

**PART III : QUANTITATIVE APTITUDE**

101.  $2 \operatorname{cosec}^2 23^\circ \cot^2 67^\circ - \sin^2 23^\circ - \sin^2 67^\circ - \cot^2 67^\circ$

is equal to

- (A) 0 (B) 1  
(C)  $\sec^2 23^\circ$  (D)  $\tan^2 23^\circ$

102. The base of a right pyramid is an equilateral triangle of side  $10\sqrt{3}$  cm. If the total surface area of the pyramid is  $270\sqrt{3}$  sq. cm, its height is

- (A) 12 cm (B)  $12\sqrt{3}$  cm  
(C) 10 cm (D)  $10\sqrt{3}$  cm

103. The volumes of a cylinder and a cone are in the ratio 3 : 1. Find their diameters and then compare them when their heights are equal.

- (A) Diameter of cylinder < Diameter of cone  
(B) Diameter of cylinder = 2 times of diameter of cone  
(C) Diameter of cylinder = Diameter of cone  
(D) Diameter of cylinder > Diameter of cone

104. A square of side 3 cm is cut off from each corner of a rectangular sheet of length 24 cm and breadth 18 cm and the remaining sheet is folded to form an open rectangular box. The surface area of the box is

- (A)  $423 \text{ cm}^2$  (B)  $468 \text{ cm}^2$   
(C)  $396 \text{ cm}^2$  (D)  $612 \text{ cm}^2$

105. The sides of a triangle are 16 cm, 12 cm and 20 cm. Find the area.

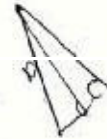
- (A)  $81 \text{ cm}^2$  (B)  $64 \text{ cm}^2$   
(C)  $112 \text{ cm}^2$  (D)  $96 \text{ cm}^2$

106. What is the height of a cylinder that has the same volume and radius as a sphere of diameter 12 cm?

- (A) 8 cm (B) 7 cm  
(C) 10 cm (D) 9 cm

107. The length of the shadow of a vertical tower on level ground increases by 10 metres when the altitude of the sun changes from  $45^\circ$  to  $30^\circ$ . Then the height of the tower is

- (A)  $10\sqrt{3}$  m  
(B)  $5\sqrt{3}$  m  
(C)  $10(\sqrt{3} + 1)$  m  
(D)  $5(\sqrt{3} + 1)$  m



108. If  $5 \tan \theta = 4$ , then  $\frac{5 \sin \theta - 3 \cos \theta}{5 \sin \theta + 2 \cos \theta}$  is equal to

- (A)  $\frac{1}{3}$  (B)  $\frac{2}{3}$   
(C)  $\frac{1}{4}$  (D)  $\frac{1}{6}$

109. If  $x \sin \theta - y \cos \theta = \sqrt{x^2 + y^2}$  and  $\frac{\cos^2 \theta}{a^2} + \frac{\sin^2 \theta}{b^2} = \frac{1}{x^2 + y^2}$ , then the correct relation is

- (A)  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$   
(B)  $\frac{x^2}{b^2} - \frac{y^2}{a^2} = 1$   
(C)  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$   
(D)  $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$



110. If  $2(\cos^2 \theta - \sin^2 \theta) = 1$  ( $\theta$  is a positive acute angle), then  $\cot \theta$  is equal to

- (A)  $\sqrt{3}$  (B)  $-\sqrt{3}$   
(C)  $\frac{1}{\sqrt{3}}$  (D) 1

$$\frac{y}{-2} = \frac{-1}{0} = \frac{-k}{-4}$$

$$\frac{2x}{2} = \frac{2y}{2} = \frac{2z}{2}$$

111. Number of solutions of the two equations  $4x - y = 2$  and  $2y - 8x + 4 = 0$  is

- (A) infinitely many
- (B) zero
- (C) one
- (D) two

$$4x - y = 2$$

$$2y - 8x + 4 = 0$$

$$4x - 2y = -2$$

$$-2y = -4x - 2$$

$$y = 2x + 1$$

(C) one

112. If  $a^2 + b^2 + c^2 = 2(a - b - c) - 3$ , then the value of  $2a - 3b + 4c$  is

- (A) 1
- (B) 7
- (C) 2
- (D) 3

$$a^2 + b^2 + c^2 = 2(a - b - c) - 3$$

$$a^2 - 2a + b^2 + 2b + c^2 + 2c = -3$$

$$(a-1)^2 + (b+1)^2 + (c+1)^2 = 0$$

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

(C) 2

113. Let  $a = \sqrt{5} - \sqrt{5}$ ,  $b = \sqrt{5} - 2$ ,  $c = 2 - \sqrt{3}$ . Then point out the correct alternative among the four alternatives given below.

- (A)  $a < b < c$
- (B)  $b < a < c$
- (C)  $a < c < b$
- (D)  $b < c < a$

$$a = 0$$

114. If  $a = \frac{b^2}{b-a}$ , then the value of  $a^3 + b^3$  is

- (A) 2
- (B) 6ab
- (C) 0
- (D) 1

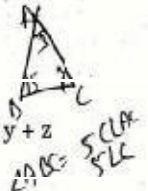


115. If  $xy + yz + zx = 0$ , then

$$\left( \frac{1}{x^2 - yz} + \frac{1}{y^2 - zx} + \frac{1}{z^2 - xy} \right) (x, y, z \neq 0)$$

is equal to

- (A) 0
- (B) 3
- (C) 1
- (D)  $x + y + z$



116. A can do a work in 20 days and B can do the same work in 30 days. In how many days can A and B together do the work?

- (A) 15
- (B) 16
- (C) 10
- (D) 12

$$\frac{1}{20} + \frac{1}{30} = \frac{3}{60} + \frac{2}{60} = \frac{5}{60}$$

$$\frac{5}{60} = \frac{1}{12}$$

117. The volume of air in a room is  $204 \text{ m}^3$ . The height of the room is 6 m. What is the floor area of the room?

- (A)  $34 \text{ m}^2$
- (B)  $32 \text{ m}^2$
- (C)  $46 \text{ m}^2$
- (D)  $44 \text{ m}^2$

118. If the total surface area of a cube is  $96 \text{ cm}^2$ , its volume is

- (A)  $36 \text{ cm}^3$
- (B)  $56 \text{ cm}^3$
- (C)  $16 \text{ cm}^3$
- (D)  $64 \text{ cm}^3$

119. From a point P, two tangents PA and PB are drawn to a circle with centre O. If OP is equal to diameter of the circle, then  $\angle APB$  is

- (A)  $60^\circ$
- (B)  $45^\circ$
- (C)  $90^\circ$
- (D)  $30^\circ$

120. A chord 12 cm long is drawn in a circle of diameter 20 cm. The distance of the chord from the centre is

- (A) 16 cm
- (B) 8 cm
- (C) 6 cm
- (D) 10 cm



121. 360 sq. cm and 250 sq. cm are the areas of two similar triangles. If the length of one of the sides of the first triangle be 8 cm, then the length of the corresponding side of the second triangle is

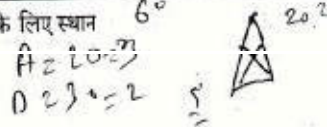
- (A) 6 cm
- (B)  $6\frac{1}{5}$  cm
- (C)  $6\frac{1}{3}$  cm
- (D)  $6\frac{2}{3}$  cm

122. If in  $\Delta ABC$ ,  $\angle ABC = 5 \angle ACB$  and  $\angle BAC = 3 \angle ACB$ , then  $\angle ABC =$

- (A)  $120^\circ$
- (B)  $130^\circ$
- (C)  $80^\circ$
- (D)  $100^\circ$

123. The perpendiculars, drawn from the vertices to the opposite sides of a triangle, meet at the point whose name is

- (A) orthocentre
- (B) incentre
- (C) circumcentre
- (D) centroid



233-4  
 $2916 \times \frac{8}{100}$   
 $2916 \times 100$   
 $133.28$   
 $2582.72$

561  
 $2652 \times \frac{8}{100}$   
 $214.56$   
 $2652 \times 100$   
 $214.56$

124. A sum becomes ₹ 2,916 in 2 years at 8% per annum compound interest. The simple interest at 9% per annum for 3 years on the same amount will be

- (A) ₹ 625 (B) ₹ 600  
 (C) ₹ 675 (D) ₹ 650

125. The average of 30 numbers is 40 and that of other 40 numbers is 30. The average of all the numbers is

- (A) 34.5 (B)  $34\frac{2}{7}$   
 (C) 35 (D) 34

126. The value of  $\sqrt{40 + \sqrt{9 \cdot 31}}$  is

- (A) 11 (B)  $\sqrt{111}$   
 (C) 9 (D) 7

127. The ratio of age of two boys is 5 : 6. After two years the ratio will be 7 : 8. The ratio of their ages after 12 years will be

- (A) 11/12 (B) 22/24  
 (C) 15/16 (D) 17/18

128. Divide 50 into two parts so that the sum of their reciprocals is 1/12.

- (A) 28, 22 (B) 35, 15  
 (C) 20, 30 (D) 24, 36

129. The length and breadth of a rectangle are doubled. Percentage increase in area is

- (A) 400% (B) 150%  
 (C) 200% (D) 300%

130. In the annual examination Mahuya got 10% less marks than Supriyo in Mathematics. Mahuya got 81 marks. The marks of Supriyo are

- (A) 89 (B) 90  
 (C) 87 (D) 88

131. A train is moving at a speed of 80 km/h and covers a certain distance in 4.5 hours. The speed of the train to cover the same distance in 4 hours is

- (A) 90 km/h (B) 100 km/h  
 (C) 70 km/h (D) 85 km/h

132. A shopkeeper blends two varieties of tea costing ₹ 18 and ₹ 13 per 100 gm in the ratio 7 : 3. He sells the blended variety at the rate of ₹ 18.15 per 100 gm. His percentage gain in the transaction is

- (A) 8% (B) 10%  
 (C) 12% (D) 14%

133. A invests ₹ 64,000 in a business. After few months B joined him with ₹ 48,000. At the end of year, the total profit was divided between them in the ratio 2 : 1. After how many months did B join?

- (A) 7 (B) 8  
 (C) 4 (D) 6

134. A got 30% concession on the label price of an article sold for ₹ 8,750 with 25% profit on the price he bought. The label price was

- (A) ₹ 10,000 (B) ₹ 13,000  
 (C) ₹ 16,000 (D) ₹ 12,000

135. The cost price of a book is ₹ 150. At what price should it be sold to gain 20%?

- (A) ₹ 80 (B) ₹ 120  
 (C) ₹ 180 (D) ₹ 100

136. If books bought at prices ranging from ₹ 150 to ₹ 300 are sold at prices ranging from ₹ 250 to ₹ 350, what is the greatest possible profit that might be made in selling 15 books?

- (A) ₹ 3,000  
 (B) Cannot be determined  
 (C) ₹ 750  
 (D) ₹ 4,250

Handwritten calculations and notes at the bottom of the page, including '90', '100', '100%', and '81'.

137. In a two-digit number, the digit at the unit's place is 1 less than twice the digit at the ten's place. If the digits at unit's and ten's place are interchanged, the difference between the new and the original number is less than the original number by 20. The original number is

- (A) 47 (B) 59  
(C) 23 (D) 35

138. The base of a right prism is a triangle whose perimeter is 28 cm and the inradius of the triangle is 4 cm. If the volume of the prism is 366 cc, then its height is

- (A) 4 cm (B) 8 cm  
(C) 6 cm (D) None of these

139. The equation  $\cos^2 \theta = \frac{(x+y)^2}{4xy}$  is only possible when

- (A)  $x < y$  (B)  $x = -y$   
(C)  $x > y$  (D)  $x = y$

140. Which is greater  $\sqrt[3]{2}$  or  $\sqrt{3}$ ?

- (A) Equal  
(B) Cannot be compared  
(C)  $\sqrt[3]{2}$   
(D)  $\sqrt{3}$

141. If  $a + b + c = 9$  (where  $a, b, c$  are real numbers), then the minimum value of  $a^2 + b^2 + c^2$  is

- (A) 81 (B) 100  
(C) 9 (D) 27

142. L.C.M. of  $\frac{2}{3}, \frac{4}{9}, \frac{5}{6}$

- (A)  $\frac{20}{27}$  (B)  $\frac{8}{27}$   
(C)  $\frac{20}{3}$  (D)  $\frac{10}{3}$

143. Find the value of

$$3 + \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{3}+3} + \frac{1}{\sqrt{3}-3}$$

- (A) 6  
(B) 3  
(C)  $\frac{3}{2(\sqrt{3}+3)}$   
(D)  $2\sqrt{3}$

144. 'a' divides 228 leaving a remainder 18. The biggest two-digit value of 'a' is

- (A) 30 (B) 70  
(C) 21 (D) 35

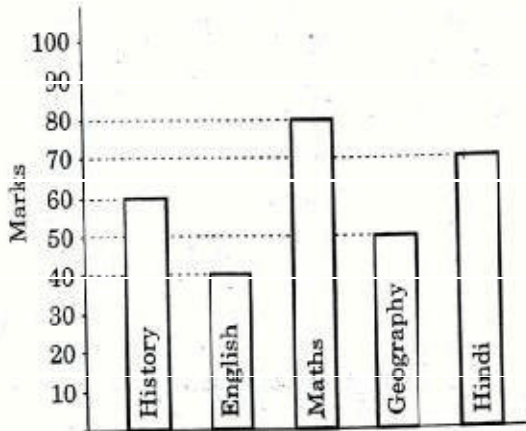
145. If the sum of the digits of any integer lying between 100 and 1000 is subtracted from the number, the result always is

- (A) divisible by 5  
(B) divisible by 6  
(C) divisible by 2  
(D) divisible by 9

146. If a number is as much greater than 31 as it is less than 75, then the number is

- (A) 53 (B) 106  
(C) 44 (D) 74

**Directions :** The bar graph shows the marks obtained by a student in an examination out of 100 marks in each subject. Study the diagram and answer the Q. Nos. 147 and 148.



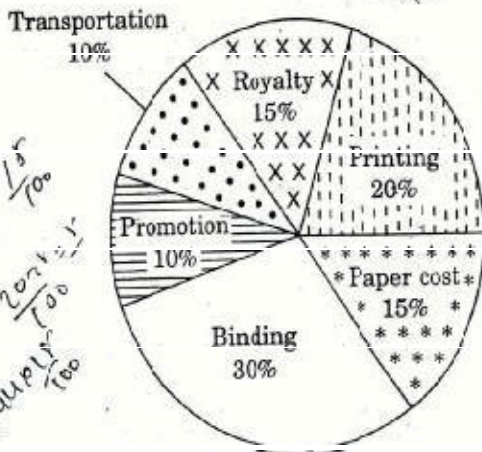
147. The average marks of Hindi and English is

- (A) 60 (B) 65  
(C) 50 (D) 55

148. The ratio of the marks of Maths and History is

- (A) 4 : 3 (B) 6 : 5  
(C) 8 : 5 (D) 3 : 4

**Directions :** Various expenditures incurred by a publishing company for publishing a book in 2011 are given below. Study the chart and answer the Q. Nos. 149 and 150.



149. Royalty of a book is less than the printing cost by

- (A) 20% (B) 25%  
(C) 5% (D)  $33\frac{1}{3}\%$

150. Price of a book is 20% above cost price. If the marked price is ₹ 180, then the cost of paper for a single copy, in ₹, is

- (A) 42 (B) 44.25  
(C) 36 (D) 22.50

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147. The difference between the circumference and the radius of a circle is 27 cm. The area of the circle is (Take  $\pi = \frac{22}{7}$ )

- (A) 154 sq. cm (B) 259 sq. cm  
(C) 148 sq. cm (D) 111 sq. cm

148. If  $\tan^2 \theta - \sin^2 \theta = x$ , then the value of  $\tan^2 \theta \sin^2 \theta$  is

- (A) x (B) 2  
(C)  $\frac{1}{x}$  (D) 1

149. If  $x - y = 1$ , then  $x^3 - y^3 - 3(xy - 2)$  is equal to

- (A) 7 (B) 6  
(C) 10 (D) 4

150. Ram's income is greater than Shyam's income by 20%. Then the percent by which Shyam's income is less than Ram's income is

- (A)  $16\frac{2}{3}\%$  (B)  $18\frac{2}{5}\%$   
(C)  $10\frac{1}{5}\%$  (D)  $12\frac{1}{3}\%$