NATIONAL TALENT SEARCH EXAMINATION-2018-19, UP

SCHOLASTIC APTITUDE TEST (SAT) HINTS & SOLUTIONS

Solution PHYSICS

101. [2]→ When object at C image at C

102. [1]→$I=\frac{Q}{T}=\frac{15}{5}=3A$

103. [4] Image is formed at retina

104. [3] 1kWh = 3.6×10^{6} J

105. [1] Generator converts mechanical energy to Electrical energy.

106. [4] $\mu=\frac{C}{V}=\frac{C}{\mu}=2\times10^{8}$ m/sec

107. [3] $R_{rated}=\frac{V^2_{rated}}{P_{rated}}=484\Omega$

Now V = 110 V ; R = 484 Ω

$P=\frac{V^2}{R}=25$ Watt

108. [2] $P=\frac{1}{f}=\frac{100}{20}=5D$

109. [3]

$\frac{1}{V}=\frac{1}{f}+\frac{1}{u}=\frac{25}{150}$

$\Rightarrow$ V = 6 cm

110. [1] minimum distance to hear echo = 17 m

111. [2] Solar cells are used in satellite.

112. [1] At 4ºC density is maximum hence volume for same mass is minimum

$\therefore\ V_1 > V_2$

113. [4] each resistance after cutting $\rightarrow \frac{R}{5}$

When connected in parallel $\rightarrow \frac{R}{25}$

$\frac{R}{R'} = 25$

CHEMISTRY

114. Ans.(1)

MO formula of amide

$\overset{+2}{M}\ \overset{-2}{M}$ Valency of element M is +2

So the phosphate of element is

$\overset{+2}{M}\ \overset{-3}{PO_4}$

$M_3(PO_4)_3$

115. Ans.(3)

Solid CO_2 is also called dry Ice.

116. Ans.(2)

F-have maximum electro negativity

117. Ans.(4)

$2HgO \xrightarrow{\Delta} 2Hg + O_2$

118. Ans. (3)

HgS is called cinnabar

119. Ans. (2)

–CHO is functional group of ethanal

120. Ans. (4)

pH of water is = 7

121. Ans. (1)

$C_2H_5OH \rightarrow$ ethanol

122. Ans. (3)

Oxalic acid present in tomato

123. Ans. (4)

15 ml NaOH neutralize to = 10 ml HCl

them 30 ml NaOH neutralize to 20 ml HCl

124. Ans. (2)

Baking soda = $NaHCO_3$

125. Ans. (4)

Displacement reaction

126. Ans. (3)

If aluminium carbide react with water them aluminium hydroxide and methane will produce.

$Al_4C_3 + 12\ H_2O \rightarrow 4Al\ (OH)_3 + 3CH_4$

Mathematics

181. $P(x) = 2x^3 + 5x^2 - 9x - 18$

$\alpha\beta = 3$ .....(1)

$\alpha\beta\gamma = \frac{-(-18)}{2} = 9$

$3\gamma = 9$

$\gamma = 3$

$\alpha + \beta + \gamma = \frac{-5}{2}$

$\alpha + \beta = \frac{-5}{2} - 3 = \frac{-11}{2}$

$\beta = \frac{-11}{2} - \gamma$ ..... (2)

Using (1) & (2)

$\alpha\left(\frac{-11}{2} - \alpha\right) = 3$

$\alpha^2 + \frac{11}{2}\alpha + 3 = 0$

$2\alpha^2 + 11\alpha + 6 = 0$

$\alpha = \frac{-11 \pm \sqrt{121 - 48}}{4} = \frac{-11 \pm \sqrt{73}}{4}$

Which not in option, so it is bonus

182. $x - y = 2$

$\underline{x + y = 4}$

$2x = 6$

$x = 3$

$y = 1$

$a = 3$, $b = 1$

Which not in option, so it is bonus

183. A (– 1 , 4), B (5 , 2) and C (x , y)

$\frac{-1+5+x}{3}=0$ $\qquad$ $\frac{4+2+y}{3}=-3$

$4 + x = 0$ $\qquad$ $6 + y = – 9$

$x = – 4$ $\qquad$ $y = – 15$

$\Rightarrow (– 4 , – 15)$

184. (i) $\tan\theta + \sin\theta = m$

$\tan\theta – \sin\theta = n$

$(\tan^2\theta – \sin^2\theta) = m \cdot n$ $\qquad$ .....(1)

$m + n = 2\tan\theta$

$m – n = 2\sin\theta$

$(m + n)(m – n) = 4\tan\theta\sin\theta$

from equ. (1)

$\frac{\sin^2\theta}{\cos^2\theta} – \sin^2\theta = m \cdot n$

$\sin^2\theta\left(\frac{1-\cos^2\theta}{\text{cosec}^2\theta}\right) = n \cdot n$

$\tan^2\theta \sin^2\theta = mn$

$\tan\theta \sin\theta = \sqrt{mn}$

$4\tan\theta\sin\theta = 4\sqrt{n.m}$

put $4\tan\theta\sin\theta = m^2 – n^2$

$m^2 – n^2 = 4\sqrt{n.m}$

185. $\frac{x_1 + x_2 + ... + x_{35}}{35} = 75$

$(x_1 + x_2 + ... + x_{35}) = 75 \times 35 = 2625$ $\qquad$ ..... (1)

$(x_1 + ... + x_{18}) = 70 \times 18$ $\qquad$ ..... (2)

$(x_{18} + ... + x_{35}) = 80 \times 18$ $\qquad$ ..... (3)

equation (2) + (3)

$(x_1 + ... + x_{18}) + (x_{18} + ... + x_{35}) = 18 (70 + 80)$

$(x_1 + ... + x_{35}) + x_{18} = 150 \times 18$

$2625 + x_{18} = 2700$

$x_{18} = 2700 – 2625 = 75.$

186. $x = \frac{1}{3-2\sqrt{2}}$ $y = \frac{1}{3+2\sqrt{2}}$

$x = \frac{3+2\sqrt{2}}{\left(3-2\sqrt{2}\right)\left(3+2\sqrt{2}\right)}$ $y = \frac{1\left(3-2\sqrt{2}\right)}{\left(3+2\sqrt{2}\right)\left(3-2\sqrt{2}\right)}$

$x = \frac{3+2\sqrt{2}}{1}$ $y = \frac{3-2\sqrt{2}}{1}$

$x + y = 3+2\sqrt{2} + 3-2\sqrt{2} = 6.$

187. Option (a)

188. Let number of sides = n

$n \times 18° = 360°$

$n = \frac{360}{18} = 20°$

$n = 20°.$

189. $\frac{(x+1) + (x+3) + (x+4) + (x+8)}{4} = \frac{4x+16}{4}$

$= x + 4.$

190. P(–6, 8), O(0, 6)

$OP = \sqrt{(-6-0)^2+(s-0)^2} = \sqrt{36+64}$

$\sqrt{100} = 10.$

191.

	A	B
Income	9x	4x
Expenses	3y	y

Save = Income – Expenses

1000 = 9x – 3y .....(1)

1000 = 4x – y ..... (2)

(1) – (2) × 3

1000 = 9x – 3y

3000 = – 12x – 3y

– – +

– 2000 = – 3x

$x = \frac{2000}{3}$

Income of B = $4x = 4 \times \frac{2000}{3} = \frac{8000}{3}$

Answer not in option.

So it is Bonus.

192. Let side of 1st square = a_1

Let side of 2nd square = a_2

Area of first square = a_1^2

Area of second square = a_2^2

$a_1^2 + a_2^2 = 468$

perimeter $p_1 = 4a_1$

$p_2 = 4a_2$

$4(a_1 + a_2) = 120$

$a_1 + a_2 = 30$

$(a_1 + a_2)^2 = 900$

$a_1^2 + a_2^2 + 2a_1a_2 = 900$

$468 + 2(30 - a_2)(a_2) = 900$

$2a_2(30 - a_2) = 900 - 468 = 432$

$-a_2^2 + 30a_2 = 216$

$a_2^2 - 30a_2 + 216 = 0$

$a_2^2 - 18a_2 - 12a_2 + 216 = 0$

$a_2(a_2 - 18) - 12(a_2 - 18) = 0$

$(a_2 - 12)(a_2 - 18) = 0$

$a_2 = 12$

$a_1 = 18$

Difference 18 – 12 = 6.

193. (A_1) area of $\Delta ABC = 48$

(A_2) area of $\Delta AEF = 12$

$$\left(\frac{A_1}{A_2}\right) = \left(\frac{BC}{EF}\right)^2$$

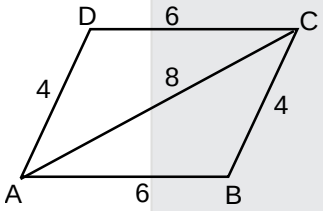
Given EF = 3

$$\frac{48}{12} = \left(\frac{BC}{3}\right)^2$$

$$4 = \left(\frac{BC}{3}\right)^2$$

BC = 2 × 3 = 6.

194.



Area Δ ABC

$$s = \frac{6+4+8}{2} = 9$$

$$\Delta = \sqrt{9\times3\times5\times1}$$

$$= 3\sqrt{15}$$

Area of parallelogram = 2 area triangle = $6\sqrt{15}$

195. Cone

radius = 4x

height = 2y

Volume = $\frac{1}{3}\pi(4x^2) \times (2y)$

Cylinder

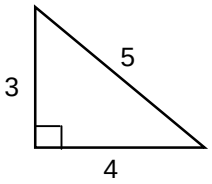
radius = 3x

height = 3y

$V_2 = \pi\,(3x)^2\,(3y)$

$$\frac{V_1}{V_2} = \frac{\frac{1}{3}\pi(16x^2)(2y)}{\pi 9x^2 \times 3y} = \frac{32}{81}$$

196.



$\sin\theta = \frac{3}{5}$

$\cos\theta = \frac{4}{5}$

$\sin 2\theta = 2\sin\theta\cos\theta = \frac{2\times3}{5} \times \frac{4}{5} = \frac{24}{25}$.

198. Let $x = .6666.....$ $y = .7777.....$

$10x = 6.666.....$ $10y = 7.777.....$

$x = .6666.....$ $y = .7777.....$

$9x = 6$ $9y = 7$

$x = \frac{6}{9}$ $y = \frac{7}{9}$

$x + y = \frac{6}{9} + \frac{7}{9} = \frac{13}{9} = 1.\overline{4}$.

199. $\left(x + \frac{1}{x}\right) = \sqrt{3}$ are $x^3 + \frac{1}{x^3} + 3x \times \frac{1}{x}\left(x + \frac{1}{x}\right) = \left(\sqrt{3}\right)^3$

$x^3 + \frac{1}{x^3} + 3\left(\sqrt{3}\right) = 3\sqrt{3}$

$x^3 + \frac{1}{x^3} = 0$.

200. $5^{x+1} + 5^{2-x} = 126$

$5^x \cdot 5^1 + \frac{5^2}{5^x} = 126$

Let $5^x = y$

$5y + \frac{25}{y} = 126$

$5y^2 - 126y + 25 = 0$

$5y^2 - 125y - y + 25 = 0$

$5y(y - 25) - 1(y - 25) = 0$

$(5y - 1)(y - 25) = 0$

$y = \frac{1}{5}, 25 \quad \Rightarrow x = -1, 1$