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NATIONAL TALENT SEARCH EXAMINATION (NTSE-2020) STAGE -1
STATE : CHHATTISGARH   PAPER : SAT

Date: 03/11/2019

Max. Marks: 100   **SOLUTIONS**   **Time allowed: 120 mins**

1. Newton second is equivalent to unit of which physical quantity?

(A) Velocity   (B) Angular momentum

(C) Linear momentum   (D) Energy

Ans. (C)

Sol. $1\ N.s = \dfrac{Kgm}{s^2}.s = kg\ m/s$

$= mv$

$= Momentum$

2. The number of electrons in one coulomb charges are :

(A) 5.46×10^{-29} (B) 9×10^{13} (C) 6.25×10^{18} (D) 1.6×10^{-19}

Ans. (C)

Sol. $Q = \pm ne$

∵ $1e = -1.6 \times 10^{-13}\ C$

∴   No. of electrons in 1 C charge

$1 = n \times (1.6 \times 10^{-19})$

∴ $n = \dfrac{1}{1.6 \times 10^{-19}} = 6.25 \times 10^{-18}$ electrons

3. A radioactive nucleus can emit

(A) α, β or γ in sequence   (B) α, β or γ any one particle at a time

(C) α, β or γ all the three together   (D) Only α and β together

Ans. (B)

Sol. α, β or γ anyone particle at a time. Only one phenomenon can occur at a time, either α-decay or β-decay.

4. The quantity remains unchanged in the transformer is :

(A) Current   (B) Voltage   (C) Frequency   (D) None of these

Ans. (C)

Sol. Because frequency depends on the source.

5. The radius of curvature of concave mirror is 10 cm. If the object is placed at 20 cm in front of it, then what will be the position of image and magnification?

(A) $\dfrac{20}{3}$ cm, 3   (B) $-\dfrac{20}{3}$ cm, $-\dfrac{1}{3}$ (C) –20 cm, 3   (D) $-\dfrac{20}{3}$ cm, 6

Ans. (B)

Sol. C = –10 cm   u = –20 cm   f = –5 cm

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

or $\frac{-1}{5} = \frac{1}{v} - \frac{1}{20}$

or $\frac{1}{v} = \frac{-1}{5} + \frac{1}{20} = \frac{-4+1}{20} = \frac{-3}{20}$

or $\boxed{v = \frac{-20}{3} cm}$

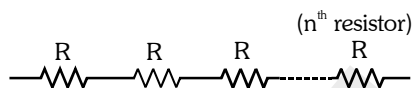$$m = \frac{-v}{u} = \frac{-\left(-\frac{20}{3}\right)}{-20} = \frac{20}{3} \times \left(\frac{-1}{20}\right)$$

or $\boxed{m = -\frac{1}{3}}$

6.   If n identical resistance of equal values are firstly connected in series and then connected in parallel, then the value

of their resistance $\frac{R_S}{R_P}$ will be :

(A) $\frac{1}{n}$ (B) $\frac{1}{n^2}$ (C) n^2 (D) n

Ans. **(C)**

Sol. $R_{equivalent}$ in series :
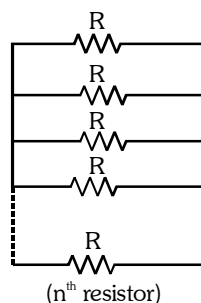

$R_S = R + R + R + R + ... + R$ (upto nth term)

∴ $R_S = nR$

$R_{equivalent}$ in parallel connection :

$$\frac{1}{R_P} = \frac{1}{R} + \frac{1}{R} + ... + \frac{1}{R} = \frac{n}{R}$$ (upto nth term)

∴ $R_P = \frac{R}{n}$

Now, $\frac{R_S}{R_P} = \frac{nR}{R/n} = n^2$

7. In a house, if two bulbs each of 60W glow daily for 5 hour upto 1 month (30 days), then what will be the cost of electricity consumed if the rate of electricity per unit is Rs. 2.00 ?

(A) 24   (B) 36   (C) 12   (D) 30

Ans. *(B)*

Sol. Power consumed by 1 bulb = 60 W

∴   Power consumed by 2 bulb = $60 \times 2 = 120$ W = 0.12 KW

Energy consumed in 1 day = Power × time = 0.12 KW × 5 H = 0.6 KWH

∴   Energy consumed in 30 days = $0.6 \times 30 = 18$ KWH

Price of 1 unit (1 KWH) = Rs 2

∴   Price of 18 units = 18×2 = Rs. 36

8. When the momentum of a body increased by 100%, then its kinetic energy is

(A) Increases by 300%   (B) Increases by 200%   (C) Increases by 100%   (D) Decreases by 300%

Ans. *(A)*

Sol. $P = \sqrt{2mE}$ or $P \propto \sqrt{E}$ or $\dfrac{P_1}{P_2} = \left(\dfrac{E_1}{E_2}\right)^{1/2}$

or $\left(\dfrac{P_1}{P_2}\right)^2 = \left(\dfrac{E_1}{E_2}\right)$ or $\left(\dfrac{1}{2}\right)^2 = \dfrac{E_1}{E_2}$ or $E_2 = 4E_1$

Now, % change in kinetic energy = $\dfrac{E_2 - E_1}{E_1} \times 100 = \dfrac{4E_1 - E_1}{E_1} \times 100 = +300\%$

9. If two different bodies A and B have their masses in ratio 1 : 4 and their volumes are equal, then their densities (of A and B) will be in ratio :

(A) 1 : 4   (B) 4 : 1   (C) 2 : 1   (D) 1 : 2

Ans. *(A)*

Sol. $\dfrac{M_A}{M_B} = \dfrac{1}{4}$ and $V_A = V_B$ (given)

∴ $\dfrac{\rho_A}{\rho_B} = \dfrac{M_A / V_A}{M_B / V_B} = \dfrac{M_A}{M_B} \times \dfrac{V_B}{V_A} = \dfrac{1}{4} \times 1$ [∵ mass (M) = density (ρ) × volume (V)]

or $\boxed{\dfrac{\rho_A}{\rho_B} = \dfrac{1}{4}}$

10. A wave completes 24 cycles in 0.8 seconds, then the frequency of that wave is :

(A) 30 Hz   (B) 8 Hz   (C) 24 Hz   (D) 12 Hz

Ans. *(A)*

Sol. Frequency, f = $\dfrac{\text{No. of cycle}}{\text{time taken}} = \dfrac{24}{0.8} = \dfrac{24}{8} \times 10$

or $\boxed{f = 30 \text{ Hz}}$

11. Angular velocity of hands of second in a watch will be

(A) π Radian/sec.   (B) 2π Radian/sec   (C) $\dfrac{\pi}{60}$ Radian/sec   (D) $\dfrac{\pi}{30}$ Radian/sec

Ans. *(D)*

Sol. $\omega = \dfrac{2\pi}{T} = \dfrac{2\pi}{60}$ rad/s

or $\omega = \dfrac{\pi}{30}$ rad/s

12. Which of the following have greatest thermal conductivity

(A) Brass   (B) Iron   (C) Aluminium   (D) Silver

Ans. *(D)*

Sol. Silver is the best conductor of heat having thermal conductivity of 406 W/m-K.

13. The power of the convex lens is 4.0D, then its focal length will be :

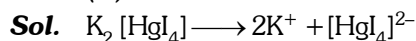(A) 25 m   (B) –25 m   (C) –25 cm   (D) 25 cm

Ans. *(D)*

Sol. $f = \dfrac{1}{Power} = \dfrac{1}{4} m = 0.25m = 25$ cm

$\therefore$ f = + 25 cm

14. Which one of the following is a complex salt?

(A) Ca(OCl)Cl   (B) Pb(OH)NO$_3$ (C) $K_2[HgI_4]$ (D) $Ca[H_2PO_2]_2$

Ans. *(C)*

Sol. $K_2[HgI_4] \longrightarrow 2K^+ + [HgI_4]^{2-}$

15. At 277 K, the volume of single drop of water is 0.018 ml, number of water molecules per drop of water will be :

(A) 6.023×10^{23} (B) 6.023×10^{24} (C) 6.023×10^{20} (D) 6.023×10^{21}

Ans. *(C)*

Sol. Given volume of single drop of water = 0.018 ml

$\therefore$ Since, density of water = 1 g/ml

$\therefore$ Mass of single drop of water = 0.018g

No. of mole = $\dfrac{0.018 \text{ g}}{18 \text{g}} = 10^{-3}$ mole

Now, number of water molecules per drop of water = $6.023 \times 10^{23} \times 10^{-3} = 6.023 \times 10^{20}$

16. Which one of the following is not an acidic salt ?

(A) $NaHSO_4$ (B) NaH_2PO_4 (C) Na_3PO_4 (D) Na_2HPO_4

Ans. *(C)*

Sol. Because it does not contain any repalceable H^+ ion.

17. The pH of caustic soda solution containing 2 gm/litre caustic soda will be [log 2 = 0.30]

(A) 11.9   (B) 9.7   (C) 10.8   (D) 12.7

Ans. *(D)*

Sol. Weight of caustic soda = 2 gm/L

Molar mass of caustic soda (NaOH) = 23 + 16 + 1 = 40 g

$\therefore$ Molarity of NaOH = $\dfrac{2}{40} = \dfrac{1}{20}$ mol / L

Now, pOH of NaOH = $-\log[OH^-]$ = $-\log\left[\dfrac{1}{20}\right]$ = $-\log 1 + \log 20$

$= 0 + \log 2 + \log 10 = 1.3010$

pH + pOH = 14

pH = 14 − 1.3010 = 12.7

18. Which of the following is not a sulphide ore of the metal?

(A) Zinc Blende   (B) Argentite   (C) Dolomite   (D) Galena

Ans. **(C)**

Sol. Dolomite $(CaCO_3 \cdot MgCO_3)$ $\begin{bmatrix} \text{Because Zinc Blende is ZnS} \\ \text{Argentite is } Ag_2S \\ \text{Galena is PbS} \end{bmatrix}$

19. Chemical formula of the product formed by heating gypsum at 373 K is

(A) $CaSO_4.H_2O$ (B) $CaSO_4 \cdot \dfrac{1}{2} H_2O$ (C) $CaSO_4 \cdot \dfrac{3}{2} H_2O$ (D) $CaSO_4.2H_2O$

Ans. **(B)**

Sol. $CaSO_4 \cdot 2H_2O \xrightarrow[\substack{OR \\ 373K}]{100°C} CaSO_4 \cdot \dfrac{1}{2}H_2O + \dfrac{3}{2}H_2O(\uparrow)$

gypsum   Plaster of paris

20. Which of the following reaction is a displacement reaction ?

(A) $2KClO_3 \longrightarrow 2KCl + 3O_2$ (B) $2H_2 + O_2 \longrightarrow 2H_2O$

(C) $Zn + 2HCl \longrightarrow ZnCl_2 + H_2$ (D) $N_2 + 3H_2 \longrightarrow 2NH_3$

Ans. **(C)**

Sol. $Zn + 2HCl\ ZnCl_2 + H_2$,

because according to reactivity series zinc is more reactive than hydrogen.

21. Which of the following elements would lose an electron easily :

(A) K   (B) Mg   (C) Na   (D) Ca

Ans. **(A)**

Sol. K, because its size is bigger than Na, Mg and Ca so, the valence electron in K will feel lesser nuclear force of attraction so it will require less energy to remove on electron.

22. The compound which contains both ionic and covalent bonds is

(A) CH_4 (B) Cl_2 (C) NaCN   (D) KCl

Ans. **(C)**

Sol. NaCN $\longrightarrow Na^+ CN^-$ (This is ionic bonding because ionic bonds are formed by transfer of e^-)

CN^- contains covalent bond. $(C \equiv N)^-$

23. In modern periodic table, the number of verticle columns are :

(A) 07   (B) 16   (C) 08   (D) 18

Ans. **(D)**

Sol. Factual statement

24. When steam is passed over red hot coke, which gas is formed

(A) CO_2 (B) $CO + H_2$ (C) NH_3 (D) $CO + N_2$

Ans. *(B)*

Sol.   C + H_2O $\longrightarrow$ $CO + H_2$ (Water gas)

red hot coke   (steam)

25. Brass is an alloy of

(A) Copper and Tin (B) Zinc and Lead (C) Lead and Tin (D) Copper and Zinc

Ans. *(D)*

Sol. Brass is an alloy of copper and Zinc (Cu + Zn).

26. A hydrocarbon contain 75% carbon, its empirical formula will be

(A) C_2H_2 (B) CH_4 (C) C_2H_6 (D) C_2H_4

Ans. *(B)*

Sol. Hydrocarbon contain 75% carbon then it has 25% hydrogen because hydrocarbon is made of carbon and hydrogen. So Emprical formula will be

C : H

75 : 25

$\dfrac{75}{12} : \dfrac{25}{1}$

6.25 : 25

1 : 4

So formula will be CH_4.

27. In which kingdom yeast is include according R.H. Whittaker :

(A) Protista (B) Fungi (C) Plantae (D) Monera

Ans. *(B)*

Sol. Five kingdom classification was given by Robert H. Whittaker in 1969. Living organisms can be classified into five major kingdoms : Monera, Protista, Fungi, Animalia & Plantae.

28. The main function of plasma membrane is to

(A) Prevent water from entering or leaving

(B) Act as a sieve, allowing only lipids to pass

(C) It take control of what will come in and go in the cell

(D) Move the cell from place to place.

Ans. *(C)*

Sol. The main function of plasma membrane is to regulate the movement of molecules inside and outside the cell.

29. One of the following is an incorrect statement about insulin. This is

(A) It is produced in Pancreas (B) It regulates growth and development of the body

(C) It regulates blood glucose level in body (D) Its deficiency in the body will cause diabetes.

Ans. *(B)*

Sol. Function of insulin in body → It regulates blood glucose level in body.

Its deficiency cause → Diabetes.

30. A child is of blood group 'O'. His parents with blood group 'A'. What will be the blood group of parents :

(A) $I^A I^A$ (B) $I^A I^O$ (C) $I^A I^B$ (D) $I^B I^B$

Ans. *(B)*

Sol. If

Mother   Father
$I^A I^O$ [Heterozygous] $I^A I^O$ [Heterozygous]

Blood groups are :-

♀ \ ♂	I^A	I^O
I^A	$I^A I^A$	$I^A I^O$
I^O	$I^A I^O$	$I^O I^O$

1/4 = O
3/4 = A
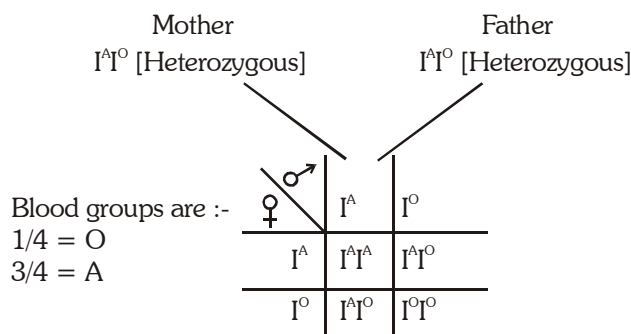
31. The oxygen liberated during photosynthesis by green plants comes from :

(A) Glucose   (B) Water   (C) Carbon dioxide   (D) Chlorophyll

Ans. *(B)*

Sol. In photosynthesis reaction $\rightarrow$ O_2 comes from splitting of water

Photolysis of water : $H_2O \longrightarrow 2H^+ + 2e^- + \boxed{\frac{1}{2} O_2}$
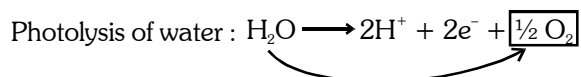
32. Sex determining chromosome is

(A) X   (B) Y   (C) Z   (D) O

Ans. *(B)*

Sol. Sex determinating chromosome in humans is Y.

Birth of male and female child depends on Y or X chromosomes of male, female always produce X chromosomes, so have no significant role in sex determination of offspring.

33. Biotic components of the ecosystem among the following is

(A) Producer   (B) Consumer   (C) Decomposer   (D) Above all

Ans. *(D)*

Sol. Biotic components of the ecosystem are the living components like producer, consumer, decomposer.

34. Lysosome is called as

(A) Suicide bag   (B) Kitchen of cell

(C) Power house of cell   (D) Protective covering of cell.

Ans. *(A)*

Sol. Lysosome is called as Suicidal bag.

35. The function of chlorophyll in photosynthesis is

(A) Absorbing light   (B) Breaking down water molecule

(C) No function   (D) Reduction of CO_2

Ans. *(A)*

Sol. The role of chlorophyll in photosynthesis is vital. Chlorophyll, which resides in the chloroplasts of plants, is the green pigment that is necessary in order for plants to convert CO_2 and water, using sunlight, into oxygen and glucose.

36. Which test is done for jaundice

(A) Vidal   (B) ELISA   (C) Billirium   (D) None of above

Ans. *(C)*

Sol. A bilirubin blood test determines the levels of bilirubin in the body when your body has too much bilirubin, your skin and the whites of your eyes will become yellow. This condition is called Jaundice.

37. Which of the following gas present in maximum amount in atmosphere

(A) Oxygen (B) Carbon dioxide (C) Hydrogen (D) Nitrogen

Ans. *(D)*

Sol. Percentage of gases in atmosphere :

(A) Oxygen $\longrightarrow$ 20.95%

(B) Carbon dioxide $\longrightarrow$ 0.04%

(C) Hydrogen $\longrightarrow$ Trace amount 0.00005

(D) Nitrogen $\longrightarrow$ 78.09%

38. Total number of bones present in human body are

(A) 205 (B) 206 (C) 207 (D) 208

Ans. *(B)*

Sol. Total number of bones present in human body are 206 (adult) and 270 bones at birth.

39. Vinita suddenly sees a tiger. Her heartbeat goes up and blood pressure increase. Which hormone is released at this time in her body

(A) Adrenaline (B) Thyroxine (C) Corticoid (D) Insulin

Ans. *(A)*

Sol. Adrenaline, also known as epinephrine, Adrenaline is a hormone released from the adrenal glands and its major action, together with noradrenaline, it prepares the body for Emergency condition.

40. Bending of growing shoot towards sunlight is called

(A) Phototropism (B) Hydrotropism (C) Geotropism (D) Chemotropism

Ans. *(A)*

Sol. Bending of growing shoot towards sunlight is called : phototropism (response to a light stimulus).

41. If any polynomial f(x) is divided by $x^2 - 9$, then remainder is $3x + 2$. If divided by it is $(x - 3)$ the remainder will be:

(A) –7 (B) 7 (C) 11 (D) –11

Ans. *(C)*

Sol. $f(x) = (x^2 - 9) q(x) + 3x + 2$

$f(3) = 0 + 9 + 2$

$f(3) = 11$

42. If a triangle ABC $\angle A = x°$, $\angle B = 3x°$ and $\angle C = y°$. If $3y - 5x = 30$, then the triangle type will be :

(A) Right angled triangle (B) Acute angled triangle

(C) Obtuse angled triangle (D) Right angled isosceles triangle

Ans. *(A)*

Sol. $x + 3x + y = 180°$

$4x + y = 180°$ ....(A)

$-5x + 3y = 30°$ .... (B)

$12x + 3y = 540°$

$-5x + 3y = 30°$

$\underline{+ \quad - \quad -}$

$17x = 510°$

$x = \dfrac{510}{17} = 30°$

$y = 60°$

$\angle A = 30°, \angle B = 90°, \angle C = 60°$

Right angled Δ.
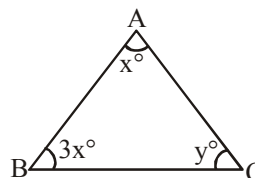
43. If system of equations has infintely many solutions of $(k - 4) x + 4y = k$ and $kx + ky = 16$, then the value of k will be

(A) ± 8 (B) -8 (C) 8   (D) 6

Ans. *(C)*

Sol. $(k - 4)x + 4y = k$

$kx + ky = 16$

infinitely many solutions

$$\frac{k-4}{k} = \frac{4}{k} = \frac{-k}{-16}$$

$k^2 = 64$

$k = \pm 8$

when $k = 8$

$$\frac{8-4}{8} = \frac{4}{8} = \frac{8}{16}$$

when $k = -8$

$$\frac{-8-4}{-8} \neq \frac{4}{-8} = \frac{-8}{16}$$

So, $k = 8$

44. Roots of the equation $2x^2 + 5x + 5 = 0$ will be

(A) real and equal   (B) real and not equal

(C) non-real and equal   (D) non-real and not equal

Ans. *(D)*

Sol. $2x^2 + 5x + 5 = 0$

$D = 5^2 - 4 \times 2 \times 5$

$= 25 - 40 < 0$

Roots are non real and not equal.

45. If $y = 1$ is a common root of the equations $ay^2 + ay + 3 = 0$ and $y^2 + y + b = 0$ then the value of ab will be

(A) 3   (B) $-\dfrac{7}{2}$ (C) 6   (D) -3

Ans. *(A)*

Sol. $ay^2 + ay + 3 = 0$

$y^2 + y + b = 0$

$y = 1$ is common root

$\therefore a + a + 3 = 0$

$2a = -3$

$a = \dfrac{-3}{2}$

$1 + 1 + b = 0$

$b = -2$

$ab = \dfrac{-3}{2} \times (-2) = 3$

46. If a sum of the nth terms of a arithmetic progression is $n^2 + 4n$. Then the 15th term will be

(A) 285 (B) 252 (C) 537 (D) 33

Ans. *(D)*

Sol. $S_n = n^2 + 4n$

$a_{15} = S_{15} - S_{14}$

$= [15^2 + 4(15)] - [14^2 + 4(14)]$

$= 29 + 4(1)$

$a_{15} = 33$

47. Pay ratio of three employee A, B and C is $2 : 3 : 5$. If their pay increases 15%, 10% and 5% respectively, then ratio of their pay will be

(A) $3 : 2 : 1$ (B) $15 : 10 : 5$ (C) $23 : 33 : 60$ (D) $46 : 66 : 105$

Ans. *(D)*

Sol. Pay ratio of A, B, C = $2 : 3 : 5$ pay increase by 15%, 10%, 5%

A = 2x

B = 3x

C = 5x

new payment

$A = \dfrac{115}{100} \times 2x$

$B = \dfrac{110}{100} \times 3x$

$C = \dfrac{105}{100} \times 5x$

New ratio = $\dfrac{115}{100} \times 2x : \dfrac{110 \times 3x}{100} : \dfrac{105 \times 5x}{100}$

$23 \times 2 : 22 \times 3 : 21 \times 5$

$46 : 66 : 105$

48. For a triangle whose vertices are (8, 6), (8, –2) and (2, –2) the co-ordinate of the circumcentre will be

(A) (5, 2) (B) (2, 5) (C) (–5, 2) (D) (2, –5)

Ans. *(A)*

Sol.
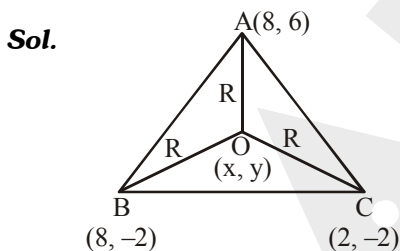
$OA = OB = OC = R$

(A) $OA^2 = OB^2$

$(x - 8)^2 + (y - 6)^2 = (x - 8)^2 + (y + 2)^2$

$(y - 6)^2 - (y + 2)^2 = 0$

$(-8)(2y - 4) = 0$

$y = 2$

(B) $OB^2 = OC^2$

$(x - 8)^2 + (y + 2)^2 = (x - 2)^2 + (y + 2)^2$

$(x - 8)^2 - (x - 2)^2 = 0$

$(2x - 10)(-6) = 0$

$x = 5$

∴ Coordinates of circumcentre in (5, 2)

49. $2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta)$ is equal to

(A) 0   (B) 1   (C) –1   (D) 2

Ans. *(C)*

Sol. $2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta)$

$2(1)(\sin^4\theta + \cos^4\theta - \sin^2\theta\cos^2\theta) - 3[\sin^4\theta + \cos^4\theta]$

$= -\sin^4\theta - \cos^4\theta - 2\sin^2\theta\cos^2\theta$

$= -[\sin^4\theta + \cos^4\theta + 2\sin^2\theta\cos^2\theta]$

$= -1$

50. The length of shadow of a tower on the plane ground is $\sqrt{3}$ times the height of the tower. The angle of elevation of sun is

(A) 45°   (B) 30°   (C) 60°   (D) 90°

Ans. *(B)*

Sol. angle of elevation of sun

$\tan\theta = \dfrac{h}{x}$

$\tan\theta = \dfrac{h}{\sqrt{3}h} = \dfrac{1}{\sqrt{3}}$

$\theta = 30°$
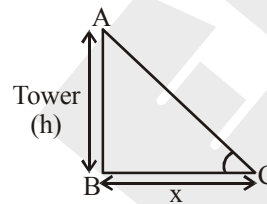
51. In the given figure, two circles touch internally. The sum of their areas is 116π cm^2 and difference between their radii is 6 cm. The radius of the big circle will be

(A) 14 cm   (B) 4 cm   (C) 10 cm   (D) 18 cm

Ans. *(C)*

Sol. $R - r = 6 \Rightarrow R = 6 + r$

$\pi R^2 + \pi r^2 = 116\pi$

$R^2 + r^2 = 116$

$(6 + r)^2 + r^2 = 116$
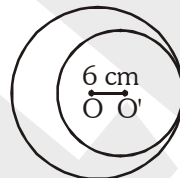
$2r^2 + 12r + 36 = 116$
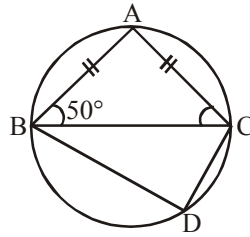
$2r^2 + 12r - 80 = 0$

$r^2 + 6r - 40 = 0$

$r = -10, +4$

∴ $r = 4$

$\Rightarrow R = r + 6 = 10$ cm

∴ $r = 4 \Rightarrow R = r + 6 = 10$ cm

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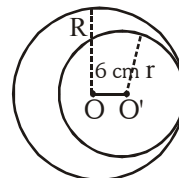
52. In the given figure ΔABC is an isosceles triangle with AB = AC and ∠ABC = 50°. Then the ∠BDC will be

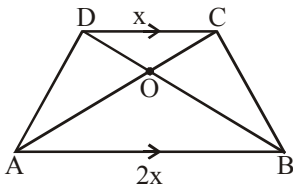(A) 80°   (B) 100°   (C) 90°   (D) 50°

Ans. (B)

Sol.
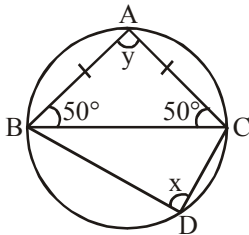
∠ABC = ∠ACB = 50°

y = 180° – 50° – 50° = 80°

x = 180° – 80° = 100°   (sum of opposite angles of a cyclic quadrilateral is 180°)

53. A trapezium ABCD is such that AB || DC. Their diagonals intersect each other at a point O. If AB = 2CD, then the ratio of the areas of ΔAOB and ΔCOD will be

(A) 4 : 1   (B) 2 : 1   (C) 1 : 2   (D) 1 : 4

Ans. (A)

Sol.

ΔAOB ∼ ΔCOD

$$\frac{ar(\Delta AOB)}{ar(\Delta COD)} = \left(\frac{AB}{CD}\right)^2 = \left(\frac{2}{1}\right)^2 = \frac{4}{1}$$

54. Which term of the A.P., 27, 24, 21, ... is zero ?

(A) 8th (B) 5th (C) 10th (D) 11th

Ans. (C)

Sol. 27, 24, 21, ...

a = 27, d = –3

$a_n = 0$

0 = 27 + (n – 1)(–3)

n – 1 = 9

⇒ n = 10

55. The volumes of two spheres are in the ratio 64 : 27. The ratio of the their surface area will be

(A) 1 : 2   (B) 2 : 3   (C) 9 : 16   (D) 16 : 9

Ans. *(D)*

Sol. Let radii of spheres be r_1 and r_2 respectively.

$$\frac{v_1}{v_2} = \frac{64}{27}$$

$$\frac{\frac{4}{3}\pi r_1^3}{\frac{4}{3}\pi r_2^3} = \frac{64}{27} \Rightarrow \frac{r_1}{r_2} = \frac{4}{3}$$

$$\frac{s_1}{s_2} = \frac{4\pi r_1^2}{4\pi r_2^2} = \left(\frac{r_1}{r_2}\right)^2 = \frac{16}{9}$$

56. From a solid circular cylinder with height 10 cm and radius of the base 6 cm, a right circular cone of the same height and same radius of base is removed. The volume of the remaining solid will be

(A) 360π cubic cm   (B) 120π cubic cm   (C) 240π cubic cm   (D) 480π cubic cm
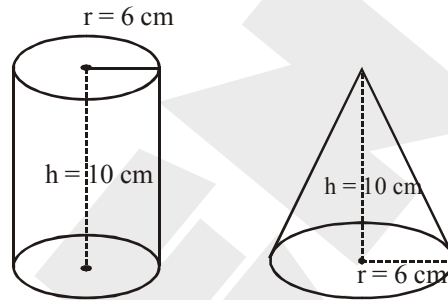
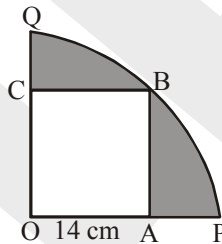**Ans.** *(C)*

Sol. $V_{cone} = \dfrac{1}{3} V_{cyl}$

Remaining volume $= \dfrac{2}{3} V_{cyl}$

$$= \frac{2}{3} \times \pi(36) \times 10$$
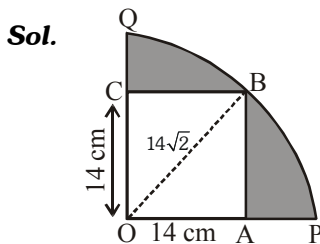
$$= 240\pi \text{ cm}^3$$

57. In the given figure a square OABC is inscribed in a quadrant OPBQ of a circle. If OA = 14 cm, then the area of the shaded region will be

(A) 308 square cm   (B) 196 square cm   (C) 112 square cm   (D) 504 square cm

Ans. *(C)*

Sol.

OB $= 14\sqrt{2} = r$

area of shaded region $= \frac{1}{4}\pi r^2 - (14)^2 = \frac{1}{4} \times \frac{22}{7} \times (14)^2 \times 2 - (14)^2$

$$= (14)^2\left[\frac{11}{7} - 1\right]$$

$$= \frac{14 \times 14 \times 4}{7} = 112 \text{ cm}^2$$

58. Mean of certain number is $\bar{x}$. If each observation is divided by $m(m \neq 0)$ and increased by n, then the mean of new observation will be
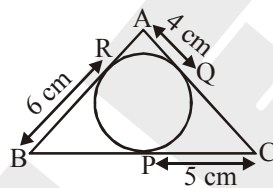
(A) $\frac{\bar{x}}{n} + m$ (B) $\frac{\bar{x}}{m} + n$ (C) $\bar{x} + \frac{n}{m}$ (D) $\bar{x} + \frac{m}{n}$

Ans. *(B)*

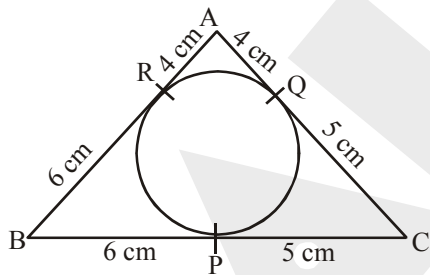*Sol.* Mean $= \bar{x}$

new mean $= \frac{\bar{x}}{m} + n$

59. In the given figure, the perimeter of $\triangle ABC$ will be

(A) 30 cm   (B) 60 cm   (C) 45 cm   (D) 15 cm

Ans. *(A)*

Sol.

AQ = AR = 4 cm, CP = CQ = 5 cm, BP = BR = 6 cm

Perimeter = (10 + 11 + 9) cm

       = 30 cm

60. Rajat opened a recurring deposit account in a branch of Central Bank Of India. He deposited ₹200 per month for three years. If he got an interest of ₹444, the rate of interest per annum will be

(A) 6%   (B) 5%   (C) 4%   (D) 3%

Ans. **(C)**

Sol. In Recuring deposit

Total amount $= Pn + \dfrac{PNr}{100}$

P $\rightarrow$ monthly instalment

r $\rightarrow$ rate % per annum

n $\rightarrow$ number of monthly installants

N = Period of recuring deposite $= \dfrac{n(n+1)}{24}$

$N = \dfrac{(3 \times 12)(37)}{24} = \dfrac{37 \times 3}{2} = \dfrac{111}{2}$

$200 \times 36 + 444 = 200 \times 36 + \dfrac{200 \times 111 \times r}{100 \times 2}$

$444 = 111 \times r \Rightarrow r = 4\%$

61. Who of the following made the painting 'Monalisa':

(A) Michel Angelo   (B) Behzaad   (C) Carlyle   (D) Leonardo da-Vinchi.

Ans. **(D)**

Sol. The monalisa is a half length portrait painting by the Italian Renaissance artist Leonardo-de-Vinci

62. What was the name of the party founded by Hitler:

(A) Germany National Party   (B) Nazi Party

(C) National Force   (D) Fasiyo.

Ans. **(B)**

Sol. German worker's party was renamed by Hitler into National Socialist German Worker's Party or Nazi Party in 1920.

63. Who was the first 'Tirthankar' of Jainism:

(A) Pashravnath   (B) Rishabhdeo   (2) Mahavir   (D) Chetak.

Ans. **(B)**

Sol. Rishabhdeo was first thirthankar.

64. Which of the following pair is not correct:

(A) End of cold war — 1998   (B) Merger of Vietnam — 1975

(C) India got independence — 1947   (D) Nigeria became independent — 1955.

Ans. **(D or Bonus)**

Sol. Nigeria become independent on October 1, 1963.

(Page - 139, 10th, History)

End of cold war - 1992

65. What are the factors affecting the construction of residential houses:

(a) Climate   (b) Condition of surface   (c) Social believes   (d) Industrialisation.

Choose the correct option:

(A) A, B, C and D   (B) A and D   (C) A, B and C   (D) B and D

Ans. **(A)**

Sol. ABCD, Self Explanation

66. During whose rule the Chinese traveller Fa-Hien came in India:

(A) Maurya Dynasty   (B) Shunga Dynasty   (C) Gupta Dynasty   (D) Kushan Dynasty.

Ans. **(C)**

Sol. Gupta Dynasty (Chandragupta-II)

67. When did America declare its liberation from England:

(A) 4 July 1776   (B) 15 My 1876   (C) 1 January 1786   (D) 4 July 1861.

Ans. **(A)**

Sol. 4th July, 1776 was independence day for USA.

68. Which of the following statement is false about Mahatma Gandhi's 'Dandi March':

(A) It happened in 1930   (B) With this Quit India Movement has started

(C) It started from Sabarmati Ashram   (D) Gandhi Ji broke the salt resolution.

Ans. **(B)**

Sol. Quit India movement started in 1942 while Dandi March in 1930.

69. Match the following structures with their respective rulers:

(a) Kutub Minar   1. Muhammed Adil Shah

(b) Gol Gumbad   2. Iltutmish

(c) Buland Darwaja   3. Aurangzeb

(d) Moti Mosque (Delhi)   4. Akbar.

Choose the correct option:

(A) a-4, b-3, c-2, d-1   (B) a-3, b-4, c-1, d-2   (C) a-2. M. c-4. d-3   (D) a-1, b-2, c-3, d-4

Ans. **(C)**

Sol. 1

70. When did tribal revolution 'Bhomkaal' occurred in Bastar?

(A) 1857   (2) 1876   (C) 1901   (D) 1910

Ans. **(D)**

Sol. 150 year history of protests and rebellion Bastar culminated in Bhookall Rebellion in 1910.

71. By what name Chhattisgarh area was known during Ramayan period

(A) Uttar Kosal   (B) Dakshin Kosal   (C) Chhattisgarh Desh   (D) Vidarbh

Ans. **(C)**

Sol. Dakshin Kosal was the name of Chattisgarh in Ramayan.

72. Match the following revolutionary events with its respective revolutionaries

(a) Raind Murder case (scam)   1. Ramprasad Bismil

(b) Kakori conspiracy case   2. Suryasen

(c) Central assembly bomb case   3. Barukeshwar Dutt

(d) Chatgaon armoury loot   4. Chhafekar Brothers

Choose the correct option:

(A) a-4, b-1, c-3, d-2   (B) a-2, b-4, c-1, d-3   (C) a-4, b-3, c-2, d-1   (D) a-3, b-1, c-2, d-4

Ans. **(A)**

Sol. Based on History of revolutionary freedom fighers in India.

73. The source of energy in future:

(A) Coal   (B) Sun   (C) Water   (D) Wind

Ans. *(B)*

Sol. The source of energy in future is Sun.

74. In India which of the following crops is sown most

(A) Kharif   (B) Rabi   (C) Zayad   (D) Some in all seasons

Ans. *(D)*

Sol. Some crops are grown in all seasons.

75. In the Himalayan range the change in vegetation is due to height along with the reasons given below:

1. Decrease in temperature

2. Changes in rain-falls

3. Unfertile soil

4. Strong winds

Choose the correct option:

(A) 1,2,3   (B) 2,3,4   (C) 1,2,4   (4) 1,2,3,4

Ans. *(A)*

Sol. Self explanatory.

76. According to forest area in Chhattisgarh state stands at which place in India:

(A) Fourth   (B) First   (C) Third   (D) Second

Ans. *(A)*

Sol. Acfording ot forest area Chattisgarh stands at third place.

77. Which layer of soil is important for agriculture:

(A) C and R   (B) C and B   (C) O and A   (D) A and B

Ans. *(C)*

Sol. O and A (page 78, Fig 2.1, 10th)

78. According to census 2011 in India, which of the following state has maximum density of population:

(A) Bihar   (B) Uttar Pradesh   (C) Maharashtra   (D) Punjab

Ans. *(A)*

Sol. Bihar has maximum density.

79. Among the following which one is related to 'Blue Revolution'in India:

(A) Indigo produce   (B) Tea garden   (C) Pisciculture   (D) Sericulture

Ans. *(C)*

Sol. Pisciculture is related to 'Blue Revolution'.

80. The following type of soil is found in the desert of Thar:

(A) Sandy soil   (B) Black soil   (C) Yellow soil   (D) Forest soil

Ans. *(A)*

Sol. Sandy soil is found in desert of thar.

81. In which hill Kodai Kenal is situated:

(A) Anamalai (B) Koyambatur (C) Bailadila (D) Palani

Ans. *(D)*

Sol. Kodaikanal is a small hilly town located on Palani Hills of Western Ghats.

82. Which continent is known as 'White continent':

(A) Europe (B) Asia (C) Antarctica (D) Australia

Ans. *(C)*

Sol. Antarctica

83. Through which degree latitude or longitude the tropic of cancer passes in India

(A) 23°30' Northern latitude (B) 26°3' Southern longitude

(C) 25°6' latitude (D) 17°8' Southern longitude.

Ans. *(A)*

Sol. 23°30' N

84. Math the following mineral table

(a) Energy mineral 1. Chromite

(b) Metal mineral 2. Granite

(c) Atomic mineral 3. Coal

(d) Secondary mineral 4. Thorium

Choose the correct option :

(A) a-3, b-1, c-4, d-2 (B) a-4, b-2, c-1, d-3 (C) a-3, b-4, c-2, d-1 (D) a-2, b-3, c-1, d-4

Ans. *(A)*

Sol. Chromite is ore of Chromium.

85. Which of the following does not take the oath of the office?

(A) President (B) Vice-President (C) Speaker (D) Prime Minister.

Ans. *(C)*

Sol. Speaker does not take any oath.

86. This economy was established through planning commission in India:

(A) Socialist economy (B) Mixed economy (C) Capitalist economy (D) Marxist economy.

Ans. *(B)*

Sol. Mixed Economy. India adopted mixed economy.

87. The Union Council of Ministers in collectively responsible to:

(A) The parliament (B) The President (C) The Rajya Sabha (D) The Lok Sabha.

Ans. *(D)*

Sol. Union Council of Ministers is collectively responsible towards the Lok Sabha.

88. What should be the quorum of females in the meetings of 'Gram-Sabha'?

(A) $\dfrac{1}{10}$ (B) $\dfrac{1}{6}$ (C) $\dfrac{1}{3}$ (D) $\dfrac{1}{5}$

Ans. *(A)*

Sol. $\dfrac{1}{10}$ should be the quorum for females in the meeting of Gram Sabha.

89. Who was the speaker of the inaugural session of Constituent Assembly?
(A) Dr. Bhim Rao Ambedkar   (B) Dr. Rajendra Prasad
(C) Pt. Jawahar Lai Nehru   (D) Sachidanand Sinha.

Ans. *(D)*

Sol. Sachidanand Sinha was the speaker of inageuralisession.

90. Which of the following are the emergency powers of president of India?
(A) President's rule in the states   (B) Amenesty of the criminals
(C) Appointment of ministers   (D) Appointments of Prime Minister

Ans. *(A)*

Sol. Article 356.

91. Indian constitution defines India as:
(A) A union of the states   (B) A quasi federal
(C) A federation   (D) A co-operative federation.

Ans. *(A)*

Sol. Article-1

92. The name of the speaker of present Lok Sabha is:
(A) Smt Sumitra Mahajan   (B) Smt. Meera Kumar
(C) Shri Venkaiya Naidu   (D) Shri Omprakash Birla

Ans. *(D)*

Sol. Present Loksabha Speaker is Omprakash Birla.

93. What does demonetisation mean?
(A) To remove old currency   (B) The decline value of currency
(C) To restrict printing currency due to recession   (D) To fix the international value of currency.

Ans. *(A)*

Sol. Demonetisation mean to remove old currency.

94. Which of the following accounts gives maximum rate of interest?
(A) Saving account   (B) Current account
(C) Fixed deposit account   (D) Monthly deposit account

Ans. *(C)*

Sol. Fixed deposite account gies maximum rate of interest.

95. Who issues currency note in India?
(A) Finance ministry   (B) State Bank of India
(C) Reserve Bank of India   (D) Finance Secretary.

Ans. *(C)*

Sol. Reserve Bank of India issues currency notes.

96. Assume that there are 5 families in a group whose average per capita income is Rs. 4000/-. If the average per capita income of these families turns to 5000/- in next two year, then we can say that:
(A) Level of the group is decreased
(B) The income of all persons has definitely increased
(C) Group level has improved
(D) Income of all persons has decreased.

Ans. *(C)*

Sol. Group level has improved.

97. What is the abbreviation of public distribution system of the country?

(A) FCA   (B) ICDS   (C) PDS   (D) MDM

Ans. *(C)*

Sol. PDS : Public Distribution System.

98. 'Saubhagya Web Portal has been launched by the government of India to track

(A) Gas connection holders   (B) Electrical connection holders

(C) Domestic violence in urban areas   (D) Clean India Movement.

Ans. *(B)*

Sol. Saubhagya web portal is for tracking electrical connections.

99. The father of the white revolution in India is considered as

(A) Dr. V. Kuriyan   (B) Swaminathan   (C) Norman Borlaug   (D) Saim Pitroda

Ans. *(A)*

Sol. Dr. V. Kuriyan is father of white revolution.

100. The biggest source to increase the government revenue is

(A) Loan   (B) Tax   (C) Profit   (D) Budget

Ans. *(B)*

Sol. Tax is the biggest source of Revenue.