Test Booklet Code  A, B & C

Test No. 2

Answers & Hints

for  Olympiads & Class IX-2020
### All India Aakash Test Series for Class IX (2020)

**TEST - 2**

**Test Date : 13-10-2019**

**ANSWERS**

#### SECTION-I (Code-A)

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#### SECTION-II (Code-B)

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#### SECTION-III (Code-C)

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**Hints to Selected Questions**

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<tr>
<th>SECTION-I (Code-A)</th>
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<tbody>
<tr>
<td>1. Answer (2)</td>
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<td>2. Answer (1)</td>
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<td>3. Answer (2)</td>
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<tr>
<td>4. Answer (2)</td>
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<tr>
<td>( F = ma )</td>
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<tr>
<td>( F = 12 \times 5 = 60 \text{ N} )</td>
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<tr>
<td>5. Answer (3)</td>
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<td>6. Answer (1)</td>
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<tr>
<td>7. Answer (1)</td>
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<tr>
<td>( \rho = \frac{M}{\nu} = \frac{500}{250} = 2 \text{ g/cm}^3 )</td>
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<td>8. Answer (3)</td>
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<td>9. Answer (3)</td>
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<td>10. Answer (3)</td>
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<tr>
<td>11. Answer (3)</td>
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<tr>
<td>Relative speed of car moving in opposite direction</td>
</tr>
<tr>
<td>( \frac{5}{4/60} = 75 \text{ km/hr} )</td>
</tr>
<tr>
<td>Speed of third car = 75 – 45 = 30 km/hr</td>
</tr>
<tr>
<td>12. Answer (4)</td>
</tr>
<tr>
<td>( S = \frac{1}{2} at^2 )</td>
</tr>
<tr>
<td>( \frac{2S}{3} = \frac{1}{2} a(t')^2 )</td>
</tr>
<tr>
<td>( t = \sqrt{\frac{2S}{a}} )</td>
</tr>
<tr>
<td>( t' = \sqrt{\frac{4S}{3a}} = \sqrt{\frac{2}{3}} t )</td>
</tr>
<tr>
<td>( t - t' = t - \frac{2}{\sqrt{3}} t )</td>
</tr>
<tr>
<td>( \Delta t = t \left( 1 - \frac{\sqrt{2}}{\sqrt{3}} \right) )</td>
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<tr>
<td>13. Answer (2)</td>
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<tr>
<td>( \therefore a = \frac{-2 - 6}{4} = -2 \text{ m/s}^2 )</td>
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<tr>
<td>( S_1 = 6 \times 4 + \frac{1}{2} \times (-2) \times (4)^2 )</td>
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<tr>
<td>( S_1 = 8 \text{ m} )</td>
</tr>
<tr>
<td>( S_2 = -2 \times 2 = -4 \text{ m} )</td>
</tr>
<tr>
<td>( S_3 = 4 \times 2 = 8 \text{ m} )</td>
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<tr>
<td>( S = 8 + 8 - 4 = 12 \text{ m} )</td>
</tr>
<tr>
<td>( V_{avg} = \frac{12}{8} = 1.5 \text{ m/s} )</td>
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<tr>
<td>14. Answer (3)</td>
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<tr>
<td>From law of conservation of momentum, ( mu = 2mv )</td>
</tr>
<tr>
<td>( v = \frac{u}{2} )</td>
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<tr>
<td>Retardation = ( \frac{f}{2m} )</td>
</tr>
<tr>
<td>( \therefore v^2 = u^2 + 2as )</td>
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<tr>
<td>( 0 = \left( \frac{u}{2} \right)^2 - 2 \times \frac{f}{2m} x )</td>
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<tr>
<td>( \frac{u^2}{4} = \frac{fx}{m} )</td>
</tr>
<tr>
<td>( u = \sqrt{\frac{4fx}{m}} )</td>
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<tr>
<td>15. Answer (2)</td>
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<tr>
<td>( a = \frac{60 - 12}{7 + 3 + 2} = \frac{48}{12} = 4 \text{ m/s}^2 )</td>
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<tr>
<td>For the block of 2 kg, ( T_2 - 12 = 2 \times 4 )</td>
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<tr>
<td>( T_2 = 8 + 12 = 20 \text{ N} )</td>
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<tr>
<td>For the block of 3 kg, ( T_1 - T_2 = 3 \times 4 )</td>
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<tr>
<td>( T_1 = 12 + 20 = 32 \text{ N} )</td>
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16. Answer (1)

\[ a = \frac{(m_1 - m_2)g}{(m_1 + m_2)} \]

Since both the blocks travel equal distance in opposite directions

\[ h = \frac{1}{2} \left( \frac{m_1 - m_2}{m_1 + m_2} \right) gt^2 \]

\[ t = \sqrt{\frac{h (m_1 + m_2)}{g (m_1 - m_2)}} \]

17. Answer (3)

\[ T = \sqrt{\frac{2h}{g}} \]

\[ T = \sqrt{\frac{2 \times 125}{10}} = 5 \text{ s} \]

\[ S_b = 0 + \frac{10}{2} (2 \times 5 - 1) \]

\[ S_b = 45 \text{ m} \]

18. Answer (1)

\[ g_d = g \left( 1 - \frac{d}{R} \right) \]

\[ \frac{64}{100} g = g \left( 1 - \frac{d}{R} \right) \]

\[ \frac{d}{R} = 1 - \frac{64}{100} = \frac{36}{100} \]

\[ d = \frac{36}{100} \times 6400 \]

\[ d = 2304 \text{ km} \]

19. Answer (3)

\[ Mg = B_{\text{net}} \]

\[ v \times 2.4 \times g = \frac{V}{2} \times 0.8 \times g + \frac{V}{2} \times x \times g \]

\[ 2.4 = 0.4 + \frac{x}{2} \]

\[ x = 4 \text{ g/cm}^3 \]

20. Answer (3)

When system is at rest,

\[ W + T = B \]

When system is moving upward with acceleration \( \frac{g}{2} \),

\[ v \rho_b \left( g + \frac{g}{2} \right) + T_0 = v \rho_i \left( g + \frac{g}{2} \right) \]

\[ T_0 = v \frac{3g}{2} (\rho_i - \rho_b) \]

When system is moving downward with acceleration \( \frac{g}{4} \),

\[ v \rho_b \left( g - \frac{g}{4} \right) + T' = v \rho_i \left( g - \frac{g}{4} \right) \]

\[ T' = \frac{3g}{4} v (\rho_i - \rho_b) \]

21. Answer (3)

22. Answer (4)

23. Answer (3)

24. Answer (4)

25. Answer (3)

26. Answer (4)

27. Answer (1)

28. Answer (4)

29. Answer (3)

30. Answer (4)

31. Answer (4)

32. Answer (3)

33. Answer (3)

34. Answer (4)

35. Answer (4)

36. Answer (4)

37. Answer (3)

38. Answer (2)

39. Answer (3)

40. Answer (3)

Concentration of solution made by Rama (w/w)

\[ \frac{25}{100 + 25} \times 100 = \frac{25}{125} \times 100 = 20\% \]

Concentration of solution made by Kanta (w/w)

\[ \frac{50}{150 + 50} \times 100 = \frac{50}{200} \times 100 = 25\% \]

Concentration of solution made by Shyam (w/w)

\[ \frac{50}{200} \times 100 = 25\% \]
41. Answer (3)
42. Answer (1)
   Squamous epithelium is also called pavement epithelium.
43. Answer (4)
44. Answer (2)
   *Wuchereria* is a nematode.
45. Answer (3)
46. Answer (4)
47. Answer (2)
48. Answer (4)
49. Answer (3)
50. Answer (2)
51. Answer (4)
52. Answer (4)
53. Answer (2)
54. Answer (4)
   Smooth muscles are found in iris of eye.
55. Answer (3)
56. Answer (1)
57. Answer (2)
58. Answer (3)
59. Answer (4)
60. Answer (3)
   The given features are of phylum Mollusca.
61. Answer (2)
62. Answer (3)
   \[x^6 - 729 = (x^2 - 3)^3 = (x^3 + 3)(x^3 - 3)\]
   \[= (x + 3)(x - 3)(x^2 + 9 + 3x)(x^2 + 9 - 3x)\]
63. Answer (4)
64. Answer (1)
65. Answer (3)
66. Answer (2)
67. Answer (4)
   \[\sqrt{\left(\frac{9}{2} - 3\right)^2 + \left(\frac{3\sqrt{3}}{2} - 0\right)^2} = \sqrt{\left(\frac{6 - 9}{2}\right)^2 + \left(0 - \frac{3\sqrt{3}}{2}\right)^2}\]
   \[= \sqrt{(6 - 3)^2 + 0^2} = 3 \text{ units}\]
   \(\Rightarrow\) Triangle is equilateral with side = 3 units
   \(\Rightarrow\) Perimeter = 9 units
68. Answer (3)
69. Answer (4)
70. Answer (1)
71. Answer (1)
72. Answer (3)
   \(x^2 + x - 6\) is factor of \(x^3 + ax^2 + bx + 6,\)
   \(\Rightarrow (x + 3), (x - 2)\) are factors of \(x^3 + ax^2 + bx + 6\)
   \(\Rightarrow (-3)^3 + a(-3)^2 + (-3)b + 6 = 0\)
   \(\Rightarrow 9a - 3b = 21\)
   \(\Rightarrow 3a - b = 7\) \(\ldots(i)\)
   and \((2)^3 + a(2)^2 + 2b + 6 = 0\)
   \(\Rightarrow 4a + 2b = -14\)
   \(\Rightarrow 2a + b = -7\) \(\ldots(ii)\)
   Solving (i) and (ii), we get
   \(\Rightarrow 5a = 0 \Rightarrow a = 0 \Rightarrow b = -7\)
73. Answer (4)
   \[y + x\sqrt{10} = (\sqrt{8} - \sqrt{5})^2 = 8 + 5 - 2\sqrt{40} = 13 - 4\sqrt{10}\]
   \(\Rightarrow y = 13, x = -4\)
   \(\Rightarrow |y| - |x| = 13 - 4 = 9\)
74. Answer (3)
   In \(\triangle BCE\) and \(\triangle BAG,\)
   \(BC = BA\) \[\text{[Sides of a square]}\]
   \(BE = BG\) \[\text{[Sides of a square]}\]
   and \(\angle CBE = 90^\circ - \angle ABE = \angle ABG\)
   \[\therefore \triangle BCE \cong \triangle BAG\] \[\text{[By SAS]}\]
   \(\Rightarrow CE = AG = 4 \text{ cm}\) \[\text{[By CPCT]}\]
75. Answer (2)
   \(AB = \sqrt{(2 + 5)^2 + (-2 + 2)^2} = 7 \text{ units,}\)
   \(BC = \sqrt{(4 - 2)^2 + (4 + 2)^2} = 2\sqrt{10} \text{ units,}\)
   \(CD = \sqrt{(4 + 3)^2 + (4 - 4)^2} = 7 \text{ units,}\)
   and \(AD = \sqrt{(-5 + 3)^2 + (4 + 2)^2} = 2\sqrt{10} \text{ units,}\)
   \[\therefore \ ABCD \text{ is a parallelogram}\]
   \[\therefore \text{Opposite sides are equal}\]
76. Answer (2)
77. Answer (1)
78. Answer (2)

\[ \angle BAC = 90^\circ \]
\[ \Rightarrow \angle BAD = \angle CAD = 45^\circ \]
\[ \Rightarrow \angle ADC = 45^\circ + 15^\circ = 60^\circ \text{ and} \]
\[ \angle ADB = 45^\circ + 75^\circ = 120^\circ \]

In \( \triangle ABD \) and \( \triangle ACD \),
\( AB > BD > AD \) \quad \ldots(i)
and \( AD > AC > CD \) \quad \ldots(ii)
\[ \Rightarrow CD < AD < BD \quad \text{[From (i) and (ii)]} \]

79. Answer (2)

\[ \frac{1}{3} \left( \frac{a^2}{bc} + \frac{b^2}{ac} + \frac{c^2}{ab} \right) = \frac{1}{3} \left( \frac{a^3 + b^3 + c^3}{abc} \right) = \frac{3abc}{3abc} = 1 \]
\[ \therefore a + c = -b \Rightarrow a + b + c = 0. \text{ So,} \ a^3 + b^3 + c^3 = 3abc \]

80. Answer (3)

\[ 5^3 = \frac{5^3}{5} - 600 \]
\[ \Rightarrow \frac{5^3}{125} - \frac{5^3}{5} = -600 \]
\[ \Rightarrow 5^3 \left( 1 - \frac{25}{125} \right) = -600 \]
\[ \Rightarrow 5^3 = \frac{-600}{24} = 25 \]
\[ \Rightarrow 5^x = 125 \times 25 = 5^4 \]
\[ \Rightarrow 3x = 5 \]
\[ \Rightarrow x = \frac{5}{3} \]

81. Answer (2)
82. Answer (3)
83. Answer (4)
84. Answer (3)
85. Answer (1)
86. Answer (2)

87. Answer (4)
The opposite letter of G is t.
88. Answer (3)
The opposite letter of Z is a.
89. Answer (2)
90. Answer (1)
91. Answer (3)
A is father of N, who is daughter of M. Therefore A is husband of M.
92. Answer (4)
K is wife of C, who is brother of B and B is father of Q.
93. Answer (4)
94. Answer (2)
\[ \theta = \left( 30 + \frac{11}{2} M \right)^\circ \]
\[ \theta = (30 \times 9 - \frac{11}{2} \times 24)^\circ \]
\[ \theta = (270 - 132)^\circ \]
\[ \theta = 138^\circ \]
95. Answer (3)
96. Answer (4)
97. Answer (1)
98. Answer (3)
99. Answer (3)
100. Answer (4)

**SECTION-II (Code-B)**

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

Study of fungi is called mycology.
7. Answer (3)
8. Answer (2)
9. Answer (3)
10. Answer (2)
11. Answer (4)
12. Answer (2)
13. Answer (1)
The given features are of division Pteridophyta.
14. Answer (3)
Reticulate venation is found in dicots.
15. Answer (3)
16. Answer (2)
17. Answer (1)
18. Answer (2)
19. Answer (1)
20. Answer (1)
21. Answer (2)
Mesosome is formed by folding of cell membrane.
22. Answer (4)
Here, 'a' is Porifera, 'b' is Coelenterata, 'c' is Aschelminthes and 'd' are Annelida to Chordata.
23. Answer (4)
Here, 'P' is chloroplast, 'Q' is nucleus, 'R' is golgi apparatus and 'S' is smooth endoplasmic reticulum.
24. Answer (2)
25. Answer (3)
26. Answer (3)
27. Answer (4)
28. Answer (2)
Here, 'A' is endoplasmic reticulum, 'B' is nucleus and 'C' is vacuole.
29. Answer (2)
30. Answer (4)

SECTION-III (Code-C)

1. Answer (2)
Let $A = (-3, 2)$, $B = (-5, -5)$, $C = (2, -3)$ and $D = (4, 4)$
Sides of quadrilateral
$AB = \sqrt{(-3+5)^2 + (2+5)^2} = \sqrt{53}$ units
$BC = \sqrt{(-5-2)^2 + (-3+5)^2} = \sqrt{53}$ units,
$CD = \sqrt{(2-4)^2 + (-3-4)^2} = \sqrt{53}$ units,
and $AD = \sqrt{(4+3)^2 + (4-2)^2} = \sqrt{53}$ units
$\Rightarrow ABCD$ is a rhombus.
Now, $AC = \sqrt{(-3-2)^2 + (2+3)^2} = 5\sqrt{2}$ units
and $BD = \sqrt{(-5-4)^2 + (-5-4)^2} = 9\sqrt{2}$ units
$\Rightarrow$ Area of $ABCD = \frac{1}{2} \times AC \times BD = \frac{5\sqrt{2} \times 9\sqrt{2}}{2} = \text{45 sq. units}$
2. Answer (2)
Draw bisector of $\angle B$ intersecting $AC$ at $P$ and Join $PD$.

3. Answer (3)
In $\triangle ABD$,
$\angle B + \angle BAD = 90^\circ$
$\Rightarrow \angle B + \angle BAE - \angle DAE = 90^\circ$ ...(i)
and in $\triangle ACD$,
$\angle C + \angle CAD = 90^\circ$
$\Rightarrow \angle C + \angle CAE + \angle DAE = 90^\circ$
$\Rightarrow \angle C + \angle BAE + \angle DAE = 90^\circ$ ...(ii)
$\Rightarrow \angle BAE = \angle CAE$
Subtracting (ii) from (i),
\[ \angle B - \angle C - 2\angle DAE = 0 \]
\[ \Rightarrow \angle DAE = \frac{\angle B - \angle C}{2} = \frac{70^\circ - 40^\circ}{2} = 15^\circ \]
\[ \Rightarrow \angle AED = 90^\circ - \angle DAE = 90^\circ - 15^\circ = 75^\circ \]

4. Answer (3)
\[ \sqrt{x} = \sqrt{7 - 4\sqrt{3}} = \sqrt{4^2 + 3^2 - 2 \times 4 \times \sqrt{3}} \]
\[ = \sqrt{\left(\sqrt{4^2 - 3^2}\right)^2} = 2 - \sqrt{3} \]
\[ \Rightarrow \frac{1}{\sqrt{x}} = \frac{1}{2 - \sqrt{3}} = \frac{2 + \sqrt{3}}{4 - 3} = 2 + \sqrt{3} \]
\[ \Rightarrow \sqrt{x} + \frac{1}{\sqrt{x}} = 4 \]

Now, \( x^{3/2} + \frac{1}{x^{3/2}} = \left(\sqrt{x}\right)^3 + \frac{1}{\left(\sqrt{x}\right)^3} \)
\[ = \left(\sqrt{x} + \frac{1}{\sqrt{x}}\right) - 3\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right) \]
\[ \therefore (x + y)^3 = x^3 + y^3 + 3xy (x + y) \]
\[ \Rightarrow x^{3/2} + \frac{1}{x^{3/2}} = 4^3 - 3 \times 4 = 52 \]

5. Answer (1)
Let \( p(x) = a_0x^{100} + a_1x^{99} + a_2x^{98} + a_3x^{97} \text{......} \)
\[ \Rightarrow p(1) = a_0 + a_1 + a_2 + a_3 \text{......} \]
\[ \text{and } p(-1) = a_0 - a_1 - a_2 - a_3 \text{......} \]
\[ \Rightarrow p(1) + p(-1) = 2(a_0 + a_2 + a_4 + ....) \]
\[ \Rightarrow a_0 + a_2 + a_4 + .... = \frac{p(1) + p(-1)}{2} \]

6. Answer (1)
7. Answer (3)
\[ n^4 - 2n^3 - n^2 + 2n = n^2(n^2 - 1) - 2n(n^2 - 1) \]
\[ = (n^2 - 1)(n^2 - 2n) \]
\[ = (n - 2)(n - 1)n(n + 1) \]
\[ = \text{Product of 4 consecutive integers} = \text{divisible by 2, 4} \]
\[ \text{and i.e., } 24 \]

8. Answer (4)
In \( \triangle ABD \) and \( \triangle ACE \),
\( AB = AC \) an \( AD = AE \) [Given]
\[ \text{and } \angle BAD = \angle BAC + \angle CAD = \angle DAE + \angle CAD = \angle CAE \]
\[ \therefore \angle BAC = \angle DAE \]
\[ \Rightarrow \triangle ABD \equiv \triangle ACE \quad \text{[By SAS]} \]
\[ \Rightarrow \angle AEC = \angle ADB = 30^\circ \quad \text{[By CPCT]} \]

9. Answer (2)
\[ x^2 - x - 12 = \frac{x^3 - 9x - 7}{x + 1} \]
\[ = \frac{x^3 + 3x - 7}{x^2 + x - 12} \]
\[ = \frac{4x + 5}{x^2 + 4} \]
\[ \Rightarrow \text{Remainder} = 4x + 5 = ax + 5 \]
\[ \Rightarrow a = 4 \]
\[ \therefore \sqrt{a} = -2 \]

10. Answer (4)
Let \( 4^a = 14^b = 8^c = 7^d = k \)
\[ \Rightarrow 4 = k^{1/a}, 14 = k^{1/b}, 8 = k^{1/c}, 7 = k^{1/d} \]
\[ \Rightarrow k^{1/a} \times k^{1/b} = k^{1/c} \times k^{1/d} \quad \therefore 4 \times 14 = 8 \times 7 \]
\[ \Rightarrow k^{1/a + 1} = k^{1/c + 1/d} \]
\[ \Rightarrow \frac{1}{a + b} = \frac{1}{c + d} \]
\[ \Rightarrow \frac{a + b}{ab} = \frac{c + d}{cd} \]
\[ \Rightarrow \frac{ab}{cd} = \frac{a + b}{c + d} \]

11. Answer (3)
12. Answer (2)
13. Answer (2)
Similarly, \( EG + GF > BE \) ...(iv)

Adding (iii) and (iv),
\[ DE + EG + GF > AB \]
\[ \Rightarrow EG + GF > AB - DE \]

14. Answer (3)
\[
\frac{\sqrt{4} - \sqrt{5}}{(\sqrt{4})^2 - (\sqrt{5})^2} + \frac{\sqrt{5} - \sqrt{6}}{(\sqrt{5})^2 - (\sqrt{6})^2} + \frac{\sqrt{6} - \sqrt{7}}{(\sqrt{6})^2 - (\sqrt{7})^2} \ldots \]
\[+ \frac{\sqrt{143} - \sqrt{144}}{(\sqrt{143})^2 - (\sqrt{144})^2} \]
\[= \sqrt{5} - \sqrt{4} + \sqrt{6} - \sqrt{5} + \sqrt{7} - \sqrt{6} \ldots \ldots \]
\[\sqrt{144} - \sqrt{143} = \sqrt{144} - \sqrt{4} \]
\[= 12 - 2 = 10 \]
\[\Rightarrow \sqrt{\frac{4000}{10}} = \sqrt{400} = 20 \]

15. Answer (4)
\[ f(3) = 0 \quad \text{[By Factor Theorem]} \]
\[ \Rightarrow 3^4 - 3^3 - 7(3)^2 + 3a + b = 0 \]
\[ \Rightarrow 3a + b = 9 \quad ...(i) \]
and \( f(2) = -12 \quad \text{[By Remainder Theorem]} \]
\[ \Rightarrow 2^4 - 2^3 - 7(2)^2 + 2a + b = -12 \]
\[ \Rightarrow 2a + b = 8 \]
\[ \Rightarrow b = 8 - 2a \quad ...(ii) \]
Substituting (ii) in (i),
\[ \Rightarrow 3a + 8 - 2a = 9 \]
\[ \Rightarrow a = 9 - 8 = 1 \]
\[ \Rightarrow b = 8 - 2 = 6 \]
\[ \therefore 6a : b = \frac{6 \times 1}{6} = 1 \]
## Our Result in Medical & Engineering Entrance Exams-2019

<table>
<thead>
<tr>
<th>Score</th>
<th>Students</th>
</tr>
</thead>
</table>
| 80081 | 69826 Classroom  
10253 Distance & Digital  
in NEET-UG |
| 688   | 576 Classroom  
112 Distance & Digital  
for AIIMS |
| 7879  | 7250 Classroom  
629 Distance & Digital  
in JEE (Main) |
| 1633  | 1441 Classroom  
192 Distance & Digital  
in JEE (Adv.) |

## Our Result in Olympiads / Scholarship Exams 2018-2019

<table>
<thead>
<tr>
<th>Score</th>
<th>Students</th>
</tr>
</thead>
</table>
| 800   | 790 Classroom  
10 Distance & Digital  
in PRMO 2018 |
| 90    | 89 Classroom  
1 Distance  
in RMO 2018 |
| 751   | 715 Classroom  
36 Distance & Digital  
in NTSE Stage - I 2018-2019 |
| 366   | 317 Classroom  
49 Distance & Digital  
in NTSE Stage - II 2018 |
| 576   | 548 Classroom  
28 Distance & Digital  
in NSEs 2018 |
| 12    | 11 Classroom  
1 Distance  
in INO 2019 |
| 585   | 457 Classroom  
128 Distance & Digital  
in KVPY Aptitude Test 2018-2019 |
| 445   | 337 Classroom  
108 Distance & Digital  
in KVPY Fellowship Award 2018-2019 |
| 791   | 776 Classroom  
15 Distance & Digital  
in NSO Level-I 2018-2019 |
| 481   | 466 Classroom  
15 Distance & Digital  
in IMO Level-I 2018-2019 |