SCHOLASTIC APTITUDE TEST (SAT) SOLUTION

101.

Sol. (4) Faraday

102.

Sol. **(3)** Kelvin

103. **[1]**

Sol. 1 ly = 9.46×10^{15} m

$\Rightarrow$ 1m = $\frac{1}{9.46 \times 10^{15}} = 1.057 \times 10^{-16}$ly

104.

Ans. **[2]**

Sol. $E = \frac{hc}{\lambda}$

$\Rightarrow$ $E \alpha \frac{1}{\lambda}$

$\therefore$ $\lambda_B = 0.3\ \mu m$

$\lambda_A = 0.7\ \mu m$

$\Rightarrow$ $E_B > E_A$

105.

Ans. (3)

Sol. Infra red rays

106.

Ans. (2)

Sol. $\frac{1}{Re_q} = \frac{1}{R_1} + \frac{1}{R_2} + ... \frac{1}{R_n}$

$= \frac{1}{R} + \frac{1}{R} + \ldots\ldots \frac{1}{R}$ (n times)

$\frac{1}{Re_q} = \frac{n}{R} \Rightarrow Re_q = \frac{R}{n}$ R = 4

$\because$ $Re_q = \frac{4}{n}$

107. $v = \frac{2d}{t}$

$\Rightarrow d = \frac{vt}{2}$

$= \frac{1440 \times 1.5}{2}$

$= 720$

$= 1.80$ km

Ans. **[2]**

108. $k_1 = k_2$

$\Rightarrow \frac{P_1^2}{2m_1} = \frac{P_2^2}{2m_2}$

$\Rightarrow \frac{P_1}{P_2} = \sqrt{\frac{m_1}{m_2}}$

$\Rightarrow \frac{P_1}{P_2} = \sqrt{\frac{1}{4}}$

$\Rightarrow \frac{P_1}{P_2} = \frac{1}{2}$

Ans. **[3]**

109. ${}^{w}\mu_g = \frac{{}^{a}\mu_g}{{}^{a}\mu_w}$

$= \frac{\frac{3}{2}}{\frac{4}{3}}$

$= \frac{9}{8}$

Ans. **[4]**

110. For maximum equivalent resistance all resistance are connected series \.

$R_{max} = R_1 + R_2 + \ldots\ldots$

$= 0.1 + 0.1 + \ldots\ldots$ 10 times

$= 0.1 \times 10$

$= 1\ \Omega$

for Minimum.

All resistance are connected in parallel

$$\frac{1}{R_{min}} = \frac{1}{R_1} + \frac{1}{R_2} + ...$$

$$\Rightarrow \frac{1}{R_{min}} = \frac{1}{0.1} + \frac{1}{0.1} + ...\frac{1}{0.1}$$

$$\Rightarrow \frac{1}{R_{min}} = \frac{10}{0.1}$$

$\Rightarrow R_{min} = 0.01\ \Omega$

$R_{min} < R_{eq.} < R_{max}$

$= 1\,\Omega < Req. < 1\,\Omega$

Ans. **[3]**

111. Specific resistance more & melting point high.

Ans. **[1]**

112. Water is optical rarer & wax is optical rarer & T.I.R possible when light come from optical denser to optical rarer medium.

Ans. **[2]**

113.

(A) (B) (C) (D)

Ans. **[1]**

Sol. For second pendulum

T = 2 sec.

$F = \frac{1}{T}$

$= \frac{1}{2}$

$F = 0.5\ H_Z$

114.

Ans. **[3]**

Sol. $\frac{K_1}{K_2} = \frac{9}{4}$

$$\Rightarrow \quad \frac{\frac{P^2}{2m_1}}{\frac{P^2}{2m_2}} = \frac{9}{4}$$

$\Rightarrow \quad \frac{m_2}{m_1} = \frac{9}{4}$

$\Rightarrow \quad \frac{m_1}{m_2} = \frac{4}{9}$

115. $M^{2t} = 2,18,14$

$M = 2,8,14,2$

Mass number = 56

Atomic number = 26

Number of neutrons = At. Wt. – At. No

= 56 – 26 = 30

116. $CH_3COOH + C_2H_5OH \rightarrow CH_3COOC_2H_5 + H_2O$

Acetic acid Ethylalcohol Ethyl acetate

117. $Al_2O_3 + 6HCl \rightarrow 2AlCl_3 + 3H_2O$

acid

$Al_2O_3 + 2NaOH \rightarrow 2NaAlO_2 + H_2O$

Sodium meta aluminate

So Al_2O_3 is amphoteric oxide

18. Potash alum $\rightarrow K_2SO_4 . Al_2(SO_4)_3 . 24H_2O$

119. $[OH^-] = 1 \times 10^{-10}$ mol/ℓ

$= 10^{-10}$ M

$P^{OH} = -10g\,[OH^-]$

$= -10g\,[10^{-10}]$

$\therefore \log m^n = n\log m$

$P^{OH} = 10$

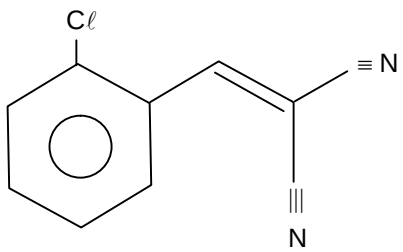
$P^H + P^{OH} = 14$

$P^H = 14 - P^{OH}$

$= 14 - 10$

$P^H = 4$

120. Teargas $\rightarrow$ Chloropicrin ($C_{10}H_5ClN_2$)



121. Number of Carbon atom in Kerosene $\rightarrow$ $C_{11} - C_{16}$

122. Baking Soda $\rightarrow$ $NaHCO_3$

123. Acidic Solvents are $\rightarrow$ those who donate proton

124. **[3]**

Sol. Method to purity the colloidal solution is $\Rightarrow$
Dialysis – In which removal of true solution particle from colloidal solution.

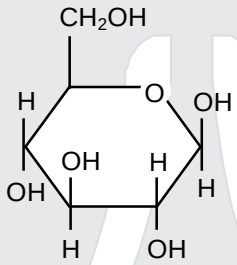
125. **[4]**

Sol. Dispersion of any liquid in a liquid $\rightarrow$ Emulsion

126. **[1]**

Sol. Hydrolysis of starch

Starch + Water $\rightarrow$ Glucose



127. **[2]**

Sol. Amalgam is $\rightarrow$ Alloy with Mercury

181. **[1]**

Sol. $\cos\theta \cdot \sqrt{\sec^2\theta - 1}$

$\cos\theta \cdot \sqrt{\tan^2\theta}$ $\quad (\because \sec^2 - 1 = \tan^2\theta)$

$\cos\theta \cdot \tan\theta$

$\cos\theta \times \dfrac{\sin\theta}{\cos\theta}$

$= \sin\theta$

182. **[2]**

Sol. We know that $-1 \le \sin x \le 1$

$\therefore$ Max volume of sin x = 1

$\therefore$ x = $x = \dfrac{\pi}{2}$

183. **[3]**

Sol. $2x + 3y + z = 0$

We know that if $a + b + c = 0$

Then, $a^3 + b^3 + c^3 = 3abc$

$\therefore$ $(2x)^3 + (3y)^3 + (z)^3 = 3(2x)(3y)(z)$

$= 8x^3 + 27y^3 + z^3 = 18xyz$

$\therefore \quad \frac{8x^3 + 27y^3 + z^3}{xyz} = \frac{18xyz}{xyz}$

= 18

184. [2]

Sol. $2x + \frac{4}{x} = 9$

$2x^2 - 9x + 4 = 0$

Sum of the roots = $\frac{-(-9)}{2}$

$= \frac{9}{2}$

185. [4]

Sol. Let the radii of two spheres be r_1 & r_2

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

Ratio of their surface area

$\frac{S_1}{S_2} = \frac{4\pi r_1^2}{4\pi r_2^2} \left(\frac{r_1}{r_2}\right)^2 \left(\frac{4}{3}\right)^2 = \frac{16}{9}$

186. [2]

Sol. H.C.F of $(a^2 - 1)$ and $p\,a^2 - q\,(a + 1)$ is $(a - 1)$. Therefore, $(a - 1)$ is the common factor for both the expressions.

$\therefore$ At $a = 1$, $p\,a^2 - q\,(a + 1) = 0$

$p \cdot 1^2 - q\,(1 + 1) = 0$

$p - 2q = 0$

$\therefore \; p = 2q$

187. [2]

Sol. Sum of all angles of hecagon = 720°

Let 5 angles each of x°

$\therefore$ 5x + 100 = 720

5x = 720 – 100 = 620

$x = \frac{620}{5}$

$\therefore$ each angle is124°

188. [1]

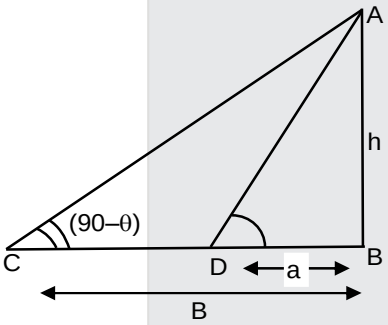
Sol. $$\frac{(0.7)^\circ-(0.1)^{-1}}{\left(\frac{3}{8}\right)^{-1}\cdot\left(\frac{3}{2}\right)^3+\left(-\frac{1}{3}\right)^{-1}}=\frac{1-10}{\frac{8}{3}x\frac{27}{8}+(-3)}=\frac{-9}{6}=\frac{-3}{2}$$

189. [4]

Sol. Let $\angle BDA = \theta$

$\therefore \angle BCA = (90-\theta)$

Let the height of the tower be h.



In Δ ABC, $\tan\theta = \frac{h}{BD}$

$\Delta \tan\theta = \frac{h}{a}$

In Δ ABC, $\tan(90-\theta) = \frac{h}{BC} = \frac{h}{b}$

$\therefore \text{Cot}\theta = \frac{h}{b}$ $\quad (\because \tan\theta = \frac{h}{a})$

$\therefore \frac{a}{h} = \frac{h}{b}$ $\quad \therefore h^2 = ab$, $h = \sqrt{ab}$

190. [4]

Sol. $$p = x+\frac{1}{x} = \frac{x^2+1}{x}$$

$$p-\frac{1}{p}=\frac{x^2+1}{x}-\frac{x}{x^2+1}$$

$$= \frac{x^4+1+2x^2-x}{x(x^2+1)}=\frac{x^4+x^2+1}{x^3+x}$$

191. **[3]**

Sol. $\log_5[\log_2(\log_3 x] = 0$

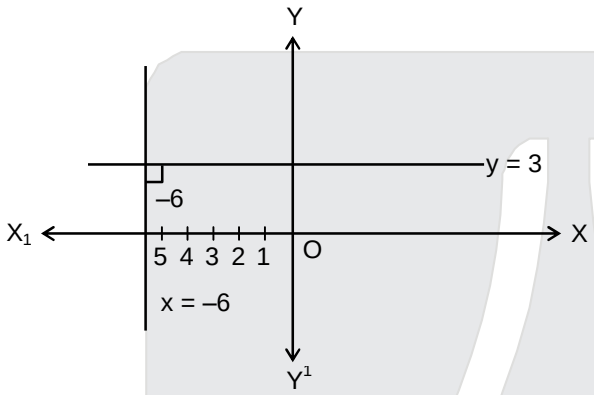
$\therefore \log_2(\log_3 x) = 5° = 1$

$\log_3 x = 2^1 = 2$

$x = 3^2 = 9$

192. **[2]**

Sol.



$6 + x = 0$

$\therefore x = -6$

$3 - y = 0$

$\therefore y = 3$

Angle between the lines = 90°

193. **[2]**

Sol. 6, 8, 2x – 5, 2x – 1, 15, 17, 20, 22

No. of terms = 8 (even)

$\therefore$ Median $= \dfrac{4^{th}\text{Obs.} + 5^{th}\text{Obs.}}{2}$

$\therefore 14 = \dfrac{2x - 1 + 15}{2}$

$28 = 2x + 14$

$\therefore 2x = 14$

194. **[3]**

Sol. $A' = \{1, 2, 7, 8\}$

$B' = \{2, 4, 6, 8\}$

$\therefore A' - B' = \{1, 7\}$

195. [3]

Sol. $\frac{1}{3}C^2 - 2C - 9 = \frac{1}{3}C^2 - 3C + C - 9$

$\frac{1}{3}C(C-9) + 1(C-9)$

$= \left(\frac{1}{3}C+1\right)(C-9)$

$= (C+3)\left(\frac{1}{3}C-3\right)$

196. [1]

Sol. Ratio of share of A, B, C = $\frac{1}{4}:\frac{2}{5}:1\frac{3}{8}$

$= \left(\frac{1}{4}:\frac{2}{5}:\frac{11}{8}\right) \times 40$

$\therefore$ A : B : C = 10 : 16 : 55

Share of A = $\frac{10\times 810}{81}$ = 100 Rs.

197. [4]

Sol. Radius of wheel = 0.25m

Distance covered in 1 revolution = $2 \times \pi \times 0.25$

No. of revolution in 11 km = $\frac{110000\times 7}{0.5\times 22}$ = 0.5πm = 7000

198. [1]

Sol. 1, 3, 5, ... , 49

$\therefore$ 49 = 1 + (n – 1)2 $\quad\therefore$ n = 25

$\therefore$ sum of all odd numbers $\frac{25}{2}(1 + 49) = 25 \times 25 = 625$

199. [2]

Sol. Let the age of son be x yrs.

$\therefore$ age of father = 7x yrs

2 yrs ago, age of son = (x – 2) yrs.

age of father = (7x – 2) yrs.

A/Q, (7x – 2) = 13(x – 2)

7x – 2 = 13x – 26

2A = 6x $\quad\therefore$ x = 4

$\therefore$ age of father = 7 × 4 = 28 yrs.

200. [3]

Sol. $\ell \times b = a$ $\quad b \times h = b$ $\quad \ell \times h = c$

$\therefore \ell \times b \times b \times h \times \ell \times h = a\ b\ c$

$(\ell bh)^2 = abc$

$\therefore \ell bh = \sqrt{abc}$

$\therefore$ twice of the volume $= 2\sqrt{abc}$

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