



Unified International
Mathematics Olympiad

UNIFIED INTERNATIONAL MATHEMATICS OLYMPIAD (UPDATED)

CLASS - 6

Question Paper Code : UM9264

KEY

1	2	3	4	5	6	7	8	9	10
A	B	D	A	B	C	C	B	C	D
11	12	13	14	15	16	17	18	19	20
D	D	C	B	B	D	C	A	B	B
21	22	23	24	25	26	27	28	29	30
B	C	B	C	B	A	A	C	B	C
31	32	33	34	35	36	37	38	39	40
A,B,C,D	B,D	A,B,C	C,D	A,B,C	C	B	D	B	C
41	42	43	44	45	46	47	48	49	50
A	B	C	A	C	A	B	D	C	B

EXPLANATIONS

MATHEMATICS - 1

01. (A)
$$\frac{0.65 \times 0.65 \times 0.65 + 0.35 \times 0.35 \times 0.35}{0.65 \times 0.65 - 0.65 \times 0.35 + 0.35 \times 0.35}$$
- $$= \frac{0.274625 + 0.042875}{0.4225 - 0.2275 + 0.1225}$$
- $$= \frac{0.3175}{0.3175} = 1$$
02. (B) $2 \times 3 \times 5 \times 7 \times 11 \times 13 \times \dots = 30030 \times \dots$
 \therefore The units digit = zero

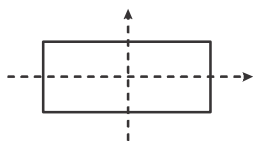
03. (D) Given product of two numbers
 $= \text{LCM} \times \text{HCF}$
 $\Rightarrow 264 \times \text{other number} = 1320 \times 12$
 \therefore Other number = $\frac{1320 \times 12}{264} = 60$
04. (A) Greatest 5 digit number = 99,999
 Greatest 4 digit number = 9,999
 \therefore Number of 5 digit numbers
 $= 99,999 - 9,999 = 90,000$

$$\begin{aligned}
 05. (B) \quad \text{LHS} &= \frac{-1.11 \times -1.11 + 3.57 \times 3.57}{1.5129 + 5.4756} \\
 &= \frac{1.2321 + 12.7449}{6.9885} \\
 &= \frac{13.977}{6.9885} = 2
 \end{aligned}$$

$$\begin{aligned}
 06. (C) \quad \text{Given } A : B &= 6 : 5 \text{ \& } B : C = 4 : 1 \\
 \text{LCM of B ratios} &= 20 \\
 \therefore A : B &= 6 \times 4 : 5 \times 4 = 24 : 20 \\
 B : C &= 4 \times 5 : 1 \times 5 = 20 : 5 \\
 \therefore A : B : C &= 24 : 20 : 5 \Rightarrow A : C = 24 : 5
 \end{aligned}$$

$$\begin{aligned}
 07. (C) \quad \text{Area of rectangle} \\
 &= lb = 47\frac{2}{3} \text{ cm} \times 11\frac{2}{11} \text{ cm} \\
 &= \frac{143}{3} \times \frac{123}{11} \text{ cm}^2 \\
 &= 533 \text{ cm}^2
 \end{aligned}$$

08. (B) A rectangle has two lines of symmetry.



$$\begin{aligned}
 09. (C) \quad \text{Let } x &= 19, \text{ then LHS of Option A} \\
 &= \frac{21}{3} - \frac{18}{5} = \frac{35 - 18}{5} = \frac{17}{5} \\
 \text{RHS of Option A} &= \frac{22}{4} - 1 = \frac{11}{2} - 1 = \frac{9}{2} \\
 \text{Let } x &= 19 \text{ the LHS of Option B} \\
 &= \frac{21}{3} - \frac{20}{5} = 3 \\
 \text{RHS of Option B} &= \frac{22}{4} + 1 = \frac{13}{2} \\
 \text{LHS of Option B} &\neq \text{RHS of Option B} \\
 \text{Let } x &= 19, \text{ the LHS of Option C} = 3 \\
 \text{RHS of Option C} &= \frac{19 - 3}{4} - 1 = \frac{16}{4} - 1 = 3 \\
 \therefore \text{LHS of Option C} &= \text{RHS of Option C}
 \end{aligned}$$

$$\begin{aligned}
 10. (D) \quad \text{Perimeter of a triangle} \\
 &= \frac{a}{2} + \frac{b}{3} - \frac{c}{4} + \frac{a}{4} - \frac{b}{3} - \frac{c}{2} + \frac{a}{3} - \frac{b}{4} + \frac{c}{3} \\
 &= \frac{a}{2} + \frac{a}{4} + \frac{a}{3} - \frac{b}{4} - \frac{b}{3} - \frac{c}{4} - \frac{c}{2} + \frac{c}{3} \\
 &= \frac{6a + 3a + 4a}{12} - \frac{b}{4} - \frac{3c - 6c + 4c}{12} \\
 &\Rightarrow \frac{13a}{12} - \frac{b}{4} - \frac{5c}{12} \Rightarrow \frac{13a - 3b - 5c}{12} \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 11. (D) \quad 3 : 4 &= \frac{3}{4}, 5 : 8 = \frac{5}{8}, \\
 11 : 12 &= \frac{11}{12}, 15 : 16 = \frac{15}{16} \\
 \therefore \text{LCM of denominators} &= 48 \\
 \therefore \frac{3}{4} &= \frac{3}{4} \times \frac{12}{12} = \frac{36}{48} \\
 \frac{5}{8} &= \frac{5}{8} \times \frac{6}{6} = \frac{30}{48} \\
 \frac{11}{12} &= \frac{11}{12} \times \frac{4}{4} = \frac{44}{48} \\
 \frac{15}{16} &= \frac{15}{16} \times \frac{3}{3} = \frac{45}{48} \\
 \therefore \frac{45}{48} &> \frac{44}{48} > \frac{30}{48} > \frac{36}{48} \\
 \therefore \frac{45}{48} &\text{ is greatest } \Rightarrow 15 : 16 \text{ is greatest.}
 \end{aligned}$$

$$\begin{aligned}
 12. (D) \quad 320 &\text{ is divisible by 8} \\
 \therefore 2345678987654320 &\text{ is divisible by 8} \\
 \therefore 2345678987654325 \\
 &= 2345678987654320 + 5 \\
 \therefore \text{Remainder} &= 5
 \end{aligned}$$

13. (C) The possible fractions can be

$$\frac{1}{9}, \frac{2}{8}, \frac{3}{7}, \frac{4}{6}, \frac{5}{5}, \frac{6}{4}, \frac{7}{3}, \frac{8}{2}$$

Among $\frac{3}{7}$ satisfies the given condition

$$\text{of } \frac{3+3}{7-1} = \frac{6}{6} = 1$$

$$\therefore 7 - 3 = 4$$

14. (B) LCM of 3, 5, 6, 8, 10 & 12 = 120

$$\text{Required number} = 120x + 2$$

Given $(120x + 2)$ is divisible by 13

\therefore 962 is in the form of $120x + 2$ and divisible by 13 also

15. (B) Given $(1 + 2 + 3 + \dots + 50) + (46 + 47 + \dots + 99) = 1275 + 3915$

$$\therefore 1 + 2 + 3 + \dots + 50 + (46 + 47 + 48 + 49 + 50) + (51 + \dots + 99) = 5190$$

$$\therefore 1 + 2 + 3 + \dots + 50 + 240 + 51 + 52 + \dots + 99 = 5190$$

$$\therefore 1 + 2 + 3 + \dots + 99 = 5190 - 240 = 4950$$

16. (D) No property is satisfied by the division operation

17. (C) The required numbers are 18 & 8 because $18 \times 8 = 144$ & $18 + 8 = 26$
 \therefore larger number = 18

18. (A) Smallest odd composite number = 9

$$\therefore 41 + P \text{ is divisible by } 9$$

$$\therefore 45 \text{ is divisible by } 9$$

$$\therefore 41 + P = 45$$

$$P = 4$$

19. (B) Age of Ram = $60y - 5y = 55y$

$$\text{Age of Raju} = 55y - 4y = 51 \text{ year}$$

$$\text{Age of Babu} = 51y - 6y = 45 \text{ years}$$

$$\text{Age difference between Mahesh \& Babu} = 60y - 45y = 15y$$

20. (B) Prime numbers between 1 and 50 are 2,3,5,7,11,13,17,19,23,29,31,37,41,43,47
 $\therefore m = 15$

Prime numbers between 50 and 100 are 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

$$\therefore n = 10$$

$$\therefore m - n = 15 - 10 = 5$$

21. (B) 997 is the greatest 3 digit prime number

22. (C) $42 = 6 \times 7$ & $78 = 6 \times 13$

\therefore First number = 7, second number = 6, third number = 13

Product of this three numbers

$$= 6 \times 7 \times 13 = 546$$

23. (B) $3\frac{2}{3} + 7\frac{3}{5} - 8\frac{7}{10} - 2\frac{11}{15}$

$$= \frac{11}{3} + \frac{38}{5} - \frac{87}{10} - \frac{41}{15}$$

$$= \frac{110 + 228 - 261 - 82}{30}$$

$$= \frac{-5}{30} = \frac{-1}{6}$$

24. (C) $7x^2 + 5xy - 9y^2 - 4x^2 - 7xy + 5y^2 + 4y^2 - 3x^2 - 6xy$

$$= 7x^2 - 4x^2 - 3x^2 - 9y^2 + 5y^2 + 4y^2 + 5xy - 7xy - 6xy$$

$$= 7x^2 - 7x^2 - 9y^2 + 9y^2 - 2xy - 6xy$$

$$= 7x^2 - 7x^2 - 9y^2 + 9y^2 - 2xy - 6xy$$

$$= -8xy$$

25. (B) Given the ratio of A & B

$$\frac{5}{4} : \frac{5}{3} = \frac{5}{4} \times 12 : \frac{5}{3} \times 12$$

$$= 5 \times 3 : 5 \times 4$$

$$= 3 : 4 = 3x : 4x$$

$$\therefore \text{A's amount} = ₹ 3x \text{ \& B's amount} = ₹ 4x$$

$$\text{Given } 3x = ₹ 36,774$$

$$x = \frac{₹36,774}{3} = 12,258$$

$$\therefore \text{Total money} = ₹ (3x + 4x) = ₹ 7x$$

$$= ₹ 7 \times 12,258 = ₹ 85,806$$

MATHEMATICS - 2

26. (A) Let $a = 5 \in z$ & $b = 10 \in z$ then
 $a - b = 5 - 10 = -5 \in z$
 \therefore Subtraction of integers follow closure property
27. (A) $CDXXVIII = 428$, $CDXXIII = 423$, $CCCXLIII = 343$, $CCCII = 302$
 \therefore Option 'A' is in descending order
28. (C) Dividend = Divisor \times quotient + Remainder
 $10,00,000 = \text{divisor} \times 999 + 1$
 \therefore Divisor $\times 999$
 $= 10,00,000 - 1 = 9,99,999$
 \therefore Divisor $= \frac{9,99,999}{999} = 1001$
29. (B) The result is having more than 51 factors
 \therefore It is a composite number
 It is even number
30. (C)

$$\begin{array}{r} 247) 416(1 \\ \underline{247} \\ 169) 247(1 \\ \underline{169} \\ 78) 169(2 \\ \underline{156} \\ 13) 78(6 \\ \underline{78} \\ \textcircled{0} \end{array}$$

$$\begin{array}{r} 13) 663(51 \\ \underline{65} \\ 13 \\ \underline{13} \\ \textcircled{0} \end{array}$$

$$\text{HCF} = 13$$

$$13 \left| \begin{array}{l} 247, 416, 663 \\ \hline 19, 32, 51 \end{array} \right.$$

$$\therefore \text{LCM} = 13 \times 19 \times 32 \times 51$$

$$= 4,03,104$$

$$\therefore \text{LCM} + \text{HCF} = 4,03,104 + 13 = 4,03,117$$

31. (A, B, C, D)

$$\text{Sum of odd place numbers} = 5 + 8 + 3 + 7 + 9 + 6 + 4 = 42$$

$$\text{Sum of even place numbers} = 4 + 9 + 6 + 8 + 7 + 5 + 3 = 42$$

$$\therefore \text{The difference of their sums} = 42 - 42 = 0$$

Given number is divisible by 11

Option B:

$$7 + 5 + 3 + 8 + 6 + 4 + 9 = 42$$

$$5 + 8 + 3 + 7 + 9 + 6 + 4 = 42$$

\therefore Option 'B' is divisible by 11

Similarly option 'C' & option 'D' are also divisible by 11

32. (B, D)

$$\text{LCM of } 48, 32, 16, 24 \text{ \& } 12 = 96$$

$$\therefore \frac{-19}{48} = \frac{-38}{96}, \frac{-17}{32} = \frac{-51}{96},$$

$$\frac{-7}{16} = \frac{-42}{96}, \frac{-13}{24} = \frac{-52}{96}, \frac{-5}{12} = \frac{-40}{96}$$

$$\frac{-52}{96} < \frac{-51}{96} < \frac{-42}{96} < \frac{-40}{96} < \frac{-38}{96}$$

$$\text{i.e., } \frac{-13}{24} < \frac{-17}{32} < \frac{-7}{16} < \frac{-5}{12} < \frac{-19}{48}$$

$$\text{LCM of } 36, 24, 9, 6 \text{ and } 4 = 72$$

$$\frac{-23}{36} = \frac{-46}{72}, \frac{-17}{24} = \frac{-51}{72}, \frac{-7}{9} = \frac{-56}{72}, \frac{-3}{4} = \frac{-54}{72}$$

$$\frac{-5}{6} = \frac{-60}{72}$$

\therefore Ascending order is

$$\frac{-60}{72} < \frac{-56}{72} < \frac{-54}{72} < \frac{-51}{72} < \frac{-46}{72}$$

$$\text{i.e., } \frac{-5}{6} < \frac{-7}{9} < \frac{-3}{4} < \frac{-17}{24} < \frac{-23}{36}$$

33. (A, B, C)

Option 'A' is true because $2 + 3 = 5$

Option 'B' is true because $5 + 7 + 11 = 23$ which is an odd number

Option 'C' is true because

$3 \times 5 \times 11 = 165$ which is an odd number

Option 'D' is false because

$2 \times 5 \times 11 = 110$ which is even number

34. (C, D) A square and rhombus have equal sides

35. (A, B, C) Options A, B & C are true

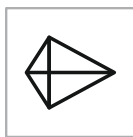
REASONING



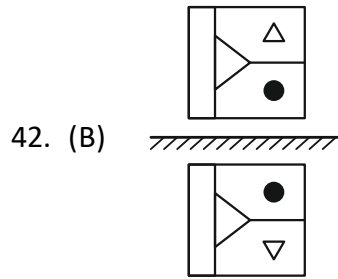
38. (D) ★ moves one step clockwise direction
● moves opposite side.



40. (C) Except option (C) remaining options are equal size triangles.

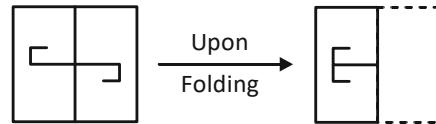


41. (A) $9 = 3 \times 3$
 $15 = 3 \times 5$
 $21 = 3 \times \underline{7}$ (A)
 $7 = 9 - 2$
 $7 = 12 - 5$
 $7 = 20 - \underline{13}$ (B)
 $4 = 2 \times 2$
 $16 = 2 \times 8$
 $24 = 2 \times \underline{12}$ (C)
 $A + B + C = 7 + 13 + 12 \Rightarrow 32$



43. (C) Among the options MOTOR is formed from the given word.

44. (A) The folded transparent sheet will appear as



45. (C) From the table, we find that Harsh is neither hardworking nor ambitious.

	Intelligent	Hard working	Honest	Ambitious
Kiran	✓	✓	✗	✓
Gopal	✓	✗	✗	✓
Harsha	✓	✗	✓	✗
Raghu	✗	✓	✓	✗
Jitendra	✗	✓	✓	✓

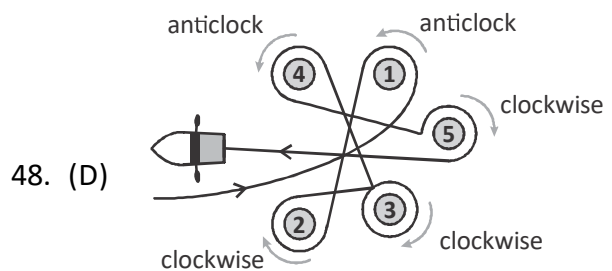
Hence, option (C) is correct.

CRITICAL THINKING

46. (A) Underneath the shelf well that one is a lot more shallower on B so therefore the correct answer is shelf A will definitely break first.

47. (B) From statement 2 alone we can get to know who lives in which state. A - Assam, B - Bihar.

D and E are already given, so only C is left out who will be living in Kashmir.



49. (C) Because 'Heroism' means great bravery and Synonyms is Courage.

50. (B)

