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UIMO
Unified International Mathematics Olympiad

UNIFIED INTERNATIONAL MATHEMATICS OLYMPIAD (UPDATED)

CLASS - 7
Question Paper Code : UM9279

KEY

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

EXPLANATIONS

MATHEMATICS - 1

1. (D) $x = 60°$ [$\because$ corresponding angles]
   $x + y = 180°$
   $y = 180° - 60° = 120°$
2. (C) Let the other number be x
   Given $-36 + x = 23$
   $x = 23 + 36 = 59$
3. (D) $10^2 = 8^2 + 6^2 \Rightarrow$ 6cm, 8cm and 10cm are the sides of a right angled triangle
   $\therefore$ Area of right angled triangle = $\frac{1}{2}$ × product of perpendiculars
   $= \frac{1}{2} \times 6 \text{ cm} \times 8 \text{ cm} = 24 \text{ cm}^2$
4. (B) Given in ΔABC, $AB = AC \Rightarrow \angle C = \angle B = 50°$
   $\therefore \angle A = 180° - \angle B - \angle C = 80°$
5. (A) SSS criterion is used to construct equilateral triangle
6. (D) If $\frac{x}{y} < 1 \Rightarrow \frac{y}{x} > 1$

7. (C) Sum of first ten composite numbers = 112

Mean of sum of first ten composite numbers = 112 / 10 = 11.2

8. (B) To construct a triangular pyramid it is required 4 equilateral triangles

9. (B) $x + y + y + z + z + x = 8 + 5 + 7 = 20$

$2x + 2y + 2z = 20$

$2(x + y + z) = 20$

$x + y + z = \frac{20}{2} = 10$

$8 + z = 10$

$z = 10 - 8 = 2$

10. (A) Let CP of each article be ₹x

$\therefore$ CP of 12.5 article = ₹$12.5x$

Given SP of 10 article = ₹$12.5x$

$\therefore$ SP of 12.5 article $= \frac{₹12.5x}{10}$

= ₹$1.25x$

$\therefore$ Gain = SP – CP = $1.25x - x = 0.25x$

$\therefore$ Gain percentage

$\frac{\text{Gain}}{\text{CP}} \times = \frac{₹0.25x}{x} \times 100 = 25\%$

11. (A) Option 'A' is a pentagon but remaining three options are quadrilaterals

12. (D) Given (4x – 7) cm = (2x + 5) cm

4x – 2x = 5cm + 7 cm

2x = 12 cm

x = 6 cm $\Rightarrow$ 2x + 5 = 17 cm

13. (D) Middle odd number = $\frac{55}{5} = 11$

Next odd number = 11 + 2 = 13

Largest odd number = 13 + 2 = 15

14. (A) Let principal be ₹ x

Amount = $\frac{41}{40}$ x

I = A – P = $\frac{41x}{40} - x$

$I = \frac{x}{40}$

But I = $\frac{PTR}{100} = \frac{x}{40}$

$\frac{x \times R \times \frac{1}{4}}{100} = \frac{x}{40}$

R = 10%

15. (B) In ΔADC, $70° + \angle C + \angle ADC = 180°$

$\angle C + \angle ADC = 180° - 70° = 110°$

But $y = \angle C + \angle ADC = 110°$

16. (C) Given $(\text{side})^2 = 196\ \text{cm}^2 = (14\ \text{cm})^2$

$\therefore$ Side = 14 cm

$\therefore$ Diameter of the circle = 14 cm

$\therefore$ Radius = $\frac{d}{2}$ = 7 cm

Area of the circle = $\pi r^2 = \frac{22}{7} \times 7 \times 7\ \text{cm}^2$

$= 154\ \text{cm}^2$

Remaining area = $196\ \text{cm}^2 - 154\ \text{cm}^2 = 42\ \text{cm}^2$

17. (A) $\frac{6}{7} = 0.857, \quad \frac{7}{9} = 0.777$

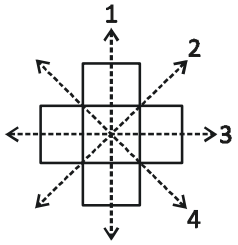
$\therefore \frac{95}{112} = 0.848, \frac{99}{112} = 0.883,$

$\frac{3}{4} = 0.75, \frac{97}{112} = 0.866$

$\therefore$ 0.848 lies between 0.857 & 0.777

$\therefore \frac{7}{9} < \frac{95}{112} < \frac{6}{7}$

18. (A) Given figure has 4 lines of symmetry



19. (C) The above given table is in the form of $y = 9x - 2$

20. (B) $\text{LHS} = \frac{1}{3}y^2 - \frac{4}{7}y + 11 - \frac{1}{7}y$

$+3 - 2y^2 - \frac{2}{7}y + \frac{2}{3}y^2 - 2$

$= \left(\frac{1}{3}y^2 - 2y^2 + \frac{2}{3}y^2\right) + \left(\frac{-4}{7}y - \frac{1}{7}y - \frac{2}{7}y\right)$

+ (11 + 3 – 2)

$= \left(\frac{-y^2 - 6y^2 + 2y^2}{3}\right) + \left(\frac{-4y - y - 2y}{7}\right) + 12$

$= \frac{-3y^2}{3} - y + 12$

$= (-y^2 - y + 12)$

21. (C) Given AB||CD

$\Rightarrow \angle DAB + \angle ADC = 180 \quad \rightarrow \quad (1)$

Given AD||BC $\Rightarrow \angle D$

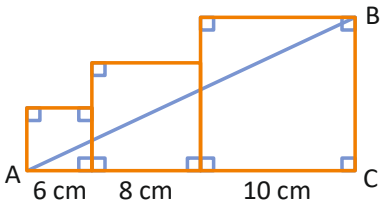
$AB + \angle ABC = 180 \quad \rightarrow \quad (2)$

From eq (1) & (2)

$\cancel{\angle ADB} + \angle ADC = \cancel{\angle DAB} + \angle ABC$

$\therefore \quad \angle ADC = \angle ABC$

22. (D) Given area of first square = $36cm^2 = (6cm)^2$



$\therefore \quad S_1^2 = (6\ cm)^2$

$\therefore \quad S_1 = 6$ cm

Similarty $S_2 = 8$ cm & $S_3 = 10$ cm

$\therefore \quad S_1 + S_2 + S_3 = 6cm + 8cm + 10cm = 24cm$

In ΔACD, AC = 24cm & BC = 10cm & $\angle C = 90$

$\therefore \quad AB^2 = (24cm)^2 + (10cm)^2 = 576\ cm^2 + 100\ cm^2 = 676\ cm^2$

$AB^2 = (26cm)^2$

$\therefore \quad AB = 26cm$

23. (C) $\frac{a^2b\,c^3 \times a^5\,b^4 \times c^2}{a^{-7}b^{-8}c^9 \times a^{-11}b^{12}c^{-13} \times a^{14}b^{-15}c^{-16}}$

$= a^{2+5+7+11-14} \quad b^{1+4+8-12+15} \quad c^{3+2-9+13+16}$

$= a^{11}\ b^{16}\ c^{25}$

24. (B) $\frac{\left(\frac{21x^3y^3}{25}\right)}{\frac{7x^2y}{5}} + \frac{\frac{14x^3y}{25}}{\left(\frac{7x^2y}{5}\right)} = \frac{\cancel{21}^{3}x^3y^3}{\cancel{25}_{5}}$

$\times \frac{\cancel{5}}{\cancel{7}x^2y} + \frac{\cancel{14}^{2}x^3y}{\cancel{25}_{5}} \times \frac{\cancel{5}}{{}_{1}\cancel{7}x^2y}$

$= \frac{3}{5}xy^2 + \frac{2}{5}x$

25. (A) Given $4^x - \frac{4^x}{4} = 24 \qquad 2^{2x} = 2^5$

$\Rightarrow \frac{4^x \times 4 - 4^x}{4} = 24 \qquad 2x = 5$

$\Rightarrow 4x\frac{(4-1)}{4} = 24 \qquad x = \frac{5}{2}$

$\Rightarrow 4^x \times \frac{3}{4} = 24$

$(2x)^x = \left(\cancel{2} \times \frac{5}{\cancel{2}}\right)^{\frac{5}{2}}$

$\Rightarrow (2^2)^x = 24 \times \frac{4}{3} = 32 = 5^{5/2}$

26. (A) $\text{LHS} = \frac{15}{2} + \frac{1}{2} \div \frac{1}{2}$ of $\frac{1}{4} - \frac{2}{5} \times \frac{7}{3}$

$\div \frac{15}{8}$ of $\left(\frac{7}{5} - \frac{4}{3}\right)$

$= \frac{15}{2} + \frac{1}{2} \times 8 - \frac{2}{5} \times \frac{7}{3} \div \frac{\cancel{15}}{8}$ of $\frac{1}{\cancel{15}}$

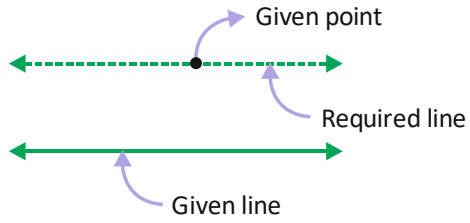
$= \frac{15}{2} + 4 - \frac{2}{5} \times \frac{7}{3} \times 8$

$= \frac{15}{2} + 4 - \frac{112}{15} = \frac{225 + 120 - 224}{30}$

$$= \frac{121}{30}$$

$$= 4\frac{1}{30}$$

27. (B) Only one line can be drawn through the given point which is parallel to the given line



28. (A) Given

A : B = 0.01 0.11 = 0.01 × 100 0.11 × 100 = 1 : 11

B : C = 2.2 : 1 = 2.2 × 10 : 1 × 100 = $\cancel{22}^{11} : \cancel{10}^{5} = 11:5$

∴ A : B : C = 1 : 11 : 5

29. (D) Side of a square

$$= \frac{\text{Perimeter}}{4} = \frac{140\text{m}}{4} = 35\text{m}$$

Area of square = S^2 = $(35m)^2$ = 1225 sq metres

30. (C) Factors of 48 area 1, 2, 3, 4, 6, 8, 12, 16, 24, 48

∴ Total factors of 48 = 10

MATHEMATICS - 2

31. (A,B,D)

Given $\Delta DCP \cong \Delta MLA$

$\angle D = \angle M$, $\angle C = \angle L$ & $\angle P = \angle A$

and CP = $\angle A$, DP = MA, DC = ML

32. (A,B,D)

Given problem is true for all values of x Except zero

33. (A,B,C)

Except option 'D' remaining options are true

34. (A,B,C)

Except option 'D' remaining options are true

35. (B,C,D) In ΔABD,

$90° + 30° + x = 180°$

$x = 180° - 120° = 60°$

In ΔBCD, given BC = CD

$\Rightarrow \angle CDB = \angle CBD = y$

$y + y + 30° = 180°$

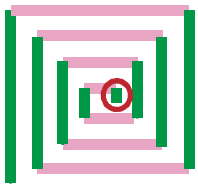
$2y = 180° - 30° = 150°$

$$y = \frac{150°}{2} = 75°$$

$x + y = 60° + 75° = 135°$

REASONING

36. (B) The innermost line is Pink instead of Green.



37. (C) The series follows 2 rules:

(1) The number written in words is reduced by 1 every time. This number is written in words and in numerical form alternately.

(2) The second number increases by 1 every time.

By following these rules, the next term will be THREE-5.

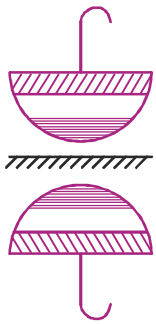
38. (C) After studying the given information carefully. We observe that D < A < B > C

B > C > A > D

∴ B > A

39. (C) Everytime the shape turn 90° right. The colours of a shape from top to bottom moves next below shape. Bottom shape colour moves to top position shape.

40. (D) 

41. (C) 

42. (A) 

43. (C) $23 - 12 = 11 \times 7 = 77$

$45 - 28 = 17 \times 2 = 34$

$31 - 19 = 12 \times \mathbf{3} = 36$

44. (D) Pile, Pine, Pice, Pie, Pen and Pin can be formed.

45. (D) F R I D A Y → I R F Y A D

A U G U S T → G U A T S U

W I N T E R → N I W R E T

CRITICAL THINKING

46. (D) 46

8^{th} Jan 2017 $\rightarrow$ Sunday

8th Mar 2017 is 31 – 8

$\Rightarrow$ 23 days + 28 + 8

$\Rightarrow$ $\frac{59 \text{ days}}{7} \Rightarrow$ 3 odd days

$\Rightarrow$ Wednesday

Statement-1 : Mar 2017 is Wednesday (true)

March	April	May	June	July
23 days	30 days	31 days	30 days	8 days

$\frac{122 \text{ days}}{1} \Rightarrow$ 17 weeks 3 odd days

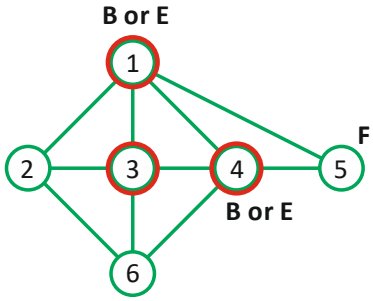
$\Rightarrow$ Saturday

Statement-2 : 8^{th} July 2017 is a saturday

Hence both statements are true.

47. (B) 3

According to the given picture, B, E and A have four friends means



1, 3, 4 are represents the letters B, E, A

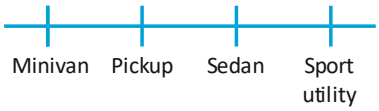
F is friend with only B and E

F represent number 5

B and E reperesents 4 and 1

Therefore A represent number 3

48. (B) False



Minivan is left most corner

Minivan is not parked between the pickup and sedan

So statement 3 is false.

49. (A) Pig + 2 Monkeys = Elephant

(from balance 1)

Kangaroo + Pig = Elephant

(from balance 2)

2 Pigs + Monkey = Elephant + Kangaroo

(from balance 3)

Elephant + ~~Kangaroo~~ = 2 Pigs + Monkey (3)
Elephant – ~~Kangaroo~~ = Pig (2)

2 Elephant = 3 Pigs + Monkey

2 (Pig + 2 Monkeys) = 3 Pigs + Monkey

2 Pigs + 4 Monkeys = 3 Pigs + Monkey

3 Monkey = Pig

Elephant = 3 Monkeys + 2 Monkey

Elephant = 5 Monkeys

50. (C) There are 2 shortest paths from A to B and there are 3 shortest paths from B to C. Therefore, the number of ways of taking the shortest path from A to C by passing through B is $2 \times 3 = 6$ ways.