Test No. 1

Answers & Hints

for Olympiads, NTSE & Class X-2020
### TEST - 1

**Test Date:** 21-07-2019

#### ANSWERS

##### SECTION-I (Code-D)

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##### SECTION-II (Code-E)

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##### SECTION-III (Code-F)

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SECTION-I (Code-D)

1. Answer (1)
2. Answer (1)
\[
\frac{360}{\theta} - 1 = n
\]
\[
\Rightarrow \frac{360}{\theta} - 1 = 5
\]
\[
\Rightarrow \theta = 60^\circ
\]
When angle is reduced by 30°
Then,
\[
n = \frac{360}{\theta}
\]
\[
= \frac{360}{60}
\]
\[
= 12
\]
Number of images = \( n - 1 \)
\[
= 12 - 1 = 11
\]
3. Answer (1)
4. Answer (1)
\[
v' = \frac{c}{\mu}
\]
Time = \( \frac{\text{thickness}}{\text{speed}} \)
\[
= \frac{\mu t}{c}
\]
\[
= \frac{1.5 t}{c}
\]
\[
= \frac{3 f}{2 c}
\]
5. Answer (4)
\[
P_{eq} > 0
\]
\[
P_1 + P_2 > 0
\]
\[
\frac{1}{f_1} - \frac{1}{f_2} > 0
\]
\[
\Rightarrow \frac{1}{f_1} > \frac{1}{f_2}
\]

6. Answer (2)
7. Answer (1)
\[
\frac{1}{f} = \frac{1}{v} + \frac{1}{u}
\]
\[
\Rightarrow \frac{1}{f} = \frac{1}{v} - \frac{1}{2f}
\]
\[
\Rightarrow \frac{1}{v} = \frac{1}{f} + \frac{1}{2f}
\]
\[
\Rightarrow \frac{1}{v} = \frac{3}{2f}
\]
\[
\Rightarrow v = \frac{2f}{3}
\]
\[
m = \frac{v}{u}
\]
\[
= \frac{2f}{-2f}
\]
\[
= \frac{1}{3}
\]
8. Answer (Deleted)
9. Answer (3)

\[\Delta S'PQ \sim \Delta S'P'Q'\]
10. Answer (3)
11. Answer (2)
12. Answer (1)
\[v_i = 2 \text{ m/s}\]
\[v_i = \frac{2}{1} \text{ m/s}\]
\[v_{ig} = v_0 + 2v_m\]
\[= 2 + 2 \times 1\]
\[= 4 \text{ m/s}\]
13. Answer (2)
14. Answer (1)
15. Answer (4)
16. Answer (3)
17. Answer (2)
\[m = \frac{-v}{u}\]
\[-2 = \frac{-v}{-u}\]
\[\Rightarrow v = -2u\]
\[\frac{1}{f} = \frac{1}{v} + \frac{1}{u}\]
\[\Rightarrow \frac{1}{f} = \frac{1}{v} + \frac{1}{u}\]
\[\Rightarrow \frac{1}{f} = \frac{-3}{2u}\]
\[\Rightarrow u = \frac{-3}{2f}\]
Therefore, \[v = -3f\]
Distance between object and image = \[-3f + \frac{3}{2}f\]
\[= \frac{-3}{2}f\]
18. Answer (4)
19. Answer (3)
\[d' = \frac{d}{\mu}\]
\[= \frac{20}{4} = \frac{5}{3}\]
\[= 15 \text{ cm}\.]
20. Answer (3)
21. Answer (3)
22. Answer (4)
23. Answer (2)
24. Answer (3)
25. Answer (4)
Chemical formula of rust is \(\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}\)
26. Answer (1)
27. Answer (1)
28. Answer (2)
29. Answer (3)
30. Answer (3)
31. Answer (4)
32. Answer (3)
33. Answer (3)
34. Answer (4)
35. Answer (4)
36. Answer (4)
37. Answer (2)
\[\text{Na}_2\text{SO}_4(aq) + \text{BaCl}_2(aq) \rightarrow \text{BaSO}_4(s) + 2\text{NaCl(aq)}\]
38. Answer (4)
In \(\text{H}_2\text{SO}_4\)
Oxidation number of H = +1
Oxidation number of O = –2
Let oxidation number of S = x
In \(\text{H}_2\text{SO}_4\), total charge = 0
\[\therefore 2 \times 1 + x + 4 \times (-2) = 0\]
\[\Rightarrow 2 + x - 8 = 0\]
\[\Rightarrow x - 6 = 0\]
\[\therefore x = +6\]
39. Answer (2)
40. Answer (4)
41. Answer (2)
42. Answer (3)
43. Answer (2)
44. Answer (4)
45. Answer (1)
46. Answer (3)
47. Answer (2)
48. Answer (3)
49. Answer (1)
50. Answer (3)
51. Answer (2)

In transpiration, pure water is lost in the form of vapours.

52. Answer (1)
53. Answer (2)

The reactions in the dark phase are catalysed by RuBisCO enzyme.

54. Answer (1)
55. Answer (3)
56. Answer (3)

The given characteristics are of leucocytes.

57. Answer (3)
58. Answer (3)
59. Answer (2)

Molluscs are ammonotelic.

60. Answer (4)
61. Answer (3)
62. Answer (2)

\[2x - 9 = (6 - x)^2\]
\[2x - 9 = 36 + x^2 - 12x\]
\[x^2 - 14x + 45 = 0\]
\[(x - 9)(x - 5) = 0\]
\[x = 9\] and \[5\]

If we put \(x = 9\) and \(5\)
\[x = 9\] does not satisfy the equation
\[\therefore\] extraneous root = 9

63. Answer (2)

\[1176 = 2^3 \times 3 \times 7^2\]
\[\therefore\] sum of all the factors of \(1176\)
\[1176 = \left(\frac{2^4 - 1}{2 - 1}\right) \left(\frac{3^2 - 1}{3 - 1}\right) \left(\frac{7^3 - 1}{7 - 1}\right)\]

64. Answer (2)

\[-\frac{b}{a} = 2\] ...(i)

and

\[-\frac{c}{a} = -3\] ...(ii)

From (i) and (ii)

\[-\frac{b}{c} = \frac{2}{3}\]

65. Answer (4)
66. Answer (4)
67. Answer (2)
68. Answer (1)
69. Answer (3)
70. Answer (3)
71. Answer (1)
72. Answer (3)
73. Answer (2)
74. Answer (3)
75. Answer (1)
76. Answer (3)
77. Answer (3)

78. Answer (3)
79. Answer (2)
80. Answer (3)
81. Answer (1)

Pattern is \(n^2 + n + 1\)

82. Answer (2)

Pattern obtained by double difference of the terms.

83. Answer (4)

\[23^2, 29^2, 31^2, 37^2, 41^2, 43^2\ldots\]

84. Answer (1)
85. Answer (2)

Letters at prime positions.
86. Answer (1)
   \[ 2n : (n + 1)^2 \]

87. Answer (4)
   \[ abc : 2 \times (a \times b + c) \]

88. Answer (2)
   \[ abc : (a + b)^2 \]

89. Answer (1)
90. Answer (4)
91. Answer (3)
92. Answer (2)
93. Answer (1)
94. Answer (2)
95. Answer (4)
96. Answer (3)
97. Answer (4)

\[
\begin{array}{cccc}
  a & b & c & d \\
 a & b & c & d \\
 a & b & c & d \\
\end{array}
\]

98. Answer (2)

\[
\begin{array}{cccc}
  a & x & b & y \\
 a & x & b & y \\
 a & x & b & y \\
\end{array}
\]

99. Answer (1)
100. Answer (3)

**SECTION-II (Code-E)**

1. Answer (4)
   Trypsin is secreted by pancreas.
2. Answer (2)
3. Answer (3)
4. Answer (2)
5. Answer (3)

Residual volume is the volume of air that is left in the alveoli of lungs even after forceful expiration.
6. Answer (2)
7. Answer (1)
8. Answer (2)
9. Answer (4)
10. Answer (2)
11. Answer (3)

One mole of ATP releases 30.5 kJ/mol of energy.
12. Answer (3)

13. Answer (3)
   ‘A’ represents Basophils.
14. Answer (3)
15. Answer (3)
16. Answer (1)
17. Answer (3)
18. Answer (2)

‘X’ is parasitic mode of nutrition.
19. Answer (1)

Glycolysis is the common process in aerobic and anaerobic respiration.
20. Answer (4)
21. Answer (2)
22. Answer (1)
23. Answer (3)
24. Answer (4)
25. Answer (2)
26. Answer (2)
27. Answer (1)
28. Answer (3)
29. Answer (4)
30. Answer (4)

‘A’ is sublingual gland, ‘B’ is submandibular gland and ‘C’ is parotid gland.

**SECTION-III (Code-F)**

1. Answer (2)
2. Answer (2)
3. Answer (3)
4. Answer (2)
5. Answer (3)

\[
13^{1001} \times 7^{133} \times 2^{143}
\]

\[
13^{1000} \times 13 \times 7^{132} \times 7 \times 2^{142} \times 2
\]

\[
\left[ (13)^4 \right]^{250} \times (7^4)^33 \times (2^2)^71 \times (13 \times 7 \times 2)
\]

\[
(1)^{250} \times (1)^{33} \times (4)^{70} \times (4 \times 13 \times 7 \times 2)
\]

\[
1 \times 1 \times [4^2]^{35} \times 8
\]

\[
8 \times [16]^{35}
\]

\[
8 \times 6 = 8 \text{ [unit digit]}
\]
6. Answer (2)

Minimum value = \(-\frac{D}{4a}\) [where \(a > 0\)]

7. Answer (1)

8. Answer (3)

\[
\sqrt{a} = \frac{b + c}{\sqrt{a}}
\]

\[
a = \frac{b + c}{2}
\]

2a = b + c  \quad \ldots (i)

4a = 2(b + c)

2a + 2a = 2(b + c)

b + c + 2a = 2(b + c)

(a + b) + (a + c) = 2(b + c),

Hence, a + b, b + c, a + c are in A.P.

9. Answer (3)

10. Answer (4)

Sum of \((n - 1)\) terms = \((-1)^{n-1} (n - 1) (n - 1 - 1)\)

\(S_{n-1} = (-1)^{n-2} (n - 1) (n - 2)\)

\(\therefore \quad n^{th} \text{ term } = S_n - S_{n-1}\)

\[= (-1)^{n-1}n(n-1) - (-1)^{n-2} (n-1)(n-2)\]

\[= (-1)^{n-2} (n-1) [n(n-1) - (n-2)]\]

\[= (-1)^{n-2} (n-1) [-n - n + 2]\]

\[= (-1)^{n-2} (n-1) [-2n + 2]\]

\(\therefore \quad 4^{th} \text{ term } = (-1)^{4-2} (4-1) (-2 \times 4 + 2)\)

\[= (-1)^2 (3) (-8 + 2)\]

\[= 1 \times 3 (-6) = -18\]