

**NTSE STAGE – I**  
**02 – A/2017 – 18 (For Class – X)**  
**MENTAL ABILITY TEST (MAT)**  
**HINTS & SOLUTIONS**

1. 2

$$1. \frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{4}} + \frac{1}{\sqrt{4}+\sqrt{5}} + \frac{1}{\sqrt{5}+\sqrt{6}} + \frac{1}{\sqrt{6}+\sqrt{7}} + \frac{1}{\sqrt{7}+\sqrt{8}} + \frac{1}{\sqrt{8}+\sqrt{9}}$$

$$\left[ \left( \frac{1}{\sqrt{2}+1} \times \frac{\sqrt{2}-1}{\sqrt{2}-1} \right) + \left( \frac{1}{\sqrt{3}+\sqrt{2}} \times \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}-\sqrt{2}} \right) + \left( \frac{1}{\sqrt{4}+\sqrt{3}} \times \frac{\sqrt{4}-\sqrt{3}}{\sqrt{4}-\sqrt{3}} \right) + \dots + \left( \frac{1}{\sqrt{9}+\sqrt{8}} \times \frac{\sqrt{9}-\sqrt{8}}{\sqrt{9}-\sqrt{8}} \right) \right]$$

$$\Rightarrow [(\sqrt{2}-1) + (\sqrt{3}-\sqrt{2}) + (\sqrt{4}-\sqrt{3}) + \dots + (\sqrt{9}-\sqrt{8})]$$

$$\Rightarrow (-1 + \sqrt{9}) = -1 + 3 = 2$$

2. **No option correct.**

3. 3

$$3. \frac{n(n-3)}{2} = 35$$

$$n^2 - 3n - 70 = 0$$

$$n = 10$$

$$\frac{(n-2) \times 180}{n} = \frac{8 \times 180}{10} = 144^\circ$$

4. 4

$$4. 15 - 2 \div 900 + 90 \times 100 = ?$$

$$\Rightarrow 15 \times 2 + 900 \div 90 - 100 = 15 \times 2 + 10 - 100$$

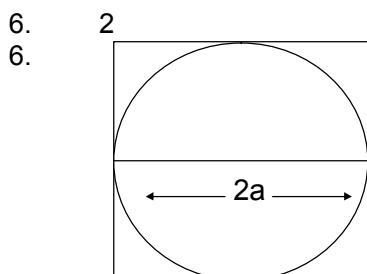
$$\Rightarrow 30 + 10 - 100 = 40 - 100 = -60$$

5. 4

$$5. (k+1)x^2 - 5x + 2k = 0$$

Product of roots =  $\alpha \cdot \frac{1}{\alpha} = \frac{2k}{k+1}$

$$\Rightarrow k + 1 = 2k \Rightarrow k = 1$$



Let each side of cube =  $2a$   
 $\therefore$  diameter of sphere =  $2a$

$$\therefore \frac{\text{Vol. of cube}}{\text{Vol of sphere}} = \frac{(2a)^3}{\frac{4}{3}\pi(a)^3} = \frac{8a^3}{\frac{4}{3}\pi a^3} = \frac{6}{\pi}$$

7. 2

7.  $2x^2 - 5x + 16 = 0$

$$\left(\frac{\alpha^2}{\beta}\right)^{\frac{1}{3}} + \left(\frac{\beta^2}{\alpha}\right)^{\frac{1}{3}}$$

$$= \frac{\alpha^{2/3} \cdot \alpha^{1/3} + \beta^{2/3} \cdot \beta^{1/3}}{(\alpha\beta)^{1/3}} = \frac{\alpha + \beta}{(\alpha\beta)^{1/3}} = \frac{5/2}{2} = \frac{5}{4}$$

8. 1

8. Divided = Divisor x Quotient + Rem

Quotien = 10

∴ divisor = 100

& remainder = 10

∴ divided = 100 x 10 + 10 = 1010

9. 2

9.  $\left[ (0.111)^3 + (0.222)^3 - (0.333)^3 + (0.333)^2 (0.222) \right]^2$

Taking common (0.111)

$$(0.111)^3 + (0.111)^3 (2)^3 - (0.111)^3 (3)^3 + (0.111)^2 (3)^2 (0.111)(2)$$

$$= (0.111)^3 (1 + 8 - 27 + 18)$$

$$= 0$$

10. 2

10.  $9^{2n} - 4^{2n}$  is of form  $a^n - b^n$  (where n is even)

Therefore  $a^n - b^n$  is always divisible by  $(a - b)$  &  $(a + b)$

So it is divisible by  $(9 + 4)$  and  $(9 - 4)$  i.e., 5 and 13

11. 1

11. LCM + HCF = 50

LCM - HCF = 20

∴ LCM = 35 & HCF = 15

∴ product of number = LCM x HCF

= 35 x 15

= 525

12. 1

12. Speed of train =  $\frac{\text{length of train} + \text{length of platform}}{\text{time taken by train}}$

$$\Rightarrow 120 \times \frac{5}{18} = \frac{320 + x}{24} \quad (\text{Let length of platform be } x \text{ m})$$

∴ x = 480 m

∴ Speed of man =  $\frac{\text{length of platform}}{\text{time taken by man}}$

$$= \frac{480}{4 \times 60} = 2 \text{ m / sec}$$

13. 4

$$13. \frac{a^{n+1} + b^{n+1}}{a^n + b^n} = \frac{a+b}{2} \text{ when } (n=0)$$

$\Rightarrow$  value of  $n = 0$

14. 3

14. Let total workers =  $x$

$$\therefore \text{women} = \frac{1}{3}x$$

$$\therefore \text{men} = \frac{2}{3}x$$

$$\text{Women with children} = \frac{1}{3} \times \frac{1}{2} \times \frac{1}{3}x = \frac{x}{18}$$

$$\text{Men with children} = \frac{3}{4} \times \frac{2}{3} \times \frac{2x}{3} = \frac{x}{3}$$

$$\text{Worker with children} = \frac{x}{18} + \frac{x}{3} = \frac{7x}{18}$$

$$\text{Worker without children} = x - \frac{7x}{18} = \frac{11}{18} \text{ of } x$$

15. 4

15. Let Akash earns  $x$  rs. As profit

$$\text{Then Alok earns} = x + \frac{75x}{100} = \frac{175x}{100} = \frac{7x}{4}$$

$\therefore$  Akash's profit is less than Alok by

$$\frac{7x}{4} - x$$
$$= \frac{4}{7x} \times 100$$

$$= \frac{3x}{7x} \times 100$$

$$= \frac{3}{7} \times 100 = 42.85\%$$

16. 3

16. Let height of towers, be  $5x$ ,  $6x$ ,  $7x$  meter respectively

$$\therefore \text{Speed of spider} = \frac{5x}{15} \text{ m/min}$$

$$\therefore \text{Time taken to climb the highest one} = \frac{7x}{\frac{5x}{15}}$$

$$= \frac{7x \times 15}{5x}$$
$$= 21 \text{ min}$$

17. 1

$$17. \text{Centroid} = \left( \frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3} \right)$$

$$(0, 1) = \left( \frac{4 + 2 + x_3}{3}, \frac{-2 - 6 + y_3}{3} \right)$$

$$\therefore (x_3, y_3) = (-6, 11)$$

18. 1

$$18. \cos^2 \alpha = \sin \alpha \cdot \tan \alpha$$

$$\cos^3 \alpha = \sin^2 \alpha$$

$$\frac{\cos^2 \alpha}{\sin^2 \alpha} = \frac{1}{\cos \alpha} \Rightarrow \cot^2 \alpha = \frac{1}{\cos \alpha}$$

$$\cot^6 \alpha - \cot^2 \alpha = \cot^2 \alpha (\cot^4 \alpha - 1)$$

$$= \frac{1}{\cos \alpha} \left( \frac{1}{\cos^2 \alpha} - 1 \right)$$

$$= \frac{1}{\cos \alpha} \left( \frac{\sin^2 \alpha}{\cos^2 \alpha} \right) = \frac{\sin^2 \alpha}{\cos^3 \alpha} = 1$$

19. 3

$$19. 7 + 6 + 5 + 4 + 3 + 2 + 1 = 28$$

20. 2

20. We can choose vertices out of 6 in  ${}^6C_3 = 20$  ways

Chosen vertices can form equilateral triangle in just 2 ways

$$\text{Required probability} = \frac{2}{20} = \frac{1}{10}$$

21. 2

$$\begin{aligned} 21. \quad & A = 630 \quad \text{males teacher in F} = 100 \\ & B = 720 \quad \text{female teacher in C} = 28\% \text{ of } 4500 - (600) \\ & C = 1260 \quad = 660 \\ & D = 675 \\ & E = 945 \quad \text{female in B} = 16\% \text{ of } 1500 - 400 \\ & F = 270 \quad = 320 \\ & \Rightarrow 100 + 660 + 320 = 1080 \end{aligned}$$

22. 4

$$22. \frac{x}{100} \times 630 = 575 \Rightarrow x = 90\%$$

23. 3

23. In B we have 630 total teachers  
Male = 400  
Female = 230  
In E we have 945 total teachers  
Male = 500  
Female = 445

24. 2

24. Total number of teachers in E = 945

Female teachers in F = 170  
 Difference = 945 – 170 = 775

25. 3

25. Male in C → 600  
 Female in B → 320  
 $C_M : B_F = 600 : 320 = 15 : 8$

26. 1

26.  $25 \times 10 + 5 = 255$ ,  $255 \times 10 - 5 = 2545$ ,  $2545 \times 10 + 5 = 25455$ ,  $25455 \times 10 - 5 = 254545$

27. 4

27.  $4 \times 3 = 12 \rightarrow$  Alphabet position of L  
 $1 \times 17 = 17 \rightarrow$  Alphabet position of Q  
 $5 \times 4 = 20 \rightarrow$  Alphabet position of T

28. 4

28. After removing even numbers  
 1 5 9 7 1 5 3 5 9 7 5 9 1 3 5 1 3  
 Answer → 9

29. 4

29. Total hours = 89 hours

Faulty time 23 hours & 44 min =  $23 + \frac{44}{60}$  i.e.,  $\frac{356}{15}$  hr

$\frac{356}{15}$  hr of incorrect watch = 24 hr of correct watch

$\therefore$  89 hours of incorrect watch =  $\frac{24 \times 15}{356} \times 89 = 90$  hrs

$\therefore$  Actually watch will be 1 hr faster than faulty watch.  
 i.e., 11 pm

30. 2

30.  $1 + 2 + 3 \dots 5 6$

Sum =  $\frac{n(n+1)}{2} = \frac{56 \times 57}{2} = 28 \times 57 = 1596$

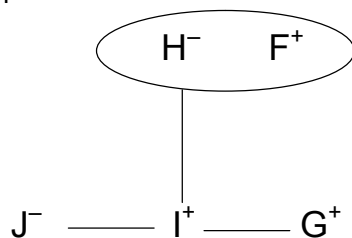
31. 2

31. Total white box =  $\frac{64}{2} = 32$

Now odd in white box =  $\frac{32}{2} = 16$

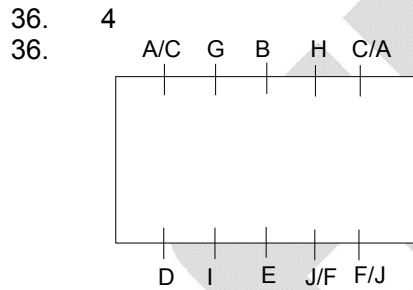
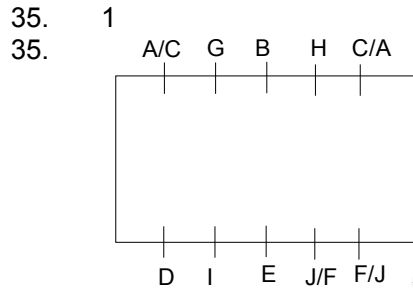
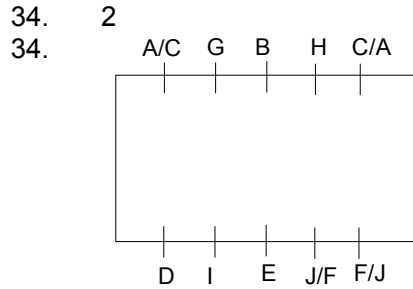
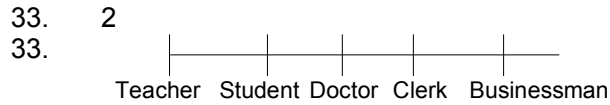
32. 4

32.



+ means male member  
 – means female members

○ means couple  
 — means brother / daughter  
 | means son / daughter

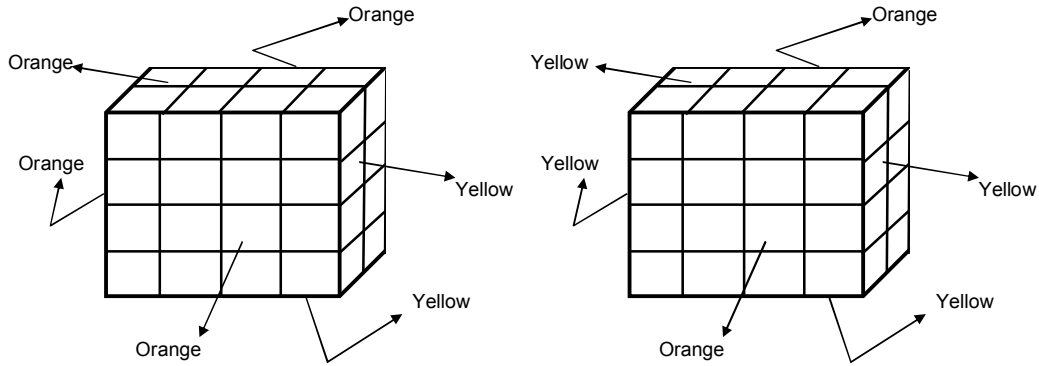


37. 3  
 37. 1 mango = 4 banana  
 = 2 apples  
 = 10 strawberries

38. 2  
 38.  $52 < 4 \wedge 5 > 8 \vee 2$   
 $52 - 4 \times 5 + 8 \div 2$   
 $52 - 4 \times 5 + 4$   
 $56 - 20 = 36$

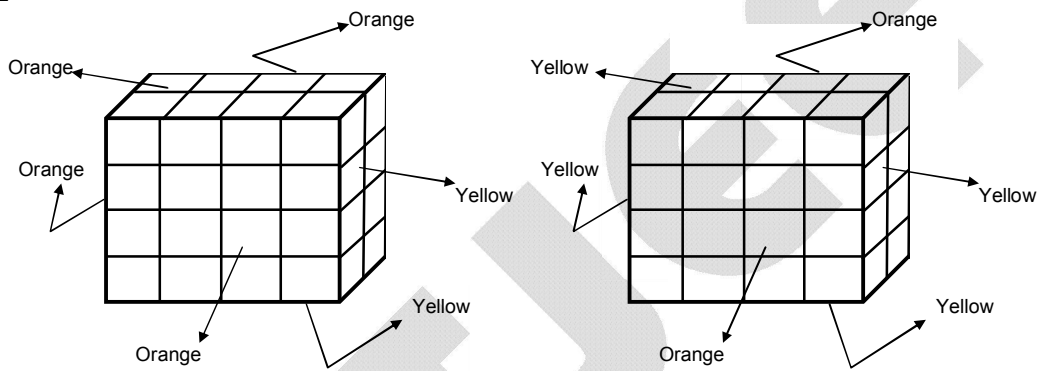
39. 1  
 39. 4:35  
 To find mirror image  
 $11:60 - 4:35 = 7:25$

40. 1  
40.



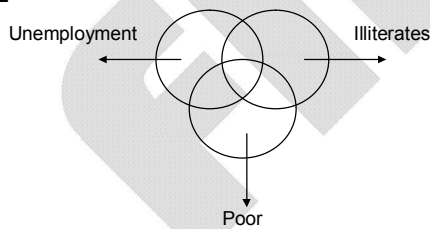
All the smaller cubes have colour on their faces,

41. 2  
41.



The larger faces will have one face coloured cube which is four on each face.  
So, in total there are four larger faces.  
 $4 \times 4 = 16$   
16 cubes will have only one face colour.

42. 2  
42.



43. 1  
43. By observation

44. 4  
44. From one row to another the contents of each cell moves one place towards right.

45. 3  
45. By observation

46. 4  
46. By observation.

47. 1  
47. Blue → 2  
Sky → 1  
Was → 3  
People → 8  
Like → 0  
In → 6  
Birds → 9  
'People like birds' → 809

48. 1  
48.  $5 \times 2 + 2 = 12$   
 $12 \times 2 + 2 = 26$   
 $26 \times 2 + 2 = 54$

49. 3  
49.  $9 \times (2 + 1) = 27$   
 $7 \times (3 + 2) = 35$   
 $4 \times (4 + ?) = 36$   
 $? = 9 - 4 = 5$

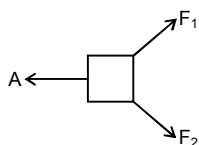
50. 2  
50.  $\sqrt{64} + \sqrt{36} + \sqrt{49} = 8 + 6 + 7 = 21$   
 $\sqrt{121} + \sqrt{81} + \sqrt{100} = 11 + 9 + 10 = 30$



# NTSE STAGE – I SCHOLASTIC APTITUDE TEST (SAT) HINTS & SOLUTIONS

## PHYSICS

101. 1  
101.



Minimum number of forces required is 3.

102. 1  
102.

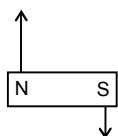
Resistance of the heater be  $R$ .  
New resistance of heater is  $R/2$ .

$$\text{Initial power} = \frac{V^2}{R}$$

$$\text{Final power} = \frac{V^2}{R/2} = 2 \frac{V^2}{R}$$

$\therefore$  Heat generated is doubled.

103. 3  
103.



Force acting at different part of the magnet is different. So both torque and force will be acting.

104. 2  
104.

$$P = 2 \times 10^3 \text{ watt}$$

$$\text{Energy in 1 min} = 2 \times 10^3 \times 60 \text{ J.}$$

$$\Rightarrow 2 \times 10^3 \times 60 = m \times 10 \times 10$$

$$\Rightarrow m = 1200 \text{ kg} ; \text{ Volume} = 1200 \text{ litre.}$$

105. 3  
105.

Initial velocity =  $V$

Final velocity =  $V'$

$$\frac{1}{2}mv^2 \times 4 = \frac{1}{2}m(v')^2$$

$$V' = 2V.$$

Initial momentum =  $mv$

Final momentum =  $2mv$ .

$\therefore$  Momentum is doubled.

106. 3  
106.

Total work done by gravity is zero.

107. 2

$$\Rightarrow \frac{GM_m \times 80}{(2R_m)^2} = 9.8$$

$$\Rightarrow \frac{GMm}{Rm^2} = \frac{9.8}{40} = 0.49 \text{ m/s}^2$$

108. 2

$$108. P = P_1 + P_2$$

$$\Rightarrow P = \frac{1}{f_1} + \frac{1}{f_2}$$

$$\Rightarrow P = \frac{f_1 + f_2}{f_1 f_2}$$

109. 1

$$109. \frac{\sin i}{\sin r} = \frac{V_1}{V_2}$$

$$\Rightarrow \frac{\sin 30}{\sin 60} = \frac{V}{V'}$$

$$\Rightarrow V' = \sqrt{3} V$$

110. 2

$$110. \frac{1}{2}g(t)^2 - \frac{1}{2}g(t-2)^2 = 40$$

$$\Rightarrow 5t^2 - 5(t-2)^2 = 40$$

$$\Rightarrow t^2 - (t-2)^2 = 8$$

$$\Rightarrow t = 3$$

$$\therefore \text{height} = \frac{1}{2}gt^2 = \frac{1}{2} \times 10 \times 9 = 45 \text{ m.}$$

111. 4

$$111. R = \frac{\rho \ell}{A}$$

$$\text{New area} = nA$$

$$\therefore \text{New length} = \frac{\ell}{n}$$

$$\Rightarrow R' = \frac{\rho \ell}{n^2 A} = \frac{R}{n^2}$$

112. 3

112. Ammeter has low resistance and due to its resistance current in the circuit decreases.

113. 4

113. As the rays are diverging so the optical device is convex mirror.

114. 4

114. Work is zero only when force and displacement are perpendicular to each other. So, work will be down in all the cases.

### CHEMISTRY

115. 2

115. Silver is a good conductor of electricity.

116. 1

$$116. \text{Cr} = [\text{Ar}] 4s^1 3d^5$$

Half filled configuration of d – subshell is more symmetrical.

117. 3

117. Amphoteric.

$\text{Al}_2\text{O}_3$  can react with acid and base both.

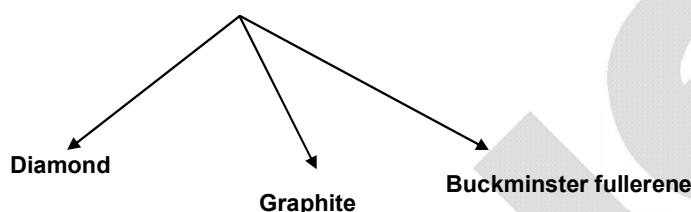
118. 3  
118. As Solution is acidic so  $\text{pH} < 7$

119. 3  
119. In basic solution phenolphthalein shows pink colour.

120. 1  
120. 4s, 4p, 4d, 4f  
4s = one orbital,      4d = five orbital      Total = 7 + 5 + 3 + 1  
4p = Three orbital      4f = seven orbital      = 16  
So, Total no. of electron = 32

121. 1  
121. Addition of NaCl results precipitation of soap to separate out soap from the solution. (as in question paper sodium is given which is considered wrong. It should be NaCl)

122. 3  
122. There are 3 allotropes of carbon.



123. 2  
123. Due to  $\text{Ca}(\text{NO}_3)_2$  &  $\text{CaSO}_4$ .  
As oxides of nitrogen & sulphur reacts with limestone on Taj Mahal to form nitrates and sulphates of calcium.

124. 1  
124.  $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{N}_2\text{O}$ , and  $\text{O}_3$   
Act as green house gases.

125. 1  
125. s, p, d, f subshells are present in an atom.

126. 1  
126. Boron and cadmium used in atomic reactors to control speed of neutron.

127. 2  
127. Moles =  $\frac{1000}{108} = 9.25$   
No. of atoms =  $9.25 \times 6.023 \times 10^{23}$   
=  $5.571 \times 10^{24}$  atoms

## BIOLOGY

128. 2  
128. Chromosomes carry genes, which are the hereditary units, which carry hereditary characters to the offspring.
129. 3  
129. Mitochondria is called the power house of the cell.
130. 4  
130. Plasma membrane is made up of both protein and lipid.
131. 2  
131. Oviduct is the site of fertilization in humans.
132. 1  
132. Heart never takes rest as it has cardiac muscles which never gets fatigue.
133. 1  
133. Lacteal present in the villi of the small intestine help to absorb fatty acids and glycerol.
134. 1  
134. The experiment 'origin of primitive life on Earth' was performed by Urey and Miller.
135. 2  
135. Bicuspid valve is present in the human heart in between left atrium and left ventricle.
136. 3  
136. During the light reaction NADPH and ATP are synthesized which is utilized in dark reaction.
137. 4  
137. Grafting in monocot plants is not possible because they have scattered Vascular Bundles.
138. 1  
138. Haemophilia disease is linked with sex chromosome.
139. 3  
139. The primary building blocks of DNA Nitrogenous base, phosphorus and deoxyribose.
140. 1  
140. Islets of Langerhans helps in formation of insulin

## MATHEMATICS

141. 4  
141.  $x^4 + 4x^3 + nx^2 + 4x + 1 = (ax^2 + bx + c)^2$   
 $x^4 + 4x^3 + nx^2 + 4x + 1 = a^2x^4 + b^2x^2 + c^2$   
 $+ 2abx^3 + 2bcx + 2acx^2$   
 $= a^2x^4 + 2abx^3 + (b^2 + 2ac)x^2 + 2bcx + c^2$   
Comparing coefficients,  
 $a^2 = 1$   
 $c^2 = 1$   
 $2ab = 4$

$$b^2 + 2ac = n$$

$$2bc = 4$$

Solving, we get  $\frac{a}{c} = 1 \Rightarrow a = c$

$$b = \pm 2, a = \pm 1, c = \pm 1$$

$$\therefore b^2 + 2ac = 4 + 2 = 6$$

142. 3

142. Let initial salary be Rs. 100

After 10% reduction, salary = Rs. 90

$$\therefore \text{Required percent of increase} = \frac{10}{90} \times 100$$

$$= 11\frac{1}{9}\%$$

143. 2

143. Let  $\sqrt{x} = a, \sqrt{y} = b$

Given equation  $a^3 + b^3 = 183$  and  $a^2b + ab^2 = 182$

$$\Rightarrow (a+b)^3 - 3ab(a+b) = 183 \text{ and } ab(a+b) = 182$$

$$\Rightarrow (a+b)^3 = 183 + 3 \times 182$$

$$\Rightarrow a+b = 9 \text{ and } ab = \frac{182}{9}$$

$$\text{Now } \sqrt{x} + \sqrt{y} = 9 \text{ and } \sqrt{xy} = \frac{182}{9}$$

$$\text{So, } x+y = 81 - 2\sqrt{xy} = \frac{365}{9}$$

$$\Rightarrow \frac{18}{5}(x+y) = 146$$

144. 3

144. Minimum value of  $m + n =$

Minimum value of  $m +$  minimum value of  $n$   
 $= 9 + 16 = 25$

145. 3

145. Let  $x = a, y = 2b, z = 4c$

$$\text{then } (a)^2 + (2b)^2 + (4c)^2 = 48 \quad \Rightarrow x^2 + y^2 + z^2 = 48$$

$$\text{and } 2ab + 8bc + 4ca = 48 \quad \Rightarrow xy + yz + zx = 48$$

$$\text{Now, } (x-y)^2 + (y-z)^2 + (z-x)^2 = 0$$

$$x = y = z$$

$$a = 2b = 4c$$

$$\frac{a}{4} = \frac{b}{2} = \frac{c}{1} = \lambda$$

$$\text{So, } ab + 4bc + 2ca = 4\lambda \cdot 2\lambda + 8\lambda \cdot \lambda + 2\lambda \cdot 4\lambda = 24$$

$$\lambda^2(8+8+8) = 24$$

$$\lambda = \pm 1$$

$$\Rightarrow a^2 + b^2 + c^2 = 21\lambda^2 = 21$$

146. 3  
 146. By angle sum property of  $\triangle ACE$  and  $\triangle DBF$

147. **No option is correct**

147.  $\sin^4 x = \cos^2 x$   
 $\Rightarrow (1 - \cos^2 x)^2 = \cos^2 x$   
 $\Rightarrow \cos^4 x - 3\cos^2 x + 1 = 0$   
 $\Rightarrow \cos^2 x = \frac{3 - \sqrt{5}}{2}$

Now,  $\cos^4 x + \cos^2 x = \left(\frac{3 - \sqrt{5}}{2}\right)^2 + \left(\frac{3 - \sqrt{5}}{2}\right)$   
 $= 5 - 2\sqrt{5}$

148. **No option is correct**

148. The roots are 1, 2, 3 and k  
 $1 + 2 + 3 + k = 0$   
 $k = -6$   
 $c = 1 \times 2 \times 3 \times -6$   
 $c = -36$

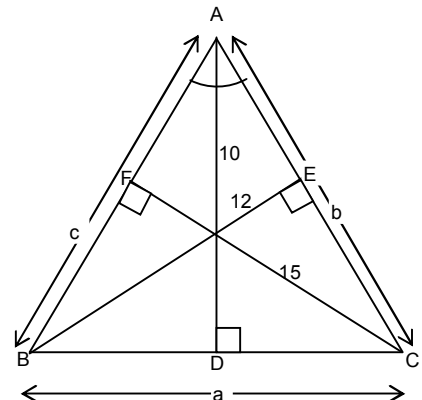
149. 3

149.  $x = 4 + \sqrt{15}$   
 $y = 4 - \sqrt{15}$   
 $x + y = 8$   
 $xy = 1$   
 $x^3 + y^3 = (x + y)((x + y)^2 - 3xy)$   
 $= 8(64 - 3)$   
 $= 8(61)$   
 $= 488$

150. 4

150.  $AD = 10$  cm,  $BE = 12$  cm,  $CF = 15$  cm  
 Let  $BC = a$  cm  
 $AC = b$  cm  
 $AB = c$  cm  
 Area of  $\Delta = \frac{1}{2} \times 10a = \frac{1}{2} \times 12b = \frac{1}{2} \times 15c$   
 $\Rightarrow a : b : c = 6 : 5 : 4$   
 let sides are  $6x$ ,  $5x$  and  $4x$

$\Rightarrow \frac{1}{2} \times 10 \times 6x = \sqrt{\frac{15x}{2} \left(\frac{15x}{2} - 6x\right) \left(\frac{15x}{2} - 5x\right) \left(\frac{15x}{2} - 4x\right)}$



$$\Rightarrow x = \frac{8}{\sqrt{7}}$$

$$\text{So, semi perimeter} = \frac{60}{\sqrt{7}} \text{ cm}$$

151. 3

$$12 \cot^2 \theta - 31 \operatorname{cosec} \theta + 32 = 0$$

$$12(\operatorname{cosec}^2 \theta - 1) - 31 \operatorname{cosec} \theta + 32 = 0$$

$$12 \operatorname{cosec}^2 \theta - 31 \operatorname{cosec} \theta + 20 = 0$$

$$12 \operatorname{cosec}^2 \theta - 16 \operatorname{cosec} \theta - 15 \operatorname{cosec} \theta + 20 = 0$$

$$4 \operatorname{cosec} \theta (3 \operatorname{cosec} \theta - 4) - 5(3 \operatorname{cosec} \theta - 4) = 0$$

$$\operatorname{cosec} \theta = \frac{5}{4} \text{ or } \frac{4}{3} \Rightarrow \sin \theta = \frac{4}{5} \text{ or } \frac{3}{4}$$

152. No option is correct

$$152. \frac{1}{2} ac = 16$$

$$ac = 32$$

$$ed = 18$$

$$ab = 50$$

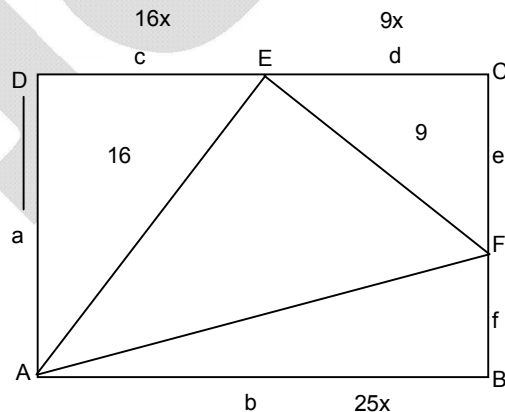
$$\frac{c}{b} = \frac{32}{50} = \frac{16}{25}$$

$$e \cdot \frac{9}{25} b = 18$$

$$eb = \frac{18 \times 25}{9} = 50$$

$$e = a \text{ f} = 0$$

$$\therefore \Delta AEF = 25$$



153. 4

153. When side changes from S to 2S volume changes from  $2S^3$  to  $8S^3$

$$S \rightarrow S^3$$

$$2S \rightarrow 8S^3$$

$$\therefore \text{Increase percent} = \frac{75^3}{5^3} \times 100$$

$$= 700\%$$

154. 2

$$154. \frac{V_1}{V_2} = \frac{\pi(2x)^2 \cdot 5y}{\pi(3x)^2 \cdot 3y}$$

$$= \frac{20}{27}$$

155. 2

155. Ratio of volumes

$$\begin{aligned} \frac{1}{3}\pi r^2 : r : \pi r^2 r : \frac{2}{3}\pi r^3 \\ = \frac{1}{3} : 1 : \frac{2}{3} \\ = 1 : 3 : 2 \end{aligned}$$

156. 1

156. CP of 1 = Rs. 10000

CP of 2 = Rs. 20000

∴ No profit, No loss

157. 1

157.  $a_1 + a_2 + \dots + a_7 + a_8 = 160$

$$a_1 + a_2 = 31$$

$$a_3 + a_4 + a_5 = 64$$

$$a_7 - a_6 = 4$$

$$a_8 - a_6 = 7$$

Solving we get

$$a_6 = 18$$

$$a_7 = 22$$

$$a_8 = 25$$

158. 1

158.  $R = \frac{2}{3} \times \text{altitude}$

$$= \frac{2}{3} \times \frac{\sqrt{3}}{2} \times 3\sqrt{3}$$

$$= 3 \text{ cm}$$

159. 2

159.  $\frac{1}{9}\sqrt[3]{x} + \frac{2}{9}\sqrt[3]{x} + \frac{1}{6}\sqrt[3]{x} = 1$

$$\sqrt[3]{x} \left( \frac{1}{3} + \frac{1}{6} \right) = 1$$

$$\sqrt[3]{x} \left( \frac{2+1}{6} \right) = 1$$

$$\sqrt[3]{x} = 2$$

$$x = 8$$



160. **No option is correct**

$$160. \quad \bar{x} - 10 = \frac{40}{100} \times \bar{x}$$

$$\Rightarrow \bar{x} = \frac{50}{3}$$

If each observation is increased by 5 then new mean =  $\frac{65}{3}$

**FITJEE**