UNIFIED COUNCIL

An ISO 9001:2015 Certified Organisation

UCO Unified Cyber Olympiad

UNIFIED CYBER OLYMPIAD (UPDATED)

CLASS - 9

Question Paper Code : UC345

KEY

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

SOLUTIONS

MENTAL ABILITY

1. (B) $x = 2 + \sqrt{5}$

$$\frac{1}{x} = \frac{1}{2+\sqrt{5}} \times \frac{2-\sqrt{5}}{2-\sqrt{5}} = \frac{2-\sqrt{5}}{4-5}$$

$= -(2-5) = -2 + \sqrt{5}$

$$x + \frac{1}{x} = 2 + \sqrt{5} + (-2 + \sqrt{5}) = 2\sqrt{5}$$

Squaring on both sides

$$x^2 + \frac{1}{x^2} + 2 = 20$$

$$x^2 + \frac{1}{x^2} = 18$$

2. (D)

$(\sqrt{37} + \sqrt{11})^2 = 37 + 11 + 2\sqrt{407} = 48 + 2\sqrt{407}$

$(\sqrt{41} + \sqrt{7})^2 = 41 + 7 + 2\sqrt{287} = 48 + 2\sqrt{287}$

$(\sqrt{43} + \sqrt{5})^2 = 43 + 5 + 2\sqrt{215} = 48 + 2\sqrt{215}$

$(\sqrt{35} + \sqrt{13})^2 = 35 + 13 + 2\sqrt{455} = 48 + 2\sqrt{455}$

Smallest one is $48 + 2\sqrt{215}$ *i.e.,* $\sqrt{43} + \sqrt{5}$

3. (D) $x^2 - 7x - 18 = 0$

$(x - 9)(x + 2) = 0$

$\alpha = 9$ and $\beta = -2$

$\Rightarrow \alpha + \beta = 9 - 2 = 7$

4. (C) $xy + 1 = 5y$ ... (1)

$2xy + 3 = 13y$ ... (2)

eq (1) × 2 $\Rightarrow 2xy + 2 = 10y$

$$\frac{2xy + 3 = 13y}{-1 = -3y} \quad \text{... (2)}$$

$$y = \frac{1}{3}$$

$$\frac{x}{3} + 1 = \frac{5}{3} \quad \text{... (1)}$$

$$\frac{x}{3} = \frac{2}{3}$$

$x = 2$

$2x - 3y = 2(2) - 3(\frac{1}{3}) = 4 - 1 = 3$

5. (A) The given equation can be written as:

$$6x + 6y = 5xy \Rightarrow \frac{6}{y} + \frac{6}{x} = 5 \quad \text{... (i)}$$

$$6x - 6y = xy \Rightarrow \frac{6}{y} - \frac{6}{x} = 1 \quad \text{... (ii)}$$

Putting $\frac{1}{x} = u$ and $\frac{1}{y} = v$ in the above equations, we get:

$6v + 6u = 5$ ... (iii)

$6v - 6u = 1$ ... (iv)

Adding (iii) and (iv) we get: $12v = 6$ $v = \frac{1}{2}$

substituting $v = \frac{1}{2}$ in (iii) we get:

$$6u = 2 \Rightarrow u = \frac{1}{3}$$

$$\therefore x = \frac{1}{u} = 3 \text{ and } y = \frac{1}{v} = 2$$

$$\left[\text{Q } \frac{1}{x} = u \Rightarrow x = \frac{1}{u} \text{and} \frac{1}{y} = v \Rightarrow y = \frac{1}{v}\right]$$

6. (D) $LHS = (x + y)^3 - (x - y)^3 - 3(2y)(x^2 - y^2)$

$= (x + y)^3 - (x - y)^3 - 3(x + y - x + y)(x + y)(x - y)$

$= (x + y)^3 - (x - y)^3 - 3[(x + y) - (x - y)](x + y)(x - y)$

$= [(x + y) - (x - y)]^3$

$= (2y)^3 = 8y^3$

7. (B) Length of wire = 3600 m = 360000 cm

= h(height of cylinder)

Vol. of wire = $\pi r^2 \times 360000 = \pi$

$$\Rightarrow r^2 = \frac{1}{360000} \Rightarrow r = \frac{1}{600} cm$$

$$Diameter = 2 \times \frac{1}{600} cm = \frac{1}{300} cm.$$

8. (A) $5^x \times 5 + \frac{5}{(5^x)} = 26$

$$\frac{(5^x)^2 5 + 5}{5^x} = 26$$

let $5^x = a$

$$\frac{5a^2 + 5}{a} = 26$$

$5a^2 + 5 = 26a$

$5a^2 - 26a + 5 = 0$

$5a^2 - 25a - a + 5 = 0$

$5a(a - 5) - 1(a - 5) = 0$

$a - 5 = 0$ (or) $5a - 1 = 0$

$a = 5$ (or) $a = \frac{1}{5}$

$5^x = 5$ (or) $5^x = 5^{-1}$

$x = 1$ (or) -1

9. (C) $(x + 1)(x + 4)(x + 2)(x + 3) - 360 = 0$

$(x^2 + 5x + 4)(x^2 + 5x + 6) - 360 = 0$

$(a + 4)(a + 6) - 360 = 0$

Where $a = x^2 + 5x$

$a^2 + 10a + 24 - 360 = 0$

$a^2 + 10a - 336 = 0$

$(a + 24)(a - 14) = 0$

$(x^2 + 5x + 24)(x^2 + 5x - 14) = 0$

$x^2 + 5x + 24 = 0$ has no real roots

$x^2 + 5x - 14 = 0$

$x^2 + 7x - 2x - 14 = 0$

$x(x + 7) - 2(x + 7) = 0$

$(x + 7)(x - 2) = 0$

$x = -7$ (or) 2

10. **(D)** *Let A's present age = x years and B's present age = y years*

Then, $(x-5) = 3(y-5) \Rightarrow x - 3y = -10$ ..(i)

Also, $(x+10) = 2(y+10) \Rightarrow x - 2y = 10$ ..(ii)

Subtracting (i) from (ii) we get: $y = 20$

Subtracting $y = 20$ *in (i) we get :* $x - 60 = -10 \Rightarrow x = 50$

$\therefore$ *A's present age = 50 years and B's present age = 20 years*

11. **(B)** $\frac{a}{a+1} + \frac{b}{b+1} = \frac{ab+a+ab+b}{(a+1)(b+1)}$

$= \frac{2ab+a+b}{ab+a+b+1} = \frac{2+a+b}{2+a+b} = 1$

(Since, ab = 1 given)

12. **(B)** *Amount of salt in 30 kg solution =* $\left(\frac{2}{100} \times 30\right)$ *kg = 0.6 kg*

Let x kg of pure salt be added.

Then, $\frac{0.6+x}{30+x} = \frac{10}{100}$

$\Rightarrow 60 + 100x = 300 + 10x$

$\Rightarrow 90x = 240 \Rightarrow x = \frac{8}{3} = 2\frac{2}{3}$.

13. **(C)** (ii) $x^2 + \frac{1}{x^2} - 7 = x^2 + \frac{1}{x^2} + 2 - 9$

$= x^2 + 2x \times \frac{1}{x} + \frac{1}{x^2} - 9$

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

14. ***Deleted***

15. **(C)** $\sqrt[3]{x + 3\sqrt[3]{x^2y} + y + 3\sqrt[3]{xy^2}}$

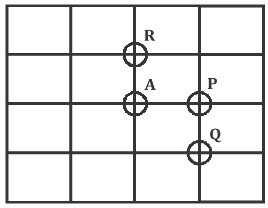
$= \sqrt[3]{(x^{\frac{1}{3}})^3 + 3x^{\frac{2}{3}}y^{\frac{1}{3}} + (y^{\frac{1}{3}})^3 + 3x^{\frac{1}{3}}y^{\frac{2}{3}}}$

$= \sqrt[3]{(x^{\frac{1}{3}} + y^{\frac{1}{3}})^3} = \sqrt[3]{x} + \sqrt[3]{y}$

REASONING

16. **(D)** *Each set consists of even numbers only whose H.C.F. is 2.*

17. **(D)** *South-East*



18. **(D)** *The pattern is +5, +9,+13,+17, +21, +25. Missing number = 15 + 13 = 28.*

19. **(B)** *P's mother's mother's son is P's uncle. P's uncle's daughter is P's cousin.*

20. **(A)** *Malga means peach; uper means cobbler; port means juice; mogga means apple; and grop means jelly. Therefore, moggaport means apple juice.*

21. **(C)** *In the first row, (28/7) * 5 = 20.*

*In the second row, (84/12) * 5 = 35.*

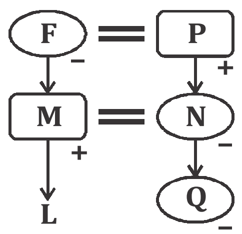
*In the third number, missing number = (45/ 9) * 5 = 25.*

22. **(B)** 

23. **(D)** *The first letters in all the groups are consecutive vowels starting with A. The second letters in all the groups are consecutive vowels starting with I. Hence the missing pair is OA.*

24. **(B)** *N is the wife of M. So, one couple is M-N. Now, F is the grandmother of L. M is the son of F and his wife N is the mother of Q.*

So, F is also grandmother of Q. But Q is the granddaughter of P. So, P is the grandfather of Q and the husband of F. Thus F-P is another couple.

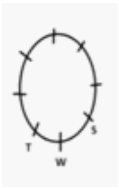


25. **(C)** *3, 5, 9 are geometrical figures containing line segments parallel to the sides of the figure.*

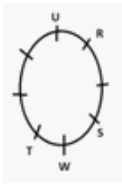
1, 6, 8 consist of a circle and a triangle intersecting it. The triangle is also divided into two equal parts by a straight line. 2, 4, 7 are all funnel shaped figures.

26. **(A)** *48, 75, 84 are divisible by 3 but not 35.*

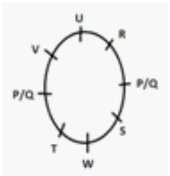
27. **(D)** *S is to the immediate right of W and W is to the immediate right of T. So, we get the following arrangement.*



R and U are opposite to T and W respectively.



V is not sitting next to either R or T and there is no information about P and Q. Hence, we get the following arrangement.



Either P or Q is two places to the right of W.

28. **(B,C)** *Both A and E are possible.*

29. **(B)** *As Train is guided by the 'Track' simil arly the 'Bullet' is guided by the 'Barrel'.*

30. **(B)**

COMPUTERS

31.	**(C)**	32.	**(B)**	33.	**(D)**
34.	**(D)**	35.	**(B)**	36.	**(B)**
37.	**(A)**	38.	**(C)**	39.	**(C)**
40.	**(D)**	41.	**(D)**	42.	**(B)**
43.	**(D)**	44.	**(C)**	45.	**(B)**

ENGLISH

46.	**(A)**	47.	**(D)**	48.	**(A)**
49.	**(C)**	50.	**(D)**		

The End