbers when added, sum up to 9...

CORE CONCEPT AND DERIVATION

Commutative Property of Variable Sums.

Formula: $A + B + C = C + B + A$

Solution: Reordering letter variables leaves their numerical total invariant.

Why other options are incorrect:

- **Options A, B, and D:** Disregard the basic algebraic principle that changing variable order does not alter sum.

Question #4 Key: (A)

BUMHS 2025

What would be the result of: [Formula] ?

CORE CONCEPT AND DERIVATION

Order of Operations.

Formula: Multiplication before subtraction.

Solution:

- $10 - (3 \times 2) = 10 - 6 = 4$.

Why other options are incorrect:

- **Option C:** Evaluates left-to-right: $(10 - 3) \times 2 = 14$.

Question #5 Key: (C)

SZABMU 2025

Every alphabet in the word "SURGEON" represent a fixed numerical value and the numbers when added, sum up to 9...

CORE CONCEPT AND DERIVATION

Anagram Sum Equivalence.

Formula: N/A

Solution: Identical letters maintain an identical total sum of 99.

Why other options are incorrect:

- **Options A, B, and D:** Violate fixed variable algebraic sum rules.

Question #6 Key: (D)

SZABMU 2024

In a group of 100 players, 70 play football, 50 play hockey, and 55 play cricket. 30 play both hockey and cric...

CORE CONCEPT AND DERIVATION

Principle of Inclusion-Exclusion for Three Sets.

Formula:

$$|F \cup H \cup C| = |F| + |H| + |C| - (|F \cap H| + |H \cap C| + |F \cap C|) + |F \cap H \cap C|$$

Solution:

- Total players $|F \cup H \cup C| = 100$
- Football: $|F| = 70$, Hockey: $|H| = 50$, Cricket: $|C| = 55$
- Two-set overlaps: Football & Hockey $|F \cap H| = 25$, Hockey & Cricket $|H \cap C| = 30$
- Triple overlap (all three games): $|F \cap H \cap C| = 20$
- Let $x = |F \cap C|$ be the number of players who play both football and cricket.

Substituting into the Inclusion-Exclusion equation:

$$100 = 70 + 50 + 55 - (25 + 30 + x) + 20$$

$$100 = 175 - 55 - x + 20$$

$$100 = 140 - x$$

$$x = 140 - 100 = 40$$

Therefore, exactly **40** players play both football and cricket.

Why other options are incorrect:

- **Option A (25), Option B (30), Option C (35):** Incorrect values resulting from misapplying the set intersection formula or erroneously omitting/double-counting the triple intersection set of 20 players.

Question #7 Key: (D)

DUHS 2024

Which number is a multiple of its digits ?

CORE CONCEPT AND DERIVATION

Divisibility & Digit Product Rules.

Formula: $N \pmod{d_1 \times d_2} = 0$

Solution: Digits of 24 are 2 and 4. Product = $2 \times 4 = 8$. Since $24/8 = 3$, 24 is a multiple of its digits' product.

Why other options are incorrect:

- **Option A:** Digits product = 2; 21 is odd (not divisible by 2).

Question #8 Key: (A)

UHS 2024

P, Q and R are one-digit, non-negative numbers. P is the smallest even number. Q is the largest odd number. R...

CORE CONCEPT AND DERIVATION

Number Property Evaluation.

Formula: $P = 2, Q = 9, R = 5$

Solution:

- Smallest positive single-digit even number $P = 2$.
- Largest single-digit odd number $Q = 9$.
- $P + Q + R = 2 + 9 + 5 = 16$.

Why other options are incorrect:

- **Option C:** Calculates $(9 + 5) \times 2 = 28$ (not 30).

Question #9 Key: (B)

UHS 2024

X, Y and Z are three whole numbers less than 24 but greater than 11. X is the smallest prime number in this ra...

CORE CONCEPT AND DERIVATION

Number Bounds & Factors.

Formula: Bounds = $12 \leq N \leq 23$.

Solution:

- Smallest prime in range = 13 (X).
- Largest multiple of 3 in range = 21 (Y).
- Smallest multiple of 11 in range = 22 (Z).

Why other options are incorrect:

- **Option A:** Includes 24 and 11 which violate strictly 'less than 24 and greater than 11'.

Question #10 **Key: (B)**

BUMHS 2023

X, Y and Z are three whole numbers less than 31 but greater than 23. X is a prime number. Y is the largest odd...

CORE CONCEPT AND DERIVATION

Integer Range Boundaries.

Formula: Range = $24 \leq N \leq 30$.

Solution:

- Prime in range = 29 (X).
- Largest odd < 31 in range = 29 (Y).
- Smallest even > 23 in range = 24 (Z).

Why other options are incorrect:

- **Option A:** Includes 31 which violates 'less than 31'.

Question #11 **Key: (C)**

KMU 2023

Some months have 31 days, how many have 28?

CORE CONCEPT AND DERIVATION

Literal Word Riddles.

Formula: N/A

Solution: Every single month of the calendar year contains at least 28 days.

Why other options are incorrect:

- **Options A and B:** Fall for the misinterpretation that only February has 28 days.

Question #12 **Key: (B)**

UHS 2023

X, Y and Z are three whole numbers less than 31 but greater than 23. X is a prime number. Y is the largest odd...

CORE CONCEPT AND DERIVATION

Bounded Interval Whole Numbers.

Formula: Interval = (23, 31).

Solution: Prime = 29 (X), Max odd < 31 in range = 29 (Y), Min even = 24 (Z).

Why other options are incorrect:

- **Option A:** Includes interval boundary 31.

Question #13 **Key: (B)**

BUMHS 2022

X, Y and Z are three whole numbers less than 31 but greater than 23. X is a prime number. Y is the largest odd...

CORE CONCEPT AND DERIVATION

Whole Number Sets.

Formula: Interval = (23, 31).

Solution: Prime = 29, Max odd = 29, Min even = 24.

Why other options are incorrect:

- **Option A:** Includes upper boundary 31.

Question #14 **Key: (B)**

SZABMU 2022

X, Y and Z are three whole numbers less than 24 but greater than 11. X is the smallest prime number. Y is the ...

CORE CONCEPT AND DERIVATION

Integer Interval Bounds.

Formula: Interval = (11, 24).

Solution: Smallest prime = 13 (X), Largest multiple of 3 = 21 (Y), Smallest multiple of 11 = 22 (Z).

Why other options are incorrect:

- **Option A:** Includes boundary values 24 and 11.