

Chhattisgarh NTSE
STAGE – 1 (2019-20)
SAT

ANSWER KEYS

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

SOLUTIONS

- C
Newton Second is equivalent to = NS
The quantities are Force x Time

$$\begin{aligned} & ma \times t \\ &= m \times \frac{v}{t} \times t \\ &= mv \\ &= P \\ &= \text{Linear momentum} \end{aligned}$$
- C
 $Q = ne$

$$n = \frac{Q}{e} = \frac{1}{1.6 \times 10^{-19}} = \frac{10^{19}}{1.6} = \frac{100 \times 10^{18}}{16} = 6.25 \times 10^{18} \text{ electrons}$$
- B
A radioactive nucleus doesn't emit Alpha & Beta radiations simultaneously. Some nucleus emit Alpha particles, some Beta particles. They form a new nucleus and radiate Gamma rays to come back to lower energy state. So
- C
The quantity remains unchanged is transformer is frequently
- B
 $R = 10\text{cm}$
 $f = -5\text{cm}$

$$\frac{1}{t} = \frac{1}{v} + \frac{1}{u}$$
$$\frac{1}{-5} = \frac{1}{v} + \frac{1}{-20}$$
$$\frac{1}{20} - \frac{1}{5} = \frac{1}{v}$$
$$\frac{1-4}{20} = \frac{1}{v}$$
$$\frac{-3}{20} = \frac{1}{v}$$
$$v = \frac{-20}{3}$$

Now, $m = \frac{-v}{u} = -\frac{\left(\frac{-20}{3}\right)}{(-20)}$

$$m = -\frac{20}{3} \times \frac{1}{20}$$
$$m = \frac{-1}{3}$$

6. C

In series

$$R_s = nR$$

$$R_p = \frac{R}{n}$$

$$\frac{R_s}{R_p} = \frac{nR}{\left(\frac{R}{n}\right)}$$

$$\frac{R_s}{R_p} = nR \times \frac{n}{R}$$

$$\frac{R_s}{R_p} = n^2$$

7. B

$$P = 60 \text{ watt}$$

$$= \frac{\text{watt} \times \text{hour}}{1000}$$

$$= \frac{(2 \times 60) \times (5 \times 30)}{1000}$$

$$= 18 \text{ Units}$$

$$\begin{aligned} \text{Now Bill} &= 2 \times 18 \\ &= 36 \text{ Rs} \end{aligned}$$

8. A

$$K = \frac{P^2}{2m}$$

$$\frac{K_1}{K_2} = \frac{P_1^2}{P_2^2}$$

$$\frac{K_1}{K_2} = \left(\frac{100}{200}\right)^2$$

$$\frac{K_1}{K_2} = \frac{1}{4}$$

$$K_2 = 4K_1$$

$$\begin{aligned} \% \text{ Increase} &= \frac{4K_1 - K_1}{K_1} \times 100\% \\ &= 3 \times 100\% \\ &= 300\% \end{aligned}$$

9. A

$$\frac{M_A}{M_B} = \frac{1}{4}$$

$$V_A = V_B$$

$$\therefore S = \frac{m}{v}$$

$$\frac{S_A}{S_B} = \frac{m_A}{m_B} \times \frac{V_B}{V_A}$$

$$\frac{S_A}{S_B} = \frac{1}{4} \times \frac{1}{1}$$

10. A

24 cycles in 0.8 seconds

by unitary method in 0.8 second no. of cycles=24

$$\text{in 1 second } \frac{1 \times 24}{0.8} = 30 \text{ cycles}$$

11. D

$$w = \frac{\theta}{t} = \frac{2\pi}{60} = \frac{\pi}{30} \text{ rad / sec}$$

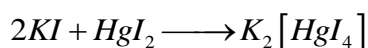
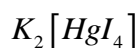
12. D

13. D

$$P = \frac{1w}{f} \therefore f = \frac{1w}{P} = \frac{100}{4}$$

$$f = 25 \text{ cm}$$

14. C



15. C

A + 4°C, density of water = 1 gm/ml

SO, mass of a single drop = 0.018 × 1g

$$= 0.018 \text{ g}$$

$$\text{No. of moles of } H_2O = \frac{0.018}{18} = 10^{-3}$$

$$\begin{aligned} \text{So, no. of } H_2O \text{ molecules} &= 10^{-3} \times N_A \\ &= 10^{-3} \times 6.023 \times 10^{23} \\ &= 6.023 \times 10^{20} \end{aligned}$$

16. C

Not gives H^+ ion in aqueous solution

17. D

$$\begin{aligned} \text{Concentration of } NaOH &= \frac{2}{40} M \\ &= 0.05 M \end{aligned}$$

$$[OH^-] = 5 \times 10^{-2}$$

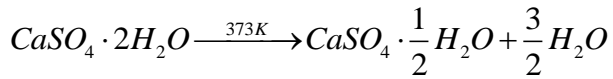
$$\begin{aligned} POH &= -\log(5 \times 10^{-2}) = 2 - \log 5 \\ &= 2 - \log \frac{10}{2} \\ &= 1 + \log 2 = 1.3 \end{aligned}$$

$$\text{So, } PH = 14 - POH = 14 - 1.3 = 12.7$$

18. C



19. B



20. C

Zn is more reactive than Hydrogen

21. A

K is most electropositive

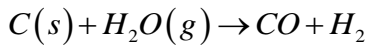
22. C

NaCN Sodium carbon bond is ionic and carbon-nitrogen bond is covalent

23. D

18

24. B



25. D

26. B

	%	Mole	Simplest reaction
C	75	$\frac{75}{12} = 6.25$	1
H	25	$\frac{25}{1} = 25$	4

Empirical formulae = CH_4

27. B

R.H. Whittaker proposed 5 kingdom classification and isolated kingdom fungi which has characteristic of both kingdom Plantae and Animalia. Because it was difficult to place the organisms in either of the two kingdom due to its mode of nutrition and cellular organization.

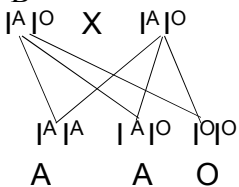
28. C

Plasma membrane is selectively permeable which selectively transports ions in and out of cell and maintains osmotic potential.

29. B

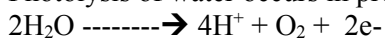
Insulin is a hormone that is secreted by Beta cells of Islet of Langerhann of pancreas, that binds the free glucose circulating in blood and controls the condition of hyperglycemia.

30. B



31. B

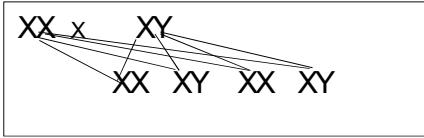
Photolysis of water occurs in presence of light during photosynthesis. Photolysis results in formation of oxygen.



32. B

Sex determining chromosome is Y

Presence of one Y chromosome in the allosome results formation of male offspring.



33. D

All living organisms of ecosystem are biotic component.

Producers are plants (autotrophic).

Consumers are heterotrophic animals.

Decomposers are microorganisms acting as detritivores.

34. A

Lysosome destroys all wornout organelles in cytoplasm and hence might lead to apoptosis causing death of cell. Hence, called suicidal bag.

35. A

Chlorophyll is a pigment that absorbs all visible rays except green light. Hence, leaf looks green in colour. Light absorbed in form of photon helps in formation of assimilatory power ATP and NADPH which help in running C3 cycle which produces starch.

36. C

During Jaundice the liver functions abnormally and produces lots of bilirubin which starts depositing and leads to pale colour of eye ball, nails and skin.

37. D

Dinitrogen in atmosphere constitute 78% of total gas in atmosphere.

38. B

Total number of bones in human body is 206. The human skeleton is divided into two groups :-

a) Axial skeleton- 80 bones

b) Appendicular skeleton- 126 bones

39. A

Adrenaline is the causative agent of 3F's (Fight, Flight and Freight). These are reflexes triggered by adrenaline in emergency condition for self defence.

40. A

Phototropism (photo + tropism), movement of shoot apex towards light. This phenomena is necessary for optimum use of light by leaves to carryout photosynthesis.

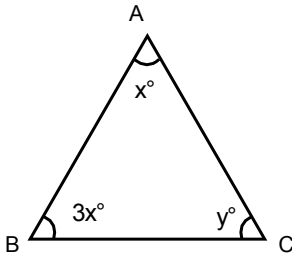
41. C

Let $g(x)$ be the quotient when the polynomial $f(x)$ is divided by $x^2 - 9$

$$\therefore \text{Hence } f(x) = (x^2 - 9)g(x) + 3x + 2$$

When $f(x)$ is divided by $x - 3$, remainder will be $f(3) = 11$ (by remainder theorem)

42. A



As, $\angle A + \angle B + \angle C = 180^\circ$
 $x + 3x + y = 180^\circ$
 $4x + y = 180^\circ$ 1
 $3y - 5x = 30^\circ$ 2 (given)

Solving 1 & 2

$x = 30^\circ$ $y = 60^\circ$
 $\angle A = 30^\circ$ $\angle C = 60^\circ$ $\angle B = 90^\circ$

43. C

$$(K - 4)x + 4y = K$$

$$Kx + K = 16$$

Above two equations have infinitely many solutions. \therefore

$$\frac{K-4}{K} = \frac{4}{K} = \frac{K}{16}$$

i.e. $\frac{K-4}{K} = \frac{4}{K}$ and $\frac{4}{K} = \frac{K}{16}$

\uparrow
 -8 doesn't satisfy
 Hence $K = 8$.

\downarrow
 $K = \pm 8$

44. D

$$2x^2 + 5x + 5 = 0$$

As $D = (5)^2 - 4 \times 2 \times 5 = -15 < 0$

Hence roots are non-real and not equal.

45. A

$$ay^2 + ay + 3 = 0$$

$$y^2 + y + b = 0$$

As $y = 1$ is a common root of both the equations. Hence it will satisfy both the equations

$$2a + 3 = 0 \text{ and } 2 + b = 0$$

$$a = -\frac{3}{2} \quad b = -2$$

Hence $ab = 3$

46. D

$$\text{Sum of terms } S_n = n^2 + 4n$$

$$\text{Hence } n^{\text{th}} \text{ term } T_n = S_n - S_{n-1}$$

$$T_n = (n^2 + 4n) - ((n-1)^2 + 4(n-1))$$

$$T_n = 2n + 3$$

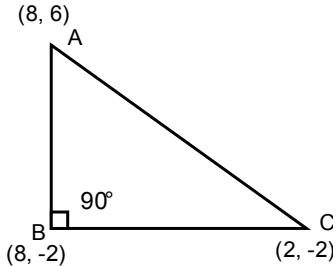
$$\text{Hence } 15^{\text{th}} \text{ term} = T_{15} = 2 \times 15 + 3 = 33$$

47. D

Pay ratio of A, B, C is 2 : 3 : 5. Pay increases 15%, 10%, 5% respectively. Hence their new pay would be in the ratio.

$$\begin{aligned} \text{A : B : C} &= 2K + \frac{15}{100} \times 2K : 3K + \frac{10}{100} \times 3K : 5K + \frac{5}{100} \times 5K \\ &= \frac{230K}{100} : \frac{330K}{100} : \frac{525K}{100} \\ &= 46 : 66 : 105 \end{aligned}$$

48. A



It is a right angled triangle, right angle at B. Hence circumcenter is the mid point of hypotenuse. Its coordinates are

$$\left(\frac{8+2}{2}, \frac{6-2}{2} \right)$$

$$(5, 2)$$

49. C

$$2(\sin^6 \theta + \cos^6 \theta) - 3(\sin^4 \theta + \cos^4 \theta)$$

$$\Rightarrow 2\{(\sin^2 \theta)^3 + (\cos^2 \theta)^3\} - 3\{(\sin^2 \theta)^2 + (\cos^2 \theta)^2\}$$

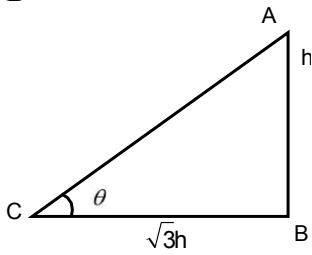
$$\Rightarrow 2\{(\sin^2 \theta + \cos^2 \theta)(\sin^4 \theta - \sin^2 \theta \cos^2 \theta + \cos^4 \theta)\} - 3\{(\sin^2 \theta + \cos^2 \theta)^2 - 2\sin^2 \theta \cos^2 \theta\}$$

$$\Rightarrow 2\{(\sin^2 \theta + \cos^2 \theta)^2 - 3\sin^2 \theta \cos^2 \theta\} - 3(1 - 2\sin^2 \theta \cos^2 \theta)$$

$$\Rightarrow 2 - 6\sin^2 \theta \cos^2 \theta - 3 + 6\sin^2 \theta \cos^2 \theta$$

$$\Rightarrow -1$$

50. B

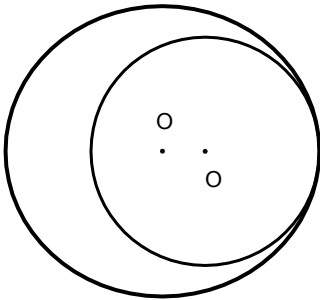


Height of tower $AB = h$

Length of tower $BC = \sqrt{3}h$

$$\tan \theta = \frac{AB}{BC} = \frac{h}{\sqrt{3}h} = \frac{1}{\sqrt{3}} = 30^\circ$$

51. C



$R_6 \rightarrow$ radius of big circle

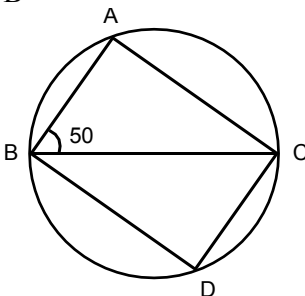
$R_5 \rightarrow$ radius of small circle

Given $\pi r_6^2 + r_5^2 = 116r$ 1

$r_6 - r_5 = 6$ 2

Solving 1 & 2 $r_6 = 10$ $r_5 = 4$

52. B



As $AB = AC$

$$\angle ABC = \angle ACB = 50^\circ$$

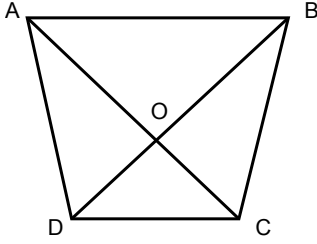
$$\therefore \angle BAC = 180 - 100 = 80^\circ$$

As ABDC is a cyclic quadrilateral

$$\therefore \angle BAC + \angle CDB = 180^\circ$$

Or $\angle BDC = 180 - 80 = 100^\circ$

53. A



Given $AB = 2CD$

$AB \parallel DC$

As $\triangle AOB$ & $\triangle COD$ are similar

$$\frac{\text{as } \triangle AOB}{\text{as } \triangle DOC} = \frac{AB^2}{CD^2} = 4:1$$

54. C

Given AP 27, 24, 21,

First term, $a = 27$

Common term, $d = -3$

Let r^{th} term be zero

$$\text{Hence } T_r = a + (r-1)d = 0$$

$$27 + (r-1) \times -3 = 0$$

$$r = 10$$

Hence 10th term

55. D

Volume of two spheres is in the ratio = $\frac{64}{27}$

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

$$\frac{r_1}{r_2} = \frac{4}{3}$$

$$\text{Ratio of surface area} = \frac{4\pi r_1^2}{4\pi r_2^2} = \frac{16}{9}$$

56. C

Height of cylinder, $h = 10\text{cm}$

Radius of base of cylinder, $r = 6\text{cm}$

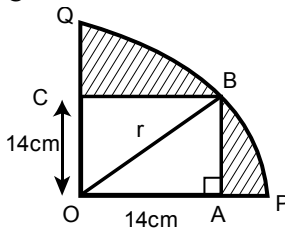
Volume of cylinder = $\pi r^2 h$

Volume of cone = $\frac{1}{3}\pi r^2 h$

Hence remaining = $\pi r^2 h - \frac{1}{3}\pi r^2 h$

Volume = $\frac{2}{3}\pi r^2 h$
 $= 240\pi$

57. C



$$OB^2 = OA^2 + AB^2$$

$$r = 14\sqrt{2} \text{ cm}$$

Volume of remaining section

$$= \frac{1}{4} \pi r^2 - r^2$$

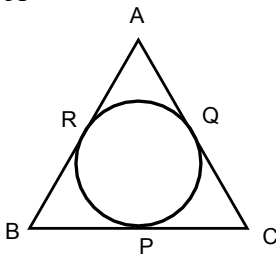
$$= \frac{1}{4} \times \frac{22}{7} \times (14\sqrt{2})^2 - (14)^2$$

$$= 112 \text{ sq cm}$$

58. B

$$\text{Mean new} = \frac{\bar{x}}{m} + n$$

59. A



$$CP = 5 \text{ cm}$$

$$AQ = 4 \text{ cm}$$

$$BR = 6 \text{ cm}$$

As, $BR = BP$

$$CP = CQ$$

$$AR = AQ$$

$$\text{Hence Perimeter of } \triangle ABC = 2(CP + AQ + BR)$$

$$= 30 \text{ cm}$$

60. C

$$\text{Recurring Interest} = \frac{P \times n(n+1) \times r}{2400}$$

$$444 = \frac{200 \times 36 \times 37 \times r}{2400}$$

$$r = 4\%$$

P – Principal

r – rate of interest

n – no of months