

# Madhya Pradesh NTSE STAGE – 1

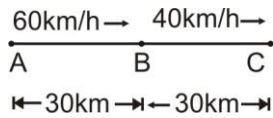
## (2017) ANSWERS KEYS (SAT)

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

## HINT & SOLUTIONS (SAT)

### PHYSICS

1. (C)

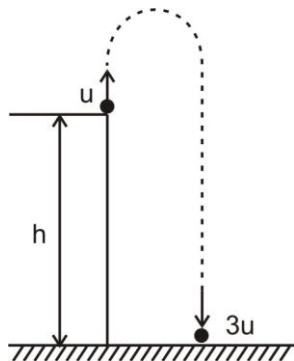


$$T = t_{AB} + t_{AC}$$

$$= \frac{30}{60} + \frac{30}{40} = \frac{1}{2} + \frac{3}{4} = \frac{5}{4}h$$

$$= 75 \text{ min}$$

2. (D)



$$(-3u)^2 = (u)^2 + 2(-g)(-h)$$

$$\Rightarrow 9u^2 = u^2 + 2gh$$

$$\Rightarrow 8u^2 = 2gh$$

$$\Rightarrow \left[ h = \frac{4u^2}{g} \right]$$

3. (B)

$$\text{Let } v_2 = 2v_1$$

$$\therefore \frac{k_1}{p_1} = \frac{1/2 m_1 v_1^2}{m v_1} = \frac{v_1}{2}$$

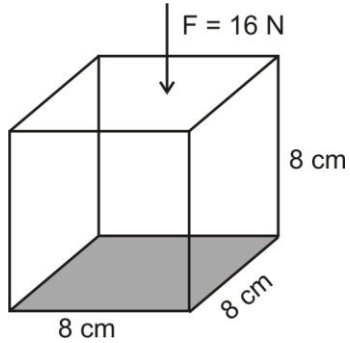
$$\text{Now, } \frac{k_2}{p_2} = \frac{1/2 m v_2^2}{m v_2} = \frac{v_2}{2} = \frac{2v_1}{2} = 2 \left( \frac{v_1}{2} \right) = 2 \left( \frac{k_1}{p_1} \right)$$

4. (C)

$$\therefore V = v\lambda$$

$$\lambda = \frac{3 \times 10^8}{10^9} = 0.3\text{m} = 30\text{cm}$$

5. (B)



$$P = \frac{F}{A} = \frac{16}{8 \times 8 \times 10^{-4}} = 0.25 \times 10^4 \text{Pa}$$

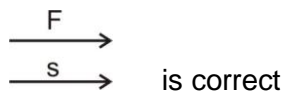
$$[P = 2500\text{Pa}]$$

6. (D)

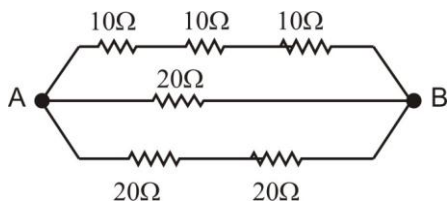
$$W = F s \cos \theta$$

when  $\theta = 0^\circ$ ,  $\Rightarrow \cos 0^\circ = 1$  (maximum)

$W = F s$  is maximum



7. (A)



$$R_{AB} = ?$$

$$\frac{1}{R_{AB}} = \frac{1}{30} + \frac{1}{20} + \frac{1}{40}$$

$$\frac{1}{R_{AB}} = \frac{4+6+3}{120} = \frac{13}{120}$$

$$R_{AB} = \frac{120}{13} = 9.23\Omega$$

8. (B)

$$R_1 = \frac{\rho L}{4A} \quad \dots (1)$$

$$R_2 = \frac{\rho \times 2L}{A} \quad \dots (2)$$

$$\frac{R_1}{R_2} = \frac{\rho L}{4A} \times \frac{A}{\rho \times 2L}$$

$$\frac{R_1}{R_2} = \frac{1}{8} = 1:8$$

9. (A)

On increasing the length of the conductor by stretching, the new resistance is given by -

$$R' = (n)^2 R \quad \text{Where } n \text{ is no. of times of stretching}$$

$$R' = (3)^2 R [n = 3]$$

$$R' = 9R$$

10. (A)

Our solar system lies in "Milky way" Galaxy

11. (B)

"Presbyopia" Occurs in old age. 'Presbyopia' is natural part of the ageing process. It happens due to hardening of the lens of eye to focus light behind rather than on the retina when looking at closer objects.

12. (C)

by lens makers' formula

$$\frac{1}{f} = (n-1) \left( \frac{1}{R_1} - \frac{1}{R_2} \right) ; \text{ where } n \text{ is refractive index of lens.}$$

In case - 1

$$\frac{1}{f_1} = (n-1) \left( \frac{1}{R} - \left( -\frac{1}{R} \right) \right)$$

$$f_1 = \frac{R}{2(n-1)}$$

In Case - 2

$$\frac{1}{f_2} = (n-1) \left( \frac{1}{R} - \frac{1}{\infty} \right)$$

$$f_2 = \frac{R}{(n-1)}$$

$$\therefore f_2 = 2f_1 = 2f$$

13. (C)

$$p_1 = p_2$$

$$\sqrt{2m_1K_1} = \sqrt{2m_2K_2}$$

$$m_1K_1 = m_2K_2$$

if  $m_1 > m_2$

so,  $\frac{m_1}{m_2} = \frac{K_2}{K_1}$  so, if  $m_1 > m_2$  then –

$$K_2 > K_1$$

## CHEMISTRY

14. Electron is discovered by J.J. Thomson

15. Gypsum is  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

16. The process in which the red hot cast iron is cooled immediately in cold water is known as quenching

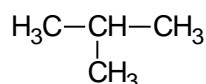
17.  $\text{Na}^+ \Rightarrow 1s^2 2s^2 2p^6$

18.  $\text{SO}_2$

$$x + (-2) \times 2 = 0$$

$$x = 4$$

19.



2-methylpropane

20. Stainless steel contains Fe, Ni, Cr

21. Number of proton = 1

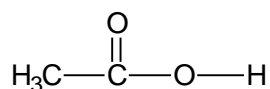
Number of electron = 11

Number of Neutron = 12

22. General electronic configuration of III group is  $ns^2 np^1$

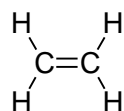
23.  $\text{Zn(s)} + \text{H}_2\text{SO}_4(\text{aq}) \longrightarrow \text{ZnSO}_4(\text{aq}) + \text{H}_2 \uparrow$

24.



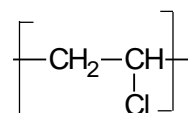
Carboxylic acid

25.



Double covalent bond

26.



Poly vinyl chloride (PVC)

## MATHEMATICS

$$81. \quad \frac{\cos^2 \theta + \tan^2 \theta - 1}{\sin^2 \theta}$$

$$\Rightarrow \cot^2 \theta + \sec^2 \theta - \operatorname{cosec}^2 \theta$$

$$\Rightarrow \sec^2 \theta - 1$$

$$\Rightarrow \tan^2 \theta$$

$$82. \quad \frac{\cos^2 20^\circ + \cos^2 70^\circ}{\sin^2 59^\circ + \sin^2 31^\circ}$$

$$\Rightarrow \frac{\cos^2 20^\circ + \sin^2 20^\circ}{\cos^2 31^\circ + \sin^2 31^\circ}$$

$$\Rightarrow 1$$

$$83. \quad \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

$$\frac{2}{3} = \frac{m}{-7}$$

$$m = -\frac{14}{3}$$

$$84. \quad x^3 - 4x^2 - 7x + 10$$

$$\Rightarrow (x-1)(x^2 - 3x - 10)$$

$$\Rightarrow (x-1)(x-5)(x+2)$$

$$x = 1, 5, -2$$

$$85. \quad \frac{x+1}{x^2-1} - \frac{x-x^2+2}{x(x^2-1)}$$

$$\Rightarrow \frac{x^2+x-x+x^2-2}{x(x^2-1)}$$

$$\Rightarrow \frac{2x^2-2}{x(x^2-1)}$$

$$\Rightarrow \frac{2}{x}$$

$$86. \quad MB = \sqrt{5^2 - 3^2}$$

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

$$AB = 8 \text{ cm}$$

$$87. \quad 2\pi(R+r)h = 1320$$

$$2\pi(8+r)14 = 1320$$

$$2 \times \frac{22}{7} \times 14(8+r) = 1320$$

$$(8+r) = 15$$

$$r = 7$$

$$\text{Diameter} = 14$$

$$88. \quad \tan \theta = \frac{h}{4}$$

$$\theta = 45^\circ$$

$$89. \quad \sin \theta (\operatorname{cosec} \theta - \sin \theta)$$

$$\Rightarrow 1 - \sin^2 \theta$$

$$= \cos^2 \theta$$

$$90. \quad \text{HT, TH}$$

$$P(E) = \frac{1}{2}$$

91. Only one way to have same birthday

$$\therefore P(E) = \frac{364}{365}$$

92. Sunita = y                      Vineeta = x  
(y - 5) = 3(x - 5)              (y + 10) = 2(x + 10)  
3x - y - 10 = 0                  2x - y + 10 = 0  
x = 20,                              y = 50

93. 10, 12, 14 ..... 98  
98 = 10 + (n - 1)2  
88 = 2n - 2  
n = 45

94.  $A^c \cap B^c$

95.  $N = \frac{\frac{4}{3}\pi(8)^3}{\frac{4}{3}\pi(1)^3} = \frac{5}{2}$

96.  $\left[ \frac{\cos 41}{\cos 41} + \frac{\cos 41}{\cos 41} \right]^2$   
 $2^2 = 4$

97. C

98. B

99.  $S = \frac{20}{2}[16 + (20 - 1)(-5)]$   
 $= 10[16 - 95]$   
 $= 0 \times -79 = -790$

100. Distance covered  
 $= 21 \times 60 \times 2\pi \frac{1.6}{2}$   
 $= 21 \times 60 \times \frac{22}{7} \times 1.6$   
 $= 6336 \text{ m}$   
 $= 6.336 \text{ km}$

## NTSE STAGE – 1 (2017)

### ANSWERS KEYS (MAT)

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

### HINT & SOLUTIONS (MAT)

- $1^3, 2^3, 3^3, 4^3, 5^3, 6^3, 7^3$   
 $= 125$
- Common difference 3, 5, 7, 9, 11  
 $28 + 11 = 39$
- 10, 18, 28, 40, 54, ?, 88  
8      10      12      14      16  
 $54 + 16 = 70$
- $x3, x3, x3, \dots$   
 $108 \times 3 = 324$
- $1^2, 3^2, 5^2, 7^2, 9^2, 11^2$   
Square of odd numbers is 81
- Raw material – Clay
- 1<sup>st</sup> comes in 2<sup>nd</sup>- water
- lack of second results in the first – sanitation
- Thermometer shows temperature
- An oven is an appliance to keep food items hot  
Similarly, a refrigerator keeps food-items cold
- First is made up of second – steel
- 1<sup>st</sup> revolves around 2<sup>nd</sup> – earth
- 1<sup>st</sup> + 135° clockwise direction – North East
- +1, +1, +1, ....  
OFNFTJT



15. +1, -1, +1, -1...  
UQBHOHOF
16. +1, +1, +1....  
FAMOUS
17. A – 4, C – 5, E – 9, P – 7, T = 7  
Ans 455978
18. In the given code  
A = 2, B = 4, C = 6, ....2 = 52  
So, ACT = 2 + 6 + 40 = 48 and  
BAT = 4 + 2 + 40 = 46  
Ans – 46
19. All except throat are sense organs – Throat
20. Brother of mother – Uncle  
Uncle's son – Cousin
21. Grand son
22. Let Akash's age today = x years  
Then, Akash's age after 1 year = (x + 1) years  
Therefore  $x + 1 = 2(x - 12)$   
 $\Rightarrow x + 1 = 2x - 24 = 25$
23. Let's son's age be x  
Then father's age is 3x  
Five years ago, father's age =  $3x - 5$   
And son's age =  $x - 5$   
So,  $3x - 5 = 4(x - 5)$   
 $\Rightarrow 3x - 5 = 4x - 20 = 15$
24. Given that seventh day of a month is three days earlier than Friday  
 $\Rightarrow$  Seventh day is Tuesday  
 $\Rightarrow$  14<sup>th</sup> is Tuesday  
 $\Rightarrow$  19<sup>th</sup> is Sunday
25. 26<sup>th</sup> Jan – Saturday  
Day in between 26<sup>th</sup> Jan to 14<sup>th</sup> Feb  $\Rightarrow$  19  
So off day = 5  
Therefore Saturday + 5 = Thursday
26. (Rank from bottom) + (Rank from top) – 1  
 $26 + 7 - 1 = 32$
27. Position from right = 14  
Total = 40  
So  $\Rightarrow 40 - 14 + 1 = 27$
28. South-West
29. 10 meters
30. By observation – C
31.  $8 + 6 + 2 + 4 = 20$

32.  $9 \times 3 = 27$
33.  $7 + 5 + 1 + 1 + 3 + 4 = 21$
34. By observation – Six
35. By observation – A (4, 6, 8)
36. By observation – 2
37. By observation – 4
38.  $13 + 19 = 32$   
 $4 \times 8 = 32$   
 So C – 20
39.  $x_1, x_2, x_3, x_4, x_5, x_6$   
 $480 \times 6 = 2880$
40.  $1 + 2 = 3$   
 $2 + 3 = 5$   
 $3 + 5 = 8$   
 $5 + 8 = 13$
41.  $5 \times (6 + 7) = 63$   
 Ans (A) – 1
42.  $A + F = K$   
 $1 + 6$   
 $+5 + 5$   
 Ans D – K
43. By observation (A)
44. By observation (C)
45. By observation (B)
46. By observation (D)
47. By observation (A)
48. By observation (D)
49. By observation (C)
50. By observation (B)