NTSE-2017 (Stage-I)
SOLUTIONS

SAT

1. (2)

$$a = -8 \text{ m/s}^2$$
$$v = u + at$$
$$o = u - 8 \times 3$$
$$u = 24 \text{ m/sec}$$
$$s = ut + \frac{1}{2}at^2$$
$$s = 24 \times 3 - \frac{1}{2} \times 8 \times 9$$
$$s = 72 - 36$$
$$s = 36 \text{ m}$$

2. (1)

$$Pi = Pt$$
$$\frac{10}{1000} \times 100 + 10 = \left(\frac{10}{1000} + 1\right)V$$
$$t = (1.01)\ V$$
$$v \simeq 1 \text{ m/sec.}$$

3. (3)
Density of liquid

4. (1)

$$1 \text{ unit} = 1 \text{ kwh} = 3.6 \times 10^6 \text{ J}$$
$$200 \text{ unit} = 200 \times 3.6 \times 10^6 \text{ J}$$
$$= 72 \times 10^7 \text{ J}$$
$$= 7.2 \times 10^8 \text{ J}$$

5. (1)
Speed of sound will be maximum in solids. So speed is maximum in glass.

6. (1)

$$w = \frac{wg}{6}$$
$$= 15 \times \frac{9.8}{6}$$
$$w = 24.5 \text{ N}$$

7. (4)

$$w = \frac{1}{2}mv^2 - \frac{1}{2}mu^2$$

$$u = 18 \times \frac{5}{18} = 5 m/s$$

$$v = 72 \times \frac{5}{18} = 20 m/s$$

$$w = \frac{1}{2} \times 2(400 - 25) = 375 J$$

8. (2)
Between the principle focus & centre of curvature.

9. (3)
For maximum angle of Refraction, speed is maximum.

10. (3)
Tyndall effect.

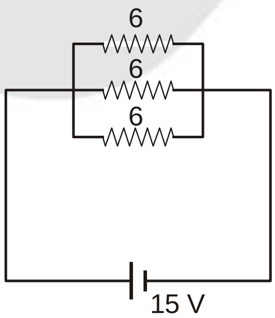
11. (3)
By fleming's left hand Rule.

12. (3)

$$Req = \frac{6}{3} = 2\Omega$$

$$i = \frac{15}{2} = 7.5 A$$

$$i = \frac{i}{3} = \frac{7.5}{3} = 2.5 A$$



13. (2)
10^6 K

14. (3)

$$\frac{W_B}{W_{A+W_B}} \times 100 = \frac{30}{250} \times 100 = 12\%$$

15. (1)
Cheese is an example of Gel.

16. (2)
Fractional Distillation.

17. (4)
Mg_{12} 2, 8, 2

18. (3)

$$\frac{4}{16} \times 6.02 \times 10^{23} = 1.505 \times 10^{23}$$

19. (4)
No of e^- in Al^{3+} and F^- is same
$Al^{3+} \rightarrow 13 - 3 = 10$
$F^- \rightarrow 9 + 1 = 10$

20. (4)
10.2 pH > 7 for basic solution

21. (3)
Ay does not react with O_2 at high temperature.

22. (2)
Aqua – Regia
$2Au + 3HNO_3 + 11HCl \longrightarrow 2HAucl_4 + 3NOCl + 6H_2O$

23. (3)
Potassium.

24. (3)
$$CH_3 - CH_2 - OH \xrightarrow[H_2SO_4]{\text{Hot,Conc.}} CH_2 = CH_2 + H_2O$$

25. (1)
Both Na and K have same electronic configuration of valance shell.

26. (3)
Methanol is added to ethanol to make it unfit for drinking.

27. (4)
Besides nucleus, mitochordria and chloroplast have DNA.

28. (3)
Bryophytes are considered as Amphibians of plant kingdom.

29. (4)
Sclerenchyma tissue provide mechanical support to plant.

30. (4)
Cytokinin induces cell division.

31. (3)
In PTC undifferentiated mass of cell are called callus.

32. (1)
Amrita devi Vishnoi was involved in chipko movement in Khejarli in Marwar, Rajasthan in 1730 it was related to plant conservation movement.

33. (1)
Ultraviolet radiations causes more harm to ozone layer.

34. (3)
Lysosomes are called suicidal bags.

35. (4)
Stratified squamous epithelium present on lining of oesophagus.

36. (3)
Only Ascaris belong to Aschelminthes with triploblastic and pseudocoelomate, while others are platyhelminthes with triploblastic and acoelomates.

37. (4)
Echidna platypus is only oviparous mammal.

38. (2)
Normal blood pressure in Human is 120/80 mm of Hg.

39. (1)
Brain and spinal form central Nervous system.

40. (4)
Raja Saurus is an example of dinosaur genus of carnivorous Abelisaurian theropod with an unusual head crest.

41. (2)

$x + y + 3x^{1/3}y^{1/3}(x^{1/3} + y^{1/3})$

$\Rightarrow (x^{1/3} + y^{1/3})^3$

So, cube root is $(x^{1/3} + y^{1/3})$

42. (2)

$0.\overline{23} + 0.2\overline{3}$

$\Rightarrow 0.23232323 \ldots\ldots\ldots\ldots. + 0.2333333$

$\Rightarrow 0.465656565 \ldots\ldots\ldots$

$\Rightarrow 0.4\overline{65}$

43. (1)

$x = -\sqrt{2}$

so $K(-\sqrt{2})^2 - (\sqrt{2})(-\sqrt{2}) + 1 = 0$

$2K + 2 + 1 = 0$

$2K + 3 = 0$

$K = -3/2$

44. (3)

$3x + 2y = 13xy$

$4x - 5y = 2xy$

$12x + 8y = 52xy$

$\pm 12x \mp 15y = -6xy$

$23y = 46xy \quad \Rightarrow y = 0 \text{ or } x = \frac{1}{2}$

for $y = 0 \Rightarrow x = 0$

for $x = \frac{1}{2} \Rightarrow y = \frac{1}{3}$ point are (0, 0) and $\left(\frac{1}{2}, \frac{1}{3}\right)$

45. (1)

$\tan\theta = \frac{h}{9} \qquad \tan(90^\circ - \theta) = \frac{h}{16}$

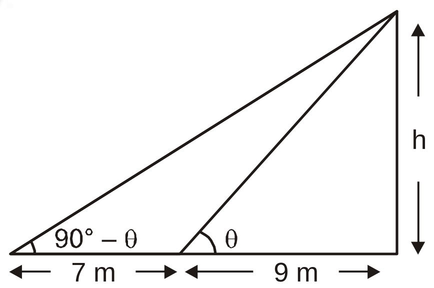
$\tan\theta = \frac{h}{9} - (1) \qquad \cot\theta = \frac{h}{16} - (11)$

(1) × (11)

$\Rightarrow \frac{h^2}{16 \times 9} = 1$

$h^2 = 16 \times 9$

$h = 4 \times 3 = 12$



46. (4)

$\sin\theta = p$

$\cos\theta = q$

$\Rightarrow \frac{p - 2p^3}{2q^3 - q}$

$\Rightarrow \frac{p(1-2p^2)}{q(2q^2-1)} = \frac{\sin\theta(1-2\sin^2\theta)}{\cos\theta(2\cos^2\theta - 1)}$

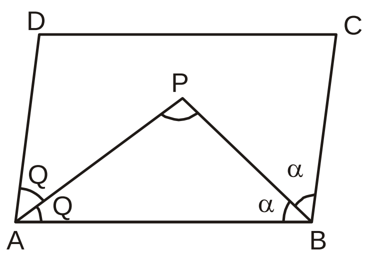
$= \tan\theta$

47. (4)

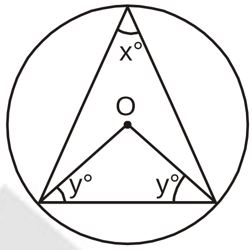
$2Q + 2\alpha = 180^\circ$

$Q + \alpha = 90^\circ$

So, $\angle APB = 90^\circ$

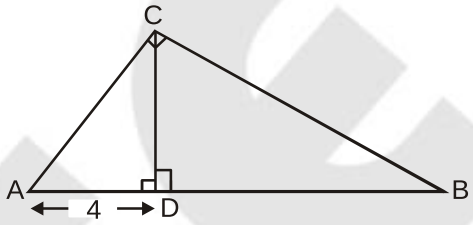


48. (1)



$$\angle OAB' = \angle OBA = y°$$
$$\angle AOB = 2\angle ACB = 2x°$$
$$2x + 2y = 180°$$
$$x + y = 90°$$

49. (1)



$$\angle C = \angle D$$
$$\angle B = \angle B$$
$$\angle A = \angle BCD$$

So $\Delta CBA \sim DBC$

$$\frac{BC}{BD} = \frac{AB}{BC} = \frac{AC}{DC}$$
$$\frac{BC}{9} = \frac{13}{BC}$$

So $BC^2 = 13 \times 9$

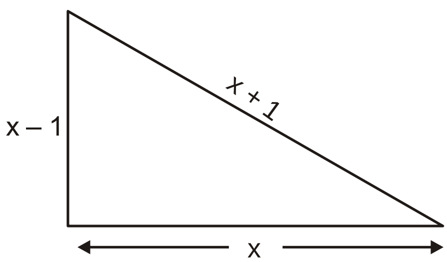
Similarly

$$\angle A = \angle A$$
$$\angle C = \angle D$$
$$\angle B = \angle ACD$$
$$\Delta ACB \sim \Delta ADC$$
$$\frac{AC}{AD} = \frac{BC}{DC} = \frac{AB}{AC}$$
$$\frac{AC}{4} = \frac{13}{AC}$$

$\Rightarrow$ $AC^2 = 13 \times 4$

$$\frac{BC^2}{AC^2} = \frac{13\times 9}{13\times 4} = \frac{3}{2}$$
$$\frac{BC}{AC} = \frac{3}{2}$$

50. (3)



$$x^2 + (x-1)^2 = x^2 + 1 + 2x$$
$$x^2 + x^2 + 1 - 2x = x^2 + 1 + 2x$$
$$x^2 - 4x = 0$$
$$x = 4\text{cm}$$

Sides are 4, 5, 3
So perimeter = 12

51. (4)

$$2x^2 + 3kx + 8 = 0$$

Roots are equal so

$$b^2 - 4ac = 0$$

$\Rightarrow$ $9k^2 - 4(2)(8) = 0$

$\Rightarrow$ $9k^2 = 64$

$\Rightarrow$ $k^2 = \frac{64}{9}$

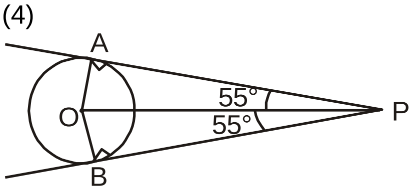
$\Rightarrow$ $k = \pm 8/3$

52. (1)

$$a + b + c = x - y + y - 2 + z - x = 0$$

so, $a^3 + b^3 + c^3 = 3(x-y)(y-z)(z-x)$

53. (4)



35° ($\because \angle APO = \angle BPO$)

54. (4)
Total cases = {TT, TH, HT, HH}

So required probability = $\frac{3}{4}$

55. (1)
tan 25° tan 35° tan 45° tan 55° tan 65°
tan 25° tan 35° tan 45° cot 35° tan 25° {as tan (90° – θ) = cot θ}
= 1

56. (1)

$$\frac{n}{2}[a+\ell] = 400$$

$$\Rightarrow \frac{n}{2}[5+45] = 400$$

$$\Rightarrow \frac{n}{2}[50] = 400$$

$$n = 16$$

so $a + (n-1)d = 45$

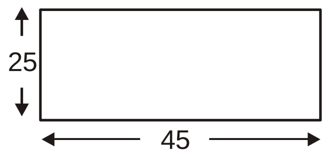
$\Rightarrow 5 + (15)d = 45$

$\Rightarrow 15d = 40$

$$d = \frac{8}{3}$$

$T_4 = a + (3)d = 13$

57.



$$\Rightarrow \frac{1}{4}(\pi(23)^2 - \pi(12)^2)$$

$$\Rightarrow \frac{1}{4}(\pi(23+12)(23-12))$$

$$\Rightarrow \frac{1}{4}\left[\frac{22}{7}\times 35\times 11\right]$$

$$\Rightarrow \frac{1}{4}[110\times 11]$$

$$\Rightarrow \frac{605}{2} = 302.5M.$$

58. (4)

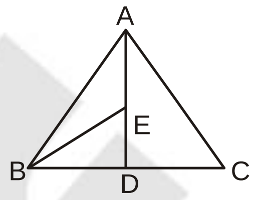
$$\frac{4}{3}\times\pi\times 6\times 6\times 6 = \pi\times 3\times 3\times h$$

$$32 = h$$

59. (2)

$$\text{Mode} = 3\text{ median} - 2\text{ Mean}$$
$$5 = 3(3) - 2(x)$$
$$2x = 4$$
$$x = 2$$

60. (3)



Let area of ABC $= x$

So, area of ABD $= \frac{x}{2}$

So, area of BED $= \frac{x}{4}$

So, ratio is $\frac{x}{x/4} = 4:1$