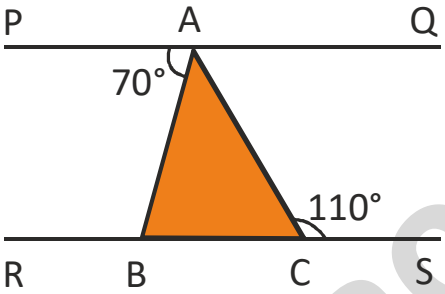
01. If a + b + c = 9 and ab + bc + ca = 26, then choose the value of $a^3 + b^3 + c^3 - 3abc$.

(A) 27 (B) 29 (C) 495 (D) 729

02. In the given figure, if PQ||RS, ∠PAB = 70° and ∠ACS = 110°, then select the measure of ∠BAC.



(A) 40° (B) 70° (C) 110° (D) 30°

03. Which option is closest to $\sqrt{82} - \sqrt{80}$?

(A) 0.13 (B) 0.25 (C) 0.11 (D) 0.15

04. What is the area of an isosceles triangle with equal sides b and base a ?

(A) $\frac{a}{2}\sqrt{b^2 - a^2}$ (B) $\frac{1}{2}a\sqrt{4b^2 - a^2}$

(C) $\frac{a}{4}\sqrt{b^2 - a^2}$ (D) $\frac{a}{4}\sqrt{4b^2 - a^2}$

05. Choose the factor of $[(1 - x^2)(1 - y^2) + 4xy]$

(A) $(1 + xy + x - y)$ (B) $(1 + xy - x - y)$

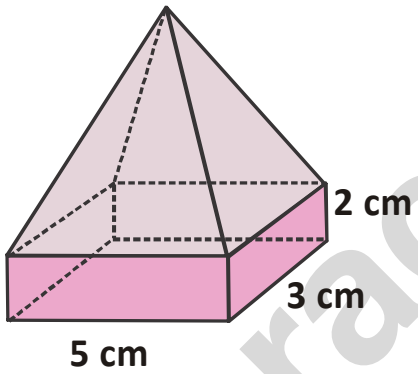
(C) $(1 - xy + x - y)$ (D) $(1 - xy - x - y)$

06. **In a parallelogram ABCD, the centroids of ΔABD and ΔBCD are P & Q respectively. Choose the area of ΔBPQ if the area of the parallelogram ABCD is 126 cm².**

(A) 21 cm² (B) 63 cm²

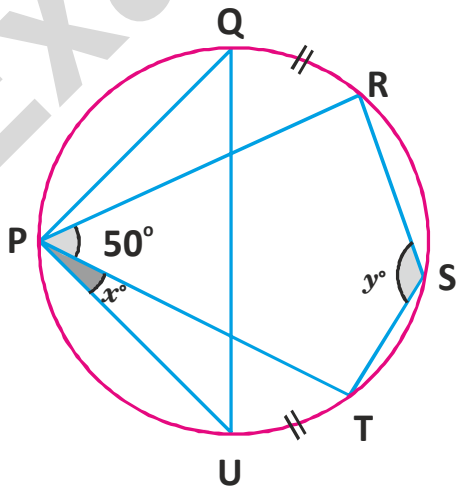
(C) 31.5 cm² (D) 15.75 cm²

07. **If the height of the pyramid is 4 cm, find the volume of the composite solid, in cm³.**



(A) 50 (B) 60 (C) 90 (D) 120

08. **In the given figure, QU is a diameter and arc QR = arc TU. What is the value of $x + y$?**



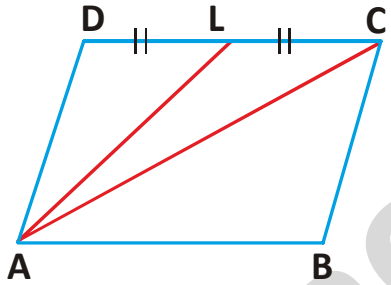
(A) 130° (B) 140° (C) 150° (D) 160°

09. **Two different lines in a plane can intersect maximum at _____**

(A) one point. (B) two points.

(C) three points. (D) four points.

10. **ABCD is a parallelogram of CL = LD. If area of quadrilateral (ABCL) is 72 cm² then, select the area of ΔADC.**



(A) 24 cm² (B) 48 cm² (C) 36 cm² (D) 54 cm²

11. **The polynomials $ax^2 + 3x^2 - 3$ and $ax^3 - 5x + a$ when divided by $(x - 4)$ leave remainders R_1 and R_2 respectively. Find the value of 'a', if $2R_1 - R_2 = 0$.**

(A) $-\frac{18}{127}$ (B) $\frac{18}{31}$

(C) $\frac{10}{3}$ (D) $-\frac{17}{127}$

12. **If $x = 2 - \sqrt{3}$, then choose the value of $x^2 - \frac{1}{x^2}$.**

(A) $8\sqrt{3}$ (B) $-4\sqrt{3}$

(C) $-8\sqrt{3}$ (D) $4\sqrt{3}$

13. **Select the factor of $(x - b)^5 + (b - a)^5$**

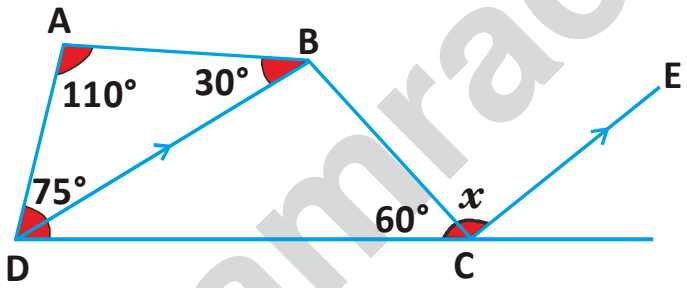
(A) $(a - b)$ (B) $(x - b)$

(C) $(x - a)$ (D) $(x + b)$

14. **In a parallelogram ABCD, P and Q are midpoints of BC and CD. Area of ΔAPQ is _____ of the area of parallelogram ABCD.**

(A) equal (B) $\frac{1}{8}$ (C) $\frac{1}{4}$ (D) $\frac{3}{8}$

15 **If CE is parallel to DB in the given figure, then choose the value of 'x'.**



(A) 30° (B) 45° (C) 75° (D) 85°

16. **The height and base radius of a cone are each increased by 100%. The volume of the cone now becomes _____ times original.**

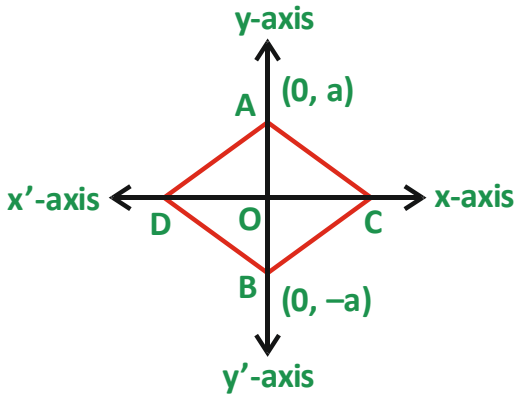
(A) double (B) four times

(C) three times (D) eight times

17. **In ΔABC, AB = 8 cm. If the altitudes corresponding to AB and BC are 4 cm and 5 cm respectively, find the measure of BC.**

(A) 6.4 cm (B) 4.6 cm (C) 5.4 cm (D) 4.5 cm

18. **In the graph ΔABC and ΔABD are equilateral triangles.**



Find the respective coordinates of points C and D.

(A) $(0, a\sqrt{3}), (0, -a\sqrt{3})$ (B) $(0, -a\sqrt{3}), (0, a\sqrt{3})$

(C) (a, 0), (–a, 0) (D) $(a\sqrt{3}, 0), (-a\sqrt{3}, 0)$

19. **PQRST is a cyclic pentagon and PT is a diameter. Select the result of (∠PQR + ∠RST).**

(A) 180° (B) 270° (C) 216° (D) 144°

20. **Find the area of the quadrilateral whose sides are 9 m, 40 m, 28 m and 15 m respectively and the angle between first two sides is a right angle.**

(A) 272 m^2 (B) 256 m^2

(C) 306 m^2 (D) 342 m^2

21. **In a trapezium ABCD. AB||CD and AD = BC. ∠DAB = $3x$° and ∠BCD = $2x$° then find ∠ABC.**

(A) 72° (B) 108° (C) 75° (D) 105°

22. **Select the sector of ($x^4 + 5x^2 + 9$)**

(A) $(x^4 + 3x + 3)$ (B) $(x^2 + 2x + 3)$

(C) $(x^2 - 2x + 3)$ (D) $(x^2 - x + 3)$

23. **What is the distance between (3, 5) and (3, –6) ?**

(A) 11 units (B) 1 unit

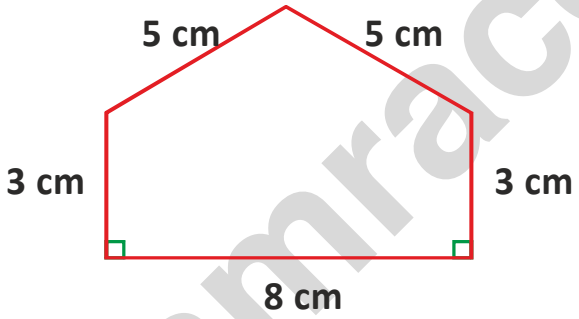
(C) 15 units (D) 30 units

24. **The base radii of two right circular cylinders are in the ratio 2 : 3 and heights are in the ratio 5 : 3. Choose the ratio of their volumes.**

(A) 10 : 9 (B) 20 : 27

(C) 50 : 27 (D) 4 :9

25. **What is the area of the pentagon shown ?**



(A) 32 cm^2 (B) 42 cm^2

(C) 36 cm^2 (D) 54 cm^2

26. If the distance between two point particles is doubled, then the gravitational force between them

(A) decreases by a factor of 4.

(B) decreases by a factor of 2.

(C) increases by a factor of 2.

(D) increases by a factor of 4.

27. What force would be needed to produce an acceleration of 4 m/s^2 on a ball of mass 6 kg ?

(A) 3 N (B) 9 N (C) 24 N (D) 56 N

28 Potential energy cannot be stored in a

(A) compressed spring. (B) stretched rubber band.

(C) bent plastic ruler. (D) fan in motion.

29. A car has an initial speed of 40 m/s and decelerates at 5 m/s^2 for 6 s. What is the speed of the car at the end of 6 s ?

(A) 8 m/s (B) 10 m/s (C) 70 m/s (D) 90 m/s

30. If soldiers use guns of different weights with bullets of a fixed weight, then they prefer

(A) light guns as handling them is easy

(B) heavy guns as they can be held firmly

(C) heavy guns as they have less recoil

(D) light guns as they can be carried easily

31. **An engine can pump 40,000 litres of water to a vertical height of 35 metres in 5 minutes. Calculate the gravitational potential energy of water at the given height.**

(A) 39.2×10^4 J (B) 1.4×10^6 J

(C) 1.37×10^7 J (D) 8.5×10^{-3} J

32. **A particle is moving along a circular track of radius 1 m with uniform speed. Find the ratio of the distance covered and the displacement in half revolution.**

(A) 1 : 1 (B) 0 : 1 (C) π : 1 (D) π : 2

33. **Match the entries in Column I with those in Column II.**

	Column - I		Column - II
(a)	Force	1.	$N\ m^{-2}$
(b)	Weight	2.	Kg
(c)	Pressure	3.	N
(d)	Impulse	4.	N s
(e)	Mass	5.	kg wt

(A) a-3, b-2, c-4, d-1, e-5

(B) a-5, b-4, c-3, d-1, e-2

(C) a-3, b-5, c-1, d-4, e-2

(D) a-4, b-2, c-1, d-3, e-5

34. A boy moved a body through 3 m in four different ways. In which case, the work done is maximum ?

(A) Pushing a body over an inclined plane

(B) Lifting a body vertically upwards

(C) Pushing a body over smooth rollers

(D) Pushing on a plane horizontal surface

35. The weight of a body on the surface of the earth is 12.6 N. When it is raised to a height half the radius of the earth, then what will be its weight ?

(A) 1.2 N (B) 2.8 N

(C) 3.7 N (D) 5.6 N

36. What is the percentage of Calcium(Ca) in Calcium carbonate ($CaCO_3$) ?

(A) 32.65 (B) 40 (C) 88.9 (D) 18

37. Identify a solid-in-solid colloid.

(A) Shaving cream (B) Milk of magnesia

(C) Milky glass (D) Cheese

38. Calculate the number of iron atoms in a piece of iron weighing 2.8 g. (Atomic mass of iron = 56)

(A) 30.11×10^{23} atoms (B) 3.11×10^{23} atoms

(C) 3.0115×10^{22} atoms (D) 301.1×10^{23} atoms

39. Ice-cream is a/an

(A) solution. (B) emulsion.

(C) element. (D) suspension.

40. On converting 25°C, 38°C and 66°C to Kelvin scale, the correct sequence of temperatures will be

(A) 298 K, 311 K and 339 K

(B) 298 K, 300 K and 338 K

(C) 273 K, 278 K and 543 K

(D) 298 K, 310 K and 338 K

41. Carbon dioxide, hydrogen sulphide, calcium chloride and sodium oxide are molecules that are

(A) triatomic

(B) triatomic and tetra-atomic

(C) diatomic and triatomic

(D) tetraatomic

42. Identify a homogeneous solution.

(A) Muddy water (B) Bread

(C) Concrete (D) Sugar and water

43. How much lime is obtained by heating 400 g of lime stone ?

(A) 224 g (B) 220 g (C) 400 g (D) 320 g

44. Which substance is pure ?

(A) Steel (B) Magnalium

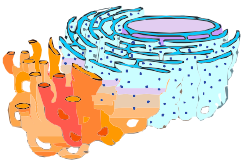
(C) Ammonia (D) Gun powder

45. The atomicities of ozone, sulphur, phosphorus and argon respectively are

(A) 8, 3, 4 and 1 (B) 1, 3, 4 and 8

(C) 4, 1, 8 and 3 (D) 3, 8, 4 and 1

46. Identify the option which is showing the organelle that is correctly matched with its specific function.

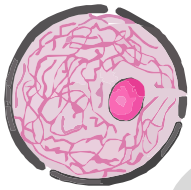


I

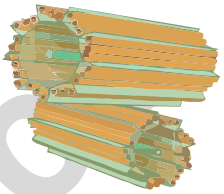
II

III

IV



V



VI

(A) Organelle - I; Function - Power house of the cell

(B) Organelle - IV; Function - Carries out photosynthesis

(C) Organelle - V; Function - Control the formation of spindle fibres

(D) Organelle - VI; Function - Chemical modification of proteins

47. Which of the following does not have a poison apparatus ?

(A) Scorpion (B) Centipede

(C) Spider (D) Crab

48. Which tissue provides mechanical strength to plants ?

(A) Sclerenchyma (B) Collenchyma

(C) Parenchyma (D) Chlorenchyma

49. What kind of a disease is arthritis ?

(A) An acute disease

(B) A chronic disease

(C) An infectious disease

(D) A communicable disease

50. Farmers need to apply less nitrogenous fertilizers to paddy fields. If which of these incorporated after transplanting as intercrop ?

(A) Rhodophyceae (B) Spirogyra

(C) Azolla spp. (D) Dandelion

51. Which of the following best describes a tissue ?

(A) A collection of a single type of cell working together to perform various functions

(B) A group of similar cells working together to perform a specific function

(C) A single part of an organism

(D) A single part of an organ

52. Which of the following explains the rise of water by capillary action in the xylem ?

(i) The xylem wall attracts water molecules upwards by adhesion

(ii) Water attracts other water molecules by cohesion

(iii) Water continues to move downwards until the downward forces are balanced by the weight of the water

(iv) Water continues to rise upwards until the upward forces are balanced by the weight of the water

(A) (i), (ii) and (iii) only (B) (ii), (iii) and (iv) only

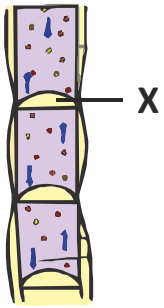
(C) (i), (ii) and (iv) only (D) (i), (iii) and (iv) only

53. Identify the process of preparing manure with the help of earthworms and kitchen waste.

(A) Green manuring (B) Vermicomposting

(C) Pasteurization (D) Neutralization

54. The diagram shows part of the xylem vessel.



What is the substance that makes up structure X ?

(A) Lignin (B) Cellulose

(C) Starch (D) Chromosome

55. Houseflies are the vectors of

(A) Cholera (B) Malaria

(C) Dengue (D) Influenza

56. **How many triangles, rectangles and circles can you identify in the image ?**

(A) 4 rectangles, 3 triangles and 1 circle

(B) 4 rectangles, 5 triangles and 2 circles

(C) 3 rectangles, 3 triangles and 2 circles

(D) 2 rectangles, 3 triangles and 2 circles

57. **Read the statement and argument, then choose the correct option.**

Statement :

Are nuclear families better than joint families ?

Arguments :

(I) No, joint families ensure greater security.

(II) Yes, nuclear families ensure greater freedom.

(A) Only argument I is strong

(B) Only argument II is strong

(C) Either I or II is strong

(D) Both I and II are strong

58. **Fact 1 : Sushant said, " Dhoni and I both play cricket".**

Fact 2 : Dhoni said, " I don't play ciricket".

Fact 3 : Sushant always tells the truth, but Dhoni sometimes lies.

If the first three statements are facts, which of the following statements must also be a fact ?

I. Dhoni play cricket.
II. Sushant plays cricket.
III. Dhoni is Lying.

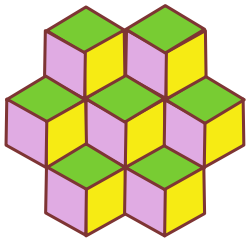
(A) II only

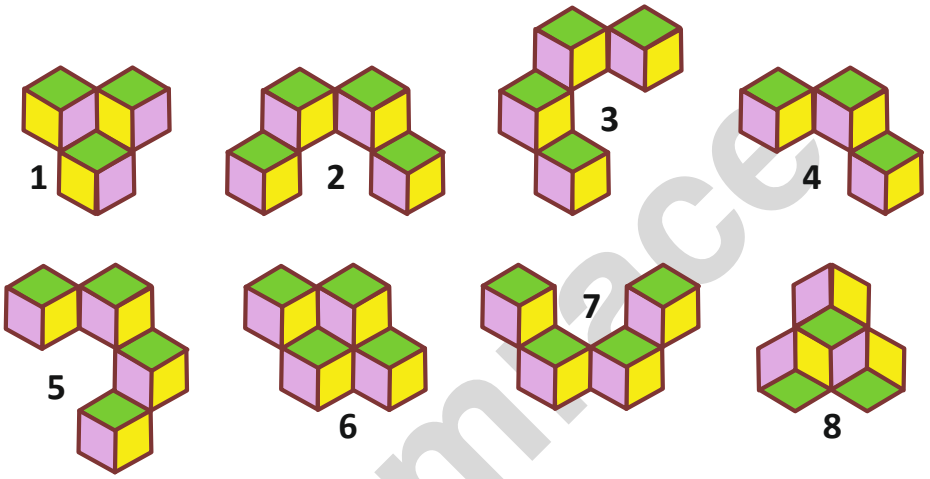
(B) I and II only

(C) I, II and III

(D) None of the statement is a known fact.

59. **Which two pieces were used to produce the given pattern ?**





(A) 1 and 2 (B) 4 and 6

(C) 3 and 8 (D) 4 and 5

60. **Nancy has gone to meet her cousins after 7 years. She remembers their names but could not recognize who is who. Their names are Shilpa, Megha, Raju, Diksha, Swetha, Chitra and Namrata.**

- **The eldest among them loves drawing while the youngest loves crafting.**
- **Swetha and Diksha love to sing and non of them is youngest.**
- **Shilpa is elder than Diksha, while Megha is elder than Swetha.**
- **Raju the elder brother of Chitra likes to play cricket.**
- **Namrata neither loves singing nor crafting.**

Who is youngest among the cousins of Nancy ?

(A) Shilpa (B) Namrata

(C) Swetha (D) Chitra

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CLASS - 9

Question Paper Code : UN474

KEY

1. A	2. A	3. C	4. D	5. A	6. A	7. A	8. C	9. A	10. B
11. C	12. C	13. C	14. D	15. D	16. D	17. A	18. D	19. B	20. C
21. B	22. D	23. A	24. B	25. C	26. A	27. C	28. D	29. B	30. C
31. C	32. D	33. C	34. B	35. D	36. B	37. C	38. C	39. B	40. A
41. A	42. D	43. A	44. C	45. D	46. B	47. D	48. A	49. B	50. C
51. B	52. C	53. B	54. A	55. A	56. A	57. D	58. C	59. B	60. D

SOLUTIONS

MATHEMATICS

01. (A) Given $(a + b + c) = 9$

Squaring on both sides

$a^2 + b^2 + c^2 + 2abc + 2bc + 2ca = 81$

Subtracting $3ab + 3bc + 3ca$ on both sides

$\therefore$ $a^2 + b^2 + c^2 - ab - bc - ca = 81 - 3(26) = 3.$

$\therefore$ $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

$= 9 \times 3$

$= 27$

02. (A) $\angle PAB + \angle BAC = \angle ACS$

$\therefore$ $\angle BAC = 110° - 70° = 40°$

03. (C)

9	82.0000	9.05
	81	
180	100	
	0	
1805	10000	
	9025	
	975	

8	82.$\overline{00}$ $\overline{00}$	8.94
	81	
169	100	
	0	
1784	10000	
	9025	
	975	

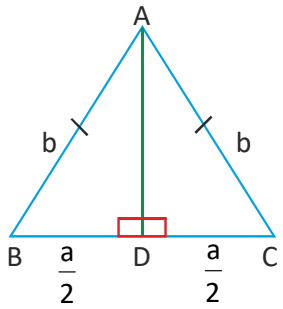
$\sqrt{82}$ = 9.05

$\sqrt{80}$ = 8.94

$\therefore$ $\sqrt{82} - \sqrt{80}$ = 9.05 – 8.94

= 0.11

04. (D)



Given AB = AC = b

In ΔABC, AD $\perp$ BC

$\therefore$ $\Delta ABD \cong \Delta ACD \Rightarrow BD = DC = \frac{BC}{2} = \frac{a}{2}$

In ΔABD, $\angle D = 90°$

$\therefore$ $Ab^2 = AB^2 - BD^2 = b^2 - a^2 = \frac{4b^2 - a^2}{4}$

$AD = \frac{\sqrt{4b^2 - a^2}}{4} = \frac{\sqrt{4b^2 - a^2}}{2}$

Area of $\Delta ABC = \frac{1}{2}$ BC × AD

$= \frac{1}{2} \times a \frac{\sqrt{4b^2 - a^2}}{2} = \frac{a}{4}\sqrt{4b^2 - a^2}$

05. (A) $(1 - x^2)(1 - y^2) + 4xy = 1 - y^2 - x^2 + x^2y^2 + 4xy$

$= (1 + x^2y^2 + 2xy) - (x^2 + y^2 - 2xy)$

$= (xy + 1)^2 - (x - y)^2$

$= (xy + 1 + x - y)(xy + 1 - x + y)$

06. (A) Given AP = PQ = QC and

Area of the 11 gm ABCD = 126 cm^2

Area of $\Delta ABC = \frac{1}{2}$ × ar 11 gm ABCD = 63 cm^2

Area of $\Delta PQB = \frac{1}{3}$ area 11 gm ΔABC = 63 cm^2

07. (A) Volume of the solid = Volume of cuboid + Volume of the pyramid

$= 5 \times 3 \times 2\ cm^3 + \frac{1}{\cancel{3}} = 5 \times \cancel{3} \times 4\ cm^3$

= 30 cm^3 + 20 cm^3

= 50 cm^3

08. (C) $x° = \angle QPR = \frac{90° - 50°}{2} = 20°$

$y° = 180° - 50° = 130°$

$x + y = 150°$

09. (A) Two different lines can intersect at one point

10. (B) Area of $\Delta ACL = \frac{1}{3}$ of area of the quadrilateral ABCL

$= \frac{1}{3} \times 72\ cm^2$

= 24 cm^2

Area of ΔADC = 2 × area of ΔACL = 48 cm^2

11. (C) Given $2R_1 - R_2 = 0$

$2[a \times 4^2 + 3 \times 4^2 - 3]\ [a \times 4^3 - 5 \times 4 + a] = 0$

$2(16a + 48 - 3) - (64a - 20 + a) = 0$

$32a + 90 - 65a + 20 = 0$

$-33a = -110$

$a = \frac{110}{33}$

12. (C) Given $x = 2 - \sqrt{3}$

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

$$\therefore \quad x + \frac{1}{x} = 2 - \sqrt{3} + 2 + \sqrt{3} = 4$$

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

$$x^2 - \frac{1}{x^2} = \left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right) = 4x - 2\sqrt{3} = -8\sqrt{3}$$

13. (C) Given $f(x) = (x - b)^5 + (b - a)^5$

$f(a) = (a - b)^5 + (b - a)^5$

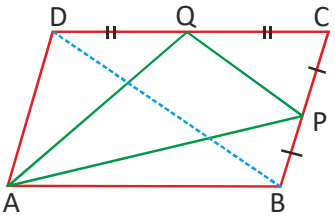
$= (a - b)^5 + (-1)^5 (a - b)^5$

$= \cancel{(a-b)^5} - \cancel{(a-b)^5}$

$= 0$

$(x - a)$ is a factor of $(x - b)^5 + (b - a)^5$

14. (D)



Area of $\Delta ABP = \frac{1}{4}$ of area of the parallelogram ABCD .....Eq. (1)

Area of $\Delta CPQ = \frac{1}{4}$ of area of $\Delta ABCD = \frac{1}{4} \times \frac{1}{2}$ area of || gm ABCD.....Eq. (2)

Area of $\Delta ADQ = \frac{1}{4}$ of area of parallelogram ABCD .....Eq. (3)

$\therefore$ Area of ΔAPQ = Area of parallelogram ABCD - eq. (1) – eq. (2) – eq. (3)

= Ar || gm ABCD = $\frac{1}{4}$ ar || gm ABCD = $\frac{1}{8}$ ar || gm ABCD $-\frac{1}{4}$ area of || gm ABCD $= \left[\frac{8-2-1-2}{8}\right]$ Area of || gm ABCD

$= \frac{3}{8}$ area of parallelogram ABCD

15 (D) ABCD is a quadrilateral

$110° = 75° + 60° + \angle ABC = 360°$

$245° + \angle ABC = 360°$

$\angle ABC = 360° - 245° = 115°$

$\therefore \quad 30 + \angle DBC = 115°$

$\angle DBC = 85°$

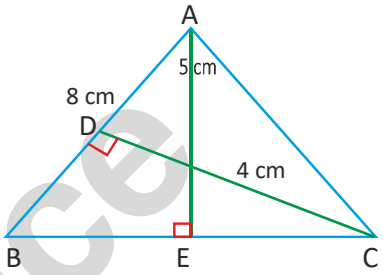
$\therefore \quad x = \angle DBC = 85°$

16. (D) Given R = 2r & H = 2h

New volume = $\pi^2 H = \pi(2r)^2 (2h) = \pi r^2 h$

= 8 times the original volume

17. (A)



Area of $\Delta ABC = \frac{1}{2}$ AB × CD = $\frac{1}{2}$ × BC × AE

$\Rightarrow \frac{1}{2} \times BC \times 5 \text{ cm} = \frac{1}{2} \times 8 \text{ cm} \times 4 \text{ cm}$

$\therefore$ BC = $\frac{32 \text{ cm}^2}{5 \text{ cm}}$ = 6.4 cm

18. (D) In ΔABC given AB = BC = CA

$\therefore \quad OC = \frac{\sqrt{3}}{2} \times AB$

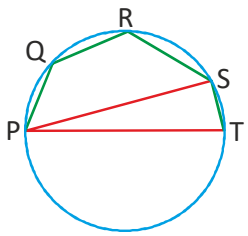
$\frac{\sqrt{3}}{\cancel{2}} \times \cancel{2}a$

$= \sqrt{3}a$

$\therefore$ C = $(\sqrt{3}a, 0)$

Similarly D = $(-\sqrt{3}a, 0)$

19. (B)



Const:- Join PS

In ΔPST, $\angle PST = 90°$ .....(1)

[$\because$ Angle in a semicircle]

PQRS is a cyclic quadrilateral

$\therefore$ $\angle PQR + \angle RSP = 180$ .....(2)

eq. (2) + (1) $\Rightarrow$ $\angle PQR + \angle RSP + \angle PST = 180° + 90° = 270°$

$\Rightarrow$ $\angle PQR + \angle RST = 270°$

20. (C) Area of $\Delta ABC = \frac{1}{2} \times AB \times BC = 180\ m^2$

In ΔABC, $\angle ABC = 90°$

$\Rightarrow AC^2 = AB^2 + BC^2 = 40^2 + 9^2$

$AC = \sqrt{1681}$

$AC = 41$ m

In ΔACD,

$$s = \frac{a+b+c}{2} = \frac{41+28+15}{2} = \frac{84}{21} = 42$$

Area of $\Delta ACD = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{42 \times 1 \times 27 \times 14}$

$= \sqrt{15876}\ m^2$

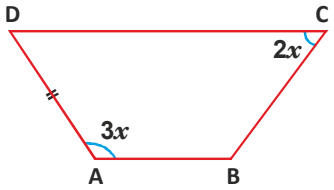
$= 126\ m^2$

$\therefore$ Area of quadrilateral ABCD

$= (180 + 126)\ m^2$

$= 306\ m^2$

21. (B) Given ABCD is an isosceles trapezium



$\therefore$ $\angle DAB = \angle ABC$ & $\angle BCA = \angle CDA = 2$ m

But $\angle DAB + \angle CDA = 180°$

$3x + 2x = 180°$

$$x = \frac{180°}{5} = 36°$$

$\angle ABC = \angle DAB = 3x = 108°$

22. (D) $x^4 + 5x^2 + 9 = x^4 + 5x^2 + 9 + x^2 - x^2$

$= x^4 + 6x^2 + 9 - x^2$

$= (x^2 + 3)2 - x^2$

$= (x^2 - x + 3)(x^2 + x + 3)$

23. (A) Distance between (3, 5) and (3, –6) = 5 – (–6) = 11 units.

24. (B) Given $r_1 : r_2 = 2 : 3$

$$\Rightarrow \frac{r_1}{r_2} = \frac{2}{3} \Rightarrow r_1 = \frac{2}{3} r_2$$

Given $h_1 : h_2 = 5 : 3$

$$\Rightarrow \frac{h_1}{h_2} = \frac{5}{3} \Rightarrow h_1 = \frac{5h_2}{3}$$

$\therefore$ $v_1 : v_2 = \pi r_1^2 h_1 : \pi r_2^2 h_2$

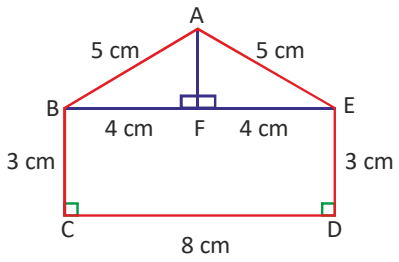
$$= \left(\frac{2}{3} r^2\right) = \left(\frac{5h_2}{3}\right) : r_2^2 h_2$$

$$= \frac{4r_2^2}{9} \times \frac{5h_2}{3} : r_2^2 : h_2$$

$$= \frac{20}{27} : 1$$

$= 20 : 22$

25. (C)



Area of the pentagon = Area of the rectangle + area of the triangle

$= 8 \times 3\ cm^2 + \frac{1}{2} \times BE \times AF$

$= 24\ cm^2 + \frac{1}{2} \times 8\ cm \times 3\ cm$

$= 36\ cm^2$

PHYSICS

26. (A) Gravitational force obeys an inverse-square law: $F_{grav} \propto \frac{1}{r^2}$. Therefore, if r increases by a factor of 2, then F_{grav} decreases by a factor of $2^2 = 4$.

27. (C) Acceleration (a) = 4 m/s^2

Mass (m) = 6 kg

Force (F) = ?

By using the formula, F = m × a,

F = 6 kg × 4 m/s^2

F = 24 kg m/s^2 = 24 N

So, a force of 24 N is needed to produce an acceleration of 4 m/s^2 on a ball of mass 6 kg.

28 (D) A fan in motion has kinetic energy.

29. (B) $a = \frac{v-u}{t}$

$-5 = \frac{v-40}{6}$

v = – 30 + 40

= 10 m/s

30. (C) If P = mv is the momentum of the rifle after firing, in order to have less recoil speed, the mass of the gun should be more or it should be heavy.

31. (C) 1000 litres = 1 m^3

Volume of water = 40,000 litres

$= \frac{40000}{1000} = 40\ m^3$

Mass of water, m = density × volume

= 1000 × 40 = 40,000 kg

P.E. = mgh = 40,000 × 9.8 × 35

= 1.37 × 10^7 J

32. (D) In a circular track,

(i) Distance covered in $\frac{1}{2}$ revolution

$= \frac{2\pi r}{2} = \pi r$

(ii) Displacement in half revolution = 2r.

We have r = 1

∴ Ratio = π : 2

33. (C) The correct matching is

a – 3, b – 5, c – 1, d – 4, e – 2

(i) Force – N

(ii) Weight – Kg wt

(iii) Pressure – N m^{-2}

(iv) Impulse – N s

(v) Mass – Kg

34. (B) More work is done when a body is lifted vertically upwards.

35. (D) Weight of a body on the surface of the earth

W = mg = 12.6 N

At height h, $g' = \frac{gR^2}{(R+h)^2}$

When h = R/ 2, $g' = g\left[\frac{R}{R+(R/2)}\right]^2 = g\frac{4}{9}$

Weight at height h = mg × $\frac{4}{9}$

$= 12.6 \times \frac{4}{9} = 5.6$ N

CHEMISTRY

36. (B) Mass of $CaCO_3$ = 100

Calcium (Ca) = 40

Carbon (C) = 12

Oxygen (O) = 16 × 3 = 48

$$\% \text{ of calcium} = \frac{\text{Mass of Calcium}}{\text{Mass of } CaCO_3} \times 100$$

$$= \frac{40}{100} \times 100 = 40\%$$

37. (C) Milky glass is a solid-in-solid colloid. Shaving cream is a colloidal foam with a gas dispersed in a liquid. Milk of magnesia is a solid dispersed in a liquid Cheese is a gel, a liquid dispersed in a solid.

38. (C) 1 mole of iron = gram atomic mass of iron = 56 grams

We know that 1 mole of iron element contains 6.023×10^{23} atoms of iron.

56 g of iron contains = 6.023×10^{23} atoms

2.8 g of iron contains

$$= \frac{6.023 \times 10^{23}}{56} \times 2.8 = \frac{6.023 \times 10^{22}}{2}$$

= 3.0115×10^{22} atoms

39. (B) Ice-cream is an emulsion of fat globules in sugar water solution.

40. (A) As per the given temperatures on Celsius scale, the correct sequence of temperatures on Kelvin scale rounded to 273 instead of 273.15 K is as follows.

25°C + 273 = 298 K

38°C + 273 = 311 K

66°C + 273 = 339 K

41. (A) Carbon dioxide (CO_2), hydrogen sulphide (H_2S), calcium chloride ($CaCl_2$) and sodium oxide (Na_2O) are all triatomic molecules as they contain 3 atoms in their molecules.

42. (D) Sugar and water form a homogeneous solution as there is no clear separation between its constituents (i.e., sugar and water).

43. (A) $CaCO_3 \xrightarrow{\text{heat}} CaO + CO_2(g)$

Limestone → Lime

(40 + 12 + 48) → (40 + 16)

= 100 g → = 56 g

100 g of $CaCO_3$ on heating gives 56 g of CaO

400 g of $CaCO_3$ on heating gives

$$= \frac{56\text{ g}}{100\text{ g}} \times 400\text{ g} = 224\text{ g}$$

44. (C) Ammonia is a compound. So, it is a pure substance. Rest of them are mixtures.

45. (D) Atomicites of ozone, sulphur, phosphorus and argon are given bellow:

Oone (O_3) = 3

Sulphur (S_8) = 8

Phosphorus (P_4) = 4

Argon (Ar) = 1

BIOLOGY

46. (B) Organelle IV is the chloroplast and it contains photosynthetic pigments to absorb ligh and carry out photosynthesis.

47. (D) Crab has no poison apparatus.

48. (A) Sclerenchyma provides mechanical strength to plants.

49. (B) Arthritis a chronic disease.

50. (C) Azolla spp. is a biofertilisers.

51. (B) A tissue comprises an ensemble of cells that are ot necessarily identical but are derived from the same origin, working together to carry out a particuular function.

52. (C) There are three forces involved in capillary action, adhesion, cohesion and a temporary bond between water molecules and form a stream of water moving up the plants. The xylem wall attracts water molecules upwards by adhesion. Water attracts other water molecules by cohesion. Water continues to rise upwards until the upward forces are balanced by the weight of the water.

53. (B) The process of preparing manure the help of earthworms is known as vermicomposting.

54. (A) Lignin prevents the collapse of xylem vessel.

55. (A) Houseflies are the vectors of Cholera.

CRITICAL THINKING

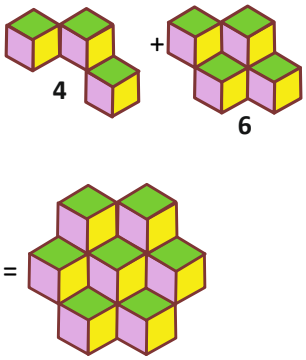
56. (A)

4 rectangles 3 triangles 1 circle

57. (D) There is more security in joint family as there are other members to help. Also in nuclear families, there are lesser persons, so lesser responsibilities and more freedom. Hence, both arguments are strong.

58. (C) If Sushant always tells the truth, then both Dhoni and Sushant plays cricket(Statement I and II), And Dhoni is lying (statement III).

59. (B)



60. (D) Chitra is the youngest one among them.

Shilpa is not young. Because she is elder than Diksha.

Megha is not youngest. Because she is elder than swetha.

Raju is not youngest. Because he is elder brother of Chitra.

Given that Swetha and Diksha are not youngest.

Namrata is not youngest because she does not like crafting. Hence, Chitra is the youngest one.

The End