UIM
Unified International Mathematics Olympiad

UNIFIED INTERNATIONAL MATHEMATICS OLYMPIAD

> **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) $\dfrac{0.65 \times 0.65 \times 0.65 + 0.35 \times 0.35 \times 0.35}{0.65 \times 0.65 - 0.65 \times 0.35 + 0.35 \times 0.35}$

$= \dfrac{0.274625 + 0.042875}{0.4225 - 0.2275 + 0.1225}$

$= \dfrac{0.3175}{0.3175} = 1$

02. (B) $2 \times 3 \times 5 \times 7 \times 11 \times 13 \times \ldots\ldots = 30030 \times \ldots$

∴ The units digit = zero

03. (D) Given product of two numbers

= LCM × HCF

$\Rightarrow$ 264 × other number = 1320 × 12

∴ Other number = $\dfrac{1320 \times 12}{264} = 60$
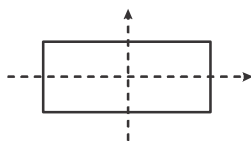
04. (A) Greatest 5 digit number = 99,999

Greatest 4 digit number = 9,999

∴ Number of 5 digit numbers

= 99,999 − 9,999 = 90,000

05. (B) LHS = $\dfrac{-1.11 \times -1.11 + 3.57 \times 3.57}{1.5129 + 5.4756}$

$= \dfrac{1.2321 + 12.7449}{6.9885}$

$= \dfrac{13.977}{6.9885} = 2$

06. (C) Given A : B = 6 : 5 & B : C = 4 : 1

LCM of B ratios = 20

$\therefore$ A : B = 6 × 4 : 5 × 4 = 24 : 20

B : C = 4 × 5 : 1 × 5 = 20 : 5

$\therefore$ A : B : C = 24 : 20 : 5 $\Rightarrow$ A : C = 24 : 5

07. (C) Area of rectangle

$= lb = 47\dfrac{2}{3}$ cm × $11\dfrac{2}{11}$ cm

$= \dfrac{143}{3} \times \dfrac{123}{11}$ cm^2

$= 533$ cm^2

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

09. (C) Let x = 19, then LHS of Option A

$= \dfrac{21}{3} - \dfrac{18}{5} = \dfrac{35 - 18}{5} = \dfrac{17}{5}$

RHS of Option A = $\dfrac{22}{4} - 1 = \dfrac{11}{2} - 1 = \dfrac{9}{2}$

Let x = 19 the LHS of Option B

$= \dfrac{21}{3} - \dfrac{20}{5} = 3$

RHS of Option B = $\dfrac{22}{4} + 1 = \dfrac{13}{2}$

LHS of Option B $\neq$ RHS of Option B

Let x = 19, the LHS of Option C = 3

RHS of Option C = $\dfrac{19 - 3}{4} - 1 = \dfrac{16}{4} - 1 = 3$

$\therefore$ LHS of Option C = RHS of Option C

10. (D) Perimeter of a triangle

$= \dfrac{a}{2} + \dfrac{b}{3} - \dfrac{c}{4} + \dfrac{a}{4} - \dfrac{b}{3} - \dfrac{c}{2} + \dfrac{a}{3} - \dfrac{b}{4} + \dfrac{c}{3}$

$= \dfrac{a}{2} + \dfrac{a}{4} + \dfrac{a}{3} - \dfrac{b}{4} - \dfrac{c}{4} - \dfrac{c}{2} + \dfrac{c}{3}$

$= \dfrac{6a + 3a + 4a}{12} - \dfrac{b}{4} - \dfrac{3c - 6c + 4c}{12}$

$\Rightarrow \dfrac{13a}{12} - \dfrac{b}{4} - \dfrac{5c}{12} \Rightarrow \dfrac{13a - 3b - 5c}{12}$ cm

11. (D) 3 : 4 = $\dfrac{3}{4}$, 5 : 8 = $\dfrac{5}{8}$,

11 : 12 = $\dfrac{11}{12}$, 15 : 16 = $\dfrac{15}{16}$

$\therefore$ LCM of denominators = 48

$\therefore \dfrac{3}{4} = \dfrac{3}{4} \times \dfrac{12}{12} = \dfrac{36}{48}$

$\dfrac{5}{8} = \dfrac{5}{8} \times \dfrac{6}{6} = \dfrac{30}{48}$

$\dfrac{11}{12} = \dfrac{11}{12} \times \dfrac{4}{4} = \dfrac{44}{48}$

$\dfrac{15}{16} = \dfrac{15}{16} \times \dfrac{3}{3} = \dfrac{45}{48}$

$\therefore \dfrac{45}{48} > \dfrac{44}{48} > \dfrac{30}{48} > \dfrac{36}{48}$

$\therefore \dfrac{45}{48}$ is greatest $\Rightarrow$ 15 : 16 is greatest.

12. (D) 320 is divisible by 8

$\therefore$ 2345678987654320 is divisible by 8

$\therefore$ 2345678987654325

= 2345678987654320 + 5

$\therefore$ Remainder = 5

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

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

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 +......+ 50) + (46 + 47 + ...+ 99) = 1275 + 3915

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

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

$\therefore$ 1 + 2 + 3 + ...+ 99 = 5190 − 240 = 4950

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

17. (C) The required numbers are 18 & 8

because 18 × 8 = 144 & 18 + 8 = 26

$\therefore$ larger number = 18

18. (A) Smallest odd composite number = 9

$\therefore$ 41 + P is divisible by 9

$\therefore$ 45 is divisible by 9

$\therefore$ 41 + P = 45

P = 4

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

Age of Raju = $55y - 4y = 51$ year

Age of Babu = $51y - 6y = 45$ years

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 × 7 & 78 = 6 × 13

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

Product of this three numbers

= 6 × 7 × 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

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

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

$= 3 : 4 \qquad = 3x : 4x$

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

Given $3x$ = ₹ 36,774

$x = \dfrac{₹36,774}{3}$ = 12,258

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

= ₹ 7 × 12,258 = ₹ 85,806

26. (A) Let a = 5 ∈ z & b = 10 ∈ z then

a − b = 5 − 10 = −5 ∈ z

∴ Subtraction of integers follow closure property

27. (A) CDXXVIII = 428, CDXXIII = 423, CCCXLIII = 343, CCCII = 302

∴ Option 'A' is in descending order

28. (C) Dividend = Divisor × quotient + Remainder

10,00,000 = divisor × 999 + 1

∴ Divisor × 999

= 10,00,000 − 1 = 9,99,999

∴ Divisor $= \dfrac{9,99,999}{999} = 1001$

29. (B) The result is having more than 51 factors

∴ It is a composite number

It is even number

30. (C)

```
247) 416 (1
     247
     ‾‾‾
     169) 247 (1
          169
          ‾‾‾
          78) 169 (2
              156
              ‾‾‾
              13) 78 (6
                  78
                  ‾‾
                  (0)
```

```
13) 663 (51
    65
    ‾‾
    13
    13
    ‾‾
    (0)
```

HCF = 13

```
13 | 247, 416, 663
   |‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾
     19, 32, 51
```

∴ LCM = 13 × 19 × 32 × 51

= 4,03,104

∴ LCM + HCF = 4,03,104 + 13 = 4,03,117

MATHEMATICS - 2

31. (A, B, C, D)

Sum of odd place numbers = 5 + 8 + 3 + 7 + 9 + 6 + 4 = 42

Sum of even place numbers

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

∴ 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

∴ Option 'B' is divisible by 11

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

32. (B, D)

LCM of 48, 32, 16, 24 & 12 = 96

∴ $\dfrac{-19}{48} = \dfrac{-38}{96}, \dfrac{-17}{32} = \dfrac{-51}{96},$

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

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

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

LCM of 36, 24, 9, 6 and 4 = 72

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

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

∴ Ascending order is

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

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

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 × 5 × 11 = 165 which is an odd number

Option 'D' is false because

2 × 5 × 11 = 110 which is even number

34. (C, D) A square and rhombus have equal sides
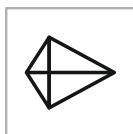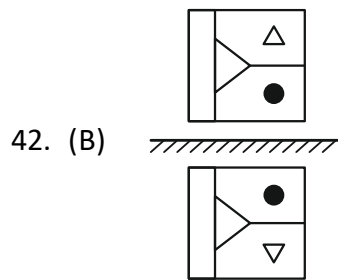
35. (A, B, C) Options A, B & C are true

REASONING

36. (C)

37. (B) S T A R

38. (D) ★ moves one step clockwise direction

● moves opposite side.

39. (B)

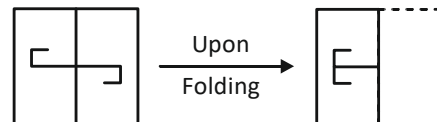**40.** (C) Except option (C) remaining options are equal size triangles.

41. (A) 9 = 3 × 3

15 = 3 × 5

21 = 3 × **7**   .... (A)

7 = 9 – 2

7 = 12 – 5

7 = 20 – **13**   .... (B)

4 = 2 × 2

16 = 2 × 8

24 = 2 × **12**   .... (C)

A + B + C = 7 + 13 + 12 ⇒ 32

42. (B)

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.

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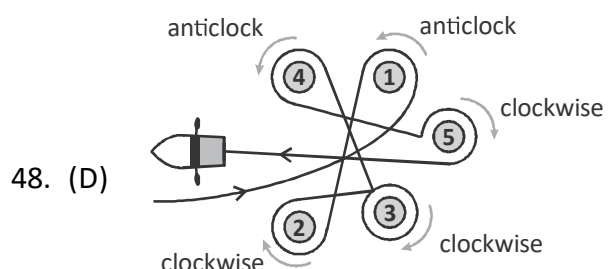
49. (C) Because 'Heroism' means great bravery and Synonyms is Courage.

50. (B)