

101. Let C₁ and C₂ be the inscribed and circumscribed circles of a triangle with sides 3 cm, 4 cm and

5 cm then $\frac{\text{area of } C_1}{\text{area of } C_2}$ is

- a. $\frac{9}{16}$ b. $\frac{9}{25}$
 c. $\frac{4}{25}$ d. $\frac{16}{25}$

Sol. c.

$$\text{radius of } C_1 = r = \frac{\text{Area of } \Delta}{\text{semiperimeter}} = \frac{6}{6} = 1$$

$$\text{radius of } C_2 = R = \frac{5}{2}$$

$$\frac{\text{Area of } C_1}{\text{Area of } C_2} = \frac{\pi r^2}{\pi R^2} = \left(\frac{r}{R}\right)^2 = \left(\frac{2}{5}\right)^2 = \frac{4}{25}$$

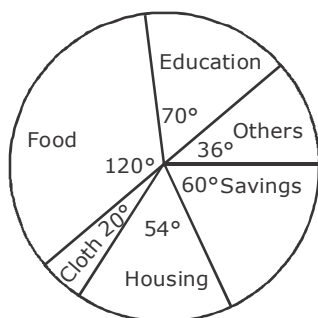
102. If $x = \frac{1}{\sqrt{2}+1}$ then (x+1) equals to

- a. 2 b. $\sqrt{2} - 1$
 c. $\sqrt{2} + 1$ d. $\sqrt{2}$

sol. d.

$$x = \frac{1}{\sqrt{2}+1} = \sqrt{2} - 1 \Rightarrow x+1 = \sqrt{2}$$

Directions : 103 to 105, the pie chart given here shows expenditure incurred by a family on various items and their savings. Study the chart and answer the questions based on the pie-chart



103. If the monthly income is ₹ 36000 then the yearly savings is

- a. ₹ 72000 b. ₹ 60000
 c. ₹ 74000 d. ₹ 70000

sol. d.

$$\text{Yearly saving} = \frac{60}{360} \times 36000 \times 12 = 72000$$

104. If the expenditure on education is ₹ 1600 more than that of housing then the expenditure on food is

- a. ₹ 6000 b. ₹ 12000
 c. ₹ 7000 d. ₹ 3333

sol. b.

$$\text{Let Income} = x$$

$$\text{So, } \left(\frac{70 - 54}{360}\right)x = 1600$$

$$\therefore \text{Food expenditure} = \frac{120}{360} \times 36000 = 12000$$

105. The ratio of expenditure on food to savings is:

- a. 2 : 1 b. 3 : 1
 c. 3 : 2 d. 10 : 9

sol. a.

$$\text{ratio of expenditure on food to saving} = 2 : 1$$

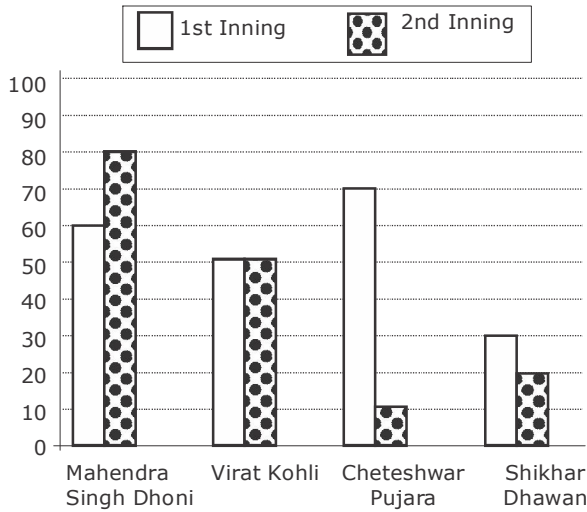
106. The average marks obtained by a student in 6 subjects is 88. On subsequent verification it was found that the marks obtained by him in a subject was wrongly copied as 86 instead of 68. The correct average on the marks obtained by him is

- a. 85 b. 87
 c. 84 d. 86

sol. c.

$$\text{Correct average} = 88 - \frac{18}{6} = 85$$

Directions : 107 to 110 given here a multiple bar diagram of the scores of four players in two innings. Study the diagram and answer the questions.



107. The average run of two innings of the player who scored highest in average is
 a. 75 b. 85
 c. 80 d. 70

sol. d.

$$\text{Result} = \frac{80+60}{2} = 170$$

108. The average run in two innings of the player who has scored minimum at the second inning is:
 a. 50 b. 60
 c. 40 d. 30

sol. c.

$$\text{Result} = \frac{70+10}{2} = 40$$

109. The average score in second innings contributed by the four players is
 a. 30 b. 60
 c. 40 d. 50

sol. c.

$$\begin{aligned} \text{Result} &= \frac{80+50+10+20}{4} \\ &= \frac{160}{4} = 40 \end{aligned}$$

110. The total scores in the first innings contributed by the four players is
 a. 220 b. 200
 c. 210 d. 190

sol. c.

$$\text{Result} = 60+50+70+30 = 210$$

111. If the volume of sphere is numerically equal to its surface area then its diameter is:
 a. 4 cm b. 2 cm
 c. 3 cm d. 6 cm

sol. d.

$$\begin{aligned} \frac{4}{3}r^3 &= 4\pi r^2 \Rightarrow r = 3 \\ \Rightarrow \text{diameter} &= 6 \end{aligned}$$

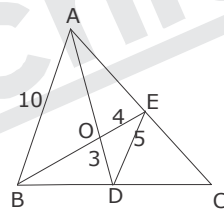
112. A train runs at an average speed of 75 km/hr. If the distance to be covered is 1050 kms. How long will the train take to cover it?
 a. 13 hrs b. 12 hrs
 c. 14 hrs d. 15 hrs

sol. c.

$$\text{time} = \frac{1050}{75} = 14 \text{ hrs.}$$

113. G is the centroid of ΔABC . The medians AD and BE intersect at right angles. if the lengths of AD and BE are 9 cm and 12 cm respectively; then the length of AB (in cm) is?
 a. 10 b. 10.5
 c. 9.5 d. 11

sol. a.



AD = 9 cm
 BE = 12 cm

Method-1

$$OD = \frac{1}{3} AD = 3 \text{ and } OE = \frac{1}{3} BE = 4$$

ΔDOE is right angled $\Rightarrow DE = 5$
 AB = 2DE = 10 (By mid point theorem)

Method-2

$$OA = 6, OB = 8$$

ΔAOB is right angled $\Rightarrow AB = 10$

114. The minimum value of $2 \sin^2 \theta + 3 \cos^2 \theta$ is
 a. 1 b. 3
 c. 2 d. 4

sol. c

$$\begin{aligned} 2\sin^2 \theta + 3\cos^2 \theta &= 2 + \cos^2 \theta \\ \text{minimum value} &= 2 + 0 = 2 \end{aligned}$$

115. If the three angles of a triangle are $(x + 15^\circ)$, $(\frac{6x}{5} + 6^\circ)$ and $(\frac{2x}{3} + 30^\circ)$ then the triangle is:
 a. scalene b. isosceles
 c. right angled d. equilateral

sol. d.

$$(x+15^\circ) + (\frac{6x}{5} + 6^\circ) + (\frac{2x}{3} + 30^\circ) = 180^\circ$$

$$\Rightarrow \frac{43}{15}x = 129^\circ$$

$$\Rightarrow x = 45^\circ$$

angles are $(60^\circ, 60^\circ, 60^\circ)$

$\Rightarrow \Delta$ is equilateral.

116. If the number of vertices, edges and faces of a rectangular parallelopiped are denoted by v, e, and f respectively, the value of $(v - e + f)$ is
 a. 4 b. 2
 c. 1 d. 0

sol. b.

$$v - e + f = 2$$

117. 5 persons will live in a tent. If each person requires $16m^2$ of floor area and $100m^3$ space for air then the height of the cone of smallest size to accommodate these persons would be?
 a. 18.75 m b. 16 m
 c. 10.25 m d. 20 m

sol. a.

$$\frac{\text{valume of cone}}{\text{floor Area}} = \frac{h}{3}$$

$$\Rightarrow \frac{500}{80} = \frac{h}{3}$$

$$\Rightarrow h = \frac{150}{8} = 18.75 \text{ m}$$

118. If the altitude of an equilateral triangle is $12\sqrt{3}$ cm, then its area would be

- a. 12 cm^2 b. 72 cm^2
 c. $36\sqrt{3} \text{ cm}^2$ d. $144\sqrt{3} \text{ cm}^2$

sol. d.

$$\begin{aligned} \text{Area of equilateral } \Delta &= \frac{1}{\sqrt{3}}h^2 = \frac{1}{\sqrt{3}} \times 144 \times 3 \\ &= 144\sqrt{3} \end{aligned}$$

119. The difference between successive discounts of 40% followed by 30% and 45% followed by 20% on the marked price of an article is ₹12.

The marked price of the article is:

- a. ₹ 400 b. ₹ 200
 c. ₹ 800 d. ₹ 600

sol. d.

$$\left(40 + 30 - \frac{40 \times 30}{100}\right)\% - \left(45 + 20 - \frac{45 \times 20}{100}\right)\% = 12$$

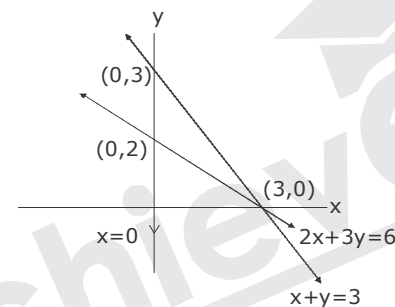
$$\Rightarrow 58\% - 56\% = 12 \Rightarrow 2\% = 12 \Rightarrow 100\% = 600$$

$$\therefore \text{M.P.} = 600$$

120. The area of the triangle formed by the graphs of the equations $x = 0$, $2x + 3y = 6$ and $x + y = 3$ is

- a. 3 sq. unit b. $1\frac{1}{2}$ sq. unit
 c. 1 sq. unit d. $4\frac{1}{2}$ sq. unit

sol. b.



$$\text{Area} = \frac{1}{2} \times 1 \times 3$$

$$= \frac{3}{2} = 1\frac{1}{2} \text{ sq. units}$$

121. Among the equations/ $x+2y+9=0$; $5x-4=0$; $2y-13=0$, $2x-3y=0$, the equation of the straight line passing through origin is

- a. $2x - 3y = 0$ b. $5x - 4 = 0$
 c. $x + 2y + 9 = 0$ d. $2y - 13 = 0$

sol. a

$2x - 3y = 0$ passes through origin

122. The HCF of x^6-1 and x^4+2x^3-2x-1 is

- a. x^2+1 b. $x+1$
 c. x^2-1 d. $x-1$

sol. c.

$$\begin{aligned} x^6 - 1 &= (x^2 - 1)(x^4 + x^2 + 1) \\ &= (x^2 - 1)(x^2 - x + 1) \\ x^4 + 2x^3 - 2x - 1 &= (x^4 - 1) + 2x(x^2 - 1) \\ &= (x^2 - 1)(x^2 + 1) + 2x(x^2 - 1) \end{aligned}$$

$$= (x^2 - 1)(x^2 + 2x + 1) = (x^2 - 1)(x + 1)^2$$

$$\text{H.C.F.} = x^2 - 1$$

123. The least number which when divided by 6, 9, 12, 15, 18 leaves the same remainder 2 in each case is
- a. 178 b. 182
c. 176 d. 180

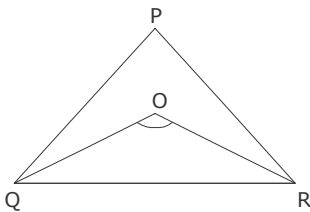
sol. b.

$$\text{Result} = \text{L.C.M. of } 6, 9, 12, 15, 18 + 2$$

$$= 180 + 2 = 182$$

124. Internal bisectors of $\angle Q$ and $\angle R$ of ΔPQR intersect at O. If $\angle ROQ = 96^\circ$ then the value of $\angle RPQ$ is:
- a. 12° b. 6°
c. 36° d. 24°

sol. a.



$$\angle ROQ = 90^\circ + \frac{1}{2} \angle RPQ \Rightarrow \angle RPQ = 12^\circ$$

125. A certain sum will amount of ₹ 12,100 in 2 years at 10% per annum of compound interest, interest being compounded annually. The sum is:
- a. ₹ 12000 b. ₹ 6000
c. ₹ 8000 d. ₹ 10000

sol. d.

$$\text{Rs. } 12100 = P \left(1 + \frac{10}{100} \right)^2$$

$$\Rightarrow 12100 = P(1.1)^2$$

$$\Rightarrow P = \frac{12100}{1.21} = 10000$$

126. A's 2 days work is equal to B's 3 days work. if A can complete the work in 8 days then to complete the work B will take:
- a. 14 days b. 15 days
c. 16 days d. 12 days

sol. d.

$$\text{B takes days} = \frac{3}{2} \times 8 = 12$$

127. If the measure of three angles of a triangle are in the ratio 2:3:5, then the triangle is
- a. equilateral b. isosceles
c. obtuse angled d. right angled

sol. d.

$$\text{Angles be } 2x, 3x, 5x$$

$$\text{sum} = 10x = 180^\circ$$

$$\Rightarrow x = 18^\circ$$

$$\Rightarrow 5x = 90^\circ$$

$$\Rightarrow \Delta \text{ is right angle.}$$

128. What must be added to each term of the ratio 2:5 so that it may equal to 5:6?
- a. 12 b. 78
c. 65 d. 13

sol. d.

$$\frac{2+x}{5+x} = \frac{5}{6} \Rightarrow 6x+12 = 25+5x \Rightarrow x = 13$$

129. If the sum and difference of two angles are $\frac{22}{9}$ radian and 36° respectively, then the value of smaller angle in degree taking the value of π as $\frac{22}{7}$ is :
- a. 60° b. 48°
c. 52° d. 56°

sol. c.

$$\frac{22}{9} \text{ radian} = \frac{22}{9} \times \frac{180}{22} \times 7 = 140^\circ$$

$$\text{Smaller angle} = \frac{\text{sum} - \text{diff}}{2}$$

$$= \frac{140^\circ - 36^\circ}{2} = 52^\circ$$

130. 4 men and 6 women complete a work in 8 days, 2 men and 9 women also complete in 8 days. The number of days 18 women complete the work is:
- a. $4\frac{2}{3}$ days b. $5\frac{2}{3}$ days
c. $4\frac{1}{3}$ days d. $5\frac{1}{3}$ days

sol. d.

$$8(4M+6W) \text{ can do work in 1 day}$$

$$8(2M+9W) \text{ can do work in 1 day}$$

$$\text{so, } 32M + 48W = 16M + 72W$$

$$\Rightarrow 4M = 6W$$

$$\text{Now, } 4M+6W = 12W \text{ can do in 8 day}$$

$$\Rightarrow 18W \text{ can do in } = \frac{12 \times 8}{18} = \frac{16}{3} = 5\frac{1}{3}$$

131. If $\frac{x^{24} + 1}{x^{12}} = 7$ then the value of $\frac{x^{72} + 1}{x^{36}}$

- a. 432 b. 433
c. 343 d. 322

sol. d.

$$\frac{x^{24} + 1}{x^{12}} = 7 \Rightarrow x^{12} + \frac{1}{x^{12}} = 7$$

$$\frac{x^{72} + 1}{x^{36}} = x^{36} + \frac{1}{x^{36}} = \left(x^{12} + \frac{1}{x^{12}}\right)^3 - 3\left(x^{12} + \frac{1}{x^{12}}\right)$$

$$= 7^3 - 3 \times 7 = 322$$

132. if $5x + 9y = 5$ and $125x^3 + 729y^3 = 120$

- a. 135 b. $\frac{1}{135}$
c. $\frac{1}{9}$ d. 45

sol. b.

$$\begin{aligned} 25x^3 + 729y^3 &= 120 \\ \Rightarrow (5x + 9y)^3 - 3 \times 5x \times 9y(5x + 9y) &= 120 \\ \Rightarrow 125 - 135xy \times 5 &= 120 \\ \Rightarrow 5 \times 135xy &= 5 \Rightarrow xy = \frac{1}{135} \end{aligned}$$

133. If 4 men or 8 women can do a piece of work in 15 days, in how many days can 6 men and 12 women do the same piece of work?
a. 45 days b. 20 days c. 15 days
d. 30 days e. 5 days

sol. e.

$$\begin{aligned} 4M &= 8W \\ 6M &= 12W \\ 8W \text{ can do work in } &15 \text{ days} \\ 6M + 12W &= 24W \text{ can do work in } 15 \text{ days} \\ &= 15 \times \frac{8}{24} = 5 \end{aligned}$$

134. The value of $\sin^2 22^\circ + \sin^2 68^\circ + \cot^2 30^\circ$ is

- a. $\frac{3}{4}$ b. 4
c. $\frac{5}{4}$ d. 3

sol. b.

$$\begin{aligned} \sin^2 22^\circ + \sin^2 68^\circ + \cot^2 30^\circ \\ = 1 + 3 = 4 \end{aligned}$$

135. Find a simple discount equivalent to a discount series of 10%, 20% and 25%

- a. 45% b. 55%
c. 52% d. 46%

sol. d.

$$\begin{aligned} \text{Result} &= 100 - \left(100 \times \frac{90}{100} \times \frac{80}{100} \times \frac{75}{100}\right) \\ &= 100 - (54) = 46\% \end{aligned}$$

136. If θ be acute angle and $\tan(4\theta - 50^\circ) = \cot(50^\circ - \theta)$, then the value of θ in degrees is

- a. 30 b. 40
c. 20 d. 50

sol. $4\theta - 50^\circ + 50^\circ - \theta = 90^\circ$
 $\Rightarrow 3\theta = 90^\circ \Rightarrow \theta = 30^\circ$

137. cost price of 100 books is equal to the selling price of 60 books. The gain or loss percentage will be:

- a. $66\frac{2}{3}\%$ b. $66\frac{1}{4}\%$
c. 66% d. $66\frac{3}{4}\%$

sol. a.

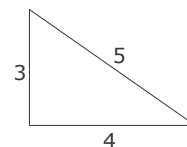
$$\text{Gain \%} = \frac{2}{3} \times 100 = \frac{200}{3} = 66\frac{2}{3}\%$$

138. If $5 \sin \theta = 3$, the numerical value of

$$\frac{\sec \theta - \tan \theta}{\sec \theta + \tan \theta}$$

- a. $\frac{1}{3}$ b. $\frac{1}{2}$
c. $\frac{1}{4}$ d. $\frac{1}{5}$

sol. c.



$$\sin \theta = \frac{3}{5};$$

$$\frac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta} = (\sec\theta - \tan\theta)^2 = \left(\frac{5}{4} - \frac{3}{4}\right)^2 = \frac{1}{4}$$

139. If $\frac{3}{4}$ of a number is 7 more than $\frac{1}{6}$ of the number, the $\frac{5}{3}$ of the number is:

- a. 15 b. 18
c. 12 d. 20

sol. d.

Let number be x.

$$\frac{3x}{4} - \frac{x}{6} = 7 \Rightarrow \frac{7x}{12} = 7 \Rightarrow x = 12 \Rightarrow \frac{5x}{3} = 20$$

140. What is the arithmetic means of first 20 odd natural numbers?

- a. 17 b. 19
c. 22 d. 20

sol. d.

$$\frac{20^2}{20} = 20$$

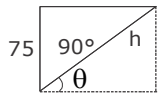
141. A kite is flying at the height of 75 m from the ground. The string makes an angle θ (where $\cot\theta = 8/15$) with the level ground. Assuming that there is no slack in the string, the length of the string is equal to:

- a. 75 m b. 85 m
c. 40 m d. 65 m

sol. b.

h = Length of string

$$\cot\theta = \frac{8}{15}$$



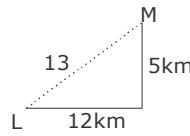
$$\cos(90^\circ - \theta) = \frac{75}{h} \Rightarrow \sin\theta = \frac{75}{h}; \left(\sin\theta = \frac{15}{17}\right)$$

$$\Rightarrow \frac{15}{17} = \frac{75}{h} \Rightarrow h = 85 \text{ m}$$

142. If a person travels from a point L towards east for 12 km and then travels 5km towards north and reaches a point M, then shortest distance from L to M is

- a. 14 b. 12
c. 17 d. 13

sol. d.



143. In an examination, a student must get 36% marks to pass. A student who gets 190 marks failed by 35 marks. The total marks in that examination is:

- a. 500 b. 625
c. 810 d. 450

sol. b.

$$\text{total marks} = 100 \times \frac{225}{36} = 625$$

144. A train 180 mts long is running at a speed of 90 km/h. How long will it take to pass a post?

- a. 8.2 secs b. 7.8 secs
c. 8 secs d. 7.2 secs

sol. d.

$$90 \text{ km/h} = 90 \times \frac{5}{18} = 25 \text{ m/s.}$$

$$\text{time to pass a post} = \frac{180}{25} = 7.2 \text{ sec}$$

145. An article which is marked at ₹975 is sold for ₹897. the % discount is?

- a. 6% b. 10%
c. 12% d. 8%

sol. d.

$$\text{Discount \%} = \frac{975 - 897}{975} \times 100 = \frac{78}{975} \times 100 = 8\%$$

146. If $\sec\theta + \tan\theta = p$, ($p \neq 0$) then $\sec\theta$ is equal to

- a. $\left(p + \frac{1}{p}\right), p \neq 0$ b. $\frac{1}{2}\left(p + \frac{1}{p}\right), p \neq 0$
c. $2\left(p - \frac{1}{p}\right), p \neq 0$ d. $\left(p - \frac{1}{p}\right), p \neq 0$

sol. b.

$$\sec\theta + \tan\theta = P$$

$$\Rightarrow \sec\theta - \tan\theta = \frac{1}{P}$$

$$\text{adding both } 2 \sec\theta = P + \frac{1}{P}$$

$$\Rightarrow \sec\theta = \frac{1}{2}\left(P + \frac{1}{P}\right)$$

147. If $p = 99$ then the value of $p(p^2 + 3p + 3)$

- a. 999999 b. 988899
c. 989898 d. 998889

sol. a.

$$P = 99$$

$$\begin{aligned} P(P^2 + 3P + 3) &= P^3 + 3P^2 + 3P \\ &= P^3 + 3P^2 + 3P + 1 - 1 = (P+1)^3 - 1 \\ &= 1000000 - 1 = 999999 \end{aligned}$$

148. If $x = 2$ then the value of $x^3 + 27x^2 + 243x + 631$

- a. 1233 b. 1231
c. 1321 d. 1211

sol. a.

$$x = 2$$

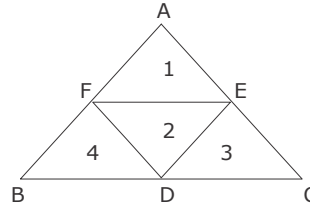
$$\begin{aligned} x^3 + 27x^2 + 243x + 631 \\ &= x^3 + 3(x^2)9 + 3(x)(9)^2 + 729 - 729 + 631 \\ &= (x+9)^3 - 98 = 11^3 - 98 = 1331 - 98 = 1233 \end{aligned}$$

149. If D, E and F are the mid points of BC, CA and AB respectively of the $\triangle ABC$ then the ratio of area of the parallelogram DEFB and area of the trapezium CAFD is:

- a. 1 : 3 b. 1 : 2
c. 3 : 4 d. 2 : 3

sol. d.

Area of region 1,2,3,4 are equal



$$\frac{\text{Area of } \parallel_{gm} \text{ DEFB}}{\text{Area of Trapezium CAFD}} = \frac{2}{3}$$

150. If A and B are in the ratio 4 : 5 and the difference of their squares is 81, what is the value of A?

- a. 36 b. 15
c. 45 d. 12

sol. d.

$$\begin{aligned} \text{Let } A &= 4x, B = 5x \\ (5x)^2 - (4x)^2 &= 81 \\ \Rightarrow (9x)(x) &= 81 \Rightarrow x^2 = 9 \Rightarrow x = 3 \\ \Rightarrow 4x &= 12 = A \end{aligned}$$