Solution

NEET

Entrance Exam - NEET-UG

PHYSICS

1.

(d) $-\frac{\pi}{4}$

Explanation:

y_1 = cos (4t - 2x) = sin (4t - 2x + $\frac{\pi}{2}$)

y_2 = sin (4t - 2x + $\frac{\pi}{4}$)

Phase difference between two waves is,

$\Delta\phi$ = (4t - 2x + $\frac{\pi}{4}$) - (4t - 2x + $\frac{\pi}{2}$) = $\frac{\pi}{4} - \frac{\pi}{2} = -\frac{\pi}{4}$

2.

(d) 415 Hz

Explanation:

415 Hz

3. **(a)** $\frac{1}{6}$

Explanation:

Let v be the velocity of sound.

Closed organ pipe P_1 of length L_1:

Frequency of different modes of vibration $v'_n = \frac{(2n-1)v}{4L_1}$

First harmonic i.e n = 1, $v'_1 = \frac{v}{4L_1}$

Open organ pipe P_2 of length L_2:

Frequency of mth harmonic $v'_m = \frac{mv}{4L_2}$

For third harmonic i.e m = 3 $v'_3 = \frac{3v}{2L_2}$

But $v'_3 = v_3$

$\frac{v}{4L_1} = \frac{3v}{2L_2} \Rightarrow \frac{L_1}{L_2} = \frac{1}{6}$

4.

(b) Henry

Explanation:

Self Inductance L= ϕI

= WbA

= Henry

5.

(d) Spring constant

Explanation:

Surface tension = $\frac{\text{Force}}{\text{Length}}$

= $\frac{[MLT^{-2}]}{[L]}$ = $[ML^0T^{-2}]$

Spring constant = $\frac{\text{Force}}{\text{Length}}$

= $\frac{[MLT^{-2}]}{[L]}$ = $[ML^0T^{-2}]$

$\theta = \cos^{-1}(1) = 0°$

6.

(c) 2×10^2 cm^3

Explanation:

Dimensions of the block ,

Length (l) = 12 cm

Breadth (b) = 6 cm

Height (h) = 2.45 cm

volume of the block = lbh

$V = 12 \times 6 \times 2.45$

$V = 176.4$ cm^3

$V = 176.4 \times (10^2 \times 10^2)$ cm^3

$V = 1.764 \times 10^2$ cm^3

$V = 2 \times 10^2$ cm^3

7.

(b) $T^{-2} = T_1^{-2} + T_2^{-2}$

Explanation:

$T = 2\pi\sqrt{\frac{M}{k}}$

$\therefore k = \frac{4\pi^2 m}{T^2}$

In the given situation

$k = k_1 + k_2$

$\therefore \frac{4\pi^2 m}{T^2} = \frac{4\pi^2 m}{T_1^2} + \frac{4\pi^2 m}{T_2^2}$

$T^{-2} = T_1^{-2} + T_2^{-2}$

8. **(a)** $\frac{d^2y}{dt^2} + \omega^2 y = 0$

Explanation:

$\frac{d^2y}{dt^2} + \omega^2 y = 0$

9.

(b) 300 m

Explanation:

The initial velocity of the ball is = 20 m/s

The final velocity of the ball is = 80 m/s

The acceleration due to gravity is = 10 m/s^2

So, the height of the tower can be obtained from the expression:

$v^2 = u^2 + 2gh$

Substitute the values in above expression:

$80^2 = 20^2 + (2 \times 10 \times h)$

$h = \frac{6400-400}{20}$m

$h = \frac{6000}{20} \Rightarrow 300$ m

10.

(b) 2100$\frac{m}{sec^2}$ upwards

Explanation:

The velocity at time the ball strikes the floor,

u = $\sqrt{2gh_1}$

= $\sqrt{2 \times 9.8 \times 2.5}$

= 7 m/s

Hence, change in velocity:

Δv = 7 - (-14)

= 21 m/s

Acceleration = $\frac{\Delta v}{\Delta t}$

= $\frac{21}{0.01}$

= 2100 m/s^2, upwards

11.

(d) 4 J K^{-1}

Explanation:

At constant volume, total energy utilized in increasing the temperature of gas is:

$(\Delta Q)_V = \mu C_V \Delta T$

80 = μC_V(120 - 100)

Now, $\mu C_V = \frac{80}{20}$ = 4 Joule/Kelvin

This is the heat capacity of 5 mole gas.

12.

(c) 2V

Explanation:

From Charle's law V $\propto$ T

$\therefore \frac{V_2}{V_1} = \frac{T_2}{T_1}$

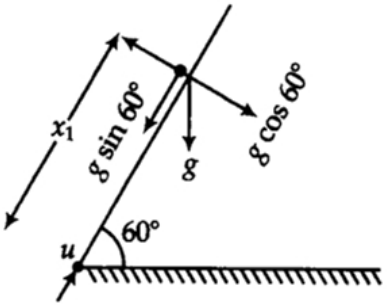
$\frac{V_2}{V} = \frac{327 + 273}{27 + 273} = \frac{600}{300}$ = 2

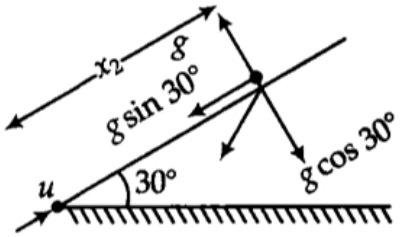
$\Rightarrow V_2$ = 2V

13. **(a)** 1 : $\sqrt{3}$

Explanation:

Let u be the initial velocity





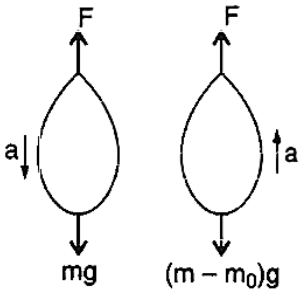
Moved distance, (x_1) = $\frac{u^2}{2g \sin 60^\circ}$

Moved distance, (x_2) = $\frac{u^2}{2g \sin 30^\circ}$

Now, $\frac{x_1}{x_2} = \frac{\sin 30^\circ}{\sin 60^\circ} = \frac{1 \times 2}{2 \times \sqrt{3}} = 1 : \sqrt{3}$

14. **(a)** $\frac{2ma}{g+a}$

Explanation:



Let F be the upthrust of the air. As the balloon is descending down with an acceleration a,

∴ mg - F = ma ...(i)

Let mass m_0 be removed from the balloon so that it starts moving up with an acceleration a . Then,

F - (m - m_0)g = (m - m_0)a

F - mg + m_0g = ma - m_0a ...(ii)

Adding eqn. (i) and (ii), we get

m_0g = 2ma - m_0a

m_0g + m_0a = 2ma

m_0(g + a) = 2ma

$m_0 = \frac{2ma}{a+g}$

15.

(b) reversible engine will be greater

Explanation:

We know that in a reversible process, the graph can be retraced in reverse direction on the same path as for forward direction. Therefore, a reversible engine has more efficiency than the irreversible engine operating between the same temperatures.

16.

(d) (T - 4)K

Explanation:

W = $\frac{-1}{\gamma - 1}$[$P_f V_f$ - $P_i V_i$]

or 6R = $\frac{-1}{\frac{5}{3} - 1}$ R[T_f - T_i]

or T_f - T_i = -4

or T_f = (T - 4)K

17.

(d) $\frac{2}{f}$ + 1

Explanation:

$C_V = \frac{n}{2}R$ [n is the degrees of freedom]

$C_P = C_V + R$

$C_p = \frac{n}{2}R + R = \left(1 + \frac{n}{2}\right) \cdot R$

$\delta = \frac{C_p}{c_V} = \frac{\left(1+\frac{n}{2}\right)\cdot R}{\frac{n}{2}\cdot R} = \frac{2+n}{n} = 1 + \frac{2}{n}$

Here in the question, degrees of freedom is represented as f.

$\delta = \frac{C_P}{C_V} = 1 + \frac{2}{f}$

18.

(c) only ii

Explanation:

Energy required = mgh

In both cases, h is the same. Hence, the energy given by both is the same.

[It is worth noting here that powers of two m en.will be different as power is the energy expenses per unit time and times are different here.]

19.

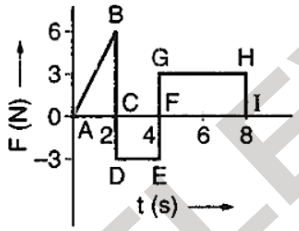
(d) only iii

Explanation:

"Man jumping on a cart" and "bullet imbedded in a block" are examples when two bodies have to move together after the collision, therefore both of them are inelastic collision. Whereas it is not the case for "collision of two glass balls".

20. **(a)** 12 Ns

Explanation:



Change in momentum = Area under F-t graph in that interval = Area of ΔABC - Area of rectangle CDEF + Area of rectangle FGHI

= $\frac{1}{2} \times 2 \times 6 - 3 \times 2 + 4 \times 3$ = 12 Ns

21.

(c) $E_1 < E_2$

Explanation:

Given: $P_1 = P_2$ or $m_1v_1 = m_2v_2$

$E_1 = \frac{1}{2}mv^2 = \frac{p^2}{2m}$ or $E \propto \frac{1}{m}$ (∵ $P_1 = P_2 = p$)

$\frac{E_1}{E_2} = \frac{m_2}{m_1}$

As $m_1 = m_2$, hence $E_1 < E_2$

22.

(d) $\frac{1+100\gamma t}{1+\gamma t}$

Explanation:

$d_f = d_1(1 + \gamma t)$, $\frac{d_2}{d_1} = \frac{d_2}{d_1} = \frac{d_1\left(1+\gamma_2\Delta t\right)}{d_1\left(1+\gamma_1\Delta t\right)}$

23.

(d) $2\alpha\Delta t$

Explanation:

Moment of inertia of a rod,

$I = \frac{1}{12}ML^2$ ...(i)

where M is the mass of the rod and L is the length of the rod

$\therefore \quad \Delta I = \frac{1}{12}2ML\Delta L$ ($\because$ M is a constant) ...(ii)

Divide eqn. (ii) by eqn. (i), we get

$\frac{\Delta I}{I} = 2\frac{\Delta L}{L}$ ...(iii)

As $\Delta L = L\alpha\Delta T$

or $\frac{\Delta L}{L} = \alpha\Delta T$

Substituting the value $\frac{\Delta L}{L}$ in eqn. (iii), we get,

$\frac{\Delta I}{I} = 2\alpha\Delta t$

24.

(c) 10g

Explanation:

Let h be the height through which the liquid rises in the capillary tube of radius r.

$\therefore h = \frac{2S\cos\theta}{r\rho g}$

Mass of the water in the first tube is,

$m = \pi r^2 h\rho = \pi r^2 \times \left(\frac{2S\cos\theta}{r\rho g}\right) \times \rho$

$= \frac{\pi r 2S\cos\theta}{g}$

or $m \propto r$

$\therefore \frac{m'}{m} = \frac{r'}{r} = \frac{2r}{r} = 2$

or $m' = 2m = 2 \times 5g = 10g$

25. **(a)** Hole number 3

Explanation:

It is noted that horizontal range is maximum when $h = \frac{H}{2} = \frac{90}{2}$ = 45 cm, which is as per the figure is hole 3.

26.

(b) 8 times

Explanation:

8 times

27.

(c) 32 N

Explanation:

Weight of body at height R, will be:

Here, W = $\frac{GMm}{R^2}$

and W' = $\frac{GMm}{(R+h)^2}$

W' = $w\left(\frac{R}{(R+h)}\right)^2$

= $w\left(\frac{R}{(R+\frac{R}{2})}\right)^2$

= $W\left(\frac{2}{3}\right)^2$

= $\left(\frac{4}{9}\right)$ W

= $\frac{4}{9} \times 72 = 32$ N

28.

(d) $6\sqrt{2}$

Explanation:

As $T^2 \propto R^3$

Hence, $\frac{T_2^2}{T_1^2} = \frac{R_2^3}{R_1^3}$ or $\frac{T_2^2}{(24\text{hrs})^2} = \left(\frac{3R}{6R}\right)^3$

[Here T_1 = 24 hrs, as satellite is geostationary, hence its time period is equal to the time period of the earth (= 24 hrs)]

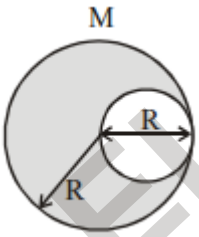
[Further, R_2 = R + 2R = 3R and R_1 = R + 5R = 6R]

$\therefore \quad T_2 = 24 \times \left(\frac{1}{2}\right)^{3/2} = \frac{12}{\sqrt{2}} = 6\sqrt{2}$

29.

(d) 13 $MR^2/32$

Explanation:



Total disc mass =MR^2

As mass is proportional to area, mass of disc removed= M/4

Now, about the same perpendicular axis:

$I_{Removed} = \frac{M}{4}\frac{R^2}{4} \times \frac{1}{2} + \frac{M}{4} \times \frac{R^2}{4} = \frac{3MR^2}{32}$

$\Rightarrow I_{Remaining\ Disc} = I_{Total} - I_{Removed} = \frac{MR^2}{2} - \frac{3MR^2}{32} = \frac{13MR^2}{32}$

30.

(c) $\frac{11}{5}Mr^2$

Explanation:

$\frac{11}{5}Mr^2$

31.

(b) 0.6 m

Explanation:

According to law of conservation of energy

Translational K.E. + Rotational K.E. = Potential energy stored in compressed spring

$\frac{1}{2}mv^2 + \frac{1}{2}m\omega^2 = \frac{1}{2}Kx^2$

or $\frac{1}{2}mv^2 + \frac{1}{2} \times \frac{1}{2}mR^2 \times \frac{v^2}{R^2} = \frac{1}{2}Kx^2$

or $\frac{1}{2}mv^2 + \frac{1}{4}mv^2 = \frac{1}{2}Kx^2$

or $\frac{3}{4}mv^2 = \frac{1}{2}Kx^2$

or $\frac{3}{4} \times 3 \times (4)^2 = \frac{1}{2} \times 200 \times x^2$

$\therefore \quad x^2 = \frac{3 \times 3 \times 4}{100} = \frac{36}{100}$

or $x = \frac{6}{10}$ = 0.6 m

32.

(d) 250 m/s

Explanation:

It is noted that potential energy stored in rubber cord catapult will be converted to kinetic energy

$\frac{1}{2}mv^2 = \frac{1}{2} \times \frac{\gamma Al^2}{L}$

Now, $v = \sqrt{\frac{YAl^2}{mL}}$

$= \sqrt{\frac{5 \times 10^8 \times 25 \times 10^{-6} \times \left(5 \times 10^{-2}\right)^2}{5 \times 10^{-3} \times 10 \times 10^{-2}}}$

On solving, we get have velocity of projected missile as 250 m/s.

33.

(d) 13 dB

Explanation:

As P $\propto$ I,

$\therefore$ SL_2 - SL_1 = 10 log $\left(\frac{I_2}{I_1}\right)$ = 10 log $\left(\frac{P_2}{P_1}\right)$

= 10 log $\left(\frac{400}{20}\right)$ = 10 log 20 $\cong$ 13 dB

34.

(b) (175π) m/s

Explanation:

From the given equation, $\omega = 7\pi$

k = 0.04

velocity of wave is given as , v = $\frac{\mathrm{w}}{\mathrm{k}} = \frac{7\pi \times 100}{4}$

$v = 175\pi \; m/sec$

35.

(c) 1

Explanation:

Beat frequency for 400 Hz and 401 Hz = 1. Beat frequency for 401 Hz and 402 Hz = 1. Here the beats produced by 400 Hz and 402 Hz will overlap that produced by the other. Hence, beat frequency = 1

36.

(b) $\frac{1}{4}$

Explanation:

$\frac{1}{4}$

37.

(b) $1 : 10^2$

Explanation:

Given that, ω_1 =100 rad s^{-1} and ω_1 = 1000 rad s^{-1}

$A_1 = A_2 = A$

$\therefore \frac{(a_1)_{max}}{(a_2)_{max}} = \frac{\omega_1^2 A_1}{\omega_2^2 A_2} = \frac{\omega_1^2}{\omega_2^2} = \frac{(100)^2}{(1000)^2} = 1 : 10^2$

38.

(c) $P_2 < P_1$

Explanation:

According to Ideal gas equation

PV = nRT or $V = \frac{nRT}{P}$

For an isobaric process.

P = constant and $V \propto T$

Therefore, V-T graph is a straight line passing through origin.

Slope of this line is inversely proportional to P.

In the given figure

$(slope)_2 > (slope)_1$

$\therefore P_2 < P_1$

39.

(b) $\frac{400}{\sqrt{3}}$

Explanation:

As $v_{rms} = \sqrt{\frac{3K_BT}{m}}$

$\therefore \frac{v_{27}}{v_{127}} = \sqrt{\frac{27+273}{127+273}} = \sqrt{\frac{300}{400}} = \frac{\sqrt{3}}{2}$

$\therefore v_{127} = \frac{2}{\sqrt{3}} \times v_{27} = \frac{2}{\sqrt{3}} \times 200 ms^{-1} = \frac{400}{\sqrt{3}} ms^{-1}$

40.

(b) $\frac{10}{3} m$

Explanation:

Distance travelled in the 3rd second = Distance travelled in 3 s - distance travelled in 2 s

As u = 0

$S_{(3^{rd}s)} = \frac{1}{2}a \cdot 3^2 - \frac{1}{2}a \cdot 2^2 = \frac{1}{2} \cdot a \cdot 5$

As $a = \frac{4}{3} ms^{-2}$

Hence, $S_{(3^{rd}s)} = \frac{1}{2} \times \frac{4}{3} \times 5 = \frac{10}{3} m$

41.

(d) $\frac{3}{\sqrt{26}}$

Explanation:

The projection of vector A on B is given as

$\frac{1}{\overrightarrow{|A|}}(\overrightarrow{A}.\overrightarrow{B}) = \frac{1}{|-i+3j+4k|} \times (2i+3j-k).(-i+3j+4k)$

$= \frac{-2+9-4}{\sqrt{1+9+16}} = \frac{3}{\sqrt{26}}$

42.

(d) $\vec{A} \cdot \vec{B}$ = 0

Explanation:

$\vec{A}.\vec{B} = A\ B\ \cos\ \theta$

$here\ \theta = 90^0$

$so\ \vec{A}.\vec{B} = 0$

43.

(b) 0.5 m/s and -0.3 m/s

Explanation:

From the question, as both bodies are similar and collision is elastic, so velocities will be interchanged after the collision, hence

V_A = -0.3 m/s

V_B = 0.5 m/s

44.

(b) 8.1 kW

Explanation:

Mass of water falling/second = 15 kg, h = 60 m

g = 10 m /s^2, loss = 10%, i. e., 90% is used

Pow er generated = 15 $\times$ 10 $\times$ 60 $\times$ 0.9 = 8100 W = 8.1 kW

45.

(d) momentum

Explanation:

momentum

CHEMISTRY

46. **(a)** 40, 30

Explanation:

Let 'a' and 'b' be the atomic masses of X and Y respectively.

Now, Mass = Molar mass $\times$ mole

For XY_2 : 10 = (a + 26) $\times$ 0.1

For X_3Y_2 : 9 = (3a + 2b) $\times$ 0.05

or a + 2b = 100

3a + 2b = 180

Thus, a = 40 and b = 30

47.

(c) 5 L

Explanation:

$C_3H_8 + 5O_2 \longrightarrow 3CO_2 + 4H_2O$

1 mole or 22.4 L C_3H_8 at STP requires 5 mole or 5×22.4 LO_2 at STP.

48.

(d) 4

Explanation:

Molecular weight of haemoglobin = 67200 g

Weight of iron in one molecule of haemoglobin

$= \frac{0.33}{100} \times 67200 = 221.76$ g

Now, atomic weight of iron = 56 g mol^{-1}

Number of iron in one molecule of haemoglobin

$= \frac{221.76}{56} = 3.96 \approx 4$

49. **(a)** 200 amu

Explanation:

Average atomic mass $= \frac{(90\times200)+(8\times199)+(2\times202)}{100}$

= 199.96 ≈ 200 amu

50.

(d) 4×10^{-18}

Explanation:

$v = \frac{c}{\lambda}, \therefore \lambda = \frac{3\times10^8}{8\times10^{15}} = 4 \times 10^{-8}$

51.

(d) ns → (n - 2)f → (n - 1)d → np

Explanation:

For n=6n = 6n=6, the electron filling follows the order based on increasing energy levels, as described by the Aufbau principle. Let's break down the options:

- **For n=6n = 6n=6:**
  - The 6s6s6s orbital will be filled first.
  - After that, the 4f4f4f orbital (since n−2=4n-2 = 4n−2=4) is filled.
  - Next, the 5d5d5d orbital (since n−1=5n-1 = 5n−1=5) is filled.
  - Finally, the 6p6p6p orbital is filled.

So, the correct sequence is:

6s→4f→5d→6p6s → 4f → 5d → 6p6s→4f→5d→6p

52. **(a)** 14

Explanation:

No. of electrons in a sub-shell is (4l + 2).

53. **(a)** $\frac{h}{\sqrt{2}\pi}$

Explanation:

Orbital angular momentum = $\sqrt{l(l+1)} \times \frac{h}{2\pi}$

For p - electron (l = 1) = $\sqrt{1(1+1)} \times \frac{h}{2\pi} = \sqrt{2} \times \frac{h}{2\pi} = \frac{h}{\sqrt{2}\pi}$

54. **(a)** Li < B < Be < C < O < N < F < Ne

Explanation:

'Be' and 'N' comparatively more stable valence subshell than 'B' and 'O'.

Hence, the correct order of first ionization enthalpy is:

Li < B < Be < C < O < N < F < Ne

55.

(b) $[Ne]3s^2\ 3p^5$

Explanation:

Elements Xe, Kr and Ar belong to the same group since each one of them has two electrons in the valence shell. In contrast, element Ne has seven electrons in the valence shell, and hence it lies in other groups.

56. **(a)** $1s^2, 2s^2, 2p^6, 3s^2$

Explanation:

Abnormally high difference between 2nd and 3rd ionisation energy means that the element has two valence electrons.

57. **(a)** O < S < F < Cl

Explanation:

Electron gain enthalpy of halogens are greater than the chalcogens. So, oxygen and sulphur have lower electron gain enthalpy than fluorine and chlorine. Also, oxygen and fluorine due to their small size has lower electron gain enthalpy than their next homologue. Thus, the correct order is O<S<F<Cl.

58.

(c) O_2^-

Explanation:

Electronic configuration of CO, CN^- and NO^+ (14 electrons)

$= \sigma 1s^2 < \sigma^* 1s^2 < \sigma 2s^2 < \sigma^* 2s^2 < \pi 2p_x^2 = \pi 2p_y^2 < \sigma 2p_z^2$

As no unpaired electrons. Thus, they are diamagnetic in nature.

Electronic configuration of O_2^- (17 electrons)

$= \sigma 1s^2 < \sigma^* 1s^2 < \sigma 2s^2 < \sigma^* 2s^2 < \sigma 2p_z^2 < \pi 2p_x^2 = \pi 2p_y^2 < \pi^* 2p_x^2 = \pi^* 2p_y^1$

It contains 1 unpaired electron thus, it is paramagnetic in nature.

59. **(a)** $N_2^{2-} < N_2^- < N_2$

Explanation:

According to MOT, the molecular orbital electronic configuration of

$N_2 : (\sigma 1s)^2 (\sigma^* 1s)^2 (\sigma 2s)^2 (\sigma^* 2s)^2 (\pi 2p_x)^2\ (\pi 2p_y)^2 (\sigma 2p_z)^2$

$\therefore$ B.O. $= \frac{10-4}{2} = 3$

$N_2^- : (\sigma 1s)^2 (\sigma^* 1s)^2 (\sigma 2s)^2 (\sigma^* 2s)^2 (\pi 2p_x)^2 (\pi^* p_y)^2\ (\sigma 2p_z)^2 (\pi^* 2p_x)^1$

$\therefore$ B.O. $= \frac{10-5}{2} = 2.5$

$N_2^{2-} : (\sigma 1s)^2 (\sigma^* 1s)^2 (\sigma 2s)^2 (\sigma^* 2s)^2 (\pi 2p_x)^2 (\pi 2p_y)^2\ (\sigma 2p_z)^2 (\pi^* 2p_x)^1 (\pi^* 2p_y)^1$

$\therefore$ B.O. $= \frac{10-6}{2} = 2$

Hence, the order: $N_2^{2-} < N_2^- < N_2$.

60.

(b) BCl_3 has no lone pair but NCl_3 has a lone pair of electrons

Explanation:

Presence of a bond pair and lone pair affects the shape of the molecule. This is because lone pairs and bond pairs repel each other and ultimately change the shape of the molecule.

BCl_3 has 3 bond pairs and 0 lone pair.

NCl_3 has 3 bond pairs and 1 lone pair.

61.

(b) BF_3 and NO_2^-

Explanation:

The hybridisation of the central atom can be calculated as

$H = \frac{1}{2}$[(No. of valence electrons in valence shell of atom) + (No. of monovalent atoms around central atom) - (Charge on cation) + (Charge on anion)]

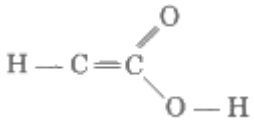
$\therefore$ BF_3, $H = \frac{1}{2}[(3) + (3) - (0) + (0)]$

= 3 $\Rightarrow$ sp^2 hybridisation

For NO_2^-, $H = \frac{1}{2}[(5) + (0) - (0) + (1)]$

= 3 $\Rightarrow$ sp^2 hybridisation

62.

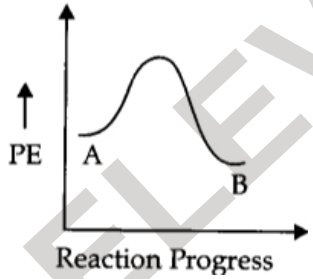
(c) 

Explanation:

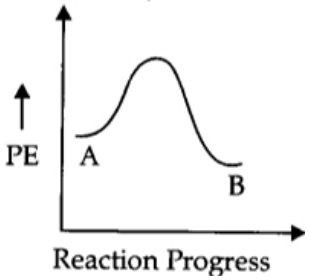
$H - C = \overset{O}{\overset{\|}{C^*}} - O - H$

The asterick (*) marked carbon has a valency of 5 and hence this formula is not correct because carbon has a maximum valency of 4.

63.

(b) 

Explanation:



From $\Delta H_{rxn} = (E_a)_f - (E_a)_b$

$-4.2 = 9.6 - (E_a)_b$

$(Ea)_b = 9.6 + 4.2 = 13.8$ kJ/mol.

Here $(Ea)_b$ is highly positive and the reaction is exothermic in nature.

64.

(b) -93 kJ mol^{-1}

Explanation:

$\frac{1}{2}H_2 + \frac{1}{2}Cl_2 \rightarrow HCl$ ΔH_f = ?

$\Delta H_{reaction} = \left[\frac{1}{2}(\text{ B.E. })_{H_2} + \frac{1}{2}(\text{ B.E. })_{Cl_2}\right] - (\text{ B.E. })_{HCl}$

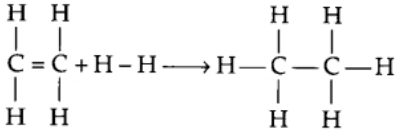
= [217 + 121] - 431

= 338 - 431 = -93 kJ mol^{-1}

65.

(b) -120.0 kJ mol^{-1}

Explanation:



$\Delta H_{reaction}$ = Σ(Bond enthalpy)$_{reactants}$ - Σ(Bond enthalpy)$_{Product}$

= [(B.E)$_{C=C}$ + 4(B.E)$_{C-H}$ + (B.E.)$_{H-H}$] - [(B.E)$_{C-C}$ + 6(B.E)$_{H-H}$]

= [606.10 + 4(410.50) + 431.37] - [336;49 + 6(410.50)]

= 2679.47 - 2799.49

= -120.02 kJ mol^{-1}

66. **(a)** C(graphite) + $\frac{1}{2}O_2$(g) $\rightarrow$ CO(g)

Explanation:

C(s) + $\frac{1}{2}O_2$(g) $\rightarrow$ CO(g); $\Delta n = +\frac{1}{2}$; Also the moles of gases increase and therefore entropy change (ΔS) is positive. An increase in temperature will cause more change in T ΔS. Also, it is a combustion reaction and thus ΔH = - ve

Since ΔG = ΔH - TΔS

= -ve -(+ ve) = -ve

67.

(c) 100 mL of 0.1 M HCl + 200 mL of 0.1 M NH_4OH

Explanation:

100 mL of 0.1 M HCl + 200 mL of 0.1 M NH_4OH

68.

(d) Water

Explanation:

The solubility of AgCl is maximum in water. In presence of a common ion, the solubility decreases.

69.

(d) 1×10^{-12}

Explanation:

$\because$ For water $[H^+] = [OH^-]$

$K_W = [H_3O^+]\,[OH^-] = 1 \times 10^{-6} \times 1 \times 10^{-6} = 1 \times 10^{-12}$

70.

(c) 13

Explanation:

$[OH^-] = 2 \times 0.05 = 0.1$

$\therefore$ pOH = 1 and pH = 13

71.

(d) 12.65

Explanation:

meq. of HCl = $0.01 \times V$

meq. of NaOH = $0.1 \times V$

$\therefore$ meq. of NaOH left = 0.1 V - 0.01 V

$\therefore$ [NaOH] left = $\frac{0.09V}{2V}$ = 0.045 M

$\therefore$ pOH = -log $[OH^-]$ = - log [0.045] = 1.35

$\therefore$ pH = 12.65

72. **(a)** $A_3(BC_4)_2$

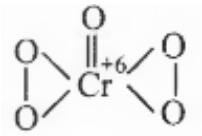
Explanation:

The sum of oxidation number is zero.

73.

(c) +6

Explanation:



Let oxidation state of Cr be a

$a + (-2) + 4 \times (-1) = 0$

$\therefore$ a = +6

74.

(c) $FeSO_4$

Explanation:

$Mn^{+7} + 5e \rightarrow Mn^{2+}$

$FeSO_4 : Fe^{2+} \rightarrow Fe^{3+} + e$

$Fe(NO_2)_2 : Fe^{2+} \rightarrow Fe^{3+} + e$

$(N^{3+})_2 \rightarrow 2N^{5+} + 4e$

$Fe(C_2O_4)_2 : Fe^{2+} \rightarrow Fe^{3+} + e$

$(C^{3+})_2 \rightarrow 2C^{4+} + 2e$

$FeSO_3 : Fe^{2+} \rightarrow Fe^{3+} + e$

$S^{4+} \rightarrow S^{6+} + 2e$

75.

(b) SO_2

Explanation:

SO_2 acts as a reducing agent whereas $KMnO_4$ acts as an oxidizing so it can oxidize SO_2 readily.

$KMnO_4 + SO_2 \rightarrow Mn^{2+} + SO_3$

P_2O_5 and NO_2 are strong oxidizing agents. In CO_2, the oxidation number of carbon is +4 (maximum) and cannot be oxidized further.

76.

(b) +2, +4

Explanation:

When ns^2 electrons of the outermost shell do not participate in bonding then these ns^2 electrons are called inert pairs and the effect is called inert pair effect. Due to this inert pair effect, Ge, Sn, and Pb of group IV have a tendency to form both +4 and +2 ions. Now the inert pair effect increases down the group, hence the stability of M^{2+} ions increases and M^{4+} ions decrease down the group. For this reason, Pb^{2+} is more stable than Pb^{4+} and Sn^{4+} are more stable than Sn^{2+}.

77.

(b) BCl_3

Explanation:

In BCl_3 the central atom 'B' is sp^2 hybridized and contains only 'six' electrons in its valence shell. Therefore, it is electron deficient.

78.

(d) $\left(SiO_3^{2-}\right)_n$

Explanation:

Chain silicates are formed by sharing two oxygen atoms by each tetrahedron. Anions of chain silicate have two general formula:

(i) $(SiO_3)_n^{2n-}$, (ii) $(Si_4O_{11})_n^{6n-}$

79. **(a)** Al < Ga < In < Tl

Explanation:

In group 13 elements, the stability of +3 oxidation state decreases down the group while that of +1 oxidation state increases due to the inert pair effect. Hence, stability of +1 oxidation state increases in the sequence: Al < Ga < In < Tl.

80.

(b) $NaNH_2$

Explanation:

$NaNH_2$ is used to distinguish between 1-butyne and 2-butyne.

$\underset{1-\text{butyne}}{CH_3CH_2C \equiv CH} \xrightarrow{NaNH_2} CH_3CH_2C{\equiv}CNa + \frac{1}{2}H_2 \uparrow$

$\underset{2-\text{butyne}}{CH_3 - C{\equiv}C\text{-}CH_3} \xrightarrow{NaNH_2}$ No reaction

81. **(a)** Nitrobenzene

Explanation:

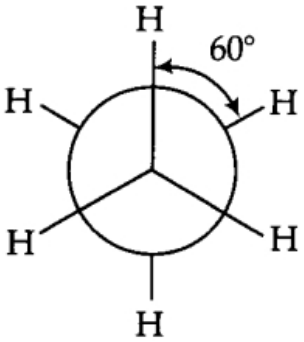
Nitro group being electron withdrawing, deactivates the benzene nucleus due to which electrophile cannot attack on benzene ring easily and it becomes incapable to give Friedal-Craft's reaction easily.

82.

(d) 60^o

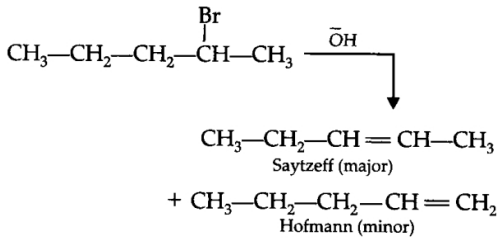
Explanation:

Staggered form is produced when rearrangement of -H groups rotated by an angle of 60^o over front arrangement of -H groups and minimize repulsion.



83. **(a)** Saytzeff's Rule

Explanation:

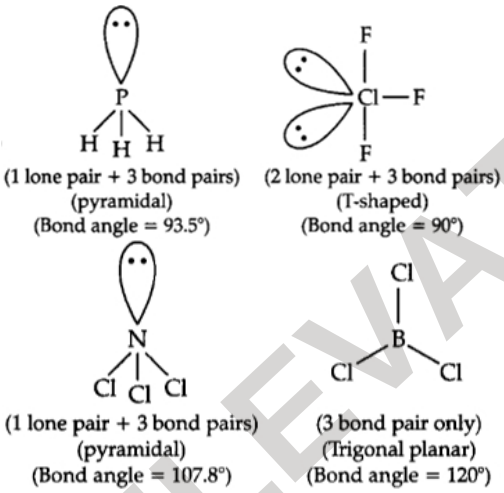


Saytzeff product is that product which contains highly substituted alkene while in Hofmann product less substituted alkene is formed during dehydrohalogenation of 2-bromopentane.

84.

(b) BCl_3

Explanation:



85.

(d) H_3PO_3, HCl

Explanation:

$PCl_3 + 3H_2O \rightarrow H_3PO_3 + 3HCl$

86.

(c) PH_3

Explanation:

$PH_4I + NaOH \rightarrow NaI + PH_3 + H_2O$

87.

(b) $sp > sp^2 > sp^3$

Explanation:

The correct order regarding the electro negativity of hybrid Orbitals of carbon is $sp > sp^2 > sp^3$ which is due to the increase in s character.

As, the s-character increases electron attracting tendency, i.e., electronegativity increases.

sp $\Rightarrow$ 50 to s-character

sp^2 $\Rightarrow$ 33.3 to s-character

sp^3 $\Rightarrow$ 25 to s-character

88.

(c) (i) > (ii) > (iii) > (iv)

Explanation:

The carbonion which have more s-character will be more stable. Thus, the order of stability is:

$$RC \equiv \overset{\delta-}{C} > C_6\overset{\delta-}{H}_5 > R_2C == \overset{\delta-}{C}H > R_3C - \overset{\delta-}{C}H_2$$

89.

(c) Dimethyl ether

Explanation:

Dimethyl ether does not show nucleophilic attack due to absence of multiple bond. Rest in all other compounds given in option have multiple bonded C-atom and bears partial positive charges therefore they undergo nucleophilic attack by ^-OH ions.

90. **(a)** Option B is correct

Explanation:

CH_2=C=CH_2, the middle carbon is attached with two π-bonds, so it has sp-hybridisation.

$\underset{\searrow}{CH_2} = \underset{\downarrow}{C} = \underset{\searrow}{CH_2}$ (they are called as allenes)

$\quad\ sp^2 \quad\ sp \quad\ sp^2$

BOTANY

91. **(a)** Endodermis

Explanation:

The innermost layer of the cortex is the endodermis. It is structurally and physiologically different from the cells on either side of it. The radial and transverse walls of the endodermal cells contain a band of lignin and suberin known as Casparian strip.

92. **(a)** Dumb - bell shaped

Explanation:

In grasses, the guard cells are Dumb-bell shaped. The guard cells are living and contain chloroplasts.

93. **(a)** Thick walls, no intercellular spaces and large number of chloroplasts

Explanation:

Thick walls, no intercellular spaces and large number of chloroplast. Chloroplast of bundle sheath cells lack grana.

94.

(b) Protoxylem

Explanation:

Protoxylem

95.

(d) Both processes can happen together because the diffusion coefficient of water and

CO_2 is different

Explanation:

Both processes can happen together because the diffusion coefficient of water and CO_2 is different. During photosynthesis carbon dioxide diffuses from the atmosphere to the leaves and during transpiration loss of water takes place from aerial parts of the plant to the atmosphere.

96.

(b) Chloroplast-Mitochondria-Peroxisome

Explanation:

Photorespiration required three cell organelles in sequence of chloroplast, peroxisome and mitochondria. Option (Chloroplast-Mitochondria-Peroxisome) may be correct if be read as said sequence.

97.

(b) Less than 50%

Explanation:

If the total incident solar radiation, the proportion of PAR (photosynthetically active radiation) accounts to less than 50%. Photosynthetically active radiation designates the spectral range of solar radiation from 400 to 700 nanometers, that photosynthetic organisms are able to use in the process of photosynthesis.

98.

(c) Lumen thylakoids

Explanation:

According to chemiosmotic hypothesis, ATP synthesis is linked to the development of a proton gradient across the membrane of the thylakoid. The splitting of the water molecule takes place on the inner side of the membrane and so the hydrogen ions (protons) that are produced, they accumulate within the lumen of the thylakoids. So, the highest number of protons are found in lumen of thylakoids in chloroplast.

99.

(d) Chromoprotein

Explanation:

Proteins having pigmented prosthetic groups are referred to as chromoproteins. Phytochrome is a chromoprotein, e.g., phytochrome A and phytochrome B that regulate flowering in plants by under different light conditions by absorption of red or far-red light by their pigment.

100. **(a)** PS-II to $Cytb_6f$ complex

Explanation:

In light reaction, PQ facilitates the transfer of electrons from PS-II to $Cytb_6$ complex, which then reduces plastocyanin.

101.

(b) Abscisic acid

Explanation:

Abscisic acid prepares plants to cope with stress conditions like drought, etc. by inducing stomatal closure and other reactions. Hence it is named stress hormone

102.

(c) 2, 4-D

Explanation:

The term Auxins is derived from the Greek language. It means 'to grow', and it was from human urine. Auxins can be natural and synthetic. Indole-3-acetic acid (IAA) and Indole butyric acid are examples of natural auxins. Naphthalene acetic and 2, 4-Dichlorophenoxyacetic (2, 4-D) are synthetic auxins. The auxin 2, 4-D is used as weedicide in agriculture to destroy weeds in the field. It can destroy the weeds of dicotyledonous plants in cereal crops.

103. **(a)** ureides

Explanation:

In Glycine max (Soyabean) the product of biological nitrogen fixation is transported with the help of xylem vessels, from the root nodules to other parts in the form of ureides. It is investigated that, in Soyabean nodules the major part of fixed ammonia in symbiotic state of rhizobia is rapidly excreted to the cytosol of infected cells in nodules and then with the help of glutamine synthetase pathway, the ammonia is assimilated into amino acids. The fixed nitrogen is then assimilated into ureides and followed by transportation to other parts.

104.

(b) Auxins

Explanation:

Auxins prevent fruit and leaf drop at early stages.

105.

(d) Gibberellic acid

Explanation:

Gibberellic acid breaks seed dormancy by activating enzyme α-amylase. While abscisic acid and phenolic acid induce seed dormancy.

106.

(c) gas vacuoles

Explanation:

Gas vacuoles are inclusion bodies of blue-green, purple and green photosynthetic bacteria.

107.

(b) Having two types of nuclei

Explanation:

Ciliates such as Paramoecium differs from other protozoans in having two types of nuclei i.e., macronucleus and micronucleus.

108.

(b) Protista

Explanation:

Chlamydomonas and Chlorella are unicellular algae (eukaryotic organisms). Being unicellular and eukaryotic, they are placed in the kingdom Protista.

109. **(a)** 0.1 μm

Explanation:

The size of Pleuropneumonia - like Organism (PPLO) is 0.1 μm.

110.

(b) Archaebacteria

Explanation:

Archaebacteria are special since they live in some of the harshest habitats such as extreme salty areas (halophiles), hot springs (thermoacidophiles), and marshy areas (methanogens). Archaebacteria differ from other bacteria in having a different cell wall structure and this feature is responsible for their survival in extreme conditions. In the subdivision Euryarchaeota, uncultivated organisms in deep-sea marine sediments are responsible for the removal of methane a potent greenhouse gas, via anaerobic oxidation of methane stored in these sediments.

111.

(d) Streptococcus

Explanation:

Streptococcus is a bacterium which is included under kingdom monera. Monerans have prokaryotic cell organisation in which membrane bound organelles like mitochondria, E.R., Golgi bodies, etc. are absent. All the other three i.e., Saccharomyces (a fungus), Chlamydomonas (an algae) and Plasmodium (a protozoan protist) are eukaryotes containing true membrane bound organelles.

112.

(c) Statement (a) is correct.

Explanation:

Metaphase is the stage of mitosis where the highly coiled chromosome align in the middle of cell.

113.

(d) (B), (A), (C), (D)

Explanation:

∴ B, A, C, D

- Synapsis pairing of homologous chromosomes happens in the second stage nucleolus of meiosis I.
- Crossing between non-sister chromatids happens in the third stage pachytene of meiosis I.
- Terminalisation of chiasmata makes the beginning of the final stage of meiosis I.
- Disappearance of nucleolus happens by the end of final stage Diakinesis of meiosis I.

114. **(a)** M phase

Explanation:

Some dividing cells at the end of the mitotic phase exit the cell cycle and enter into a vegetative inactive stage also called a quiescent phase.

115.

(c) Telophase - Nuclear envelop reforms, Golgi complex reforms

Explanation:
Telophase is the fifth and final phase of mitosis. The process that separates the replicated genetic material carried in the nucleus of a parent cell into two identical daughter cells.
Telophase begins once the replicated, paired chromosomes have been separated and pulled to opposite sides, or poles, of the cell. By the end of telophase, the spindle breaks down and the nuclear envelope and golgi complex is reformed.

116. **(c)** Pachytene
Explanation:
Pachytene stage i.e., the third stage of prophase is characterized by the full formation of the synaptonemal complex which allows the exchange of genetic material between two homologous chromosomes by a process known as crossing over. This also helps in the generation of recombinants.

117. **(b)** Synapsis
Explanation:
Synapsis (also called syndesis), as it's a pairing of the homologous chromosomes. It occurs during the zygotene stage of prophase I of meiosis. The homologous chromosomes come dozen leading to cross over in the react stage called (pachytene). These features are hereby not observed during mitosis.

118. **(b)** These are composed of ribonucleic acid and proteins
Explanation:
Ribosomes are naked ribonucleoprotein protoplasmic particles (RNP, particles) which function as the sites of protein synthesis.

119. **(c)** Lysosomes and Vacuoles
Explanation:
Lysosomes and Vacuoles do not have DNA.

120. **(c)** Mesosome
Explanation:
Mesosomes are of two types.- septal and lateral. Septal mesodone connects nucleoid with plasma membrane. It takes part in the replication of nucleoid.
Lateral mesosome is not connected with nucleoid. It contain respiratory enzymes and is often called chondrioid.

121. **(a)** (A) - (iii), (B) - (iv), (C) - (i), (D) - (ii)
Explanation:
Cristae are inner foldings found in the inner mitochondrial membrane. Thylakoids are flat disk-like membranous sac-like structures in the stroma of plastids. The centromere is the constriction in the chromosome which holds two arms of chromatids together. Cisternae

are disc-shaped sacs in the Golgi complex. They contain secretion like enzymes or hormones to be transported to another part of the cell.

122. **(c)** Endoplasmic reticulum
Explanation:
Rough endoplasmic reticulum are actively involved in the protein synthesis and secretion.

123. **(a)** Ribosomes
Explanation:
Ribosomes act as sites of polypeptide synthesis from mRNA.

124. **(d)** magnesium
Explanation:
Pyruvic acid is converted into acetyl CoA with the help of pyruvate dehydrogenase complex. Pyruvate dehydrogenase requires magnesium, CoA, NAD^+, TPP and lipoic acid.

125. **(c)** Amphibolic
Explanation:
Because the respiratory pathway is involved in both anabolism and catabolism, it would hence be better to consider the respiratory pathway as an amphibolic pathway rather than as a catabolic one.

126. **(c)** The cycle starts with the condensation of acetyl group (Acetyl CoA) with pyruvic acid to yield citric acid
Explanation:
The cycle starts with the condensation of acetyl group (Acetyl CoA) with pyruvic acid to yield citric acid

127. **(b)** Enzymes of electron transport are embedded in outer membrane.
Explanation:
In mitochondria, enzymes of electron transport are embedded in the inner membrane.

128. **(d)** Volvox
Explanation:
Chlorella is single-celled green algae. Ulothrix and spirogyra are filamentous green algae. Volvox is a colonial green alga.

129. **(c)** Fucus
Explanation:
Fucus is a genus of brown alga. It belongs to class phaeophyceae. In fucus, the accumulation product of photosynthesis is D-mannitol (a sugar alchohol(=) and the reserve food material is laminarin.

130. **(a)** motile sperms.

Explanation:

Cycas is a gymnosperm and Adiantum is a pteridophyte. Both Cycas and Adiantum resemble each other in having multiciliate sperms. Cambium and seeds are absent in pteridophytes, while vesselsare absent in both two groups.

131.

(c) Marchantia

Explanation:

Archegoniophore is the stalk or other outgrowth of a prothallium upon which archegonia are borne. Archegoniaphore is found in Marchantia.

132. **(a)** it has obligate association with mycorrhizae

Explanation:

The fungus associated with roots of Pinus increased minerals and water absorption for the plant by increasing surface area. It also protects the seedling from soil-borne disease. Therefore, the mycorrhizal association is obligatory for Pinus seed germination.

133.

(c) One

Explanation:

Only one statement is correct(II).

- In Equisetum(pteridophyte) the female gametophyte is free-living however the female gametophytes in these plants are retained on the parent sporophytes for variable periods.
- In mosses after fertilization, the zygote develops into a sporophyte, consisting of a foot, seta and capsule. The sporophyte in mosses(Polytrichum) is more elaborate than that in liverworts(Riccia).
- Sexual reproduction in Volvox is oogamous.
- Spores in slime moulds possess true walls.

134.

(d) Mannitol is stored food in Rhodophyceae

Explanation:

In Phaeophyceae food is stored as complex carbohydrates, which may be in the form of laminarin or mannitol.

135.

(c) Statement c is wrong

Explanation:

Certain marine brown and red algae produce large amounts of hydrocolloids (water holding substances), e.g., algin(brown algae) and carrageen (red algae) are used commercially.

ZOOLOGY

136.

(b) One glycerol molecules and three fatty acid molecules

Explanation:

A typical fat molecule is a triglyceride formed by the esterification of one glycerol and three fatty acid molecules. A fat molecule consists of two parts: one glycerol backbone and three fatty acids tails. Glycerol is small organic molecules with three hydroxyl (OH) groups, while a fatty acid consists of a long hydrocarbon chain attached to a carboxyl group.

137.

(d) (ii) and (iv)

Explanation:

Starch synthesis during daytime is coordinated with sucrose synthesis in the cytosol. Starch is chemically non-reactive and osmotically inactive polysaccharides of much greater molecular weight.

138.

(b) Nitrogen-containing polysaccharide

Explanation:

Macromolecule chitin is a complex structural heteropolysaccharide containing amino sugars and chemically modified sugars. Polysaccharides are long carbohydrate molecules of monosaccharide units joined together by glycosidic bonds. They have a general formula $C_x(H_2O)_y$. Chitin is the main component of the cell wall of fungi, the exoskeletons of arthropods, insects, and radulae of molluscs, etc.

139.

(c) Inulin, insulin

Explanation:

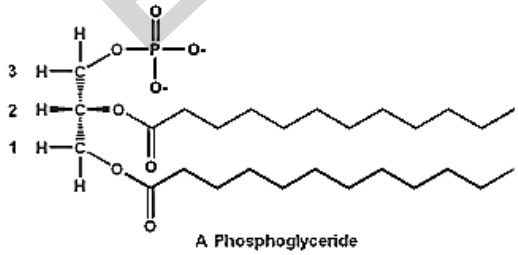
Inulin is a polysaccharide molecule having $\beta(2 \rightarrow 1)$ glycosidic bond. Insulin is a protein molecule having a peptide bond.

140.

(b) A saturated or unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached.

Explanation:

Phosphoglyceride is a glycerol-based phospholipid. The alcohol here is glycerol, to which two fatty acids (either saturated or unsaturated) are attached at the 1 and 2 positions and phosphoric acid is attached as esters.



A Phosphoglyceride

141. **(a)** Addition of lot of succinate does not reverse the inhibition of succinic dehydrogenase by malonate.

Explanation:

The substrate binds with the enzyme at its active site. A competitive inhibitor binds to the enzyme at the active sites. Inhibition of succinic dehydrogenase by malonate is an example of competitive inhibition. Succinate and malonate both bind to the same active

sites of the enzyme succinic dehydrogenase. Addition of a lot of succinate reverse inhibition of succinic dehydrogenase by malonate.

142. **(c)** Both fore and hind wings develop

Explanation:

The nymphs look very much like adults. The nymph grows by moulting about 13 times to reach the adult form. The next to last nymphal stage has wing pads but only adult cockroaches have wings.

143. **(b)** Tight junctions and Gap junctions, respectively.

Explanation:

In the epithelium and other tissues, three types of junctions are present. They are tight junctions, adhering junctions, and gap junctions. Tight junctions prevent the leakage of substances across a tissue. Gap junctions help in communication with each other by connecting the cytoplasm of adjoining cells. It helps in the rapid transfer of ions, small molecules, and other big molecules.

144. **(a)** Facilitate communication between adjoining cells by connecting the cytoplasm for rapid transfer of ions, small molecules and some large molecules

Explanation:

Gap junctions facilitate the cells to communicate with each other by connecting the cytoplasm of adjoining cells, for rapid transfer of ions, small molecules, and sometimes big molecules.

145. **(c)** Nucleated RBCs

Explanation:

The blood cells in frog are RBC (red blood cells) or erythrocytes, WBC (white blood cells) or leucocytes and platelets. RBC's are nucleated and contain red coloured pigment namely haemoglobin.

146. **(c)** Males bear a pair of short thread like anal styles.

Explanation:

In cockroaches, the males bear a pair of short, thread-like anal styles which are absent in females.

147. **(a)** (a), (b) and (c) are correct

Explanation:

In earthworms, prostomium serves as a covering for the mouth. It looks like a wedge and is used to open cracks in the soil into which it can crawl. It has receptors and can also act as a sensory structure.

148. **(c)** Limbic system: Consists of fibre tracts that interconnect different regions of brain: Controls movement.

Explanation:
In a brain, every part has a specific function. All the involuntary movements in the body are controlled by medulla oblongata.

149.
(d) Cerebellum - language comprehension
Explanation:
Cerebellum coordinates and controls rapid muscular activities such as running, typing, etc. Although it does not initiate such voluntary movements, but it is an important centre for coordinating movements and for controlling posture and balance.

150.
(b) Cerebellum
Explanation:
Cerebellum

151.
(b) Regulation of body temperature
Explanation:
Regulation of body temperature

152.
(d) Hypersecretion of the thyroid gland
Explanation:
Hypersecretion of the thyroid gland

153.
(b) High level of circulating HCG to stimulate estrogen and progesterone synthesis.
Explanation:
In pregnant females, high levels of HCG will maintain corpus luteum and stimulates it to secrete estrogen and progesterone.

154.
(b) Option (c)
Explanation:
Glucagon is secreted by alpha cells of the islets of Langerhans.

155. **(a)** Only A
Explanation:
The adrenal medulla secretes two hormones called adrenaline (noradrenaline) or epinephrine (norepinephrine). Adrenaline and noradrenaline are rapidly secreted in response to stress of any kind and during emergency situations and are called emergency hormones or hormones of Fight or Flight.

156.
(b) Deficiency of iodine in diet
Explanation:
Deficiency of iodine in diet

157. **(a)** (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)
Explanation:

- Floating ribs are the 11th and 12th ribs. They are not connected with the sternum.

- Acromion is the process present at the junction of the Clavicle and Scapula.
- The scapula is the bone present on the ventral side of the body located between the second and seventh ribs.
- The glenoid cavity of the scapula is a part of the shoulder. The head of the humerus articulates into the glenoid cavity.

158.

(c) Tetanus

Explanation:

Tetanus toxin can lead to muscle spasms, nursing loss, and seizures in neonates. Usually, this happens during the first two weeks of birth and may be associated with inadequate measures of hygiene of care for the neonate's umbilical cord stump.

159.

(c) (a), (c), (d), (e) only

Explanation:

During muscular contraction, the following events occur in the following sequence order. There are disappearing '**H**' zone, decrease in the width of the **I** band, myosin hydrolyzes ATP to release ADP and inorganic phosphate, and Z-lines are pulled inward attached to actin filaments.

160.

(b) Smaller animals have a higher metabolic rate

Explanation:

Basal metabolic rate is the minimum amount of energy needed to keep the body functioning. It is inversely proportional to the size of body, thus smaller animals have a higher metabolic rate.

161.

(c) High pO_2, low pCO_2, less H^+, lower temperature

Explanation:

When percentage saturation of haemoglobin with oxygen is plotted against the pO_2 a sigmoid curve is formed. The Sigmoid curve can also be called the oxygen dissociation curve. It is used in studying the effect of factors like pCO_2 H^+ concentration, etc. In the alveoli, high pO_2 low pCO_2 less H^+, and low temperature will favour the formation of oxyhaemoglobin.

162.

(c) A: Alveolar cavity - main site of exchange of respiratory gases

Explanation:

The correct labelled part with their function is A. The labelled parts A, B, C, and D in the given figure are alveolar cavity, red blood cell, blood capillary and basement membrane respectively.

163.

(d) C - Vena Cava - takes blood from body parts to right auricle, P_{CO_2} = 45 mm Hg

Explanation:

C - Vena Cava - takes blood from body parts to right auricle, P_{CO_2} = 45 mm Hg

164.

(b) Residual volume

Explanation:

Residual volume is the volume of air which remains in the lungs after the most forceful expiration. This residual air enables the lungs to continue exchange of gases even after maximum exhalation.

165.

(d) One can consciously breathe in and breathe out by moving the diaphragm alone, without moving the ribs at all

Explanation:

One can consciously breathe in and breathe out by moving the diaphragm alone, without moving the ribs at all.

166.

(d) More than that in the pulmonary vein

Explanation:

More than that in the pulmonary vein

167.

(c) Only (iv)

Explanation:

Only (iv)

168. **(a)** Defense mechanisms of body

Explanation:

Immunoglobulins help attack viruses and bacteria.

169.

(c) Have more RBCs and their haemoglobin has a lower binding affinity to oxygen

Explanation:

When a person moves up a hill, the partial pressure of oxygen and total atmospheric pressure decreases which stimulates the JG cells of kidney to secrete erythropoietin hormone. The increasing in the number of RBCs to compensate the supply of oxygen. At higher altitude the haemoglobin has lower binding affinity to oxygen because the primary factor responsible for binding is partial pressure of oxygen which decreases with altitude.

170.

(c) Whale

Explanation:

Whale is a mammal and in mammals, two separate circulatory pathways are found-systemic circulation and pulmonary circulation. Oxygenated and deoxygenated blood received by the left and right atria respectively passes on to the left and right ventricles. Thus, oxygenated and deoxygenated blood is not mixed. This is referred to as double circulation.

171.

(d) Option (c)

Explanation:

Aquatic amphibians release ammonia as nitrogenous wastes, frog and humans release urea as nitrogenous wastes whereas pigeons, lizards and cockroach release uric acid as nitrogenous wastes.

172.

(d) Silver fish

Explanation:

A silverfish (*Lepisma saccharina*) is a small, primitive, wingless insect and hence is a representative of phylum Arthropoda.

173.

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

Explanation:

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

174. **(a)** Annelida, Arthropoda and Chordata

Explanation:

True segmentation is present in Annelida, Arthropoda, and Chordata. They also have an organ-system level of organization, bilateral symmetry, and are true coelomates.

175. **(a)** (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

Explanation:

- **Asterias** - Basically, sea stars having radially symmetrical bodies and larva with bilateral symmetrical bodies.
- **Scorpion** - They have book lungs.
- **Ctenoplana** - This is part of a phylum of animals known as Ctenophora. They are known as see walnuts or comb jellies. They are bio-luminescence in nature.
- **Locusta** - Locusts differ from other grasshoppers in their ability to change from a solitary living form into gregarious, highly mobile, adult swarms. They are polyphagous and feed on leaves, shoots, flowers, fruit, seeds, stems, etc.

176.

(c) (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

Explanation:

(a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

177.

(b) (i) and (ii)

Explanation:

The increase in osmolarity from outer to inner medullary interstitium, i.e., from 300 m $OsmolL^{-1}$ in the cortex to about 1200 m $OsmolL^{-1}$ in the inner medulla is maintained due to close proximity between henle's loop and vasa recta as well as counter-current mechanism.

Other statements can be corrected as- PCT helps in selective secretion of H^+, ammonia and K^+ ions and absorption of HCO_3^- from the filtrate. Blood pressure in glomerular capillaries is responsible for glomerular filtration and not for counter current mechanism.

178.

(d) Podocytes: create minute spaces (slit pores) for the filtration of blood into the

Bowman's capsule

Explanation:

The epithelial cells of Bowman's capsule called podocytes are arranged in an intricate manner so as to leave some minute spaces called filtration slits or slit pores. Blood is filtered so finely through these membranes that almost all the constituents of the plasma except the proteins pass onto the lumen of the Bowman's capsule.

179.

(c) Maintaining hyperosmolarity towards inner medullary interstitium in the kidneys.

Explanation:

The proximity between the loop of Henle and vasa recta as well as the counter-current in them helps in maintaining an increasing osmolarity towards the inner medullary interstitium. This mechanism helps to maintain a concentration gradient in the medullary interstitium so human urine is nearly four times concentrated than the initial filtrate formed.

180. **(a)** Juxta glomerular cells to release rennin.

Explanation:

A fall in glomerular filtration rate (GFR) activates the juxtaglomerular of kidney cells to release renin, which activates the renin-angiotensin-aldosterone system (RAAS), is a signaling pathway responsible for regulating the body's blood pressure. As the blood pressure is regulated the GFR is also regulated.