

JUNIOR SCIENCE TALENT SEARCH EXAMINATION (JSTSE)
07 – A / 2018 – 19 (For Class – IX)
Held on January 20, 2019

ANSWER KEYS
GENERAL KNOWLEDGE

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

PHYSICS

51.	1	52.	4	53.	1	54.	2
55.	2	56.	2	57.	2	58.	1
59.	1*	60.	1	61.	2	62.	3
63.	2	64.	1	65.	3	66.	2
67.	3	68.	2	69.	3		
70.	Insufficient data			71.	3	72.	2
73.	2	74.	2	75.	4	76.	3
77.	2	78.	2	79.	3	80.	3
81.	4	82.	2	83.	2	84.	2
85.	4	86.	3	87.	2	88.	1
89.	3	90.	1				

CHEMISTRY

91.	2	92.	1	93.	4	94.	1
95.	2	96.	2	97.	1	98.	4
99.	No option is correct						
100.	2	101.	4	102.	4	103.	3
104.	3	105.	1	106.	1	107.	4
108.	3	109.	3	110.	3	111.	2
112.	3	113.	2	114.	4	115.	1
116.	2	117.	4	118.	1	119.	4
120.	1	121.	3	122.	3	123.	4
124.	2	125.	1	126.	3	127.	3
128.	1	129.	3	130.	4		

BIOLOGY

131.	3	132.	1	133.	2	134.	2
135.	1	136.	1	137.	3	138.	2
139.	1	140.	2	141.	4	142.	3
143.	4	144.	2	145.	3	146.	2
147.	2	148.	3	149.	4	150.	2
151.	1	152.	1	153.	3	154.	1
155.	4	156.	4	157.	2	158.	1
159.	3	160.	4	161.	2	162.	1
163.	3	164.	4	165.	3	166.	4
167.	1	168.	2	169.	2	170.	3

MATHEMATICS

171.	2	172.	3	173.	4	174.	2
175.	3	176.	3	177.	1	178.	2
179.	1	180.	2	181.	1	182.	2
183.	4	184.	4	185.	2	186.	4
187.	4	188.	1	189.	1	190.	3
191.	2	192.	3	193.	1	194.	4
195.	3	196.	2	197.	2	198.	3
199.	2	200.	3				

HINTS AND SOLUTIONS

51. 1

Sol. As the body fall freely its velocity will increase and on rebounding the direction of velocity will change. So, (1) is the graph.

52. 4

Sol. Distance travelled by the ball can be found out by the formula.

$S_{n^{\text{th}}} = \frac{1}{2} a(2n - 1)$. So the distance travelled in 1st, 2nd, 3rd and 4th second are 5, 15, 25, 35 respectively. So, ratio is 1 : 3 : 5 : 7.

53. 1

Sol. SI of $\frac{G}{g} = \frac{\text{Nm}^2}{\text{kg}^2 \text{m/s}^2}$

CGS of $\frac{G}{g} = \frac{\text{dyne (cm)}^2}{\text{g}^2 \text{cm/s}^2}$

∴ Ratio of SI/CGS is 10.

54. 2

Sol. Only momentum will be conserved.

55. 2

Sol. Graph between force and times gives impulse of force.

56. 2

Sol. $\frac{d_b}{d_w} = \frac{2}{3} \dots(1)$ $\left(\begin{array}{l} d_b = \text{density of body} \\ d_w = \text{density of water} \end{array} \right)$

$\frac{d_b}{d_l} = \frac{1}{4} \dots(2)$ $(d_l = \text{density of liquid})$

Dividing equation-1 by equation-2

$$\frac{d_l}{d_w} = \frac{8}{3}$$

$$d_l = \frac{8}{3} \text{g/cc}$$

57. 2

Sol. As the momentum is same the kinetic energy of bullet will be more.

58. 1

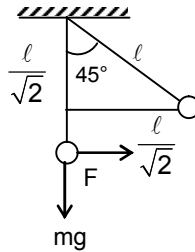
Sol. Total energy will be constant.

59. 1*
Sol. If the force is variable then on balancing the force at the final point the force. $F = mg$

If the force is constant. According to energy conservation.

$$F \times \frac{\ell}{\sqrt{2}} = mg \left(\ell - \frac{\ell}{\sqrt{2}} \right)$$

$$F = mg(\sqrt{2} - 1)$$



60. 1
Sol. According to graph acceleration is -10 m/s^2
 \therefore Force = ma
 $= 0.05 \times 10$
 $= 0.5 \text{ N}$

61. 2

$$\text{Sol. } g = \frac{GM}{R^2} = \frac{G \times d \times \frac{4}{3} \pi R^3}{R^2}$$

$$\Rightarrow d = \frac{3g}{4\pi GR}$$

62. 3

$$\text{Sol. } mgh_1 = \frac{60}{100} w \times mg \times 10$$

$$\Rightarrow h_1 = 6 \text{ m.}$$

63. 2

$$\text{Sol. } d = \frac{v \times t}{2} = \frac{1531 \times 1.05}{2} = 803.7 \text{ m}$$

64. 1

Sol. Frequency is independent of medium.

65. 3

$$\text{Sol. } \left\{ u + \frac{a}{2}(2t - 1) \right\} + \left\{ u + \frac{9}{2}(2t + 1) \right\} = 100$$

$$\Rightarrow u + at = 50$$

$$\Rightarrow V = 50 \text{ m/s}$$

66. 2

$$\text{Sol. } F = \frac{1 \times 60 \times 10^3}{1} = 60,000 \text{ N}$$

67. 3

$$\text{Sol. } a = \frac{V - (-u)}{2}$$

$$= \frac{\sqrt{2g \times 20} + \sqrt{2g \times 10}}{2}$$

$$= 338 \text{ m/s}$$

68. 2
Sol. To reduce reverberation of sound.

69. 3
Sol. $T = t_{\text{up}} + t_{\text{down}}$
 $\Rightarrow t_{\text{up}} = \sqrt{\frac{2h}{g}} ; t_{\text{down}} = \frac{h}{v}$
 $T = \sqrt{\frac{2 \times 125}{10}} + \frac{125}{340}$
 $= 5 + 0.36 = 5.36 \text{ s.}$

70. **Insufficient data**

71. 3
Sol. $\left(\frac{19}{20}V\right)^2 = V^2 + 2as \quad \dots(i)$
 $0 = V^2 + 2as \times n \quad \dots(ii)$
From (i) and (ii) $n = 11$

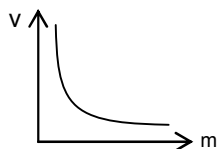
72. 2
Sol. Minimum number of unequal forces which can give zero resultant is 3.

73. 2
Sol. Area under a-t graph gives change in velocity.
 $V - 0 = \frac{1}{2} \times 10 \times 11 = 55 \text{ m/s.}$

74. 2
Sol. $Q \perp S$.
Hence, work done by Q is zero.

75. 4
Sol. $t_1 + t_2 = \frac{2u}{g}$
 $\Rightarrow \frac{u}{g} = 6 \text{ s.}$
Time taken to reach maximum height = $\frac{u}{g} = 6 \text{ s.}$

76. 3
Sol. $mv = \text{constant}$
 $\Rightarrow V = \frac{1}{m}$
Hence,



77. 2

Sol. Total height ($h_1 + h_2$) = $\frac{1}{2} \times 10 \times 5 \times 5 = 125$ m

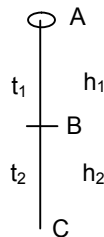
till 3 s ; $h_1 = \frac{1}{2} \times 10 \times 9 = 45$ m

$h_2 = 80$ m

$h_2 = \frac{1}{2} g t_2^2$

$\Rightarrow t_2 = 4$ s

$\Rightarrow t = t_1 + t_2 = 7$ s



78. 2

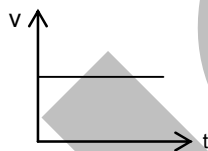
Sol. $T = 2 \times 10^{-6}$ s, $V = 1500$

$\Rightarrow V = \frac{\lambda}{T}$

$\Rightarrow \lambda = 1500 \times 2 \times 10^{-6} = 3 \times 10^{-3}$ m.

79. 3

Sol. Shape is constant.
Hence, $V = \text{constant}$.
So, this is the given graph.



80. 3

Sol. Rate of change of momentum is force.
Force per unit area is pressure.

81. 4

Sol. All of the above works on the principle of conservation of linear momentum.

82. 2

Sol. Lubrication reduces friction so surfaces will slide upon each other.

83. 2

Sol. $P_i = mv$

$P_f = m \left(\frac{120 V}{100} \right)$

$KE_f = \frac{1}{2} mv^2$

$KE_f = \frac{1}{2} m \left(\frac{6V}{5} \right)^2$

$= \frac{1}{2} m \frac{36V^2}{25}$

Percentage increase in KE = $\frac{KE_f - KE_i}{KE_i} \times 100$

$$= \frac{\frac{1}{2} m \times \frac{36V^2}{25} - \frac{1}{2} mv^2}{\frac{1}{2} mv^2} \times 100$$

$$= \frac{36 - 25}{25} \times 100 = 44\%$$

84. 2
Sol. Kepler's 1st law is consequence of the law of conservation of angular momentum.
85. 4
Sol. On increasing the temperature of iron body gradually its colour becomes white.
86. 3
Sol. At 4°C the density of water is maximum so on increasing or decreasing the temperature volume will increase.
87. 2
Sol. Time period of simple pendulum of clock is 2 sec.
88. 1
Sol. As spring constant is same every where so there will be no change in time.
89. 3
Sol. Kinetic energy will have twice the frequency of that of the particle as kinetic energy does not depend on direction.
90. 1
Sol. Work = mgh = 50 × 10 (0.15) 45 = 3375 J.
Time = 9 sec.
Power = $\frac{\text{Work}}{\text{Time}} = \frac{3375}{9} = 375 \text{ W}$
= 0.375 kW.
91. 2
Sol. Due to sublimation a black coating is formed on its inner surface
92. 1
Sol. $Q = m\ell$
 $\ell = \frac{Q}{m} \Rightarrow \text{J/Kg}$
93. 4
Sol. In incandescent light bulb plasma state is not present.
94. 1
Sol. It's become liquid after mixing.
95. 2
Sol. At high pressure & low temperature force of attraction increases.
96. 2
Sol. In water at 0°C, latent heat content is also present.
97. 1
Sol. After addition of non-volatile solid in water its freezing point decreases.

98. 4

	Mixture	Separation Technique
(A)	Black ink	Chromatography and water
(B)	Liquid air	Fractional distillation
(C)	Copper sulphate solution in water	Evaporation and crystallization
(D)	Acetone	Distillation

99. No option is correct

Sol. P contains 6 valence electrons

Q contains 7 valence electrons

It should be S and Cl/F

100. 2

Sol. $\therefore X_2$ contains 34 proton

$\therefore X$ contain 17 proton

in ${}^{37}_{17}X$ no. of neutron = $A - Z = 20$

101. 4

Sol. $n = \frac{360}{18} = 20$ moles of water

No. of molecules = $20 \times N_A$

= 1.204×10^{25}

102. 4

Sol. No. of molecules = $n \times N_A$

$n \uparrow$ No. of molecules \uparrow

103. 3

Sol. $H_2O \longrightarrow H_2 + \frac{1}{2}O_2$
18 g 2 g 16 g

104. 3

Sol. $n_{Mg^{++}} = \frac{3.01 \times 10^{23}}{N_A} = \frac{1}{2}$

$n_{CO_3^-} = \frac{3.01 \times 10^{23}}{N_A} = \frac{1}{2}$

$n_{MgCO_3} = \frac{1}{2}$

Wt = $n \times$ Molar mass

= $\frac{1}{2} \times 84 = 42$

105. 1

Sol. $9.1 \times 10^{-28} \text{ g} = 1 e^-$

$9.1 \times 10^{-28} \text{ g} \times 6.02 \times 10^{23} = 1 \text{ mole } e^-$

In 1000 gm no. of moles = $\frac{1000}{9.1 \times 10^{-28} \times 6.02 \times 10^{23}} = \frac{10^8}{9.1 \times 6.022} \text{ moles } e^-$

106. 1

Sol. $T \uparrow$ Solubility \uparrow (dissolution process is endothermic)

107. 4

Sol. Sulphur is readily soluble in CS_2 .

108. 3
Sol. Dry ice undergoes sublimation
109. 3
Sol. $n = \frac{7.4}{178}$, no of molecules = $n \times N_A = 2.5 \times 10^{22}$
110. 3
Sol. Average atomic mass = $\frac{(206 \times 23.6) + (207 \times 22.6) + (208 \times 53.8)}{23.6 + 22.6 + 53.8} = 207.302$
111. 2
Sol. In vitamin B₁₂, Co(III) is present.
112. 3
Sol. Iodine tincture i.e Alcoholic solution of I₂
113. 2
Sol. Fog is a colloidal solution of liquid in gas.
114. 4
Sol. H₃PO₃
O.S of P = +3 + x - 6 = 0
x = +3
115. 1
Sol. C₆₀H₁₂₂
12 × 60 + 122 = 842 amu
Wt in gm = 842 × 1.66 × 10⁻²⁴
= 1.4 × 10⁻²¹ g
116. 2
Sol. $n_{\text{NaCl}} = \frac{5.85}{58.5} = 0.1$ moles
Total no. of ions = 0.2 × 6.02 × 10²³ = 1.204 × 10²³
117. 4
Sol. Naphthalene is volatile and undergoes sublimation.
118. 1
Sol. Sucrose is disaccharide
119. 4
Sol. In CS₂

12 g	32 × 2 g
3 g	16 g
120. 1
Sol. Boron is a semi conductor
121. 3
Sol. Wt = n × Molar mass
122. 3
Sol. Co - 60 is used for Leukamia

123. 4
Sol. Oxidation state of Fe in Fe_2O_3 :
 $2x - 6 = 0$
 $x = +3$
124. 2
Sol. Mn gives H_2 gas when reacts with dil. HNO_3
125. 1
Sol. Solder alloys is used for electrical welding.
126. 3
Sol. In aqua regia ratio of conc. HCl & conc. HNO_3 is 3 : 1.
127. 3
Sol. Nitrogen gas is filled in tyres of aeroplane.
128. 1
Sol. Reactivity order is
 $\text{Mg} > \text{Al} > \text{Zn} > \text{Fe}$
129. 3
Sol. $\text{H}_2\text{O} \xrightarrow{\text{Electrolysis}} \underset{\text{Cathode}}{\text{H}_2} + \underset{\text{Anode}}{\frac{1}{2}\text{O}_2}$
130. 4
Sol. TEL(Tetra Ethyl Lead) is used as a Antiknocking agent.
131. 3
Sol. Lysosome do not have double membrane.
132. 1
Sol. IR – 36 is improved variety of rice.
133. 2
Sol. Vaccine of small pox is discovered by Edward Jenner.
134. 2
Sol. Gymnosperm is not included in cryptogamae.
135. 1
Sol. Naked seeds are present in pinus.
136. 1
Sol. Vector of encephalitis is culex.
137. 3
Sol. BCG vaccine is given for immunity against tuberculosis.
138. 2
Sol. Starch is stored in Amyloplast.
139. 1
Sol. Salamander is an amphibian.
140. 2
Sol. The 'binomial nomenclature' was proposed by Carolus Linnaeus.

141. 4
Sol. Companion Cell is a component of Phloem tissue.
142. 3
Sol. Nitrosomonas bacteria does not have ability to fix atmospheric nitrogen.
143. 4
Sol. Intestinal muscles are Involuntary and Unstriated.
144. 2
Sol. Ribosomes are the centre for Protein synthesis.
145. 3
Sol. Sclerenchyma do not have intercellular spaces.
146. 2
Sol. Unicellular green algae is Chlamydomonas.
147. 2
Sol. 'Haemocoel' is present in Cockroach.
148. 3
Sol. The antibiotic penicillin blocks the bacterial process that builds cell wall.
149. 4
Sol. Euglena is an organism having characteristic of both plant and animal.
150. 2
Sol. Slime mould are classified in Kingdom Protista.
151. 1
Sol. Colonial Coelenterate is coral.
152. 1
Sol. Bacteria which can cause acne is Staphylococci.
153. 3
Sol. Nervous control occur only in animals
154. 1
Sol. Mg is present in chlorophyll.
155. 4
Sol. Kala-azar is caused by Protozoan.
156. 4
Sol. 'World AIDS Day' is celebrated on 1 December.
157. 2
Sol. 'Water vascular system' for locomotion is found in starfish.
158. 1
Sol. Pseudocoelom is found in Roundworm.
159. 3
Sol. The eukaryotic cell without plastid is found in fungi.

160. 4
Sol. Both mitochondria and plastids are capable of forming their own proteins.
161. 2
Sol. Paramoecium is a ciliated protozoan.
162. 1
Sol. The life supporting zone of the earth is Biosphere.
163. 3
Sol. Indigenous breed of poultry in India is Aseel.
164. 4
Sol. Rain water which have dissolved oxides of sulphur and nitrogen, forms acid rain.
165. 3
Sol. Gonorrhoea, a sexually transmitted disease is caused by bacteria.
166. 4
Sol. In earthworm cutaneous respiration takes place.
167. 1
Sol. 2, 4-D chemical is used as Weedicide.
168. 2
Sol. CFCs chemical is responsible for ozone depletion.
169. 2
Sol. Echidna is egg laying mammal.
170. 3
Sol. Ringworm is a fungal disease.

171. 2

Sol. $x = \left(\frac{\sqrt{3}+1}{\sqrt{3}-1} + \frac{\sqrt{3}-1}{\sqrt{3}+1} + \frac{\sqrt{3}-2}{\sqrt{3}+2} \right)$

On rationalizing.

$$x = \left[\frac{(\sqrt{3}+1)(\sqrt{3}+1)}{2} + \frac{(\sqrt{3}-1)(\sqrt{3}-1)}{2} + \frac{(\sqrt{3}-2)^2}{-1} \right]$$

$$= \left[\frac{(4+2\sqrt{3})}{2} + \frac{4-2\sqrt{3}}{2} + \frac{7-4\sqrt{3}}{-1} \right]$$

$$x = 4 - 7 + 4\sqrt{3}$$

$$x = 4\sqrt{3} - 3$$

$$\text{So } x^2 + \left(\frac{39}{x} \right)^2 = (4\sqrt{3} - 3)^2 + \left(\frac{39}{4\sqrt{3} - 3} \right)^2$$

$$= 48 + 9 - 24\sqrt{3} + \frac{39 \times 39}{48 + 9 - 24\sqrt{3}}$$

$$= 57 - 24\sqrt{3} + \frac{1521}{57 - 24\sqrt{3}}$$

$$= 57 - 24\sqrt{3} + 57 + 24\sqrt{3}$$

$$= 114$$

172. 3

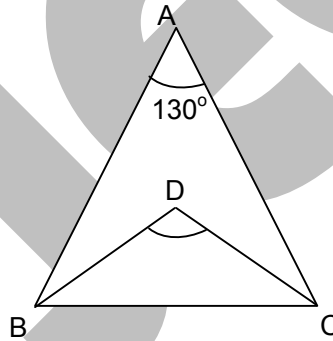
Sol. $\frac{a}{b} + \frac{b}{a} = 1 \quad a^2 + b^2 = ab$
 $a^2 + b^2 - ab = 0$
 $a^3 + b^3 = (a+b)(a^2 + b^2 - ab) = 0$

173. 4

Sol. $\sqrt{2+\sqrt{3}} + \sqrt{2-\sqrt{3}} = x$ on squaring both side
 $x^2 = 2 + \sqrt{3} + 2 - \sqrt{3} + 2\sqrt{2^2 - (\sqrt{3})^2}$
 $x^2 = 4 + 2 \times 1$
 $x = \sqrt{6}$

174. 2

Sol. $\angle BDC = 90^\circ + \frac{130^\circ}{2}$
 $= 90^\circ + 65^\circ$
 $= 155^\circ$



175. 3

Sol. $4^x - 4^{x-1} = 24$
 $4^x - \frac{4^x}{4} = 24$
 $\frac{3}{4}(4^x) = 24 \Rightarrow 2^{2x} = 2^5$
 $x = \frac{5}{2}$
 So $(2x)^x = \left(2 \times \frac{5}{2}\right)^{5/2} = (\sqrt{5})^5 = \sqrt{5} \times \sqrt{5} \times \sqrt{5} \times \sqrt{5} \times \sqrt{5}$
 $= 25\sqrt{5}$

176. 3

Sol. $\frac{(2.3)^3 - (0.3)^3}{(2.3)^2 + (0.69) + 0.09} = k$
 $k = 2.3 - 0.3 = 2$ Using $a^3 - b^3 = (a-b)(a^2 + b^2 + ab)$

177. 1

Sol. Put $x = 1$
 $a_0 + a_1 + a_2 + \dots + a_7 = 2^7 = 128$

178. 2

Sol. $a : b = 2 : 3 \Rightarrow a = 2k, b = 3k$

$x : y = 3 : 4 \Rightarrow x = 3m, y = 4m$

Put the value

$$\frac{25 \times 3k \times 4m - 2 \times 2k \times 3m}{3 \times 2k \times 4m + 4 \times 3k \times 3m} = \frac{300 - 12}{24 + 36}$$

$$= \frac{288}{60} = \frac{24}{5}$$

179. 1

Sol. $(x^3 - 3x^2 + 3x + 7) = (x + 1)(ax^2 + bx + c)$

$$x^2(x + 1) - 4x(x + 1) + 7(x + 1) = x^3 - 3x^2 + 3x + 7$$

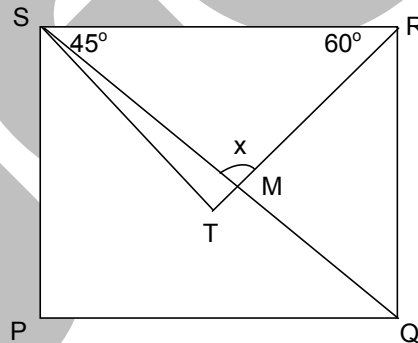
$$(x^2 - 4x + 7)(x + 1) = x^3 - 3x^2 + 3x + 7$$

$$a = 1, b = -4, c = 7$$

$$a + b + c = 4$$

180. 2

Sol. From figure $x = 75^\circ$



181. 1

Sol. Sum of all angles of pentagon = 540°

$$140^\circ + x + 2x + 3x + 4x = 540^\circ$$

$$10x = 400$$

$$x = 40^\circ$$

$$\text{Greatest angle} = 4 \times 40 = 160^\circ$$

182. 2

Sol. Total age of 18 students = 18×14.5
= 261 years

$$\text{New Mean} = \frac{261 + 16 + 15}{20} = 14.6 \text{ years}$$

183. 4

Sol. Let $\sqrt{42 + \sqrt{42 + \sqrt{42 + \dots \infty}}} = x$

$$x = \sqrt{42 + x}$$

$$x^2 = 42 + x$$

$$x^2 - x - 42 = 0$$

$$x^2 - 7x + 6x - 42 = 0 \Rightarrow (x - 7)(x + 6) = 0$$

$$x = 7 \quad x = -6$$

But $x = -6$ is not possible.

184. 4

Sol. From figure

$$a + b = 40^\circ$$

$$x = 180 - (2(a + b))$$

$$x = 100^\circ$$

185. 2

Sol. C.P. of 25 = S.P. of 20

$$\frac{CP}{SP} = \frac{20}{25}$$

$$\% \text{ gain} = \frac{5}{20} \times 100 = 25\%$$

186. 4

Sol. $0.\overline{272} = \frac{272 - 2}{990}$

$$= \frac{270}{990} = \frac{27}{99}$$

and $0.\overline{1363} = \frac{1363 - 13}{9900} = \frac{135}{990}$

$$0.\overline{272} + 0.\overline{1363} = \frac{27}{99} + \frac{135}{990}$$

$$= \frac{405}{990} = \frac{9}{22}$$

187. 4

Sol. $a = 2 + \sqrt{3}$

$$\frac{1}{a} = \frac{1}{2 + \sqrt{3}} \times \frac{2 - \sqrt{3}}{2 - \sqrt{3}} = 2 - \sqrt{3}$$

$$a - \frac{1}{a} = 2 + \sqrt{3} - (2 - \sqrt{3})$$

$$\Rightarrow 2\sqrt{3}$$

188. 1

Sol. $10a + 5 = 42 + 6a - 5$

$$4a = 32$$

$$a = 8$$

189. 1

Sol.

$$\begin{array}{r} \overline{) x^4 + x^2 - 20} \\ \underline{x^4 + 5x^2} \\ - \end{array}$$

$$-4x^2 - 20$$

$$-4x^2 - 20$$

$$+ \quad +$$

$$0$$

$$\text{other factor} = x^2 - 4$$

190. 3

Sol. $x = 7 + 4\sqrt{3}$

$$\frac{1}{x} = \frac{1}{7 + 4\sqrt{3}} = 7 - 4\sqrt{3}$$

Also $xy = 1 \Rightarrow \frac{1}{y} = x = 7 + 4\sqrt{3}$

$$\Rightarrow \frac{1}{x} + \frac{1}{y} = 14$$

Squaring both side

$$\frac{1}{x^2} + \frac{1}{y^2} + \frac{2}{xy} = 196$$

$$\frac{1}{x^2} + \frac{1}{y^2} = 194$$

191. 2

Sol. $5^{2m-1} = 5^{2m-2} + 100$

Let $5^{2m} = t \Rightarrow \frac{t}{5} = \frac{t}{25} + 100$

$$\frac{4t}{25} = 100$$

$$t = 25^2$$

$$5^{2m} = 5^4$$

$$m = 2$$

So, $3^{2+m} = 3^{2+2} = 81$

192. 3

Sol. Total number of outcomes = 2^5

Number of favourable outcomes = ${}^5C_2 + {}^5C_3 + {}^5C_4 + {}^5C_5$
 $10 + 10 + 5 + 1 = 26$

$$\text{Probability} = \frac{26}{2^5} = \frac{13}{16}$$

193. 1

Sol. $\frac{3\sqrt{2} + 2\sqrt{3}}{5\sqrt{2} - 4\sqrt{3}} \times \frac{(5\sqrt{2} + 4\sqrt{3})}{(5\sqrt{2} + 4\sqrt{3})} = \frac{30 + 12\sqrt{6} + 10\sqrt{6} + 24}{(5\sqrt{2})^2 - (4\sqrt{3})^2} = 27 + 11\sqrt{6}$

$$27 + 11\sqrt{6} = x + y\sqrt{6}$$

$$x = 27, y = 11, x - y = 16$$

194. 4

Sol. $p + q = -r, q + r = -p, p + r = -q$

Given question reduces to

$$\frac{(-p)^2}{qr} + \frac{(-q)^2}{rp} + \frac{(-r)^2}{pq} = \frac{p^3 + q^3 + r^3}{pqr} = \frac{3pqr}{pqr} = 3 \quad (\because p + q + r = 0 \Rightarrow p^3 + q^3 + r^3 = 3pqr)$$

195. 3

Sol. $2\ell + n = m$

Squaring both sides

$$4\ell^2 + n^2 + 4\ell n = m^2$$

$$4\ell^2 - m^2 + n^2 + 4\ell n = 0$$

196. 2

Sol. $m^2 + \left(\frac{1}{5m}\right)^2 = \frac{43}{5}$

We have $\left(m + \frac{1}{5m}\right)^2 = m^2 + \left(\frac{1}{5m}\right)^2 + \frac{2}{5} = \frac{45}{5}$

$\Rightarrow \left(m + \frac{1}{5m}\right)^2 = 9$

$\Rightarrow m + \frac{1}{5m} = 3$

So, $m^3 + \frac{1}{125m^3} = \left(m + \frac{1}{5m}\right)\left(\left(m + \frac{1}{5m}\right)^2 - \frac{3}{5}\right)$

$= 3 \times \left(3^2 - \frac{3}{5}\right)$

$= 25\frac{1}{5}$

197. 2

Sol. Let CP_1 is cost price of bag and CP_2 is cost price of book.

$CP_1 + CP_2 = 371$

$CP_1 = CP_2 \left(1 + \frac{12}{100}\right)$

$CP_1 + 1.12 CP_1 = 371$

$CP_1 = \frac{371}{2.12} = 175, CP_2 = 371 - 175 = 196$

198. 3

Sol. In $\triangle ABE$, $(AD + DB)^2 + 5^2 = 13^2$ (i)

In $\triangle DBC$ $BD^2 + (BE + EC)^2 = 13^2$ (ii)

From (i) and (ii), $2 \times AD \times DB = 10 \times EC$

$DB = 5$ ($\because AD = EC$)

From (i), $AD + 5 = 12$

$AD = 7$ cm

199. 2

Sol. Favourable outcomes = $\{(3,6), (4,5), (5,4), (6,3)\}$

Total outcomes = $6^2 = 36$

Probability = $\frac{4}{36} = \frac{1}{9}$

200. 3

Sol. $A = 2m, B = 3m, C = 4m$

$(2m)^2 + (3m)^2 + (4m)^2 = 11600$

$m^2 = 400$

$m = 20$

$A - B + C = 3m = 60$