

FIITJEE

NSEJS SIMULATION TEST

Date: November 15, 2017

QP CODE: 123002.0

ANSWER KEYS

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

HINTS & SOLUTIONS

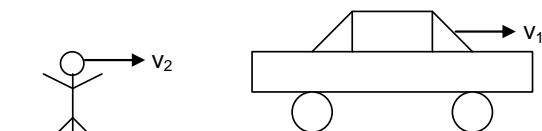
1. A
 1. $\mu = \sqrt{n(n+2)}$
 $n = 4$ (unpaired electron)

2. D
 2. $\frac{1}{m} + \frac{4}{n} = \frac{1}{12}, \quad n < 60$
 $\Rightarrow \frac{1}{m} = \frac{1}{12} - \frac{4}{n} = \frac{n-48}{12n}$
 $\Rightarrow m = \frac{12n}{n-48}$

Positive integral values of m for odd integral values of n are for n = 49, 51 and 37. Therefore, there are 3 integral pairs of values of m and n that satisfy the given equation.

3. D
 3. Mohan is suffering from Patau's syndrome. It is caused due to an extra chromosome number 13.

4. B
 4. $f_1 = \left(\frac{c-v_2}{c-v_1} \right) f$
 $f_2 = \left(\frac{c+v_2}{c+v_1} \right) f$
 $\frac{f_1}{f_2} = \frac{(c+v_1)(c-v_2)}{(c-v_1)(c+v_2)}$



5. A
 5. Cr⁺³ is present in the crystal.

6. B
 6. $\frac{1}{\lambda} = R_H Z^2 \left(\frac{1}{n_2^2} - \frac{1}{n_1^2} \right)$

7. B
 7. Area of triangle whose vertices are (a, a), (a + 1, a + 1) and (a + 2, a)

$$= \frac{1}{2} \begin{vmatrix} a & a & 1 \\ a+1 & a+1 & 1 \\ a+2 & a & 1 \end{vmatrix}$$

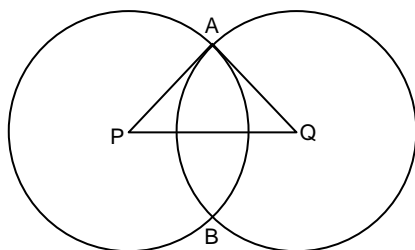
$$= \frac{1}{2} \{ a(a+1-a) - a(a+1-a-2) + 1(a^2 + a - a^2 - 3a - 2) \}$$

$$= -1$$

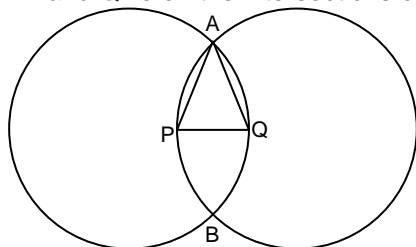
∴ Area = 1 (taking only magnitude)

8. B

8.



If P and Q lie on the intersections of the circles as shown in the figure given below.



In this case, triangle APQ is equilateral. So, the maximum possible measure of the angle AQP is 60°. The answer is between 0° and 60°.

9. C

Mumps is a contagious disease caused by a virus. It spreads through saliva or mucus from mouth, nose or throat infection & results in painful swelling of parotid glands. Tetanus is caused by bacteria, yellow fever is transmitted to people primarily through the bite of infected Aedes species of mosquito, in SARS there is no as such swelling of parotid glands.

10. A

Microfilaments also called as Actin filaments and are primarily composed of polymers of actin, Microtubules are cytoskeletal filaments in cell made of sub units called Tubulin, Flagellin is a globular protein that arranges itself in a hollow cylinder to form filament in bacterial Flagella, Glycocalyx is a Glycoprotein and Glycolipid covering that surrounds the cell membrane of some bacteria.

11. A

$$L = 10 \log_{10} \left(\frac{I}{I_0} \right)$$

12. C

Net inward flux in the loop decreases because current in the wire decreases. To increase flux current should flow in the clockwise direction in the loop.

13. A

Salt of copper gives blue colour to firework.

14. A

Ca/Mg salt of soap is formed in hard water which is insoluble in water.

15. D

If the ratio of the altitudes of a triangle is 3 : 5 : 6, the ratio of its sides will be $1/3 : 1/5 : 1/6 = 10 : 6 : 5$. Therefore, checking from the options we find that the sides of the triangle are 50, 30, 25.

16. A

18! contains 3 fives. Therefore, it has 3 zeroes.

17. A

17. First child blood group is AB, genotype $I^A I^B$
 First husband blood group is B, genotype possible ($I^B I^B, I^B I^O$)
 Mother's blood group can be: $I^A I^O$ or $I^A I^A$ (A blood group)

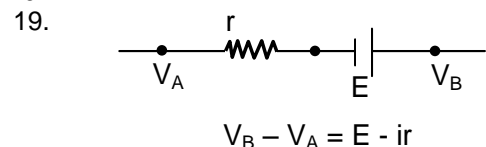
Child blood group is O ($I^O I^O$)
 Second husband blood group is A ($I^A I^O$)
 Mother's blood group can be

		Father	
		I^A	I^O
Mother	I^A	$I^A I^A$	$I^A I^O$
	I^O	$I^A I^O$	$I^O I^O$

∴ Mother's blood group is A; genotype ($I^A I^O$)

18. B
 18. Signals from fully developed foetus and placenta ultimately leads to parturition which requires the release of oxytocin from maternal pituitary.

19. A



20. A

20. Case (i) $\frac{1}{2} g \sin \theta t^2 = \ell$ or $t = \sqrt{\frac{2\ell}{g \sin \theta}}$
 Case (ii) $\frac{1}{2} (g + a) \sin \theta t^2 = \ell$ or $t = \sqrt{\frac{2\ell}{(g + a) \sin \theta}}$

21. A

21. $m = \frac{n_{\text{solute}}}{\text{wt. of solvent (kg)}}$ wt. of solvent = $v \times d$

22. B

22. $3^\circ, 2^\circ$ & 1° amines with same M.F. show F.I.

23. D

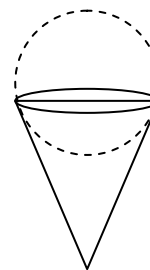
23. 96% Alcohol & 4% water act as Azeotrope & boils at same temperature.

24. B

24. $7^{3^2} = 7^9$ and $(7^3)^2 = 7^6$. Hence, clearly $7^9 > 7^6$.

25. C

25. Though it is given that diameter of the cone is equal to the diameter of the spherical ball. But the ball will not fit into the cone because of its slant shape. Hence, more than 50% of the portion of the ball will be outside the cone.



26. D
26. By Pythagorus theorem, we find the given triangle is a right angled triangle with 12 as height and 5 as base.

So, the area of the triangle is $\frac{1}{2} \times 12 \times 5 = 30$ sq unit.

\therefore We find the length of the rectangle with width 10 and area 30 i.e., $10 \times \text{length} = 30$.

\therefore Length = 3 unit

Hence, the perimeter of the rectangle is $2 \times (10 + 3) = 26$ unit.

27. B
27. High pH, low temperature and decrease in $p\text{CO}_2$ shifts the oxygen haemoglobin dissociation curve to left.

28. D
28. For origin of first form of life from pre-existing non-living organic molecules the primitive earth conditions created include high temperature, volcanic storms, reducing atmosphere containing CH_4 , NH_3 etc.

29. C
29. Sickle-cell anaemia is an autosomal recessive gene disorder in which sickle-celled RBCs are formed instead of normal ones. They carry very less content of O_2 as their haemoglobin is malformed. The person suffering from this disease shows symptoms of anaemia.

30. B

30. Let $\frac{M}{L}$ be mass per unit length. Then mass of length $(L - \ell)$ is $M' = M \frac{(L - \ell)}{L}$.

$$T = M' \times \frac{F}{M} = \frac{M(L - \ell)}{L} \times \frac{F}{M} = \frac{(L - \ell)}{L} F$$

31. B

31. $w = \Delta U = mgh$

where $h = \frac{\ell}{2}$ = rise in position of centre of mass

32. B

32. $\text{Sc} - [\text{Ar}] 4s^2, 3d^1$

$$n = 3, l = 2, m = -2 \text{ s} = +\frac{1}{2} \text{ or } -\frac{1}{2}$$

33. C

33. Gamma radiation has highest penetrating power.

34. D

34. Total age of eight people 10 year ago = 231 year
Total age of eight people 7 year ago = $231 + 8 \times 3 - 60 + 0 = 195$
Total age of eight people 4 year ago = $195 + 3 \times 8 - 60 + 0 = 159$
Current total age of eight people = $159 + 4 \times 8 = 191$ year

$$\therefore \text{Average age} = \frac{191}{8} = 24 \text{ year (approximately).}$$

35. C

$$35. \quad a = b(b - 1)$$

$$a^2 - 2a = b^2 [b^2 + 1 - 2a] - 2b(b - 1)$$

or $a(a - 2) = b(b - 1)(b^2 - b - 2)$

$$= b(b - 1)(b^2 - 2b + b - 2) = b(b - 1)(b + 1)(b - 2)$$

So, this is divisible by 24 for $b \leq 4$.

36. A

36. Let the radius of cylinder DEFG be x cm.

$$\therefore OG = x \text{ cm}$$

$\triangle APD$ and $\triangle AOB$ are similar

$$\therefore \frac{AP}{PD} = \frac{AO}{BO} = \frac{5}{2}$$

(\because Height of case = 10 cm and radius = 4 cm)

$$\therefore AP = \frac{5}{2} \times x$$

$$\therefore \text{Height of cylinder} = PO = AO - AP$$

$$= \left(10 - \frac{5}{2}x\right)$$

$$\therefore \text{Total surface area of cylinder} = 2\pi r^2 + 2\pi r \times h$$

$$= 2\pi \left[x^2 + x \left(10 - \frac{5}{2}x\right) \right] = 2\pi \left[x^2 + 10x - \frac{5x^2}{2} \right]$$

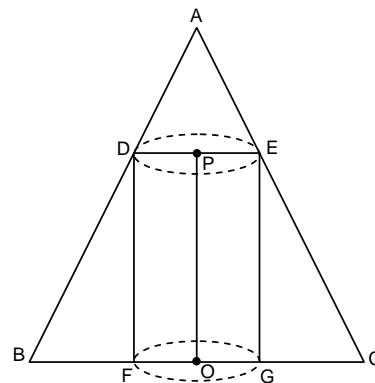
$$= 2\pi \left[10x - \frac{3}{2}x^2 \right]$$

Now, maximum value of a quadratic equation

$$ax^2 + bx + c, \text{ where } a \neq 0, \text{ is } \frac{4ac - b^2}{4a}$$

$$\therefore \text{Max value of } \left(10x - \frac{3}{2}x^2\right) \text{ is } \frac{50}{3}.$$

$$\text{Hence maximum total surface area of cylinder} = \frac{100\pi}{3} \text{ sq. cm}$$



37. A

37. Ascaris is dioecious and belongs to phylum nematoda. In salamander, there is internal fertilisation, pteropus is viviparous, and Aurelia belongs to class cnidaria/coelenterata and shows tissue level of organisation.

38. B

38. During G_1 phase, the cell is metabolically active and continuously grows but does not replicate its DNA. S or synthesis phase marks the period during which DNA synthesis / replication take place. During this time amount of DNA per/cell doubles. There is no change in DNA contents in G_2 phase. At the end of meiosis I it is divided into two cells, and at the end of meiosis II it is divided into 4 cells.

39. C

39. Work done by gravity will depend only upon the height 'h' and not on the length of inclined plane. So work done in both the cases = mgh only.
ratio = 1 : 1.

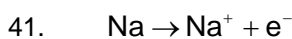
40. C

40. $\therefore F_1 = \frac{m_1 v^2}{R_1}$ and $F_2 = \frac{m_2 v^2}{R_2}$

$\therefore \frac{\mu_1 m_1 g}{\mu_2 m_2 g} = \left[\frac{m_1 v^2}{R_1} / \frac{m_2 v^2}{R_2} \right]$

$\therefore \frac{\mu_1}{\mu_2} = \frac{R_2}{R_1}$

41. C



42. A

42. $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

43. D

43. $x - y = +0.2$ or $(x - y)^2 = 0.04$

Also, $x^2 + y^2 = 0.1$ (since $x^2 + y^2 > 0$)

And solving this two we get $2xy = 0.6$ from this we can find value of $x + y$ which comes out to be $+0.4$ or -0.4 and solving this two we get $|x| + |y| = 0.4$.

44. B

44. Basically, the question is of weights, so let us analyse them only 4 rubies weight as much as 3 emeralds.

4 rubies = 16 crores

3 emeralds = 15 crores

\therefore All rubies, multiple of 4 allowed, is the best deal,

so, $\frac{12}{0.3} = 40$ rubies

45. A

45. $\text{RQ} = \frac{\text{Volume of CO}_2 \text{ evolved}}{\text{Volume of O}_2 \text{ consumed}}$

It depends upon the type of respiratory substrate used during respiration.

RQ equal to unity \rightarrow Carbohydrates, RQ is 0.7 \rightarrow Fats, RQ is 0.9 \rightarrow Proteins, peptone, RQ more than unity \rightarrow Organic acids

46. B

46. Relaxin and inhibin do not have opposite effects to each other as relaxin relaxes pubic symphysis during parturition while inhibin decreases the secretion of FSH.

47. A

47. Tryptophan is required for the formation of vitamin Nicotinamide as well as the plant hormone Indole-3-acetic acid.

48. A

48. Initial extension in the spring $x = \frac{l}{\cos 60^\circ} - l = l$

$\therefore \frac{1}{2} k l^2 = \frac{1}{2} m v^2$

$\therefore v = l \sqrt{\frac{k}{m}}$

49. D

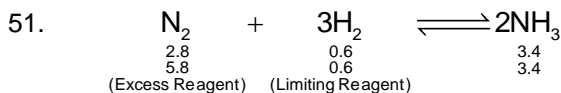
$$F_{\text{net}} = V\rho g = F - (h\rho g)A$$

50. B

$$\frac{1}{2}mv^2 - \frac{GMm}{R} = \frac{-GMm}{R + 7R}$$

$$\Rightarrow v = \sqrt{\frac{7GM}{4R}}$$

51. B



52. D

$$M_1V_1 = M_2V_2$$

$$M_2 = \frac{M_1V_1}{V_2}$$

$$M_2V_2 = M_3V_3$$

$$M_3 = [\text{H}^+]$$

$$\text{pH} = -\log [\text{H}^+]$$

53. B

53. Volume of the given ice cuboid = $8 \times 11 \times 2 = 176$
Let the length of the required rod is l

$$\therefore \pi l \times \frac{8^2}{4} = 176 \quad \therefore l = 3.5 \text{ inches}$$

54. A

54. The number of stamps that were initially bought were more than one of each type. Hence, the total number of stamps
= $2(5 \text{ rupee}) + 2(2 \text{ rupee}) + 3(1 \text{ rupee}) + 3(1 \text{ rupee}) = 10$ tickets

55. A

55. $a, a + 2, a + 4$ are prime numbers.
Put value of "a" starting from 3.
We will have 3, 5, 7 as the only set of prime numbers satisfying the given relationship.

56. A

56. Hardy – Weinberg principle is applicable only under following conditions: No mutation, No gene flow / gene migration, No genetic drift, No genetic recombination and No natural selection pressure.

57. A

57. Pseudostratified tissue has a distinctive appearance. \therefore the nuclei of individual cells do not line up perfectly.

58. B

$$58. \text{Centrifugal force } F_c = \frac{mv^2}{R} = mg.$$

$$\text{Net force opposite to tension in equilibrium} = \sqrt{m^2g^2 + m^2g^2} = \sqrt{2} \text{ mg}$$

$$g_{\text{eff}} = g\sqrt{2} \quad ; \quad T = 2\pi\sqrt{\frac{\ell}{g\sqrt{2}}}$$

59. B

59. We know that $\beta = 10 \log_{10} \frac{I}{I_0}$; According to the problems $\beta_A = 10 \log_{10} \frac{I}{I_0}$

$$\beta_B - \beta_A = 10 \log \left(\frac{2I}{I} \right) = 10 \times 0.3010 = 3 \text{ dB}$$

60. C

60. The distance of object from L_1 and L_2 are different so two images are formed.

61. D

61. $H_2O \rightarrow$ Bent shape

$SO_2 \rightarrow$ Bent shape

62. B

62. In BH_3 , hydrogen exhibits -1 oxidation state.

63. A

63. Here, $\angle ACB = \theta + 180 - (2\theta + \alpha) = 180 - (\theta + \alpha)$
So, here we can say that $\triangle BCD$ and $\triangle ABC$ will be similar.

According to property of similarity $\frac{AB}{12} = \frac{12}{9}$

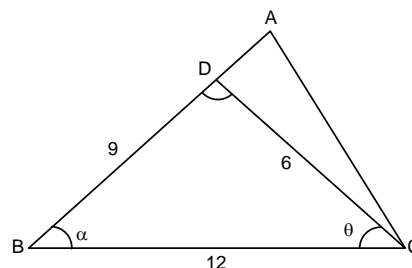
Hence, $AB = 16$,

$$\frac{AC}{6} = \frac{12}{9}$$

$\Rightarrow AC = 8$

Hence, $AD = 7$, $AC = 8$

Now, $\frac{\text{Perimeter of } \triangle ADC}{\text{Perimeter of } \triangle BDC} = \frac{6 + 7 + 8}{9 + 6 + 12} = \frac{21}{27} = \frac{7}{9}$



64. B

64. The diagonal of the innermost square is 2 unit.

\therefore Diagonal of the 7th square = 14

and diagonal of the 8th square = 16

$$\therefore \text{Area of 7th square} = \frac{1}{2} \times 14^2 = 98$$

$$\text{and area of the 8th square} = \frac{1}{2} \times 16^2 = 128$$

\therefore Their difference = $128 - 98 = 30$

65. B

65. According to the remainder theorem, the following expression will have the same remainder,

$$\frac{(7)^{84}}{342} = \frac{(7^3)^{28}}{342} = \frac{(343)^{28}}{(342)} \Rightarrow \text{Remainder} = 1$$

66. D

66. Green glands are excretory in function which are present in some crustaceans (prawns, crabs)

67. D

67. Edible part of banana is endocarp and less developed mesocarp.

68.

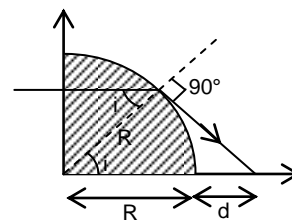
B

$$\frac{2}{\sqrt{3}} \sin i = 1 \times \sin 90^\circ$$

$$i = 60^\circ$$

$$\cos i = \frac{R}{R+d}$$

$$d = R$$



69.

C

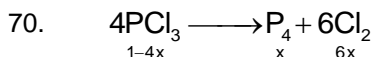
$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$$

$$y = -x + \frac{1}{f} \Rightarrow \frac{1}{3} = \frac{-1}{2} + \frac{1}{f}$$

$$\Rightarrow f = \frac{6}{5}$$

70.

A



$$K_c = \frac{x \times (6x)^6}{(1-4x)^4}$$

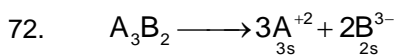
71.

B

$$-\frac{\Delta[A]}{\Delta t} = \frac{1}{4} \frac{\Delta[C]}{\Delta t}$$

72.

D



$$K_{sp} = (3s)^3 \times (2s)^2 = 108s^5$$

73.

B

angular momentum is constant

$$mvr = C \text{ (where } C \text{ is constant)}$$

$$v \propto \frac{1}{r}$$

$$\frac{KE_1}{KE_2} = \left(\frac{r_2}{r_1}\right)^2$$

74.

D

$$KE = \frac{p^2}{2m}$$

75.

D

$$\begin{aligned} \text{Average of first 97 natural numbers} &= \frac{1+2+\dots+97}{97} \\ &= \frac{97 \times 98}{2 \times 97} \\ &= 49 \end{aligned}$$

76. A
 76. Sucrose is a disaccharide made up of Glucose and fructose.
77. C
 77. The first step of the Calvin pathway is the CO_2 fixation where $\text{RuBP} + \text{CO}_2 \xrightarrow{\text{RuBis Co}} 2 \times 3\text{PGA}$. RuBisCo is the most abundant enzyme in the world and is characterised by the fact that its active site can bind to both CO_2 and O_2 .
 In C_3 plants, some O_2 binds with RuBisCo and hence CO_2 fixation is decreased. Here the RuBP instead of being converted to 2 molecule of PGA bind with O_2 to form one molecule to phosphoglycerate and phosphoglycolate in a pathway called photorespiration. In this pathway, there is release of CO_2 with the utilisation of ATP.
78. B
 78. Formation of non-functional methaemoglobin causes blue-baby syndrome. This is due to excess of nitrates in drinking water
79. C
 79.
$$\text{Density} = \frac{2m}{\frac{m}{\rho_1} + \frac{m}{\rho_2}} \Rightarrow \frac{2\rho_1\rho_2}{\rho_1 + \rho_2}$$
80. C
 80.
$$E_{\text{cell}}^{\circ} = E_{\text{C}}^{\circ} - E_{\text{A}}^{\circ}$$