



UNIFIED CYBER OLYMPIAD

CLASS - 9

Question Paper Code : UC394

KEY

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

SOLUTIONS

MENTAL ABILITY

$$01. (C) \quad \frac{1}{x} = \frac{1}{3+2\sqrt{2}} \times \frac{3-2\sqrt{2}}{3-2\sqrt{2}} = \frac{3-2\sqrt{2}}{3^2 - (2\sqrt{2})^2}$$

$$= \frac{3-2\sqrt{2}}{9-8}$$

$$= 3-2\sqrt{2}$$

$$\therefore x + \frac{1}{x} = 3 + 2\sqrt{2} + 3 - 2\sqrt{2} = 6$$

C.O.B.S.

$$\left(x + \frac{1}{x}\right)^3 = 6^3$$

$$x^3 + \frac{1}{x^3} + 3 \cancel{x} \times \frac{1}{\cancel{x}} \left(x + \frac{1}{x}\right) = 216$$

$$x^3 + \frac{1}{x^3} + 3(6) = 216$$

$$x^3 + \frac{1}{x^3} = 216 - 18 = 198$$

02. (B) Sum of the digits of the given number
 $= 6 + 3 + 6 + 4 + 6 + 5 + 6 + 6 + 6 + 7 + 6 + 8 + 6 + 9 = 84$

If sum of the digit is 81 then it is divisible by 9

i.e. 63646566676866 is divisible by 9

$$\therefore 63646566676869 = 63646566676866 + 3$$

$\therefore 63646566676869$ is divided by 9 then the remainder is 3.

$$\begin{aligned} 03. (D) \quad & \frac{a^2}{4} + \frac{b^2}{16} + 4 - \frac{ab}{4} - b + 2a \\ &= \left(\frac{a}{2}\right)^2 + \left(\frac{-b}{4}\right)^2 + 2^2 + 2\left(\frac{a}{2} \times \frac{-b}{4}\right) \\ &+ 2\left(\frac{-b}{4} \times 2\right) + 2\left(2 \times \frac{a}{2}\right) \\ &= \left(\frac{a}{2} - \frac{b}{4} + 2\right)^2 \end{aligned}$$

$$\begin{aligned} \therefore \left(\frac{a}{2} - \frac{b}{4} + 2\right) &\text{ is a factor of} \\ \left(\frac{a^2}{2} + \frac{b^2}{16} - \frac{ab}{4} + b + 2a + 4\right) \end{aligned}$$

$$04. (A) \quad \text{Given } p(x) = ax^4 - bx^2 + x + 5 \text{ and } p(-3) = 2$$

$$\therefore p(-3) = a(-3)^4 - b(-3)^2 + (-3) + 5 = 2$$

$$\Rightarrow 81a - 9b - 3 + 5 = 2$$

$$\Rightarrow 81a - 9b = 0$$

$$\therefore p(3) = a(3)^4 - b(3)^2 + (3) + 5$$

$$= 81a - 9b + 3 + 5$$

$$= 0 + 8$$

$$= 8$$

$$05. (D) \quad x^2 - \frac{75^3}{100^4}x - \frac{9625^{385}77}{1000^{408}} = 0$$

$$\therefore \frac{8x^2 - 6x - 77}{8} = 0$$

$$\therefore 8x^2 - 6x - 77 = 0 \times 8$$

$$8x^2 - 28x + 22x - 77 = 0$$

$$4x(2x - 7) + 11(2x - 7) = 0$$

$$(2x - 7)(4x + 11) = 0$$

$$2x - 7 = 0 \quad (\text{or}) \quad 4x + 11 = 0$$

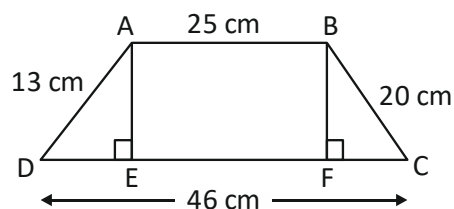
$$2x = 7$$

$$4x = -11$$

$$x = \frac{7}{2} \quad x = \frac{-11}{4}$$

$$x = -2.75$$

06. (B) Construction : — $AE \perp CD$ & $BF \perp CD$



AEFB is a rectangle

$$\therefore EF = AB = 25 \text{ cm}$$

$$\text{Let } CF = x \Rightarrow x + 25 \text{ cm} + DE = 46 \text{ cm}$$

$$DE = 46 \text{ cm} - 25 \text{ cm} - x$$

$$DE = (21 - x) \text{ cm}$$

$$AE = BF$$

[\because Perpendicular distance between parallel lines]

$$\therefore AE^2 = BF^2$$

$$\Rightarrow AD^2 - DE^2 = BC^2 - CF^2$$

$$\Rightarrow 13^2 - (21 - x^2) = 20^2 - x^2$$

$$\Rightarrow 169 - (441 - 42x + x^2) = 400 - x^2$$

$$\Rightarrow 169 - 441 + 42x - \cancel{x^2} = 400 - \cancel{x^2}$$

$$-272 + 42x = 400$$

$$42x = 400 + 272 = 672$$

$$x = \frac{672}{42} = 16$$

$$x = 16$$

$$AE^2 = 13^2 - (21 - x)^2$$

$$= 13^2 - (21 - 16)^2$$

$$= 13^2 - 5^2$$

$$= 169 - 25$$

$$AE = \sqrt{144}$$

$$AE = 12 \text{ cm}$$

$$\begin{aligned} \text{Area of the trapezium ABEC} &= \frac{1}{2} \times AE \\ & \quad (AB + CD) \end{aligned}$$

$$= \frac{1}{2} \times 12^6 \text{ cm } (25 + 46) \text{ cm}$$

$$= 6 \text{ cm} \times 71 \text{ cm} = 426 \text{ cm}^2$$

$$07. (A) \quad \frac{3^{2023} + 3^{2022} + 3^{2021}}{3^{2022} + 3^{2021} - 3^{2020}} = \frac{3^{2021}(3^2 + 3^1 + 1)}{3^{2020}(3^2 + 3 - 1)}$$

$$= 3^{2021-2020} \frac{(9+4)}{(9+2)} = 3 \times \frac{13}{11} = \frac{39}{11}$$

08. (C) Let the original length be 'l' units & original breadth be 'b' units.

$$\text{Given } lb - (l - 5)(b + 2) = 80$$

$$lb - [lb + 2l - 5b - 10] = 80$$

$$\cancel{lb} - \cancel{lb} - 2l - 5b + 10 = 80$$

$$-2l + 5b = 80 - 10$$

$$-2l + 5b = 70 \quad \longrightarrow \textcircled{1}$$

$$\text{Given } (l + 10)(b - 5) - lb = 50$$

$$\cancel{lb} - 5l + 10b - 50 - \cancel{lb} = 50$$

$$-5l + 10b = 50 + 50$$

$$-5(l - 2b) = 100$$

$$l - 2b = \frac{100}{-5} = -20$$

$$l - 2b = -20 \quad \longrightarrow \textcircled{2}$$

$$\begin{array}{r} -2l + 5b = 70 \longrightarrow \textcircled{1} \\ 2l - 4b = -40 \longrightarrow \textcircled{2} \times 2 \\ \hline b = 30 \end{array}$$

$$\therefore l - 2(30) = -20 \longrightarrow \textcircled{2}$$

$$l - 60 = -20$$

$$l = -20 + 60 = 40$$

$$\text{Original = Perimeter} = 2(l + b) = 2(40 + 30) = 140 \text{ units}$$

09. (D) Given $2\pi rh + 2\pi r^2 - 2\pi rh$

$$= 3872 \text{ cm}^2 - 2640 \text{ cm}^2$$

$$2\pi r^2 = 1232 \text{ cm}^2$$

$$2 \times \frac{22}{7} \times r^2 = 1232 \text{ cm}^2$$

$$r^2 = \frac{1232 \times 7}{2 \times 22} = 196$$

$$r = \sqrt{196} = 14 \text{ cm}$$

$$r = 14 \text{ cm}$$

$$2 \times \frac{22}{7} \times 14^2 \text{ cm} \times h = 2640 \text{ cm}^2$$

$$h = \frac{2640}{2 \times 22 \times 14} \text{ cm} = 30 \text{ cm}$$

$$h = 30 \text{ cm}$$

$$\text{Volume of the cylinder} = \pi r^2 h$$

$$= \frac{22}{7} \times 14^2 \text{ cm} \times 14 \text{ cm} \times 30 \text{ cm}$$

$$= 18,480 \text{ cm}^3$$

10. (C) Let 'k' to be added to $(x^3 - 3x^2 + 5x - 6)$

So, its exactly divisible by $(x + 3)$

$$\therefore p(x) = x^3 - 3x^2 + 5x - 6 + K \text{ \& } p(-3) = 0$$

$$p(-3) = (-3)^3 - 3(-3)^2 + 5(-3) - 6 + K = 0$$

$$-27 - 27 - 15 - 6 + K = 0$$

$$\therefore K = 75$$

$$\therefore 75 \text{ to be added}$$

11. (A) It is in indirect variation

$$\therefore x_1 y_1 = x_2 y_2$$

$$\Rightarrow 20 \times 14 = 35 \times y_2$$

$$\therefore y_2 = \frac{20 \times 14}{35} = 8$$

12. (D) Radius of the hemisphere, $r = 4.2 \text{ cm}$.

$$\text{Radius of the cylinder, } r = 4.2 \text{ cm}$$

$$\text{Height of the cylinder, } h = 12 \text{ cm}$$

$$\text{Total surface area of the article}$$

$$= \text{curved surface area of cylinder} + \text{curved surface area of 2 hemispheres}$$

$$= 2\pi rh + 2 \times 2\pi r^2 = 2\pi rh + 4\pi r^2$$

$$= 2\pi r(h + 2r)$$

$$= \left[2 \times \frac{22}{7} \times 4.2 \times (12 + 2 \times 4.2) \right] \text{ cm}^2$$

$$= (26.4 \times 20.4) \text{ cm}^2 = 538.56 \text{ cm}^2$$

13. (B) $6x^2 + 25x - 221 = 6x^2 + 51x - 26x - 221$

$$= 3x(2x + 17) - 13(2x + 17)$$

$$= (2x + 17)(3x - 13)$$

14. (D) Option (A)

$$\begin{aligned}
 x + \frac{1}{x} &= \frac{5 - \sqrt{21}}{2} + \frac{2}{5 - \sqrt{21}} = \frac{(5 - \sqrt{21})^2 + 2^2}{2(5 - \sqrt{21})} \\
 &= \frac{25 - 10\sqrt{21} + 21 + 4}{2(5 - \sqrt{21})} \\
 &= \frac{50 - 10\sqrt{21}}{2(5 - \sqrt{21})} \\
 &= \frac{10(5 - \sqrt{21})}{2(5 - \sqrt{21})}
 \end{aligned}$$

= 5 which is a rational number.

(option B)

$$\begin{aligned}
 x + y &= \frac{\sqrt{2} + 1}{\sqrt{2} - 1} + \frac{\sqrt{2} - 1}{\sqrt{2} + 1} \\
 &= \frac{(\sqrt{2} + 1)^2 + (\sqrt{2} - 1)^2}{(\sqrt{2} - 1)(\sqrt{2} + 1)} \\
 &= \frac{(\sqrt{2})^2 + 2(\sqrt{2})(1) + 1^2 + (\sqrt{2})^2 - 2\sqrt{2}(1) + 1^2}{(\sqrt{2})^2 - 1^2} \\
 &= \frac{2 + 1 + 2 + 1}{1}
 \end{aligned}$$

$$x + y = 6$$

S.O.B.S.

$$x^2 + 2xy + y^2 = 36$$

$$x^2 + 2(1) + y^2 = 36$$

$$[\because xy = \frac{\sqrt{2} + 1}{\sqrt{2} - 1} \times \frac{\sqrt{2} - 1}{\sqrt{2} + 1} = 1]$$

$$x^2 + 2 + y^2 = 36$$

$$x^2 + y^2 = 36 - 2 = 34$$

$x^2 + y^2 + xy = 34 + xy = 34 + 1 = 35$ which is a rational number

Option (C)

$$\begin{aligned}
 x + y &= \frac{(3 - 2\sqrt{2})^2 + (3 + 2\sqrt{2})^2}{(3 + 2\sqrt{2})(3 - 2\sqrt{2})} \\
 &= \frac{9 - 12\sqrt{2} + 8 + 9 + 12\sqrt{2} + 8}{9 - 8} \\
 &= 34 \text{ which is a rational number}
 \end{aligned}$$

Option (D)

$$\begin{aligned}
 &\left(\frac{\sqrt{13} - \sqrt{11}}{\sqrt{13} + \sqrt{11}} \right) - \left(\frac{\sqrt{13} + \sqrt{11}}{\sqrt{13} - \sqrt{11}} \right) \\
 &= \frac{(\sqrt{13} - \sqrt{11})^2 - (\sqrt{13} + \sqrt{11})^2}{(\sqrt{13} + \sqrt{11})(\sqrt{13} - \sqrt{11})} \\
 &= \frac{13 - 2\sqrt{143} + 11 - (13 + 2\sqrt{143} + 11)}{(\sqrt{13})^2 - (\sqrt{11})^2} \\
 &= \frac{24 - 2\sqrt{143} - 24 - 2\sqrt{143}}{2} \\
 &= \frac{-4\sqrt{143}}{2}
 \end{aligned}$$

= $-2\sqrt{143}$ which is an irrational number

15. (B) It is in direct proportion

$\therefore x_1$ = length of the pole = 5 m 60 cm

y_1 = length of the shadow = 3 m 20 cm

x_2 = ?

y_2 = length of the shadow = 6 cm

$$\therefore \frac{x_1}{y_1} = \frac{x_2}{y_2}$$

$$\frac{5 \text{ m } 60 \text{ cm}}{3 \text{ m } 20 \text{ cm}} = \frac{x_2}{6 \text{ m}}$$

$$\Rightarrow x_2 = \frac{5.6 \text{ m}}{3.2 \text{ m}} \times 6 \text{ m}$$

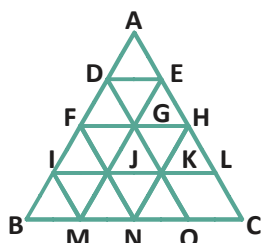
$$= \frac{56 \text{ m}}{32 \text{ m}} \times 6 \text{ m}$$

$$= \frac{42 \text{ m}}{4}$$

$$= 10 \text{ m } 50 \text{ cm}$$

REASONING

16. (C) At sunrise, the sun is in the East. If her shadow is behind her, she's facing East. Turning 90 degrees clockwise means she'll be facing South, so her shadow (with the sun still in the East) will be to her right.
17. (D) Except option (D), all other figures can be rotated to get one another.
18. (A) According to the given coding, A + B means A is the brother of B and B x C means B is the father of C. Combining both, A is the brother of B, and B is the father of C.
19. (B) The figure may be labelled as shown.



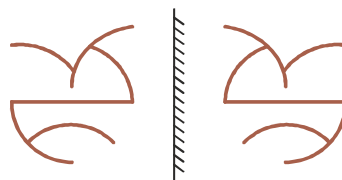
The horizontal lines are DE, FH, IL and BC i.e., 4 in number

The slanting lines are AC, DO, FN, IM, AB, EM and HN i.e. 7 in number,

Thus, there are $4 + 7 = 11$ straight lines in the figure.

20. (D) By, comparing letters and digit, we get
 T = 1, O = 2, U = 3,
 R = 4, C = 5, L = 6,
 E = 7, A = 8, S = 9
 and P = 0
 As the 5th letter is SCULPTURE is P and '0' is used for P, therefore, 5th digit is the required code which is '0'
21. (C) When the second alphabets in each of the words are changed to the next alphabet in the English alphabetical order, we have
 AOD FPR TIE BJJ SVM
 Clearly, there two words having two vowels. These words are AOD and TIE
22. (D) MARVELOUS

23. (B)



24. (C) Such meaningful words are 'FILE' and 'LIFE'.

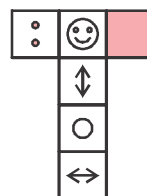
25. (D)



26. (A)



27. (C)



28. (B) Lemonade always is the correct answer because deal is hidden between Lemonade and always

29. (C) In the first fig., central number
 $\frac{1}{10}(5 \times 6 \times 4) = 12$

In the second fig., $\frac{1}{10}(6 \times 7 \times 5) = 21$

Similarly in the third figure

$$\frac{1}{10}(4 \times 8 \times 10) = 32$$

30 (C) 1st letter :

N $\xrightarrow{-3}$ K $\xrightarrow{-3}$ H $\xrightarrow{-3}$ E $\xrightarrow{-3}$ B

Middle number:

5 $\xrightarrow{+2}$ 7 $\xrightarrow{+3}$ 10 $\xrightarrow{+4}$ 14 $\xrightarrow{+5}$ 19

3rd number:

V $\xrightarrow{-2}$ T $\xrightarrow{-2}$ R $\xrightarrow{-2}$ P $\xrightarrow{-2}$ N

COMPUTERS

31. (A) The personal computer industry was started by IBM.
32. (C) Non-volatile storage retains data even when the computer is turned off. Solid State Drives (SSD) are non-volatile, meaning they keep their stored data even without power.
33. (D) A real-time operating system (RTOS) is an operating system (OS) intended to serve real-time applications that process data as it comes in, typically without buffer delays. Processing time requirements (including any OS delay) are measured in tenths of seconds or shorter increments of time
34. (B) (A) Printer - Concerned with the control panel. You can add, remove, or adjust printer settings via the control panel.
(C) Font - Concerned with the control panel. You can install or remove fonts and sometimes adjust default font settings.
(D) Keyboard - Concerned with the control panel. You can adjust keyboard settings, layouts, and input methods.
(B) Run Application - Not typically associated with the control panel. Running applications is usually done via the operating system's interface, like the Start Menu or desktop in Windows, for instance.
35. (D) To create mail merged results, MS Word can take address input from MS-Excel, MS-Access and Text Files.
36. (B) Hover Buttons in FrontPage were interactive buttons that changed appearance when a user hovered over them. They could be easily customized and added to web pages without the need for complex coding.
37. (D) By positioning the cursor at the appropriate place in your Microsoft Word document and pressing Ctrl + Enter, you can insert a page break. This keyboard shortcut is a quick way to force content following the cursor to begin on a new page.
38. (D) It displays both reviewers' changes, usually in different colors, to distinguish between them. Word assigns different colors to different reviewers to help identify who made specific changes.
39. (D) If Mike simply subtracts the birth year from the current year, it wouldn't account for whether the user's birthday has occurred yet for the current year. This might lead to the age being off by a year.
40. (B) In Visual Basic If...Then...Else statement is used for coding single-alternative and dual-alternative selection structures. The If...Then...Else statement statements provide for a statement block where the condition may be true and another if the condition is false.
41. (B) The Clone Stamp tool allows you to copy pixels from one part of an image and paint them over another area, effectively duplicating the source pixels.
42. (A) Shortcut key to toggle between Standard and Quick Mask mode is Q.
43. (B) The Information Technology Act 2000 is the prime legislation dealing with cyber offenses and electronic commerce in India which is based on the United Nations Model Law on Electronic Commerce adopted by the United Nations Commission on International Trade Law (UNCITRAL).
44. (D) LinkedIn social media network is considered the most popular for business-to-business marketing.
Note: LinkedIn was founded by Reid Hoffman and was launched in 2003.
45. (C) Adjustment Layers in Photoshop allow for non-destructive edits. Instead of directly modifying the original image, you can apply changes on a separate layer and adjust them as needed without affecting the original image below.

ENGLISH

46. (C) The complete sentence would be: "There was a bright light in the sky through out the night."
47. (A) The antonym for "Frugal" is:extravagant
48. (B) The idiom "To get cold feet" means to suddenly become afraid or hesitant about doing something that was previously planned or decided. It is often used to describe a situation where someone loses their nerve or confidence.

49. (D) The group of words "To slap with a flat object" describes an action where you strike something or someone with a flat, usually open hand or a flat object like a newspaper or a flyswatter. It is a quick and often non-lethal motion used to hit or strike something.

The correct replacement for this group of words is: swat

50. (A) In the first pair, "Particular" is related to "Fussy" as both words describe someone who is very concerned with details or is overly attentive to small details.

To find a word similar in meaning to "Subservient" in the same way, we need to find a word that describes someone who is overly obedient or submissive. The best choice from the options provided is: Meek.

So, the completed pair would be: "Subservient : Meek."

THE END
