Rajasthan NTSE-2017-18 (Stage-I)
ANSWER KEYS

SAT

1. (4)	**2.** (3)	**3.** (4)	**4.** (2)	**5.** (2)	**6.** (1)	**7.** (3)	**8.** (4)	**9.** (1)	**10.** (2)
11. (1)	**12.** (4)	**13.** (4)	**14.** (3)	**15.** (3)	**16.** (2)	**17.** (4)	**18.** (2)	**19.** (4)	**20.** (2)
21. (2)	**22.** (1)	**23.** (3)	**24.** (1)	**25.** (1)	**26.** (1)	**27.** (3)	**28.** (3)	**29.** (3)	**30.** (2)
31. (3)	**32.** (1)	**33.** (3)	**34.** (3)	**35.** (2)	**36.** (4)	**37.** (1)	**38.** (4)	**39.** (1)	**40.** (3)
41. (3)	**42.** (2)	**43.** (4)	**44.** (3)	**45.** (3)	**46.** (3)	**47.** (2)	**48.** (2)	**49.** (4)	**50.** (3)
51. (2)	**52.** (2)	**53.** (1)	**54.** (3)	**55.** (2)	**56.** (2)	**57.** (1)	**58.** (2)	**59.** (3)	**60.** (2)
61. (2)	**62.** (3)	**63.** (1)	**64.** (4)	**65.** (2)	**66.** (4)	**67.** (2)	**68.** (1)	**69.** (3)	**70.** (2)
71. (4)	**72.** (3)	**73.** (2)	**74.** (4)	**75.** (2)	**76.** (3)	**77.** (1)	**78.** (4)	**79.** (2)	**80.** (4)
81. (3)	**82.** (1)	**83.** (2)	**84.** (3)	**85.** (4)	**86.** (3)	**87.** (1)	**88.** (2)	**89.** (2)	**90.** (3)
91. (2)	**92.** (3)	**93.** (2)	**94.** (4)	**95.** (4)	**96.** (1)	**97.** (3)	**98.** (4)	**99.** (1)	**100.** (4)

MAT

1. (2)	**2.** (4)	**3.** (1)	**4.** (3)	**5.** (2)	**6.** (1)	**7.** (3)	**8.** (4)	**9.** (1)	**10.** (3)
11. (2)	**12.** (3)	**13.** (1)	**14.** (2)	**15.** (4)	**16.** (2)	**17.** (3)	**18.** (1)	**19.** (1)	**20.** (3)
21. (1)	**22.** (2)	**23.** (3)	**24.** (4)	**25.** (3)	**26.** (2)	**27.** (4)	**28.** (3)	**29.** (2)	**30.** (2)
31. (4)	**32.** (3)	**33.** (1)	**34.** (4)	**35.** (4)	**36.** (3)	**37.** (1)	**38.** (4)	**39.** (2)	**40.** (4)
41. (2)	**42.** (1)	**43.** (3)	**44.** (2)	**45.** (3)	**46.** (4)	**47.** (1)	**48.** (3)	**49.** (1)	**50.** (3)

ENGLISH

1. (3)	**2.** (4)	**3.** (3)	**4.** (1)	**5.** (3)	**6.** (3)	**7.** (2)	**8.** (1)	**9.** (4)	**10.** (4)
11. (3)	**12.** (1)	**13.** (3)	**14.** (3)	**15.** (2)	**16.** (1)	**17.** (4)	**18.** (2)	**19.** (3)	**20.** (3)
21. (1)	**22.** (2)	**23.** (1)	**24.** (2)	**25.** (3)	**26.** (4)	**27.** (2)	**28.** (3)	**29.** (3)	**30.** (2)
31. (3)	**32.** (1)	**33.** (4)	**34.** (3)	**35.** (3)	**36.** (4)	**37.** (2)	**38.** (3)	**39.** (2)	**40.** (4)
41. (2)	**42.** (1)	**43.** (3)	**44.** (4)	**45.** (1)	**46.** (3)	**47.** (1)	**48.** (3)	**49.** (2)	**50.** (4)

SAT Solutions

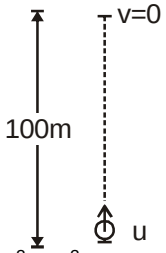
1. (A) Slope of distance time graph is constant for uniform speed
(D) Slope of velocity time graph is zero for uniform speed

2. $m_b = 50$ gm
$v_b = 100$ m/s
$m_g = 10$ kg
$v_g = ?$

$v_g = \quad v_g = \dfrac{-m_b v_b}{m_g} = \dfrac{-{}^{50}/_{1000} \times 100}{10}$

$$\boxed{v_g = \frac{1}{2} m/s}$$

3.



$v^2 - u^2 = 2g\,(100)$
$o - u^2 = -2g\,(100)$
$u^2 = 2g\,(100)$ ... (i)
and when initial velocity is doubled
$(2u)^2 = 2gH$ ... (ii)

$\dfrac{(ii)}{(i)} \quad \dfrac{2gH}{2g(100)} = \dfrac{4u^2}{u^2}$

$$\boxed{H = 400m}$$

4. $g = \dfrac{GM}{R^2}$

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

5. $f = \dfrac{1}{T}$

so, unit of frequency is $(\text{second})^{-1}$.

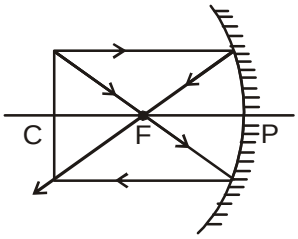
6. $v = \lambda f$
$v = 10 \times 1000 \times 3 \times 10^{-3}$

$$\boxed{v = 30 m/s}$$

$t = \dfrac{\text{distance}}{\text{speed}} = \dfrac{3}{30}$

$$\boxed{t = \frac{1}{10} = 0.1\,\text{sec.}}$$

7.



8. f = +30 cm

u = – 15 cm

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

$$\frac{1}{v}=\frac{1}{30}-\frac{1}{15}$$

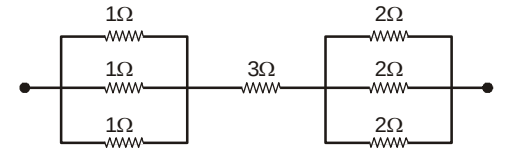
V = –30 cm

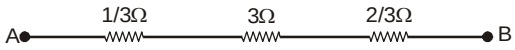
$$m=\frac{v}{u}=\frac{-30}{-15}=2$$

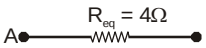
$$\boxed{m=2}$$

9. Resistivity do not depend on shape and size of material.

10.







$$\boxed{R_{eq}=\frac{1}{3}+3+\frac{2}{3}=4\Omega}$$

11. Total power = 4 × 100 = 400 w

Total energy = 400 × 6 × 30 = 72000 w - h

= 72 kwh

Total cost = 72 × 5 = 360 Rs.

13. When light travels from rarer to denser medium then light bends towards normal.

14. $HCl \xrightarrow{-H^+} Cl^{\ominus}$

acid Conjugate base

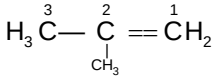
15. $CaSO_4.2H_2O \xrightarrow[100^0C]{-\frac{3}{2}H_2O} CaSO_4.\frac{1}{2}H_2O$

$CaSO_4.\frac{1}{2}H_2O$ formula of plaster of paris

16. C_2H_5OH slow down the process of reaction

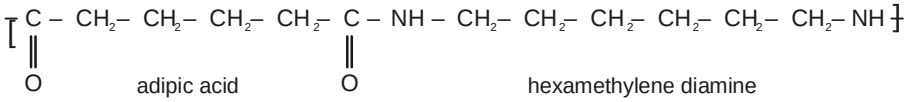
17. Non metal = Si have both property of metal and non metal

18.



2-methylprop-1-ene

19.



20. NH_4Cl + NaCl
sublime not sublime

21. $\text{mole} = \frac{w}{M}$ Molecular weight of $N_2 = 2 \times 14 = 28$

$= \frac{14}{28}$

$= ½$ $\text{mole} = \frac{N}{N_A}$

$\frac{1}{2} \times N_A = N$

$N = 3.011 \times 10^{23}$

22. $S \rightarrow$ K L M
16 2 8 6

23. $Fe \rightarrow Fe^{+2}, Fe^{+3}$

24. $Al_2(CO_3)_3$ $[Al^{+3} \times CO_3^{-2}]$

25. Freon – 112 is $C_2F_2Cl_4$

26. $Mg + Cl_2 \rightarrow MgCl_2$ (high MP/BP)
$MgCl_2$ is ionic compound ↓
ionic compound have high $Mg(OH)_2$
melting and boiling point water soluble

27. Sclerenchyma is simple permanent tissue in which lignin is present which makes it dead & it provides mechanical strength as in the fibrous covering of coconut.

28. Nucleus is the headquarter of the cell which control activities of cell and discovered by Robert Brown.

29. Cytokinin is a plant hormone which mainly control cell division & promote growth in plants.

30. As Lichens are SO_2 sensititive and can't grow in the area where sulphur dioxide pollution is present.

31. Cycas & Pinus are gymnosperms which are perennial, evergreen & woody.

32. Vacuole maintains the osmotic pressure in plants & maintain turgidity.

33. As sunlight, chlorophyll, CO_2 are the main elements essential for photosynthesis.

34. The nature of nerve impulse is both electrical & chemical, so electrochemical.

35. As uric acid is the main component of their excretory waste. So uricotelic.

36. Monohybrid Cross

Parents - Tall × dwarf
TT × tt

Gametes - (T) (T) (t) (t)

♀ / ♂	T	T
t	Tt	Tt
t	Tt	Tt

F_1 generation - Tt (tall)

selfing

Tt × Tt

Gametes - (T) (t) (T) (t)

♀ / ♂	T	t
T	TT	Tt
t	Tt	tt

F_2 generation - Phenotypic ratio - 3 : 1
tall : dwarf

Genotypic ratio - 1 : 2 : 1
TT : Tt : tt

37. Cartilage is skeletal connective tissue which forms endoskeleton of human body.

38. Echidna is a mammal & lay eggs & act as a connecting link between reptiles & mammals.

39. As it does not pass from one person to other, so non-communicable.

40. They have a pseudocoelom as the coelom is partially lined by the tissue derived from mesoderm.

41.
$$\frac{3+2\sqrt{3}}{3-\sqrt{3}} = \frac{3+2\sqrt{3}}{3-\sqrt{3}} \times \frac{(3+\sqrt{3})}{(3+\sqrt{3})}$$
$$= \frac{9+3\sqrt{3}+6\sqrt{3}+6}{9-3} = \frac{15+9\sqrt{3}}{6}$$
$$= \frac{15}{6} + \frac{9}{6}\sqrt{3}$$
$$= a + \sqrt{3}\,b$$
$$\therefore \quad a = \frac{15}{6} \quad b = \frac{9}{6}$$
$$\therefore \quad \sqrt{a+b} = 2$$

42. $2x^2 + px + 8 = 0$

$D = 0$

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

$p^2 = 4 \times 2 \times 8$

$p^2 = 64$

$p = 8$

$k = 2, p = 8$

$p(x^2 + x) + k = 0$

$px^2 + px + k = 0$

$D = 0$

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

$4pk = p^2$

$4k = p$

$4k = 8$

$k = 2$

43.

$x^2 - p(x + 1) - k = x^2 - px - p - k$

α, β are roots

$\alpha + \beta = p$

$\alpha\beta = -(p + k)$

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

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

$-(p + k) + p = 5$

$-p - k + p = 5$

$K = -5$

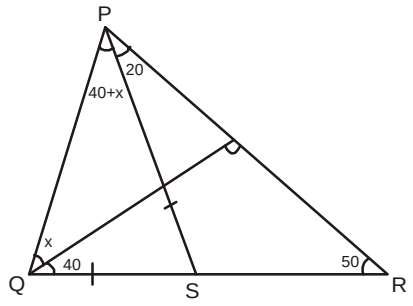
44. $6^{18} - 5^{10}$

unit digit of $6^{18} = 6$

unit digit of $5^{10} = 5$

$\therefore$ unit digit $= 6 - 5 = 1.$

45.



$PS = QS$

$\therefore \quad \angle QPS = 40 + x$

$\angle P + \angle Q + \angle R = 180$

$40 + x + 20 + 40 + x + 50 = 180$

$2x = 30$

$X = 15$

46. $20,\ 19\frac{1}{4},\ 18\frac{1}{2},.....$

$a = 20$ $\qquad d = \frac{-3}{4}$ $\qquad a_n = 0$

$a_n = a + (n - 1)d$

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

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

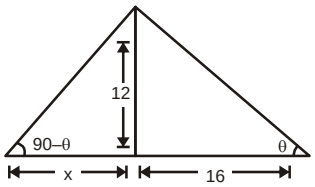
$3n - 3 = 80$

$3n = 83$

$n = \frac{83}{3} = 27.66$

$\therefore$ first negative term will be $28^{th.}$

47.



$\tan\theta = \frac{12}{16}$ $\quad \tan(90-\theta) = \frac{12}{x}$

$\cot\theta = \frac{12}{x}$

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

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

$x = 9$

48.

$m = \frac{\cos A}{\cos B} \qquad n = \frac{\cos A}{\sin B}$

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

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

$= \frac{1}{\sin^2 B \cos^2 B} \times \cos^2 A \cos^2 B$

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

49.

$\frac{(\text{Ratio of area})_1}{(\text{Ratio of area})_2} = \left(\frac{h_1}{h_2}\right)^2$

$= \left(\frac{4}{9}\right)^2 = \frac{16}{81}$

50.

$x^2 + y^2 = 100$

$X^2 + 9y^2 = 144$

$8y^2 = 44$

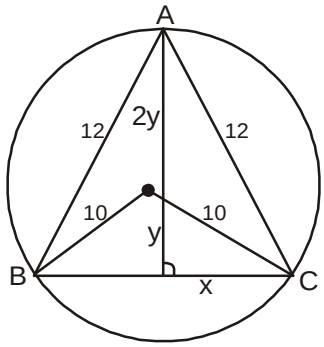
$y^2 = \frac{11}{2}$

$x^2 = 100 - y^2$

$= \frac{189}{2}$

$x = 9.72$

$2x \approx 19.2$



51. x, x + 2, ……. x + 18

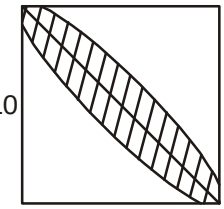
$10x + 90 = 1200$

$x = 111$

$\therefore \quad \text{Mean} = \frac{111+113+115+117+119}{5}$

$= 115$

52.



$$\frac{\pi(100)}{4} - \frac{1}{2}\times 100$$

$$x = 100\left(\frac{\pi}{4} - \frac{1}{2}\right)$$

$\therefore$ $$2x = 200\frac{(\pi-2)}{4}$$

$$= 50\left(\frac{22}{7} - 2\right)$$

$$= 50\left(\frac{8}{7}\right)$$

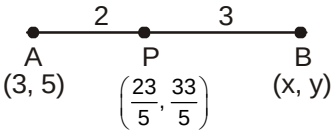
$$= \frac{400}{7}$$

53.

$$V = \frac{1}{3}\pi(r_1^2 + r_2^2 + r_1 r_2)h$$

$$= \frac{1}{3}\times\frac{22}{7}(4+1+2)14 = \frac{308}{3}$$

54.



$$\frac{2x+9}{5} = \frac{23}{5} \qquad \frac{2y+15}{5} = \frac{33}{5}$$

$x = 7$ $y = 9$

55. Leap year
2 odd days

Probability $= \frac{2}{7}$

56.

$2\pi r = 60 + 2r$

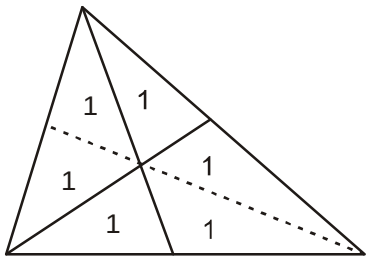
$2r(\pi - 1) = 60$

$2r\left(\frac{15}{7}\right) = 60$ Circumference $= 2\pi r$

$= 28\pi$

$2r = 28$

57.



Area of $\Delta DCEG = 2\ cm^2$

58. 60° 30'

$$30' = \frac{30^\circ}{60} = \frac{1^\circ}{2} \Rightarrow 60\frac{1^\circ}{2} = \frac{121^\circ}{2}$$

$$\frac{121}{2} \times \frac{\pi}{180} = \frac{121}{360}\pi^C$$

59. Let diameter = 2 diameter' $= \frac{3}{2}$

radius = 1 radius' $= \frac{3}{4}$

$$\% = \frac{1-\frac{9}{16}}{1} \times 100 = \frac{700}{16} = 43.75\%$$

60. $(x-y)^3 + (y-z)^3 + (z-x)^3$

$a^3 + b^3 + c^2 = 3abc$ if $a + b + c = 0$

$\therefore$ $= 3(x-y)(y-z)(z-x)$

MAT Solutions

1. G, K, O, S, (W)
+4 +4 +4 +4

2. DX, HT, KQ, OM, (RJ) → Out of given options only this is possible as R (I + 1) = RJ
Reverse +1

3. H, D, A, Y, X, (X)
–4 –3 –2 –1 0

4. KLE, IND, GPC, ERB, CTA

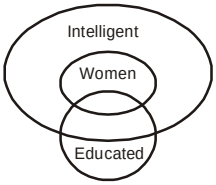
5. 4, 9, 25, 49, 121, 169
square of prime number

6. 1, 3, 7, 13, 21, (31), 43, 57
+2 +4 +6 +8 +10 +12 +14

7. 5, 3, 10, 8, 17, 15, (26), 24
+5 +7 +9 +5 +7 +9

8. 97, 77, 59, (43), 29, 17
–20 –18 –16 –14 –12

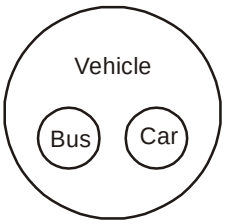
9. Clearly, educated women are intelligent



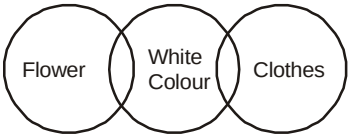
10. Argument (1) is strong and (2) is weak.

11. Statement is true and reason is false.

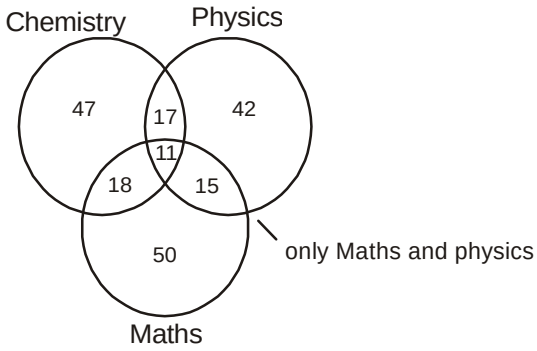
12.



13.



14-15



15. Error in question. question should be: What is the percentage of students who got distinction in at least one subject?

16. Rest are countries but Kabul is a city.

17. Rest are cubes

18.
$R^- \times Q^+$
|
P^+ Q is father of P.

19.
R
T **P**
S **Q**

20. 27 + 81 / 9 – 6 = 30

21. 3, 2, 4, 5 all are adjacent to 6 in figure (1), (2) and (3)

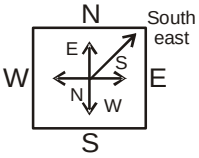
22. No such small cube exists.

23. G A S
T Z H (reverse order)

24. B O Y
2 + 15 + 25 = 42

25.
Sohan
|
Son1+
|
Son+ – Ranjana–

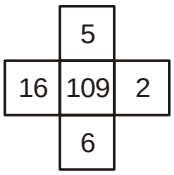
26.



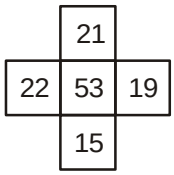
27. 6, 4, 1, 2, 2, 8, 7, 4, 2, 7, 5, 3, 8, 6, 2, 1, 7, 0, 4, 1, 3, 2, 8, 6

28. Fever – Doctor – Diagnosis – Medicine – Recovery

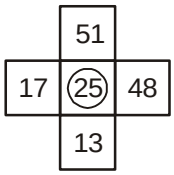
29.



$(16 - 6)^2 + (5 - 2)^2 = 109$



$(22 - 15)^2 + (21 - 19)^2 = 53$



$(17 - 13)^2 + (51 - 48)^2 = 25$

30. The complete form of part is whole, so the complete form of arc is circle.

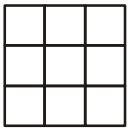
31-34. By observation

35. U only vowel.

36-47 By observation

48. $20 \times 3^2 = 180$, $4 \times 5^2 = 100$
so $7 \times 7^2 = 343$

49.



9 squares of 1 × 1 size
4 squares of 2 × 2 size
1 squares of 3 × 3 size
so answer is 14

50. Top layer = 1, middle layer = 3 and bottom layer = 6
Total = 10