

INDIAN ASSOCIATION OF PHYSICS TEACHERS

NATIONAL STANDARD EXAMINATION

IN JUNIOR SCIENCE 2011-2012

TOTAL TIME : 120 minutes

Marks : 240

ONLY ONE OUT OF FOUR OPTIONS IS CORRECT

N.B. : Physical constants are given at the end.

1. Let the electrostatic force between two electrons (F_e) be x times the gravitational force (F_g) between them.

Then, x is of the order of

- (a) 10^{40} (b) 10^{42}
(c) 10^{38} (d) 10^{37}

Ans. [b]

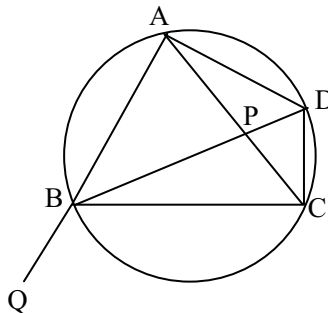
Sol. $F_e = \frac{Kq_e q_e}{r^2}$

$$F_g = \frac{GM_e M_e}{r^2}$$

$$\Rightarrow \frac{F_e}{F_g} = \frac{Kq_e^2}{GM_e^2}$$

$$= \frac{9 \times 10^9 \times 1.6 \times 10^{-19} \times 1.6 \times 10^{-19}}{6.67 \times 10^{-11} \times 9.1 \times 10^{-31} \times 9.1 \times 10^{-31}}$$
$$= 0.0417 \times 10^{44} = 4.1 \times 10^{42}$$

2. In the figure shown below, $m \angle ABD = 2x$, $m \angle ADB = 3x$, $m \angle APB = 4x$ and $m \angle CBQ = 7x$. Therefore, $m \angle BCD$ is



- (a) 90° (b) 85°
(c) 72° (d) 96°

Ans. [a]

3. An arrow shot vertically upwards loses its initial speed by 60% in 3 seconds. The maximum height reached by the arrow is ($g = 9.8 \text{ ms}^{-2}$)

(a) 122.5 m

(b) 44.1 m

(c) 100 m

(d) 45 m

Ans. [a]

Sol. Let initial speed = v

then after 3 sec, $\frac{40}{100} v$

$$\Rightarrow 0.4 v = v - 9.8 \times 3$$

$$\Rightarrow 0.4 v = v - 29.4$$

$$\Rightarrow 0.6 v = 29.4$$

$$\Rightarrow v = 49 \text{ m/s}$$

$$\text{For } H_{\max} \Rightarrow 0 = (49)^2 - 2 \times 9.8 \times H$$

$$\Rightarrow H = \frac{49 \times 49}{2 \times 9.8} = 122.5 \text{ m}$$

4. Bromine can be liberated from KBr solution by the action of

(a) iodine solution

(b) chlorine water

(c) NaCl

(d) KI

Ans. [b]

Sol. $\text{Br}_2 + \text{Cl}_2 \rightarrow 2\text{Cl} + \text{Br}_2$

5. A certain force applied to a body A gives it an acceleration of 10 ms^{-2} . The same force applied to body B gives it an acceleration of 15 ms^{-2} . If the two bodies are joined together and the same force is applied to the combination, the acceleration will be -

(a) 6 ms^{-2}

(b) 25 ms^{-2}

(c) 12.5 ms^{-2}

(d) 9 ms^{-2}

Ans. [a]

Sol. $F = m_A \times 10 \dots\dots (1)$

Also $F = m_B \times 15 \dots\dots (2)$

For $F = (m_A + m_B) a$

$$\Rightarrow F = \left(\frac{F}{10} + \frac{F}{15} \right) a$$

$$\Rightarrow 1 = \left(\frac{3+2}{30} \right) a$$

$$\Rightarrow a = 6 \text{ m/s}^2$$

6. Oxygen exhibits (-1) oxidation state in
- (a) OF₂ (b) H₂O
(c) H₂O₂ (d) HClO

Ans. [c]

Sol. H₂O₂

x

$$2 + 2x = 0 \Rightarrow x = -1$$

7. The process involved in healing of the wound is -
- (a) meiosis I and II (b) mitosis
(c) meiosis I (d) meiosis II

Ans. [b]

8. The family pedigree of Queen Victoria shows a number of haemophilic descendents as -
- (a) she herself was haemophilic
(b) haemophilia is autosomal recessive disorder
(c) haemophilia is sex linked recessive disorder and Queen Victoria was a carrier
(d) haemophilia is caused by contact and therefore it was seen in the royal family descendents

Ans. [c]

9. A ball is dropped from a height of 7.2 m. It bounces back to 3.2 m after striking the floor. The ball remains in contact with the floor for 20 ms. Given that $g = 10 \text{ ms}^{-2}$, the average acceleration of the ball during the contact is -
- (a) 100 ms⁻² (b) 200 ms⁻²
(c) 600 ms⁻² (d) 1000 ms⁻²

Ans. [d]

Sol. $a_{av} = \frac{(v - u)}{t} \dots\dots (1)$

For u, $u^2 = 0^2 + 2 \times 10 \times 7.2$

$\Rightarrow u = 12 \text{ m/s}$

For V, $0^2 = v^2 - 2 \times 10 \times 3.2$

$\Rightarrow v = 8 \text{ m/s}$

$\therefore a_{av} = \frac{8 - (-12)}{20 \times 10^{-3}} = \frac{20}{20 \times 10^{-3}} = 10^3 \text{ m/s}^2 = 1000 \text{ m/s}^2$

10. In $\triangle ABC$, D is a point on side AC such that $\angle ABD = \frac{1}{2} \angle ABC$. If $AB = 36$, $BC = 48$, $CD = 28$, then the length DA will be -

- (a) 20 (b) 21
(c) 22 (d) 24

Ans. [b]

11. Human body cannot digest carbohydrate in the form of -

- (a) sugars (b) starch
(c) cellulose (d) glycogen

Ans. [c]

12. Unsaturated fatty acids contain -

- (a) atleast one double bond (b) two double bonds
(c) more than two double bonds (d) no double bond

Ans. [b]

Sol. One double bond in $\begin{array}{c} \text{O} \\ || \\ -\text{C}-\text{OH} \end{array}$ group & one double bond in carbon chain.

*According to NCERT they do not count $\begin{array}{c} \text{O} \\ || \\ -\text{C}- \end{array}$

13. A loaded bus (mass m_2) and an unloaded bus (mass m_1) are both moving with the same kinetic energy. Brakes are applied to both the buses so as to exert equal retarding force. If s_1 and s_2 are the distances covered

by the two buses respectively before coming to rest, then $\frac{s_1}{s_2}$ is -

- (a) 1 (b) $\frac{m_1}{m_2}$ (c) $\sqrt{\frac{m_1}{m_2}}$ (d) $\frac{m_1^2}{m_2^2}$

Ans. [a]

Sol. Using work energy theorem,

KE = work done by friction

$$\Rightarrow \frac{1}{2} m_1 v_1^2 = F_r \times s_1$$

$$\& \frac{1}{2} m_2 v_2^2 = F_r s_2$$

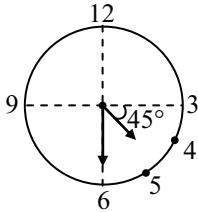
$$\Rightarrow s_1 = s_2$$

14. The centre of a clock is taken as origin. At 4.30 pm, the equation of line along minute hand is $x = 0$. Therefore, at this instant the equation of line along the hour hand will be -

- (a) $x - y = 0$ (b) $x + y = 0$
 (c) $y = \sqrt{2} x$ (d) $y = \frac{x}{\sqrt{2}}$

Ans. [b]

Sol.



$$m = \tan 135^\circ = -1$$

\therefore equation of line $y = mx$

$$\text{or } y = -x$$

$$y + x = 0$$

15. Heterosis is the -

- (a) superiority of male parent over the hybrid
 (b) superiority of female parent over the hybrid
 (c) superiority of hybrid over the parents
 (d) superiority of both the parents over the hybrid

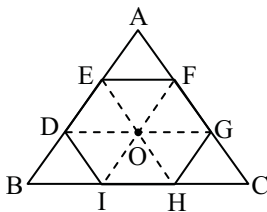
Ans. [d]

16. An equilateral triangle has area $A \text{ cm}^2$. A regular hexagon of maximum area is cut off from the triangle. If the area of the hexagon is 320 cm^2 , the area A is -

- (a) 640 cm^2 (b) 480 cm^2
 (c) 600 cm^2 (d) 400 cm^2

Ans. [b]

Sol.



Using area of hexagon = 320 cm^2 , we can find the side.

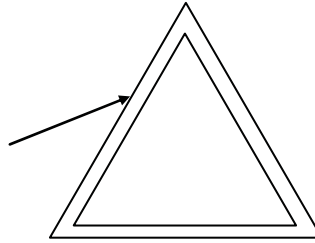
Also 6 smaller equilateral triangles constitute one hexagon.

\therefore nine equilateral triangles give the area of bigger triangle. Therefore

$$6 \text{ triangles} = 320 \text{ cm}^2$$

$$\therefore 9 \text{ triangles} = \frac{3}{2} (320) \text{ cm}^2 = A = 480 \text{ cm}^2$$

17. A ray of light is incident on a hollow glass prism as shown. Then the ray will undergo



- (a) deviation and dispersion both
 (b) deviation but no dispersion
 (c) dispersion but no deviation
 (d) neither deviation nor dispersion

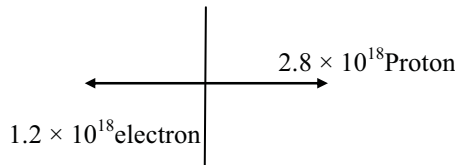
Ans. [d]

18. In a neon discharge tube 2.8×10^{18} Ne^+ ions move to the right per second while 1.2×10^{18} electrons move to the left per second. Therefore, the current in the discharge tube is -

- (a) 0.64 A towards right
 (b) 0.256 A towards right
 (c) 0.64 A towards left
 (d) 0.256 A towards left

Ans. [a]

Sol.



$$\Rightarrow \longrightarrow 4 \times 10^{18} \text{ proton}$$

$$\Rightarrow \longrightarrow 4 \times 10^{18} \times 1.6 \times 10^{19} \text{ C}$$

$$i = \frac{Q}{t} = \frac{4 \times 10^{18} \times 1.6 \times 10^{19}}{1}$$

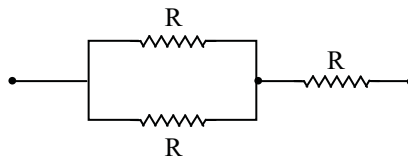
$$= 0.64 \text{ Amp towards Right}$$

19. Genome of a sexually reproducing organism is -

- (a) all the chromosomes present in the diploid cell
 (b) total number of chromosomes present in the haploid cell
 (c) total number of genes present in a cell
 (d) totality of DNA presenting the haploid cell

Ans. [b]

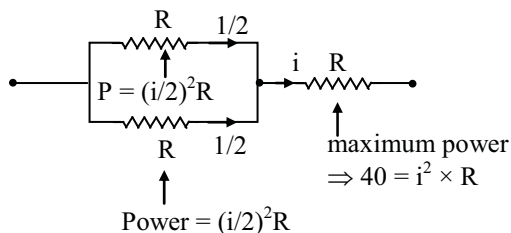
20. Three equal resistances are connected as shown in the figure. Maximum power that can be dissipated by each resistance is 40 watt. Therefore, the maximum power that can be safely dissipated in the combination is



- (a) 120 watt
 (b) 80 watt
 (c) 60 watt
 (d) 40 watt

Ans. [c]

Sol. Power on a particular resistance = $i^2 R$



$$\text{Total power} = \left(\frac{i}{2}\right)^2 R + \left(\frac{i}{2}\right)^2 R + i^2 R$$

$$P_T = \frac{3i^2 R}{2}$$

whereas $i^2 R = 40$

$$\therefore P_T = \frac{3}{2} \times 40 = 60 \text{ W}$$

21. The compound that has both ionic and covalent bonds is

(a) boric acid (H_3BO_3)

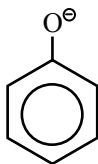
(b) sodium chloride (NaCl)

(c) ethyl alcohol ($\text{C}_2\text{H}_5\text{OH}$)

(d) sodium phenolate ($\text{C}_6\text{H}_5\text{ONa}$)

Ans. [d]

Sol. $\text{C}_6\text{H}_5\text{ONa} \rightarrow \text{C}_6\text{H}_5\text{O}^- + \text{Na}^+$



Phenolate ion
covalent bond

22. The colonial form of algae is

(a) Chlamydomonas

(b) Chara

(c) Porphyra

(d) Volvox

Ans. [d]

23. An object is placed at a distance x_1 from the focus of a concave mirror. Its real image is formed at a distance x_2 from the focus. Hence, the focal length of the mirror is

(a) $\frac{x_1 x_2}{x_1 + x_2}$

(b) $\sqrt{x_1 x_2}$

(c) $\frac{x_1 + x_2}{2}$

(d) $|x_1 - x_2|$

Ans. [b]

Sol. By Newton's formula

$$x_1 x_2 = f^2$$

$$\therefore f = \sqrt{x_1 x_2}$$

24. If $\frac{b+c-a}{a}$, $\frac{c+a-b}{b}$ and $\frac{a+b-c}{c}$ are in A.P. and $a+b+c \neq 0$, then

(a) $b = \frac{ac}{a+c}$

(b) $b = \frac{2ac}{a+c}$

(c) $b = \frac{a+c}{2}$

(d) $b = \sqrt{ac}$

Ans. [b]

Sol. $\frac{b}{a} + \frac{c}{a} - 1$, $\frac{c}{b} + \frac{a}{b} - 1$, $\frac{a}{c} + \frac{b}{c} - 1$ are in A.P.

Adding 2 in each term

$\frac{b}{a} + \frac{c}{a} + 1$, $\frac{c}{b} + \frac{a}{b} + 1$, $\frac{a}{c} + \frac{b}{c} + 1$ are in A.P.

$(b+c+a) \frac{1}{a}$, $(c+a+b) \frac{1}{b}$, $(a+b+c) \frac{1}{c}$ are in A.P.

But $(a+b+c) \neq 0$

Then $\frac{1}{a}$, $\frac{1}{b}$, $\frac{1}{c}$ are in A.P.

Then $b = \frac{2ac}{a+c}$

25. The metal that dissolves in liquid ammonia giving dark blue coloured solution is

(a) Sn

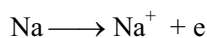
(b) Pb

(c) Na

(d) Ag

Ans. [c]

Sol.



ammonicated electron

blue colour occurs due to ammonicated electron

26. How much water should be filled in a container 21 cm in height, so that it appears half filled when viewed

from the top of the container ? [refractive index of water = $\frac{4}{3}$]

(a) 8 cm

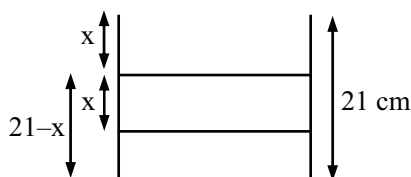
(b) 10.5 cm

(c) 12 cm

(d) 14 cm

Ans. [c]

Sol.



let the water be filled upto a height $21 - x$ the by formula of

$$\frac{\text{real depth}}{\text{apparent depth}} = \frac{4}{3}$$

$$\frac{21 - x}{x} = \frac{4}{3}$$

Solving we get $x = 9$

$$\therefore 21 - x = 12$$

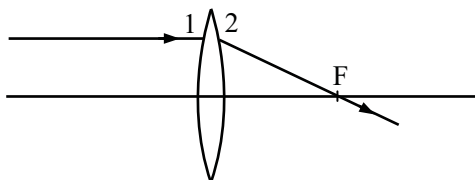
27. An electron moving to the east in a horizontal plane is deflected towards south by a magnetic field. The direction of this magnetic field is

- (a) towards north (b) towards west
(c) downwards (d) upwards

Ans. [c]

Sol. Using Fleming's left hand rule & the sign of charge i.e. is negative. We can find the direction of magnetic field.

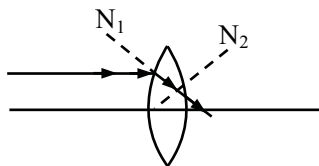
28. The figure shows a ray of light incident on a convex lens, parallel to its principal axis. Obviously the emergent ray passes through the principal focus F. Which of the following statement is correct ?



- (a) The ray bends downwards only once inside the lens
(b) The ray bends downwards at each surface
(c) The ray bends downwards at the first surface and upwards at the second surface
(d) The ray bends upwards at the first surface and downwards at the second surface

Ans. [b]

Sol.



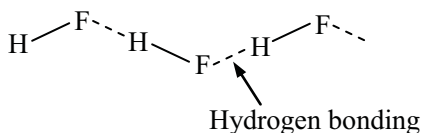
By drawing the normals at the two surfaces we can find the deviation to be in the downward direction on both the surfaces.

29. Hydrogen fluoride is a liquid at room temperature due to :

- (a) dimerisation (b) dissociation followed by aggregation
(c) association (d) polymerisation

Ans. [c]

Sol. association of hydrogen bonding.



30. In usual course, the progeny varies from its parents due to
(a) mutation (b) pleiotropic effect.
(c) chromosomal recombination (d) independent assortment

Ans. [c]

31. If the eight digit number 2575d568 is divisible by 54 and 87, the value of the digit 'd' is
(a) 4 (b) 7
(c) 0 (d) 8

Ans. [b]

32. Which of the following hydroxides is NOT an alkali ?
(a) Ammonium hydroxide (b) Calcium hydroxide
(c) Copper hydroxide (d) Sodium hydroxide

Ans. [c]

Sol. $\text{Cu}(\text{OH})_2$ is acidic due to lewis acidic nature of Cu^{2+} .

33. When the polynomial $(6x^4 + 8x^3 + 17x^2 + 21x + 7)$ is divided by $(3x^2 + 4x + 1)$, the remainder is $(ax + b)$.
Therefore,
(a) $a = 1, b = 2$ (b) $a = 1, b = -2$
(c) $a = 2, b = 1$ (d) $a = -1, b = -2$

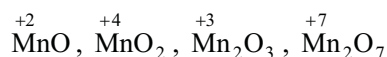
Ans. [a]

Sol. $2x^2(3x^2 + 4x + 1) + 5(3x^2 + 4x + 1) + x + 2$
Then $a = 1, b = 2$

34. The most basic oxide among MnO , Mn_2O_3 , MnO_2 and Mn_2O_7 is
(a) MnO (b) MnO_2
(c) Mn_2O_3 (d) Mn_2O_7

Ans. [a]

Sol. Less positive charge more basic oxide.



35. BCG vaccine is used to prevent
(a) tuberculosis (b) blood cancer, cholera and gonorrhoea
(c) leprosy (d) goitre

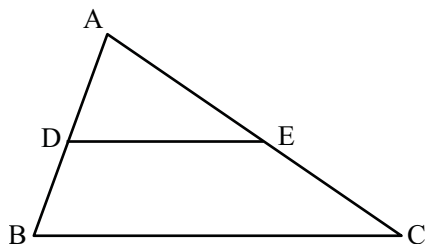
Ans. [a]

36. The metal which cannot displace hydrogen from acid is
(a) silver (b) sodium
(c) calcium (d) magnesium

Ans. [a]

Sol. Ag can not displace H from acid because its reduction potential is more than H. or it is lower side in reactive series.

37. In the figure shown below, $DE \parallel BC$ and $AD = 3x - 2$, $AE = 5x - 4$, $BD = 7x - 5$ and $CE = 5x - 3$. Therefore, the value of x is



(a) only 1

(b) only $\frac{7}{10}$

(c) 1 or $\frac{7}{10}$

(d) $\frac{10}{7}$

Ans. [a]

Sol. $\frac{AD}{BD} = \frac{AE}{EC}$

Then $x = 1$

38. Down's syndrome is a result of

(a) XO genotype

(b) XXY genotype

(c) Trisomy (chromosome 12)

(d) Trisomy (chromosome 21)

Ans. [d]

39. Sudden decrease in the intermolecular forces of attraction occur most efficiently in

(a) evaporation

(b) melting

(c) condensation

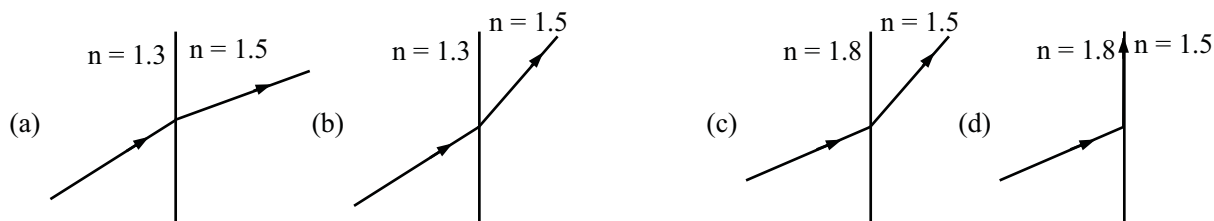
(d) sublimation

Ans. [d]

Sol. Order of attraction solid > liquid > gas

in sublimation solid \rightarrow gas

40. Which of the following does NOT represent correct refraction ?



Ans. [b]

41. Correct formula of dolomite is-

(a) $\text{CaCO}_3 \cdot \text{MgCO}_3$

(b) $\text{CaCO}_3 \cdot \text{ZnCO}_3$

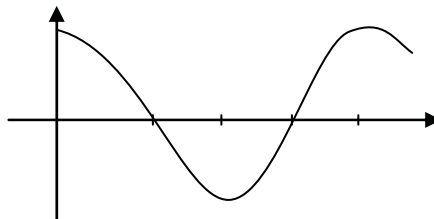
(c) $\text{MgCO}_3 \cdot \text{ZnCO}_3$

(d) $\text{FeCO}_3 \cdot \text{CaCO}_3$

Ans. [a]

Sol. Dolomite is $\text{CaCO}_3 \cdot \text{MgCO}_3$

42. The figure shows graphical representation of a sound wave. The quantities on X and Y axes respectively are-



(a) time and displacement

(b) distance and pressure

(c) distance and change in density

(d) density and pressure

Ans. [c]

Sol. The given curve is for distance and change in density.

43. A certain amount of heat is required to raise the temperature of x gram of a substance through $t_1^\circ\text{C}$. The same amount of heat when taken away from y gram of water, it cools through $t_2^\circ\text{C}$. Therefore, the specific heat of the substance is-

(a) $\frac{yt_1}{xt_2}$

(b) $\frac{xt_2}{yt_1}$

(c) $\frac{yt_2}{xt_1}$

(d) $\frac{xt_1}{yt_2}$

Ans. [c]

Sol. $x s_1 t_1 = y (1) t_2$

(for substance) (for water)

$$\therefore \Delta_1 = \frac{yt_2}{xt_1} \text{ in } \frac{\text{cal}}{\text{gm}^\circ\text{C}}$$

44. An aeroplane is flying horizontally at a height of 3150 m above a horizontal plane ground. At a particular instant it passes another aeroplane vertically below it. At this instant, the angles of elevation of the planes from a point on the ground are 30° and 60° . Hence, the distance between the two planes at that instant is-

(a) 1050 m

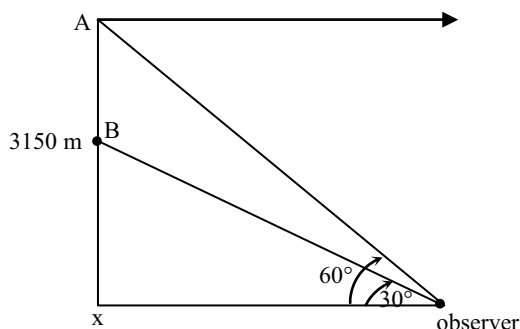
(b) 2100 m

(c) 4200m

(d) 5250 m

Ans. [b]

Sol.



In ΔAxO ,

$$\frac{Ax}{xO} = \tan 60^\circ = \sqrt{3}$$

In ΔBxO ,

$$\frac{Bx}{xO} = \tan 30^\circ = \frac{1}{\sqrt{3}}$$

$$\Rightarrow \frac{\frac{3150}{xO}}{\frac{Bx}{xO}} = \frac{\sqrt{3}}{\frac{1}{\sqrt{3}}}$$

$$\Rightarrow \frac{3150}{Bx} = \frac{\sqrt{3} \cdot \sqrt{3}}{1 \times 1} = 3$$

$$\Rightarrow Bx = \frac{3150}{3} = 1050$$

$$\therefore AB = 3150 - 1050 = 2100$$

45. Which of the following is NOT a usual floral pigment?

- (a) Betacyanins (b) Anthocyanins
(c) Carotenes (d) Betaxanthins

Ans. [b]

46. The element that is NOT present in the compound BARYTA is-

- (a) B (b) O
(c) H (d) Ba

Ans. [a]

Sol. Baryta is $Ba(OH)_2$

47. With reference to human beings, the correct order of taxonomical classification is-

- (a) chordata, primata, mammalia, hominidae (b) chordata, mammalia, primata, hominidae
(c) chordata, primata, hominidae, mammalia (d) chordata, mammalia, hominidae, primata

Ans. [b]

48. A boy throws a stone (mass 100 g) vertically upwards. It reaches a height of 10 m and then falls to the ground. The work done by the boy is ($g = 10 \text{ ms}^{-2}$)-

- (a) 10J (b) 20J
(c) zero (d) -10J

Ans. [a]

Sol. PE at the highest point = KE at the lowest point
 = work done by the boy
 $\therefore W = mgh$
 $= (0.1) \times 10 \times 10$
 $W = 10J$

49. The compound used to remove carbon dioxide from air is-
 (a) sodium carbonate (b) sodium hydroxide
 (c) sodium nitrate (d) sodium chloride

Ans. [b]

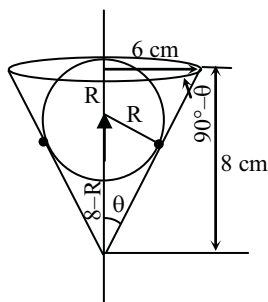
Sol. $NaOH + CO_2 \rightarrow NaHCO_3$

50. A conical vessel of radius 6 cm and height 8 cm is completely filled with water. A metal sphere is now lowered into the water. The size of the sphere is such that when it touches the inner surface, it just gets immersed. The fraction of water that overflows from the conical vessel is-

- (a) $\frac{3}{8}$ (b) $\frac{5}{8}$ (c) $\frac{7}{8}$ (d) $\frac{5}{16}$

Ans. [c]

Sol.



$$\sin \theta = \frac{R}{8 - R} = \frac{6}{10}$$

$$\Rightarrow 10R = 48 - 6R$$

$$\Rightarrow 48 = 16R$$

$$\Rightarrow R = 3$$

* for cone

$$= \frac{1}{3} \pi r^2 h \quad \dots (1)$$

* For sphere

$$= \frac{4}{3} \pi r^3 \quad \dots (2)$$

Put value of in eqn. (1) and (2)

$$\therefore \text{remaining will be} = 1 - \frac{1}{8} = \frac{7}{8}$$

51. Which of the following does NOT involve friction?
(a) Writing on a paper using a pencil (b) Turning a car to the left on a horizontal road
(c) A car at rest parked on a sloping ground (d) Motion of a satellite around the earth

Ans. [d]

Sol. Satellite is moving in vacuum therefore no friction involved.

52. Sting of a honeybees represents modification of-
(a) ovipositor (b) abdominal bristles
(c) abdominal appendage (d) mandibles

Ans. [d]

53. The property which is characteristic of an electrovalent compound is that-
(a) it is easily vapourised (b) it has a high melting point
(c) it is a weak electrolyte (d) it often exists as a liquid

Ans. [b]

Sol. It has strong electrostatic force of attraction.

54. Out of the following, the correct activity series of the metals is-
(a) $K > Na > Ca > Mg$ (b) $Na > K > Ca > Mg$
(c) $Mg > Ca > Na > K$ (d) $Mg > Na > Ca > K$

Ans. [a]

Sol. Factual

55. If the glands in the pharyngeal bulb of earthworm are inactivated, digestion of which of the following is affected?
(a) proteins (b) carbohydrates
(c) lipids (d) nucleic acids

Ans. [a]

56. Which of the following group elements from the periodic table form electron deficient molecules?
(a) Group IV (b) Group V (c) Group III (d) Group I

Ans. [c]

Sol. Boron family mostly make compound having vacant p orbital.

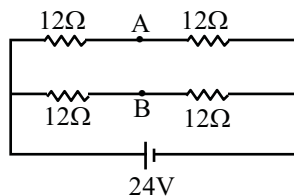
- *57. Which of the following elements forms polyatomic molecules?
(a) Nitrogen (b) Chlorine (c) Argon (d) Boron

Ans. [d]

Sol. According to homonuclear molecule.

* Question is incomplete

58. In the circuit arrangement shown, if the points A and B are joined by a wire the current in this wire will be



- (a) 1A (b) 2A (c) 4A (d) zero

Ans. [d]

Sol. It is a balanced wheatstone bridge, therefore current is zero in the middle branch.

59. Given $\sqrt{600} = 24.49$, the value of $\frac{\sqrt{2} + \sqrt{3}}{\sqrt{3} - \sqrt{2}}$ is-

- (a) 9.978 (b) 8.989 (c) 9.989 (d) 9.898

Ans. [d]

Sol. $\frac{1.414 + 1.732}{1.732 - 1.414} = 9.898$

60. Besides drip irrigation, an effective way of economizing farm irrigation without hampering metabolic processes of plants would be the use of -

- (a) humidifiers (b) sun screen nettings
(c) organic fertilizers/manures (d) anti-transparent sprays

Ans. [a]

61. Mixture of ethyl alcohol and water can be easily separated by using -

- (a) separating funnel (b) fractional distillation
(c) filter paper (d) none of the above

Ans. [b]

Sol. Due to different volatility

Note : According to NCERT.

62. If $x < 0$ and $\log_7(x^2 - 5x - 65) = 0$, then x is -

- (a) -13 (b) -11
(c) -6 (d) -5

Ans. [c]

Sol. $\log_7(x^2 - 5x - 65) = 0$
 $x^2 - 5x - 65 = 7^0$
 $x^2 - 5x - 65 = 1$
 $x = -6$

63. Pressure of a certain volume V of an ideal gas is increased by four times its initial pressure whereas the temperature is reduced to 50% of its initial temperature. The resulting volume of the gas is-
- (a) $10V$ (b) $0.1V$
(c) $0.5V$ (d) $0.25V$

Ans. [b]

Sol. Using gas law

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

$$P_1 = P, P_2 = 5P$$

$$V_1 = V, V_2 = ?$$

$$T_1 = T, T_2 = \frac{T}{2}$$

$$V_2 = 0.1V.$$

64. If $2^{2x-1} + 2^{1-2x} = 2$, then the value of x is -
- (a) 0.5 (b) -0.5
(c) 1 (d) 0

Ans. [a]

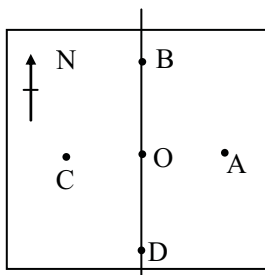
Sol.
$$\frac{2^{2x}}{2} + \frac{2}{2^{2x}} = 2$$

Then $x = \frac{1}{2}$

65. Like sickle cell anaemia, the other genetic disorder related to blood pigment is -
- (a) leukemia (b) phenylketonuria
(c) thalassemia (d) xeroderma pigmentosa

Ans. [d]

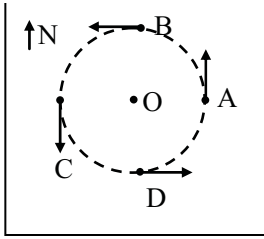
66. Consider points A, B, C, D on a horizontal cardboard equidistant from centre O as shown in the figure. A copper wire perpendicular to the cardboard passes through the centre O and carries an electric current flowing upwards. Deflection of magnetic needle will be maximum when it is kept at the point -



- (a) A (b) B (c) C (d) D

Ans. [c]

Sol.



Initially needle is in N direction, therefore deflection is maximum at point C

$$\delta = 180^\circ$$

67. If $a^2 + b^2 + c^2 + d^2 = 25$, out of the following statements the correct one is-

(a) $ab + bc + cd + da \leq 25$

(b) $ab + bc + cd + da \geq 25$

(c) $ab + bc + cd + da \leq \frac{25}{2}$

(d) $ab + bc + cd + da \geq \frac{25}{2}$

Ans. [b]

Sol. Using A.M. and G.M.

$$A.M. \geq G.M.$$

$$(ab + bc + cd + da) \geq 25$$

68. The release of chemical messenger at nerve –muscle end plate is under the influence of the ions -

(a) Cl

(b) Fe^{++} and S^{++}

(c) Ca^{++}

(d) Mg^{++} and Sr^{++}

Ans. [a]

69. Given that $a(a + b) = 36$ and $b(a + b) = 64$, where a and b are positive, $(a - b)$ equals -

(a) 2.8

(b) 3.2

(c) -2.8

(d) -2.5

Ans. [c]

Sol. $a^2 + b^2 + 2ab = 100$

$$(a + b) = 10$$

$$(a - b) = -2.8$$

70. A sphere and a cube have equal surface areas. The ratio of their volumes is -

(a) $\frac{\pi}{6}$

(b) $\frac{6}{\pi}$

(c) $\sqrt{\frac{6}{\pi}}$

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

Ans. [c]

Sol. $4\pi r^2 = 6\ell^2$

$$\left(\sqrt{\frac{2\pi}{3}}\right)r = \ell \quad \therefore \frac{V_1}{V_2} = \frac{\frac{4\pi}{3}r^3}{\ell^3}$$

Then ratio of their volume is $\sqrt{\frac{6}{\pi}}$

71. An equilateral triangle has area $A\sqrt{3}$. Three circles are drawn with their centres at the vertices of the triangle. Diameter of each circle is equal to the length of each side of the triangle. The area of the triangle NOT included in any of the three circles is -

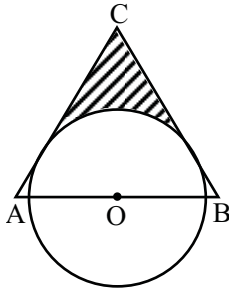
(a) $A(\sqrt{3} - \frac{\pi}{6})$

(b) $A(\pi - \sqrt{3})$

(c) $A(3\pi - \sqrt{3})$

(d) $A(\sqrt{3} - \frac{\pi}{2})$

Ans. [d]



Sol.

To calculate side length of Δ , $\frac{\sqrt{3}}{4}x^2 = A\sqrt{3} \Rightarrow x = A\sqrt{2}$

\Rightarrow radius of circle = \sqrt{A}

Area of complete triangle = $A\sqrt{3}$

Area of half circle = $\frac{\pi r^2}{2} = \frac{\pi A}{2}$

Shaded area = $A\sqrt{3} - \frac{\pi A}{2} = A\left(\sqrt{3} - \frac{\pi}{2}\right)$

72. In a school, the average score of all 1400 students at an examination was found to be 69.5. The average score of boys in the school was 68 and that of girls was 72. Hence, the number of boys and the number of girls respectively are -

(a) 680 and 720

(b) 720 and 680

(c) 875 and 525

(d) 800 and 600

Ans. [c]

Sol. Let No. of boys = x

No. of girls = $(1400 - x)$

$$\bar{x} = \frac{x(68) + (1400 - x)72}{1400}$$

$$(69.5) \times 1400 = 68x + 72 \times 1400 - 72x$$

No. of boys = $x = 875$

No. of girls = 525

73. The biochemical analysis to confirm CAM in a given plant is -

- (a) titratable acid number (b) iodine number
(c) activity of transaminases (d) total reducing power

Ans. [c]

Sol.

74. If a, b, c are positive, $\frac{a+c}{b+c}$ is -

- (a) always smaller than $\frac{a}{b}$ (b) always greater than $\frac{a}{b}$
(c) greater than $\frac{a}{b}$ only if $a > b$ (d) greater than $\frac{a}{b}$ only if $a < b$

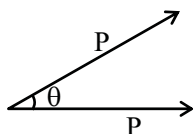
Ans. [d]

75. Two vectors of equal magnitude are inclined to each other at an angle θ . Keeping the direction of one of them fixed the other is rotated through an equal angle θ . Now, the resultant of these vectors has the same magnitude as each of the two vectors. Therefore, angle θ is -

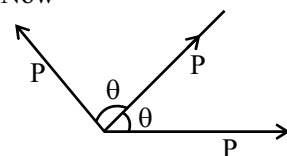
- (a) 90° (b) 30°
(c) 45° (d) 60°

Ans. [d]

Sol. Initially



Now



Using $R = \sqrt{A^2 + B^2 + 2AB \cos \theta}$

We get

$$P = \sqrt{P^2 + P^2 + 2(P)(P) \cos(2\theta)}$$

$$\therefore \cos(2\theta) = \frac{1}{2}$$

$$\therefore 2\theta = 120^\circ$$

$$\theta = 60^\circ$$

76. Consider the points A (a , b + c), B (b, c + a) and C(c, a + b). The area of ΔABC is -

(a) $2(a^2 + b^2 + c^2)$

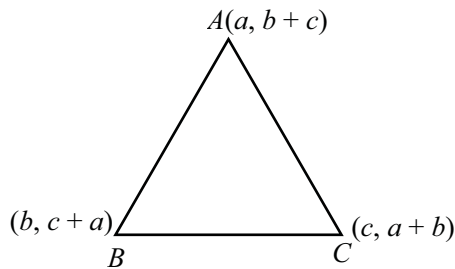
(b) $\frac{a^2 + b^2 + c^2}{6}$

(c) $2(ab + bc + ca)$

(d) none of these

Ans. [d]

Sol.



$$\begin{aligned} \text{Area of triangle} &= \frac{1}{2} \begin{vmatrix} a & b+c & 1 \\ b & c+a & 1 \\ c & a+b & 1 \end{vmatrix} \\ &= \frac{1}{2} [a(c+a-a-b) - (b+c)(b-c) + 1(ab+b^2-c^2-ac)] \\ &= \frac{1}{2} [a(c-b) - (b^2-c^2) + ab + b^2 - c^2 - ac] \\ &= \frac{1}{2} [ac - ab - b^2 + c^2 + ab + b^2 - c^2 - ac] = 0 \end{aligned}$$

77. Plants with inferior ovary always bear -

(a) pseudocarps

(b) berries

(c) aggregate fruits

(d) seedless fruits

Ans. [a]

78. Which of the following hydroxides on heating decomposes to liberate oxygen as one of the products ?

- (a) Mercury hydroxide (b) Copper hydroxide
(c) Sodium hydroxide (d) Zinc hydroxide

Ans. [a]

Sol. $\text{Hg}(\text{OH})_2$

***Compound is not found.**

79. The set of annelid characters that are shared by leeches is (i) setate for locomotion (ii) metameric segmentation, (iii) indeterminate number of segments, (iv) presence of clitellum, (v) hermaphroditism -

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

Ans. [d]

80. Which of the following statements is INCORRECT ?

- (a) Electric current is a scalar quantity
(b) Electric lines of force are closed curves
(c) Magnetic lines of induction are closed curves
(d) Changing magnetic field induces an electric current in a coil

Ans. [b]

Sol. Electric lines of force doesn't form closed loops (for conservative electric field), while magnetic lines form closed curves.