

Physics

- A body starts from rest and moves with constant acceleration. If the distance covered by it in the 7th second of its journey is 26 m, what is the acceleration of the body?
 A) 2 m/s^2 B) 4 m/s^2
 C) 3 m/s^2 D) 5 m/s^2
- A body starts from rest and moves with constant acceleration. What is the ratio of the distance covered in the 5th second to the total distance covered in 5 seconds?
 A) $\frac{9}{25}$ B) $\frac{1}{5}$
 C) $\frac{7}{25}$ D) $\frac{2}{5}$
- A body starts from rest and moves with constant acceleration. What is the ratio of the distance travelled by the body during the 3rd second to that travelled in the 4th second?
 A) $\frac{3}{5}$ B) $\frac{5}{7}$
 C) $\frac{7}{9}$ D) $\frac{3}{7}$
- A car moving with a velocity of 15 m/s can be stopped by applying a constant retarding force over a distance of 30 m. If the velocity of the car is increased to 45 m/s, what distance will it cover before coming to rest under the same retarding force?
 A) 90 m B) 180 m
 C) 270 m D) 360 m
- A car moving with a speed of 30 km/h can be stopped by applying brakes after at least 3 m. If the same car is moving with a speed of 90 km/h, what is the minimum stopping distance under the same braking retardation?
 A) 9 m B) 18 m
 C) 27 m D) 36 m
- The velocity acquired by a body moving with uniform acceleration is 25 m/s in 3 seconds and 45 m/s in 7 seconds. What is the initial velocity of the body?
 A) 5 m/s B) 10 m/s
 C) 12 m/s D) 15 m/s
- The velocity of a particle moving with constant acceleration at an instant t_0 is 12 m/s. After 4 seconds from that instant, the velocity of the particle becomes 24 m/s. What was the velocity of the particle 3 seconds before t_0 ?
 A) 3 m/s B) 6 m/s
 C) 9 m/s D) 15 m/s
- A bullet moving with a velocity of 100 cm/s penetrates a wooden block and comes to rest after traversing 9 cm inside it. What initial velocity is required for the bullet to traverse a distance of 16 cm inside the same wooden block?
 A) 120 cm/s B) 133.3 cm/s
 C) 150 cm/s D) 160 cm/s
- Which of the following statements is true for a body moving along a straight path?
 A) A body can have zero velocity and non-zero acceleration simultaneously
 B) A body with constant speed must have zero acceleration in all cases
 C) Velocity of a body can never change direction if acceleration is constant
 D) Average velocity is always equal to average speed regardless of path shape
- Two bodies of masses m_A and m_B are dropped from heights h_A and h_B respectively from rest under gravity in vacuum. What is the ratio of the speeds with which they hit the ground?
 A) $\sqrt{h_A} : \sqrt{h_B}$ B) $h_A : h_B$
 C) $m_A\sqrt{h_A} : m_B\sqrt{h_B}$ D) $\frac{1}{h_A} : \frac{1}{h_B}$

11. A body dropped from the top of a cliff reaches the ground in 4 seconds. Taking $g = 9.8 \text{ m/s}^2$, what is the height of the cliff?
- A) 39.2 m B) 78.4 m
C) 98.0 m D) 156.8 m
12. A body falls freely from rest under gravity. If the distance covered by it in the last second of its fall is equal to the distance covered by it in the first 4 seconds of its motion, how long was the body in the air?
- A) 6.5 s B) 7.5 s
C) 8.5 s D) 9.5 s
13. An object is dropped vertically downwards under gravity from rest. What is the change in its speed after falling through a distance $3d$ from its starting point?
- A) $\sqrt{3gd}$ B) $\sqrt{6gd}$
C) $3\sqrt{gd}$ D) $2\sqrt{3gd}$
14. A bullet enters a thick block of wood with an initial velocity v . If the bullet penetrates a distance x into the block before coming to rest, what is the retardation experienced by the bullet?
- A) $\frac{v^2}{x}$ B) $\frac{v^2}{2x}$
C) $\frac{v^2}{4x}$ D) $\frac{2v^2}{x}$
15. A small stone is dropped from the top of a cliff into a deep well of depth d . If the speed of sound in air is v_s and acceleration due to gravity is g , what is the total time T elapsed between dropping the stone and hearing the sound of the splash at the top of the cliff?
- A) $T = \sqrt{\frac{2d}{g}} + \frac{d}{v_s}$ B) $T = \frac{2d}{v_s} + \sqrt{\frac{d}{g}}$
C) $T = \sqrt{\frac{d}{2g}} + \frac{2d}{v_s}$ D) $T = \frac{d}{v_s} + \frac{2d}{g}$
16. A stone is dropped from the top of a tower. During its fall, it covers 25 m in its last second. Taking $g = 10 \text{ m/s}^2$, what is the total height of the tower?
- A) 30 m B) 45 m
C) 60 m D) 80 m
17. A body falling freely from height h takes time t_1 to reach the ground. What is the time t_2 taken by the body to cover the first $\frac{1}{9}$ th of the height?
- A) $t_2 = \frac{t_1}{9}$ B) $t_2 = \frac{t_1}{3}$
C) $t_2 = \frac{t_1}{\sqrt{3}}$ D) $t_2 = 3t_1$
18. A stone is dropped from a certain height and takes 6 seconds to reach the ground. If it is stopped after 4 seconds of its fall and then immediately released, what will be the total time taken by the stone to reach the ground?
- A) 8.0 s B) 8.5 s
C) 9.0 s D) 10.0 s
19. Two bodies are dropped from different heights at different instants. The second body is dropped 3 seconds after the first body. If both bodies reach the ground simultaneously 6 seconds after the first body is dropped, what is the difference between the initial heights of the two bodies? (Take $g = 9.8 \text{ m/s}^2$)
- A) 88.2 m B) 132.3 m
C) 176.4 m D) 122.5 m
20. A body is released from the top of a tower of height H m. After 3 seconds, it is stopped and then instantaneously released. What will be its height from the ground after the next 3 seconds? (Take $g = 10 \text{ m/s}^2$)
- A) $(H - 45)$ m B) $(H - 90)$ m
C) $(H - 135)$ m D) $(H - 180)$ m
21. A body falls freely from rest under gravity. What is the ratio of the distances traversed by the body in the 1st, 2nd, and 3rd seconds of its motion?
- A) 1 : 2 : 3 B) 1 : 4 : 9
C) 1 : 3 : 5 D) 1 : 5 : 9
22. A particle is dropped from a certain height. The time taken by it to fall through successive equal distances of h meters will be:
- A) all equal, being equal to $\sqrt{\frac{2h}{g}}$ second B) in the ratio of the square roots of the integers
 $1 : \sqrt{2} : \sqrt{3} : 2 \dots$
C) in the ratio of the difference in the square roots of the integers, i.e., $1, (\sqrt{2} - 1), (\sqrt{3} - \sqrt{2}), (\dots)$ D) in the ratio of the reciprocals of the square roots of the integers, i.e., $1, \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{3}}, \dots$
23. Water drops fall at regular intervals from a tap 16 m above the ground. The first drop strikes the ground at the same instant the fifth drop begins to fall from the tap. What are the distances of the second, third, and fourth drops from the tap at that instant?
- A) 9 m, 4 m, 1 m B) 12 m, 8 m, 4 m
C) 10 m, 5 m, 2 m D) 8 m, 4 m, 1 m

24. Water drops fall at regular intervals from a tap 16 m above the ground. The third drop is leaving the tap at the instant the first drop touches the ground. How far above the ground is the second drop at that instant?
- A) 4.0 m B) 8.0 m
C) 12.0 m D) 14.0 m
25. Two bodies are thrown vertically upwards with their initial speeds in the ratio 3 : 4. What are the ratios of the maximum heights reached by them and the ratios of the times taken by them to reach their maximum heights, respectively?
- A) 9 : 16 and 3 : 4 B) 3 : 4 and 9 : 16
C) 9 : 16 and 9 : 16 D) 3 : 4 and $\sqrt{3} : 2$
26. If a ball is thrown vertically upwards with a speed of 30 m/s, its velocity after 2 seconds will be: (take $g = 10 \text{ m/s}^2$)
- A) 5 m/s B) 10 m/s
C) 15 m/s D) 20 m/s
27. If a particle is projected vertically upwards with a speed u , what is the distance covered by the particle during the last t seconds of its ascent?
- A) ut B) $\frac{1}{2}gt^2$
C) $ut - \frac{1}{2}gt^2$ D) $(u + gt)t$
28. A particle is projected vertically upwards with an initial velocity v_0 . What is the distance travelled by the particle in the n^{th} second of its motion?
- A) $v_0 - \frac{g}{2}(2n - 1)$ B) $v_0 + \frac{g}{2}(2n - 1)$
C) $v_0t - \frac{1}{2}gt^2$ D) $v_0 - g(2n - 1)$
29. A helicopter is ascending vertically with a constant speed of 20 m/s. When it is at a height of 160 m above the ground, a package is dropped from it. How long will the package take to reach the ground? (Take $g = 10 \text{ m/s}^2$)
- A) 4 s B) 6 s
C) 8 s D) 10 s
30. A ball is thrown vertically upwards from the top of a tower with a speed of 9.8 m/s. It strikes the ground at the base of the tower after 4 seconds. What is the height of the tower? (Take $g = 9.8 \text{ m/s}^2$)
- A) 39.2 m B) 58.8 m
C) 78.4 m D) 98.0 m
31. A stone is thrown vertically upward with a speed u from the top of a tower. It reaches the ground with a velocity $2u$. What is the height of the tower?
- A) $\frac{u^2}{2g}$ B) $\frac{u^2}{g}$
C) $\frac{3u^2}{2g}$ D) $\frac{2u^2}{g}$
32. Two balls A and B are projected vertically upward from the top of a tower with the same initial speed u . Ball A is thrown vertically upwards while ball B is thrown vertically downwards with the same speed u . If v_A and v_B are their final speeds upon reaching the ground at the base of the tower, what is the relation between v_A and v_B ?
- A) $v_A > v_B$ B) $v_A < v_B$
C) $v_A = v_B$ D) $v_A = 2v_B$
33. A stone is dropped from a balloon ascending at a uniform rate of 12 m/s. What is the displacement of the stone from the point of release after 5 s? (Take $g = 10 \text{ m/s}^2$)
- A) 65 m downward B) 65 m upward
C) 185 m downward D) 185 m upward
34. A rocket is launched vertically upward from the ground with a constant upward acceleration of 10 m/s^2 . Its fuel is completely exhausted after 20 s. What is the total time elapsed from the instant of launch until the rocket reaches its maximum height? (Take $g = 10 \text{ m/s}^2$)
- A) 20 s B) 30 s
C) 40 s D) 50 s
35. A particle moves along the x-axis with its position as a function of time t given by the equation $x(t) = (t^2 - 4t + 3)\hat{i}$, where x is in meters and t is in seconds. At what time t does the particle temporarily come to rest (stand still)?
- A) 1 s B) 2 s
C) 3 s D) 4 s
36. Two balls are projected simultaneously from the top of a building of height h , one vertically upward and the other vertically downward, both with the same initial speed of $v_0 = 40 \text{ m/s}$. Taking $g = 10 \text{ m/s}^2$, find the time interval between the two balls striking the ground.
- A) 4 s B) 6 s
C) 8 s D) 10 s

37. A particle moves along the x-axis according to the equation $x(t) = t^3 - 6t^2 + 9t + 4$, where x is in meters and t is in seconds. Find the total distance travelled by the particle between $t = 0$ s and $t = 4$ s.

- A) 8 m B) 12 m
C) 16 m D) 20 m

38. A car accelerates uniformly from an initial velocity of 15.0 m/s to a final velocity of 45.0 m/s in a time interval of 10.0 s. What is the magnitude of the constant acceleration of the car?

- A) 2.0 m/s^2 B) 3.0 m/s^2
C) 4.5 m/s^2 D) 6.0 m/s^2

39. Water droplets fall at regular time intervals from a tap located at a height above the ground. When the 5th droplet is about to fall from the tap, the 1st droplet hits the ground. If the distance between the 3rd and 4th droplets at this instant is 5 m, find the total height of the tap above the ground. (Take $g = 10 \text{ m/s}^2$)

- A) 40 m B) 80 m
C) 120 m D) 160 m

40. A ball is projected vertically upward from the ground with an initial speed u . It reaches a height $H = \frac{3}{4}H_{\text{max}}$, where H_{max} is the maximum height attained by the ball, at two different times t_1 and t_2 during its motion. Find the ratio of the two times $\frac{t_1}{t_2}$.

- A) $\frac{1}{3}$ B) $\frac{1}{2}$
C) $\frac{1}{\sqrt{3}}$ D) $\frac{\sqrt{3}-1}{\sqrt{3}+1}$

41. A particle starts from the position vector $\vec{r}_0 = (3.0\hat{i} + 2.0\hat{j}) \text{ m}$ at time $t = 0$ with an initial velocity of $\vec{v}_0 = (2.0\hat{i} + 6.0\hat{j}) \text{ m/s}$. It experiences a constant acceleration of $\vec{a} = (4.0\hat{i} + 2.0\hat{j}) \text{ m/s}^2$. What is the magnitude of the displacement vector of the particle from the origin at time $t = 3$ s?

- A) 15 m B) 25 m
C) 29 m D) 35 m

42. If a car at rest accelerates uniformly and attains a speed of 72 km/h in 12 s, then the distance covered by the car during this time is:

- A) 60 m B) 120 m
C) 144 m D) 240 m

43. If a train travelling at 108 km/h is to be brought to rest in a distance of 150 m, then the magnitude of its retardation should be:

- A) 1 m/s^2 B) 3 m/s^2
C) 5 m/s^2 D) 6 m/s^2

44. Initially a body is at rest. If its acceleration is 4 m/s^2 , then the distance travelled by the body in the 6th second of its journey is:

- A) 12 m B) 22 m
C) 24 m D) 72 m

45. A body starts from rest and accelerates uniformly at 4 m/s^2 for 6 s. After this, it moves with the acquired uniform velocity for the next 8 s. What is the total distance travelled by the body?

- A) 192 m B) 264 m
C) 272 m D) 320 m

Chemistry

46. Sum of bond order of CO and NO^+ is ____

- A) 5 B) 6
C) 3 D) 1

47. Number of compounds with one lone pair of electrons on central atom amongst following is $\text{O}_3, \text{H}_2\text{O}, \text{SF}_4, \text{ClF}_3, \text{NH}_3, \text{BrF}_5, \text{XeF}_4$ ____

- A) 3 B) 10
C) 5 D) 4

48. The number of species from the following which are paramagnetic and with bond order equal to one is ____ ($\text{H}_2, \text{He}_2^+, \text{O}_2^+, \text{N}_2^{2-}, \text{O}_2^{2-}, \text{F}_2, \text{Ne}_2^+, \text{B}_2$)

- A) 0 B) 2
C) 10 D) 1

49. The total number of anti bonding molecular orbitals, formed from 2s and 2p atomic orbitals in a diatomic molecule is ____

- A) 7 B) 5
C) 8 D) 4

50. The total number of molecular orbitals formed from 2s and 2p atomic orbitals of a diatomic molecule

- A) 7 B) 6
C) 2 D) 8

51. The linear combination of atomic orbitals to form molecular orbitals takes place only when the combining atomic orbitals A. have the same energy B. have the minimum overlap C. have same symmetry about the molecular axis D. have different symmetry about the molecular axis Choose the most appropriate from the options given below:

- A) A, B, C only B) A and C only
C) B, C, D only D) B and D only

52. Given below are two statements: Statement (I): A π bonding MO has lower electron density above and below the inter-nuclear axis. Statement (II): The π^* antibonding MO has a node between the nuclei. In the light of the above statements, choose the most appropriate answer from the options given below:

- A) Both Statement I and Statement II are false B) Both Statement I and Statement II are true
C) Statement I is false but Statement II is true D) Statement I is true but Statement II is false

53. The total number of lone pairs of electrons on oxygen atoms of ozone is _____

- A) 3 B) 4
C) 5 D) 6

54. According to MO theory the bond orders for O_2^{2-} , CO and NO^+ respectively, are

- A) 1, 3 and 3 B) 1, 3 and 2
C) 1, 2 and 3 D) 2, 3 and 3

55. The sum of lone pairs present on the central atom of the interhalogen IF_5 and IF_7 is _____

- A) 0 B) 1
C) 2 D) 3

56. The correct order of bond orders of C_2^{2-} , N_2^{2-} and O_2^{2-} is, respectively

- A) $C_2^{2-} < N_2^{2-} < O_2^{2-}$ B) $O_2^{2-} < N_2^{2-} < C_2^{2-}$
C) $C_2^{2-} < O_2^{2-} < N_2^{2-}$ D) $N_2^{2-} < C_2^{2-} < O_2^{2-}$

57. Identify the incorrect statement for PCl_5 from the following.

- A) In this molecule, orbitals of phosphorous are assumed to undergo sp^3d hybridization. B) The geometry of PCl_5 is trigonal bipyramidal.
C) PCl_5 has two axial bonds stronger than three equatorial bonds. D) The three equatorial bonds of PCl_5 lie in a plane.

58. Among the following species

$N_2, N_2^+, N_2^-, N_2^{2-}, O_2, O_2^+, O_2^-, O_2^{2-}$ the number of species showing diamagnetism is

- A) 1 B) 2
C) 3 D) 4

59. According to MO theory, number of species/ions from the following having identical bond order is _____.

- $CN^-, NO^+, O_2, O_2^+, O_2^{2+}$
A) 2 B) 3
C) 4 D) 5

60. The number of paramagnetic species among the following is _____. $B_2, Li_2, C_2, C_2^-, O_2^{2-}, O_2^+$ and He_2^+

- A) 3 B) 4
C) 5 D) 6

61. Number of lone pairs of electrons in the central atom of SCl_2, O_3, ClF_3 and SF_6 , respectively, are :

- A) 0, 1, 2 and 2 B) 2, 1, 2 and 0
C) 1, 2, 2 and 0 D) 2, 1, 0 and 2

62. Match List-I with List-II

	List-I(Molecule)	List-II(Bond order)
A.	Ne_2	(i) 1
B.	N_2	(ii) 2
C.	F_2	(iii) 0
D.	O_2	(iv) 3

- A) (A-iii), (B-iv), (C-i), (D-ii) B) (A-i), (B-ii), (C-iii), (D-iv)
C) (A-ii), (B-i), (C-iv), (D-iii) D) (A-iv), (B-iii), (C-ii), (D-i)

63. According to molecular orbital theory, the species among the following that does not exist is

- A) O_2^{2-} B) He_2^-
C) Be_2 D) He_2^+

64. Which of the following are isostructural pairs?

A. SO_4^{2-} and CrO_4^{2-} B. $SiCl_4$ and $TiCl_4$ C. NH_3 and NO_3^- D. BCl_3 and $BrCl_3$

- A) C and D only B) A and B only
C) A and C only D) B and C only

65. The total number of electrons in all bonding molecular orbitals of O_2^{2-} is

- A) 8 B) 10
C) 12 D) 14

66. The difference between bond orders of CO and NO^+ is $x/2$ where $x = \underline{\hspace{2cm}}$. (Round off to the Nearest Integer)

- A) 0 B) 1
C) 2 D) 3

67. In the following the correct bond order sequence is:

- A) $O_2^{2-} > O_2^+ > O_2^- > O_2$ B) $O_2^+ > O_2^- > O_2^{2-} > O_2$
C) $O_2^+ > O_2 > O_2^- > O_2^{2-}$ D) $O_2 > O_2^- > O_2^{2-} > O_2^+$

68. The bond order and magnetic behaviour of O_2^- ion are, respectively

- A) 1.5 and paramagnetic B) 1.5 and diamagnetic
C) 2 and diamagnetic D) 1 and paramagnetic

69. According to molecular orbital theory, the number of unpaired electron(s) in O_2^{2-} is

- A) 0 B) 1
C) 2 D) 3

70. The bond order and the magnetic characteristics of CN^- are:

- A) $2\frac{1}{2}$, diamagnetic B) 3, diamagnetic
C) 3, paramagnetic D) $2\frac{1}{2}$, paramagnetic

71. Of the species, NO , NO^+ , NO^{2+} and NO^- , the one with minimum bond strength is:

- A) NO^+ B) NO
C) CNO^{2+} D) NO^-

72. Two pi and half sigma bonds are present in:

- A) O_2^+ B) N_2
C) O_2 D) N_2^+

73. The ion that has sp^3d^2 hybridisation for the central atom, is:

- A) $[ICl_4]^-$ B) $[ICl_2]^-$
C) $[IF_6]^-$ D) $[BrF_2]^-$

74. Among the following molecules/ions, C_2^{2-} , N_2^{2-} , O_2^{2-} , O_2 Which one is diamagnetic and has the shortest bond length?

- A) O_2 B) N_2^{2-}
C) O_2^{2-} D) C_2^{2-}

75. Total number of lone pair of electrons in I_3^- ion is:

- A) 3 B) 6
C) 9 D) 12

76. According to molecular orbital theory, which of the following will not be a viable molecule?

- A) He_2^{2+} B) He_2^+
C) H_2^- D) H_2^{2-}

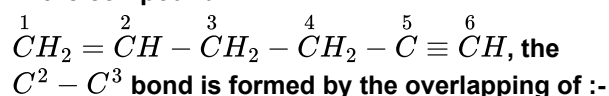
77. Which of the following best describes the diagram of molecular orbital?

- A) A bonding π orbital B) A non-bonding orbital
C) An antibonding σ orbital D) An antibonding π orbital

78. In the molecular orbital diagram for the molecular ion, N_2^+ , the number of electrons in the σ_{2p} molecular orbital is:

- A) 0 B) 2
C) 3 D) 1

79. In the compound



- A) $sp - sp^2$ B) $sp^3 - sp^3$
C) $sp - sp^3$ D) $sp^2 - sp^3$

80. The type of hybrid orbitals used by chlorine atom in ClO^- , ClO_2^- , ClO_3^- and ClO_4^- is/are :-

- A) sp , sp^2 , sp^3 and sp^3d B) sp and sp^3
C) Only sp^3 D) only sp

81. The minimum bond length will be observed in :-

- A) O_2 B) O_2^-
C) O_2^+ D) O_2^{2-}

82. Which among the given pair of molecules consists only of $\pi(\pi)$ bonds ?

- A) B_2 and F_2 B) B_2 and C_2
C) N_2 and O_2 D) C_2 and N_2

83. Which is correct electronic configuration for C_2 molecule according to M.O.T.

- A) $KK(\sigma 2s)^2(\sigma^* 2s)^2(\pi 2p_x)^2(\pi 2p_y)^2(\sigma 2p_z)^2$ B) $KK(\sigma 2s)^2(\sigma^* 2s)^2(\pi 2p_x)^1(\pi 2p_y)^1$
C) $KK(\sigma^* 2s)^2(\sigma 2s)^2(\pi 2p_x)^2(\pi 2p_y)^2(\sigma 2p_z)^2$ D) $KK(\sigma 2s)^2(\sigma^* 2s)^2(\pi 2p_x)^2(\pi 2p_y)^2(\sigma 2p_z)^1$

84. O_2 molecule is paramagnetic due to :-

- A) it contains 2 unpaired electrons in $\pi^* 2p_x$ and $\pi^* 2p_y$ molecular orbitals B) it contains no unpaired electrons in $\pi^* 2p_x$ and $\pi^* 2p_y$ molecular orbitals
C) it contains 2 paired electrons in $\sigma 2s$ orbital D) it contains 1 unpaired electrons in $\sigma 2s$ orbital

85. Which is correct electronic configuration for singly positive nitrogen molecule :-

- A) $\sigma 1s^2 \sigma^* 1s^2 \sigma 2s^2 \sigma^* 2s^2 \pi 2p_x^2 \pi 2p_y^2 \pi 2p_z^2 \sigma^* 2s^2 \sigma 2p_x^2 \pi 2p_x^2 \pi 2p_z^1$
 B) $\sigma 1s^2 \sigma^* 1s^2 \sigma 2s^2 \sigma^* 2s^2 \pi 2p_x^2 \pi 2p_y^2 \pi 2p_z^2 \sigma^* 2s^2 \sigma 2p_x^2 \pi 2p_x^2 \pi 2p_z^1$
 C) $\sigma 1s^2 \sigma^* 1s^2 \sigma 2s^2 \sigma^* 2s^2 \pi 2p_x^2 \pi 2p_y^2 \pi 2p_z^2 \sigma^* 2s^2 \sigma 2p_x^2 \pi 2p_x^2 \pi 2p_z^1$
 D) $\sigma 1s^2 \sigma^* 1s^2 \sigma 2s^2 \sigma^* 2s^2 \pi 2p_x^2 \pi 2p_y^2 \pi 2p_z^2 \sigma^* 2s^2 \sigma 2p_x^2 \pi 2p_x^2 \pi 2p_z^1$

86. Two nodal planes are present in :-

- A) $\pi^* 2p_x$
 B) $\sigma 2p_z$
 C) $\pi 2p_x$
 D) $\pi 2p_y$

87. Which of the following ion do not have bond order of 2.5 ?

- A) O_2^-
 B) O_2^+
 C) N_2^+
 D) N_2^-

88. The no. of antibonding electron pair in O_2^- is

- A) 4
 B) 3
 C) 8
 D) 10

89. Which of the given statements is not correct ?

- A) Electron density in a bonding molecular orbital is located between the bonded atoms.
 B) Electron cloud is located away from the space between the nuclei in anti-bonding molecular orbital
 C) In anti-bonding molecular orbital there is always a nodal plane
 D) The total energy of the molecular orbitals varies from the original energies of atomic orbitals

90. The ion that is isoelectronic with CO and having same bond order is :-

- A) CN^-
 B) O_2^+
 C) O_2^-
 D) N_2^+

Botany

91. Aristotle was the earliest to attempt a more scientific basis of classification. Which of the following features did he use to classify animals?

- A) Presence or absence of a cell wall and mode of nutrition
 B) Presence or absence of a true nucleus and type of thallus
 C) Presence or absence of red blood cells and habitat
 D) Presence or absence of chlorophyll and flagella

92. Which of the following is NOT one of the main criteria used by R.H. Whittaker for his Five Kingdom classification?

- A) Cell structure and Thallus organization
 B) Mode of nutrition and Reproduction
 C) Presence or absence of chlorophyll
 D) Phylogenetic relationships

93. Which of the following is a characteristic of archaebacteria?

- A) They contain a rigid peptidoglycan cell wall.
 B) They include both photosynthetic and chemosynthetic autotrophs.
 C) They are exclusively strict aerobes.
 D) They include methanogens found in the gut of ruminant animals.

94. Consider the following statements about Cyanobacteria (blue-green algae). Which of these statements is INCORRECT?

- A) They are photosynthetic autotrophs with chlorophyll a similar to green plants.
 B) They often form blooms in polluted water bodies.
 C) They can fix atmospheric nitrogen in specialized cells called akinetes.
 D) Their colonies are often surrounded by a gelatinous sheath.

95. Mycoplasma are known to be the smallest living cells. Which of the following statements about them is correct?

- A) They have a distinct peptidoglycan cell wall.
 B) They are highly sensitive to antibiotics like penicillin.
 C) They can survive without oxygen and are pathogenic in nature.
 D) They are obligate parasites that cannot survive outside a host.

96. Diatoms are considered the chief producers in the oceans. Why are their cell walls nearly indestructible?

- A) They are coated with a thick layer of chitin.
 B) They are composed of cellulose impregnated with lignin.
 C) They are made of insoluble calcium carbonate.
 D) They are embedded with silica, forming indestructible overlapping shells.

97. Dinoflagellates are mostly marine and photosynthetic. They appear yellow, green, brown, blue, or red depending on the main pigments. Which dinoflagellate is responsible for the phenomenon known as 'red tides'?

- A) Gonyaulax
 B) Euglena
 C) Paramecium
 D) Trypanosoma

98. Slime moulds are saprophytic protists. Under suitable conditions, they form an aggregation called plasmodium. What structure do they form under unfavorable conditions?

- A)** They differentiate and form fruiting bodies bearing spores with true walls.
- B)** They form a mycelium-like network of hyphae.
- C)** They form resting cysts covered by a thick silica coat.
- D)** They undergo binary fission to become individual amoeboid cells.

99. Which of the following statements regarding the Kingdom Fungi is INCORRECT?

- A)** Except for yeasts, which are unicellular, fungi are filamentous.
- B)** Fungal cell walls are composed of cellulose and pectin.
- C)** They are heterotrophic and absorb soluble organic matter from dead substrates.
- D)** Reproduction in fungi can take place by vegetative, asexual, and sexual methods.

100. Members of Phycomycetes are found in aquatic habitats, on decaying wood in moist places, and as obligate parasites on plants. Which of the following is NOT an example of Phycomycetes?

- A)** Mucor
- B)** Rhizopus
- C)** Albugo
- D)** Penicillium

101. What are the sac like structures that contain spores in ascomycetes ?

- A)** Basidia
- B)** Sporangia
- C)** Asci
- D)** Conidia

102. Which of the following fungi belongs to the class Basidiomycetes and is known to be a parasite?

- A)** Puccinia
- B)** Alternaria
- C)** Claviceps
- D)** Neurospora

103. Deuteromycetes are commonly known as 'imperfect fungi' because:

- A)** They lack a rigid cell wall and can change shape.
- B)** They only reproduce through sexual methods.
- C)** They do not possess a well-defined nucleus.
- D)** Only their asexual or vegetative phases are known.

104. Sexual reproduction in fungi involves three sequential steps. Identify the correct sequence of these events.

- A)** Karyogamy -> Plasmogamy -> Meiosis
- B)** Plasmogamy -> Karyogamy -> Meiosis
- C)** Plasmogamy -> Meiosis -> Karyogamy
- D)** Karyogamy -> Meiosis -> Plasmogamy

105. Which of the following statements about viruses is correct?

- A)** They contain both DNA and RNA as their genetic material.
- B)** The protein coat of a virus is called a capsid, made of smaller subunits called capsomeres.
- C)** Viruses are free-living entities that can replicate independently on nutrient agar plates.
- D)** Bacteriophages usually contain single-stranded RNA as their genetic material.

106. Viroids were discovered by T.O. Diener in 1971 and were found to cause potato spindle tuber disease. Viroids differ from viruses primarily because they:

- A)** Have double-stranded DNA instead of RNA.
- B)** Lack a protein coat and have a free RNA molecule.
- C)** Are larger than viruses and have a complex cellular structure.
- D)** Are capable of replicating independently without a host.

107. Prions are infectious agents that consist entirely of abnormally folded proteins. They are known to cause several neurological diseases. Which of the following diseases is caused by prions in cattle?

- A)** Potato spindle tuber disease
- B)** Tobacco mosaic disease
- C)** Kala-azar
- D)** Bovine spongiform encephalopathy (BSE)

108. Lichens represent a symbiotic relationship between an algal component and a fungal component. The algal component is called phycobiont and the fungal component is called mycobiont. What is the specific role of the fungal partner?

- A)** It produces carbohydrates and fixes nitrogen for the alga.
- B)** It provides protection, absorbs water, and minerals for the alga.
- C)** It acts as a parasite and consumes the algal cells for energy.
- D)** It builds the physical framework to defend the lichen from predators.

109.

Read the following statements regarding Archaeobacteria and Eubacteria: 1. Archaeobacteria have a different cell wall structure responsible for their survival in extreme conditions. 2. Methanogens are present in the guts of several ruminant animals and produce methane biogas. 3. All eubacteria contain a rigid cell wall made of cellulose. Which of the statements given above are correct?

- A) 1 and 3 only B) 2 and 3 only
C) 1 and 2 only D) 1, 2, and 3

110.

Specialized cells called heterocysts present in some Cyanobacteria (like Nostoc) are responsible for:

- A) Nitrogen fixation B) Carbon dioxide fixation
C) Sexual reproduction D) Storage of reserve food

111.

Which of the following statements is incorrect regarding Mycoplasma?

- A) They lack a cell wall completely. B) They are the smallest living cells known.
C) They cannot survive without oxygen. D) They are pathogenic in both plants and animals.

112.

Read the following statements regarding Cyanobacteria: (i) They are photosynthetic autotrophs containing chlorophyll a. (ii) Some can fix atmospheric nitrogen in specialized cells called heterocysts. (iii) They often form blooms in polluted water bodies. (iv) They lack a mucilaginous sheath. Which of the statements given above are correct?

- A) Only (i) and (ii) B) Only (i), (ii), and (iii)
C) Only (ii), (iii), and (iv) D) All (i), (ii), (iii), and (iv)

113.

Contagium vivum fluidum (living infectious fluid) name was given by:

- A) D.J. Ivanowsky B) M.W. Beijerinck
C) W.M. Stanley D) Robert Hooke

114.

Kingdom Protista brings together Chlamydomonas and Chlorella with Paramecium and Amoeba. This was done because:

- A) All of them are multicellular eukaryotes B) All of them are unicellular eukaryotes
C) All of them are unicellular prokaryotes D) All of them show heterotrophic nutrition

115.

Which of the following organisms are known as the 'chief producers' in the oceans?

- A) Dinoflagellates B) Diatoms
C) Euglenoids D) Cyanobacteria

116.

The cell walls of fungi are composed of:

- A) Cellulose and pectin B) Chitin and polysaccharides
C) Peptidoglycan and lipids D) Hemicellulose

117.

Vegetative reproduction in fungi takes place by all the following methods except:

- A) Fragmentation B) Fission
C) Budding D) Oospores

118.

The imperfect fungi which are decomposers of litter and help in mineral cycling belong to:

- A) Phycomycetes B) Ascomycetes
C) Basidiomycetes D) Deuteromycetes

119.

Viroids differ from viruses in having:

- A) DNA molecules without protein coat B) RNA molecules with protein coat
C) RNA molecules without protein coat D) DNA molecules with protein coat

120.

Match Column I with Column II and select the correct analytical option:

Column I (Group)	Column II (Environment/Property)
(a) Halophiles	(i) Hot springs
(b) Thermoacidophiles	(ii) Aquatic environment
(c) Methanogens	(iii) Salty areas
(d) Cyanobacteria	(iv) Guts of ruminants

- A) a-(iii), b-(i), c-(iv), d-(ii) B) a-(i), b-(ii), c-(iii), d-(iv)
C) a-(ii), b-(i), c-(iv), d-(iii) D) a-(iii), b-(iv), c-(i), d-(ii)

121.

Match the fungal classes with their common taxonomic classifications:

Column I (Fungal Class)	Column II (Common Name)
(a) Phycomycetes	(i) Sac fungi
(b) Ascomycetes	(ii) Algal fungi
(c) Basidiomycetes	(iii) Imperfect fungi
(d) Deuteromycetes	(iv) Club fungi

- A) a-(ii), b-(i), c-(iv), d-(iii) B) a-(i), b-(ii), c-(iii), d-(iv)
C) a-(ii), b-(iv), c-(i), d-(iii) D) a-(iv), b-(iii), c-(ii), d-(i)

122.

Match the following critical biological diseases with their causative agents:

Column I (Disease)	Column II (Causative Agent)
(a) Potato spindle tuber disease	(i) Virus
(b) Cr-Jacob disease (CJD)	(ii) Viroid
(c) Tobacco Mosaic disease	(iii) Prion
(d) Citrus Canker	(iv) Bacteria

- A)** a-(ii), b-(iii), c-(i), d-(iv) **B)** a-(i), b-(ii), c-(iii), d-(iv)
C) a-(ii), b-(i), c-(iii), d-(iv) **D)** a-(iii), b-(ii), c-(iv), d-(i)

123.

Assertion (A): Archaeobacteria are able to survive in extreme harsh environmental conditions.
Reason (R): They possess a different cell wall structure compared to other bacteria.

- A)** If both A and R are true and R is the correct explanation of A. **B)** If both A and R are true but R is not the correct explanation of A.
C) If A is true but R is false. **D)** If both A and R are false.

124.

Assertion (A): Euglena is considered a plant-animal connecting link. **Reason (R):** It performs photosynthesis in the presence of sunlight but behaves like a heterotroph when deprived of sunlight.

- A)** If both A and R are true and R is the correct explanation of A. **B)** If both A and R are true but R is not the correct explanation of A.
C) If A is true but R is false. **D)** If both A and R are false.

125.

Assertion (A): Chrysophytes float passively in water currents. **Reason (R):** They lack any active flagellar movement and form a major part of plankton.

- A)** If both A and R are true and R is the correct explanation of A. **B)** If both A and R are true but R is not the correct explanation of A.
C) If A is true but R is false. **D)** If both A and R are false.

126.

Assertion (A): Neurospora is extensively used in biochemical and genetic work. **Reason (R):** It belongs to the class Basidiomycetes.

- A)** If both A and R are true and R is the correct explanation of A. **B)** If both A and R are true but R is not the correct explanation of A.
C) If A is true but R is false. **D)** If both A and R are false.

127.

Assertion (A): Lichens are excellent pollution indicators. **Reason (R):** They do not grow in areas heavily polluted with sulphur dioxide (SO₂).

- A)** If both A and R are true and R is the correct explanation of A. **B)** If both A and R are true but R is not the correct explanation of A.
C) If A is true but R is false. **D)** If both A and R are false.

128.

Assertion (A): Viruses are not included in Whittaker's five-kingdom classification. **Reason (R):** Viruses are truly non-cellular structures and are not considered truly 'living'.

- A)** If both A and R are true and R is the correct explanation of A. **B)** If both A and R are true but R is not the correct explanation of A.
C) If A is true but R is false. **D)** If both A and R are false.

129.

Assertion (A): Fusion of protoplasts between two motile or non-motile gametes is called karyogamy. **Reason (R):** Karyogamy always takes place immediately after plasmogamy in all fungi.

- A)** If both A and R are true and R is the correct explanation of A. **B)** If both A and R are true but R is not the correct explanation of A.
C) If A is true but R is false. **D)** If both A and R are false.

130.

Which group of monerans represents the most abundant microorganisms acting as major decomposers?

- A)** Archaeobacteria **B)** Chemosynthetic autotrophic bacteria
C) Heterotrophic bacteria **D)** Cyanobacteria

131.

Citrus canker disease is caused by a:

- A)** Virus **B)** Fungus
C) Bacterium **D)** Mycoplasma

132.

Instead of a rigid cell wall, Euglenoids possess a flexible, protein-rich layer called:

- A)** Capsid **B)** Pellicle
C) Frustule **D)** Cuticle

133.

Which protozoan group is characterized by the presence of a sleeping sickness-causing parasite?

- A) Amoeboid protozoans B) Flagellated protozoans
C) Ciliated protozoans D) Sporozoans

134.

Asexual reproduction in fungi occurs by all of the following spores except:

- A) Conidia B) Zoospores
C) Oospores D) Sporangiospores

135.

An intervening dikaryotic stage ($n + n$) where cells contain two nuclei per cell is distinctly found in:

- A) Rhizopus B) Neurospora
C) Ustilago D) Both B and C

Zoology

136.

An important alkaloid which is present in Tobacco is

- A) Quinine B) Nicotine
C) Narcotics D) Reserpine

137.

Mode of abuse of tobacco is by

- A) Smoking B) Chewing
C) Snuffing D) All

138.

Read the statements about the effects of smoking i) It increases the CO level and reduces O_2 level in the blood ii) Nicotine inhibits the adrenal glands to release adrenalin into blood iii) Medullary hormones increases the B.P. and heart rate iv) Smoking causes bronchitis and emphysema Which one of the above statements is wrong

- A) i B) ii
C) iii D) iv

139.

The commonly abused drugs of the following are

- A) Opioids B) Cannabinoids
C) Coca alkaloids D) All

140.

The drug which is commonly used during holi festival and religious ceremonies is

- A) Bhang B) Heroin
C) Morphine D) Dopamine

141.

Receptors for morphine and heroin are present in our

- A) Gastro intestinal tract B) Central nervous system
C) P.N.S D) 1 and B

142.

Which of the following drug is formed due to the acetylation of morphine?

- A) Tetra acetyl morphine B) Acetyl salicylic acid
C) heroin D) Aspirin

143.

Chemical name of smack is

- A) Serotonin B) BHC
C) Diethyl carbamazine D) Diacetyl morphine

144.

The mode of abuse of smack is by

- A) Injection B) Snorting
C) Oral intake D) 1 & B

145.

The drug which is sedative, pain killer and used by patients after surgery is extracted from

- A) Pod of poppy plant B) Flower tops of hemp plant
C) Leaves of coca plant D) Bark of cinchona

146.

Which of the following is not cannabinoid

- A) Smack B) Crack
C) Coke D) All

147.

Intravenous drug abusers are Likely to acquire infections such as

- A) HIV B) HBV
C) 1 & B D) Kwashiorkar

148.

Abuse and addition to alcohol leads to

- A) Necrosis B) Neurosis
C) Cirrhosis D) Psychosis

149.

Two way matching

Drugs

- A) Barbiturates
B) Amphetamines
C) Benzodiazepines
D) Lysergic acid diethyl amide

Mode of action on human systems

- I) Depression and mental illness
II) Tranquilizers
III) Sleeping pills
IV) Sleeplessness

- A) A-4, B-3, C-2, D-1 B) A-3, B-4, C-2, D-1
C) A-1, B-2, C-3, D-4 D) A-1, B-4, C-3, D-2

150.

Plants which produce drugs with hallucinogenic properties are

- A) Coca plant B) Datura
C) Atropa D) All

151.

Abuse of cannabinoids by humans effects

- A) Nervous system B) Respiratory system
C) Cardio vascular system D) Digestive system

152.

Crack is obtained from a plant which is a native of

- A) South Africa B) South America
C) South Asia D) West Africa

153.

Coca alkaloid has a stimulating action on central nervous system and it is obtained from

- A) Bulbophyllum B) Haematoxylon
C) Erythroxylum D) Taeniophyllum

154.

Which of the following are the symptoms of withdrawal syndrome of TDA abuse?

- A) Nausea and sweating B) Tremors and Anxiety
C) Ignore all social norms D) All the above

155.

Drug extracted from the dried latex of the unripe seed capsule of poppy plant is

- A) coca alkaloid B) Bhang
C) Hashish D) Morphine

156.

The age between 12 - 18 years is considered as

- A) vulnerable phase B) Adolescence period
C) A period and a process D) All the above
during which a child
becomes mature

157.

The TDA abuse leads to

- A) Addiction B) B). Dependence
C) Both D) None

158.

Choose the incorrect statement among these

- A) Addiction is a psychological attachment to certain effects such as euphoria.
B) B). With the repeated use of TDA, the tolerance level of the receptors present in our body decreases.
C) Use of TDA even once, can be a fore runner to addiction.
D) In the absence of any guidance or counseling, people get addicted and become dependent on TDA abuse.

159.

The tendency of the body to manifest a characteristic and unpleasant condition, if the regular dose or drugs or alcohol is abruptly discontinued is called ____

- A) Dependence B) Adolescence
C) Ageing D) All the above

160.

Stimulant cocaine is obtained from

- A) Rauwolfia B) Erythroxylon
C) Papaver D) Cannabis

161.

Hashish and ganja are obtained from:-

- A) Erythroxylum B) Nicotiana
C) Papaver D) Cannabis

162.

Which one is not helpful in preventing drug/alcohol abuse.

- A) Avoid undue peer pressure B) Education and danger signs
C) looking for danger signs D) Avoiding help from parents & peers

163.

The period of rapid growth and physical & mental development between childhood & adulthood is?

- A) Puberty B) youthness
C) Addiction D) Adolescence

164.

The psychological attachment of a person to specific effect of a drug or alcohol is called

- A) Addiction B) Avoidance
C) Deaddiction D) Syndrome

165.

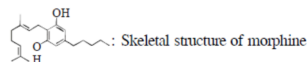
Which of the following is the side – effect of anabolic steroid on female athletes

- A) Enhanced feminine features B) Reduction in body hair features
C) Enlargement of clitoris D) increase in pitch of sound

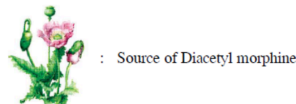
166.

Mark the incorrectly matched pair ?

A)



B)



- C) Cocaine: Interferes with transport of dopamine D) Heroin: Smack

167.

Choose the incorrect statement among these

- A) Smoking also paves the way to hard drugs. B) Tobacco has been used by human beings for more than 400 years.
C) Tobacco is smoked, chewed or used as a snuff. D) Tobacco contains a large number of chemical substances including morphine, an alkaloid.

168.

Nicotine stimulates _____ to release adrenaline and nor-adrenaline into blood circulation, both of which raise blood pressure and increase heart rate.

- A) Adrenal gland B) Thyroid gland
C) Pituitary gland D) Thymus gland

169.

Identify the number of correct statements 1.

Smoking is associated with increased incidence of cancers of lung, urinary bladder and throat, bronchitis, emphysema, coronary heart disease, gastric ulcer, etc. 2. Tobacco chewing is associated with increased risk of cancer of the oral cavity. 3. Smoking increases carbon monoxide (CO) content in blood and reduces the concentration of haem bound oxygen. This causes oxygen deficiency in the body

- A) 2 B) 3
C) 2 and 1 D) 1

170.

Adolescence means both '_____' and '_____' during which a child becomes mature in terms of his/her attitudes and beliefs for effective participation in _____.

- A) a period ; a process ; society B) Child hood ; a process ; society
C) age ; child hood ; society D) Adult hood ; child hood ; society

171.

Choose the correct statement among these

- A) Adolescence is accompanied by several biological and behavioural changes. B) Adolescence, thus is a very vulnerable phase of mental and psychological development of an individual.
C) Curiosity, need for adventure and excitement, and experimentation, constitute common causes, D) which motivate youngsters towards drug and alcohol use.
E) All are correct

172.

Choose the incorrect statement among these

- A) A child's natural curiosity motivates him/her to experiment B) This is complicated further by effects that might be perceived as benefits, of alcohol or drug use
C) The first use of drugs or alcohol may be out of curiosity or experimentation, but later the child starts using these to escape facing problems D) None of the above

173.

One among these is not the reason for adolescents leading to abuse.

- A)** Of late, stress, from pressures to excel in academics or examinations, has played a significant role in persuading the youngsters to try alcohol and drugs
- B)** The perception among youth that it is 'cool' or progressive to smoke, use drugs or alcohol, is also in a way a major cause for youth to start these habits.
- C)** Television, movies, newspapers, internet also help to promote this perception
- D)** Other factors that have been seen to be associated with drug and alcohol abuse among adolescents are stable or supportive family structures and peer pressure

174.

_____ is the tendency of the body to manifest a characteristic and unpleasant withdrawal syndrome if regular dose of drugs/alcohol is abruptly discontinued.

- A)** Dependence **B)** Adolescence
- C)** Counselling **D)** Education

175.

_____ leads the patient to ignore all social norms in order to get sufficient funds to satiate his/her needs.

- A)** Dependence **B)** Education
- C)** Counselling **D)** Television

176.

i. The immediate adverse effects of drugs and alcohol abuse are manifested in the form of reckless behavior, _____ and violence. ii. Excessive doses of drugs may lead to coma and death due to respiratory failure, heart failure or _____. iii. A combination of drugs or their intake along with _____ generally results in overdosing and even deaths.

- A)** vandalism ; cerebral haemorrhage ; alcohol **B)** Education ; typhoid ; fruit juice
- C)** academics; Malaria ; tobacco **D)** Vandalism ; cerebral haemorrhage; milk

177.

Those who take drugs intravenously (direct injection into the vein using a needle and syringe), are much more likely to acquire serious infections like _____

- A)** Malaria and filaria **B)** Typhoid and pneumonia
- C)** Ring worm infection **D)** AIDS and Hepatitis

178.

The chronic use of drugs and alcohol damages _____

- A)** Cardio vascular system and muscles **B)** Muscular system and immune system
- C)** nervous system and liver (cirrhosis). **D)** Heart and blood vessels only

179.

Sports persons (mis)use _____ and certain hormones in sports to increase muscle strength and bulk and to promote aggressiveness and as a result increase athletic performance.

- A)** Narcotic analgesics **B)** Anabolic steroids
- C)** Diuretics **D)** All the above

180.

'prevention is better than cure' holds true for

- A)** Tobacco abuse **B)** Drug abuse
- C)** Alcohol abuse **D)** All the above

ANSWER KEY

Physics

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

Chemistry

46.	2	58.	2	70.	2	82.	2
47.	4	59.	2	71.	4	83.	1
48.	4	60.	2	72.	4	84.	1
49.	4	61.	2	73.	1	85.	1
50.	4	62.	1	74.	4	86.	1
51.	2	63.	3	75.	3	87.	1
52.	3	64.	2	76.	4	88.	2
53.	4	65.	2	77.	4	89.	4
54.	1	66.	1	78.	4	90.	1
55.	2	67.	3	79.	4		
56.	2	68.	1	80.	3		
57.	3	69.	1	81.	3		

Botany

91.	3	103.	4	115.	2	127.	1
92.	3	104.	2	116.	2	128.	1
93.	4	105.	2	117.	4	129.	4
94.	3	106.	2	118.	4	130.	3
95.	3	107.	4	119.	3	131.	3
96.	4	108.	2	120.	1	132.	2
97.	1	109.	3	121.	1	133.	2
98.	1	110.	1	122.	1	134.	3
99.	2	111.	3	123.	1	135.	4
100.	4	112.	2	124.	1		
101.	3	113.	2	125.	1		
102.	1	114.	2	126.	3		

Zoology

136.	2	148.	3	160.	2	172.	4
137.	4	149.	3	161.	4	173.	4
138.	2	150.	4	162.	4	174.	1
139.	4	151.	3	163.	4	175.	1
140.	1	152.	2	164.	1	176.	1
141.	4	153.	3	165.	3	177.	4
142.	3	154.	4	166.	1	178.	3
143.	4	155.	4	167.	4	179.	4
144.	4	156.	4	168.	1	180.	4
145.	1	157.	3	169.	2		
146.	4	158.	2	170.	1		
147.	3	159.	1	171.	4		

SOLUTIONS

Q1.

Answer: B

Explanation:

The distance covered by a body moving with constant acceleration during the n^{th} second is given by the formula $S_n = u + \frac{a}{2}(2n - 1)$. Since the body starts from rest ($u = 0$), substituting $n = 7$ and $S_7 = 26$ m into the formula allows us to solve directly for the acceleration a .

Q2.

Answer: A

Explanation:

The ratio of the distance covered in the n^{th} second to the total distance covered in n seconds for a body starting from rest with uniform acceleration is given by $\frac{2n-1}{n^2}$. Substituting $n = 5$ into this general ratio gives $\frac{2(5)-1}{5^2} = \frac{9}{25}$.

Q3.

Answer: B

Explanation:

The distance covered by a body in the n^{th} second under constant acceleration starting from rest is proportional to $(2n - 1)$. For $n = 3$ and $n = 4$, the ratio of the distances is given by $\frac{2(3)-1}{2(4)-1} = \frac{5}{7}$.

Q4.

Answer: C

Explanation:

For a body coming to rest under a constant retarding force, the stopping distance is directly proportional to the square of its initial velocity, since $v^2 = u^2 - 2as$ gives $s \propto u^2$. Increasing the velocity from 15 m/s to 45 m/s increases the speed by a factor of 3, which increases the stopping distance by a factor of $3^2 = 9$. Thus, $30 \times 9 = 270$ m.

Q5.

Answer: C

Explanation:

The stopping distance of a vehicle under constant retardation is directly proportional to the square of its initial speed ($s \propto u^2$). Increasing the speed from 30 km/h to 90 km/h increases the speed by a factor of 3. Consequently, the minimum stopping distance increases by a factor of $3^2 = 9$, giving a stopping distance of $3 \text{ m} \times 9 = 27 \text{ m}$.

Q6.

Answer: D

Explanation:

Using the first equation of motion $v = u + at$, we set up two linear equations with the given velocities at two different times. Subtracting the two equations gives the constant acceleration a . Substituting the acceleration back into either equation yields the initial velocity $u = 10$ m/s.

Q7.

Answer: B

Explanation:

Using the relation $v = u + at$, the acceleration a of the particle is determined from the velocity change over 4 seconds as $a = \frac{24-12}{4} = 3 \text{ m/s}^2$. To find the velocity 3 seconds before t_0 , we calculate $v = 12 - (3 \times 3) = 3 \text{ m/s}$ (or taking the baseline backwards in time), giving $12 - 9 = 3 \text{ m/s}$.

Q8.

Answer: B

Explanation:

Using the work-energy principle or the third equation of motion $v^2 = u^2 - 2as$, the stopping distance s inside a resistive medium is directly proportional to the square of the initial velocity u^2 , provided the retarding force remains constant. Therefore, $\frac{u_2^2}{u_1^2} = \frac{s_2}{s_1}$. Taking the square root gives $u_2 = u_1 \sqrt{\frac{s_2}{s_1}} = 100 \times \sqrt{\frac{16}{9}} = 100 \times \frac{4}{3} = 133.3 \text{ cm/s}$.

Q9.

Answer: A

Explanation:

At the highest point of vertical motion under gravity, a body projected upward comes to a momentary rest so its velocity is 0 m/s, while it still experiences a downward acceleration due to gravity $g = 9.8 \text{ m/s}^2$. Thus, a body can have zero velocity and non-zero acceleration at the same instant.

Q10.

Answer: A

Explanation:

The speed attained by a freely falling body starting from rest from a height h is given by $v = \sqrt{2gh}$, which is completely independent of the mass of the body. Taking the ratio of final speeds for heights h_A and h_B gives $v_A : v_B = \sqrt{2gh_A} : \sqrt{2gh_B} = \sqrt{h_A} : \sqrt{h_B}$.

Q11.

Answer: B

Explanation:

For a body dropped from rest ($u = 0$) under constant acceleration due to gravity g , the distance fallen in time t is given by the kinematic formula $h = \frac{1}{2}gt^2$. Substituting $g = 9.8 \text{ m/s}^2$ and $t = 4 \text{ s}$ yields $h = \frac{1}{2}(9.8)(4^2) = 78.4 \text{ m}$.

Q12.

Answer: C

Explanation:

For a body starting from rest under gravity, the distance covered in the first t seconds is $S_t = \frac{1}{2}gt^2$, and the distance covered in the n^{th} second is $S_n = \frac{g}{2}(2n - 1)$. Setting $S_4 = S_n$ gives $\frac{1}{2}g(4^2) = \frac{g}{2}(2n - 1)$, which simplifies to $16 = 2n - 1$, resulting in $n = 8.5$ s.

Q13.

Answer: B

Explanation:

Using the third equation of motion $v^2 = u^2 + 2gS$ for an object starting from rest ($u = 0$), falling through a vertical displacement $S = 3d$ yields $v^2 = 2g(3d) = 6gd$. Taking the square root gives the final speed $v = \sqrt{6gd}$. Since the initial speed is 0, the change in speed is $\sqrt{6gd} - 0 = \sqrt{6gd}$.

Q14.

Answer: B

Explanation:

Using the third equation of motion $v_f^2 = v_i^2 - 2ax$, where the initial velocity is v , the final velocity $v_f = 0$, and the penetration distance is x , we get $0 = v^2 - 2ax$. Solving for the retardation a yields $a = \frac{v^2}{2x}$.

Q15.

Answer: A

Explanation:

The total time elapsed T consists of two distinct components: the time t_1 taken by the stone to fall freely under gravity to the bottom of the well, and the time t_2 taken by the sound of the splash to travel back up to the top of the cliff at constant speed. Calculating $t_1 = \sqrt{\frac{2d}{g}}$ and $t_2 = \frac{d}{v_s}$ gives $T = t_1 + t_2 = \sqrt{\frac{2d}{g}} + \frac{d}{v_s}$.

Q16.

Answer: B

Explanation:

The distance covered by a body in the n^{th} second under free fall from rest is given by $S_n = \frac{g}{2}(2n - 1)$. Setting $S_n = 25$ m with $g = 10$ m/s² gives $25 = 5(2n - 1)$, which yields $n = 3$ seconds. The total height of the tower is the distance fallen in 3 seconds: $h = \frac{1}{2}gn^2 = \frac{1}{2}(10)(3^2) = 45$ m.

Q17.

Answer: B

Explanation:

For a body falling freely from rest, the vertical distance fallen is directly proportional to the square of the time taken ($h \propto t^2$, or $t \propto \sqrt{h}$). Since the distance to cover is reduced to $\frac{1}{9}$ th of the total height, the time taken becomes $\sqrt{\frac{1}{9}} = \frac{1}{3}$ of the total time t_1 .

Q18.

Answer: B

Explanation:

The total time to reach the ground includes the initial 4 seconds of fall, plus the time required to cover the remaining height when released from rest again. By calculating the height fallen in 4 seconds out of the total height corresponding to 6 seconds, the remaining height is found to be $\frac{5}{9}$ of the total height. The time required to fall through this remaining height from rest is $\sqrt{20} \approx 4.47$ s (or using integer ratio relations $\sqrt{6^2 - 4^2} = \sqrt{20}$ s), giving a total time of $4 + 4.47 = 8.47$ s ≈ 8.5 s.

Q19.

Answer: B

Explanation:

The height from which a body is dropped from rest is given by $h = \frac{1}{2}gt^2$. The first body falls for $t_1 = 6$ seconds, so its height is $h_1 = \frac{1}{2}(9.8)(6^2) = 176.4$ m. The second body falls for $t_2 = 6 - 3 = 3$ seconds, so its height is $h_2 = \frac{1}{2}(9.8)(3^2) = 44.1$ m. The difference in their initial heights is $h_1 - h_2 = 176.4 - 44.1 = 132.3$ m.

Q20.

Answer: B

Explanation:

When the body falls freely for 3 seconds, it covers a downward displacement $h_1 = \frac{1}{2}gt_1^2 = \frac{1}{2}(10)(3^2) = 45$ m. After being stopped and released again from rest, it falls for another 3 seconds, covering an additional downward distance $h_2 = \frac{1}{2}gt_2^2 = \frac{1}{2}(10)(3^2) = 45$ m. The total downward distance covered from the top is $45 + 45 = 90$ m, making its height from the ground ($H - 90$) m.

Q21.

Answer: C

Explanation:

According to Galileo's law of odd numbers, the distances traversed by a body falling from rest during equal successive intervals of time are in the ratio of consecutive odd numbers (1 : 3 : 5 : 7 : ...). Using the formula for distance in the n^{th} second $S_n = \frac{g}{2}(2n - 1)$, the distances for $n = 1, 2, 3$ evaluate to $\frac{g}{2}$, $\frac{3g}{2}$, and $\frac{5g}{2}$, giving a ratio of 1 : 3 : 5.

Q22.

Answer: C

Explanation:

The time taken to fall through a total distance $n \cdot h$ from rest is $t_n = \sqrt{\frac{2nh}{g}} = \sqrt{n} \cdot \sqrt{\frac{2h}{g}}$. The time taken to fall through the n^{th} equal distance interval h is given by the difference in time to fall through n intervals and $(n - 1)$ intervals, which is $\Delta t_n = t_n - t_{n-1} = \sqrt{\frac{2h}{g}}(\sqrt{n} - \sqrt{n-1})$. Thus, the ratio of successive time intervals is $1 : (\sqrt{2} - 1) : (\sqrt{3} - \sqrt{2}) : (2 - \sqrt{3}) \dots$

Q23.

Answer: A

Explanation:

Since the drops fall at equal time intervals t , the total time taken by the first drop to fall 16 m is $4t$. Using $h = \frac{1}{2}gT^2$, the time interval t satisfies $16 = \frac{1}{2}g(4t)^2 = 8gt^2$. At the instant the 5th drop starts falling ($T = 0$), the 2nd, 3rd, and 4th drops have been falling for times $3t$, $2t$, and t respectively. Their distances from the tap are in the ratio $(3t)^2 : (2t)^2 : t^2 = 9 : 4 : 1$, which gives distances of 9 m, 4 m, and 1 m.

Q24.

Answer: B

Explanation:

Let t be the time interval between successive drops. When the 1st drop hits the ground, the 3rd drop leaves the tap, meaning the 1st drop has been falling for $2t$. The total distance fallen by the 1st drop is $16 \text{ m} = \frac{1}{2}g(2t)^2 = 2gt^2$. At this same instant, the 2nd drop has been falling for time t , covering a downward distance of $h_2 = \frac{1}{2}gt^2$. Since $2gt^2 = 16 \text{ m}$, we have $h_2 = 4 \text{ m}$ from the tap. Thus, the height of the 2nd drop above the ground is $16 - 4 = 12.0 \text{ m}$.

Q25.

Answer: A

Explanation:

The maximum height attained by a body projected vertically upwards with initial speed u is $H = \frac{u^2}{2g}$, and the time taken to reach the maximum height is $t = \frac{u}{g}$. Since $H \propto u^2$, the ratio of maximum heights is $(\frac{3}{4})^2 = \frac{9}{16}$. Since $t \propto u$, the ratio of times taken to reach maximum height is $\frac{3}{4}$.

Q26.

Answer: B

Explanation:

Using the first equation of motion under gravity, $v = u - gt$, substituting the initial upward velocity $u = 30 \text{ m/s}$, acceleration due to gravity $g = 10 \text{ m/s}^2$, and time $t = 2 \text{ s}$ yields a final velocity of 10 m/s .

Q27.

Answer: B

Explanation:

By time-reversal symmetry of motion under constant gravitational acceleration, the distance covered during the last t seconds of upward motion (ascent) is equal to the distance covered in the first t seconds of downward motion (descent) starting from rest at the maximum height.

Q28.

Answer: A

Explanation:

The distance covered in the n^{th} second is obtained by taking the difference between the total displacement at $t = n$ seconds and the total displacement at $t = n - 1$ seconds under constant downward gravitational acceleration g .

Q29.

Answer: C

Explanation:

When the package is released, it retains the initial upward velocity of the helicopter. Taking the upward direction as positive, the net displacement of the package when it reaches the ground is -160 m . Using the second equation of motion, we solve the resulting quadratic equation for time t .

Q30.

Answer: A

Explanation:

Taking the top of the tower as the origin and the upward direction as positive, the displacement of the ball upon reaching the ground is equal to the negative of the tower's height. Using the second equation of motion, we can directly compute this height.

Q31.

Answer: C

Explanation:

Using the third equation of motion $v^2 = u^2 + 2as$ along the vertical direction, the downward displacement is equal to the height of the tower. Taking downward as positive, initial velocity is $-u$ and final velocity is $2u$, allowing us to solve directly for the height.

Q32.

Answer: C

Explanation:

By conservation of mechanical energy or the third equation of motion, the magnitude of the final velocity depends only on the magnitude of the initial velocity, the acceleration due to gravity, and the height of the tower, making the final speeds of both balls identical upon striking the ground.

Q33.

Answer: A

Explanation:

At the moment of release, the stone retains the upward velocity of the ascending balloon. Taking the upward direction as positive, the initial velocity is $+12 \text{ m/s}$ and acceleration due to gravity is -10 m/s^2 . Substituting these values into the second equation of motion gives a negative displacement, indicating that the stone is below the release point.

Q34.

Answer: C

Explanation:

The motion consists of two phases: powered accelerated ascent up to fuel burnout, followed by unpowered free-fall ascent under gravity until the velocity becomes zero at maximum height. The total time taken is the sum of the time durations of these two phases.

Q35.

Answer: B

Explanation:

A particle comes to rest or stands still when its instantaneous velocity is equal to zero. Taking the first derivative of the position function $x(t)$ with respect to time t yields the velocity function $v(t) = 2t - 4$. Setting $v(t) = 0$ gives $t = 2$ s.

Q36.

Answer: C

Explanation:

The ball thrown downwards hits the ground in time t_1 . The ball thrown upwards reaches its peak, returns to the release point moving downwards at the same speed $v_0 = 40$ m/s, and then takes the exact same time t_1 to reach the ground. Therefore, the time interval between the two balls hitting the ground is simply equal to the total time the upward-thrown ball takes to return to its initial height, which is $2v_0/g = 2(40)/10 = 8$ s.

Q37.

Answer: C

Explanation:

To find the total distance, we must identify the times when the particle turns around by finding where the velocity

$v(t) = \frac{dx}{dt} = 0$. Differentiating $x(t)$ gives

$v(t) = 3t^2 - 12t + 9 = 3(t-1)(t-3)$. The particle reverses direction at $t = 1$ s and $t = 3$ s. Calculating the absolute displacements during each sub-interval $t \in [0, 1]$, $t \in [1, 3]$, and $t \in [3, 4]$ gives distances of 4 m, 4 m, and 8 m respectively, summing up to a total distance of 16 m.

Q38.

Answer: B

Explanation:

Uniform acceleration is calculated using the first kinematic equation of motion, $v = u + at$. Substituting the initial velocity $u = 15.0$ m/s, final velocity $v = 45.0$ m/s, and time interval $t = 10.0$ s allows us to solve directly for the acceleration a , which equals 3.0 m/s².

Q39.

Answer: B

Explanation:

Let τ be the regular time interval between consecutive drops. When the 5th drop is at the tap ($t = 0$), the times elapsed for the 4th, 3rd, 2nd, and 1st drops are τ , 2τ , 3τ , and 4τ respectively. Using $y = \frac{1}{2}gt^2$, the positions of the 3rd and 4th drops give a separation of $5\tau^2 - 0.5g\tau^2 = 5$ m, which yields $\tau = 1$ s. The total height is the distance fallen by the 1st drop in $t = 4\tau = 4$ s, which equals 80 m.

Q40.

Answer: A

Explanation:

Using the quadratic equation of motion $h = ut - \frac{1}{2}gt^2$ with $h = \frac{3}{4}H_{\max} = \frac{3}{4}\left(\frac{u^2}{2g}\right)$, we get $2gt^2 - 4ut + \frac{3u^2}{2g} = 0$, or $4gt^2 - 8ut + 3\frac{u^2}{g} = 0$. Solving for t gives $t_1 = \frac{u}{2g}$ and $t_2 = \frac{3u}{2g}$. The ratio $\frac{t_1}{t_2}$ is equal to $\frac{1}{3}$.

Q41.

Answer: C

Explanation:

Using the kinematic position vector equation

$\vec{r}(t) = \vec{r}_0 + \vec{v}_0t + \frac{1}{2}\vec{a}t^2$, we calculate the x and y components of position at $t = 3$ s. The x-component is $x(3) = 3 + 2(3) + \frac{1}{2}(4)(3)^2 = 27$ m, and the y-component is $y(3) = 2 + 6(3) + \frac{1}{2}(2)(3)^2 = 29$ m.

However, computing distance from the origin directly gives

$$|\vec{r}(3)| = \sqrt{27^2 + 29^2} = 29 \text{ m.}$$

Q42.

Answer: B

Explanation:

First, convert the final velocity from km/h to m/s to get $v = 20$ m/s. Using $v = u + at$ with initial velocity $u = 0$, the uniform acceleration is calculated as $a = \frac{5}{3}$ m/s².

Substituting u , a , and $t = 12$ s into the second equation of motion $s = ut + \frac{1}{2}at^2$ gives a total distance of 120 m.

Q43.

Answer: B

Explanation:

First, convert the initial speed from km/h to m/s to get $u = 30$ m/s. The train comes to rest, so the final velocity $v = 0$ m/s over a displacement $s = 150$ m. Using the third equation of motion, $v^2 = u^2 + 2as$, we find acceleration $a = -3$ m/s², which corresponds to a retardation of 3 m/s².

Q44.

Answer: B

Explanation:

The distance covered by a body moving with constant acceleration a starting from rest ($u = 0$) during the n th second is given by the formula $S_n = u + \frac{a}{2}(2n - 1)$.

Substituting $u = 0$ m/s, $a = 4$ m/s², and $n = 6$ gives $S_6 = \frac{4}{2}(2 \times 6 - 1) = 2 \times 11 = 22$ m.

Q45.

Answer: B

Explanation:

The journey consists of two phases. In Phase 1 ($t_1 = 6$ s), starting from rest with uniform acceleration $a = 4$ m/s², the distance covered is $s_1 = \frac{1}{2}at_1^2 = 72$ m, reaching a final velocity of $v = at_1 = 24$ m/s. In Phase 2 ($t_2 = 8$ s), the body moves at this constant velocity v , covering a distance of $s_2 = v \times t_2 = 192$ m. Summing both parts gives a total distance of $72 + 192 = 264$ m.

Q46.

Answer: B

Explanation:



Q47.

Answer: D

Explanation:

The number of compounds with one lone pair of electrons on the central atom is 4.

Q48.

Answer: D

Explanation:

Based on magnetic behavior and bond order calculations, only one species fits both criteria.

Q49.

Answer: D

Explanation:

Antibonding molecular orbital from $2s = 1$. Antibonding molecular orbital from $2p = 3$. Total = 4.

Q50.

Answer: D

Explanation:

The total number of molecular orbitals is equal to the total number of atomic orbitals combined.

Q51.

Answer: B

Explanation:

Molecular orbital should have maximum overlap. Symmetry about the molecular axis should be similar.

Q52.

Answer: C

Explanation:

A π bonding molecular orbital has higher electron density above and below inter nuclear axis.

Q53.

Answer: D

Explanation:

Total no. of lone pairs on oxygen atoms = 6.

Q54.

Answer: A

Explanation:

Theory based. (Calculated via molecular orbital electronic configurations).

Q55.

Answer: B

Explanation:

$IF_5 = 1$ lone pair; $IF_7 = 0$ lone pair; $1 + 0 = 1$.

Q56.

Answer: B

Explanation:

The bond order is calculated as $\frac{1}{2}(N_b - N_a)$. The values are $C_2^{2-} = 3$, $N_2^{2-} = 2$, and $O_2^{2-} = 1$. The increasing order is $O_2^{2-} < N_2^{2-} < C_2^{2-}$.

Q57.

Answer: C

Explanation:

The geometry is trigonal bipyramidal with sp^3d hybridization. Axial bonds are longer and weaker than equatorial bonds because they experience more repulsion.

Q58.

Answer: B

Explanation:

Species with no unpaired electrons are diamagnetic. In this list, only N_2 and O_2^{2-} have all electrons paired.

Q59.

Answer: B

Explanation:

CN^- , NO^+ , and O_2^{2+} all have 14 electrons and a bond order of 3. O_2 has $BO = 2$ and O_2^+ has $BO = 2.5$.

Q60.

Answer: B

Explanation:

Those species which have unpaired electrons are called paramagnetic species. And those species which have no unpaired electrons are called diamagnetic species.

Q61.

Answer: B

Explanation:

The number of lone pair of electrons in the central atom of SCl_2 , O_3 , ClF_3 and SF_6 are 2, 1, 2 and 0 respectively.

Q62.

Answer: A

Explanation:

Ne_2 bond order is 0. N_2 bond order is 3. F_2 bond order is 1. O_2 bond order is 2.

Q63.

Answer: C

Explanation:

If bond order of chemical species is zero then that chemical species does not exist. Therefore, Be_2 does not exist.

Q64.

Answer: B

Explanation:

Isostructural means same structure.

Q65.

Answer: B

Explanation:

M. O. Configuration of O_2^{2-} (18 electrons) is
 $\sigma 1s^2 \sigma^* 1s^2 \sigma 2s^2 \sigma^* 2s^2 \sigma 2p_z^2 \pi 2p_x^2 = \pi 2p_y^2 \pi^* 2p_x^2 = \pi^* 2p_y^2$.
Total B.M.O electrons = 10.

Q66.

Answer: A

Explanation:

Bond order of $CO = 3$. Bond order of $NO^+ = 3$. Difference
 $= 3 - 3 = 0$.

Q67.

Answer: C

Explanation:

Bond order of $O_2 = 2$. Bond order of $O_2^- = 1.5$. Bond order
of $O_2^{2-} = 1$. Bond order of $O_2^+ = 2.5$.

Q68.

Answer: A

Explanation:

O_2^- (Total electrons = 17) =
 $\sigma 1s^2, \sigma^* 1s^2 \sigma 2s^2 \sigma^* 2s^2 \sigma 2p_z^2, \pi 2p_x^2 = \pi 2p_y^2 \pi^* 2p_x^2 = \pi^* 2p_y^1, \sigma^* 2p_z^0$.
. Number of unpaired electron = 1. So, it is paramagnetic.
Bond order $= \frac{n_b - n_a}{2} = \frac{10 - 7}{2} = 1.5$.

Q69.

Answer: A

Explanation:

In O_2^{2-} , 18 electrons are present. (The molecular orbital
configuration shows that all electrons are paired).

Q70.

Answer: B

Explanation:

Total number of electrons in $CN^- = 6 + 7 + 1 = 14$.
Molecular orbital distribution
 $\sigma 1s^2 \sigma^* 1s^2 \sigma 2s^2 \sigma^* 2s^2 \pi 2p_x^2 = \pi 2p_y^2 \sigma 2p_z^2$. Bond order $=$
 $\frac{10 - 4}{2} = 3$. CN^- is diamagnetic because all electrons are
paired.

Q71.

Answer: D

Explanation:

Bond strength is directly proportional to the bond order, so
 NO^- has minimum bond strength. (Bond orders:
 $NO^+ = 3, NO^{2+} = 2.5, NO^- = 2, NO = 2.5$).

Q72.

Answer: D

Explanation:

$N_2^+ = 13e^- = \sigma 1s^2 \sigma^* 1s^2 \sigma 2s^2 \sigma^* 2s^2 \pi 2p_x^2 = \pi 2p_y^2 \sigma 2p_z^1$.
 $B.O. = \frac{\text{Bonding electrons} - \text{Antibonding electrons}}{2} = \frac{9 - 4}{2} = 2.5 = 2\pi$
bond + 0.5 σ bond.

Q73.

Answer: A

Explanation:

According to the source, the species $[ICl_4]^-$ is sp^3d^2
hybridised with 4 bond pairs and 2 lone pairs.

Q74.

Answer: D

Explanation:

C_2^{2-} has least bond length and is diamagnetic. Bond order of
 C_2^{2-} is 3, whereas N_2^{2-} is 2, O_2^{2-} is 1, and O_2 is 2.

Q75.

Answer: C

Explanation:

Total number of lone pair of electrons in I_3^- is 9.

Q76.

Answer: D

Explanation:

Molecule having zero bond order will not be a viable
molecule. For H_2^{2-} , the bond order is $(2 - 2)/2 = 0$.

Q77.

Answer: D

Explanation:

An antibonding π orbital best describes the given diagram of a
molecular orbital. Two orbitals laterally overlap to form π bond.
Out of phase combination of these two p orbitals give π^* MO.

Q78.

Answer: D

Explanation:

$N_2^+ \rightarrow KK\sigma(2s)^2 \sigma^*(2s)^2 \pi(2p_x)^2 = \pi(2p_y)^2 \sigma(2p_z)^1$.
Number of electron in $\sigma 2p_z$ is 1.

Q79.

Answer: D

Explanation:

The hybridization of a carbon atom depends on the number of
 σ bonds and lone pairs it has. In this hydrocarbon, C^2 is part
of a double bond (making it sp^2 hybridized), while C^3 is
connected only by single bonds (making it sp^3 hybridized).
The bond between them is thus an $sp^2 - sp^3$ overlap.

Q80.

Answer: C

Explanation:

The hybridization of the central atom in these oxyanions can
be determined using the formula for the number of hybrid
orbitals (H). For all four ions (ClO^- , ClO_2^- , ClO_3^- , and
 ClO_4^-), the calculation yields $H = 4$, which corresponds to
 sp^3 hybridization.

Q81.

Answer: C

Explanation:

Bond length is inversely proportional to bond order. Among the given oxygen species, O_2^+ has the highest bond order, resulting in the shortest (minimum) bond length.

Q82.

Answer: B

Explanation:

According to Molecular Orbital Theory (MOT), for molecules like B_2 and C_2 , the σ bonding effect of the 2s electrons is cancelled by the antibonding 2s electrons, leaving only electrons in π orbitals to contribute to the bond.

Q83.

Answer: A

Explanation:

The electronic configuration follows the energy order for homonuclear diatomic molecules with total electrons up to 14.

Q84.

Answer: A

Explanation:

In the energy level diagram of O_2 , the last two electrons enter the degenerate antibonding π^* orbitals. Following Hund's rule, they remain unpaired, making the molecule paramagnetic.

Q85.

Answer: A

Explanation:

The N_2^+ ion has 13 electrons. The configuration follows the standard order for nitrogen species, with one electron removed from the highest occupied molecular orbital (HOMO).

Q86.

Answer: A

Explanation:

π bonding molecular orbitals have one nodal plane, while antibonding π^* molecular orbitals possess two nodal planes.

Q87.

Answer: A

Explanation:

By calculating the bond order using the number of electrons, it is found that O_2^- has a bond order of 1.5, whereas the others all have 2.5.

Q88.

Answer: B

Explanation:

Counting the electrons in antibonding orbitals (σ^* and π^*) for O_2^- reveals 7 antibonding electrons, which form 3 complete electron pairs.

Q89.

Answer: D

Explanation:

Energy is conserved during the formation of molecular orbitals. The sum of the energies of the molecular orbitals produced is equal to the sum of the energies of the participating atomic orbitals.

Q90.

Answer: A

Explanation:

Species are isoelectronic if they have the same number of electrons. Both CO and CN^- have 14 electrons and a bond order of 3.

Q91.

Answer: C

Q92.

Answer: C

Q93.

Answer: D

Q94.

Answer: C

Q95.

Answer: C

Q96.

Answer: D

Q97.

Answer: A

Q98.

Answer: A

Q99.

Answer: B

Q100.

Answer: D

Q101.

Answer: C

Q102.

Answer: A

Q103.

Answer: D

Q104.

Answer: B

Q105.
Answer: B

Q106.
Answer: B

Q107.
Answer: D

Q108.
Answer: B

Q109.
Answer: C

Q110.
Answer: A

Q111.
Answer: C

Q112.
Answer: B

Q113.
Answer: B

Q114.
Answer: B

Q115.
Answer: B

Q116.
Answer: B

Q117.
Answer: D

Q118.
Answer: D

Q119.
Answer: C

Q120.
Answer: A

Q121.
Answer: A

Q122.
Answer: A

Q123.
Answer: A

Q124.
Answer: A

Q125.
Answer: A

Q126.
Answer: C

Q127.
Answer: A

Q128.
Answer: A

Q129.
Answer: D

Q130.
Answer: C

Q131.
Answer: C

Q132.
Answer: B

Q133.
Answer: B

Q134.
Answer: C

Q135.
Answer: D

Q136.
Answer: B

Q137.
Answer: D

Q138.
Answer: B

Q139.
Answer: D

Q140.
Answer: A

Q141.
Answer: D

Q142.
Answer: C

Q143.
Answer: D

Q144.
Answer: D

Q145.
Answer: A

Q146.
Answer: D

Q147.
Answer: C

Q148.
Answer: C

Q149.
Answer: C

Q150.
Answer: D

Q151.
Answer: C

Q152.
Answer: B

Q153.
Answer: C

Q154.
Answer: D

Q155.
Answer: D

Q156.
Answer: D

Q157.
Answer: C

Q158.
Answer: B

Q159.
Answer: A

Q160.
Answer: B

Q161.
Answer: D

Q162.
Answer: D

Q163.
Answer: D

Q164.
Answer: A

Q165.
Answer: C

Q166.
Answer: A

Q167.
Answer: D

Q168.
Answer: A

Q169.
Answer: B

Q170.
Answer: A

Q171.
Answer: D

Q172.
Answer: D

Q173.
Answer: D

Q174.
Answer: A

Q175.
Answer: A

Q176.
Answer: A

Q177.
Answer: D

Q178.
Answer: C

Q179.
Answer: D

Q180.
Answer: D