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UIMO
Unified International Mathematics Olympiad

UNIFIED INTERNATIONAL MATHEMATICS OLYMPIAD (UPDATED)

CLASS - 6

Question Paper Code : UM9269

KEY

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

EXPLANATIONS

MATHEMATICS - 1

01. (B) $\text{LHS} = \frac{18}{5}\times\frac{18}{5}-2\times\frac{18}{5}\times\frac{3}{5}+\frac{9}{25}$

$= \frac{324-108+9}{25}$

$= \frac{225}{25} = 9$

02. (D) $\text{LHS} = \left(5x^2-\frac{x^2}{2}-2x^2\right)+\left(-\frac{x}{3}+\frac{x}{2}+\frac{x}{5}\right)$

$+\left(\frac{5}{2}-\frac{1}{3}-\frac{1}{6}\right)$

$= \left(\frac{10x^2-x^2-4x^2}{2}\right)+\left(\frac{-10x+15x+6x}{30}\right)$

$+\left(\frac{15-2-1}{6}\right)$

$= \left(\frac{5x^2}{2}+\frac{11x}{30}+2\right)$

03. (C) Perimeter of the garden = $2(l + b)$

= 2(102.5 + 75.5)m

= 356 meter

Length of the required

= 5 × 356 m = 1780 metre

∴ Total cost for barbed wire

= 1780 × ₹ 22.5 = ₹ 40,050

04. (C) Saving for 3 weeks = ₹ $21x$

Expendature for 3 weeks = ₹ $3y$

∴ Total income for 3 weeks

= ₹ $21x$ + ₹ $3y$ = ₹ $3(7x + y)$

05. (C) Given triangle perimeter

= 17 cm + 20 cm + 23 cm = 60 cm

Perimeter of option 'A' triangle

= 19 cm + 20 cm + 25 cm = 64 cm

Perimeter of option 'B' square

= 4 × 14 cm = 56 cm

Perimeter of option 'C' rectangle

= 2(17.5 + 12.5)cm = 2 × 30 = 60 cm

Perimeter of option 'D' triangle

= 3 × 18 cm = 54 cm

06. (C) LHS = –1 – (–1) – (–1) – (–1) – (–1) – (–1) – (–1)

= –1 + 1 + 1 + 1 + 1 + 1 + 1

= 5

07. (B) LHS = $\frac{3\times5+1}{16}+\frac{2\times5-3}{7}=\frac{16}{16}+\frac{7}{7}=2$

RHS = $\frac{5+3}{8}+\frac{5-1}{4}=\frac{8}{8}+\frac{4}{4}=2$

∴ x = 5 is the solution of option 'B'

08. (B) Required number

= LCM of 24, 32, 36 & 54 – 5

= 864 – 5 = 859

09. (C) Required quotient

$$=\frac{\text{Dividend}-\text{Quotient}}{\text{Divisor}}$$

$$=\frac{5333348-1234}{4321}$$

$$=\frac{5332114}{4321}=1234$$

10. (B) $\frac{1}{105}$ and $\frac{2}{105}$ are the factors of the given fractions (OR)

∴ $\frac{2}{105}$ is the heighest common factor of the given fractions.

HCF of the fractions

$$=\frac{\text{HCF of numerator}}{\text{LCM of denominator}}=\frac{2}{105}$$

11. (C) Sum of 5 sides = 1 metre = 100 cm

∴ Length of each side = $\frac{100\,\text{cm}}{5}$ = 20 cm

12. (C) LHS = $\frac{24}{5}-\frac{1}{2}\div\frac{5}{4}+\frac{3}{5}\times\frac{25}{6}-\frac{733}{30}$

$$=\frac{24}{5}-\frac{1}{2}\times\frac{4}{5}+\frac{5}{2}-\frac{733}{30}$$

$$=\frac{144-12+75+-733}{30}$$

$$=\frac{-526}{30}=-17\frac{8}{15}$$

13. (A) Cost of one pen = $\frac{₹\,432}{12}$ = ₹ 36

Cost of one book = $\frac{₹\,756}{9}$ = ₹ 84

The ratio of cost of book & pen

= ₹ 84 : ₹ 36

= 7 : 3

14. (C) 542.75 ×542.75 + 2 × 542.75 × 457.25 + 457.25 × 457.25

= 2,94,577.5625 + 4,96,344.875 + 2,09,077.5625

= 10,00,000

15. (C) Given 1 + 2 + 3 + 4 + ...+ 100 = 5050

Given 96 + 97 + 98 + 99 + 100 + 101 + ... + 200 = 15,540

= 490 + 101 + 102 + 103 + ... + 200

= 15,540

∴ 101+ 102 + 103 + ...+200

= 15540 – 490

101 + 102 + 103 + ...+ 200 = 15050

∴1 + 2 + 3 + ...+ 100 + 101 + 102 + ... + 200 = 5050 + 15050 = 20100

16. (A) CCX + CCXLIX = 210 + 249 = 459 = CDLIX

17. (D) There are 1000 integers between –1000 and 1

Between zero and 100 there are 99 integers

∴ Total integers between –1000 to 100

= 1000 + 99 = 1099

18. (A) Perimeter = 2(l + b)

= 2(50 + 35) cm = 170 cm

∴ The ratio of length and perimeter

= 50 cm : 170 cm

= 5 : 17

19. (B) Number of edges of base

$$= \frac{\text{Total edges}}{2} = \frac{10}{2} = 5$$

∴ Required pyramid base shape = Pentagon

20. (D) Let the possible numbers are

18, 24, 42, 81

If 18 + 63 = 81

∴ 18 is the required number

∴ Sum of the digits = 1 + 8 = 9

21. (D) The line segments are AB, AC, AD, AE, AF, BC, BD, BE, BF, CD, CE, CF, DE, DF, & EF

∴ Total line segment = 15

22. (A) Number of flowers in the basket

= 18 × 8 = 144

23. (B) 98760 is the required number which is having 5 different digits and divisible by 8

24. (A) Zero is the additive identity of whole numbers

25. (C) Smallest prime number between 20 and 29 = 23

Greatest composite number between 20 and 29 = 28

∴ Required product = 23 × 28 = 644

26. (A) LHS

$$= \frac{5.29 \times 2.3 + 11.56 \times 3.4 + 18.49 \times 4.3 - 100.878}{5.29 + 11.56 + 18.49 - 7.82 - 14.62 - 9.89}$$

$$= \frac{12.167 + 39.304 + 79.507 - 100.878}{3.01}$$

$$= \frac{30.1}{3.01} \times \frac{10}{10} = \frac{30.1}{30.1} \times 10 = 10$$

27. (B) Let the length & breadth of the rectangle be l & b

Given L = 2l & B = 2b

∴ New rectangle area = LB = 4lb

Difference = 4lb – lb = 3lb

28. (B) Given the ratio of copper and zink

= 5 : 7 = 5x : 8x

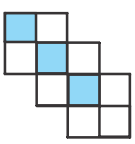
Given 5x = 105 g

$$x = \frac{105}{5} = 21 \text{ g}$$

∴ Weight of the alloy

= 5x + 8x = 13x = 13 × 21 g

= 273 g

29. (A)  $= \frac{3}{10} = 0.3$

30. (B) ∠AOB = ∠BOC – ∠AOC

= 153° – 90° = 63°

MATHEMATICS - 2

31. (A, C, D)

Present age of Karthik may be 15 years, (or) 50 years (or) 85 years.

If his present age is 15 years then after

89 – 15 = 74 years

He will be 89 years

If his present age is 50 years then after

89 – 50 = 39 years

He will be 89 years

If his present age is 85 years then after

89 – 85 = 4 years

He will be 89 years

32. (A, B, C, D)

Sum of the digits = 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 1 + 5 + 3 + 4 + 8 + 6 + 9 + 7 + 8 + 7 + 5 = 108 which is divisible by 9 & 3.

$\therefore$ Given number is divisible by 3 & 9

Given number units place is 5 $\Rightarrow$ It is divisible by 5

Given number last two digits are divisible by 25

Sum of odd place numbers = 5 + 8 + 9 + 8 + 3 + 1 + 8 + 6 + 4 + 2 = 54

Sum of even place numbers = 7 + 7 + 6 + 4 + 5 + 9 + 7 + 5 + 3 + 1 = 54

Difference of this sum = 54 – 54 = 0 $\Rightarrow$ Given number is divisible by 11

$\therefore$ Given numbe is divisible by 11 × 5 = 55

Given number is divisible by 25

Given number is divisible by 3 × 5 = 15

Given number is divisible by 9 × 5 = 45

33. (A, C, D)

Option 'A' :

LCM of 8, 4, 32 and 16 is 32

$\therefore \quad \frac{-7}{8}=\frac{-28}{32},\frac{-3}{4}=\frac{-24}{32},\frac{-11}{16}=\frac{-22}{32}$

$\therefore \quad \frac{-28}{38}<\frac{-24}{32}<\frac{-23}{32}<\frac{-22}{32}$

$\therefore$ Option 'A' is in the ascending order.

Option 'B' :

LCM of 5, 30, 10 and 15 is 30

$\therefore \quad \frac{-2}{5}=\frac{-12}{30},\frac{-7}{10}=\frac{-21}{30},\frac{-11}{15}=\frac{-22}{30}$

$\therefore \quad \frac{-12}{30}>\frac{-17}{30}>\frac{-21}{30}>\frac{-22}{30}$

$\therefore$ Option 'B' is in the descending order

Option 'C' :

LCM of 21, 42, 7 and 14 is 42

$\therefore \quad \frac{-17}{21}=\frac{-34}{42},\frac{-5}{7}=\frac{-30}{42},\frac{-9}{14}=\frac{-27}{42}$

$\therefore \quad \frac{-34}{42}<\frac{-31}{42}<\frac{-30}{42}<\frac{-27}{42}$

$\therefore$ Option 'C' is in ascending order

Option 'D' :

LCM of 6, 3, 18 and 19 is 18

$\frac{-5}{6}=\frac{-15}{18},\frac{-2}{3}=\frac{-12}{18},\frac{7}{9}=\frac{14}{18}$

$\therefore \quad \frac{-15}{18}<\frac{-12}{18}<\frac{-11}{18}<\frac{14}{18}$

$\therefore$ Option 'D' is in ascending order

34. (A, B, C, D)

$\frac{1}{2}+\frac{1}{3}+\frac{1}{6}=\frac{3+2+1}{6}=\frac{6}{6}=1$

2 – 2 + 1 = 1

31.7 – 36.6 + 5.9 = 37.6 – 36.6 = 1

$\frac{-3}{2}-\frac{5}{2}+5=\frac{-3-5+10}{2}=\frac{2}{2}=1$

35. (A, B, C)

Options A, B and C are true.

REASONING

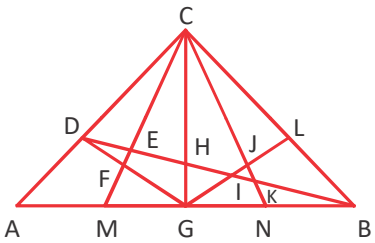
36. (B) Every time the difference between two letters increased by 2, 3, 4, 5, 6 letters respectively.

B C D E F G H I J K L M N O P Q R S T U V W X Y Z A
2 3 4 5 6

37. (C) Except 3rd image remaining images have same number of sides inner and outer shape.

38. (C) Second shape in Every pair is a combination of a letter and its vertical, horizontal flip the letter.

39. (D)



ABC, ACM, MCG, GCN, NCB, ACG, ACN, MCN, MCB, GCB, DEF, GDH, GDI, JKI, ILB, MFG, NKB, BCD, ABD, DHC, DEC, CJL, CEH, CDE, CDH, CDK

40. (B) The arrow pointing down represents T, 2 triangles represents S.

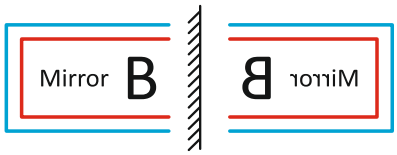
41. (B) 9 + 4 ÷ 2 × 17 – 16 = 27

9 + 2 × 17 – 16 = 27

9 + 34 – 16 = 27

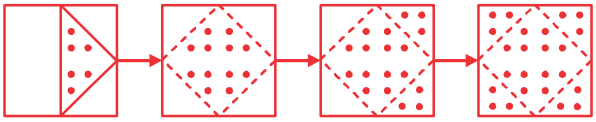
9 + 18 = 27 (Correct)

42. (C)



43. (A) Bicycle, Bifocal , **Bishop**, Bitter

44. (C)

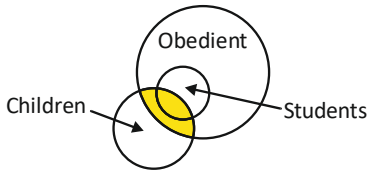


45. (D) The numbers arranged in descending order are 4, 3, 2, 1.

Now since 1st and 3rd cards have been interchanged, 3rd card would be the one which is now in the first place which is 4.

CRITICAL THINKING

46. (A) First option says that students are obedient and that some children are students. Therefore some children which are students will be obedient.



47. (C) From 2nd scale 1 triangle = 5 squares

2 hexagons = 6 squares

1 hexagon = 3 squares

3 hexagons = 9 squares

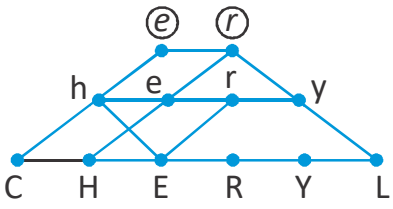
2 triangles = 10 squares

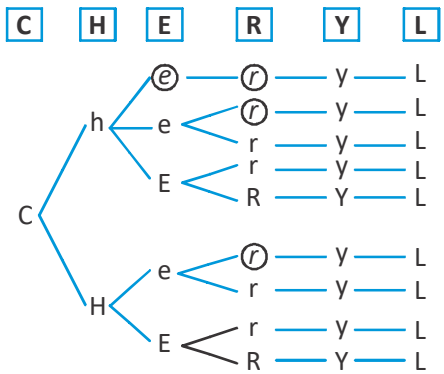
Hence, 1 square is need to balance the 3rd scale.

48. (B) Statement 3 and 4 that together prove the given sentence is correct.

49. (B) The diameter of the left wheel is less than right wheel, with 1 rotation of right wheel results more rotation (speed) of left wheel. So, (B) is the right answer.

50. (D) Use a tree diagram to list each path. To simplify the listing, the midle row uses lower case letters and the top row uses circled italicized letters in a different font. Trace each path that starts at C and leads to L.





There are 9 paths that trace her name.