

Physics

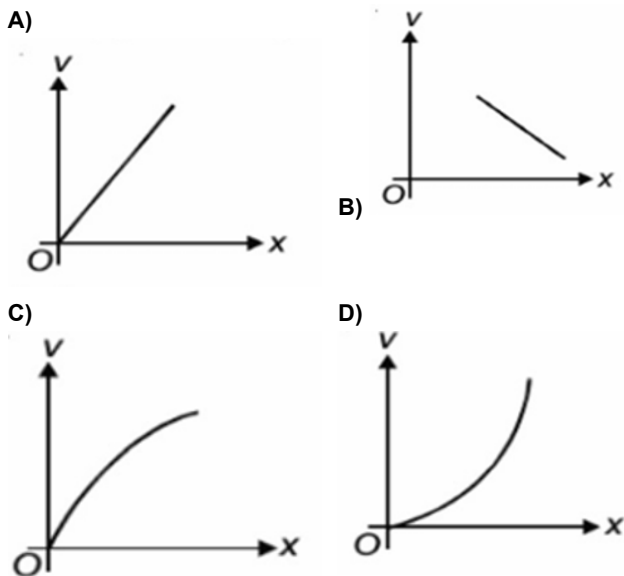
1. A particle moves in a straight line and its position x at time t is given by $x^2 = 2 + t$. Its acceleration is given by

- A) $\frac{-2}{x^3}$ B) $\frac{-1}{4x^3}$
 C) $\frac{-1}{4x^2}$ D) $\frac{1}{x^2}$

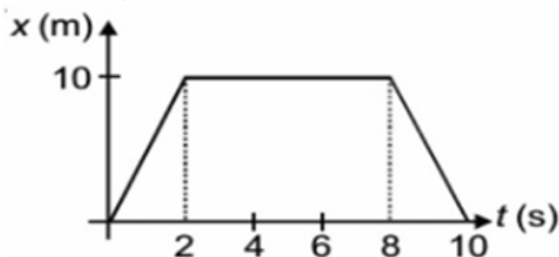
2. The position of a particle moving along x -axis is given by $x = (-2t^3 + 3t^2 + 5)$ m. The acceleration of the particle at the instant its velocity becomes zero is:

- A) 12 m/s^2 B) -12 m/s^2
 C) -6 m/s^2 D) Zero

3. For a body moving with uniform acceleration along a straight line, the variation of its velocity (v) with position (x) is best represented by:

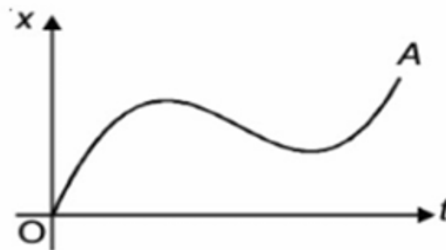


4. The position-time graph for a particle moving along a straight line is shown in the figure. The total distance travelled by it in time $t = 0$ to $t = 10$ s is:



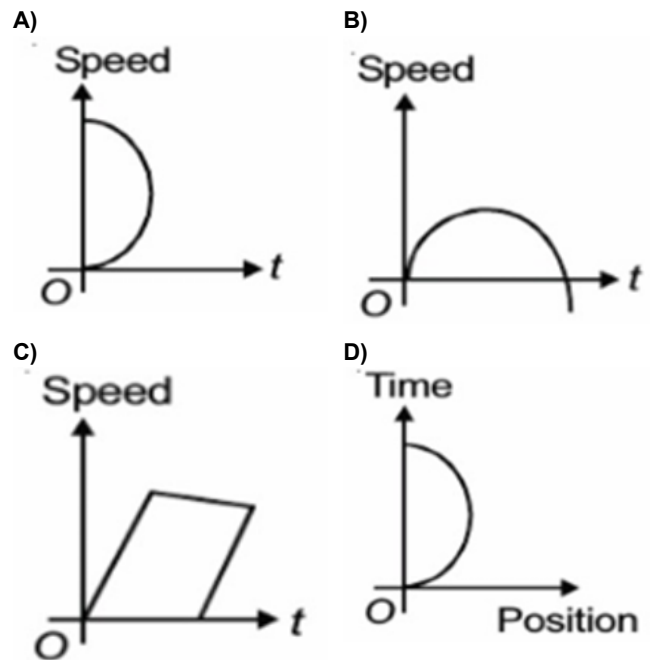
- A) Zero B) 10 m
 C) 20 m D) 80 m

5. The position-time graph for a body moving along a straight line between O and A is shown in the figure. During its motion between O and A , how many times does the body come to rest?

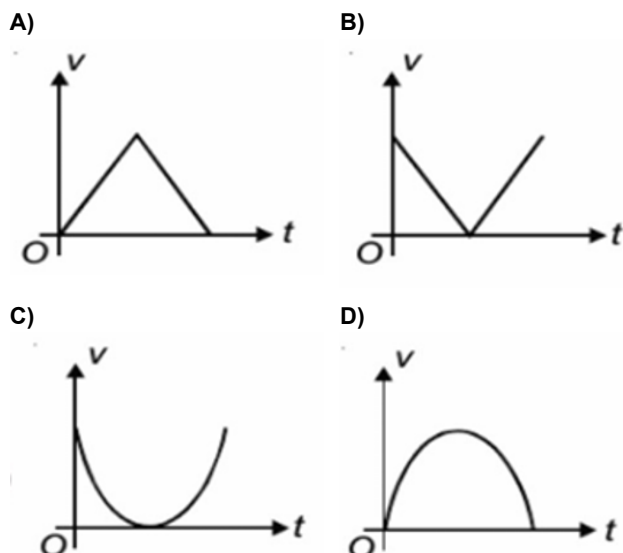


- A) Zero B) 1 time
 C) 2 times D) 3 times

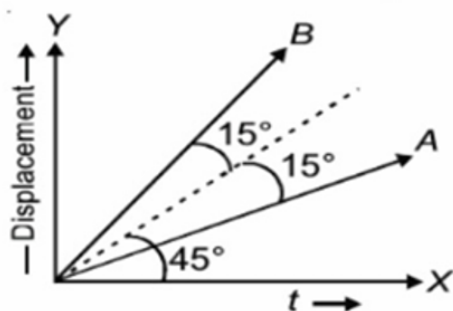
6. Which one of the following graphs for a body moving along a straight line is possible?



7. A body is projected vertically upward from ground. If we neglect the effect of air, then which one of the following is the best representation of variation of speed (v) with time (t)?

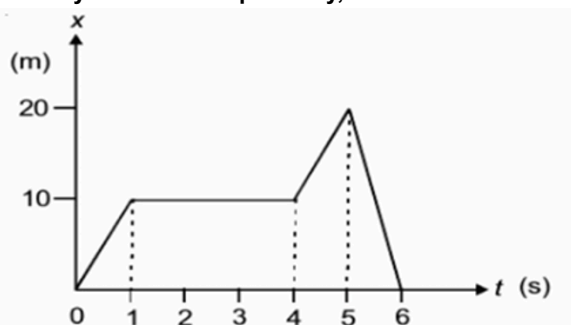


8. The displacement-time graph for two particles A and B is as follows. The ratio $\frac{v_A}{v_B}$ is:



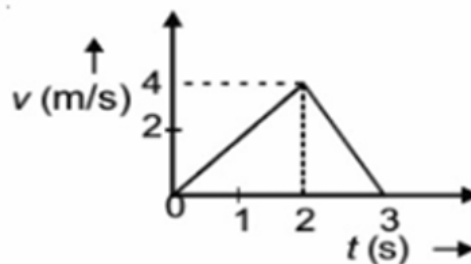
- A) 1 : 2
B) $1 : \sqrt{3}$
C) $\sqrt{3} : 1$
D) 1 : 3

9. The figure shows the graph of the x -coordinate of a particle moving along the x -axis as a function of time. Average velocity during $t = 0$ to 6 s and instantaneous velocity at $t = 3$ s respectively, will be:



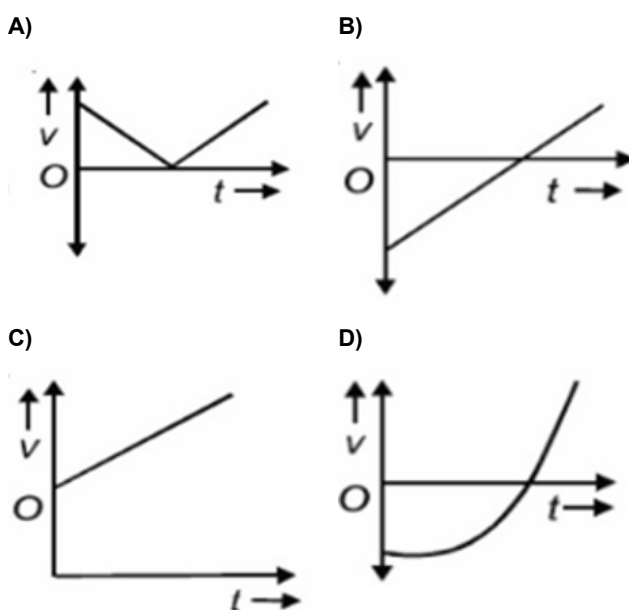
- A) 10 m/s, 0
B) 60 m/s, 0
C) 0, 0
D) 0, 10 m/s

10. The velocity versus time graph of a body moving in a straight line is as shown in the figure below.

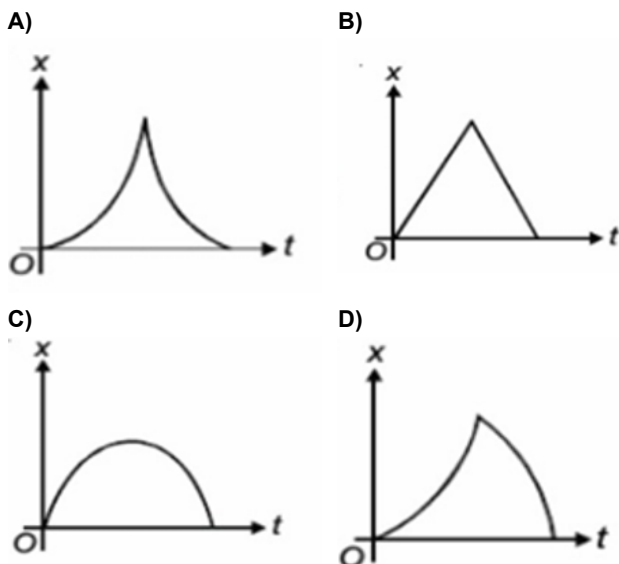
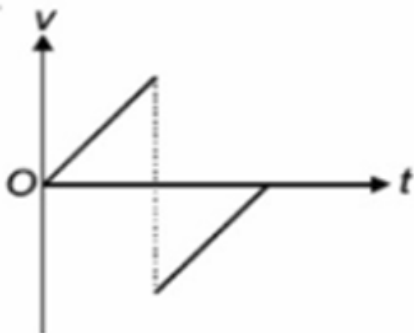


- A) The distance covered by the body in 0 to 2 s is 8 m
B) The acceleration of the body in 0 to 2 s is 4 m s^{-2}
C) The acceleration of the body in 2 to 3 s is 4 m s^{-2}
D) The distance moved by the body during 0 to 3 s is 6 m

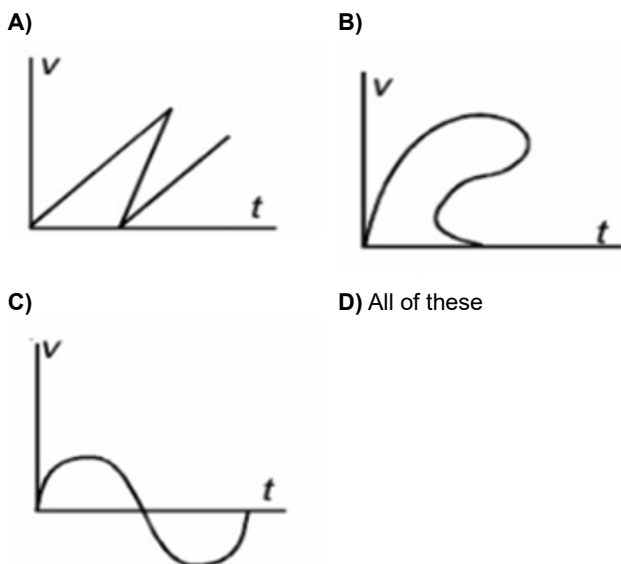
11. A particle moves along the x -axis in such a way that its x -coordinate varies with time according to the equation $x = 4 - 2t + t^2$. The speed of the particle will vary with time as:



12. The velocity (v)-time (t) graph for a particle moving along the x -axis is shown in the figure (a straight line through the origin). The corresponding position (x)-time (t) is best represented by:



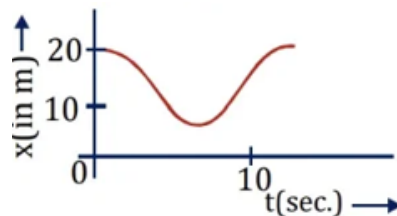
13. Which of the following speed-time (v - t) graphs is physically not possible?



14. A car accelerates from rest at a constant rate of 2 m/s^2 for some time. Then, it retards at a constant rate of 4 m/s^2 and comes to rest. If it remains in motion for 3 seconds, then the maximum speed attained by the car is :

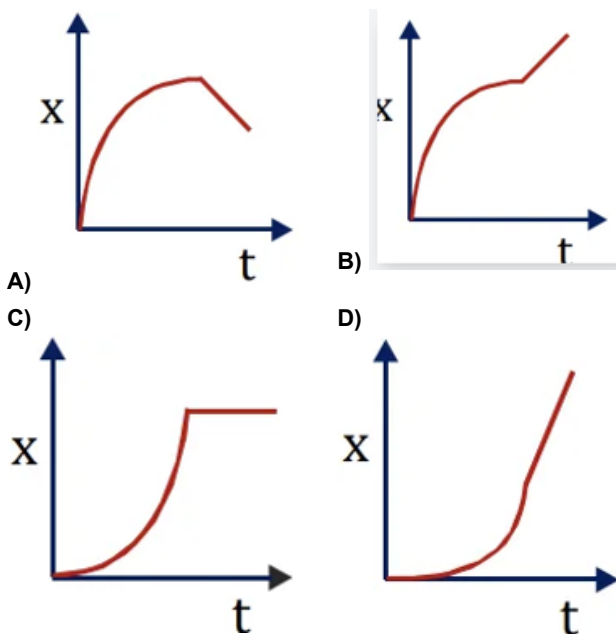
- A) 2 m/s B) 3 m/s
C) 4 m/s D) 6 m/s

15. Figure shows x - t graph of a particle. Find the time t such that the average velocity of the particle during the period 0 to t is zero from the image given below:

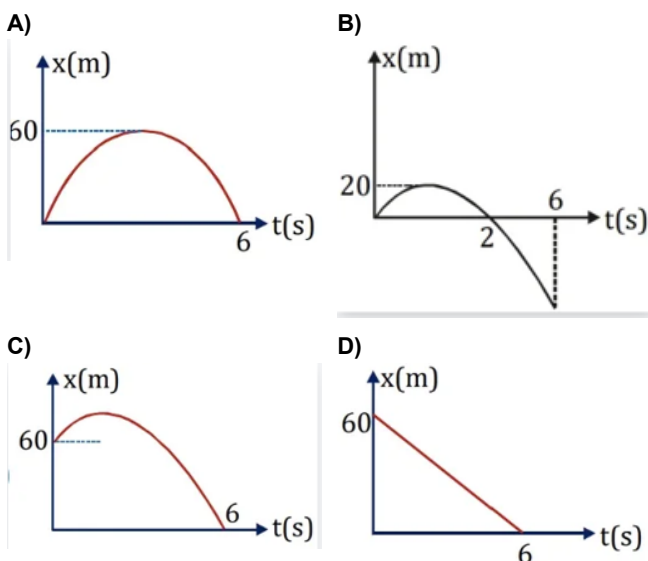


- A) 6sec. B) 8sec.
C) 10sec. D) 12sec.

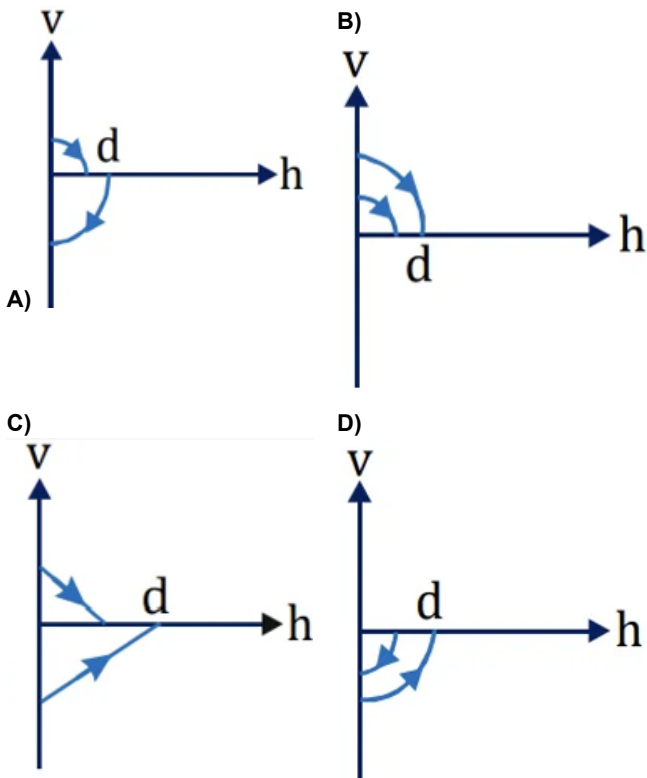
16. A car starts from rest and accelerates uniformly for 4 seconds and then moves with uniform velocity. Which of the x - t graph represent the motion of the car ? from the image given below



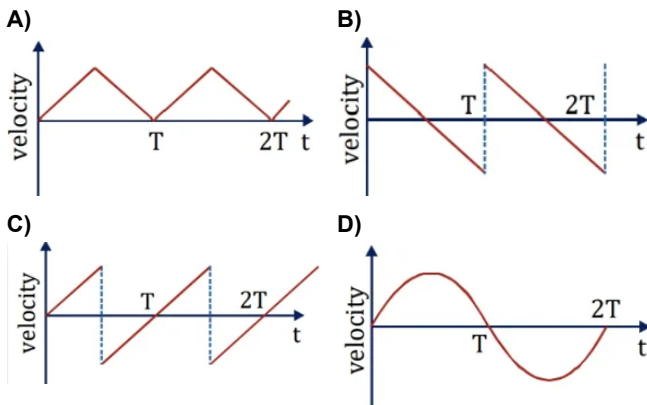
17. A stone is thrown upwards from top of a tower 60 m high at a speed of 20 m/s . The correct position-time graph for the time interval in which it reaches ground, is ($g = 10 \text{ m/s}^2$ & take origin at the base of the tower) from the image given below:



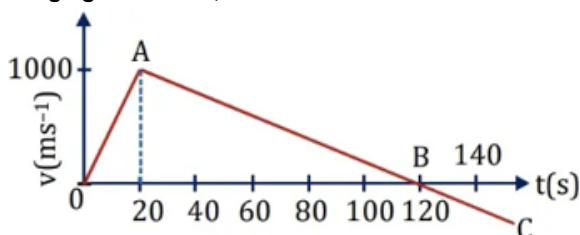
18. A ball is dropped vertically from a height d above the ground. It hits the ground and bounces up vertically to a height $d/2$. Neglecting subsequent motion and air resistance, The graph according to which its velocity V varies with the height h above the ground is from the image given below:



19. A ball is dropped from a certain height on the surface of glass. It collides elastically and comes back to its initial position. If this process is repeated then the velocity time graph is (Take downward direction as positive) from the image given below:

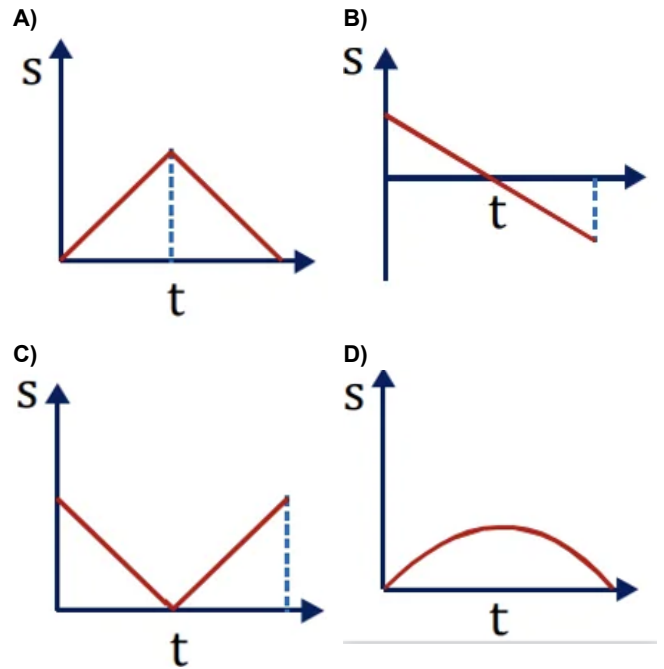


20. A rocket is launched upward from the earth's surface whose velocity time graphs shown in figure from the image given below, the acceleration of rocket is:



- A) 50m/s^2 B) 100m/s^2
C) 10m/s^2 D) 1000m/s^2

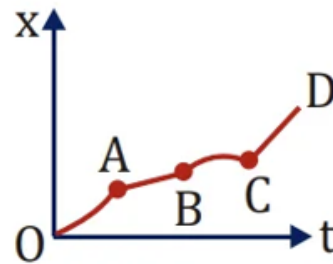
21. A body is projected vertically upward from the surface of the earth, its displacement-time graph is :



22. Acceleration-time curve for a body projected vertically upwards is a/an :-

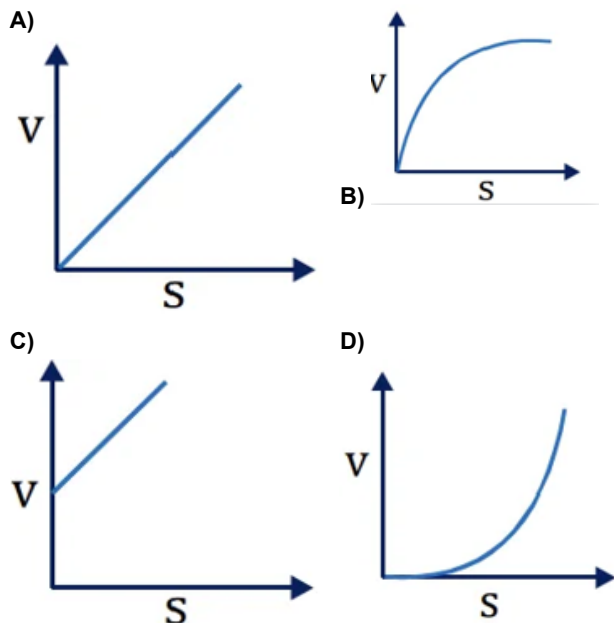
- A) Parabola B) Ellipse
C) Hyperbola D) Straight line

23. The graph between the displacement x and time t for a particle moving in a straight line is shown in figure from the image given below. During the interval OA, AB, BC and CD, the acceleration of the particle is :

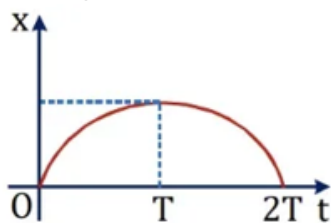


- A) OA: +, AB: 0, BC: +, CD: + B) OA: -, AB: 0, BC: +, CD: 0
C) OA: +, AB: 0, BC: -, CD: 0 D) OA: -, AB: 0, BC: -, CD: 0

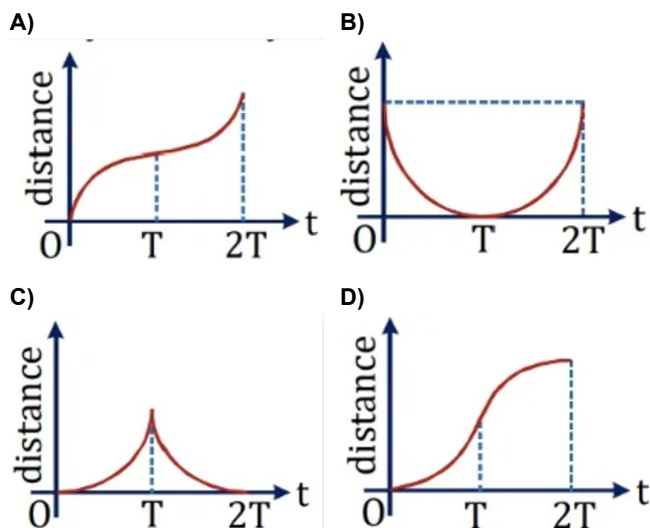
24. A particle starts from rest and move with constant acceleration. Its velocity-displacement curve is :



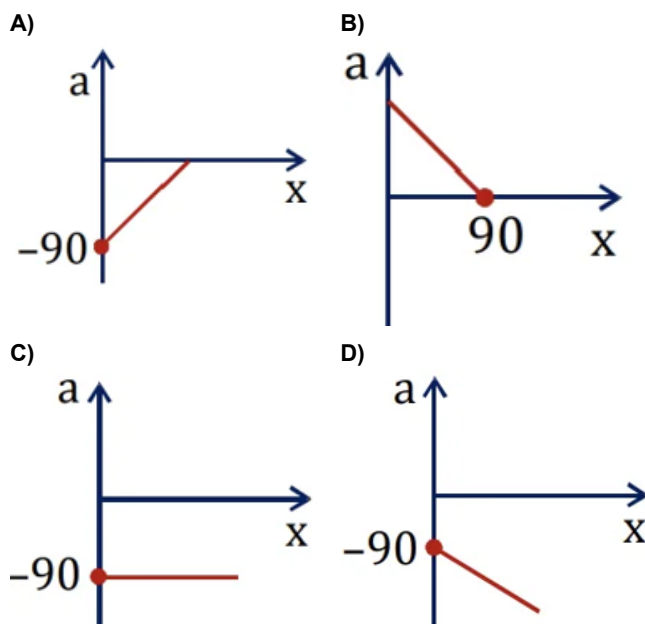
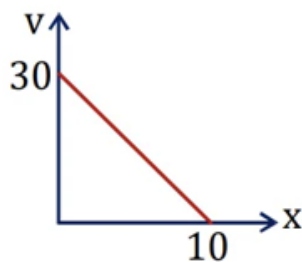
25. The $x - t$ graph of a particle moving along a straight line is shown in figure from the image given below. The distance-time graph of the particle is correctly



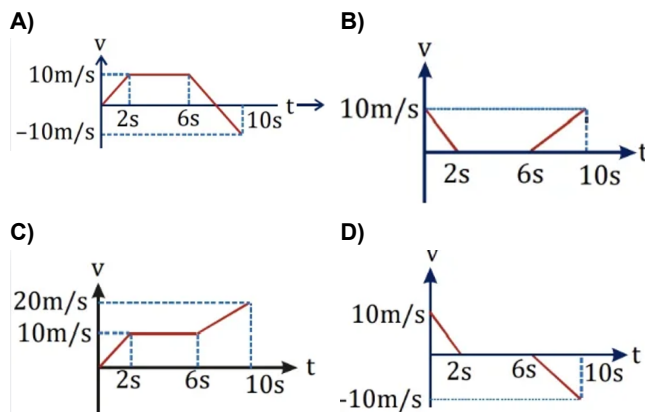
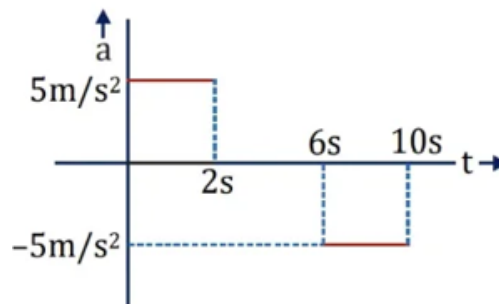
shown by :



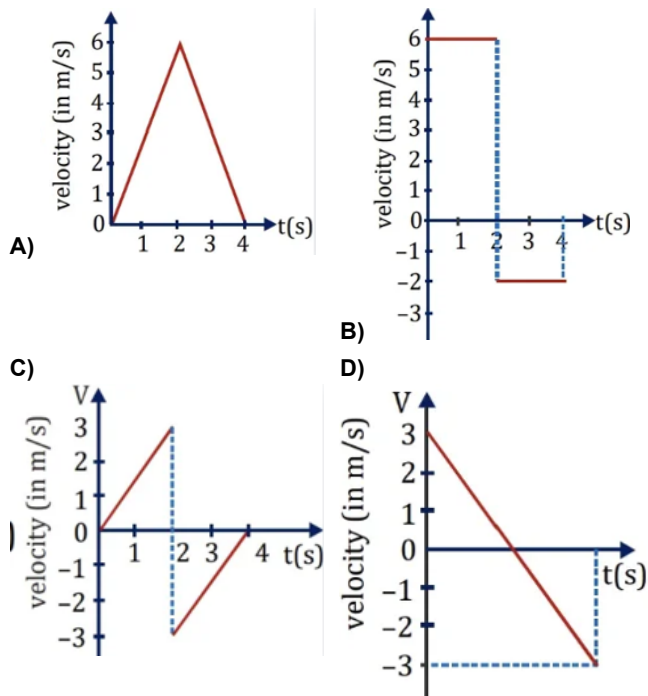
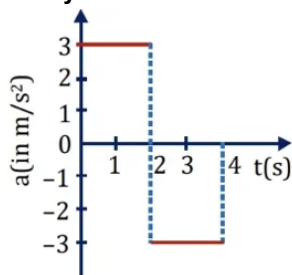
26. The given graph shows the variation of velocity with displacement from the image given below. Which one of the graph given below correctly represents the variation of acceleration with displacement :-



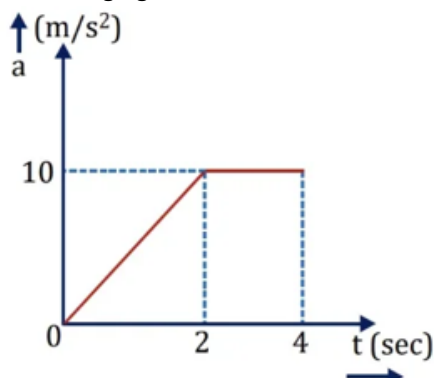
27. Acceleration-time graph of a body initially at rest is shown from the image given below. The corresponding velocity-time graph of the same body is :-



28. For the motion of a particle acceleration-time graph is shown in figure from the image given below. The velocity time curve for the duration of 0 - 4 seconds is



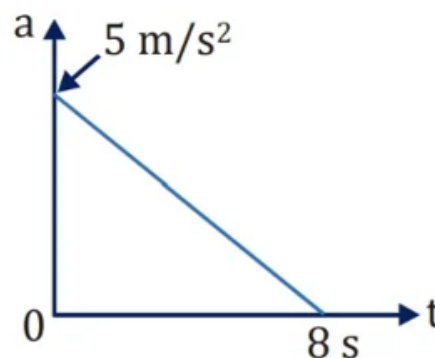
29. A particle starts from rest, its acceleration-time graph is shown from the image given below. Find out velocity



at $t = 4$ sec

- A) 20 m/s
B) 30 m/s
C) 40 m/s
D) None of these

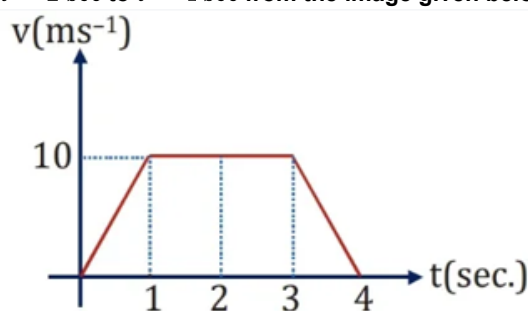
30. A particle starts from rest. Its acceleration at time $t = 0$ is 5 m/s^2 which varies with time as shown in the image given below. The maximum speed of the particle



will be:

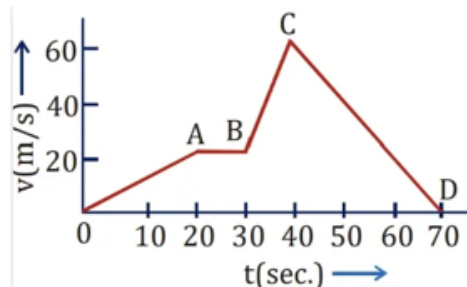
- A) 7.5 m/s
B) 15 m/s
C) 20 m/s
D) 37.5 m/s

31. Find the average acceleration of the block from time $t = 2$ sec to $t = 4$ sec from the image given below.



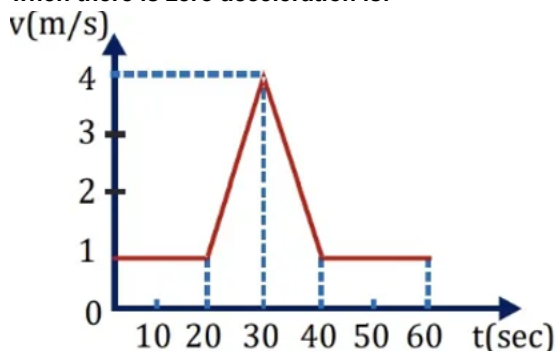
- A) 5 m/s^2
B) 10 m/s^2
C) -5 m/s^2
D) -10 m/s^2

32. The velocity versus time curve of a moving particle is as shown from the image given below. The maximum acceleration is:



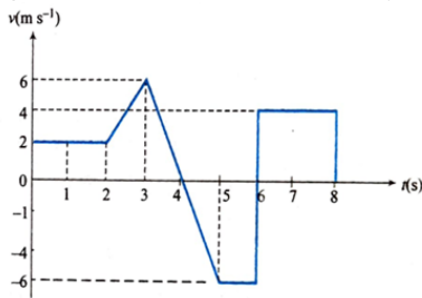
- A) 1 ms^{-2}
B) 2 ms^{-2}
C) 3 ms^{-2}
D) 4 ms^{-2}

33. Velocity-time (v-t) graph for a moving object is shown in the figure from the image given below. Total displacement of the object during the time interval when there is zero acceleration is:-



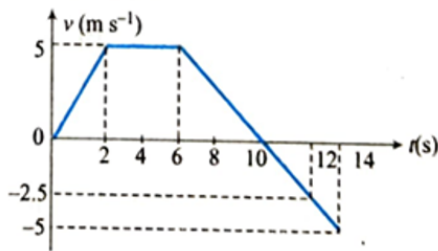
- A) 60 m
B) 50 m
C) 30 m
D) 40 m

34. The velocity–time graph of a body is shown in the figure. The displacement of the body in 8 s is:



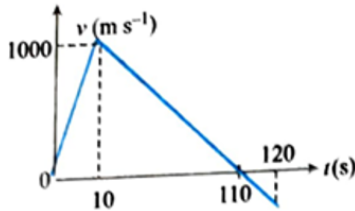
- A) 9 m
B) 12 m
C) 10 m
D) 28 m

35. The variation of velocity of a particle moving along a straight line is shown in the figure. The distance travelled by the particle in 12 s is:



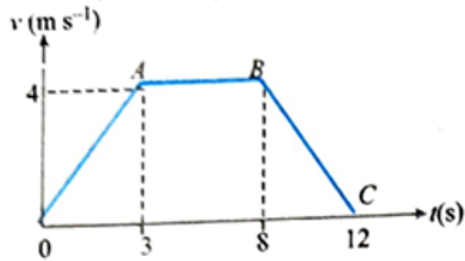
- A) 37.5 m
B) 32.5 m
C) 35.0 m
D) None of these

36. The following graph figure shows the variation of velocity of a rocket with time. Then the maximum height attained by the rocket is:



- A) 1.1 km
B) 5 km
C) 55 km
D) None of these

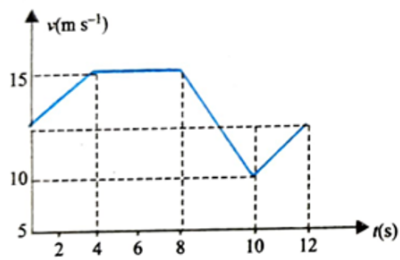
37. From the velocity–time graph, given in figure of a particle moving in a straight line, one can conclude



that:

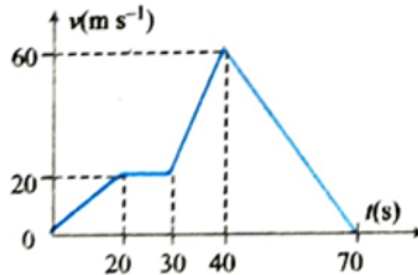
- A) Its average velocity during the 12 s interval is $24/7 \text{ m s}^{-1}$.
B) Its velocity for the first 3 s is uniform and is equal to 4 m s^{-1} .
C) The body has a constant acceleration between $t = 3 \text{ s}$ and $t = 8 \text{ s}$.
D) The body has a uniform retardation from $t = 8 \text{ s}$ to $t = 12 \text{ s}$.

38. The velocity–time graph of a particle moving in a straight line is shown in figure. The acceleration of the particle at $t = 9 \text{ s}$ is:



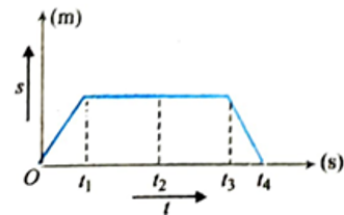
- A) Zero
B) 5 m s^{-2}
C) -5 m s^{-2}
D) -2 m s^{-2}

39. The velocity–time graph of a body is given in figure. The maximum acceleration in ms^{-2} is:



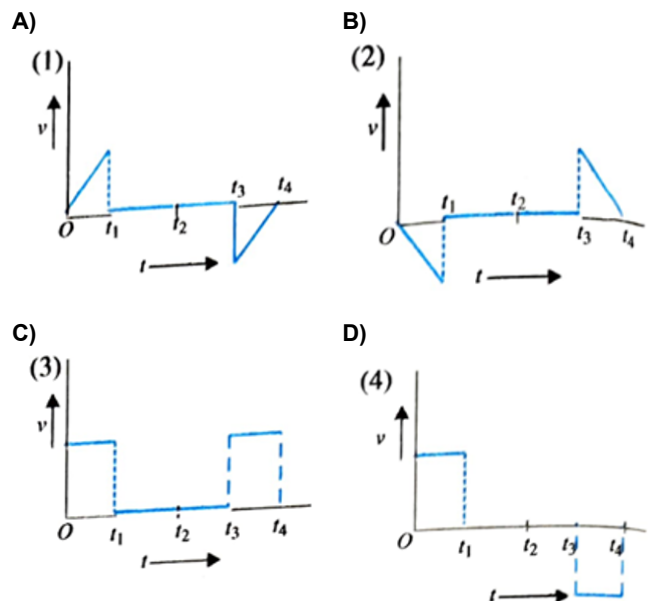
- A) 4
B) 3
C) 2
D) 1

40. The displacement–time graph of a body is shown in

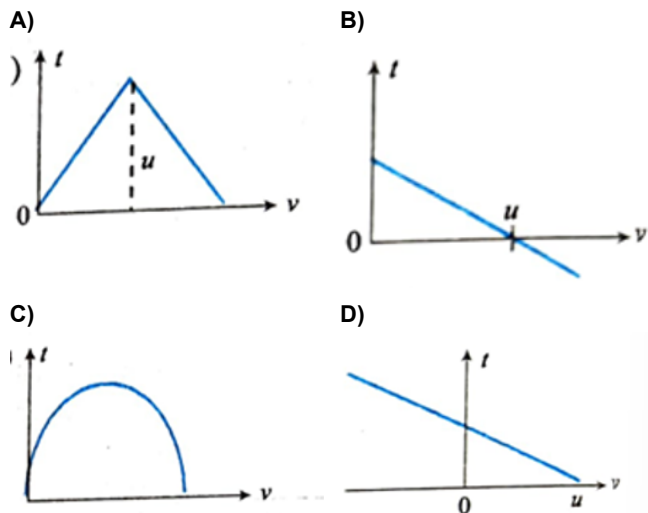


the figure.

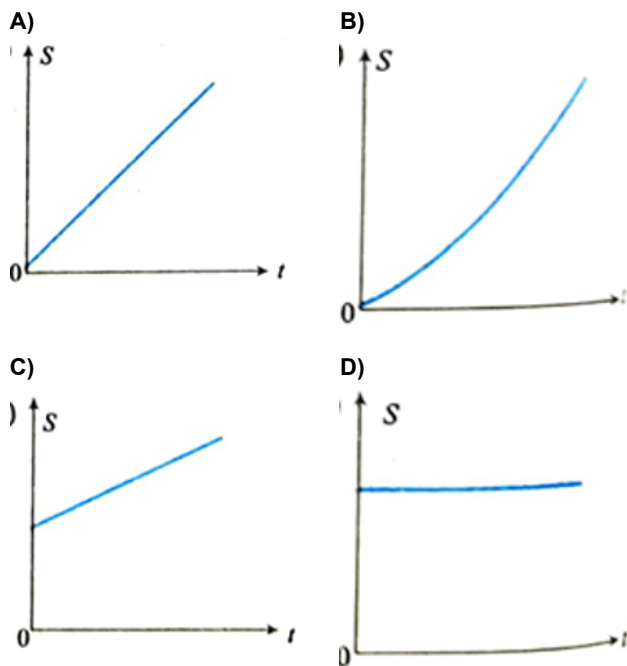
The corresponding velocity–time graph of the motion of the body will be:



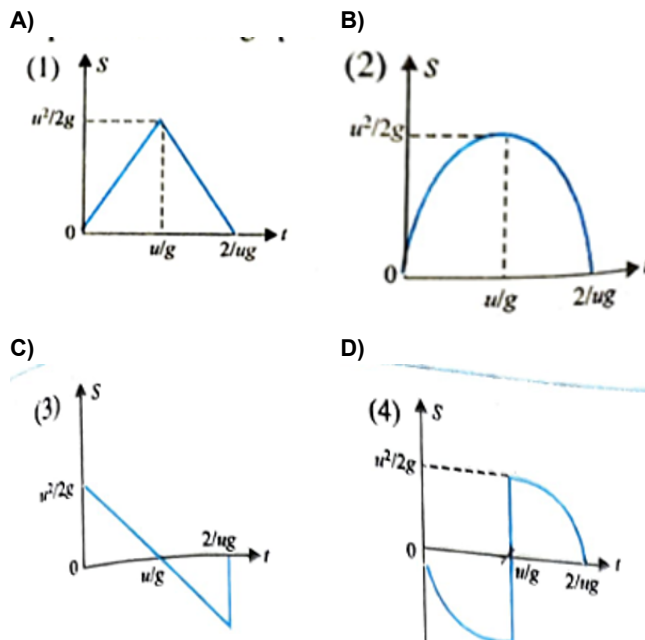
41. An object is thrown up vertically. The velocity–time graph for the motion of the particle is:



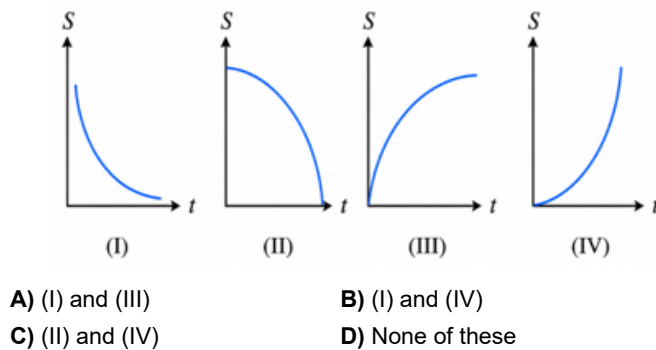
42. From a high tower, at time $t = 0$, one stone is dropped from rest and simultaneously another stone is projected vertically up with an initial velocity. The graph of distance S between the two stones plotted against time t will be:



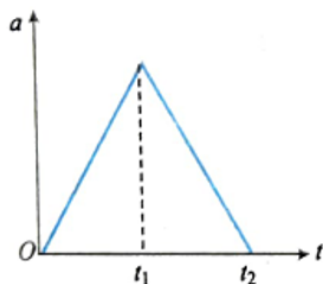
43. An object is vertically thrown upwards. Then the displacement–time graph for the motion is as shown in



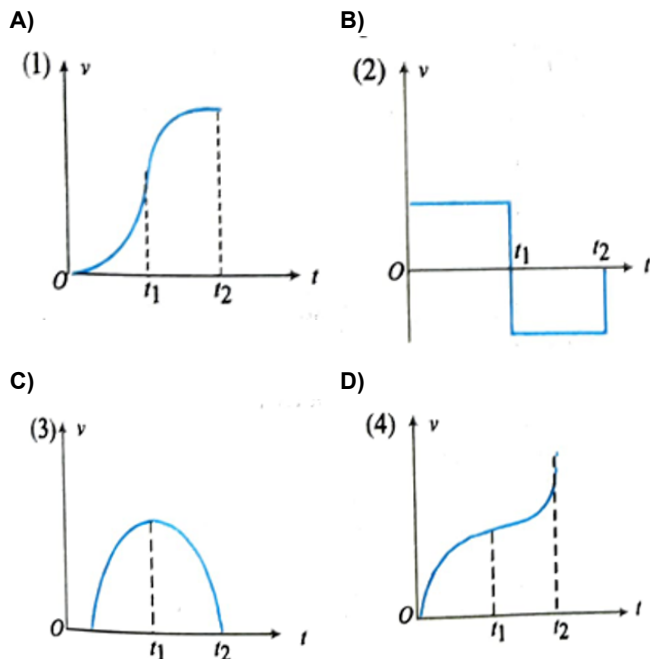
44. The acceleration will be positive in



45. The acceleration versus time graph of a particle is shown in figure. The respective $v - t$ graph of the



particle is:



Chemistry

46. Match List-I Molecule with List-II Shape.

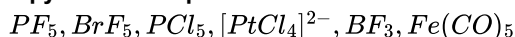
List-I Molecule	List-II Shape
(A) BrF_5	(I) T-shape
(B) H_2O	(II) See saw
(C) ClF_3	(III) Bent
(D) SF_4	(IV) Square pyramidal

- A) (A)-I, (B)-II, (C)-IV, (D)-III B) (A)-II, (B)-I, (C)-III, (D)-IV
C) (A)-III, (B)-IV, (C)-II, (D)-I D) (A)-IV, (B)-III, (C)-I, (D)-II

47. The number of species from the following in which the central atom uses sp^3 hybrid orbitals in its bonding is: $\text{NH}_3, \text{SO}_2, \text{SiO}_2, \text{BeCl}_2, \text{CO}_2, \text{H}_2\text{O}, \text{CH}_4, \text{BF}_3$.

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

48. The number of molecules/ion/s having trigonal bipyramidal shape is:



- A) 3 B) 9
C) 8 D) 2

49. Match List I with List II:

List I	List II
A. XeF_4	I. See - saw
B. SF_4	II. Square planar
C. NH_4^+	III. Bent T-shaped
D. BrF_3	IV. Tetrahedral

Choose the correct answer from the options given below :

- A) A-IV, B-III, C-II, D-I B) A-II, B-I, C-III, D-IV
C) A-IV, B-I, C-II, D-III D) A-II, B-I, C-IV, D-III

50. Match List I (molecules/ions) with List II (No. of lone pairs of e^- on central atom):

LIST-I (molecules/ions)	LIST-II (No. of lone pairs of e^- on central atom)
(A) IF_7	I. Three
(B) ICl_4^-	II. One
(C) XeF_6	III. Two
(D) XeF_2	IV. Zero

Choose the correct answer from the options given below :

- A) A-II, B-III, C-IV, D-I B) A-IV, B-III, C-II, D-I
C) A-II, B-I, C-IV, D-III D) A-IV, B-I, C-II, D-III

51. Amongst the following, the number of species having the linear shape is:



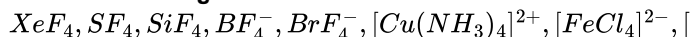
- A) 9 B) 5
C) 18 D) 89

52. The number of species from the following which have square pyramidal structure is:



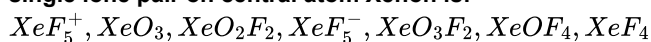
- A) 9 B) 5
C) 18 D) 3

53. The number of species having a square planar shape from the following is:



- A) 8 B) 4
C) 19 D) 28

54. The number of species from the following carrying a single lone pair on central atom Xenon is:



- A) 8 B) 4
C) 19 D) 28

55. The number of bent-shaped molecule/s from the following is: N_3^- , NO_2^- , I_3^- , O_3 , SO_2 .

- A) 3 B) 8
C) 7 D) 1

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

- A) 3 B) 8
C) 7 D) 1

57. Match list I with list II:

List I Species	List II Geometry/ Shape
A. H_3O^+	I. Tetrahedral
B. Acetylide anion	II. Linear
C. NH_4^+	III. Pyramidal
D. ClO_2^-	IV. Bent

Choose correct answer from the options given below:

- A) A-III, B-IV, C-I, D-II B) A-III, B-IV, C-II, D-I
C) A-III, B-I, C-II, D-IV D) A-III, B-II, C-I, D-IV

58. The maximum number of lone pairs of electrons on the central atom from the following species is:

ClO_3^- , XeF_4 , SF_4 and I_3^- .

- A) 3 B) 8
C) 10 D) 1

59. ClF_5 at room temperature is a:

- A) Colourless liquid with square pyramidal geometry B) Colourless gas with trigonal bipyramidal geometry
C) Colourless gas with square pyramidal geometry D) Colourless liquid with trigonal bipyramidal geometry

60. Given below are two statements : Statement I: SO_2 and H_2O both possess V-shaped structure. Statement II: The bond angle of SO_2 is less than that of H_2O . In the light of the above statements, choose the most appropriate answer from the options given below :

- A) Both Statements I and II are incorrect B) Both Statement I and II are correct
C) Statement I is correct but Statement II is incorrect D) Statement I is incorrect but Statement II is correct

61. Amongst SF_4 , XeF_4 , CF_4 and H_2O , the number of species with two lone pairs of electrons is:

- A) 3 B) 2
C) 7 D) 1

62. Based upon VSEPR theory, match the shape (geometry) of the molecules in List-I with the molecules in List-II and select the most appropriate

List - I (Shape)	List - II (Molecules)
(A) T-shaped	(I) XeF_4
(B) Trigonal planar	(II) SF_4
(C) Square planar	(III) ClF_3
(D) See-saw	(IV) BF_3

option.

- A) (A)-(I), (B)-(II), (C)-(III), (D)-(IV) B) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)
C) (A)-(III), (B)-(IV), (C)-(II), (D)-(I) D) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

63. The hybridization of P exhibited in PF_5 is $sp^x d^y$. The value of y is:

- A) 3 B) 8
C) 2 D) 1

64. In the structure of SF_4 , the lone pair of electrons on S is in:

- A) equatorial position and there are two lone pair - bond pair repulsions at 90° . B) equatorial position and there are three lone pair - bond pair repulsions at 90° .
C) axial position and there are three lone pair - bond pair repulsion at 90° . D) axial position and there are two lone pair - bond pair repulsion at 90° .

65. Consider the species CH_4 , NH_4^+ and BH_4^- . Choose the correct option with respect to these species.

- A) They are isoelectronic and only two have tetrahedral structures. B) They are isoelectronic and all have tetrahedral structures.
C) Only two are isoelectronic and all have tetrahedral structures. D) Only two are isoelectronic and only two have tetrahedral structures.

66. Number of lone pair(s) of electrons on central atom and the shape BrF_3 molecule respectively, are:

- A) 0, triangular planar. B) 1, pyramidal.
C) 2, bent T-shape. D) 1, bent T-shape.

67. The sum of number of lone pairs of electrons present on the central atoms of XeO_3 , $XeOF_4$ and XeF_6 , is:

- A) 8 B) 3
C) 7 D) 1

68. The number of molecule(s) or ion(s) from the following having non-planar structure is:

NO_3^- , H_2O_2 , BF_3 , PCl_3 , XeF_4 , SF_4 , XeO_3 , PH_4^+ , SO_3 , $[Al$

- A) 6 B) 9
C) 1 D) 7

69. 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

70. Consider PF_5 , BrF_5 , PCl_3 , SF_6 , $[ICl_4]^-$, ClF_3 and IF_5 . Amongst the above molecule(s)/ion(s). The number of molecule(s)/ion(s) having sp^3d^2 hybridisation is:

- A) 3
B) 8
C) 7
D) 4

71. 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

72. The correct shape and I-I bond angles respectively in I_3^- ion are

- A) Distorted trigonal planar, 135° and 90°
B) T-shaped, 180° and 90°
C) Trigonal planar, 120°
D) Linear, 180°

73. The number of species below that have two lone pairs of electrons in their central atom is (Round off to the nearest integer)

SF_4 , BF_4^- , ClF_3 , AsF_3 , PCl_5 , BrF_5 , XeF_4 , SF_6 .

- A) 3
B) 2
C) 7
D) 1

74. A central atom in a molecule has two lone pairs of electrons and forms three single bonds. The shape of this molecule is:

- A) see-saw
B) planar triangular
C) T-shaped
D) trigonal pyramidal

75. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R). Assertion (A): The $H-O-H$ bond angle in water molecule is 104.5° . Reason (R): The lone pair - lone pair repulsion of electrons is higher than the bond pair - bond pair repulsion.

- A) A is false but R is true.
B) Both A and R are true, but R is not the correct explanation of A.
C) A is true but R is false.
D) Both A and R are true, and R is the correct explanation of A.

76. Match List-I with List-II:

List-I (Species)	List-II (Hybrid Orbitals)
(a) SF_4	(i) sp^3d^2
(b) IF_5	(ii) d^2sp^3
(c) NO_2^+	(iii) sp^3d
(d) NH_4^+	(iv) sp^3
	(v) sp

Choose the

correct answer from the options given below :

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

77. The hybridisations of the atomic orbitals of nitrogen in NO_2^- , NO_2^+ and NH_4^+ respectively are:

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

78. The number of lone pairs of electrons on the central I atom in I_3^- is:

- A) 3
B) 8
C) 7
D) 1

79. The number of species having non-pyramidal shape among the following is: (i) SO_3 , (ii) NO_3^- , (iii) PCl_3 , (iv) CO_3^{2-} .

- A) 4
B) 8
C) 7
D) 3

80. The compound that has the largest $H-M-H$ bond angle ($M = N, S, C$), is:

- A) H_2O
B) NH_3
C) H_2S
D) CH_4

81. If AB_4 molecule is a polar molecule, a possible geometry of AB_4 is:

- A) Square pyramidal
B) Tetrahedral
C) Rectangular planar
D) Square planar

82. The shape/structure of $[XeF_5]^-$ and XeO_3F_2 , respectively, are:

- A) pentagonal planar and trigonal bipyramidal
B) octahedral and square pyramidal
C) trigonal bipyramidal and pentagonal planar
D) trigonal bipyramidal and trigonal bipyramidal

83. The molecular geometry of SF_6 is octahedral. What is the geometry of SF_4 (including lone pair(s) of electrons, if any)?

- A) Tetrahedral
B) Trigonal bipyramidal
C) Pyramidal
D) Square planar

84. The structure of PCl_5 in the solid state is:

- A) tetrahedral $[PCl_4]^+$ and octahedral $[PCl_6]^-$
 B) square planar $[PCl_4]^+$ and octahedral $[PCl_6]^-$
 C) square pyramidal
 D) trigonal bipyramidal

85. The correct statement about ICl_5 and ICl_4^- is:

- A) ICl_5 is sp^3d^2 hybridised (5bp, 1lp) and ICl_4^- is sp^3d^2 hybridised (4bp, 2lp).
 B) ICl_5 is trigonal bipyramidal and ICl_4^- is tetrahedral.
 C) ICl_5 is square pyramidal and ICl_4^- is tetrahedral.
 D) ICl_5 is square pyramidal and ICl_4^- is square planar.

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

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

87. Total number of lone pair of electrons in I_3 ion is:

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

88. Which of the following conversions involves change in both shape and hybridisation?

- A) $H_2O \rightarrow H_3O^+$
 B) $BF_3 \rightarrow BF_4^-$
 C) $CH_4 \rightarrow C_2H_6$
 D) $NH_3 \rightarrow NH_4^+$

89. The incorrect geometry is represented by

- A) NF_3 - trigonal planar
 B) BF_3 - trigonal planar
 C) AsF_5 - trigonal bipyramidal
 D) H_2O - bent

90. Identify the pair in which the geometry of the species is T-shape and square pyramidal, respectively:

- A) ICl_2^- and ICl_5
 B) IO_3^- and $IO_2F_2^-$
 C) ClF_3 and IO_4^-
 D) $XeOF_2$ and $XeOF_4$

Botany

91. Unlike plants and eubacteria, the cell walls of fungi possess a unique chemical composition. what are the primary structural components of a fungal cell wall?

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

92. Fungi are universally described as eukaryotic, heterotrophic, and multicellular organisms with filamentous bodies. Which of the following organisms is a prominent exception to this filamentous rule, being strictly unicellular?

- A) Mucor
 B) Albugo
 C) Yeast (Saccharomyces)
 D) Penicillium

93. In which classes of fungi is this dikaryophase characteristically observed?

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

94. Identify the class of fungi that is commonly found in aquatic habitats, on decaying wood in moist/damp places, or as obligate parasites on plants, featuring an asexual stage with motile zoospores or non-motile aplanospores:

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

95. Select the option that correctly matches the class of fungi with the precise developmental origin of its sexual or asexual spores:

- A) Ascomycetes → Exogenous conidia (asexual)
 B) Basidiomycetes → Endogenous basidiospores (sexual)
 C) Phycomycetes → Exogenous zoospores (asexual)
 D) Ascomycetes → Exogenous ascospores (sexual)

96. Why is the class Deuteromycetes commonly designated as the "imperfect fungi" in the biological classification scheme?

- A) They lack a well-defined cell wall surrounding their protoplast.
 B) Only their asexual or vegetative phases are known to science.
 C) They are incapable of absorbing organic nutrition from dead substrates.
 D) They lack a branched or septate mycelium network.

97. What unique architectural feature characterizes the cell walls of diatoms, and what material reinforces it?

- A) Two thin overlapping shells fitting like a soapbox, embedded with silica
 B) A single rigid plate layout, embedded with calcium carbonate
 C) A flexible proteinaceous wrapper, reinforced with chitin
 D) Spiral cellulosic bands wrapped loosely around the protoplast

98. Which option correctly describes the cell wall construction and flagellar arrangement characteristic of Dinoflagellates?

- A) No cell wall, a single flagellum located at the anterior apex
 B) Cell wall made of soft pectin, thousands of short walking cilia
 C) Stiff cellulose plates on the outer surface, two flagella (one longitudinal, one transverse)
 D) Chitinous plates on the outer surface, two parallel longitudinal flagella

99. How does behavioral shift in the nutritional patterns of Euglenoids based on environmental lighting conditions?

- A) They are strictly saprophytic in light and become parasitic in the dark.
 B) They photosynthesize in sunlight, but behave as heterotrophs by preying on smaller organisms in the dark.
 C) They perform chemosynthesis in the light and holophytic ingestion in the dark.
 D) They absorb minerals from living plant roots in a symbiotic manner.

100.

Which of the following is the correct set of sexual spores found in the fungal kingdom?

- A) Oospores, ascospores, and basidiospores
 B) Zoospores, sporangiospores, and conidia
 C) Ascospores, conidia, and zoospores
 D) Oospores, basidiospores and conidia

101.

Slime moulds are saprophytic protists. Match their morphological forms with the correct environmental conditions

- A) Favorable conditions
☐ Fruiting bodies with spores;
 Unfavorable conditions
☐ Plasmodium
 C) Favorable conditions
☐ Plasmodium; Unfavorable conditions
☐ Differentiates into fruiting bodies bearing spores
 B) Favorable conditions
☐ Chitinous cell wall;
 Unfavorable conditions
☐ Naked syncytium
 D) Favorable conditions
☐ Flagellated amoebae;
 Unfavorable conditions
☐ Cysts with calcium

102.

Why are the spores generated by slime moulds considered exceptionally resistant to environmental stress, surviving for many years?

- A) They lack cytoplasm and are completely hollow.
 B) They possess true cell walls composed of cellulose.
 C) They are coated in thick lipopolysaccharide capsules.
 D) They are actively kept alive by volcanic heat.

103.

Which group of protozoans is completely mismatched with its typical characteristic or representative example?

- A) Amoeboid protozoans
☐ Capture prey using pseudopodia
☐ Entamoeba
 B) Flagellated protozoans
☐ Parasitic forms cause sleeping sickness
☐ Trypanosoma
 C) Ciliated protozoans
☐ Have a cavity (gullet) opening to the outside
☐ Paramecium
 D) Sporozoans
☐ Move continuously using thousands of long flagella
☐ Plasmodium

104.

Match the following

Column I (Group)	Column II (Diagnostic Feature / Example)
A. Chrysophytes	3. Soapbox-like silica walls; chief producers in the ocean
B. Dinoflagellates	4. Stiff cellulose plates; longitudinal and transverse flagella
C. Euglenoids	1. Flexible protein-rich pellicle; show mixotrophic nutrition
D. Slime Moulds	5. Saprophytic; form a multinucleated plasmodium aggregation
E. Protozoans	2. Heterotrophic predators/parasites; includes Plasmodium

- A) A-3, B-4, C-1, D-5, E-2
 B) A-4, B-3, C-1, D-5, E-2
 C) A-3, B-1, C-4, D-5, E-2
 D) A-4, B-4, C-1, D-2, E-5

105.

Match the following columns

Column I (Structure)	Column II (Associated Group)
A. Cellulose-walled spores	3. Slime Moulds (under unfavorable conditions)
B. Silica-embedded shells	1. Chrysophytes (Diatoms)
C. Proteinaceous Pellicle	4. Euglenoids (like <i>Euglena</i>)
D. Silica shells on marine forms	2. Amoeboid Protozoans

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

106.

which group of protists contains photosynthetic pigments that are completely identical to those present in higher plants?

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

107.

How is the coordinated movement of thousands of cilia utilized by ciliated protozoans like Paramecium?

- A) To push the organism backward away from all water currents
 B) To cause the water laden with food to be steered directly into the gullet
 C) To inject toxins directly into passing marine fish
 D) To physically strip the cellulose plates off nearby dinoflagellates

108.

Which option correctly identifies a group that floats passively in water currents, and what is the collective ecological term?

- A) Dinoflagellates → Nekton
 B) Chrysophytes → Plankton
 C) Euglenoids → Benthos
 D) Protozoans → Neuston

109.

What is the specific evolutionary position and lifestyle attributed to all protozoans within Kingdom Protista?

- A) They are believed to be primitive relatives of animals and live as heterotrophs.
 B) They are believed to be the direct ancestors of fungi and live as saprophytes.
 C) They are considered highly evolved plants that lost their cell walls due to mutations.
 D) They are chemoautotrophic pioneers that colonized ancient volcanic rocks.

110.

When a slime mould forms a "plasmodium" under favorable conditions, what does this structure biologically represent?

- A) A massive, multicellular colony where individual cells retain separate walls
 B) A single, giant, multinucleated mass of protoplasm without any defining cell walls
 C) A collection of highly rigid, dead silica shells packed tightly together
 D) A parasitic cyst designed to infect human red blood cells

111.

Select the correct option that matches the fungal classes in Column I with their unique structural or spore characteristics listed in Column II:

Column I (Class)	Column II (Diagnostic Characteristic)
p. Phycomycetes	1. Sexual stage unknown; mycelium is branched and septate
q. Ascomycetes	2. Exogenous sexual spores; distinct dikaryophase is prominent
r. Basidiomycetes	3. Endogenous asexual spores; mycelium is coenocytic and aseptate
s. Deuteromycetes	4. Endogenous sexual spores; vegetative phase produces exogenous conidia

- A) p-3, q-4, r-2, s-1 B) p-4, q-3, r-1, s-2
C) p-3, q-1, r-2, s-4 D) p-2, q-4, r-3, s-1

112.

Match the fungal genera mentioned in Column I with their precise biological functions, industrial applications, or destructive diseases in Column II:

Column I (Genus)	Column II (Biological Role / Disease)
p. Neurospora	1. Causes destructive smut disease in crop plants
q. Albugo	2. Decomposes plant litter and helps actively in mineral cycling
r. Ustilago	3. Used extensively in advanced biochemical and genetic research
s. Trichoderma	4. Operates as an obligate parasite causing white rust on mustard

- A) p-4, q-3, r-1, s-2 B) p-3, q-4, r-2, s-1
C) p-3, q-4, r-1, s-2 D) p-1, q-4, r-3, s-2

113.

Which of the following fungal classes is characterized by having a mycelium that is completely aseptate and coenocytic?

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

114.

In which class of fungi are asexual spores generally not found, and sex organs completely absent?

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

115.

While many fungi cause plant diseases or spoilage, some are highly prized as food. Which of the following members of Ascomycetes are considered edible delicacies?

- A) Puffballs and Claviceps B) Morels and truffles
C) Toadstools and Smuts D) Bread mould and White rust

116.

A student notices white pustules or rust spots on the leaves of a mustard plant. this disease is caused by an obligate parasitic fungus named

- A) Albugo B) Puccinia
C) Ustilago D) Colletotrichum

117.

Select the correct statement regarding the site of karyogamy, meiosis, and subsequent spore layout within the class Basidiomycetes:

- A) Karyogamy and meiosis occur in the ascus, forming endogenous ascospores. B) Karyogamy and meiosis occur in the basidium, forming exogenous basidiospores.
C) Karyogamy and meiosis occur in the sporangium, forming motile zoospores. D) No karyogamy or meiosis occurs because they are imperfect fungi.

118.

Statement I: All members belonging to Kingdom Fungi are multicellular, filamentous organisms that form a complex network of hyphae called mycelium. Statement II: Yeast is a unicellular fungus belonging to the class Ascomycetes and is used extensively in baking and brewing.

- A) If only Statement I is correct. B) If only Statement II is correct.
C) If both Statement I and Statement II are correct. D) If both Statement I and Statement II are incorrect.

119.

Statement I: The mycelium of Phycomycetes is uniquely charactered as aseptate and coenocytic because it lacks cross-walls and contains multiple nuclei. Statement II: Higher fungi, including Ascomycetes and Basidiomycetes, feature branched and septate hyphae.

- A) If only Statement I is correct. B) If only Statement II is correct.
C) If both Statement I and Statement II are correct. D) If both Statement I and Statement II are incorrect

120.

Statement I: Sex organs are highly developed and conspicuous in the class Basidiomycetes to facilitate rapid outcrossing. Statement II: Plasmogamy in Basidiomycetes is achieved by the direct fusion of two vegetative or somatic cells of different strains.

- A) If only Statement I is correct. B) If only Statement II is correct.
C) If both Statement I and Statement II are correct. D) If both Statement I and Statement II are incorrect

121.

Statement I: In lower fungi like Phycomycetes, the fusion of two haploid cells immediately results in diploid cells (2n). Statement II: An intervening dikaryotic stage (n + n), where cells contain two nuclei per cell, is a diagnostic feature of Ascomycetes and Basidiomycetes.

- A) If only Statement I is correct. B) If only Statement II is correct.
C) If both Statement I and Statement II are correct. D) If both Statement I and Statement II are incorrect

122.

Statement I: Deuteromycetes are called "imperfect fungi" because they are unable to absorb organic nutrients or form a true branched mycelium. Statement II: Once the sexual stages of members of Deuteromycetes are discovered, they are often moved into Ascomycetes or Basidiomycetes.

- A) If only Statement I is correct. B) If only Statement II is correct.
C) If both Statement I and Statement II are correct. D) If both Statement I and Statement II are incorrect

123.

Statement I: Kingdom Protista acts as a biological link connecting unicellular prokaryotes with multicellular eukaryotic kingdoms like Plants, Animals, and Fungi. Statement II: All single-celled eukaryotes are placed under Kingdom Protista, but the physical boundaries of this kingdom are not well-defined.

- A) If only Statement I is correct. B) If only Statement II is correct.
C) If both Statement I and Statement II are correct. D) If both Statement I and Statement II are incorrect

124.

Statement I: Most dinoflagellates possess a single, exceptionally long flagellum that beats in a uniform circular loop to provide locomotive drive. Statement II: The cell walls of dinoflagellates have stiff cellulose plates located on their outer surface.

- A) If only Statement I is correct. B) If only Statement II is correct.
C) If both Statement I and Statement II are correct. D) If both Statement I and Statement II are incorrect

125.

The rapid multiplication of certain marine protists can turn the sea water red, creating "red tides." Which organism is responsible for this, and what is its ecological impact?

- A) Euglena, which accelerates coral reef growth B) Gonyaulax, which releases toxins that can kill marine animals like fish
C) Paramecium, which purifies the surrounding water D) Plasmodium, which infects marine mammals with malaria

126.

What unique evolutionary feature regarding photosynthetic pigments is noted in euglenoids?

- A) They possess unique pigments never found in any other kingdom. B) Their pigments are completely identical to those present in higher plants.
C) They lack chlorophyll entirely and rely solely on phycobilins. D) Their pigments change chemically into chitin when exposed to darkness.

127.

Select the correct description regarding the mode of nutrition in slime moulds and the mechanism by which their highly resistant spores are dispersed:

- A) Photosynthetic nutrition; spores are dispersed by water currents B) Saprophytic nutrition; spores are dispersed by air currents
C) Parasitic nutrition; spores are dispersed by insect vectors D) Holozoic nutrition; spores are dispersed by self-propulsion

128.

While many amoeboid protozoans are free-living in fresh water or moist soil, some live as dangerous internal tissue parasites. Identify the parasitic amoeboid genus?

- A) Amoeba B) Entamoeba
C) Trypanosoma D) Plasmodium

129.

The cell wall of fungi exhibits a distinct chemical layout. what are the primary structural molecules forming this wall?

- A) Peptidoglycan and amino acids B) Cellulose and hemicellulose
C) Chitin and polysaccharides D) Pectin and lignin

130.

What unique structural combination characterizes the vegetative mycelium network of the Rhizopus ?

- A) Septate and branched B) Aseptate and coenocytic
C) Septate and coenocytic D) Aseptate and unicellular

131.

A large number of members belonging to a specific fungal class function as decomposers of litter and help significantly in mineral cycling. Identify this group:

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

132.

In which of the following groups of fungi are asexual spores produced endogenously within a specialized sac-like structure?

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

133.

Which of the following highly valued edible fungi belong to the class Ascomycetes and are highlighted as choice delicacies ?

- A) Toadstools and Puffballs B) Morels and truffles
C) Bread mould and Mushrooms D) Smuts and Rusts

134.

Which of the following matches between a fungal plant pathogen and the crop disease it causes is completely correct ?

- A) Albugo → Loose smut of wheat B) Puccinia → Rust disease in wheat
C) Ustilago → Red rot of sugarcane D) Colletotrichum → White rust of mustard

135.

Fungi often live in close symbiotic associations with other living organisms , what are the specific names given to these mutualistic partnerships with algae and the roots of higher plants, respectively?

- A) Lichens and Mycorrhizae B) Mycorrhizae and Lichens
C) Viroids and Prions D) Rhizobium and Heterocysts

Zoology

136.

Which one of the following phyla is correctly matched with its general characteristics?

- A) Porifera – Cellular level of organisation and triploblastic
 B) Coelenterata – Diploblastic and mostly asymmetric
 C) Aschelminthes – Pseudocoelomates and bilateral symmetry
 D) Hemichordata – Coelomates and closed circulatory system

137.

Triploblastic, organ system grade body, coelomate and unsegmented body are characters of phylum

- A) Echinodermata
 B) Arthropoda
 C) Ctenophora
 D) Aschelminthes

138.

Protonephridia or flame cells of platyhelminthes help in

- A) Excretion and osmoregulation
 B) Nutrition and excretion
 C) Reproduction and respiration
 D) Secretion and nutrition

139.

Which of the following groups of animals have the following feature? I. Diploblastic II. Acoelomate III. Radial symmetry

- A) Planaria, Physalia, Aurelia
 B) Taenia, Fasciola, Wuchereria
 C) Adamsia, Ctenoplana, Meandrina
 D) Fasciola, Sycon, Sea walnut

140.

Which one of the following statements is not correct ?

- A) Mesoglea is present in between ectoderm and endoderm in Obelia.
 B) Radial symmetry is found in sea-pen.
 C) Fasciola (Liver fluke) is a pseudocoelomate animal.
 D) Taenia (Tapeworm) is a triploblastic animal.

141.

Platyhelminthes are

- A) Diploblastic, radially symmetrical and coelomate
 B) Diploblastic, radially symmetrical and acoelomate
 C) Triploblastic, bilaterally symmetrical and coelomate
 D) Triploblastic, bilaterally symmetrical and pseudocoelomate

142.

Members of Phylum Arthropoda have all features except

- A) External skeleton made of chitin
 B) Compound eyes
 C) Excretion by Malpighian tubules
 D) Usually a close type of blood vascular system

143.

Which one of the following is a correct matching pair of a body feature and the animal possessing it?

- A) Canal system – Asterias
 B) Metagenesis – Obelia
 C) Dorsal nerve cord – Pheretima
 D) Well-developed muscular pharynx – Taenia

144.

Which one of the following is not a characteristic of Phylum Annelida?

- A) Closed circulatory system
 B) Segmentation
 C) Pseudocoelom
 D) Ventral nerve cord

145.

File-like rasping organ in Pila is

- A) Ctenidium
 B) Radula
 C) Osphradium
 D) Statocyst

146.

Identify A, B, C and D marked in the following chart:

Column I	Column II	Column III
A	Sepia	A mollusca
Silkworm	Bombyx	B
Brittle star	C	An echinoderm
Brain coral	D	A cnidarian

- A) The correct option is:
 B) A : Tusk shell; B : A fish; C : Echinus; D : Meandrina
 C) A : Ascaris; B : A fish; C : Ophiura; D : Meandrina
 D) A : Cuttlefish; B : An insect; C : Ophiura; D : Meandrina
 E) A : Ascaris; B : An insect; C : Ophiura; D : Meandrina

147.

What is the common in between Anopheles, Culex and Limulus?

- A) Act as a vector.
 B) Bilaterally symmetrical, triploblastic and acoelomate animals.
 C) Jointed appendages.
 D) Body is unsegmented.

148.

Which of the following pairs of animals comprise comb jellies?

- A) Balanoglossus and Saccoglossus
 B) Pleurobranchia and Ctenoplana
 C) Sea anemone and sea pen
 D) Sea lily and brittle star

149.

Select the pseudocoelomates from the list of organisms given below.

- A) Ascaris, Fasciola, Taenia
 B) Culex, Locusta, Limulus
 C) Wuchereria, Ascaris, Ancylostoma
 D) Nereis, Hirudinaria, Wuchereria

150.

Which one of the following pairs is not correctly matched?

- A) Chaetopleura – Chiton B) Ascaris – Round worm
C) Wuchereria – Filarial worm D) Fasciola – Hook worm

151.

Select the group of organisms which have diploblastic members only.

- A) Ctenoplana, Taenia, B) Euspongia, Physalia,
Fasciola Meandrina
C) Wuchereria, Culex, D) Aedes, Ascaris, Hydra
Limulus

152.

Identify the correctly matched pair.

- A) Ascaris – Dioecious and B) Nereis – Monoecious and
incomplete alimentary canal closed circulatory system
C) Limulus – Living fossil and D) Culex – Oviparous and lac
sensory organ statocysts insect

153.

How many of the given animals are coelenterates? Physalia, Obelia, Planaria, Pennatula, Gorgonia, Pterobranchia, Meandrina and Nereis.

- A) Three B) Four
C) Five D) Six

154.

How many organisms are related with echinodermata phylum? Star fish, Sea-urchin, Sea-lily, Sea-cucumber, Brittle star, Sea-anemone, Sea-fan, Sea-pen, Sea-hare

- A) 4 B) 5
C) 6 D) 7

155.

Select the incorrect statement regarding following animals and their characteristics.

- A) Nereis – Dioecious and B) Limulus – Living fossil and
parapodia for swimming jointed appendages
C) Echinus – Endoskeleton of D) Balanoglossus – Internal
calcareous ossicles and water fertilisation and direct
vascular system development

156.

Which of the following statements is incorrect regarding the group of animals given? Physalia, Sea anemone, Obelia

- A) They are commonly called B) These animals occur as
stinging animals. attached polyps and free-
swimming medusae.
C) They have a well- D) They have special cells,
developed muscular pharynx cnidoblasts, that contain the
in the alimentary canal. nematocysts present on the
tentacles and body.

157.

Statement: I Annelids, arthropods and molluscs are segmented coelomates Statement: II Coelenterates, ctenophores and echinoderms have radial symmetry

- A) Both statement I and B) Both statement I and
statement II are correct statement II are incorrect
C) statement I is correct but D) statement I is incorrect but
statement II is incorrect statement II is correct

158.

What is true about Nereis, scorpion, cockroach and earthworm?

- A) All possess dorsal heart. B) All have open circulatory
system.
C) They belong to same D) They have jointed paired
phylum. appendages.

159.

Which of the following option is correct? I. Cell aggregate body plan is found in Phylum Platyhelminthes. II. Radial symmetry is the most common symmetry found in animals. III. Pseudocoelom is only found in Phylum Aschelminthes. IV. All triploblastic animals have a true coelom. V. Haemocoel is sometimes observed in animals belonging to Phylum Platyhelminthes.

- A) I and V are true and II, III B) II, III and V are true and I
and IV are false. and IV are false.
C) I, II and III are true and IV D) I, II, IV and V are false and
are false. only III is true.

160.

Read the following statements. (a) These are mostly endoparasite. (b) Bilaterally symmetrical and acoelomate animals. (c) Some absorb nutrients from the host directly through their body surface. (d) Specialised cells called flame cells help in osmoregulation and excretion. (e) Development is through many larval stages. All of the above statements are correct for

- A) Flatworms B) Roundworms
C) Arthropods D) Annelids

161.

Which of the following statements are correct? (a) The digestive system in platyhelminthes has two openings mouth and anus. (b) In sponges, the cells are arranged as loose cell aggregates. (c) In diploblastic animals, an undifferentiated layer mesoglea is present. (d) Metagenesis is observed in aschelminthes. (e) The animals in which the body cavity is absent are called pseudocoelomates.

- A) b, a and e B) d and c
C) c and d D) b and c

162.

Which of the following statements are correct? (i) Balanoglossus has a rudimentary structure, in collar region called stomochord, a structure similar to nerve cord. (ii) An excretory system is absent in echinoderms. (iii) In hemichordates, the excretory organ is proboscis gland. (iv) Ascaris has blind sac body plan. (v) Nereis is a dioecious animal.

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

163.

The given table shows phyla. Which phylum is correctly matched with its level of organisation, symmetry and coelom?

Phylum	Level of Organisation	Symmetry	Coelom
A Annelida	Organ level	Radial	Pseudocoelomate
B Platyhelminthes	Organ level	Radial	Acoelomate
C Arthropoda	Organ system level	Bilateral	Coelomate
D Mollusca	Organ system level	Radial	Coelomate

- A) B B) A
C) D D) C

164.

Match the following columns and select the correct option.

Column I	Column II
(A) Dentalium	(i) Brittle star
(B) Ophiura	(ii) Cuttle fish
(C) Antedon	(iii) Sea urchin
(D) Echinus	(iv) Tusk shell
(E) Sepia	(v) Sea lily

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

165.

Match Column I and Column II correctly and select the correct option from the code given below.

Column I (Animal)	Column II (Common name)
(A) Physalia	(i) Brain coral
(B) Pennatula	(ii) Sea fan
(C) Gorgonia	(iii) Sea pen
(D) Meandrina	(iv) Portuguese man of war

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

166.

Match Column I with Column II and select the correct option.

Column I	Column II
(A) Spongocoel	(i) Arthropoda
(B) Dorso-ventrally flattened body	(ii) Cnidaria
(C) Coelenteron cavity	(iii) Porifera
(D) Chitinous exoskeleton	(iv) Platyhelminthes

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

167.

Match the following columns and select the correct option.

Column I	Column II
(A) Cnidoblasts	(i) Help in locomotion
(B) Comb plates	(ii) Rasping organ
(C) Proboscis gland	(iii) Balancing organ
(D) Radula	(iv) Anchorage, defense, capture prey
(E) Statocyst	(v) Help in excretion

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

168.

Match Column I with Column II and select the correct option.

Column I	Column II
(A) Obelia	(i) Shows metagenesis
(B) Aurelia	(ii) Sessile and cylindrical
(C) Hydra	(iii) Medusae form
(D) Meandrina	(iv) Brain coral

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

169.

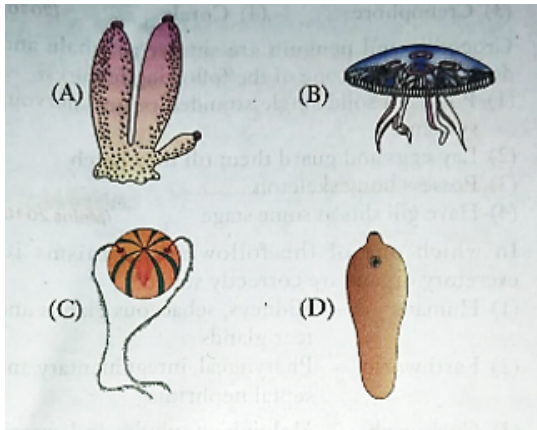
Match Column I with Column II and select the correct option.

Column I	Column II
(A) Sycon	(i) Ambulacral system
(B) Gorgonia	(ii) Book gills
(C) Asterias	(iii) Cnidoblasts
(D) Limulus	(iv) Choanocytes
(E) Ascaris	(v) Muscular pharynx
(F) Aplysia	(vi) Radula

- A) (A)-(iv), (B)-(v), (C)-(i), (D)-(ii), (E)-(iii), (F)-(vi)
 B) (A)-(vi), (B)-(v), (C)-(i), (D)-(ii), (E)-(iii), (F)-(iv)
 C) (A)-(iv), (B)-(iii), (C)-(i), (D)-(ii), (E)-(v), (F)-(vi)
 D) (A)-(iv), (B)-(i), (C)-(iii), (D)-(v), (E)-(ii), (F)-(vi)

170.

Identify the following figures correctly with their characters and phylum



- A) Fig-A, Animal-Sycon, Character-Sensory cells, Phylum-Porifera
 B) Fig-B, Animal-Aurelia, Character-Cnidocytes, Phylum-Ctenophora
 C) Fig-C, Animal-Pleurobrachia, Character-Bioluminescence, Phylum-Ctenophora
 D) Fig-D, Animal-Hirudinaria, Character-Acoelomate, Phylum-Platyhelminthes

171.

Identify the following four animals (A, B, C and D) given below. Which one of these is not correctly identified along with their correct taxonomic group and their common name?



- A) Figure-B, Name of animal-Adamsia, Taxonomic group-Ctenophora, Common name-Brain coral
 B) Figure-D, Name of animal-Spongilla, Taxonomic group-Porifera, Common name-Fresh water sponge
 C) Figure-C, Name of animal-Aurelia, Taxonomic group-Coelenterata, Common name-Jelly fish
 D) Figure-A, Name of animal-Euspongia, Taxonomic group-Porifera, Common name-Bath sponge

172.

Read the statements with regard to frog. Which of the statement(s) is/are correct and incorrect? 1. The medulla oblongata passes out through foramen of Monro and continues into spinal cord. 2. Vasa efferentia are 10-12 in number that arise from testes. 3. Ovaries have no functional connection with kidneys. 4. Frogs are uricotelic.

- A) 1, 2 and 3 are correct but 4 is incorrect.
 B) 1 and 2 are correct while 3 and 4 are incorrect.
 C) 2 and 3 are correct while 1 and 4 are incorrect.
 D) 2, 3 and 4 are correct while 1 is incorrect.

173.

Consider the following four statements (A-D) related to the common frog *Rana tigrina*, and select the correct option stating which ones are true (T) and which ones are false (F). (A) Frogs respire in water by two different methods, cutaneous and pulmonary respiration. (B) Nasal epithelium is a cellular aggregation. (C) Frog excretes urea and thus is a ureotelic animal. (D) Frog exhibits sexual dimorphism.

- A) A-T, B-F, C-F, D-T
 B) A-T, B-F, C-T, D-F
 C) A-T, B-F, C-T, D-T
 D) A-F, B-T, C-T, D-T

174.

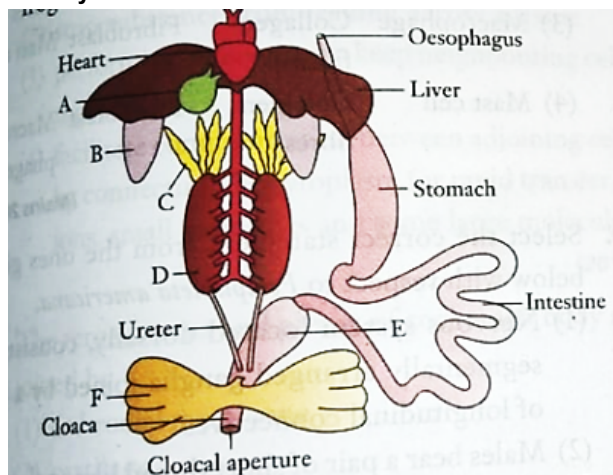
Match Column I with Column II and choose the correct option.

Column I	Column II
(A) Nictitating membrane	(i) Present on the first digit of the fore limbs of male frog
(B) Tympanum	(ii) Protect eyes while the frog is in water
(C) Copulatory pad	(iii) Receives sound signals

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

175.

Given below is the diagram of internal organs of frog. Identify A to F.



- A) A-Gall bladder, B-Lung, C-Kidney, D-Testis, E-Urethra, F-Urinary bladder
 B) A-Gall bladder, B-Lung, C-Fat bodies, D-Kidney, E-Rectum, F-Urinary bladder
 C) A-Gall bladder, B-Ovary, C-Lung, D-Kidney, E-Ileum, F-Urinary bladder
 D) A-Gall bladder, B-Fat bodies, C-Lung, D-Colon, E-Kidney, F-Urinary bladder

176.

Identify the class of the given organism.



- A) Amphibia
- B) Reptile
- C) Insecta
- D) Pisces

177.

Which of the following statement is correct about location of the male frog copulatory pad?

- A) Second digit of fore limb
- B) First digit of the fore limb
- C) First and second digit of fore limb
- D) First digit of hind limb

178.

What is the name of the blood vessel that carries deoxygenated blood from the body to the heart in a frog?

- A) Pulmonary vein
- B) Vena cava
- C) Aorta
- D) Pulmonary artery

179.

Frogs respire in water by skin and buccal cavity and on land by skin, buccal cavity and lungs. Choose the correct answer from the following:

- A) The statement is false for water but true for land
- B) The statement is false for both the environment
- C) The statement is true for water but false for land
- D) The statement is true for both the environment

180.

In frog, the renal portal system is a special venous connection that acts to link

- A) Kidney and intestine
- B) Kidney and lower part of body
- C) Liver and intestine
- D) Liver and kidney

ANSWER KEY

Physics

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

Chemistry

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

Botany

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

Zoology

136.	3	140.	3	144.	3	148.	2
137.	1	141.	3	145.	2	149.	3
138.	1	142.	4	146.	3	150.	4
139.	3	143.	2	147.	3	151.	2

152.	3	160.	1	168.	3	176.	1
153.	3	161.	4	169.	3	177.	2
154.	2	162.	3	170.	3	178.	2
155.	4	163.	4	171.	1	179.	1
156.	3	164.	1	172.	3	180.	2
157.	3	165.	2	173.	4		
158.	1	166.	3	174.	2		
159.	4	167.	2	175.	2		

SOLUTIONS

Q1.

Answer: B

Explanation:

To find the acceleration, we differentiate the given position equation with respect to time to find velocity, and then differentiate again to find acceleration. By substituting the expression for velocity back into the acceleration equation, we can express acceleration solely in terms of position x .

Q2.

Answer: C

Explanation:

Find the time when velocity is zero, then substitute that time into the acceleration equation.

Q3.

Answer: C

Explanation:

According to the third equation of motion, $v^2 = u^2 + 2ax$, the relationship between v and x is parabolic.

Q4.

Answer: C

Explanation:

Distance is the total path length. Calculate the change in position for each segment and sum their absolute values.

Q5.

Answer: C

Explanation:

A body comes to rest when the slope of the position-time graph (velocity) is zero, which occurs at the peaks and troughs of the curve.

Q6.

Answer: A

Explanation:

Speed must always be positive or zero, and for a given time, there can only be one value of speed or position.

Q7.

Answer: A

Explanation:

Speed is the magnitude of velocity. As a body goes up, speed decreases to zero and then increases as it falls back down.

Q8.

Answer: D

Explanation:

Velocity is the tangent of the angle that the displacement-time graph makes with the time axis.

Q9.

Answer: C

Explanation:

Average velocity depends on net displacement over time, and instantaneous velocity is the slope at a specific point.

Q10.

Answer: D

Explanation:

Area under the v - t graph gives distance, and the slope gives acceleration.

Q11.

Answer: A

Explanation:

Speed is the magnitude of velocity. Differentiating position gives a velocity that changes sign, resulting in a 'V' shaped speed graph.

Q12.

Answer: A

Explanation:

A linear v - t graph through the origin indicates constant acceleration, which leads to a parabolic position-time relationship.

Q13.

Answer: B

Explanation:

A closed loop on a v - t graph is impossible because it would imply two different speeds at the same time or that time is moving backwards.

Q14.

Answer: C

Explanation:

Given acceleration $\alpha = 2 \text{ m/s}^2$. Given retardation $\beta = 4 \text{ m/s}^2$.

Total time of motion $T = 3$ seconds. Using the direct formula for maximum speed in acceleration-deceleration motion: $v_{\max} = \frac{\alpha\beta}{\alpha+\beta}T$

Substitute the given values into the formula: $v_{\max} = \frac{2 \times 4}{2+4} \times 3$

$v_{\max} = \frac{8}{6} \times 3 = \frac{24}{6} = 4 \text{ m/s}$ Therefore, the maximum speed attained by the car is 4 m/s .

Q15.

Answer: D

Explanation:

From the given $x - t$ graph, at $t = 0$ s, the initial position of the particle is $x(0) = 10$ m. Average velocity over the time interval from 0 to t is defined as $v_{\text{avg}} = \frac{x(t) - x(0)}{t}$. For $v_{\text{avg}} = 0$, we require $x(t) - x(0) = 0$, which means $x(t) = x(0) = 10$ m. Looking at the graph, the curve passes through $x = 10$ m again at $t = 12$ sec. . Therefore, at $t = 12$ sec., the displacement is zero, making the average velocity during the period 0 to 12 sec. equal to zero.

Q16.

Answer: D

Explanation:

During the first 4 seconds, the car accelerates uniformly from rest.

The equation of motion is $x = \frac{1}{2}at^2$, so the $x - t$ graph is a parabola curving upwards (slope increases with time). After 4 seconds, the car moves with a constant/uniform velocity. The equation of motion becomes $x = x_4 + v(t - 4)$, so the $x - t$ graph becomes a straight line with a constant non-zero slope. Looking at the choices given, Graph (4) shows a parabolic curve bending upward for the first interval, followed by a straight inclined line for the uniform velocity phase. Therefore, Graph (4) correctly represents the motion of the car.

Q17.

Answer: C

Explanation:

The position-time equation with origin at the base of the tower ($x_0 = 60$ m) is: $x(t) = 60 + 20t - 5t^2$ At $t = 0$ s, the initial position is $x(0) = 60$ m. The maximum height (peak of the parabola) occurs when velocity becomes zero:

$v(t) = \frac{dx}{dt} = 20 - 10t = 0 \implies t = 2$ s The position at maximum height ($t = 2$ s) is:

$x(2) = 60 + 20(2) - 5(2)^2 = 60 + 40 - 20 = 80$ m The stone reaches the ground when position $x(t) = 0$:

$0 = 60 + 20t - 5t^2 \implies t^2 - 4t - 12 = 0 \implies (t - 6)(t + 2) = 0$ is incorrect.

Therefore, the position-time graph starts at $x = 60$ m at $t = 0$ s, rises to a maximum position of $x = 80$ m at $t = 2$ s, and decreases back to $x = 0$ m at $t = 6$ s. Comparing this with the given choices in the image, Graph (3) correctly starts at $x = 60$ m, goes up, and reaches $x = 0$ m at $t = 6$ s.

Q18.

Answer: A

Explanation:

Initially, the ball is dropped from $h = d$, so initial velocity at $h = d$ is $v = 0$. As the ball falls downward, height h decreases from d to 0, and velocity v becomes increasingly negative, following the parabolic relation $v = -\sqrt{2g(d - h)}$. At $h = 0$ (ground), velocity reaches its maximum negative magnitude. Upon impact, the ball rebounds upward, so velocity abruptly switches sign to positive at $h = 0$. As the ball moves upward from $h = 0$ to $h = d/2$, height h increases while positive velocity decreases parabolically following $v = +\sqrt{2g(d/2 - h)}$ until $v = 0$ at $h = d/2$. Comparing with the options shown in the image, Graph (1) correctly represents these parabolic segments in the negative velocity region (downward motion from d to 0) and positive velocity region (upward motion from 0 to $d/2$).

Q19.

Answer: C

Explanation:

Initial velocity of the ball at $t = 0$ is zero ($u = 0$). Since downward direction is taken as positive, acceleration $a = +g$. As the ball falls, its velocity increases linearly with time following $v = gt$, giving a straight line with a positive slope until time $T/2$. When the ball hits the glass surface, it collides elastically, reversing its velocity direction instantaneously from $+v$ to $-v$. As it moves upward against gravity, acceleration is still $+g$ downward, so velocity linearly increases from $-v$ to 0 at time T . This produces a periodic sawtooth waveform with positive slope throughout each falling and rising phase, jumping from positive to negative velocity at collision points. Comparing with the options shown in the image, Graph (3) accurately represents this motion.

Q20.

Answer: A

Explanation:

From the velocity-time graph of Q. no. 152, the rocket accelerates along segment OA from $t_1 = 0$ s to $t_2 = 20$ s. At $t_1 = 0$ s, the initial velocity is $v_1 = 0$ ms⁻¹. At $t_2 = 20$ s, the final velocity is $v_2 = 1000$ ms⁻¹. The time interval for acceleration is: $\Delta t = 20 - 0 = 20$ s Using the acceleration formula: $a = \frac{1000 - 0}{20} = 50$ m/s² Therefore, the acceleration of the rocket is 50 m/s².

Q21.

Answer: D

Explanation:

The relationship between displacement s and time t for a body projected vertically upward is $s = ut - \frac{1}{2}gt^2$. This is a quadratic equation, so the graph between s and t must be a parabola. Since the term with t^2 has a negative coefficient, the parabola opens downwards (concave down). At $t = 0$, $s = 0$, so the graph starts from the origin. The body goes up, reaches a maximum height (vertex of the parabola), and then comes down, so s decreases back to 0. Graph (1) shows straight lines, implying constant velocity, which is incorrect. Graph (2) and (3) do not represent the motion starting from zero displacement and returning. Graph (4) shows a parabolic curve starting from the origin, reaching a maximum, and returning to the axis, which correctly represents the motion. Therefore, the correct option is (4).

Q22.

Answer: D

Explanation:

When a body is projected vertically upwards, the only acceleration acting on it is the acceleration due to gravity. This acceleration is constant in magnitude (9.8m /s²) and always acts downwards. Mathematically, $a = -g$ (taking upward direction as positive). Since acceleration does not change with time, its value remains constant throughout the upward and downward motion. Plotting a constant acceleration against time on a graph yields a horizontal straight line parallel to the time axis. Therefore, the acceleration-time curve is a straight line.

Q23.

Answer: C

Explanation:

Analyze the slope of the $x - t$ graph in each interval: 1. Interval OA: The curve is concave up (bending upwards). The slope (velocity) is increasing from the origin. Since velocity is increasing, acceleration is positive (+). 2. Interval AB: The graph appears to be a straight line with a small positive slope. A straight line on an $x-t$ graph indicates constant velocity. Therefore, acceleration is zero (0). 3. Interval BC: The curve appears to flatten out or bend downwards (concave down). The slope (velocity) is decreasing. Since velocity is decreasing, acceleration is negative (-). 4. Interval CD: The graph is a straight line with a steep positive slope. This indicates a constant high velocity. Therefore, acceleration is zero (0). Matching this sequence (+, 0, -, 0) with the given options: - Option (1): +, 0, +, + - Option (2): -, 0, +, 0 - Option (3): +, 0, -, 0 - Option (4): -, 0, -, 0 The correct sequence corresponds to Option (3).

Q24.

Answer: B

Explanation:

From the equation of motion for constant acceleration starting from rest: $v^2 = 2as$. This can be written as $v = \sqrt{2a} \cdot \sqrt{s}$. This equation shows that velocity v is proportional to the square root of displacement s ($v \propto \sqrt{s}$). The graph of v versus s will be a parabola with its axis along the displacement axis (horizontal axis). Alternatively, we can look at the slope of the $v - s$ graph. The slope is $\frac{dv}{ds}$. Differentiating $v^2 = 2as$ with respect to s : $2v \frac{dv}{ds} = 2a$
 $\frac{dv}{ds} = \frac{a}{v}$. Since acceleration a is constant and positive, and velocity v increases as displacement s increases, the term $\frac{a}{v}$ decreases. This means the slope of the $v - s$ graph decreases as s increases. - Graph (1) shows a constant slope (straight line), which implies $v \propto s$. This is incorrect. - Graph (2) shows a curve with a decreasing slope (concave down), which matches the relationship $v \propto \sqrt{s}$. This is correct. - Graph (3) shows a straight line with a non-zero intercept, implying initial velocity is not zero. This is incorrect. - Graph (4) shows a curve with an increasing slope (concave up), which implies $v \propto s^n$ where $n > 1$. This is incorrect. Therefore, graph (2) correctly represents the velocity-displacement curve.

Q25.

Answer: A

Explanation:

Analyze the motion from the given $x - t$ graph: From $t = 0$ to $t = T$: The slope of the $x - t$ graph is positive but decreasing. This indicates the particle is moving in the positive direction with decreasing velocity (decelerating). The speed is decreasing. At $t = T$: The slope is zero (tangent is horizontal). The velocity is zero, so the particle is momentarily at rest. From $t = T$ to $t = 2T$: The slope is negative and its magnitude is increasing (the curve becomes steeper downwards). This indicates the particle is moving in the negative direction with increasing speed (accelerating in reverse). Analyze the distance-time graph: Distance is the total path length, so it must always increase (or remain constant). It cannot decrease. This eliminates graphs (2) and (3) which show the value going down. The slope of the distance-time graph corresponds to the speed ($|v|$). From $t = 0$ to $t = T$: Speed is decreasing. So, the slope of the distance graph should decrease. The curve should be concave down (bending downwards). At $t = T$: Speed is zero. So, the slope of the distance graph should be zero (horizontal tangent). From $t = T$ to $t = 2T$: Speed is increasing. So, the slope of the distance graph should increase. The curve should be concave up (bending upwards). Comparing with the options: Graph (1) shows a curve that is always increasing. It starts with a steep slope, the slope decreases (concave down) until it flattens around $t = T$, and then the slope increases again (concave up) becoming steep at $t = 2T$. This matches the behavior of the speed derived from the $x - t$ graph. Graph (4) shows a curve where the slope decreases throughout, implying the particle slows down and stops, which is incorrect for the second half of the motion. Therefore, Graph (1) is the correct representation.

Q26.

Answer: A

Explanation:

From the given $v - x$ graph, we can determine the equation of the line. The graph is a straight line with y-intercept $v_0 = 30$ and x-intercept $x_0 = 10$ (assuming the value is 10 based on visual inspection, though the exact value doesn't change the shape, let's verify with the options). Wait, looking at the options, the intercept is -90. Let's derive the general form. Let the equation of the line be $v = -mx + c$, where m is the magnitude of the slope and c is the y-intercept (30). The slope of the $v - x$ graph is $\frac{dv}{dx} = -m$. Using the formula $a = v \frac{dv}{dx}$, we substitute v and $\frac{dv}{dx}$:
 $a = (-mx + c)(-m) = m^2x - mc$. This equation shows that acceleration a varies linearly with displacement x . The graph of a vs x should be a straight line with a positive slope (m^2) and a negative y-intercept ($-mc$). From the given graph, $c = 30$. Let's assume the x-intercept is 10. Then slope $m = \frac{30-0}{10-0} = 3$. So,
 $a = (3)^2x - (3)(30) = 9x - 90$. At $x = 0$, $a = -90$. At $x = 10$, $a = 0$. The graph should start at $a = -90$ on the vertical axis and increase linearly with a positive slope, crossing the x-axis at a positive value. Looking at the options: Graph (1) shows a line starting at -90 on the a-axis and going upwards with a positive slope. This matches our derivation. Graph (2) has a negative slope. Graph (3) is a constant negative value (zero slope). Graph (4) has a negative slope starting from -90. Therefore, Graph (1) is the correct representation.

Q27.

Answer: A

Explanation:

We analyze the motion in three time intervals based on the given acceleration-time graph. The body starts from rest, so initial velocity $u = 0$ m/s.

Interval 1: $t = 0$ to $t = 2$ s.

The acceleration is constant at $a = 5$ m/s².

Using $v = u + at$, we get $v = 0 + 5t = 5t$.

At $t = 2$ s, velocity $v = 5(2) = 10$ m/s.

The velocity-time graph is a straight line with a positive slope starting from the origin (0, 0) and ending at (2, 10).

Interval 2: $t = 2$ to $t = 6$ s.

The acceleration is $a = 0$ m/s².

This means the velocity is constant.

So, $v = 10$ m/s throughout this interval.

The velocity-time graph is a horizontal line at $v = 10$ from $t = 2$ to $t = 6$.

Interval 3: $t = 6$ to $t = 10$ s.

The acceleration is constant at $a = -5$ m/s².

The initial velocity for this interval is the final velocity of the previous interval, which is 10 m/s.

Using $v = u + a(t - t_0)$, where $u = 10$ and $t_0 = 6$, we get $v = 10 - 5(t - 6)$.

At $t = 10$ s, velocity $v = 10 - 5(10 - 6) = 10 - 20 = -10$ m/s.

The velocity-time graph is a straight line with a negative slope starting from (6, 10) and ending at (10, -10). It crosses the time axis ($v = 0$) at $t = 8$ s.

Comparing this behavior with the given options, Graph (1) matches perfectly: it shows a linear increase to 10 m/s, a constant phase at 10 m/s, and then a linear decrease to -10 m/s.

Therefore, the correct option is Graph (1), which corresponds to A.

Q28.

Answer: A

Explanation:

From the given acceleration-time graph, we analyze the motion in two intervals. Interval 1: $t = 0$ to $t = 2$ s. The acceleration is constant at $a = 3$ m/s². Since $a = \frac{dv}{dt}$, the slope of the velocity-time graph is positive and constant. Assuming initial velocity $u = 0$ m/s (as suggested by graphs 1 and 3 starting at origin), the velocity at $t = 2$ s is $v = u + at = 0 + 3(2) = 6$ m/s. The graph should be a straight line from (0, 0) to (2, 6). Interval 2: $t = 2$ to $t = 4$ s. The acceleration is constant at $a = -3$ m/s². The slope of the velocity-time graph is negative and constant. The initial velocity for this interval is the final velocity of the previous interval, $v(2) = 6$ m/s.

The velocity at $t = 4$ s is

$v = v(2) + a(t - 2) = 6 + (-3)(4 - 2) = 6 - 6 = 0$ m/s. The graph should be a straight line from (2, 6) to (4, 0). Combining both intervals, the velocity-time graph starts at 0, increases linearly to 6 m/s at $t = 2$ s, and then decreases linearly back to 0 m/s at $t = 4$ s. This shape corresponds to Graph (1). Therefore, the correct option is (1), which corresponds to A.

Q29.

Answer: B

Explanation:

The particle starts from rest, so initial velocity $u = 0$ m/s. The velocity at $t = 4$ s is given by

$v = u + \text{Area under } a - t \text{ graph from } t = 0 \text{ s to } t = 4 \text{ s}$. The area under the $a - t$ graph consists of two parts: 1. Triangular region from $t = 0$ s to $t = 2$ s:

$$\text{Area}_1 = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 2 \times 10 = 10 \text{ m/s}^2$$

Rectangular region from $t = 2$ s to $t = 4$ s:

$$\text{Area}_2 = \text{width} \times \text{height} = (4 - 2) \times 10 = 2 \times 10 = 20 \text{ m/s}^2$$

Total area under the graph is:

Total Area = $\text{Area}_1 + \text{Area}_2 = 10 + 20 = 30$ m/s² Therefore, the velocity at $t = 4$ sec is: $v = 0 + 30 = 30$ m/s

Q30.

Answer: C

Explanation:

The particle starts from rest, so initial velocity $v_{\text{initial}} = 0$ m/s. The maximum speed occurs when the acceleration becomes zero (at $t = 8$ s), as velocity continues to increase as long as acceleration is positive. The area under the triangular $a - t$ graph from $t = 0$ s to $t = 8$ s represents the change in velocity:

$$\text{Area} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$\text{Area} = \frac{1}{2} \times 8 \text{ s} \times 5 \text{ m/s}^2 = 20 \text{ m/s}^2 \text{ Therefore, maximum speed } v_{\text{max}} = v_{\text{initial}} + \text{Area} = 0 + 20 = 20 \text{ m/s}.$$

Q31.

Answer: C

Explanation:

From the given $v - t$ graph, identify the velocity of the block at $t = 2$ sec and $t = 4$ sec. At $t_1 = 2$ sec, velocity $v_1 = 10$ ms⁻¹. At $t_2 = 4$ sec, velocity $v_2 = 0$ ms⁻¹. Now, calculate the change in velocity: $\Delta v = v_2 - v_1 = 0 - 10 = -10$ ms⁻¹. Calculate the time interval: $\Delta t = t_2 - t_1 = 4 - 2 = 2$ sec. Substitute these values into the average acceleration formula: $a_{\text{avg}} = \frac{-10}{2} = -5$ m/s². Thus, the average acceleration from $t = 2$ sec to $t = 4$ sec is -5 m/s².

Q32.

Answer: D

Explanation:

To find the maximum acceleration, we evaluate the slope ($\frac{\Delta v}{\Delta t}$) for each segment where velocity increases (positive acceleration). From $t = 0$ s to $t = 20$ s, velocity changes from 0 m/s to 20 m/s.

$$a_1 = \frac{20-0}{20-0} = 1 \text{ m/s}^2 \text{ From } t = 20 \text{ s to } t = 30 \text{ s, velocity remains constant at } 20 \text{ m/s. } a_2 = 0 \text{ m/s}^2$$

From $t = 30$ s to $t = 40$ s, velocity changes from 20 m/s to 60 m/s.

$$a_3 = \frac{60-20}{40-30} = \frac{40}{10} = 4 \text{ m/s}^2 \text{ Comparing the acceleration values, the maximum magnitude of positive acceleration occurs between } t = 30 \text{ s and } t = 40 \text{ s, which is } 4 \text{ m/s}^2. \text{ Therefore, the maximum acceleration is } 4 \text{ m/s}^2.$$

Q33.

Answer: D

Explanation:

From the given velocity-time graph, we need to find the time intervals where acceleration is zero. Acceleration is zero when the graph is a horizontal line (constant velocity). Looking at the graph, the velocity is constant at $v = 1 \text{ m/s}$ in two intervals: 1. From $t = 0 \text{ s}$ to $t = 20 \text{ s}$. 2. From $t = 40 \text{ s}$ to $t = 60 \text{ s}$. Calculate the displacement for the first interval ($t = 0$ to 20s): Velocity $v = 1\text{m/s}$. Time $\Delta t_1 = 20 - 0 = 20\text{s}$. Displacement $s_1 = v \times \Delta t_1 = 1 \times 20 = 20 \text{ m}$. Calculate the displacement for the second interval ($t = 40$ to 60s): Velocity $v = 1\text{m/s}$. Time $\Delta t_2 = 60 - 40 = 20\text{s}$. Displacement $s_2 = v \times \Delta t_2 = 1 \times 20 = 20\text{m}$. Total displacement during the time intervals with zero acceleration is the sum of displacements in these intervals. Total displacement $S = s_1 + s_2 = 20 \text{ m} + 20 \text{ m} = 40 \text{ m}$. This corresponds to option (4).

Q34.

Answer: C

Explanation:

Displacement is the area under the velocity-time graph from $t = 0$ to $t = 8, \text{s}$.

Q35.

Answer: A

Explanation:

The total distance travelled by a particle is the sum of the magnitudes of the areas (total area) under the velocity-time graph. Area above the time axis ($t = 0 \text{ s}$ to $t = 10 \text{ s}$): Sum of the initial triangle, central rectangle, and decreasing triangle gives $5 + 20 + 10 = 35.0 \text{ m}$. Area below the time axis ($t = 10 \text{ s}$ to $t = 12 \text{ s}$): The triangular area below the axis gives $\frac{1}{2} \times 2 \times 2.5 = 2.5 \text{ m}$. Total distance = $35.0 \text{ m} + 2.5 \text{ m} = 37.5 \text{ m}$.

Q36.

Answer: C

Explanation:

The maximum height attained by a rocket moving vertically corresponds to the total distance traveled until its velocity becomes zero. On a velocity-time ($v - t$) graph, this total distance is given by the area under the $v - t$ curve for the duration when $v \geq 0$.

Q37.

Answer: D

Explanation:

From $t = 8 \text{ s}$ to $t = 12 \text{ s}$, the velocity-time graph is a straight line sloping downwards. A constant negative slope on a $v - t$ graph indicates a constant negative acceleration, which is uniform retardation.

Q38.

Answer: C

Explanation:

The acceleration at any instant is given by the slope of the velocity-time graph at that instant. Between $t = 8 \text{ s}$ and $t = 10 \text{ s}$, the graph is a straight line sloping downwards from $v = 15 \text{ m s}^{-1}$ to $v = 5 \text{ m s}^{-1}$. Since $t = 9 \text{ s}$ lies in this interval, the acceleration at $t = 9 \text{ s}$ is equal to the constant slope of this line segment, which is -5 m s^{-2} .

Q39.

Answer: A

Explanation:

Acceleration is represented by the slope of the velocity-time ($v \rightarrow t$) graph. By calculating the slopes of all line segments with positive slope (increasing velocity), we find that the segment from $t = 30 \text{ s}$ to $t = 40 \text{ s}$ has the maximum slope of 4 m/s^2 .

Q40.

Answer: C

Explanation:

Velocity is the slope of the displacement-time graph. From 0 to t_1 , the displacement increases linearly, so the slope is constant positive. From t_1 to t_3 , the displacement is constant, so the slope is zero. From t_3 to t_4 , the displacement decreases linearly, so the slope is constant negative. Hence, the velocity-time graph must show positive constant velocity, then zero velocity, then negative constant velocity, which is Graph (3).

Q41.

Answer: D

Explanation:

When an object is thrown vertically upwards with an initial velocity u , it experiences a constant downward acceleration due to gravity ($a = -g$). The equation of motion is linear: $v = u - gt$. This represents a straight line with a positive y -intercept (u) and a negative slope ($-g$), passing through zero at the highest point and becoming negative as the object moves downwards, which matches Graph D).

Q42.

Answer: A

Explanation:

Since both stones experience the same downward acceleration due to gravity (g), their relative acceleration is zero ($\mathbf{a}_{\text{rel}} = 0$). Consequently, the relative velocity between them remains constant over time ($\mathbf{v}_{\text{rel}} = u$). Therefore, the distance between the two stones S increases linearly with time ($S = u \cdot t$), which corresponds to a straight line passing through the origin as shown in Graph A).

Q43.

Answer: A

Explanation:

For an object thrown vertically upward, the displacement first increases until the highest point and then decreases back to zero. According to the given answer key, the correct option is A.

Q44.

Answer: B

Explanation:

In a displacement-time ($S-t$) graph, the curvature (concavity) indicates the sign of acceleration ($a = \frac{d^2 S}{dt^2}$). A graph that is concave upwards (shaped like a cup,) has a positive second derivative, meaning positive acceleration. Graph (I) and Graph (IV) are both concave upwards, so the acceleration is positive in both.

Q45.

Answer: A

Explanation:

The slope of a velocity–time graph represents the acceleration ($\frac{dv}{dt} = a$). 1. From $t = 0$ to t_1 , the acceleration a increases linearly with time ($a > 0$). Thus, the velocity curve must be concave upwards with an increasing positive slope. 2. From t_1 to t_2 , the acceleration a decreases linearly back to zero ($a > 0$). Thus, the velocity continues to increase, but its slope decreases until it flattens at t_2 , producing a curve that is concave downwards. This combination of an inflection point at t_1 and a peak/flat slope at t_2 matches Graph A).

Q46.

Answer: D

Explanation:

Shapes are determined by the number of bond pairs and lone pairs on the central atom according to VSEPR theory.

Q47.

Answer: B

Explanation:

Hybridization is determined by the steric number (sum of sigma bonds and lone pairs). Species with a steric number of 4 use sp^3 orbitals.

Q48.

Answer: A

Explanation:

Trigonal bipyramidal geometry arises from sp^3d hybridization with zero lone pairs on the central atom.

Q49.

Answer: D

Explanation:

Matching molecules with their specific molecular geometries based on LP-BP repulsions.

Q50.

Answer: B

Explanation:

Lone pairs are calculated as
$$LP = \frac{1}{2}(\text{Valence electrons} - \text{Total bonds} - \text{Charge}).$$

Q51.

Answer: B

Explanation:

Linear molecules have a bond angle of 180° , typically with sp hybridization or sp^3d with 3 lone pairs.

Q52.

Answer: D

Explanation:

Square pyramidal structure requires 5 bond pairs and 1 lone pair (sp^3d^2 hybridization).

Q53.

Answer: B

Explanation:

Square planar shapes occur with sp^3d^2 (4 BP + 2 LP) or certain coordination complexes (dsp^2).

Q54.

Answer: B

Explanation:

Determining the lone pairs on Xe by calculating valence electrons minus used electrons for bonds. .

Q55.

Answer: A

Explanation:

Bent (V-shape) geometry occurs when there are lone pairs on the central atom in a triatomic molecule.

Q56.

Answer: D

Explanation:

Calculate lone pairs for both interhalogens and sum them.

Q57.

Answer: D

Explanation:

Geometry and shape are identified using the number of sigma bonds and lone pairs on the central atom.

Q58.

Answer: A

Explanation:

Identify the species with the highest number of lone pairs on the central atom.

Q59.

Answer: A

Explanation:

ClF_5 has 5 bond pairs and 1 lone pair, giving it a square pyramidal geometry.

Q60.

Answer: C

Explanation:

Both molecules are bent, but the bond angle depends on hybridization and repulsion.

Q61.

Answer: B

Explanation:

Count the lone pairs on the central atom for each molecule.

Q62.

Answer: B

Explanation:

Match molecular structures based on the count of electron domains.

Q63.

Answer: D

Explanation:

Hybridization of P in PF_5 is sp^3d , so $x = 3$ and $y = 1$.

Q64.

Answer: A

Explanation:

In sp^3d hybridization, lone pairs occupy equatorial positions to minimize repulsion.

Q65.

Answer: B

Explanation:

Species with the same total number of electrons and central atoms with 4 sigma bonds are isoelectronic and isostructural.

Q66.

Answer: C

Explanation:

BrF_3 has 3 bond pairs and 2 lone pairs on Br, resulting in sp^3d hybridization and a T-shape.

Q67.

Answer: B

Explanation:

Determine lone pairs on Xe for each molecule and sum them.

Q68.

Answer: A

Explanation:

Identify molecules with 3D geometries like pyramidal, see-saw, open-book, or tetrahedral.

Q69.

Answer: B

Explanation:

Lone pairs on central atoms for the given sequence.

Q70.

Answer: D

Explanation:

Identify molecules with a steric number of 6 (sum of bonds and lone pairs).

Q71.

Answer: B

Explanation:

Isostructural means having the same molecular structure.

Q72.

Answer: D

Q73.

Answer: B

Explanation:

Counting lone pairs on the central atom of each species.

Q74.

Answer: C

Explanation:

Steric number = 5 (3 BP + 2 LP), which leads to sp^3d hybridization and T-shape.

Q75.

Answer: D

Explanation:

VSEPR theory explains why lone pair repulsions shrink the ideal tetrahedral angle in water.

Q76.

Answer: C

Explanation:

Matching molecules with their corresponding hybridization.

Q77.

Answer: D

Explanation:

Steric number calculation for nitrogen in different ions.

Q78.

Answer: A

Explanation:

Central I in I_3^- has 2 bonds and 3 lone pairs in sp^3d hybridization.

Q79.

Answer: D

Explanation:

Identify molecules that are planar versus those that are pyramidal.

Q80.

Answer: D

Explanation:

Bond angles decrease as the number of lone pairs increases.

Q81.

Answer: A

Explanation:

Symmetrical structures like tetrahedral or square planar are typically non-polar.

Q82.

Answer: A

Explanation:

Identify geometry from bond pairs and lone pairs using steric number.

Q83.

Answer: B

Q84.

Answer: A

Explanation:

In the solid state, PCl_5 exists as an ionic compound consisting of cationic and anionic species.

Q85.

Answer: D

Explanation:

Both species have sp^3d^2 hybridization but different numbers of lone pairs, leading to different shapes.

Q86.

Answer: A

Explanation:

Identify the steric number 6 species.

Q87.

Answer: C

Explanation:

Count lone pairs on both the central atom and the terminal atoms.

Q88.

Answer: B

Explanation:

BF_3 is trigonal planar (sp^2) and becomes tetrahedral (sp^3) as BF_4^- .

Q89.

Answer: A

Explanation:

NF_3 has a lone pair on Nitrogen, making it pyramidal, not planar.

Q90.

Answer: D

Explanation:

Matching geometric pairs based on electron domains.

Q91.

Answer: B

Q92.

Answer: C

Q93.

Answer: C

Q94.

Answer: A

Q95.

Answer: A

Q96.

Answer: B

Q97.

Answer: A

Q98.

Answer: C

Q99.

Answer: B

Q100.

Answer: A

Q101.

Answer: C

Q102.

Answer: B

Q103.

Answer: D

Q104.

Answer: A

Q105.

Answer: C

Q106.

Answer: C

Q107.

Answer: B

Q108.

Answer: B

Q109.

Answer: A

Q110.

Answer: B

Q111.

Answer: A

Q112.

Answer: C

Q113.

Answer: C

Q114.

Answer: C

Q115.

Answer: B

Q116.

Answer: A

Q117.

Answer: B

Q118.

Answer: B

Q119.

Answer: C

Q120.

Answer: B

Q121.

Answer: C

Q122.

Answer: B

Q123.

Answer: B

Q124.

Answer: B

Q125.

Answer: B

Q126.

Answer: B

Q127.

Answer: B

Q128.

Answer: B

Q129.

Answer: C

Q130.

Answer: B

Q131.

Answer: D

Q132.

Answer: B

Q133.

Answer: B

Q134.

Answer: B

Q135.

Answer: A

Q136.

Answer: C

Q137.

Answer: A

Q138.

Answer: A

Q139.

Answer: C

Q140.

Answer: C

Q141.

Answer: C

Q142.

Answer: D

Q143.

Answer: B

Q144.

Answer: C

Q145.

Answer: B

Q146.

Answer: C

Q147.

Answer: C

Q148.

Answer: B

Q149.

Answer: C

Q150.

Answer: D

Q151.

Answer: B

Q152.

Answer: C

Q153.

Answer: C

Q154.

Answer: B

Q155.

Answer: D

Q156.

Answer: C

Q157.

Answer: C

Q158.

Answer: A

Q159.

Answer: D

Q160.

Answer: A

Q161.

Answer: D

Q162.

Answer: C

Q163.

Answer: D

Q164.

Answer: A

Q165.

Answer: B

Q166.

Answer: C

Q167.

Answer: B

Q168.

Answer: C

Q169.

Answer: C

Q170.

Answer: C

Q171.

Answer: A

Q172.

Answer: C

Q173.

Answer: D

Q174.

Answer: B

Q175.

Answer: B

Q176.

Answer: A

Q177.

Answer: B

Q178.

Answer: B

Q179.

Answer: A

Q180.

Answer: B