



UNIFIED CYBER OLYMPIAD

CLASS - 10
Question Paper Code : 30109

KEY

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

SOLUTIONS

MENTAL ABILITY

01. (D) Given equation is $x^2 + kx + 12 = 0$

$$\alpha + \beta = \frac{-b}{a} = -k \text{ and } \alpha\beta = 12$$

$$\alpha - \beta = 1 \text{ (Given)}$$

$$(\alpha - \beta)^2 = (\alpha + \beta)^2 - 4\alpha\beta$$

$$1^2 = (-k)^2 - 4 \times 12$$

$$1 + 48 = k^2$$

$$k = \pm \sqrt{49}$$

$$k = \pm 7$$

If $\beta = 3, \alpha = 4$

$$\beta = -4, \alpha = -3$$

$$\alpha + \beta = 7 \text{ or } -7 = k$$

02. (C) $\alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a} = \frac{-29}{6}$

03. (B) Given, $t_4 = 8 ; S_{12} = 156$

$$\Rightarrow a = 2 \text{ and } d = 2$$

$$t_n = a + (n - 1)d$$

$$\Rightarrow t_p = a + (p - 1)d$$

$$\Rightarrow 2 + 2(p - 1) = 1000$$

$$\Rightarrow 2 + 2p - 2 = 1000$$

$$\Rightarrow 2p = 1000$$

$$\Rightarrow p = 500$$

04. (D) Given in an AP $a_1 = 5$ and $a_6 = 13$

$$a_6 = a + 5d = 13$$

$$5 + 5d = 13$$

$$5d = 8$$

$$d = \frac{8}{5} = 1.6$$

$$x_1 = a + d = 5 + 1.6 = 6.6$$

$$x_2 = x_1 + d = 6.6 + 1.6 = 8.2$$

$$x_3 = x_2 + d = 8.2 + 1.6 = 9.8$$

$$x_4 = x_3 + d = 9.8 + 1.6 = 11.4$$

$$\therefore x_1 + x_2 + x_3 + x_4 = 6.6 + 8.2 + 9.8 + 11.4 = 36$$

05. (B) A diagonal divides a parallelogram into two triangles of equal area.

\therefore Area of a triangle,

$$\Delta = \sqrt{\frac{15}{2} \left(\frac{5}{2} \right) \left(\frac{8}{2} \right)} (1) = 5\sqrt{3}$$

Hence, area of parallelogram

$$= 2 \times 5\sqrt{3} = 10\sqrt{3} \text{ sq.cm.}$$

06. (B) $5\sqrt{\frac{3}{x}} + 7\sqrt{\frac{x}{3}} = \frac{68}{3}$

Let $\sqrt{\frac{3}{x}} = y \Rightarrow 5y + \frac{7}{y} = \frac{68}{3}$

$$\Rightarrow (5y^2 + 7)3 = 68y$$

$$\Rightarrow 15y^2 - 68y + 21 = 0$$

$$\Rightarrow (3y - 1)(5y - 21) = 0 \Rightarrow y = \frac{1}{3} \text{ or } y = \frac{21}{5}$$

If $y = \frac{1}{3}$, then

If $y = \frac{21}{5}$, then

$$\sqrt{\frac{3}{x}} = \frac{1}{3} \Rightarrow \frac{3}{x} = \frac{1}{9}$$

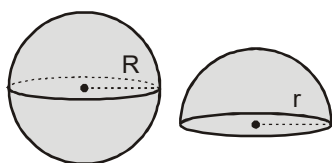
$$\sqrt{\frac{3}{x}} = \frac{21}{5} \Rightarrow \frac{3}{x} = \frac{441}{25}$$

$$\Rightarrow x = 27$$

$$\text{or } x = \frac{75}{441} = \frac{25}{147}$$

07. (C) Let the radius of the sphere be R and radius of the hemisphere be r.

From the question,



$$4\pi R^2 = \frac{1}{2} \times 4\pi r^2 + \pi r^2$$

$$\Rightarrow 4R^2 = 3r^2$$

$$\Rightarrow \frac{R}{r} = \frac{\sqrt{3}}{2}$$

The ratio of their volumes

$$= \frac{\frac{4}{3}\pi R^3}{\frac{1}{2} \cdot \frac{4}{3}\pi r^3} = 2 \cdot \left(\frac{R}{r} \right)^3$$

$$= 2 \cdot \left(\frac{\sqrt{3}}{2} \right)^3 = \frac{3\sqrt{3}}{4} = 3\sqrt{3} : 4$$

08. (B) The given equation can be written as

$$[(x+2)(x+8)][(x+4)(x+6)] = 105$$

$$[x^2 + 10x + 16][x^2 + 10x + 24] = 105$$

Substituting $x^2 + 10x = y$, we get

$$(y + 16)(y + 24) = 105$$

$$\Rightarrow y^2 + 40y + 279 = 0$$

$$\Rightarrow (y + 31)(y + 9) = 0$$

$$\Rightarrow y = -31 \text{ or } y = -9$$

Taking $y = -31$,

we have $x^2 + 10x = -31$

$$\Rightarrow x^2 + 10x + 31 = 0$$

$$\Rightarrow x = \frac{-10 \pm \sqrt{100 - 124}}{2} = -5 \pm i\sqrt{6}$$

Taking $y = -9$,

we have $x^2 + 10x = -9$

$$\Rightarrow x^2 + 10x + 9 = 0$$

$$\Rightarrow (x + 9)(x + 1) = 0$$

$$\Rightarrow x = -9 \text{ or } x = -1$$

Hence, the roots are $-1, -9, -5 \pm i\sqrt{6}$

09. (B) Volume of 300 spherical balls = Volume of rise in water level

$$\Rightarrow 300 \times \frac{4}{3} \times \frac{22}{7} \times \left(\frac{d}{2} \right)^3 = \frac{22}{7} \times 2 \times 2 \times \frac{4}{5}$$

$$\Rightarrow d = \frac{2}{5} = 0.4 \text{ cm}$$

10. (C) Number of blue and yellow marbles
 $= 25 \times \frac{8}{5} = 40$
 when 'x' green marbles are added, total number of marbles = $40 + x$
 Probability of drawing a green marble =

$$\frac{\text{Number of green marbles}}{\text{Total number of marbles}}$$

$$\Rightarrow \frac{1}{6} = \frac{x}{40+x}$$

$$\Rightarrow 40 + x = 6x \Rightarrow 5x = 40$$

$$\therefore x = 8$$

11. (D) Let the quotient when the given number is divided by 143 be 'q'. Given that the remainder is 31, the number
 $= 143q + 31$
 $= 11 \times 13q + 11 \times 2 + 9$
 $= 11(13q + 2) + 9$
 Hence the remainder when the same number is divided by 11 is 9.

12. (D) Diagonal of a square is $12\sqrt{2}$ cm
 $\Rightarrow 2\sqrt{a} = 12\sqrt{2}$ cm
 $\Rightarrow a = 12$ cm
 \therefore Perimeter of the square = $4a$
 $= 4 \times 12 = 48$ cm
 Perimeter of an equilateral triangle is $3a$
 $\Rightarrow 48$ cm = $3a$
 $\Rightarrow a = \frac{48}{3}$ cm = 16 cm
 \therefore Area of equilateral triangle
 $= \frac{\sqrt{3}}{4} a^2 = 64\sqrt{3}$ cm²

13. (D) $\alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a}$
 $(1)(-2) + (-2)(3) + (3)(1) = -a$
 $-2 - 6 + 3 = -a$
 $-a = -5$
 $a = 5$

14. (B) A non-leap year contains 365 days, i.e., 52 weeks + 1 day.
 $S = \{S, M, T, W, Th, F, Sa\}$
 $\Rightarrow n(S) = 7$
 $E = \{Sa\}$
 $\Rightarrow n(E) = 1$
 $\therefore P(E) = \frac{n(E)}{n(S)} = \frac{1}{7}$

15. (C) Let the original speed of the train be x km/h and let the time taken to complete the journey be y hours. Then, the distance covered = xy km

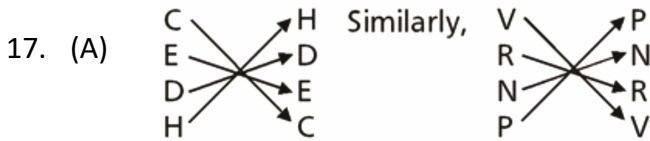
Case 1. When speed = $(x + 10)$ km/h and time taken = $(y - 2)$ hour.
 In this case, distance = $(x + 10)(y - 2)$
 $\Rightarrow xy = (x + 10)(y - 2)$
 $\Rightarrow xy = xy - 2x + 10y - 20$
 $\Rightarrow 2x - 10y + 20 = 0$

Case 2. When speed = $(x - 10)$ km/h and time taken = $(y + 3)$ hour.
 In this case, distance = $(x - 10)(y + 3)$
 $\Rightarrow xy = (x - 10)(y + 3)$
 $\Rightarrow xy = xy + 3x - 10y - 30$
 $\Rightarrow 3x - 10y - 30 = 0$
 Subtracting (1) from (2), we get
 $x - 50 = 0 \Rightarrow x = 50$
 Putting $x = 50$ in (1), we get
 $100 - 10y + 20 = 0$
 $\Rightarrow -10y = -120$ or $y = 12$

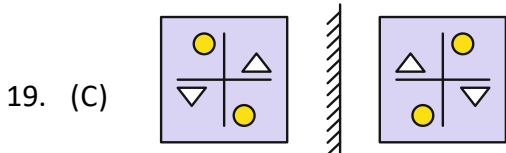
\therefore The original speed of the train = 50 km/h
 The time taken to complete the journey = 12 hours
 Hence, the length of the journey = Speed \times Time = (50×12) km = 600 km

REASONING

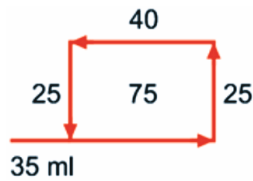
16. (C) In all other group of letters the first and second letters are equidistant from the beginning and end respectively in the alphabetical series.



18. (B) In every alternate figure, the outer design is a circle. Thus, in the answer figure the outer design will be a circle. Secondly, in every alternate figure the inner design is the same as the outer design of the previous figure. Hence, in the answer figure it will be a triangle.



20. (D) The movements of Vamshi are as shown in figure



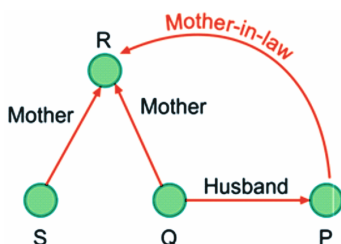
Clearly, $FB = DC = 40$ m

Vamshi's distance from the starting point A

$$= (AB - EB)$$

$$= (75 - 40) \text{ m} = 35\text{m}$$

21. (D) R is the mother of Q, and P is the husband of Q.

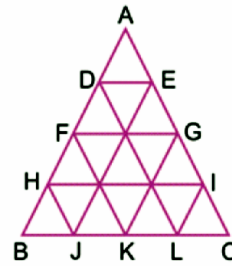


R is the mother-in-law of P.

22. (C) $19 - 10 = 9$

23. (A) Since in other options number of dots on two adjacent surfaces sum up to 7.

24. (B) The figure may be labelled as shown.



The parallelogram composed of two components each are ADME, DFNM, EMOG, FHJN, MNKO, GOLI, HBJN, NJKO, OKLI, FHNM, MNOG, DFME, HJKN, NKLO, OLCI, FNOM, MOIG and DMGE. i.e. 18 in number.

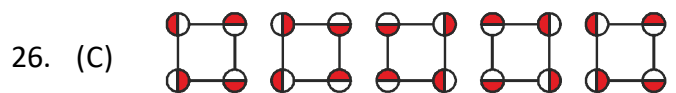
The parallelogram composed of four components each are HOKB, NILJ, FGOH, HOLJ, NICK, FGIN, FMJB, DENH, MGKJ, MGCL, DEIO, FMLK, AENF, AGOD, DMJH, DOKF, EILM and EGKN i.e. 18 in number.

The parallelogram composed of six components each are AEJH, DAIL, DECL, DEJB, HILB and HICJ i.e. 6 in number.

The parallelogram composed of eight components each are FGKB, FGCK and AGKF i.e. 3 in number.

Total number of parallelograms in the figure = $18 + 18 + 6 + 3 = 45$

25. (C) All made up of 'S' except (C), which is made up of inverted 'S'.



27. (A) Option (A) is different from others.



28. (A) I returned on Tuesday.

Given, today is Friday.

Then, tomorrow is Saturday.

Now, day before Saturday is again Friday.

Day after Friday is Saturday, then four days before Saturday is Tuesday.

Hence, I returned on Tuesday from the trip.

29. (C) The different symbols used by the mathematician to denote the operations are

$> \longrightarrow '+'$ $< \longrightarrow '-'$

$+ \longrightarrow '\div'$ $\wedge \longrightarrow 'x'$

$- \longrightarrow '='$ $\times \longrightarrow '>'$

$= \longrightarrow '<'$

Now, consider

$$8 < 4 + 2 = 6 > 3$$

$$8 - 4 \div 2 < 6 + 3$$

$$= 6 < 9 \text{ (true)}$$

Hence, option (C) follows the symbols correctly.

30. (D) F = jagged inner line, G = straight inner line. M = one black dot, N = two black dots. X = six big rectangles, Y = five big rectangles.

COMPUTERS

31. (C) Drop box is a file sharing service commonly used for uploading, downloading and sharing files. The other options like facebook, youtube and instagram are social media platform primarily used for sharing content like posts, vidoes and images, not general file sharing.

32. (A) Adding target="_blank" to the <a> tag will open the linked document in a new browser window or tab.

33. (B) The internet Engineering task force overseas the development of internet technology standards to ensure smooth communication and interoperability across the internet.

34. (A) The Web Browser is an application software to explore www (World Wide Web). It provides an interface between the server and the client and requests to the server for web documents and services.

35. (A) If a DELETE query is executed without specifying a WHERE clause, all records in the table are deleted. This action is irreversible and permanently removes all data from the table.

36. (C) Intrusion Detection Systems (IDS) monitor network traffic, system activities, and user behaviors to identify suspicious patterns or anomalies that may indicate a security breach. They help organizations detect and respond to cyber threats in real-time, thereby enhancing overall security posture.

37. (C) A bridge is a networking device that connects multiple network segments together and operates at the network layer of the OSI model. It forwards data packets between different segments of the same network based on MAC addresses.

38. (C) A graphical user interface (GUI) is a feature of an operating system that provides visual elements such as windows, icons, menus, and buttons, enabling users to interact with the computer system using a mouse, keyboard or touchscreen.

39. (B) These questions aim to test Grade 10 students' understanding of cell referencing in spreadsheet software and reinforce their knowledge of different types of cell references and their behaviors.

40. (A) Base font, which was in HTML sets the default font properties for the entire web page, including the size, colour and face of all text.

41. (C) Phishing is a type of cyber attack where attackers send fraudulent emails or messages pretending to be from reputable sources to trick individuals into revealing sensitive information or clicking on malicious links. It's important to be cautious and verify the authenticity of emails before clicking on links or providing any personal information.

42. (B) With 8 bits, you can represent $2^8 = 256$ different values, ranging from 0 to 255.

43. (A) The ruler in word processing software allows users to adjust the alignment of text (left, right, center, or justified) within the document. Options B, C, and D refer to tools for finding synonyms (Thesaurus), managing copied content (Clipboard), and creating mathematical equations (Equation Editor), respectively, which are unrelated to text alignment.

44. (C) The correct answer is (C) Linearity. While linearity may describe the flow of instructions in a program, it is not a fundamental principle of OOP. The other options, inheritance, abstraction, and encapsulation are fundamental principles of OOP.

45. (A) To declare a variable of type Student, you use the structure name (Student) followed by the variable name (s). Option A correctly declares a variable s of type Student.

ENGLISH

46. (C)

47. (C)

48. (D)

49. (D)

50. (C)