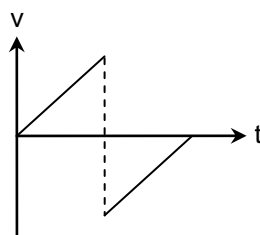


# **FIITJEE**

**(JSTSE PAPER SOLUTIONS)**

51.



52.

$$u = 0$$

$$a = g$$

$$s = u + \frac{a}{2}(2n-1)$$

$$s_1 = \frac{g}{2}(2-1) = \frac{g}{2}$$

$$s_2 = 3\frac{g}{2}$$

$$s_3 = 5g/2$$

$$s_4 = \frac{7}{2}g$$

$$s_1 : s_2 : s_3 : s_4 = 1 : 3 : 5 : 7.$$

53.

$$\frac{G}{g} = \frac{Nm^2}{kg^2 \times \frac{m}{sec^2}} = \frac{Nm}{kg^2} sec^2$$

$$\frac{\left(\frac{G}{g}\right)_{SI}}{\left(\frac{G}{g}\right)_{cgs}} = \frac{1}{10^{-1}} = 10.$$

54. Only momentum is conserved .

55. Area under force time curve gives impulse of force.

56. For water

$$F_{B_w} = \rho_w V_{im} g = 1 \times \frac{1}{3} V \times g$$

$$M_g = F_{B_w}$$

$$\rho_{solid} V \times g = \frac{V}{3} g$$

$$\rho_{solid} = \frac{1}{3} g / cc$$

For liquid

$$F_{B_v} = \rho_{liquid} V_{im} g = \rho_{liquid} \frac{3}{4} V g$$

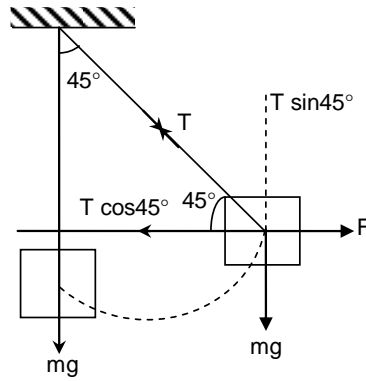
$$M_g = F_{B \times \ell}$$

$$\rho_{liq} = \frac{4}{9} g / cc .$$

57. Bullet will have greater kinetic energy.

58. For a freely falling body total energy at every point on its path remains constant.

59. In equilibrium  
 $T \sin 45^\circ = mg$   
 $T \cos 45^\circ = F$   
 $\therefore F = mg.$



60. Slope of graph gives acceleration  
 $a = -10 \text{ m/sec}^2$   
 $f = ma = 50 \times 10^{-3} \times 10 = 0.5 \text{ N}.$
61.  $\rho_E = \frac{M}{\frac{4}{3}\pi R^3}$   
 $\rho_E = \frac{3gR^2}{4\pi GR^3} = \frac{3g}{4\pi GR}.$
62. Energy of ball when it reaches the ground = 10 mg  
 So, energy remaining = 6 mg  
 $6 \text{ mg} = mgh'$   
 $h' = 6 \text{ m}.$
63.  $v = \frac{2d}{t}$   
 $d = \frac{Vt}{2} = \frac{1531 \times 1.05}{2} = 803.775 \text{ m}.$
64. Frequency does not depend on medium.
65.  $s = ut + \frac{1}{2}at^2$   
 $s_t = ut + \frac{1}{2}at^2$   
 $s_{t+1} = ut + u + \frac{1}{2}a(t^2 + 1 + 2t) = ut + u.$
66.  $F = \frac{\Delta p}{\Delta t} = \frac{1 \times 60 \times 10^3}{1} = 60,000 \text{ N}.$
67.  $a = \frac{v-u}{t}$   
 $= \frac{14(\sqrt{2}+1)}{0.1} = 337.9 \approx 338 \text{ m/s}^2.$
68. Reverberation of sound (fact based).
69. Time taken by stone to reach the bottom  
 $t_1 = \sqrt{\frac{2H}{g}} = \sqrt{\frac{2 \times 125}{10}} = 5 \text{ sec}$

time for sound to travel

$$t_2 = \frac{125}{340} = 0.36 \text{ sec}$$

$$t_1 + t_2 = 5.36 \text{ sec.}$$

70. Insufficient data.

71. Let thickness of plank be  $x$

$$v^2 = u^2 + 2as$$

$$\left(\frac{19}{20}u\right)^2 = u^2 + 2ax$$

$$a = \frac{\left(\frac{19u}{20}\right)^2 - u^2}{2x}$$

Now let the number of planks be  $n$

$$v^2 = u^2 + 2as$$

$$0 = u^2 + 2anx$$

$$u^2 + 2 \left[ \frac{\left(\frac{19u}{20}\right)^2 - u^2}{2x} \right] \times x \times n = 0$$

$$n = 11.$$

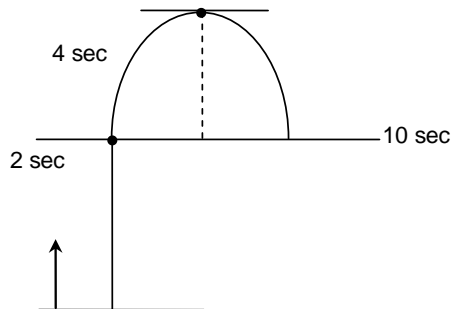
72. Minimum 3 forces are required for zero resultant.

73. Area under the curve gives  $v - u$

$$v = 55 \text{ m/sec.}$$

74. Work done of force  $Q$  is zero.

75.



76.

$$p = mv$$

$$mv = \text{constant}$$

$$m \propto \frac{1}{v}$$

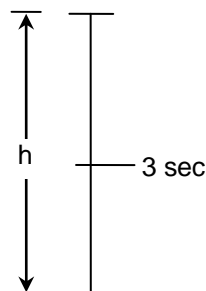
77. Let total height be  $h$

$$\text{Using } s = ut + \frac{1}{2}at^2$$

$$h = \frac{25}{2}g$$

$$\text{Distance covered in 3 sec } h' = \frac{9g}{2}$$

$$\text{Remaining distance} = \frac{25}{2} \times g - \frac{9}{2}g = 8g$$



So time required  $8g = \frac{1}{2}gt^2$

$t = 4 \text{ sec}$

Total time =  $3 + 4 = 7 \text{ sec}$ .

78.  $v = 1500 \text{ m/s}$

Time period  $T = 2 \mu\text{s} = 2 \times 10^{-6} \text{ sec}$

$v = \frac{\lambda}{T}$

$\lambda = v \times T$

$\lambda = 1500 \times 2 \times 10^{-6}$

$\lambda = 3 \times 10^{-3} \text{ m}$ .

79. Velocity time graph will be a straight line.

80. Rate of change of momentum per unit area is pressure.

81. Rocket work on principle of conservation of linear momentum.

82. When the surfaces are coated with lubricant then they slide upon each other.

83.  $\text{K.E} = \frac{P^2}{2m}$

So, 44%.

84. Fact based option 2.

85. Fact based option 4.

86. Fact based option 3.

87. Fact based option 2.

88. Fact based option 1.

89. The frequency of oscillation of kinetic energy will be 2 times the frequency of oscillation of particle in a simple harmonic motion.

90.  $P = \frac{mgh}{t} = \frac{50 \times 45 \times 15 \times 10^{-2}}{9} = 0.375 \text{ kw}$  .

91. Tungsten forms a black coating on its surface due to its sublimation.

92. The unit of latent heat is J/kg.

93. Incandescent light bulb is not an example of plasma.

94. Only liquid phase is present after mixing as sugar is soluble in water.

95. High pressure and low temperature are favourable conditions for liquefaction of ammonia.

96. 10 g of water at 0°C has more heat content, because it has more energy equal to latent heat of fusion.

97. If we add common salt to water its freezing point becomes less than 0°C because addition of soluble impurities lowers the freezing point.

98. (a) Black ink  $\longrightarrow$  (iv) Chromatography and water

- (b) Liquid air  $\longrightarrow$  (iii) Fractional distillation  
(c) Copper sulphate solution in water  $\longrightarrow$  (ii) Evaporation & crystallization  
(d) Acetone  $\longrightarrow$  (i) Distillation

99. Valence electrons of P = 6  
Valence electrons of Q = 7  
None of the options match with the given figure.
100. Mass number = 37  
Number of protons in  $X_2$  = 34  
Number of protons in X = 17  
Number of neutrons in X =  $37 - 17 = 20$
101. Number of moles of water in 360 g =  $\frac{360}{18} = 20$  moles  
Number of molecules of water =  $20 \times 6.022 \times 10^{23}$   
 $= 1.2044 \times 10^{25}$
102.  $1 \text{ g SO}_2 = \frac{1}{64} \times N_A$  molecules  
 $1 \text{ g NO}_2 = \frac{1}{46} \times N_A$  molecules  
 $1 \text{ g NH}_3 = \frac{1}{17} \times N_A$  molecules  
 $1 \text{ g H}_2 = \frac{1}{2} \times N_A$  molecules
103.  $2\text{H}_2\text{O} \longrightarrow 2\text{H}_2 + \text{O}_2$   
36 g  $\text{H}_2\text{O}$  produces  $\longrightarrow$  4g  $\text{H}_2$  and 32g  $\text{O}_2$   
 $\therefore$  18g  $\text{H}_2\text{O}$  will produce  $\longrightarrow$  2g  $\text{H}_2$  and 16g  $\text{O}_2$
104.  $6.02 \times 10^{23} \text{ Mg}^{2+} \& \text{CO}_3^{2-}$  make  $\longrightarrow$  1 mole  $\text{MgCO}_3$   
 $\therefore 3.01 \times 10^{23} \text{ Mg}^{2+} \& \text{CO}_3^{2-}$  make  $\longrightarrow \frac{1}{6.02 \times 10^{23}} \times 3.01 \times 10^{23}$   
 $= 0.5 \text{ mol MgCO}_3$   
 $= 42\text{g}$
105. Number of electrons weighing 1 kg =  $\frac{1}{9.108 \times 10^{-31}}$   
Number of moles of electrons =  $\frac{1}{9.108 \times 10^{-31} \times 6.02 \times 10^{23}}$   
 $= \frac{1}{9.108 \times 6.023} \times 10^8$
106. Solubility of  $\text{KNO}_3$  increases with increase in temperature.
107. A mixture of sulphur and carbon disulphide is homogeneous and hence will not show tyndall effect.
108. Dry ice (solid  $\text{CO}_2$ ) is a sublimable substance.
109. Number of moles of ninhydrin ( $\text{C}_9\text{H}_6\text{O}_4$ ) =  $\frac{7.4}{178} = 0.041$   
Number of molecules present =  $0.041 \times 6.023 \times 10^{23}$   
 $= 2.5 \times 10^{22}$

$$110. \quad \frac{23.6}{100} \times 206 + 207 \times \frac{22.6}{100} + 208 \times \frac{53.8}{100}$$

$$= \frac{4861.6}{100} + \frac{4678.2}{100} + \frac{11190.4}{100} = 207.302$$

Average atomic mass of Pb = 207.302

111. Vitamin B<sub>12</sub> contains Co(III).

112. Tincture of iodine is alcoholic solution of I<sub>2</sub>.

113. Fog is a colloidal solution of liquid in gas.

114. The oxidation state of P in H<sub>3</sub>PO<sub>3</sub> is  
 $3(+1) + x + 3(-2) = 0$   
 $x = +6 - 3$   
 $= +3$

115. The weight of a molecule of C<sub>60</sub>H<sub>122</sub>  
 $= (60 \times 12 + 122 \times 1) 1.67 \times 10^{-24} \text{ g}$   
 $= (720 + 122) 1.67 \times 10^{-24} \text{ g}$   
 $= 842 \times 1.67 \times 10^{-24} \text{ g}$   
 $= 1406.14 \times 10^{-24} \text{ g}$   
 $= 1.4 \times 10^{-21} \text{ g}$

116. Number of moles of NaCl =  $\frac{5.85}{58.5} = \frac{1}{10}$  moles  
 Number of ions in 1 mole of NaCl = 2 moles  
 $\therefore$  Number of ions in  $\frac{1}{10}$  moles =  $\frac{1}{10} \times 2$  moles  
 $= \frac{1}{5}$  moles  
 $= \frac{1}{5} \times 6.022 \times 10^{23}$   
 $= 1.204 \times 10^{23}$

117. Naphthalene is purified by sublimation.

118. Sucrose is not a polymer.

119.  $\text{C} + 2\text{S} \longrightarrow \text{CS}_2$

12 g carbon combines with – 64 g S

3 g carbon combines with –  $\frac{64 \times 3}{12} = 16 \text{ g}$

120. Boron is a semiconductor.

121. 0.5 mole of H<sub>2</sub>O = 0.5 × 18 = 9 g  
 0.5 mole of C<sub>2</sub>H<sub>6</sub> = 0.5 × 30 = 15 g  
 1 mole of NH<sub>3</sub> = 1 × 17 = 17 g  
 0.1 mole of CO<sub>2</sub> = 0.1 × 44 = 4.4 g

122. Co – 60 is used for leukemia.

123. In Fe<sub>2</sub>O<sub>3</sub>, Fe is trivalent.

124.  $\text{Mn} + 2\text{HNO}_3 \longrightarrow \text{Mn}(\text{NO}_3)_2 + \text{H}_2$ .

125. Solder is used for welding electrical wires.
126. Aqua-regia =  $3\text{HCl} + \text{HNO}_3$
127. Nitrogen gas is filled in tyres of aeroplane.
128. The correct order of reactivity is :  $\text{Mg} > \text{Al} > \text{Zn} > \text{Fe}$
129. The hydrogen gas is obtained at cathode and oxygen gas is obtained at anode.
130. Antiknocking agent in gasoline is tetraethyl lead (TEL).
131. Lysosome is a single membrane bound organelle while nucleus, mitochondria and plastid have double membranes.
132. IR-36 is improved variety of rice.
133. Edward Jenner discovered small pox vaccine.
134. Gymnosperm is a phanerogamae.
135. Pinus, a gymnosperm has naked seeds.
136. *Culex* is a vector of *Encephalitis*.
137. BCG vaccine is given for immunity against tuberculosis.
138. Starch is stored in amyloplast.
139. *Salamander* is an amphibian while chameleon, lizard and cobra are reptiles.
140. Carolus Linnaeus proposed the "Binomial nomenclature".
141. Phloem, a complex tissue has companion cells.
142. Nitrosomonas does not fix atmospheric  $\text{N}_2$  but help in nitrification.
143. Intestinal muscles are involuntary and unstriated.
144. Ribosomes helps in protein synthesis.
145. Sclerenchyma, a dead plant tissue does not have intercellular spaces.
146. *Chlamydomonas* is a unicellular green algae.
147. Haemocoel is present in arthropod (cockroach) and molluscs except in octopus which has closed circulatory system.
148. Penicillin blocks the cell wall formation of bacteria.
149. *Euglena*, a connecting link between plant and animal shows characteristics of both.
150. Slime moulds are classified in Protista kingdom.
151. Coral is a colonial coelenterate.
152. *Staphylococci* cause acne.
153. Nervous control occur only in animals.



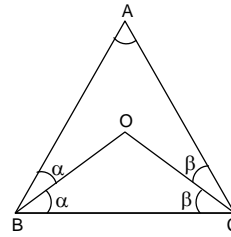
154. Mg is a constituent of chlorophyll.  
 155. Kala-azar is caused by *Leishmania donovani*, a protozoan.  
 156. 1 December is celebrated as World AIDS Day.  
 157. Starfish, an Echinodermate has water vascular system for locomotion.  
 158. Pseudocoelom is found in roundworms.  
 159. Fungi is an eukaryotic cell without plastid.  
 160. Mitochondria and plastids both contain their own DNA and ribosomes, so they are capable of forming their own proteins.  
 161. *Paramecium* is a ciliated protozoan.  
 162. Biosphere is a life supporting zone.  
 163. Aseel is an indigenous breed of poultry.  
 164. Acid rain contains sulphuric acid and nitric acid.  
 165. Gonorrhoea, a sexually transmitted disease is caused by bacteria *Neisseria gonorrhoea*.  
 166. Earthworm respire through skin and this type of respiration is called cutaneous respiration.  
 167. 2, 4-D a synthetic auxin is used as weedicide.  
 168. CFC (Chlorofluorocarbon) deplete the ozone layer.  
 169. Echidna is an egg laying mammal while kangaroo, bat and whale gives birth to babies.  
 170. Ringworm is a fungal disease while malaria is a protozoan, leprosy and tetanus are bacterial diseases.

$$\begin{aligned}
 171. \quad x &= \frac{\sqrt{3}+1}{\sqrt{3}-1} + \frac{\sqrt{3}-1}{\sqrt{3}+1} + \frac{\sqrt{3}-2}{\sqrt{3}+2} \\
 x &= -\frac{1+\sqrt{3}}{1-\sqrt{3}} - \frac{1-\sqrt{3}}{1+\sqrt{3}} - \frac{2-\sqrt{3}}{2+\sqrt{3}} \\
 &= \frac{-(1+\sqrt{3})^2}{-2} - \frac{(1-\sqrt{3})^2}{-2} - \frac{(2-\sqrt{3})^2}{1} \\
 &= (2 + \sqrt{3}) + (2 - \sqrt{3}) - (4 + 3 - 4\sqrt{3}) \\
 &= 4 - 7 + 4\sqrt{3} \\
 x &= -3 + 4\sqrt{3} \\
 x^2 &= 57 - 24\sqrt{3} \\
 \frac{1}{x} &= \frac{-3 - 4\sqrt{3}}{-39} \\
 \frac{39}{x} &= 3 + 4\sqrt{3} \\
 \left(\frac{39}{x}\right)^2 &= 57 + 24\sqrt{3} \\
 \therefore x^2 + \left(\frac{39}{x}\right)^2 &= 114
 \end{aligned}$$

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

173.  $x = \sqrt{2+\sqrt{3}} + \sqrt{2-\sqrt{3}}$   
 $x^2 = 2 + \sqrt{3} + 2 - \sqrt{3} + 2$   
 $x^2 = 6$   
 $x = \sqrt{6}$

174. In  $\triangle ABC$   
 $\angle A = 130^\circ$   
 $\therefore \angle BOC = 90^\circ + \frac{\angle A}{2} = 90^\circ + 65^\circ = 155^\circ$



175.  $4^x - 4^{x-1} = 24$   
 $\Rightarrow 4^x - \frac{4^x}{4} = 24$   
 $\Rightarrow \frac{3}{4} \cdot 4^x = 24$   
 $\Rightarrow 4^x = \frac{24 \times 4}{3}$   
 $\Rightarrow 4^x = 32$   
 $\Rightarrow 2^{2x} = 2^5$   
 $2x = 5$   
 $\therefore (2x)^x = (5)^{5/2} = 25\sqrt{5}$

176.  $\frac{(2.3)^3 - (0.027)}{(2.3)^2 + 0.69 + 0.09} = K$   
 $\Rightarrow K = \frac{(2.3)^3 - (0.3)^3}{(2.3)^2 + 2.3 \times 0.3 + (0.3)^2}$   
 $K = 2.3 - 0.3$   
 $= 2$

177.  $(3x - 1)^7 = a_7x^7 + a_6x^6 + a_5x^5 + \dots + a_1x + a_0$   
 Put  $x = 1$   
 $a_7 + a_6 + a_5 + \dots + a_1 + a_0 = 2^7 = 128$

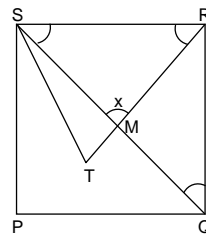
178.  $a : b = 2 : 3, x : y = 3 : 4$   
 $\therefore \frac{25by - 2ax}{3ay + 4bx}$   
 $= \frac{ax \left( 25 \frac{b}{a} \frac{y}{x} - 2 \right)}{ax \left( 3 \frac{y}{x} + 4 \frac{b}{a} \right)}$

$$= \frac{25 \times \frac{3}{2} \times \frac{4}{3} - 2}{3 \times \frac{4}{3} + 4 \times \frac{3}{2}}$$

$$= \frac{48 - 2}{10} = \frac{24}{5}$$

179.  $x^3 - 3x^2 + 3x + 7 = (x + 1)(ax^2 + bx + c)$   
 $= ax^3 + bx^2 + cx + ax^2 + bx + c$   
 $= ax^3 + (a + b)x^2 + (b + c)x + c$   
 Equating  
 $a = 1$   
 $b = -4$   
 $c = 7$   
 $\therefore a + b + c = 1 - 4 + 7$   
 $= 4$

180.  $\angle RSM = 45^\circ$   
 $\angle RST = 60^\circ$   
 $\angle TSM = 15^\circ$   
 And  $\angle STM = 60^\circ$   
 $\therefore x = 60^\circ + 15^\circ = 75^\circ$

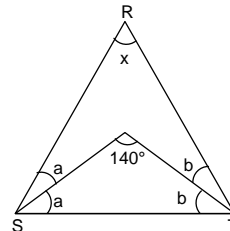


181. Let angles are  $x, 2x, 3x, 4x$   
 $\Rightarrow x + 2x + 3x + 4x + 140 = 540$   
 $\therefore x = 40$   
 $\Rightarrow$  greatest angle  $= 4x = 160^\circ$

182.  $\bar{x} = 14.5, n = 18$   
 $\Rightarrow \sum x_i = 14.5 \times 18 = 261$   
 New sum  $= 261 + 15 + 16 = 292$   
 New mean  $= \frac{292}{20} = 14.6$

183.  $x = \sqrt{42 + \sqrt{42 + \dots \infty}}$   
 $x = \sqrt{42 + x}$   
 $x^2 - x - 42 = 0$   
 $(x - 7)(x + 6) = 0$   
 $x = 7, x \neq -6$

184.  $a + b = 40^\circ$   
 $2a + 2b + x = 180^\circ$   
 $\therefore x = 100^\circ$



185. Let  $(CP)_{25} = \text{Rs } 25$   
 $(SP)_{20} = \text{Rs } 25$   
 $\therefore (CP)_{20} = \text{Rs } 20$   
 Profit %  $= \frac{25 - 20}{20} \times 100 = 25\%$

186.  $0.2\overline{72} + 0.13\overline{63}$   
 Let  $x = 0.2\overline{72} \Rightarrow 10x = 2.\overline{72}$   
 $\Rightarrow 1000x = 272.\overline{72}$   
 $\therefore x = \frac{3}{11}$   
 Let  $y = 0.13\overline{63}$   
 $\Rightarrow 100y = 13.\overline{63}$   
 $\Rightarrow 10000y = 1363.\overline{63}$   
 $y = \frac{3}{22}$   
 $\therefore \frac{3}{11} + \frac{3}{22} = \frac{9}{22}$
187.  $a = 2 + \sqrt{3}$   
 $\frac{1}{a} = 2 - \sqrt{3}$   
 $a - \frac{1}{a} = 2\sqrt{3}$
188.  $10a + 5 = 42 + 6a - 5$   
 $4a = 32$   
 $a = 8$
189.  $x^4 + x^2 - 20$  is divisible by  $x^2 + 5$   
 $x^4 + 5x^2 - 4x^2 - 20 = (x^2 + 5)(x^2 - 4)$
190.  $x = 7 + 4\sqrt{3}$ ,  $xy = 1$   
 $\Rightarrow y = \frac{1}{x} = \frac{1}{7 + 4\sqrt{3}} = 7 - 4\sqrt{3}$   
 $\Rightarrow \frac{1}{x^2} + \frac{1}{y^2} = x^2 + y^2 = (x + y)^2 - 2$   
 $= (14)^2 - 2 = 194$
191.  $5^{2m-1} = 25^{m-1} + 100$   
 $5^{2m-1} = 5^{2m-2} + 100$   
 Let  $5^{2m} = x$   
 $\frac{x}{5} = \frac{x}{25} + 100$   
 $\Rightarrow x = 5^4 = 5^{2m}$   
 $\Rightarrow 2m = 4$   
 $m = 2$   
 $\therefore 3^{2+m} = 3^4 = 81$
192. Sample space =  $2^5 = 32$   
 Required probability =  $1 - \frac{6}{32} = \frac{13}{16}$
193.  $\frac{3\sqrt{2} + 2\sqrt{3}}{5\sqrt{2} - 4\sqrt{3}} = x + y\sqrt{6}$   
 $\frac{3\sqrt{2} + 2\sqrt{3}}{5\sqrt{2} - 4\sqrt{3}} \times \frac{5\sqrt{2} + 4\sqrt{3}}{5\sqrt{2} + 4\sqrt{3}}$   
 $= 27 + 11\sqrt{6}$   
 $\therefore x = 27, y = 11$   
 $x - y = 16$

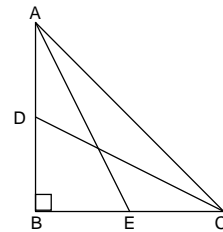
194.  $p + q + r = 0$   
 $\frac{(q+r)^2}{qr} + \frac{(r+p)^2}{rp} + \frac{(p+q)^2}{pq} \Rightarrow \frac{p^2}{qr} + \frac{q^2}{rp} + \frac{r^2}{pq}$   
 $\Rightarrow \frac{p^3 + q^3 + r^3}{pqr} = \frac{3pqr}{pqr} = 3$

195.  $2\ell - m + n = 0$   
 $2\ell + n = m$   
 $\Rightarrow$  by squaring  
 $4\ell^2 - m^2 + n^2 + 4\ell n = 0$

196.  $m^2 + \frac{1}{25m^2} = 8\frac{3}{5}$   
 $\left(m + \frac{1}{5m}\right)^2 - \frac{2}{5} = \frac{43}{5}$   
 $\Rightarrow \left(m + \frac{1}{5m}\right)^2 = 9$   
 $m + \frac{1}{5m} = 3$   
 $\left(m + \frac{1}{5m}\right)^3 = m^3 + \frac{1}{125m^3} + 3 \times m \times \frac{1}{5m} \times (3)$   
 $27 = m^3 + \frac{1}{125m^3} + \frac{9}{5}$   
 $m^3 + \frac{1}{125m^3} = 27 - \frac{9}{5} = \frac{126}{5} = 25\frac{1}{5}$

197. CP of book = x  
 CP of bag =  $\frac{112x}{100}$   
 $\therefore x + \frac{112x}{100} = 371$   
 $\Rightarrow x = \frac{371 \times 100}{212}$   
 CP of bag =  $\frac{112x}{100} = 196$

198.  $AE = DC = 13$   
 In  $\triangle ABE$   
 $AB = \sqrt{13^2 - 5^2} = 12$   
 $\therefore BD = 12 - x$   
 In  $\triangle DBC$ ,  
 $(12 - x)^2 + (5 + x)^2 = 169$   
 $\therefore x = 7 \text{ cm}$   
 $AD = 7 \text{ cm}$



199.  $n(S) = 36$   
 $E = \{(3, 6), (6, 3), (4, 5), (5, 4)\}$   
 $n(E) = 4$   
 $P(E) = \frac{4}{36} = \frac{1}{9}$

200.  $A : B : C = 2 : 3 : 4$   
And  $A^2 + B^2 + C^2 = 11600$   
Let  $A = 2K, B = 3K, C = 4K$   
 $\Rightarrow 4K^2 + 9K^2 + 16K^2 = 11600$   
 $K = 20$   
 $\therefore A = 40, B = 60, C = 80$   
 $(A - B + C) = (40 - 60 + 80) = 60$