FIITJEE

NSEJS MOCK TEST – III

Date: November 10, 2017
QP CODE: 122977.0
ANSWER KEYS

1.	**C**	2.	**B**	3.	**B**	4.	**D**
5.	**B**	6.	**B**	7.	**A**	8.	**D**
9.	**D**	10.	**B**	11.	**A**	12.	**C**
13.	**D**	14.	**C**	15.	**A**	16.	**B**
17.	**C**	18.	**B**	19.	**D**	20.	**D**
21.	**A**	22.	**B**	23.	**C**	24.	**B**
25.	**D**	26.	**D**	27.	**D**	28.	**A**
29.	**B**	30.	**C**	31.	**B**	32.	**D**
33.	**C**	34.	**D**	35.	**B**	36.	**D**
37.	**B**	38.	**A**	39.	**D**	40.	**A**
41.	**C**	42.	**C**	43.	**D**	44.	**A**
45.	**C**	46.	**A**	47.	**C**	48.	**D**
49.	**A**	50.	**D**	51.	**A**	52.	**C**
53.	**B**	54.	**C**	55.	**B**	56.	**D**
57.	**D**	58.	**C**	59.	**C**	60.	**D**
61.	**B**	62.	**A**	63.	**B**	64.	**B**
65.	**B**	66.	**B**	67.	**D**	68.	**A**
69.	**C**	70.	**B**	71.	**A**	72.	**C**
73.	**B**	74.	**D**	75.	**D**	76.	**B**
77.	**A**	78.	**D**	79.	**C**	80.	**B**

HINTS AND SOLUTIONS

1. C

1. The oxidation reaction is $H_2O \longrightarrow \frac{1}{2}O_2 + 2H^+ + 2e^-$

   Q = 2 × F = 2 × 96500 = 193000 coulomb.

2. B

2. Last number is 3^{100}

   Sum of the remaining number

   $$(1 + 3 + \ldots + 3^{99}) = \frac{1\times\left(3^{100}-1\right)}{\left(3-1\right)} = \frac{\left(3^{100}-1\right)}{2}$$

   Therefore the required ratio

   $$= \frac{3^{100}}{\left(\frac{3^{100}-1}{2}\right)} = \frac{\left(3^{100}\right)\times 2}{\left(3^{100}-1\right)} \approx \frac{\left(3^{100}\right)\times 2}{\left(3^{100}\right)} = 2$$

3. B

3. $F_{net} = i\left(\vec{l}\times\vec{B}\right) = 2BIR$

4. D

4. The members of subphylum vertebrate possess notochord during the embryonic period. The notochord is replaced by vertebral column in adult.

5. B

5. Mg(l) forms at the cathode, Br_2(g) forms at anode.

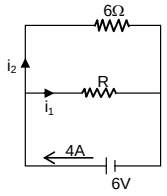
6. B

6. $i = i_1 + i_2$

   $i_2 = 1A$

   $i_1 = 4 - 1 = 3A$

   $p = VI = 6\times 3 = 18\,V$



7. A

7. When you fold a square along its diagonal, the area of new shape (isosceles triangle) would be half of the square. And if you further fold it the area of the new shape keeps getting halved.

   So, if the area of square is A, the are of the isosceles triangle after folding the square three times

   $= A\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2} = \frac{A}{8}$

   But, the area of isosceles triangle after folding the square 3 times $= \frac{1}{2}\times\left(10\times 10\right) = 50 = \frac{A}{8}$

   Therefore, area of square A = 8 × 50 = 400 cm^2

8. D

8. Excretory organs in earthworm is nephridia and flame cells in planaria.

9. D

9. at 1st surface

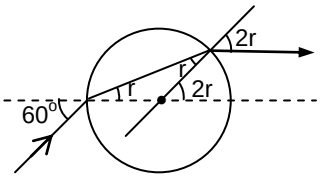
$1\times \sin 60° = \mu \sin r$ …(i)

at 2nd surface

$\mu \sin r = 1\times \sin 2r$ …(ii)

From (i) & (ii)

r = 30° & $\mu = \sqrt{3}$



10. B

10. $CN^- + H_2O \longrightarrow CNO^- + 2H^+ + 2e^-$ …(i)

$\left(Fe^{3+} + 1e^- \longrightarrow Fe^{2+}\right)\times 2$ …(ii)

Adding OH^- in equation (i)

$CN^- + H_2O + 2OH^- \longrightarrow CNO^- + 2H^+ + 2OH^- + 2e^-$

$CN^- + H_2O + 2OH^- \longrightarrow CNO^- + 2H_2O + 2e^-$

Or

$CN^- + 2OH^- \longrightarrow CNO^- + H_2O + 2e^-$ …(iii)

$2Fe^{3+} + 2e^- \longrightarrow 2Fe^{2+}$ …(iv)

From (3) & (4)

$\Rightarrow CN^- + 2OH^- + 2Fe^{3+} \longrightarrow CNO^- + H_2O + 2Fe^{2+}$

11. A

11. Let the inradius of the incircle be r, the circumradius of the circumcircle be 2r. Therefore, area of incircle = πr^2 and the area of circumcircle = $\pi(2r)^2 = 4\pi r^2$

Thus, $\left(4\pi r^2 - \pi r^2\right) = 3\pi r^2 = 2156 \Rightarrow r = \sqrt{\frac{686}{3}}$

Now, height of equilateral triangle = $\left(\frac{\sqrt{3}}{2}a\right)$

$\Rightarrow$ radius + circumradius = $\left(\frac{\sqrt{3}}{2}a\right)$

= 3(inradius) = $\left(\frac{\sqrt{3}}{2}a\right)$

$= 3\times\sqrt{\frac{686}{3}} = \left(\frac{\sqrt{3}}{2}a\right)$

$\sqrt{686\times 3} = \left(\frac{\sqrt{3}}{2}a\right)$

$a = 2\sqrt{686}$

Therefore, area of the equilateral triangle = $\frac{\sqrt{3}}{4}\left(2\sqrt{686}\right)^2$

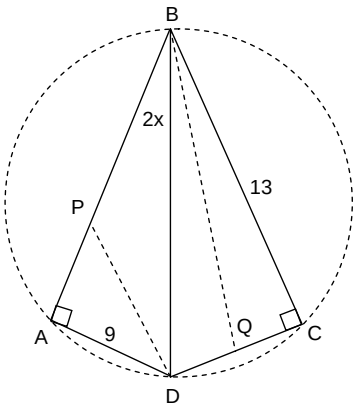
= $686\sqrt{3}$ sq cm

12. C

12. If object is kept at focus then refracted ray will be parallel to principal axis. After reflection from plane mirror it will retrace its path.

13. D

13. As per the given information, we figure out the ABCD is cyclic quadrilateral.



Area of $\Delta BPD = \frac{1}{2}(BP \times AD) = \frac{1}{2}(2x \times 9) = 9x$

Similarly, area of $\Delta BDQ = \frac{1}{2}(x \times 13) = \frac{13x}{2}$

Area of ($\Delta BPD + \Delta BQD$) = Area of quadrilateral PBQD ≤ 150

$\Rightarrow \quad 9x + \frac{13x}{2} \leq 150$

$\Rightarrow \quad 31x \leq 300$

$\Rightarrow \quad x \leq 9$ (since, x is an integer)

14. C

14. $C(s) + O_2(g) \longrightarrow CO_2(g); \Delta_r H_1 = -x\,kJ/mol$ …(i)

$CO(g) + 1/2\,O_2(g) \longrightarrow CO_2(g); \Delta_r H_2 = -y\,kJ/mol$ …(ii)

Equation (1) & (2)

$C(s) + \frac{1}{2}O_2(g) \longrightarrow CO(g); \Delta_f H = (y - x)\,kJ/mol$

15. A

15. $W_{air} = \frac{1}{2}m \times \left(\sqrt{3/2\,gh}\right)^2 - mgh = -\frac{mgh}{4}$

16. B

16. Mature RBC is enucleated so it cannot take part in DNA replication.

17. C

17. For pure water both pH and pOH decreases with rise in temperature.

18. B

18. $B \propto \frac{1}{r}$

19. D

19. Look at the following pattern

f(1) = 1 = (1 × 2 – 1) or (1^2 + 0)
f(2) = 5 = (2 × 3 – 1) or (2^2 + 1)
f(3) = 11 = (3 × 4 – 1) or (3^2 + 2)
f(4) = 19 = (4 × 5 – 1) or (4^2 + 3)
f(5) = 29 = (5 × 6 – 1) or (5^2 + 4)
f(6) = 41 = (6 × 7 – 1) or (6^2 + 5)
…….
…….
f(31) = (31 × 32 – 1) or (31^2 + 30)
Therefore, f(31) = 991

20. D

20. Exchange of gases in an old woody tree takes place through the lenticels.

21. A

21. $(4v)^2 = v^2 + 2gh \Rightarrow h = \frac{15v^2}{2g}$

22. B
22. 20 meq. Of HCl reacts completely with 20 meq. Of KOH. Hence, the final solution is neutral.
Thus, at 90°C, pH = 6

23. C
23. Since, product is more effective than addition or subtraction, so we will focus on increasing the product of $a \times b \times c$ as much as possible.
The maximum value of $|a| \times |b| \times |c| = 10 \times 9 \times 8 = 720$
Since we are subtracting (a + b + c) from (abc), so we can maximise (abc) – (a + b + c). If (a + b + c) is the largest possible negative value, which is possible when a = –10, b = –9 and c = 8.
(Remember that we cannot keep all the three values (a, b, c) negative, else the product $a \times b \times c$ will be negative, that is – 720.
Therefore, [abc – (a + b +c)] = [720 – (–11)]= 731

24. B
24. If $\mu < \mu_2$ then converging lens behaves like diverging lens.

25. D
25. $$E^{o}_{cell} = E^{o}_{Fe^{2+}/Fe} - E^{o}_{Sn^{2+}/Sn}$$
$$= -0.44 - (-0.14) = -0.30\,V$$

26. D
26. The probability that none of the retailer sends the gift in time = $0.4 \times 0.2 \times 0.1 \times 0.5 = 0.004$
The probability of receiving atleast one gift in time = 1 – 0.004 = 0.996

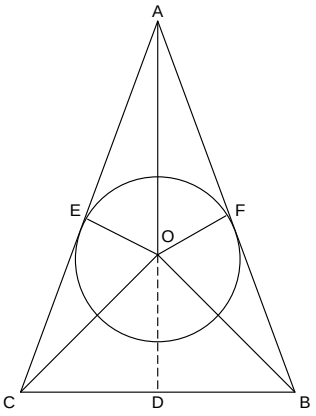
27. D
27. $$F_{net} = 2 \times \frac{G\left(R/3\right)^2}{\left(M/2 \times 2\right)^2} \times \cos 30^\circ$$
$$= \frac{\sqrt{3}GR^2}{9M^2}$$

28. A
28. When the plain dwellers move to high altitudes (3, 500 m or more), their bodies start to produce more RBCs in their blood and breathing rate will increase.

29. B
29. $\because \quad E_n \propto -\frac{Z^2}{n^2} \Rightarrow E_n \propto -Z^2$

30. C
30. Magnetic force at P & Q will not be equal hence it will move linearly as well as rotate.

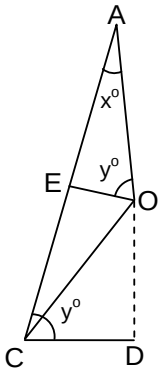
31. B
31. In ΔABC, the radii OE and OF are perpendicular on the respective sides AC and AB.



Now, the radius of ΔABC is 175 cm and AO = BO = CO = 625 cm.
Now, we can see that ΔAEO, ΔCEO, ΔBFO and ΔAFO are right ; angled congruent triangles.
Therefore, using Pythagoras theorem, we get

AE = 600 and CE = 600

As, $\Delta ADC \sim \Delta AEO$



$$\therefore \frac{AC}{AD} = \frac{AO}{AE} \Rightarrow \frac{600+600}{AD} = \frac{625}{600}$$

$$\Rightarrow AD = \frac{(1200)(600)}{625}$$

Similarly, we have

$$\frac{AC}{CD} = \frac{AO}{EO}$$

$$\Rightarrow \frac{600+600}{CD} = \frac{625}{175} \Rightarrow CD = \frac{(1200)(175)}{625}$$

$$\therefore \text{Area of } \Delta ABC = \frac{1}{2}(AD \times BC)$$

$$= \frac{1}{2}(AD \times 2CD) = AD \times CD = \frac{(1200)(600)}{625} \times \frac{(1200)(175)}{625} = 387072 \text{ cm}^2$$

32. D

32. Blue – green algae (cynobacteria) are prokaryotes, hence golgi apparatus is absent.

33. C

33. $u_A^2 = 2gh$; $\frac{1}{2}$

$$\frac{1}{2}mu^2 = mgh + \frac{1}{2}m \times u_B^2 = mgh + \frac{1}{2} \times m(u\cos 30°)^2$$

$$\Rightarrow u^2 = 8gh$$

$$\Rightarrow \frac{\frac{1}{2}mu_A^2}{\frac{1}{2}mu^2} = \frac{1}{4}$$

34. D

34. Mass of 1 molecule of water = 18 amu

$= 18 \times 1.66 \times 10^{-24}$ g

$$\text{Volume of 1 molecule} = \frac{\text{mass}}{\text{density}}$$

$$= 29.88 \times 10^{-24} = 2.988 \times 10^{-23} \text{mL}$$

35. B

35. Let the required 3 digit number be expressed as 100a + 10b + c, such that $9 \geq a > b > c \geq 0$, for every a, b, $c \in N$.
It implies that c = 0, as the number is divisible by 10.
Now, the reconstructed number is also divisible by 10, so c cannot change it s position, i.e. c must be at the unit's place, and so only a and b will change their positions.
Then, the new number can be expressed as 100b + 10a + c. Since, the difference of these two numbers is divisible by 40.

$\therefore$ $(100a + 10b + c) - (100b + 10a + c) = 40k$

$\Rightarrow$ $90(a - b) = 40k$

$\Rightarrow$ $(a - b) = \frac{4}{9}k$

Since, the maximum value of a – b = 8, as a > b > c and c is already 0, so the probable values of k = 9, 18, 27, 36,……, 72.
But $(a - b) \leq 8$, then $k \leq 18$.

k	(a – b)	a	b	Required 3 digit number
9	4	9	5	950
9	4	8	4	840
9	4	7	3	730
9	4	6	2	620
9	4	5	1	510
18	8	9	1	910

36. D

36. Since $n_2 > n_1$ hence it will behave like convergent beam.
& $n_1 > n_3$ hence it will behave like divergent beam.

37. B

37. Case I – Suppose inner balloon burst first

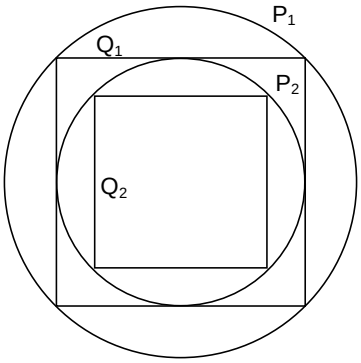
$$\frac{600}{300} = \frac{800}{T_2} \Rightarrow T_2 = 400K$$

Case II – Suppose outer balloon burst first

$$\frac{1500}{300} = \frac{1800}{T_2};\ T_2 = 360K$$

38. A

38. Let us assume that the diameter of circle P_1 be d.
Therefore, diagonal of Q_1 = d



$\Rightarrow$ side of $Q_1 = \frac{d}{\sqrt{2}}$

$\Rightarrow$ Diameter of $P_2 = \frac{d}{\sqrt{2}}$

$\Rightarrow$ Diagonal of $Q_2 = \frac{d}{\sqrt{2}}$

$\therefore$ $$\frac{\text{Radius of circle } P_2}{\text{Side of square } Q_1} = \frac{\frac{d}{2\sqrt{2}}}{\frac{d}{\sqrt{2}}} = \frac{1}{2}$$

Area of $P_1 = \frac{\pi d^2}{4}$, Area of $Q_1 = \frac{d^2}{2}$

Area of $P_2 = \frac{\pi d^2}{8}$, Area of $Q_2 = \frac{d^2}{4}$

Area of $P_3 = \frac{\pi d^2}{16}$, Area of $Q_3 = \frac{d^2}{8}$

$\therefore \quad S_1 = Q_1 - P_2 = \frac{d^2}{2} - \frac{\pi d^2}{8} = \frac{d^2}{2}\left(1 - \frac{\pi}{4}\right)$

$S_2 = Q_2 - P_3 = \frac{d^2}{4} - \frac{\pi d^2}{16} = \frac{d^2}{4}\left(1 - \frac{\pi}{4}\right)$

and $S_3 = Q_3 - P_4 = \frac{d^2}{8} - \frac{\pi d^2}{32} = \frac{d^2}{8}\left(1 - \frac{\pi}{4}\right)$

Thus, we find that $S_1 = 2S_2 = 4S_3 = 8S_4 = \ldots.$

$\therefore \quad S = S_1 + S_2 + S_3 + \ldots + S_N$

$S = S_1 + \frac{S_1}{2} + \frac{S_1}{4} + \ldots.$

$S = \frac{S_1}{\left(1 - \frac{1}{2}\right)} = 2S_1$

$\therefore \quad \frac{S}{Q_1} = \frac{2S_1}{Q_1} = \frac{2\left[\frac{d^2}{2}\left(1 - \frac{\pi}{4}\right)\right]}{\left(\frac{d^2}{2}\right)} = \frac{(4 - \pi)}{2}$

39. D

39. $W = \left(a/2 \times a^2 \times 2\rho \times g + K\, a/2\right) = a\left(a^2 \rho g + K/2\right)$

40. A

40. The smooth ER is involved in releasing free glucose from glycogen. So it takes part in glycogenolysis.

41. C

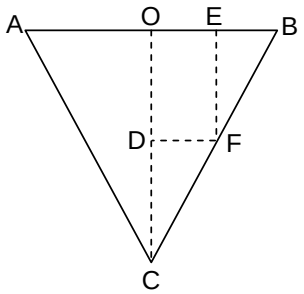
41. Boiling point is elevated and freezing point is lowered on adding non-volatile solute.

42. C

42. $f = m_A a = 1 \times \frac{10}{3} = \frac{10}{3} N$

43. D

43. Here is an inverted cone. Given that,



EF = 15 cm and BF = 17 cm.

Therefore, EB = 8 cm.

Since, OB = 13 cm, therefore

DF = OE = 13 – 8 = 5 cm.

Since, the two triangles FDC and BOC are similar, therefore

$\frac{DF}{DC} = \frac{OB}{OC} \Rightarrow \frac{5}{DC} = \frac{13}{OD + DC}$

$\Rightarrow \quad \frac{5}{DC} = \frac{13}{15 + DC} \Rightarrow$ DC = 9.375 cm

Volume of the water above the point F

$= \frac{1}{3}\pi\left[\left(13^2 \times 24.375\right) - \left(5^2 \times 9.375\right)\right] = 1295\ \pi\ cm^2$

Volume of water that can flow in a minute through the pipe

$\pi(0.5)^2 (1000) = 250\ \pi\ cm^3$

Therefore, the time elapsed before the water stops flowing out through the pipe $= \frac{1295\pi}{250\pi} = 5.18$ min.

44. A

44. C_4 plants can photosynthesize in poor concentration of CO_2 the concentration of CO_2 is maintained in Bundle sheets cells by the conversion of C_4 acid to C_3 acid (Decarboxylation).

45. C

45. $a_{surface} = \frac{GM}{R^2}$ also, $\frac{GM}{r^2} = \omega^2 r \Rightarrow GM = \omega^2 r^3$

46. A

46. Movement of (charged) colloidal particles under the influence of electrostatic field is called electrophoresis due to opposite charge.

47. C

47. For any positive value x, the minimum value of $x + \frac{1}{x}$ is 2,

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

$$\therefore \quad \frac{\left(a^2 + a + 1\right)\left(b^2 + b + 1\right)\left(c^2 + c + 1\right)\left(d^2 + d + 1\right)\left(e^2 + e + 1\right)}{abcde}$$

$$= \left(\frac{a^2 + a + 1}{a}\right)\left(\frac{b^2 + b + 1}{b}\right) \times .... \times \left(\frac{e^2 + e + 1}{e}\right) \geq (3)(3)(3)(3)(3)$$

$$= \frac{\left(a^2 + a + 1\right)\left(b^2 + b + 1\right)\left(c^2 + c + 1\right)\left(d^2 + d + 1\right)\left(e^2 + e + 1\right)}{abcde} \geq 243$$

48. D

48. $a = \frac{600 - 300}{60} = 5 \text{ m/s}^2$ where f = 0.5 × 60 = 300 N

$$a = \frac{mg - f}{m}$$

49. A

49. The substance has half life of 1 year. Let No be the initial quantity of material ad N be the new quantity.

$$\frac{N}{N_0} = \left(\frac{1}{2}\right)^n$$

$N = \frac{1}{32} \times N_0 = \frac{1}{32} =$ Hence (A), is the correct option.

50. D

50. Z = 1 × 2 × 3 × … × 31

X = (Z + 1) = (1 × 2 × 3 × … 31) + 1

Therefore, we will have

X + 1 = (Z + 2) = (1 × 2 × 3 × … × 31) + 2

X + 2 = (Z + 3) = (1 × 2 × 3 × … × 31) + 3

X + 3 = (Z + 4) = (1 × 2 × 3 × … × 31) + 4

……

……

X + 30 = (Z + 31) = (1 × 2 × 3 × … × 31) + 31

All the numbers X + 1, X + 2, X + 3, …, X + 30 are composite numbers as each number has two terms and the second term is already a factor of the first term, so it can be taken common between the two terms. It means any particular number above is divisible by the respective common factor.

e.g., The number X + 1 is divisible by 2, X + 2 is divisible by 3, X + 3 is divisible by 4 and so on.

So, there is no prime number amongst X + 1, X + 2, X + 3, ….., X + 30.

Hence, (D) is the correct answer.

51. A

51. $P = FV = m\frac{V}{T} \times \left(\frac{V}{T}t\right) = \frac{mv^2}{T^2} \times t$

52. C

52. Fat is insoluble in an aqueous environment, micelles keep fat droplets from reaggreation and small enough to be absorbed.

53. B

53. $\underset{x}{C_3H_8} + 5O_2 \longrightarrow \underset{3x}{3CO_2} + 4H_2O$

$\underset{(3-x)}{C_4H_{10}} + \frac{13}{2}O_2 \longrightarrow \underset{4(3-x)}{4CO_2} + 5H_2O$

$3x + 4(3 - x) = 10$

$x = 2$ L

Composition of mixture = 2 L C_3H_8 = 1 L C_4H_{10}.

54. C

54. $B = \frac{\mu_0 i}{4\pi a} + \frac{\mu_0 i}{4\pi a}$

55. B

55. $\frac{3}{1^2.2^2} + \frac{5}{2^2.3^2} + \frac{7}{3^2.4^2} + ...$

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

$= 1 - \frac{1}{(n+1)^2} = \frac{n^2 + 2n}{(n+1)^2}$

56. D

56. An increase in alveolar Po_2 results from an increase in alveolar ventilation (supply of oxygen) relative to metabolic rate (consumption of oxygen)

57. D

57. Ultrasonic waves are used for detecting objects under water. Technique / device used for this is sonar.

58. C

58. Retinol $\rightarrow$ Essential for maintenance of epithelial tissue,
Tocopherol $\rightarrow$ Inhibits oxidation of unsaturated fatty acids
Calciferol $\rightarrow$ Absorption of Ca^{2+}
Menadione $\rightarrow$ Helps in clotting of blood
Ascorbic acid $\rightarrow$ Required for amino acid metabolism

59. C

59. Isobars have same mass number but different atomic numbers.

60. D

60. $F_{resultant} = 0$
Hence, unchanged.

61. B

61. We have,

$$\underbrace{1111....1}_{119\text{ times}} = 10^{118} + 10^{117} + ... + 10^2 + 10^1 + 1$$

$$= \frac{\left(10^{119} - 1\right)}{10 - 1} = \left(\frac{10^{119} - 1}{10^7 - 1}\right)\left(\frac{10^7 - 1}{10 - 1}\right)$$

$$= \left(10^{112} + 10^{105} + 10^{98} + ...1\right)\left(10^6 + 10^5 + ...10 + 1\right)$$

Thus, $\underbrace{1111....1}_{119\text{ times}}$ is not a prime number.

62. A

62. Arteries are thick walled and have narrow lumen as compared to veins & calcium ions play a very important role in blood clotting.

63. B

63. The equation of any line passing through the point of intersection of the lines $x + 2y - 3 = 0$ and $4x - y + 7 = 0$ is

$x + 2y - 3 + k(4x - y + 7) = 0$ ….(1)

or $(1 + 4k)x + (2 - k)y + (7k - 3) = 0$ ….(2)

m_1 = Slope of the line (2) $= \frac{4k+1}{k-2}$

and m_2 = (Slope of the line $y - x + 10 = 0$) = 1

If the line (1) be parallel to the line $y - x + 10 = 0$

Then $\frac{4k+1}{k-2} = 1 \Rightarrow k = -1$

Hence from (1), the required equation of the line is

$(x + 2y - 3) - 1.(4x - y + 7) = 0$

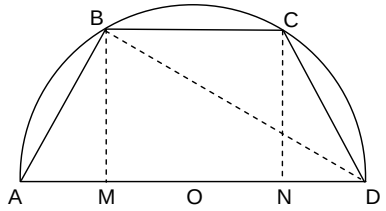
$\Rightarrow$ $3x - 3y + 10 = 0$

64. B

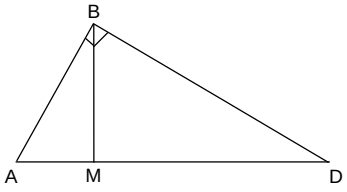
64. Glomerular filtration rate would be decreased by compression of renal capsule, as the rate of flow of blood is checked by the compression of renal capsule.

65. B

65. Draw the perpendiculars BM and CN on the diameter AD from points B and C respectively.



Now join the points B and D. Then the ΔABD is a right angled triangle as $\angle ABD = 90^o$ (angle in a semicircle is a right angle)



$\Delta ABM \sim \Delta ADB \Rightarrow \frac{AB}{AD} = \frac{AM}{AB}$

$AM = \frac{AB^2}{AD} = \frac{4}{8} = \frac{1}{2}$

and, $ND = AM = \frac{1}{2}$

$\therefore$ AD = AM + MN + ND

$8 = \frac{1}{2} + MN + \frac{1}{2} \Rightarrow MN = 7$

$\because$ BC = MN

$\therefore$ BC = 7

66. B

66. NaOH contains both ionic and covalent bonds.

67. D

67. It is given that,

$$\sum_{n=1}^{13} \frac{1}{n} = \frac{x}{13!} \Rightarrow 13!\left(\sum_{n=1}^{13} \frac{1}{n}\right) = x$$

$$\Rightarrow \quad x = 13!\left(\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + ... + \frac{1}{13}\right)$$

$$\Rightarrow \quad x = \frac{13!}{1} + \frac{13!}{2} + \frac{13!}{3} + \frac{13!}{4} + ... + \frac{13!}{11} + \frac{13!}{12} + \frac{13!}{13}$$

In the above expression, there are 13 terms and except (13!/11) all other terms are divisible by 11, leaving no remainder. So, the remainder would depend solely on (13!/11).

$$= \frac{13!}{11} = 10! \times 12 \times 13$$

When 10 is divided by 11, it has a remainder of -1.
When 12 is divided by 11, it has a remainder of 1.
When 13 is divided by 11, it has a remainder of 2.
Therefore, the effective remainder = $-1 \times 1 \times 2 = -2$.
Since, -2 is the negative remainder, so its positive equivalent remainder would be 9.
Hence, choice (D) is correct.

68. A

68. The direction of light striking the retina are as follows:
Sensory nerve $\rightarrow$ ganglionic cell $\rightarrow$ bipolar neuron $\rightarrow$ sensory neuron.

69. C

69. The oxide which cannot act as a reducing agent is CO_2 because carbon is at its maximum oxidation state.

70. B

70. '19' because 'G' is always attached to 'C' thus % of 'C' will always be equal to 'G'.

71. A

71. First term is $\sqrt{1+1+\frac{1}{4}} = \frac{3}{2} = 2 - \frac{1}{2}$

Sum of first two terms is $\frac{3}{2} + \sqrt{1+\frac{1}{4}+\frac{1}{9}}$

$$= \frac{3}{2} + \sqrt{\frac{36+9+4}{36}} = \frac{3}{2} + \frac{7}{6} = \frac{16}{6} = \frac{8}{3} = 3 - \frac{1}{3}$$

Sum of first three terms is $\frac{8}{3} + \sqrt{1+\frac{1}{9}+\frac{1}{16}}$

$$\frac{8}{3} + \sqrt{\frac{169}{144}} = \frac{8}{3} + \frac{13}{12} = \frac{45}{12} = \frac{15}{4} = 4 - \frac{1}{4}$$

Similarly, sum of the given terms is $2008 - \frac{1}{2008}$.

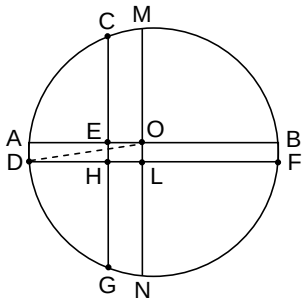
72. C
72. Liquid hydrogen and liquid oxygen can act as propellant for rockets.

73. B
73. AO = OB = OM = ON = 1.5 cm

AE : EB = 1 : 2

$\therefore$ AE = 1 cm, EO = 0.5 cm

Similarly, NL = 1 cm and OL = 0.5 cm



$\therefore$ $DL = \sqrt{(DO)^2 - (OL)^2}$

$DL = \sqrt{(1.5)^2 - (0.5)^2}$

$\Rightarrow$ $DL = \sqrt{2}$ cm

$\therefore$ $DH = DL - HL = \sqrt{2} - \frac{1}{2}$ ($\because$ HL = 0.5 cm)

$\Rightarrow$ $DH = \left(\frac{2\sqrt{2}-1}{2}\right)$

74. D
74. The cell – mediated immunity inside the human body is carried out by T – lymphocytes.

75. D
75. Prefix alkali for alkali metals denotes ashes of plants.

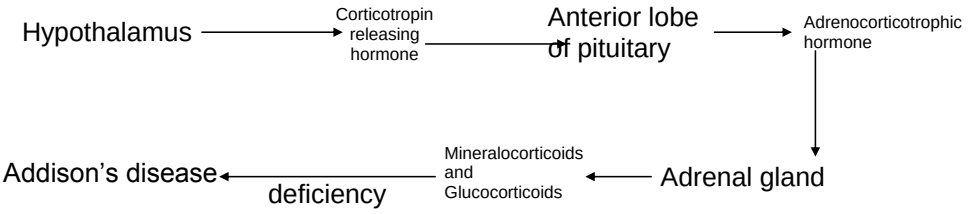
76. B
76.

Activity		Response
(i)	Blinking of eye	**Unconditioned reflex**
(ii)	Typing	**Conditioned reflex**
(iii)	Breast feeding & swallowing in new born babies	**Unconditioned reflex**
(iv)	Peristalsis of alimentary	**Unconditioned reflex**

77. A
77. In cyclic photophorylation only PS I participates and in non-cyclic photophosphorylation PS I & PS II both participate & Stroma lamellae lack PS II and NADP.

78. D
78. $\underset{\text{Flux}}{CaO} + \underset{\text{Gangue}}{SiO_2} \longrightarrow \underset{\text{Slag}}{CaSiO_3}$

79. C
79.



80. B

80. During cleavage, size does not change.