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UIMO
Unified International Mathematics Olympiad

UNIFIED INTERNATIONAL MATHEMATICS OLYMPIAD

CLASS - 7

Question Paper Code : 4P104

KEY

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

SOLUTIONS

MATHEMATICS – 1 (MCQ)

01. (A) Area = $9 \times 1\ cm^2 + 7 \times 1\ cm^2 + 5 \times 1\ cm^2 = 21\ cm^2$

02. (C) Given n || t

$\Rightarrow a + 70^o = 180^o \Rightarrow \angle a = 110°$

$l \,||\, m \Rightarrow b + 130° = 180 \Rightarrow \angle b = 50°$

$70° + \angle b = \angle c$

$\Rightarrow 70° + 50° = \angle c$

$\angle c = 120°$

$\angle a + \angle b + \angle c = 110^o + 50^o + 120^o = 280^o$

03. (A) $\frac{2(x+4)+3(1+2x)}{4} = 0$

$2x + 8 + 3 + 6x = 0$

$8x = -11$

$x = -\frac{11}{8}$

04. (A) $x^2 - 2x - x(x+1) = x^2 - 2x - x^2 - x$

$= -3x = -3 \times 2025 = -6075$

05. (A) Given $\frac{3x}{4} + x + \frac{x}{2} = 180°$

$\frac{3x + 4x + 2x}{4} = 180°$

$9x = 180° \times 4$

$x = 80°$

06. (A) $\frac{3}{4}$ × S.P = 90% of C.P

(Since loss = 10%)

$\Rightarrow$ S.P = 120% of C.P

$\Rightarrow$ S.P = 1.2 of C.P

$\therefore$ Profit % = $\frac{1.2\text{C.P} - \text{C.P}}{\text{C.P}} \times 100\%$

= 0.2 × 100 = 20%

07. (A) $\angle a = 40$ & $x + 100° = 180°$

$x = 180° - 100° = 80°$

But $\angle x + \angle a + \angle y = 180°$

$40° + 80° + \angle y = 180°$

$y = 180° - 120° = 60°$

08. (B) Given B : C : D = 2 : 3 : 7 = $2x : 3x : 7x$

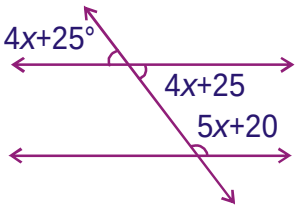
$\therefore$ $60° + 2x + 3x + 7x = 360°$

$12x = 360° - 60°$

$x = \frac{300°}{12} = 25°$

$C = 3x = 3 \times 25° = 75°$

09. (A) Given $l \parallel m \Rightarrow 4x + 25° + 5x + 20° = 180°$



$9x + 45° = 180°$

$9x = 180° - 45°$

$9x = 135°$

$x = \frac{135°}{9} = 15°$

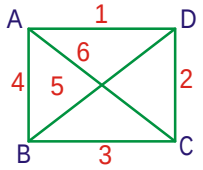
10. (A)

$\frac{(67.542)^2 - (32.458)^2}{7000 - 3491.6} = \frac{(67.542 + 32.458)(67.542 - 32.458)}{3508.4}$

$= \frac{100 \times 35.084}{3508.4}$

$= \frac{3508.4}{3508.4} = 1$

11. (A) Six line segments are formed with 4 points such that no three points are collinear



12. (B) $4^{3.5} : 2^5 = (2^2)^{3.5} : 2^5$

$= 2^7 : 2^5$

$= 2^5 \times 2^2 : 2^5$

= 4 : 1

13. (B) Required value = $1000^2 + 345^2 + 655^2 - 2 \times 1000 \times 345 + 2 \times 345 \times 655 - 2 \times 1000 \times 655$

= 1000000 + 119025 + 429025 – 690000 + 451950 – 1310000

= 0

14. (A) $(1^3 + 2^3 + 3^3 + ... + 7^3)^{\frac{3}{2}} = (1 + 8 + 27 + 64 + 125 + 216 + 343)^{-3/2}$

$= (784)^{\frac{3}{2}} = 28^{2 \times \frac{3}{2}}$

$= 28^3 = 21952$

15. (D) Given $8x + 13x + 45° + 17x + 40° = 180°$

$38x + 85° = 180°$

$38x = 180° - 85°$

$38x = 95°$

$x = \frac{95°}{38} = \frac{5°}{2} = 2.5°$

$\therefore 8x = 8 \times 2.5° = 20°$

$13x + 45° = 13 \times 2.5° + 45° = 32.5° + 45° = 77.5°$

$17x + 40° = 17 \times 2.5° + 40° = 42.5° + 40° = 82.5°$

$\therefore$ Required sum = 82.5° + 20° = 102.5°

16. (A) Given a = C = 1

Given ab, ba, cd & dc are primes.

$\therefore$ ab = 13 & ba = 31

cd = 17 & dc = 71

$\therefore \frac{ab+ba}{cd+dc}=\frac{13+31}{17+71}=\frac{44}{88}=\frac{1}{2}$

17. (D) Given AB : BC = 1 : 2 and BC : CD = 5 : 8

$\therefore$ AB : BC : CD = 5 : 10 : 16 = $5x$: $10x$: $16x$

$\therefore$ AB : BD = $5x$: ($10x$ + $16x$) =

$5x:26x=5:26$

18. (C) $144-\frac{1024}{16}\times 32-123$

$= 144 - 2048 - 123 = -2027$

19. (D) Const.: AQ||PO

$\therefore$ $\angle OPQ + \angle PQA = 180°$

[$\because$ Sum of the interior angles]

$\therefore$ $\angle PQA = 70°$

But $\angle AQR = \angle QRS$

[$\because$ Alternative angles]

$\therefore$ $\angle PQA + \angle PQR = 130°$

$70° + \angle PQR = 130°$

$\angle PQR = 60°$

20. (C) Given profit = ₹ 175

Let CP be ₹ x.

Given 14% of x = ₹ 175

$\frac{14}{100}\times x$ = ₹ 175

x = ₹ 1250

$\therefore$ CP = ₹ 1250

SP = CP + P = 1250 + 175 = 1425

21. (D) Given $\sqrt{l^2+b^2}=2b$

Squaring on both sides

$l^2 + b^2 = 4b^2$

$l^2 = 4b^2 - b^2$

$l^2 = 3b^2$

$l=\sqrt{3b^2}=\sqrt{3}b$

$\therefore \frac{l}{b}=\sqrt{3}$

$\therefore l:b=\sqrt{3}:1$

22. (A) $\angle ABD = 180° - 100° = 80°$

In ΔABD, AB = AD $\angle ADB = \angle ABD = 80°$

In ΔACD, $x + 25° = 80°$

$x = 80° - 25° = 55°$

23. (C) In ΔRST, $27° + 100° + \angle S = 180°$

$\angle S = 180° - 127° = 53°$

But $\angle P = \angle S$ [$\because$ Alternative angles]

$\therefore$ $\angle P = 53°$

24. (B) Let the two equal angles be 'x'

$x + x = 180°$

$2x = 180°$

$x = 90°$

$\therefore$ Each equal angle = 90°

25. (B) $\frac{5}{11}<\frac{1}{2}<\frac{3}{4}<\frac{6}{7}$

$\frac{-6}{7}<\frac{-3}{4}<\frac{-1}{2}<\frac{-5}{11}$

26. (D) 360°

27. (A) LHS = $\left(\frac{13x}{4}-\frac{5}{14}y-\frac{13z}{10}\right)$

$-\left(\frac{-11}{2}x-\frac{13y}{7}-\frac{12z}{5}\right)$

$=\frac{13x}{4}-\frac{5}{14}y-\frac{13z}{10}+\frac{11x}{2}+\frac{13y}{7}+\frac{12z}{5}$

$=\left(\frac{13x}{4}+\frac{11x}{2}\right)+\left(\frac{13y}{7}-\frac{5y}{14}\right)+\left(\frac{12z}{5}-\frac{13z}{10}\right)$

$=\left(\frac{13x+22x}{4}\right)+\left(\frac{26y-5y}{14}\right)+\left(\frac{24z-13z}{10}\right)$

$=\frac{35x}{4}+\frac{21y}{14}+\frac{11z}{10}$

$=\frac{35x}{4}+\frac{3y}{2}+\frac{11z}{10}$

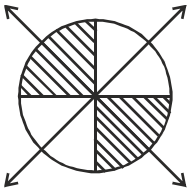
28. (B) $\angle ACB = 45°$

29. (D) $\frac{26}{100}\times 450 - x = \frac{12}{100}\times 150$

$117 - x = 18$

$x = 99$

30. (C) It has two lines of symmetry



MATHEMATICS - 2 (MAQ)

31. (A,B,C,D) $-\frac{1}{4}=0.25,\ -\frac{1}{3}=-0.33$

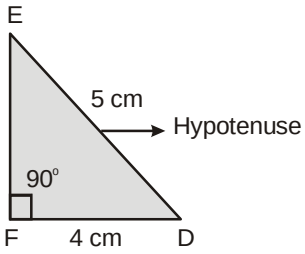
$-\frac{7}{24}$ = – 0.29 lies between $-\frac{1}{4}$ and $-\frac{1}{3}$

$-\frac{13}{48}$ = – 0.27 lies between $-\frac{1}{4}$ and $-\frac{1}{3}$

$-\frac{5}{16}$ = – 0.312 lies between $-\frac{1}{4}$ and $-\frac{1}{3}$

$-\frac{31}{120}$ = –0.258 lies between $-\frac{1}{4}$ and $-\frac{1}{3}$

32. (A,B,C,D) ΔDEF is as shown in the figure.



By Pythagoras' theorem,

$EF = \sqrt{DE^2 - DF^2}$

$= \sqrt{25-16} = \sqrt{9} = 3$ cm

By angle sum property,

$\angle D + \angle E = 180° - \angle F$

$= 180° - 90° = 90°$

33. (A,B,C,D) All the given statements about the triangle are correct.

34. (B,C) $2^{2025} = 2 \times 2 \times 2 \times ..... \times 2$ (2025 times)

It is even number [$\because$ Product of two even numbers]

It is composite number.

35. (B,C,D) $\frac{7x}{2}-\frac{5x}{2}-\frac{20x}{3}=10$

$\frac{21x-15x-40x}{6}=10$

$-\frac{34x}{6}=10$

$\frac{17x}{3}=-10$

$x=-10\times\frac{3}{17}=-\frac{30}{7}$

$\therefore$ Option (A) is false, rest of all true.

REASONING

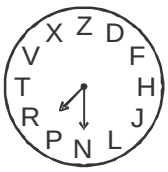
36. (B) The first figure rotates 90° ACW, completes the figure and fills interchange.

37. (C) Every alternate figure has 4 and 2 dots respectively and two lines forming 90° angle (line ¬) is added at the end in CW direction in each step to form a shape as in the last square.

38. (D) (3 × 4) – 8 = 4; (2 × 5) – 4 = 6; (4 × 5) – 9 = 11

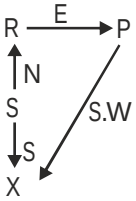
39. (C) Number of lines inside the square and outside at the bottom are the same unlike the others.

40. (C)



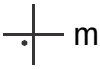
The hour hand will be between P and R at 7: 30.

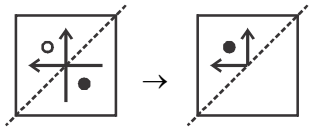
41. (D)

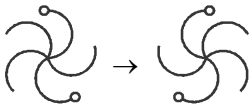


X is in the south-west direction of P.

42. (B) 

So, the code for  must be **SK**

43. (B) 

44. (D) 

45. (A) Bottom layer : (8 + 1) = 9;

Middle layer : (4 + 1) = 5;

Top layer = 1

Total : 9 + 5 + 1 = 15

CRITICAL THINKING

46. (B)

Name	Name	Lives on
Suma	Singer	5th floor
Pavitra	Doctor	4th floor
Meghana	Engineer	3rd floor
Nikita	Artist	2nd floor

47. (D) From 1 and 2 statements 6 is not the correct number.

From 4th statement 7,3, and 8 are not the correct number.

From 5th statement we conclude that "0" is the correct number but in wrong position. So, "0" occupies 1st position (since 0 is one of the numbers in the wrong place from statement 3).

From 1st statement we conclude that 2 is the 3rd digit.

0 _ 2

- From statement 2, since 1 or 4 is in the wrong place, we need to determine which.
- 1 cannot be in the second place. So, 4 occupies 2nd position.

Therefore, the digits are 042.

48. (A)

	Mr. Red	Mr. Blue	Mr. Green	Mr. Yellow
Red	✘			
Blue	✘	✘		
Green		✘	✘	
Yellow			✘	✘

(A) Mr. Red - Yellow, Mr. Blue - Red, Mr. Green - Blue, Mr. Yellow - Green

- Mr. Red (Yellow) - Valid
- Mr. Blue (Red) - Valid
- Mr. Green (Blue) - Valid
- Mr. Yellow (Green) - Valid

(B) Mr. Red - Green, Mr. Blue - Yellow, Mr. Green - Red, Mr. Yellow - Blue

- Mr. Red (Green) - Valid
- Mr. Blue (Yellow) - Valid
- Mr. Green (Red) - Valid
- Mr. Yellow (Blue) - Invalid (Mr. Blue cannot sit on Blue)

(C) Mr. Red - Blue, Mr. Blue - Green, Mr. Green - Yellow, Mr. Yellow - Red

- Mr. Red (Blue) - Invalid (Mr. Red cannot sit on Blue)

(D) Mr. Red - Yellow, Mr. Blue - Green, Mr. Green - Red, Mr. Yellow - Blue

- Mr. Red (Yellow) - Valid
- Mr. Blue (Green) - InValid
- Mr. Green (Red) - Valid
- Mr. Yellow (Blue) - Valid

Therefore, the correct answers :

(A) Mr. Red - Yellow, Mr. Blue - Red, Mr. Green - Blue, Mr. Yellow - Green

49. (D) M × N – C + F

50. (D)