

Bhavan's Mathematical Olympiad (BMO) - 2025

Complete Official Question Paper Solution Book

Subject: Mathematics	Class: Class 6
Total Marks: 50 Marks	Time Duration: 1 Hour (60 Mins)
Exam Board / Org: Bhavan's Olympiad Foundation (BOF)	Document Type: Step-by-step Solution Manual

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SECTION I: MULTIPLE CHOICE QUESTIONS (Q1 – Q40) • [1 MARK EACH]

Question 1

$\$9 - 5 = 4\$$. Here, the subtrahend is:

- a) 9
- b) 5
- c) 4
- d) none

Correct Option: b) 5

Working & Explanation:

In a subtraction sentence of the form $A - B = C$:

- **Minuend (A)**: The number from which another number is subtracted ($\$9$).
- **Subtrahend (B)**: The number that is subtracted ($\$5$).
- **Difference (C)**: The result of subtraction ($\$4$).

Therefore, the subtrahend is **5**.

Question 2

The smallest composite odd number is:

- a) 2
- b) 3
- c) 4
- d) 9

Correct Option: d) 9

Working & Explanation:

- A composite number has more than two factors.
- List of composite numbers: $\$4, 6, 8, 9, 10, 12, 14, 15, \dots$
- Composite numbers $\$4, 6, 8$ are even.
- The first composite number that is **odd** is $\$9$ (factors: $\$1, 3, 9$).

Question 3

Twin prime numbers are:

- a) (3, 5)
- b) (11, 13)
- c) (17, 19)
- d) all of these

Correct Option: d) all of these

Working & Explanation:

Twin primes are pairs of prime numbers that differ by exactly 2.

- $\$5 - 3 = 2\$$ (both 3 and 5 are prime)
- $\$13 - 11 = 2\$$ (both 11 and 13 are prime)
- $\$19 - 17 = 2\$$ (both 17 and 19 are prime)

Hence, all the given pairs are twin prime numbers.

Question 4

96,283 is divisible by:

- a) 11
- b) 2
- c) 3
- d) 1

Correct Option: a) 11

Divisibility Test for 11:

Sum of digits at odd places (from right): $3 + 2 + 9 = 14$

Sum of digits at even places (from right): $8 + 6 = 14$

Difference = $14 - 14 = 0$

Since the difference is 0, 96,283 is divisible by 11.

Question 5

An even prime number is:

- a) 3
- b) 2
- c) 4
- d) none

Correct Option: b) 2

Working & Explanation:

2 is the smallest prime number and the **only even prime number** because every other even number is divisible by 2 and thus composite.

Question 6

The LCM of two co-prime numbers are:

- a) Their divisor
- b) Their sum
- c) Their product
- d) None of these

Correct Option: c) Their product

Formula & Principle:

For any two co-prime numbers a and b , their Highest Common Factor $\text{HCF}(a, b) = 1$.

Since $\text{HCF} \times \text{LCM} = a \times b$, we have:

$1 \times \text{LCM} = a \times b \implies \text{LCM} = \text{Product of the numbers}$.

Question 7

How many three digit numbers are there by using 1, 2, 3, taking each digit only once?

- a) 5
- b) 7
- c) 8
- d) 6

Correct Option: d) 6

Step-by-step Working:

Given digits: 1, 2, 3

Number of permutations = $3! = 3 \times 2 \times 1 = 6$

The 3-digit numbers formed are: 123, 132, 213, 231, 312, 321.

Total count = 6.

Question 8

How many sides does a decagon has?

- a) 12
- b) 10
- c) 8
- d) 7

Correct Option: b) 10

Explanation:

By definition in geometry, a decagon is a polygon with **10 sides** and 10 angles.

Question 9

A boy buys 15kg sugar for ₹600. What will be the cost of 2kg sugar?

- a) 40
- b) 100
- c) ₹80
- d) none

Correct Option: c) ₹80

Unitary Method Working:

Given: Cost of 15 kg sugar = ₹600

Cost of 1 kg sugar = $\frac{600}{15} = ₹40$

Cost of 2 kg sugar = $40 \times 2 = ₹80$.

Question 10

1 million = _____ lakhs

- | | |
|-------|--------|
| a) 10 | b) 100 |
| c) 1 | d) 11 |

Correct Option: a) 10

Conversion Steps:

$$1 \text{ Million} = 1,000,000$$

$$1 \text{ Lakh} = 100,000$$

$$\text{Number of lakhs} = \frac{1,000,000}{100,000} = 10$$

Question 11

Evaluate: $601 - 600$

- | | |
|--------|------|
| a) 2 | b) 3 |
| c) 600 | d) 1 |

Correct Option: d) 1

Calculation:

$$601 - 600 = 1$$

Question 12

How many times the digit 3 occurs in all the natural numbers from 1 to 100?

- | | |
|-------|-------|
| a) 21 | b) 20 |
| c) 19 | d) 15 |

Correct Option: b) 20

Step-by-step Counting:

- Digit 3 at Unit's place (3, 13, 23, 33, 43, 53, 63, 73, 83, 93) = 10 times.
 - Digit 3 at Ten's place (30, 31, 32, 33, 34, 35, 36, 37, 38, 39) = 10 times.
- Total occurrences = $10 + 10 = 20$ times.

Question 16

Find the least 5 digit number which is exactly divisible by 99:

- a) 10098
- b) 10099
- c) 10009
- d) 9999

Correct Option: a) 10098

Step-by-step Working:

Smallest 5-digit number = \$10000\$

Divide \$10000\$ by \$99\$:

$10000 \div 99 = 101 \text{ ext{ with remainder } } 1$

Number to be added = $99 - 1 = 98$

Least 5-digit number divisible by 99 = $10000 + 98 = \mathbf{10098}$.

Question 17

1 km is equal to how many cm?

- a) 100 cm
- b) 1000 cm
- c) 10000 cm
- d) 100000 cm

Correct Option: d) 100000 cm

Unit Conversion:

$1 \text{ ext{ km} } = 1000 \text{ ext{ m} }$

$1 \text{ ext{ m} } = 100 \text{ ext{ cm} }$

$1 \text{ ext{ km} } = 1000 \text{ imes } 100 \text{ ext{ cm} } = \mathbf{100,000 \text{ ext{ cm} }}$.

Question 18

A truck can carry 7,826 bricks. How many bricks can 175 such trucks carry?

- a) 13,69,540
- b) 13,68,550
- c) 13,67,550
- d) 13,69,550

Correct Option: d) 13,69,550

Calculation:

Bricks carried by 1 truck = \$7,826\$

Total bricks carried by 175 trucks = \$7,826 \text{ imes } 175\$

$7,826 \text{ imes } 100 = 782,600$

$7,826 \text{ imes } 70 = 547,820$

$7,826 \text{ imes } 5 = 39,130$

Sum = $782,600 + 547,820 + 39,130 = \mathbf{1,369,550}$.

Question 19

Evaluate: $(12 \div 6 \times 3) \div 2$

- a) 5
- b) 4
- c) 2
- d) 3

Correct Option: d) 3

BODMAS Calculation:

Step 1: Simplify inside brackets $(12 \div 6 \times 3)$ from left to right:

$$12 \div 6 = 2$$

$$2 \times 3 = 6$$

Step 2: Divide by 2 outside bracket: $6 \div 2 = \mathbf{3}$.

Question 20

The HCF of 36 and 170 is:

- a) 2
- b) 3
- c) 4
- d) 72

Correct Option: a) 2

Prime Factorization Method:

$$36 = 2^2 \times 3^2 = 2 \times 2 \times 3 \times 3$$

$$170 = 2 \times 5 \times 17$$

Common prime factor = 2

$$\text{HCF}(36, 170) = \mathbf{2}$$

Question 21

The LCM of 24 and 36 is:

- a) 6
- b) 12
- c) 72
- d) 36

Correct Option: c) 72

Prime Factorization:

$$24 = 2^3 \times 3^1$$

$$36 = 2^2 \times 3^2$$

$$\text{LCM}(24, 36) = 2^3 \times 3^2 = 8 \times 9 = \mathbf{72}$$

Question 22

The product of two numbers is 432 and their LCM is 72. Their HCF is:

- a) 5
- b) 6
- c) 10
- d) none

Correct Option: b) 6

Formula:

$$\text{HCF} \times \text{LCM} = \text{Product of two numbers}$$

$$\text{Given: Product} = 432, \text{LCM} = 72$$

$$\text{HCF} = \frac{\text{Product}}{\text{LCM}} = \frac{432}{72} = \mathbf{6}$$

Question 23

The perimeter of a rectangular field is 42 m and its breadth is 10 m. Its length would be:

- a) 12m
- b) 13m
- c) 14 m
- d) 11 m

Correct Option: d) 11 m

Formula & Step-wise Calculation:

$$\text{Perimeter of rectangle} = 2(l + b)$$

$$2(l + 10) = 42$$

$$l + 10 = 21 \implies l = 21 - 10 = \mathbf{11 \text{ m}}$$

Question 24

12 hours 27 minutes + 3 hours 58 minutes =

- a) 16 hours 15 minutes
- b) 16 hours 25 minutes
- c) 16 hours 35 minutes
- d) 16 hours 05 minutes

Correct Option: b) 16 hours 25 minutes

Step-wise Addition:

$$\text{Sum of Hours} = 12 + 3 = 15 \text{ hours}$$

$$\text{Sum of Minutes} = 27 + 58 = 85 \text{ minutes} = 1 \text{ hour } 25 \text{ minutes}$$

$$\text{Total Time} = 15 \text{ hours} + 1 \text{ hour } 25 \text{ minutes} = \mathbf{16 \text{ hours } 25 \text{ minutes}}$$

Question 25

The elapsed time between 2:35 a.m. and 5:30 p.m is:

- a) 14 hours 55 minutes
- b) 15 hours 55 minutes
- c) 15 hours 45 minutes
- d) none

Correct Option: a) 14 hours 55 minutes

Step-by-step Time Calculation:

- From 2:35 a.m. to 12:00 noon = $9 \text{ hours } 25 \text{ minutes}$
 - From 12:00 noon to 5:30 p.m. = $5 \text{ hours } 30 \text{ minutes}$
- Total elapsed time = $(9 \text{ h } 25 \text{ m}) + (5 \text{ h } 30 \text{ m}) = 14 \text{ hours } 55 \text{ minutes}$.

Question 26

The length of the diameter of a circle is 2.8 cm. The circumference of the circle is:

- a) 8.5 cm
- b) 8.6 cm
- c) 8.8 cm
- d) none

Correct Option: c) 8.8 cm

Formula & Calculation:

Circumference $C = \pi \times d$

Given: Diameter $d = 2.8 \text{ cm}$, $\pi = \frac{22}{7}$

$C = \frac{22}{7} \times 2.8 = 22 \times 0.4 = \mathbf{8.8 \text{ cm}}$.

Question 27

The order of rotational symmetry of an equilateral triangle is:

- a) 1
- b) 2
- c) 5
- d) 3

Correct Option: d) 3

Explanation:

An equilateral triangle fits onto itself three times during a full 360° rotation (at 120° , 240° , and 360°). Hence, its order of rotational symmetry is **3**.

Question 28

Which one of the following are co-prime?

- a) 13, 247
- b) 91, 209
- c) 91, 104
- d) 23, 161

Correct Option: b) 91, 209

Analysis of Options:

- a) $\text{HCF}(13, 247) = 13$ (since $247 = 13 \times 19$)
- b) $91 = 7 \times 13$, $209 = 11 \times 19 \implies \text{HCF}(91, 209) = 1$ (Co-prime!)
- c) $\text{HCF}(91, 104) = 13$ (since $91 = 13 \times 7$, $104 = 13 \times 8$)
- d) $\text{HCF}(23, 161) = 23$ (since $161 = 23 \times 7$)

Question 29

One of the acute angle of a right angled triangle measures 75° . Find the other acute angle:

- a) 15°
- b) 25°
- c) 45°
- d) None

Correct Option: a) 15°

Step-by-step Calculation:

In a right-angled triangle, the sum of two acute angles is 90° .

Let the required acute angle be x° .

$$x + 75^\circ = 90^\circ \implies x = 90^\circ - 75^\circ = 15^\circ.$$

Question 30

How many 6-digit numbers in all are there?

- a) 90,000
- b) 8,99,999
- c) 9,00,009
- d) 9,00,000

Correct Option: d) 9,00,000

Formula & Calculation:

Total n -digit numbers = $\text{Largest } n\text{-digit number} - \text{Smallest } n\text{-digit number} + 1$

Largest 6-digit number = 9,99,999

Smallest 6-digit number = 1,00,000

$$\text{Total count} = 9,99,999 - 1,00,000 + 1 = 9,00,000.$$

Question 31

Reduce $\$ \frac{2211}{5025}$ to the lowest term:

- a) $\$ \frac{12}{25}$
- b) $\$ \frac{11}{25}$
- c) $\$ \frac{13}{24}$
- d) None

Correct Option: b) $\$ \frac{11}{25}$

Reduction Steps:

Find $\text{HCF}(2211, 5025) = 201$.

Divide both numerator and denominator by 201:

Numerator: $2211 \div 201 = 11$

Denominator: $5025 \div 201 = 25$

Lowest term = $\mathbf{\$ \frac{11}{25}}$.

Question 32

Evaluate: $\$5 + 0.005 + 0.05 + 0.5 = ?$

- a) 5.0555
- b) 5.5550
- c) 5.5505
- d) None

Correct Option: b) 5.5550

Decimal Alignment Addition:

$5.0000 + 0.5000 + 0.0500 + 0.0050 = \mathbf{5.5550}$.

Question 33

Evaluate: $\$(5 - 0.005 - 0.05 + 0.5) = ?$

- a) 5.405
- b) 5.445
- c) 5.5550
- d) None

Correct Option: b) 5.445

Step-wise Calculation:

$\$(5 + 0.5) - (0.005 + 0.05) = 5.5 - 0.055 = \mathbf{5.445}$.

Question 34

The length and breadth of a rectangular field are 1m and 50cm respectively. The ratio of breadth to the length of the field is:

- a) 1:2
- b) 2:3
- c) 2:1
- d) 5:1

Correct Option: a) 1:2

Step-wise Working:

Length = $1 \text{ m} = 100 \text{ cm}$

Breadth = 50 cm

Ratio of Breadth to Length = $\frac{50 \text{ cm}}{100 \text{ cm}} = \frac{1}{2} = \mathbf{1:2}$.

Question 35

Which is the smallest among the common multiples of 5 and 8?

- a) 80
- b) 8
- c) 5
- d) 40

Correct Option: d) 40

Concept:

The smallest common multiple of two numbers is their LCM .

Since 5 and 8 are co-prime, $\text{LCM}(5, 8) = 5 \times 8 = \mathbf{40}$.

Question 36

Which of the following is NOT equivalent to 84×15 ?

- a) $(84 \times 10) + (84 \times 5)$
- b) $(80 \times 15) + (4 \times 15)$
- c) $(80 \times 10) + (4 \times 15) + (80 \times 5)$
- d) $100 \times 15 - 4 \times 15$

Correct Option: d) $100 \times 15 - 4 \times 15$

Evaluation of Options:

Target Value = $84 \times 15 = 1260$

a) $84 \times (10+5) = 84 \times 15 = 1260$

b) $(80+4) \times 15 = 84 \times 15 = 1260$

c) $800 + 60 + 400 = 1260$

d) $100 \times 15 - 4 \times 15 = (100-4) \times 15 = 96 \times 15 = 1440 \neq 1260$.

Question 37

Evaluate: $312 \div 312 - 213 \div 213$

- a) 1
- b) 2
- c) 0
- d) None

Correct Option: c) 0

Step-wise Working:

By order of operations (BODMAS):

$$312 \div 312 = 1$$

$$213 \div 213 = 1$$

$$1 - 1 = \mathbf{0}$$

Question 38

What least number must be added to 5694 to get a number exactly divisible by 43?

- a) 20
- b) 25
- c) 0
- d) 45

Correct Option: b) 25

Step-wise Working:

Divide 5694 by 43:

$$5694 = 43 \times 132 + 18$$

$$\text{Remainder} = 18$$

$$\text{Least number to be added} = \text{Divisor} - \text{Remainder} = 43 - 18 = \mathbf{25}$$

Question 39

A car travels at a uniform speed of 40 km/hr. What distance will it cover in 5 hrs?

- a) 300km
- b) 400km
- c) 350km
- d) 200km

Correct Option: d) 200km

Formula & Calculation:

$$\text{Distance} = \text{Speed} \times \text{Time}$$

$$\text{Speed} = 40 \text{ km/hr}, \text{ Time} = 5 \text{ hrs}$$

$$\text{Distance} = 40 \times 5 = \mathbf{200 \text{ km}}$$

Question 40

The perimeter of a triangle having sides 6.9 cm, 8.05 cm and 2 cm is:

- | | |
|----------|----------|
| a) 14.85 | b) 16.95 |
| c) 10.95 | d) 17.95 |

Correct Option: b) 16.95

Calculation:

$$\text{Perimeter} = a + b + c = 6.90 + 8.05 + 2.00 = \mathbf{16.95 \text{ cm}}$$

SECTION II: ACHIEVER'S SECTION (Q41 – Q45) • [2 MARKS EACH]

Question 41

Find the largest number which divides 2011 and 2623, leaving remainder 9 and 5 respectively.

- | | |
|--------|--------|
| a) 145 | b) 154 |
| c) 144 | d) 100 |

Correct Option: b) 154

Given: Remainders are 9 and 5 for numbers 2011 and 2623 respectively.

Step 1: Subtract remainders from the given numbers:

$$2011 - 9 = 2002$$

$$2623 - 5 = 2618$$

Step 2: Find $\text{HCF}(2002, 2618)$ using Euclid's Division Algorithm:

$$2618 = 2002 \times 1 + 616$$

$$2002 = 616 \times 3 + 154$$

$$616 = 154 \times 4 + 0$$

Hence, the largest required number is $\mathbf{\text{HCF} = 154}$.

Question 42

Ananya was 10 years 6 months old when her sister Tanya was born. Tanya is now 27 years 8 months old. How old is Ananya now?

- a) 38 years 2 months
- b) 37 years 2 months
- c) 36 years 2 months
- d) none

Correct Option: a) 38 years 2 months

Given:

Age difference between Ananya and Tanya = $10 \text{ years } 6 \text{ months}$

Tanya's present age = $27 \text{ years } 8 \text{ months}$

Calculation:

Ananya's present age = Tanya's age + Age difference

$= (27 \text{ years } 8 \text{ months}) + (10 \text{ years } 6 \text{ months})$

$= 37 \text{ years } 14 \text{ months}$

Since $14 \text{ months} = 1 \text{ year } 2 \text{ months}$,

Ananya's age = $37 + 1 \text{ year } 2 \text{ months} = \mathbf{38 \text{ years } 2 \text{ months}}$.

Question 43

Convert 80°C to $^\circ \text{F}$:

- a) 165°F
- b) 152°F
- c) 148°F
- d) 176°F

Correct Option: d) 176°F

Formula:

$F = \left(\frac{9}{5} \times C \right) + 32$

Step-wise Calculation:

Given: $C = 80^\circ \text{C}$

$F = \left(\frac{9}{5} \times 80 \right) + 32$

$F = (9 \times 16) + 32$

$F = 144 + 32 = \mathbf{176^\circ \text{F}}$.

Question 44

The number whose 15% is 24 would be:

- a) 150
c) 160
- b) 123
d) 155

Correct Option: c) 160

Step-wise Working:

Let the required number be x .

Given: \$15\% \text{ of } x = 24\$

$$\frac{15}{100} \times x = 24$$
$$x = \frac{24 \times 100}{15} = \frac{2400}{15} = \mathbf{160\$}.$$

Question 45

A machine for making ice, freezes 5.76 litres of water into ice bricks, each having dimension 3 cm by 2 cm by 1 cm. How many ice bricks will be made by 5.76 L of water?

- [illegible]

Correct Option: a) 960

Step-wise Working:

Step 1: Volume of 1 ice brick = $l \times b \times h = 3 \text{ cm} \times 2 \text{ cm} \times 1 \text{ cm} = 6 \text{ cm}^3$

Step 2: Convert volume of water to cm^3 :

$$1 \text{ litre} = 1000 \text{ cm}^3$$

Total volume of water = $5.76 \times 1000 = 5760 \text{ cm}^3$

Step 3: Number of ice bricks = $\frac{\text{Total Volume}}{\text{Volume of 1 brick}} = \frac{5760}{6} = \mathbf{960}$.