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UIMO
Unified International Mathematics Olympiad

UNIFIED INTERNATIONAL MATHEMATICS OLYMPIAD (UPDATED)

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	B	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° = 180° $\Rightarrow \angle a = 110°$

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

$70° + \angle b = \angle c$

$\Rightarrow 70° + 50° = \angle c$

$\angle c = 120°$

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

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 = $2x : 3x : 7x$

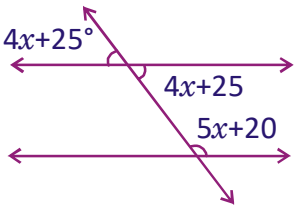
$\therefore$ $60° + 2x + 3x + 7x = 360°$

$12x = 360° - 60°$

$x = \frac{300°}{12} = 25°$

C = $3x = 3 \times 25° = 75°$

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



$9x + 45° = 180°$

$9x = 180° - 45°$

$9x = 135°$

$x = \frac{135°}{9} = 15°$

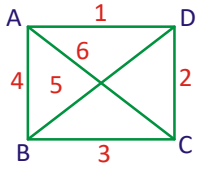
10. (A)

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

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

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

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

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

$= 28^3 = 21952$

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

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

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

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

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

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

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

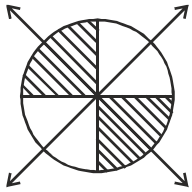
28. (B) $\angle ACB = 45°$

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) $-\frac{1}{4}=0.25,\ -\frac{1}{3}=-0.33$

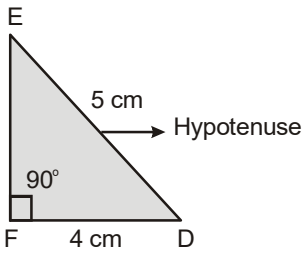
$-\frac{7}{24}$ = – 0.29 lies between $-\frac{1}{4}$ and $-\frac{1}{3}$

$-\frac{13}{48}$ = – 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

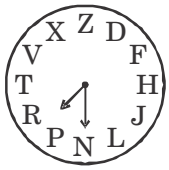
36. (B) The first figure rotates 90° ACW, completes the figure and fills interchange.

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

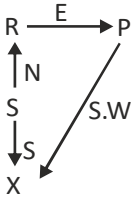
39. (C) Number of lines inside the square and outside at the bottom are the same unlike the others.

40. (C)



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

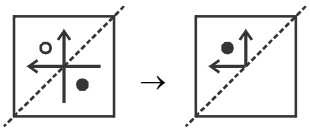
41. (D)

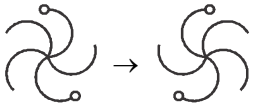


X is in the south-west direction of P.

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. (B) In July 2018, the month had 31 days.

There were four Wednesdays and four Saturdays.

The first day of July 2018 was a Sunday.

If you count from there:

- 7th, 14th, 21st and 28th July are all Saturdays.

So, 28th July 2018 was a Saturday

49. (D) M × N – C + F

50. (D)