NATIONAL TALENT SEARCH EXAMINATION-2018, RAJASTHAN

SCHOLASTIC APTITUDE TEST (SAT) HINTS & SOLUTIONS

1. Constant speed means equal distance in equal interval of time.

∴ In graph (A) and graph (D) slope is constant

2. Recoil velocity

$$V = \frac{mv}{M} = \frac{50 \times 10^{-3} \times 10^2}{10} = \frac{1}{2} = .5 \text{ m/s} = \text{Ans (3)}$$

3. h × u² ………….(i)

100 × u² ………….(ii)

h × (2u)² ………….(iii)

3 ÷ 2

$$= \frac{h}{100} = \frac{4u^2}{u^2} = h = 400$$

4. Acceleration due to gravity (g) = $\frac{GM}{R^2}$

Universal gravitation constant = G

$$\frac{g}{G} = \frac{M}{R^2}$$

5. frequency = $\frac{1}{\text{time period}}$

$$= \frac{1}{\text{sec}} = \text{Hertz}$$

6. frequency $^{(n)}$ = 10 Khz

=10×10³ Hz

λ = 3mm

= 3 × 10⁻³ m

V = nλ

V = 3 × 10⁻³ × 10 × 10³

V = 30 m/s

$$V = \frac{D}{T}$$

$$T = \frac{3}{30} = 0.1 \text{ sec}$$
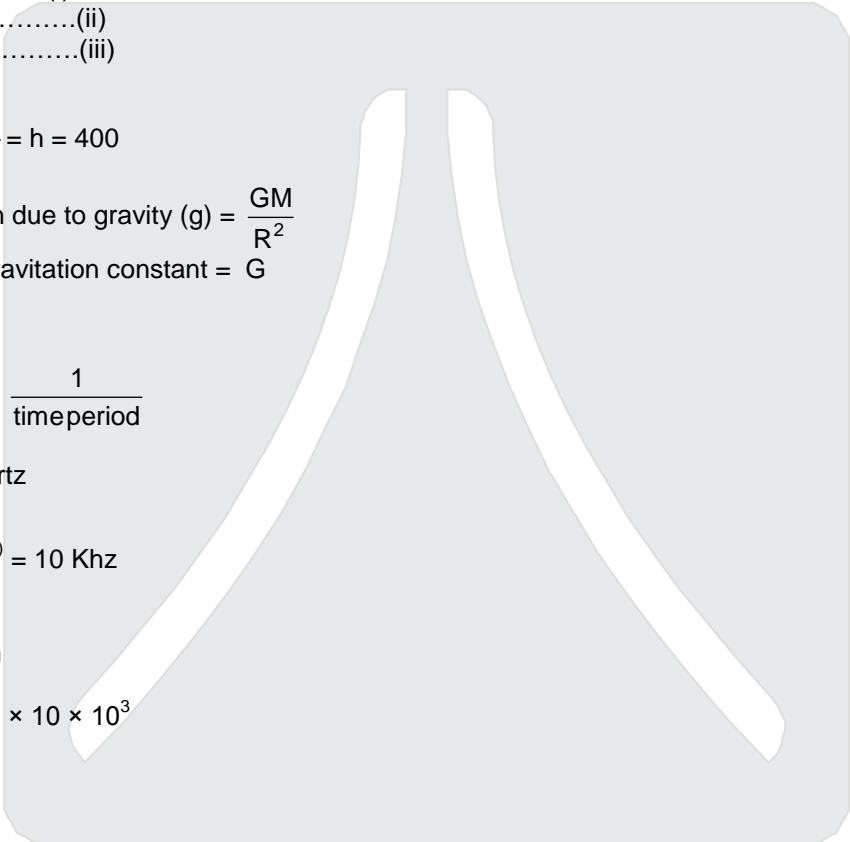
7. Size of Image = size of object image will be formed at centre of curvature.

8. F = 30 cm

u = –15cm

$$m = \frac{1}{V} - \frac{1}{u} = \frac{1}{f}$$

$$\frac{1}{V} + \frac{1}{15} = \frac{1}{30}$$

$$\frac{1}{V} + \frac{1}{30} - \frac{1}{15}$$
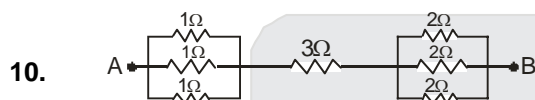
$$= \frac{1-2}{30}$$

$\dfrac{1}{V} = -\dfrac{1}{30}$

$V = -30$

$M = +\left(\dfrac{v}{u}\right)$

$= \dfrac{30}{15} = 2$

9. $P = k$

Resistivity does not depend on length and area.

10.

$\text{Req} = \dfrac{1}{3} + 3 + \dfrac{2}{3}$

$= \dfrac{1+9+2}{3} = \dfrac{12}{3} = 4\Omega$

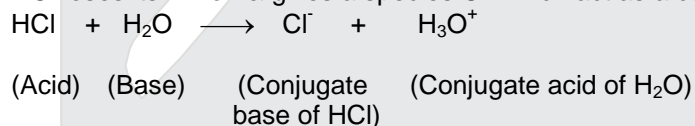**11.** $\dfrac{\text{No. of appliance} \times \text{power (watt)} \times \text{time (Hours)}}{1000}$

energy (KWH) $= \dfrac{4 \times 1000(6) \times 30}{1000} = 72$ KWh

Cost of electricity $= 72 \times 5 = 360$ Rs.

12.   According to snow rule deflection at point A and B the needle will deflect but in opposite diretion .

13.   When light goes from rarer to denser medium it bends towards the normal.

14.   **(3)**

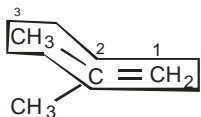HCl loses its H^+ ion & gives a species Cl^- which act as a conjugate base.

$HCl \;+\; H_2O \;\longrightarrow\; Cl^- \;+\; H_3O^+$

(Acid)   (Base)   (Conjugate   (Conjugate acid of H_2O)
                        base of HCl)

15.   (3) As per the theory

Plaster of Paris is $\longrightarrow$ $CaSO_4 \cdot \frac{1}{2} H_2O$

$CaSO_4 \cdot 2H_2O \xrightarrow{\;373K\;} CaSO_4 \cdot \frac{1}{2} H_2O$

16.   (2)

Chloroform on oxidation form phosgene gas which is toxic, therefore to deaccelerate the reaction we pour ethanol solution so that this reaction does not occur

17.   (4)

Lithium $\longrightarrow$ Metal

Sodium $\longrightarrow$ Metal

Sulphur $\longrightarrow$ Non Metal

Silicon $\longrightarrow$ Metalloid

| Educating for better tomorrow	**Corporate Office :** CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.)- 324005 **Head Office:** Plot No. A-51 [A], IPIA, Near Resonance CG Tower **Contact : 8824078330**	
	Website :www.pccp.resonance.ac.in	**E-mail :** pccp@resonance.ac.in	**SOL. SAT (RAJASTHAN)**
	Toll Free : 1800 258 5555	**CIN:** U80302RJ2007PLC024029	**NTSE STAGE-I-2018 PAGE-2**

18. (2)

2 – methyl -1- propene. (Numbering start from double bonded carbon.)

19. (4)

Nylon-66 formed by the condensation of adipic acid and hexamethylene diamine.
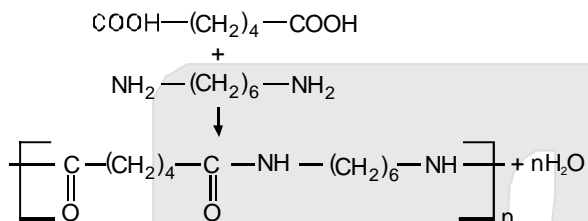
20. (2)

On heating ammonium chloride is sublime while sodium chloride not. So sublimation is the suitable method to separate sodium chloride and ammonium chloride.

21. (2)

$\because$ 28 gram Nitrogen (N_2) contain = 6.022×10^{23} molecules

$\therefore$ 14 gram N_2 contain = $\dfrac{6.022 \times 10^{23}}{28} \times 14$ = 3.011×10^{23} molecule

22. (1)

Atomic number of sulphur = 16

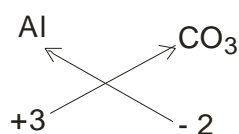Electonic configuration = $\begin{array}{ccc} K & L & M \\ 2 & 8 & 6 \end{array}$

23. (3)

Elements of d – block show more than one valency.

Iron (Fe) show variable valency because it is a d- block element.

Iron shows 2 & 3 valency i.e. Fe^{+2} (ferrous) and Fe^{+3} (ferric)

24. (1)

$Al_2 (CO_3)_3$

Chemical formula of aluminium carbonate.

25. (1)

Freon – 112 $\longrightarrow$ $C_2F_2Cl_4$

Nomenclature of freone : - Freon - XYZ

X = number of carbon atom -1

Y = number of H – atom +1

Z = number of F – atom

$C_2F_2Cl_4 \longrightarrow$ X = 2 – 1 = 1

           Y = 0 + 1 = 1

           Z = 2

Freon – 112

|	Corporate Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.)- 324005	
Resonance® Educating for better tomorrow	Head Office: Plot No. A-51 [A], IPIA, Near Resonance CG Tower **Contact : 8824078330**	
	Website :www.pccp.resonance.ac.in | E-mail : pccp@resonance.ac.in	**SOL. SAT (RAJASTHAN)**
	Toll Free : 1800 258 5555 | CIN: U80302RJ2007PLC024029	**NTSE STAGE-I-2018 PAGE-3**

26. (1)

Mg is metal which forms ionic compound with Cl which has high melting point.

$$Mg + Cl_2 \longrightarrow MgCl_2$$

41. $\dfrac{3+2\sqrt{3}}{3-\sqrt{3}} \times \dfrac{3+\sqrt{3}}{3+\sqrt{3}} = a + \sqrt{3}\,b \qquad \Rightarrow \qquad \dfrac{9+3\sqrt{3}+6\sqrt{3}+6}{9-3} = a + \sqrt{3}\,b$$

$$\Rightarrow \qquad \dfrac{15+9\sqrt{3}}{6} = a + \sqrt{3}\,b \qquad \Rightarrow \qquad \dfrac{5}{2} + \dfrac{3}{2}\sqrt{3} = a + \sqrt{3}\,b$$

$$\sqrt{a+b} = \sqrt{\dfrac{5}{2} + \dfrac{3}{2}} = \sqrt{4} = 2.$$

42. D = 0

$p^2 - 4(2)(8) = 0$

$p^2 = 64$ $\boxed{p = 8}$

$px^2 + px + k = 0$

D = 0

$p^2 - 4(p)\,k = 0$

$p - 4k = 0$

$4k = 8$

$k = 2.$

43. $x^2 - px - p - k \Big\langle \begin{smallmatrix} \alpha \\ \beta \end{smallmatrix}$

$\alpha + \beta = p \qquad \alpha\beta = -p - k$

$\alpha + \beta + \alpha\beta + 1 = 6$

$\Rightarrow \qquad p - p - k + 1 = 6$

$k = -5$

44. End digit of $6^{18} = 6$

End digit $5^{10} = 5$

Answer = 6 − 5 = 1

45.

$\angle P + \angle Q + R = 180°$

2x + 80 + 70 = 180°

2x = 30°

x = 15°
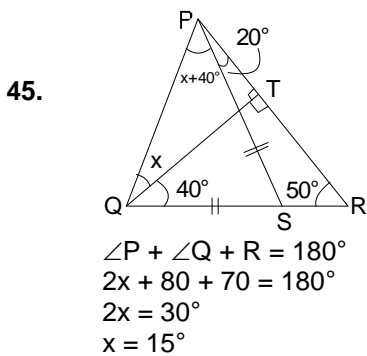
46. $20, 19\frac{1}{4}, 18\frac{1}{2}, \ldots\ldots$

$T_n < 0$

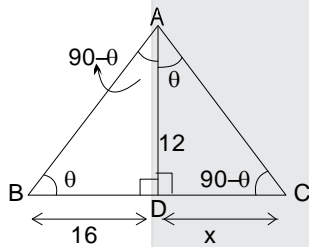$20 + (n-1)\left(-\frac{3}{4}\right) < 0$

$20 - \frac{3(n-1)}{4} < 0$

$80 - 3n + 3 < 0$

$3n > 83$

$n > 27\frac{2}{3}$

n = 28.

47.

$\Delta ABD \sim \Delta CAD$

$\frac{AB}{AC} = \frac{BD}{AD} = \frac{AD}{CD}$

$\frac{BD}{AD} = \frac{AD}{CD}$

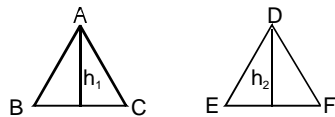$\frac{16}{12} = \frac{12}{x}$

$x = \frac{12 \times 12}{16}$

x = 9 m

48. $(m^2 + n^2) \cos^2 B$

$= \left(\frac{\cos^2 A}{\cos^2 B} + \frac{\cos^2 A}{\sin^2 B}\right) \cos^2 B$

$= \frac{\cos^2 A \sin^2 B + \cos^2 A \cos^2 B}{\cos^2 B \sin^2 B} \cdot \cos^2 B$

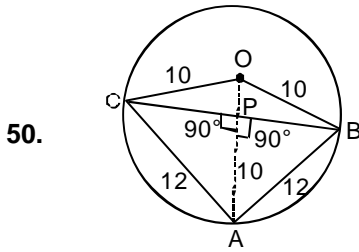$= \frac{\cos^2 A}{\sin^2 B}(\sin^2 B + \cos^2 B) = \frac{\cos^2 A}{\sin^2 B} = n^2.$
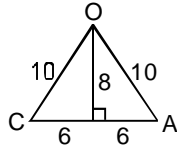
49.

$\Delta ABC \sim \Delta DEF$

$\frac{h_1}{h_2} = \frac{4}{9}$

$\frac{ar(\Delta ABC)}{ar(\Delta DEF)} = \left(\frac{h_1}{h_2}\right)^2 = \left(\frac{4}{9}\right)^2 = \frac{16}{81}$
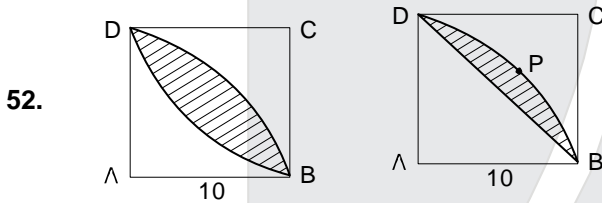
16 : 81.

50.

Sides = 10, 12, 10
CP = 9.6
BC = 9.6 × 2 = 19.2

51. a – 9, a – 7, a – 5, a – 3, a – 1, a + 1, a + 3, a + 5, a + 7, a + 9.

mean = $\dfrac{10a}{10}$ = 120 $\Rightarrow$ a = 120.

mean of first five number = $\dfrac{5a-25}{5}$ = a – 5 = 120 – 5 = 115.

52.

Area of sector (DAB) = $\dfrac{\pi \cdot (10)^2}{4}$ = 25π

Area (ΔDAB) = $\dfrac{1}{2}$ × 10 × 10 = 50

Area of segment (DPB) = 25π – 50

So, area of shaded region = 2 (25π – 50)

= 50 $\left(\dfrac{22}{7} - 2\right)$ = 100 $\left(\dfrac{11}{7} - 1\right)$ = 100 $\left(\dfrac{11-7}{7}\right)$ = $\dfrac{400}{7}$ unit^2.
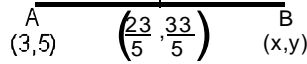
53. h = 14, r_2 = 2 cm, r_2 = 1 cm

Volume = $\dfrac{\pi}{3}$ ($r_1^2 + r_2^2 + r_1 r_2$) h

= $\dfrac{22}{7}$ (4 + 1 + 2) $\dfrac{14}{3}$

= $\dfrac{44 \times 7}{3}$ = $\dfrac{308}{3}$ cm^3.

54.

$\dfrac{23}{5}$ = $\dfrac{2x+9}{2+3}$ $\Rightarrow$ 23 = 2x + 9 $\Rightarrow$ 14 = 2x $\Rightarrow$ x = 7.

And $\dfrac{33}{5}$ = $\dfrac{2y+15}{2+3}$ $\Rightarrow$ 2y + 15 = 33 $\Rightarrow$ 2y = 18 $\Rightarrow$ y = 9.

Corporate Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.)- 324005
Head Office: Plot No. A-51 [A], IPIA, Near Resonance CG Tower **Contact : 8824078330**
Website :www.pccp.resonance.ac.in | **E-mail :** pccp@resonance.ac.in
Toll Free : 1800 258 5555 | **CIN:** U80302RJ2007PLC024029
SOL. SAT (RAJASTHAN)
NTSE STAGE-I-2018 PAGE-6

55. In leap year there are 366 days which contains 52 weeks + 2 days.
52 weeks contains 52 mondays and the remaining 2 days can be
(M, T), (T, W), (W, Th), (Th, F), (F, Sat), (Sat, Sun), (Sun, M)
So there are 7 possibility for 2 days. out of which 2 of the cases our favorable cases.

So required probability = $\dfrac{2}{7}$.

56. $2\pi r = d + 60$
$\Rightarrow 2\pi r = 2r + 60$
$\Rightarrow r(2\pi - 2) = 60$
$\Rightarrow r = \dfrac{60}{2(\pi - 1)} = \dfrac{30}{\pi - 1}$.

Circumference = $2\pi r = \dfrac{2\pi \cdot (30)}{\pi - 1} = \dfrac{60\,\pi}{\pi - 1} = \dfrac{60\,\pi}{\dfrac{22}{7} - 1} = \dfrac{60\,\pi}{15} \times 7 = 28\pi$.

57.
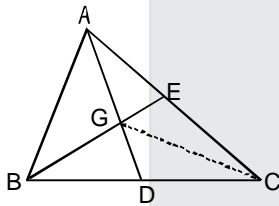
GD is median
ar (ΔBGD) = ar (ΔGDC) = 1
$\therefore$ ar(AGC) = 2
ar (ΔGEC) = 1
$\therefore$ ar (DCEG) = 1 + 1 = 2.

58. $180° = \pi^{C}$

$1° = \left(\dfrac{\pi}{180}\right)^{C}$

$60°30' = \left(60\dfrac{1}{2}\right)^{\circ} = \dfrac{\pi}{180°}\left(\dfrac{121}{2} \times \dfrac{\pi}{180}\right)^{C} = \dfrac{121}{360}\pi^{c}$.

59. r_1 $A_1 = 4\pi r_1^{2}$

$r_2 = 0.75\, r_1 = \dfrac{3}{4}\, r_1$

$A_2 = 4\pi r_2^{2} = 4\pi \cdot \dfrac{9}{16}\, r_1^{2} = \dfrac{36}{16}\,\pi r_1^{2}$

$\Delta A = A_1 - A_2 = \left(\dfrac{64}{16} - \dfrac{36}{16}\right)\pi r_1^{2} = \dfrac{28}{16}\,\pi r_1^{2}$.

% Decrease in surface area = $\dfrac{\dfrac{28}{16}\,\pi r_1^{2}}{4\pi r_1^{2}} \cdot 100 = \dfrac{28}{16} \times 100$

$= \dfrac{7}{6} \times 100 = \dfrac{700}{16} = 43.75\%$

60. Let $a = x - y$
        $b = y - z$
        $c = z - x$
$a + b + c = x - y + y - z + z - x = 0$
$\therefore$ $a^3 + b^3 + c^3 = 3abc$
$(x - y)^3 + (y - z)^3 + (z - x)^3 = 3(x - y)(y - z)(z - x)$.

SOL. SAT (RAJASTHAN)
NTSE STAGE-I-2018 **PAGE-7**

Resonance® Educating for better tomorrow	**Corporate Office :** CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.)- 324005
	Head Office: Plot No. A-51 [A], IPIA, Near Resonance CG Tower **Contact : 8824078330**
	Website : www.pccp.resonance.ac.in **| E-mail :** pccp@resonance.ac.in
	Toll Free : 1800 258 5555 **| CIN:** U80302RJ2007PLC024029

SOL. SAT (RAJASTHAN)
NTSE STAGE-I-2018 PAGE-8

Corporate Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.)- 324005
Head Office: Plot No. A-51 [A], IPIA, Near Resonance CG Tower **Contact : 8824078330**
Website :www.pccp.resonance.ac.in | **E-mail :** pccp@resonance.ac.in
Toll Free : 1800 258 5555 | **CIN:** U80302RJ2007PLC024029

SOL. SAT (RAJASTHAN)
NTSE STAGE-I-2018 PAGE-9