

## SSC CGL Tier-2 13th September 2019 Quant

### Instructions

For the following questions answer them individually

#### Question 1

**N** solid metallic spherical balls are melted and recast into a cylindrical rod whose radius is 3 times that of a spherical ball and height is 4 times the radius of a spherical ball. The value of N is:

- A 30
- B 27
- C 24
- D 36

Answer: B

#### Question 2

If x is the remainder when  $3^{61284}$  is divided by 5 and y is the remainder when  $4^{96}$  is divided by 6, then what is the value of  $(2x - y)$ ?

- A -4
- B 4
- C -2
- D 2

Answer: C

#### Question 3

What is the area (in square units) of the triangular region enclosed by the graphs of the equations  $x + y = 3$ ,  $2x + 5y = 12$  and the x-axis?

- A 2
- B 3
- C 4
- D 6

Answer: B

#### Question 4

The value of  $\sqrt{28 + 10\sqrt{3}} - \sqrt{7 - 4\sqrt{3}}$  is closest to:

- A 7.2
- B 6.1
- C 6.5
- D 5.8

Answer: C

**Question 5**

If  $\sec \theta + \tan \theta = p, (p > 1)$  then  $\frac{\operatorname{cosec} \theta + 1}{\operatorname{cosec} \theta - 1} = ?$

A  $\frac{p+1}{p-1}$

B  $p^2$

C  $\frac{p-1}{p+1}$

D  $2p^2$

**Answer: B**

**Question 6**

The value  $\operatorname{cosec}(67^\circ + \theta) - \sec(23^\circ - \theta) + \cos 15^\circ \cos 35^\circ \cos 55^\circ \cos 60^\circ \cos 75^\circ$  is:

A 2

B 0

C 1

D  $\frac{1}{2}$

**Answer: D**

**Question 7**

35% of goods were sold at a profit of 65%, while the remaining were sold at x% loss. If the overall loss is 12%, then what is the value of x? (correct to one decimal place)

A 51.8

B 50.6

C 53.5

D 52.4

**Answer: C**

**Question 8**

In a circle with centre O, ABCD is a cyclic quadrilateral and AC is the diameter. Chords AB and CD are produced to meet at E. If  $\angle CAE = 34^\circ$  and  $\angle E = 30^\circ$ , then  $\angle CBD$  is equal to:

A  $36^\circ$

B  $26^\circ$

C  $24^\circ$

D  $34^\circ$

**Answer: B**

**Question 9**

$ab(a - b) + bc(b - c) + ca(c - a)$  is equal to:

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

**Answer: D**

**Question 10**

The radius of the base of a right circular cylinder is increased by 20%. By what per cent should its height be reduced so that its volume remains the same as before?

- A 25
- B  $30\frac{2}{9}$
- C  $30\frac{5}{9}$
- D 28

**Answer: C**

**Question 11**

A is as efficient as B and C together. Working together A and B can complete a work in 36 days and C alone can complete it in 60 days. A and C work together for 10 days. B alone will complete the remaining work in:

- A 110 days
- B 88 days
- C 84 days
- D 90 days

**Answer: A**

**Question 12**

If  $2 \cos^2 \theta + 3 \sin \theta = 3$ , where  $0^\circ < \theta < 90^\circ$ , then what is the value of  $\sin^2 2\theta + \cos^2 \theta + \tan^2 2\theta + \operatorname{cosec}^2 2\theta$ ?

- A  $\frac{35}{12}$
- B  $\frac{29}{3}$
- C  $\frac{35}{6}$
- D  $\frac{29}{6}$

**Answer: C**

**Question 13**

The radius and the height of a right circular cone are in the ratio 5 : 12. Its curved surface area is  $816.4 \text{ cm}^2$ , What is the volume (in  $\text{cm}^3$ ) of the cone? (Take  $\pi = 3.14$ )

- A 2512
- B 1256
- C 3140
- D 628

**Answer: A**

**Question 14**

Given that  $(5x - 3)^3 + (2x + 5)^3 + 27(4 - 3x)^3 = 9(3 - 5x)(2x + 5)(3x - 4)$ , then the value of  $(2x + 1)$  is:

- A -13
- B 15
- C -15
- D 13

**Answer: B**

**Question 15**

The sides of a triangle are 12 cm, 35 cm and 37 cm. What is the circumradius of the triangle

- A 19 cm
- B 17.5 cm
- C 17 cm
- D 18.5 cm

**Answer: D**

**Question 16**

The base of a right pyramid is an equilateral triangle with area  $16\sqrt{3}\text{cm}^2$ . If the area of one of its lateral faces is  $30 \text{ cm}^2$ , then its height (in cm) is:

- A  $\sqrt{\frac{739}{12}}$
- B  $\sqrt{\frac{209}{12}}$
- C  $\sqrt{\frac{611}{12}}$
- D  $\sqrt{\frac{643}{12}}$

**Answer: C**

**Question 17**

A vessel contains a 32 litre solution of acid and water in which the ratio of acid and water is 5 : 3, If 12 litres of the solution are taken out and  $7\frac{1}{2}$  litres of water are added to it, then what is the ratio of acid and water in the resulting solution?

- A 4 : 7
- B 5 : 6
- C 4 : 9
- D 8 : 11

**Answer: B**

**Question 18**

A sphere of maximum volume is cut out from a solid hemisphere. What is the ratio of the volume of the sphere to that of the remaining solid?

- A 1 : 4
- B 1 : 2
- C 1 : 3
- D 1 : 1

**Answer: C**

**Question 19**

If  $\sqrt{5}x^3 + 2\sqrt{2}y^3 = (Ax + \sqrt{2}y)(Bx^2 + 2y^2 + Cxy)$ , then the value of  $(A^2 + B^2 - C^2)$  is:

- A 15
- B 20
- C 30
- D 40

**Answer: B**

**Question 20**

The value of  $(1 + \cot \theta - \operatorname{cosec} \theta)(1 + \cos \theta + \sin \theta) \sec \theta = ?$

- A -2
- B 2
- C  $\sec \theta \operatorname{cosec} \theta$
- D  $\sin \theta \cos \theta$

Answer: B

Question 21

S is the incenter of  $\triangle PQR$ . If  $\angle PSR = 125^\circ$ , then the measure of  $\angle PQR$  is:

- A  $75^\circ$
- B  $55^\circ$
- C  $80^\circ$
- D  $70^\circ$

Answer: D

Question 22

The value of  $0.47 + 0.503 - 0.39 \times 0.8$  is:

- A 0.615
- B 0.615
- C 0.625
- D 0.625

Answer: D

Question 23

If in  $\triangle ABC$ , D and E are the points on AB and BC respectively such that  $DE \parallel AC$ , and  $AD : AB = 3 : 8$ , then (area of  $\triangle BDE$ ) : (area of quadrilateral DECA) = ?

- A 9 : 55
- B 9 : 64
- C 8 : 13
- D 25 : 39

Answer: D

Question 24

Monika spends 72% of her income. If her income increases by 20% and savings increase by 15%, then her expenditure increases by: (correct to 1 decimal place)

- A 20.8%
- B 20.2%
- C 21.9%
- D 19.8%

Answer: C

**Question 25**

A, B and C started a business with their capitals in the ratio 2 : 3 : 5. A increased his capital by 50% after 4 months, B increased his capital by  $33\frac{1}{3}\%$  after 6 months and C withdrew 50% of his capital after 8 months, from the start of the business. If the total profit at the end of a year was ₹86,800, then the difference between the shares of A and C in the profit was:

- A ₹12,600
- B ₹7,000
- C ₹9,800
- D ₹8,400

**Answer: A**

**Question 26**

The graph of the equations  $5x - 2y + 1 = 0$  and  $4y - 3x + 5 = 0$ , intersect at the point  $P(\alpha, \beta)$ , What is the value of  $(2\alpha - 3\beta)$ ?

- A 4
- B 6
- C -4
- D -3

**Answer: A**

**Question 27**

An article was sold at a profit of 14%. Had it been sold for ₹121 less, a loss of 8% would have been incurred. If the same article would have been sold for ₹536.25, then the profit/loss per cent would have been:

- A Profit, 5%
- B Loss, 5%
- C Loss, 2.5%
- D Profit, 2.5%

**Answer: C**

**Question 28**

A shopkeeper allows 18% discount on the marked price of an article and still makes a profit of 23%. If he gains ₹18.40 on the sale of the article, then what is the marked price of the article?

- A ₹140
- B ₹125
- C ₹120
- D ₹146

**Answer: C**

Question 29

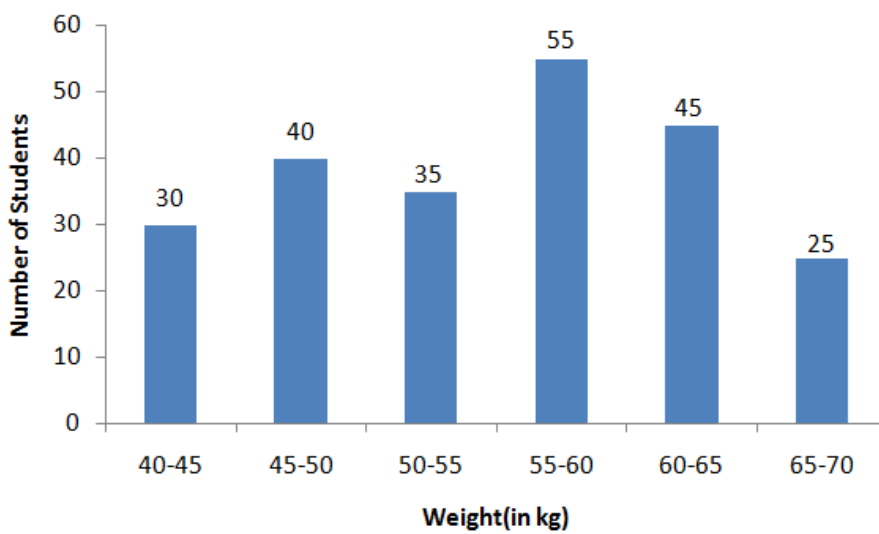
The value of  $\frac{\sec^2 \theta}{\operatorname{cosec}^2 \theta} + \frac{\operatorname{cosec}^2 \theta}{\sec^2 \theta} - (\sec^2 \theta + \operatorname{cosec}^2 \theta)$  is:

- A 0
- B -2
- C 2
- D 1

Answer: B

Question 30

The given graph shows the weights of students in a school on a particular day.



The number of students weighing less than 50 kg is what per cent less than the number of students weighing 55 kg or more?

- A 44
- B 40
- C 55
- D 30

Answer: A

Question 31

A right prism has height 18 cm and its base is a triangle with sides 5 cm, 8 cm and 12 cm. What is its lateral surface area (in  $cm^2$ ) ?

- A 450
- B 468
- C 432
- D 486

Answer: A



**Question 32**

A can do one-third of a work in 15 days, B can do 75% of the same work in 18 days and C can do the same work in 36 days. B and C work together for 8 days. In how many days will A alone complete the remaining work?

- A 24 days
- B 18 days
- C 20 days
- D 16 days

**Answer: C**

**Question 33**

A person buys 80 kg of rice and sells it at a profit of as much money as he paid for 30 kg. His profit per cent is:

- A  $27\frac{3}{11}$
- B 35
- C 40
- D  $37\frac{1}{2}$

**Answer: D**

**Question 34**

To cover a distance of 416 km, a train A takes  $2\frac{2}{3}$  hours more than train B. If the speed of A is doubled, it would take  $1\frac{1}{3}$  hours less than B, What is the speed (in km/h) of train A?

- A 56
- B 54
- C 52
- D 65

**Answer: C**

**Question 35**

The value of  $\frac{2\sqrt{10}}{\sqrt{5}+\sqrt{2}-\sqrt{7}} - \sqrt{\frac{\sqrt{5}-2}{\sqrt{5}+2}} - \sqrt[3]{\sqrt{7}-2}$  is:

- A  $2 + \sqrt{2}$
- B  $2\sqrt{5}$
- C  $\sqrt{2}$

D  $\sqrt{7}$

Answer: C

Explanation:

let the  $A = \frac{2\sqrt{10}}{\sqrt{5}+\sqrt{2}-\sqrt{7}}$ ,  $B = \sqrt{\frac{\sqrt{5}-2}{\sqrt{5}+2}}$  and  $C = \sqrt[3]{7-2}$ .

$$C = \sqrt[3]{7-2}$$

multiply and divide by  $\sqrt{7} + 2$

$$C = \frac{3}{\sqrt{7}-2} \frac{\sqrt{7}+2}{\sqrt{7}+2}$$

by using  $(a+b)(a-b) = a^2 - b^2$

$$C = \frac{3\sqrt{7}+6}{3} = \sqrt{7} + 2$$

$$B = \sqrt{\frac{\sqrt{5}-2}{\sqrt{5}+2}}$$

multiply and divide by  $\sqrt{5} - 2$

$$B = \sqrt{\frac{\sqrt{5}-2}{\sqrt{5}+2} \times \frac{\sqrt{5}-2}{\sqrt{5}-2}} = \sqrt{(\sqrt{5}-2)^2} = \sqrt{5} - 2$$

$$A = \frac{2\sqrt{10}}{(\sqrt{5}+\sqrt{2})-\sqrt{7}}$$

divide and multiply by  $(\sqrt{5} + \sqrt{2}) + \sqrt{7}$

$$A = \frac{2\sqrt{10}}{(\sqrt{5}+\sqrt{2})-\sqrt{7}} \times \frac{(\sqrt{5}+\sqrt{2})+\sqrt{7}}{(\sqrt{5}+\sqrt{2})+\sqrt{7}}$$

$$= \frac{2\sqrt{10} \times [\sqrt{5}+\sqrt{2}+\sqrt{7}]}{(\sqrt{5}+\sqrt{2})^2-7}$$

$$= \frac{2\sqrt{10} \times [\sqrt{5}+\sqrt{2}+\sqrt{7}]}{5+2+2\sqrt{10}-7}$$

$$= [\sqrt{5} + \sqrt{2} + \sqrt{7}]$$

$$\frac{2\sqrt{10}}{\sqrt{5}+\sqrt{2}-\sqrt{7}} - \sqrt{\frac{\sqrt{5}-2}{\sqrt{5}+2}} - \sqrt[3]{7-2}$$

$$= A - B - C = [\sqrt{5} + \sqrt{2} + \sqrt{7}] - \sqrt{5} + 2 - \sqrt{7} - 2 = \sqrt{2}$$

Question 36

The price of oil is increased by 20%. However, its consumption decreased by  $8\frac{1}{3}\%$ . What is the percentage increase or decrease in the expenditure on it?

A Increase by 10%

B Increase by 5%

C Decrease by 10%

D Decrease by 5%

Answer: A

Question 37

The average age of 120 students in a group is 13.56 years. 35% of the number of students are girls and the rest are boys. If the ratio of the average age of boys and girls is 6 : 5, then what is the average age (in years) of the girls?

A 12

B 11.6

C 10

D 14.4

**Answer: A**

**Explanation:**

Total students = 120

Number of girls =  $120 \times \frac{35}{100} = 42$

Number of boys =  $120 - 42 = 78$

Total age of 120 student =  $13.56 \times 120 = 1627.2$

Let the average age of boys and girls be  $6x$  and  $5x$ .

Total age of all girls =  $42 \times 5x = 210x$

Total age of all boys =  $78 \times 6x = 468x$

Total age of 120 student = total age of all girls + total age of all boys

$1627.2 = 210x + 468x$

$x = 2.4$

Average age of girls =  $5x = 5 \times 2.4 = 12$

**Question 38**

The marked price of an article is ₹1500. If two successive discounts, each of  $x\%$  . on the marked price is equal to a single discount of ₹587.40, then what will be the selling price of the article if a single discount of  $x\%$  is given on the marked price?

A ₹1,025

B ₹1,155

C ₹1,170

D ₹1,200

**Answer: C**

**Question 39**

Two parallel chords on the same side of the centre of a circle are 12 cm and 20 cm long and the radius of the circle is  $5\sqrt{13}$  cm. What is the distance (in cm) between the chords?

A 2

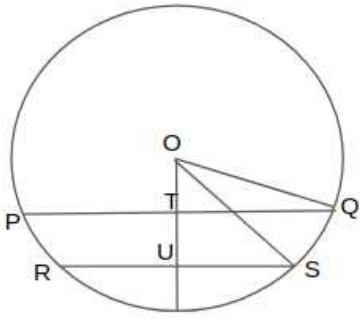
B 3

C 2.5

D 1.5

**Answer: A**

**Explanation:**



Length of chord RS = 12 cm

Length of chord PQ = 20cm

Radius =  $5\sqrt{13}$  cm

Length of US =  $RS/2 = 12/2 = 6$  cm

Length of TQ =  $PQ/2 = 20/2 = 10$  cm

( $\because$  radius divides the chords in 2 equal parts)

In triangle OUS -

using the pythagorean theorem-

$$OS^2 = OU^2 + US^2$$

$$(5\sqrt{13})^2 = OU^2 + 6^2$$

$$OU^2 = 325 - 36 = 289$$

$$OU = \sqrt{289} = 17 \text{ cm}$$

In triangle OTQ -

Using the pythagorean theorem-

$$OQ^2 = OT^2 + TQ^2$$

$$(5\sqrt{13})^2 = OT^2 + 10^2$$

$$OT^2 = 325 - 100 = 225$$

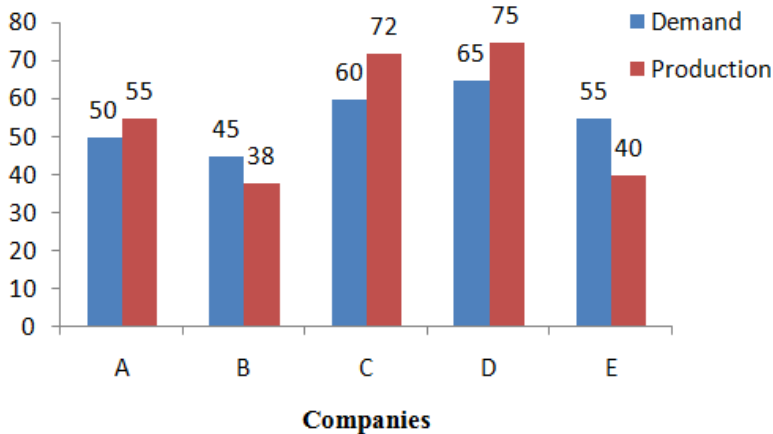
$$OT = \sqrt{225} = 15 \text{ cm}$$

Distance between Chords =  $OU - OT = 17 - 15 = 2$ cm

#### Question 40

Study the following bar graph and answer the question given.

**Demand and Production of motorcycles of five companies in 2016(in lakhs)**



The ratio of the total demand of motor cycles of companies A, C and E to the total production of motor cycles of B and C is:

- A 1 : 1
- B 2 : 1
- C 11 : 10
- D 3 : 2

Answer: D

**Question 41**

A circle touches the side BC of  $\triangle ABC$  at D and AB and AC are produced to E and F, respectively. If AB = 10 cm, AC = 8.6 cm and BC = 6.4 cm, then BE = ?

- A 3.2 cm
- B 3.5 cm
- C 2.2 cm
- D 2.5 cm

Answer: D

**Question 42**

If the measure of each exterior angle of a regular polygon is  $(51\frac{3}{7})^\circ$  then the ratio of the number of its diagonals to the number of its sides is:

- A 5 : 2
- B 13 : 6
- C 3 : 1
- D 2 : 1

Answer: D

**Explanation:**

Exterior angle of a regular polygon =  $360/n$

(where n = sides of polygon)

$$51\frac{3}{7} = 360/n$$

$$\frac{360}{7} = \frac{360}{n}$$

$$n = 7$$

$$\text{Number of diagonal} = \frac{n(n-3)}{2} = \frac{7(7-3)}{2} = 14$$

The ratio of the number of its diagonals to the number of its sides =  $14 : 7 = 2 : 1$

**Question 43**

Two numbers are in the ratio 3 : 5. If 13 is subtracted from each, the new numbers are in the ratio 10 : 21, If 15 is added to each of the original numbers, then the ratio becomes:

- A 5 : 7

B 23 : 33

C 4 : 5

D 24 : 35

Answer: D

#### Question 44

Pipes A and B are filling pipes while pipe C is an emptying pipe. A and B can fill a tank in 72 and 90 minutes respectively. When all the three pipes are opened together, the tank gets filled in 2 hours. A and B are opened together for 12 minutes, then closed and C is opened, The tank will be empty after:

A 15 minutes

B 18 minutes

C 12 minutes

D 16 minutes

Answer: B

#### Question 45

The LCM of two numbers x and y is 204 times their HCF. If their HCF is 12 and the difference between the numbers is 60, then  $x + y = ?$

A 660

B 426

C 852

D 348

Answer: D

#### Question 46

In  $\triangle ABC$ ,  $BE \perp AC$ ,  $CD \perp AB$  and  $BE$  and  $CD$  intersect each other at O. The bisectors of  $\angle OBC$  and  $\angle OCB$  meet at P. If  $\angle BPC = 148^\circ$ , then what is the measure of  $\angle A$ ?

A  $56^\circ$

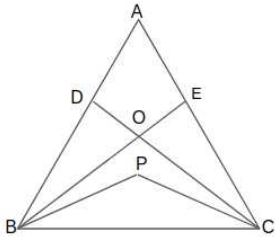
B  $28^\circ$

C  $32^\circ$

D  $64^\circ$

Answer: D

Explanation:



$$\angle BPC = 148^\circ$$

In triangle BOC-

$$\angle OBC + \angle BCO + \angle BOC = 180$$

$$\angle BOC + 2(\angle PBC + \angle PCB) = 180$$

$$\angle BOC + 2(180 - 148) = 180$$

$$\angle BOC = 180 - 64 = 116$$

#### Question 47

The value of  $\frac{2(\sin^6 \theta + \cos^6 \theta) - 3(\sin^4 \theta + \cos^4 \theta)}{\cos^4 \theta - \sin^4 \theta - 2 \cos^2 \theta}$  is:

- A -1
- B -2
- C 2
- D 1

Answer: D

#### Question 48

The value of  $24 \times 2 \div 12 + 12 \div 6 \text{ of } 2 \div (15 \div 8 \times 4) \text{ of } (28 \div 7 \text{ of } 5)$  is:

- A  $4\frac{1}{6}$
- B  $4\frac{8}{75}$
- C  $4\frac{2}{3}$
- D  $4\frac{32}{75}$

Answer: A

#### Explanation:

$$24 \times 2 \div 12 + 12 \div 6 \text{ of } 2 \div (15 \div 8 \times 4) \text{ of } (28 \div 7 \text{ of } 5)$$

Solve using by BODMAS rule,

$$24 \times 2 \div 12 + 12 \div 12 \div (15 \div 8 \times 4) \text{ of } (28 \div 35)$$

$$= 24 \times 2 \div 12 + 12 \div 12 \div 7.5 \text{ of } 0.8$$

$$= 24 \times 2 \div 12 + 12 \div 12 \div 6$$

$$= 4 + 1/6 = 4\frac{1}{6}$$

#### Question 49

A person covers 40% of the distance from A to B at 8 km/h, 40% of the remaining distance at 9 km/h and the rest at 12 km/h. His average speed (in km/h) for the journey is:

A  $9\frac{5}{8}$

B  $9\frac{2}{3}$

C  $9\frac{3}{8}$

D  $9\frac{1}{3}$

Answer: C

**Question 50**

A 15 m deep well with radius 2.8 m is dug and the earth taken out from it is spread evenly to form platform of breadth 8 m and height 1.5 m. What will be the length of the platform? (Take  $\pi = \frac{22}{7}$ )

A 28.4 m

B 28.8 m

C 30.2 m

D 30.8 m

Answer: D

**Explanation:**

Volume of earth is equal to the volume of the well so,

$$r = 2.8 \text{ m}$$

$$h = 15 \text{ m}$$

$$\text{volume of earth} = \pi \times r^2 \times h = \frac{22}{7} \times 2.8^2 \times 15 = 369.6m^3$$

Volume of earth is equal to the volume of platform so,

$$\text{volume of platform} = \text{length} \times \text{breadth} \times \text{height}$$

$$369.6 = 8 \times 1.5 \times \text{length}$$

$$\text{length} = \frac{369.6}{12} = 30.8 \text{ m}$$

**Question 51**

In  $\triangle PQR$ ,  $\angle Q > \angle R$ ,  $PS$  is the bisectors of  $\angle P$  and  $PT \perp PQ$ . If  $\angle SPT = 28^\circ$  and  $\angle R = 23^\circ$ , then the measure of  $\angle Q$  is:

A  $74^\circ$

B  $79^\circ$

C  $82^\circ$

D  $89^\circ$

Answer: B

**Question 52**

25 persons can complete a work in 60 days. They started the work. 10 persons left the work after x days. If the whole work was completed in 80 days, then what is the value of x ?



- A 9
- B 8
- C 12
- D 15

Answer: C

**Question 53**

The value of  $\sin^2 64^\circ + \cos 64^\circ \sin 26^\circ + 2 \cos 43^\circ \operatorname{cosec} 47^\circ$  is:

- A 4
- B 1
- C 2
- D 3

Answer: D

**Question 54**

A tank is in the form of a cuboid with length 12 m. If 18 kilolitre of water is removed from it, the water level goes down by 30cm. What is the width (in m) of the tank?

- A 4
- B 5
- C 5.5
- D 4.5

Answer: B

**Explanation:**

volume of water = 18 kiloliter = 18 cubic meter

Length of cuboid = 12m

Height = 30 cm = 0.3 m

Volume of water =  $length \times width \times height$

$$18 = 12 \times 0.3 \times width$$

$$Width = \frac{18}{3.6} = 5m$$

**Question 55**

In finding the HCF of two numbers by division method, the last divisor is 17 and the quotients are 1, 11 and 2, respectively. What is sum of the two numbers?

- A 833
- B 867

C 816

D 901

Answer: C

#### Question 56

A person invested one-fourth of the sum of ₹25,000 at a certain rate of simple interest and the rest at 4% p.a. higher rate. If the total interest received for 2 years is ₹4,125, what is the rate at which the second sum was invested?

A 9.5%

B 9.25%

C 5.25%

D 7.5%

Answer: B

#### Question 57

The radius of the base of a right circular cylinder is 3 cm and its curved surface area is  $60\pi\text{cm}^2$ , The volume of the cylinder (in  $\text{cm}^3$ ) is:

A  $90\pi$

B  $72\pi$

C  $60\pi$

D  $81\pi$

Answer: A

#### Explanation:

Radius( $r$ ) = 3 cm

curved surface area =  $2\pi \times r \times h$

$$60\pi = 2\pi \times 3 \times h$$

$$h = 10$$

Volume of cylinder =  $\pi \times r^2 \times h$

$$= \pi \times 3^2 \times 10 = 90\pi$$

#### Question 58

If  $\frac{3(x^2+1)-7x}{3x} = 6$ ,  $x \neq 0$ , then the value of  $\sqrt{x} + \frac{1}{\sqrt{x}}$  is:

A  $\sqrt{\frac{25}{3}}$

B  $\sqrt{\frac{11}{3}}$

C  $\sqrt{\frac{35}{3}}$

D  $\sqrt{\frac{31}{3}}$

Answer: D

Explanation:

$$3(x^2+1)-7x = 6$$

$$x[3(x+\frac{1}{x})-7] = 6,$$

$$(x + \frac{1}{x}) - \frac{7}{3} = 6$$

$$x + \frac{1}{x} = \frac{25}{3}$$

$$x + \frac{1}{x} + 2 = \frac{25}{3} + 2$$

$$(\because (a + b)^2 = a^2 + b^2 + 2ab)$$

$$(\sqrt{x} + \frac{1}{\sqrt{x}})^2 = \frac{31}{3}$$

$$\sqrt{x} + \frac{1}{\sqrt{x}} = \sqrt{\frac{31}{3}}$$

Question 59

Basir's working hours per day were increased by 15% and his wages per hour were increased by 20%. By how much per cent did his daily earnings increase?

A 40

B 38

C 35

D 36

Answer: B

Explanation:

Increment in working hour = 15%

Increment in wages = 20%

Let the working hours before the increment be 10 hours and daily wages per hour be Rs.10.

Daily wages of Basir = 10 × 10 = 100

working hours after increment =  $10 \times \frac{115}{100} = 11.5$

Daily wages per hours after increment =  $10 \times \frac{120}{100} = 12$

Daily wages of Basir after increment = 11.5 × 12 = 138

Increment in his daily earning = 138 - 100 = 38

Percentage increment in his daily earning =  $\frac{38}{100} \times 100 = 38\%$

Question 60

A student was asked to find the value of  $9\frac{4}{9} \div 11\frac{1}{3} \text{ of } 6\frac{1}{6} + (1\frac{1}{3} \times 1\frac{4}{5} \div 5) \times 2\frac{1}{6} \text{ of } 3\frac{2}{3} \div 3\frac{4}{3}$ . His answer was  $19\frac{1}{4}$ . What is the difference between his answer and the correct answer

A  $7\frac{3}{4}$

B  $6\frac{2}{3}$

C  $7\frac{1}{2}$

D  $6\frac{1}{3}$

Answer: A

Explanation:

$$9\frac{4}{9} \div 11\frac{1}{3} \text{ of } 6\frac{1}{6} + (1\frac{1}{3} \times 1\frac{4}{5} \div \frac{3}{5}) \times 2\frac{1}{6} \text{ of } 3\frac{2}{3} \div 3\frac{4}{9}$$

$$\frac{85}{9} \div \frac{34}{3} \text{ of } 6\frac{1}{6} + (\frac{4}{3} \times \frac{9}{5} \div \frac{3}{5}) \times \frac{13}{6} \text{ of } 3\frac{2}{3} \div 3\frac{4}{9}$$

$$\frac{85}{9} \div 18 + 4 \times \frac{13}{9} \div 9$$

$$\frac{85}{9} \div 18 + \frac{13}{2}$$

$$5\frac{13}{2} = \frac{23}{2}$$

Answer of the student =  $19\frac{1}{4} = \frac{77}{4}$

Difference =  $\frac{77}{4} - \frac{23}{2} = \frac{31}{4} = 7\frac{3}{4}$

**Question 61**

If a 10-digit number 5 4 3 2 y 1 7 4 9 x is divisible by 72, then what is the value of (5x - 4y)?

A 14

B 15

C 10

D 9

Answer: A

**Question 62**

What is the remainder when  $(127^{97} + 97^{97})$  is divided by 32?

A 4

B 2

C 7

D 0

Answer: D

**Question 63**

The value of  $\frac{(\sin \theta - \cos \theta)(1 + \tan \theta + \cot \theta)}{1 + \sin \theta \cos \theta} = ?$

A  $\sec \theta - \operatorname{cosec} \theta$

B  $\operatorname{cosec} \theta - \sec \theta$

C  $\sin \theta + \cos \theta$

D  $\tan \theta - \cot \theta$

Answer: A

**Question 64**

A, B and C spend 80%, 85% and 75% of their incomes, respectively. If their savings are in the ratio 8 : 9 : 20 and the difference between the incomes of A and C is ₹18,000, then the income of B is:

A ₹24,000

B ₹27,000

C ₹30,000

D ₹36,000

Answer: B

**Explanation:**

Let the Salary of A, B and C be a, b and c respectively.

$$\text{Saving of A} = a \times \frac{20}{100}$$

$$\text{Saving of B} = b \times \frac{15}{100}$$

$$\text{Saving of C} = c \times \frac{25}{100}$$

According to the question,

$$a \times \frac{20}{100} : b \times \frac{15}{100} : c \times \frac{25}{100} = 8 : 9 : 20$$

$$a \times \frac{1}{5} : b \times \frac{3}{20} : c \times \frac{1}{4} = 8 : 9 : 20$$

$$a : b : c = 8 \times 5 : 9 \times \frac{20}{3} : 20 \times 4$$

$$a : b : c = 40 : 60 : 80 = 2 : 3 : 4$$

let the income of A, B and C be 2x, 3x and 4x.

Difference between the incomes of A and C = Rs.18,000

$$2x = 18000$$

$$x = 9000$$

$$\text{Income of B} = 3 \times 9000 = \text{Rs.}27000$$

**Question 65**

If 25% of half of x is equal to 2.5 times the value of 30% of one-fourth of y. then x is what percent more or less than y?

A  $33\frac{1}{3}\%$  more

B 50% more

C  $33\frac{1}{3}\%$  less

D 50% less

Answer: B

**Explanation:**

According to question,

$$x \times \frac{1}{2} \times \frac{25}{100} = y \times 2.5 \times \frac{1}{4} \times \frac{30}{100}$$

$$\Rightarrow \frac{x}{8} = \frac{3y}{40} \times 2.5$$

$$x = \frac{3y}{2}$$

$$x = \frac{3y}{2} \times 100 = 150\% \text{ of } y$$

x is 50% more than y.

#### Question 66

The value of  $\frac{\sin \theta + \cos \theta - 1}{\sin \theta - \cos \theta + 1} \times \frac{\tan^2 \theta (\operatorname{cosec}^2 \theta - 1)}{\sec \theta - \tan \theta}$  is:

A 0

B -1

C 1

D  $\frac{1}{2}$

Answer: C

#### Question 67

In an examination, A obtained 10% more marks than B, B obtained 20% more marks than C and C obtained 32% less marks than D. If A obtained 272 more marks than C, then the marks obtained by B is:

A 850

B 816

C 1020

D 952

Answer: C

#### Explanation:

let the D obtained 100% marks.

Marks of C =

$$\text{Marks of C} = 100\% \times \frac{68}{100} = 68\%$$

$$\text{Marks of B} = 68\% \times \frac{120}{100} = 81.6\%$$

$$\text{Marks of A} = 81.6\% \times \frac{110}{100} = 89.76\%$$

Difference of the marks of A and C = 272

$$89.76\% - 68\% = 272$$

$$21.76\% = 272$$

$$81.6\% = \frac{272}{21.76} \times 81.6 = 1020$$

Marks obtained by B = 1020

#### Question 68

In quadrilateral  $ABCD$ ,  $\angle C = 72^\circ$  and  $\angle D = 28^\circ$ . The bisectors of  $\angle A$  and  $\angle B$  meet in O. What is the measure of  $\angle AOB$ ?

A  $48^\circ$

B  $54^\circ$

C  $50^\circ$

D  $36^\circ$

Answer: C

**Question 69**

a, b and c are three fractions such that  $a < b < c$ . If c is divided by a, the result is  $\frac{9}{2}$ , which exceeds b by  $\frac{23}{6}$ . The sum of a, b and c is  $\frac{19}{12}$ . What is the value of  $(2a + b - c)$ ?

A  $\frac{1}{2}$

B  $\frac{1}{3}$

C  $\frac{1}{12}$

D  $\frac{1}{4}$

Answer: D

**Explanation:**

$$\frac{c}{a} = \frac{9}{2}$$

$$c = \frac{9a}{2}$$

$$b + \frac{23}{6} = \frac{9}{2}$$

$$b = \frac{9}{2} - \frac{23}{6} = \frac{2}{3}$$

$$a + b + c = \frac{19}{12}$$

$$a + \frac{2}{3} + \frac{9a}{2} = \frac{19}{12}$$

$$\frac{11a}{2} = \frac{19}{12} - \frac{2}{3}$$

$$\frac{11a}{2} = \frac{11}{12}$$

$$a = \frac{1}{6}$$

$$c = \frac{9}{2} \times \frac{1}{6} = \frac{3}{4}$$

$$2a + b - c = \frac{2}{6} + \frac{2}{3} - \frac{3}{4} = \frac{3}{12} = \frac{1}{4}$$

**Question 70**

How many kg of salt costing ₹28 per kg must be mixed with 39.6 kg of salt costing ₹16 per kg, so that selling the mixture at ₹29.90, there is a gain of 15%?

A 33

B 31

C 35

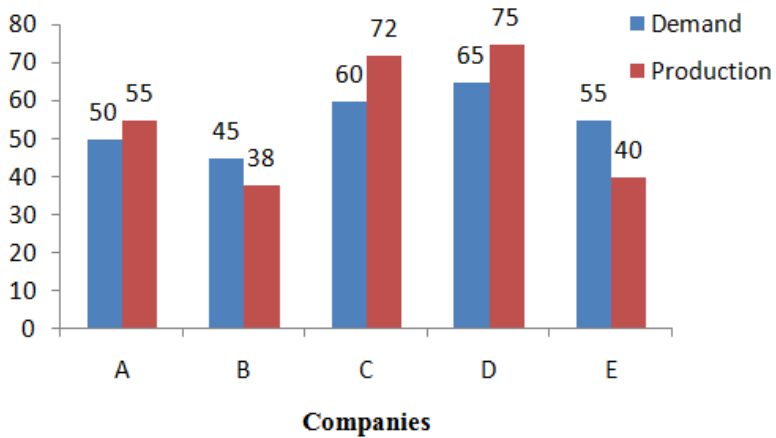
D 32

Answer: A

Question 71

Study the following bar graph and answer the question given.

**Demand and Production of motorcycles of five companies in 2016(in lakhs)**



The total production of motorcycles of companies C, D and E is what per cent less than the total demand of motor cycles of all the companies during five years?

- A 43
- B 32
- C 38
- D 47

Answer: B

Question 72

A, B and C started a business, Thrice the investment of A is equal to twice the investment of B and also equal to four times the investment of C, If C's share out of the total profit is ₹4,863, then the share of A in the profit is:

- A ₹7,272
- B ₹6,484
- C ₹9,726
- D ₹8,105

Answer: B

Question 73

Two positive numbers differ by 2001, When the larger number is divided by the smaller number, the quotient is 9 and the remainder is 41. The sum of the digits of the larger number is:

- A 15
- B 11
- C 10
- D 14



Answer: D

Question 74

Let  $x = \sqrt[6]{27} - \sqrt[3]{6^4}$  and  $y = \frac{\sqrt{45} + \sqrt{605} + \sqrt{245}}{\sqrt{80} + \sqrt{125}}$ , then the value of  $x^2 + y^2$  is:

A  $\frac{223}{36}$

B  $\frac{221}{36}$

C  $\frac{221}{9}$

D  $\frac{227}{9}$

Answer: A

Explanation:

$$x = \sqrt[6]{27} - \sqrt[3]{6^4}$$

$$x = \sqrt{3} - \sqrt[4]{27}$$

$$x = \sqrt{3} - \frac{3}{2}\sqrt{3}$$

$$x = -\frac{\sqrt{3}}{2}$$

$$x^2 = \frac{3}{4}$$

$$y = \frac{\sqrt{45} + \sqrt{605} + \sqrt{245}}{\sqrt{80} + \sqrt{125}}$$

$$y = \frac{\sqrt{5 \times 9} + \sqrt{121 \times 5} + \sqrt{49 \times 5}}{\sqrt{16 \times 5} + \sqrt{5 \times 25}}$$

$$y = \frac{3\sqrt{5} + 11\sqrt{5} + 7\sqrt{5}}{4\sqrt{5} + 5\sqrt{5}}$$

$$y = \frac{21\sqrt{5}}{9\sqrt{5}}$$

$$y^2 = \frac{2205}{405} = \frac{49}{9}$$

$$x^2 + y^2 = \frac{3}{4} + \frac{49}{9} = \frac{196 + 27}{36} = \frac{223}{36}$$

Question 75

If  $(5x + 2y) : (10x + 3y) = 5 : 9$ , then  $(2x^2 + 3y^2) : (4x^2 + 9y^2) = ?$

A 31 : 87

B 10 : 27

C 16 : 47

D 1 : 3

Answer: A

Explanation:

$$(5x + 2y) : (10x + 3y) = 5 : 9$$

$$\frac{5x+2y}{10x+3y} = \frac{5}{9}$$

$$\Rightarrow 45x + 18y = 50x + 15y$$

$$\Rightarrow 3y = 5x$$

$$\Rightarrow \frac{y}{x} = \frac{5}{3}$$

$$\Rightarrow \frac{y^2}{x^2} = \frac{25}{9} \dots (1)$$

now,

$$(2x^2 + 3y^2) : (4x^2 + 9y^2)$$

$$\Rightarrow \frac{2x^2 + 3y^2}{4x^2 + 9y^2} = \frac{x^2(2 + 3\frac{y^2}{x^2})}{x^2(4 + 9\frac{y^2}{x^2})} = \frac{(2 + 3\frac{y^2}{x^2})}{(4 + 9\frac{y^2}{x^2})}$$

From equation(1)-

$$\frac{2 + 3 \times \frac{25}{9}}{4 + 9 \times \frac{25}{9}} = \frac{6 + 25}{29 \times 3} = \frac{31}{87}$$

$$\$(2x^2 + 3y^2) : (4x^2 + 9y^2) = 31 : 87$$

### Question 76

The average of 18 numbers is 37.5. If six numbers of average X are added to them, then the average of all the numbers increases by one, The value of x is:

- A 40
- B 41.5
- C 42
- D 38.5

Answer: B

### Explanation:

Sum of the 18 numbers =  $37.5 \times 18 = 675$

( $\therefore$  average =  $\frac{\text{sum of total terms}}{\text{number of terms}}$ )

Sum of the 6 numbers =  $6 \times X = 6X$

Average of all the numbers =  $37.5 + 1 = 38.5$

$$\frac{675 + 6X}{24} = 38.5$$

$$675 + 6X = 24 \times 38.5$$

$$6X = 924 - 675 = 249$$

$$X = 41.5$$

### Question 77

In an office,  $\frac{5}{8}$  of the total number of employees are males and the rest are females.  $\frac{2}{5}$  of the number of males are non technical workers while  $\frac{2}{3}$  of the number of females are technical workers, What fraction of the total number of employees are technical workers?

- A  $\frac{5}{8}$
- B  $\frac{2}{5}$

C  $\frac{1}{2}$

D  $\frac{3}{8}$

Answer: A

**Explanation:**

Let the total number of employees be 8.

$$\text{Total number of males employee} = 8 \times \frac{5}{8} = 5$$

$$\text{Total number of females employee} = 8 - 5 = 3$$

$$\text{Non technical males workers} = 5 \times \frac{2}{5} = 2$$

$$\text{Technical males workers} = 5 - 2 = 3$$

$$\text{Technical females workers} = 3 \times \frac{2}{3} = 2$$

$$\text{total number of technical worker} = 3 + 2 = 5$$

$$\text{Fraction of the total number of technical workers} = \frac{\text{total number of technical workers}}{\text{total number of employee}} = \frac{5}{8}$$

**Question 78**

A solid cylinder of base radius 12 cm and height 15 cm is melted and recast into  $m$  toys each in the shape of a right circular cone of height 9 cm mounted on a hemisphere of radius 3 cm. The value of  $n$  is:

A 27

B 64

C 48

D 54

Answer: C

**Explanation:**

$$\text{Volume of cylinder} = \pi \times r^2 \times h = \pi \times 12^2 \times 15 = 2160\pi$$

$$\text{Volume of } n \text{ right circular cone} = \frac{1}{3}\pi \times r^2 \times h \times m = \frac{1}{3}\pi \times 3^2 \times 9 \times n$$

$$\text{Volume of hemisphere} = \frac{2}{3}\pi r^3 \times m = \frac{2}{3}\pi \times 3^3 \times n$$

volume of cylinder = Volume of  $n$  right circular cone + Volume of  $n$  hemisphere

$$2160\pi = \frac{1}{3}\pi \times 3^2 \times 9 \times n + \frac{2}{3}\pi 3^3 \times n$$

$$2160 = 27n + 18n$$

$$n = 2160/45 = 48$$

**Question 79**

In  $\triangle ABC$ ,  $D$  and  $E$  are the points on  $AB$  and  $AC$  respectively such that  $AD \times AC = AB \times AE$ . If  $\angle ADE = \angle ACB + 30^\circ$  and  $\angle ABC = 78^\circ$ , then  $\angle A = ?$

A  $56^\circ$

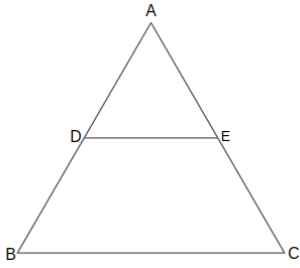
B  $54^\circ$

C  $68^\circ$

D  $48^\circ$

Answer: B

Explanation:



$$AD \times AC = AB \times AE$$

$$\frac{AD}{AE} = \frac{AB}{AC}$$

$\triangle ABC$  is similar to  $\triangle ADE$  so,

$$\angle ADE = \angle ABC$$

$$\angle ADE = 78^\circ$$

$$\angle AED = \angle ACB$$

$$\angle ADE = \angle ACB + 30^\circ$$

$$\angle ACB = 78 - 30 = 48$$

In  $\triangle ABC$  -

$$\angle ABC + \angle ACB + \angle A = 180^\circ$$

$$\angle A = 180 - 78 - 48 = 54^\circ$$

#### Question 80

P and Q are two points on the ground on either side of a pole. The angles of elevation of the top of the pole as observed from P and Q are  $60^\circ$  and  $30^\circ$ , respectively and the distance between them is  $84\sqrt{3}$  m. What is the height (in m) of the pole?

- A 63
- B 73.5
- C 52.5
- D 60

Answer: A

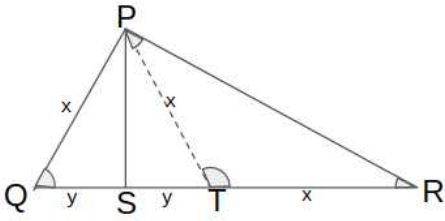
#### Question 81

If in  $\triangle PQR$ ,  $\angle P = 120^\circ$ ,  $PS \perp QR$  at  $S$  and  $PQ + QS = SR$ . then the measure of  $\angle Q$  is:

- A  $20^\circ$
- B  $50^\circ$
- C  $40^\circ$
- D  $30^\circ$

Answer: C

Explanation:



Let the  $PQ = x$  and  $QS = y$  then  $SR = PQ + QS = x + y$ .

Take a point  $T$  on the  $SR$  so that  $QS = ST = y$ .

$TR = SR - ST = x + y - y = x$

$PT = TR = x$  so,

$$\angle TPR = \angle TRP = \theta$$

In triangle  $PTR$  -

$$\angle TPR + \angle TRP + \angle PTR = 180^\circ$$

$$\angle PTR = 180^\circ - 2\theta$$

$$\angle PTS = 180^\circ - (180^\circ - 2\theta) = 2\theta$$

$$\angle PTS = \angle PQS = 2\theta$$

( $\because QP = PT$ )

In triangle  $PQR$  -

$$\angle PQR + \angle QRP + \angle RPQ = 180^\circ$$

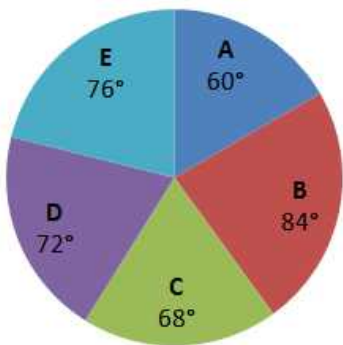
$$3\theta = 180^\circ - 120 = 60^\circ$$

$$\theta = 20^\circ$$

$$\angle Q = 2\theta = 2 \times 20^\circ = 40^\circ$$

#### Question 82

The given pie-chart shows the break-up of total marks obtained by a student in five subjects A, B, C, D and E. The maximum marks in each subject is 150 and he obtained total of 600 marks.



In how many subjects did the student obtain more than his average score?

A 3

B 2

C 4

D 1

Answer: B

**Question 83**

Walking at 60% of his usual speed, a man reaches his destination 1 hour 40 minutes late, His usual time (in hours) to reach the destination is:

A  $2\frac{1}{2}$

B  $2\frac{1}{4}$

C  $3\frac{1}{8}$

D  $3\frac{1}{4}$

Answer: A

**Question 84**

A man can row a distance of 900 metres against the stream in 12 minutes and returns to the starting point in 9 minutes. What is the speed (in km/h) of the man in still water?

A  $4\frac{1}{2}$

B 6

C  $5\frac{1}{4}$

D 5

Answer: C

**Question 85**

If  $x + y + z = 6$ ,  $xyz = -10$  and  $x^2 + y^2 + z^2 = 30$ , then what is the value of  $(x^3 + y^3 + z^3)$ ?

A 132

B 135

C 130

D 127

Answer: A

**Explanation:**

$$(x + y + z)^2 = x^2 + y^2 + z^2 + 2(ab + bc + ac)$$

$$6^2 = 30 + 2(ab + bc + ac)$$

$$(ab + bc + ac) = 3$$

$$x^3 + y^3 + z^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ac)$$

$$x^3 + y^3 + z^3 = 6 \times (30 - 3) + 3 \times (-10)$$

$$x^3 + y^3 + z^3 = 162 - 30 = 132$$

**Question 86**

The value of  $\frac{(4.6)^4 + (5.4)^4 + (24.84)^2}{(4.6)^2 + (5.4)^2 + 24.84}$  is:

- A 24.42
- B 24.24
- C 25.42
- D 25.48

**Answer: D**

**Explanation:**

$$\frac{(4.6)^4 + (5.4)^4 + (24.84)^2}{(4.6)^2 + (5.4)^2 + 24.84}$$

Addition and subtraction of  $(24.84)^2$  in the numerator.

$$\frac{(4.6)^4 + (5.4)^4 + (24.84)^2 + (24.84)^2 - (24.84)^2}{(4.6)^2 + (5.4)^2 + 24.84}$$

$$\frac{(4.6)^4 + (5.4)^4 + 2 \times (24.84)^2 - (24.84)^2}{(4.6)^2 + (5.4)^2 + 24.84}$$

$$\frac{((4.6)^2 + (5.4)^2)^2 - (24.84)^2}{(4.6)^2 + (5.4)^2 + 24.84}$$

$$(\because (a + b)^2 = a^2 + b^2 + 2ab)$$

$$\frac{((4.6)^2 + (5.4)^2 - (24.84))((4.6)^2 + (5.4)^2 + (24.84))}{(4.6)^2 + (5.4)^2 + 24.84}$$

$$(\because a^2 - b^2 = (a - b)(a + b))$$

$$(4.6)^2 + (5.4)^2 - (24.84) = 21.16 + 29.16 - 24.84 = 25.48$$

**Question 87**

If  $\frac{\sin \theta}{1 + \cos \theta} + \frac{1 + \cos \theta}{\sin \theta} = \frac{4}{\sqrt{3}}$ ,  $0^\circ < \theta < 90^\circ$ , then the value of  $(\tan \theta + \sec \theta)^{-1}$  is:

- A  $2 - \sqrt{3}$
- B  $3 - \sqrt{2}$
- C  $2 + \sqrt{3}$
- D  $3 + \sqrt{2}$

**Answer: A**

**Question 88**

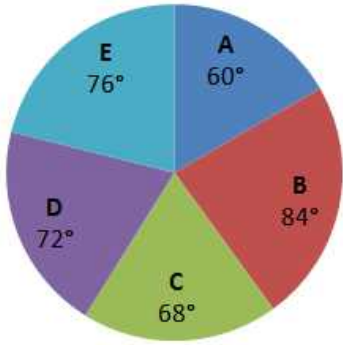
Sudha bought 80 articles at the same price. She sold some of them at 8% profit and the remaining at 12% loss resulting in an overall profit of 6%. The number of items sold at 8% profit is:

- A 64
- B 60
- C 72
- D 70

**Answer: C**

Question 89

The given pie-chart shows the break-up of total marks obtained by a student in five subjects A, B, C, D and E. The maximum marks in each subject is 150 and he obtained total of 600 marks.



The total marks obtained by the student in subjects C and E is approximately how much per cent more than what he obtained in A and D together?

- A 9.09%
- B 10.25%
- C 8.33%
- D 7.26%

Answer: A

Question 90

If the selling price of an article is 32% more than its cost price and the discount offered on its marked price is 12%, then what is the ratio of its cost price to the marked price?

- A 4 : 5
- B 3 : 8
- C 2 : 3
- D 1 : 2

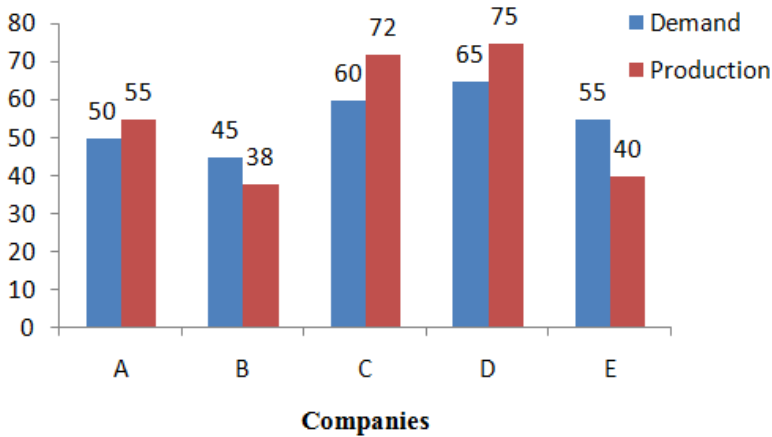
Answer: C



Question 91

Study the following bar graph and answer the question given.

**Demand and Production of motorcycles of five companies in 2016(in lakhs)**



The number of companies whose production of motorcycles is equal to or more than the average demand of motorcycles (per year) over five years is:

- A 4
- B 2
- C 1
- D 3

Answer: D

Question 92

The internal diameter of a hollow hemispherical vessel is 24 cm. It is made of a steel sheet which is 0.5 cm thick, What is the total surface area (in  $cm^2$ ) of the vessel?

- A  $612.75\pi$
- B  $468.75\pi$
- C  $600.2\pi$
- D  $600.5\pi$

Answer: A

**Explanation:**

Internal diameter of hollow hemispherical vessel = 24 cm

Internal radius( $r$ ) =  $24/2 = 12$  cm

External radius( $R$ ) =  $r + \text{thickness of sheet} = 12 + 0.5 = 12.5$  cm

Surface area of internal vessel =  $2\pi \times r^2 = 2\pi \times 12^2 = 288\pi$

Surface area of external vessel =  $2\pi \times R^2 = 2\pi \times (12.5)^2 = 312.5\pi$

Surface area of the ring =  $\pi(R^2 - r^2) = \pi(12.5^2 - 12^2) = \pi(156.25 - 144) = 12.25\pi$

Total surface area =  $288\pi + 312.5\pi + 12.25\pi = 612.75\pi$

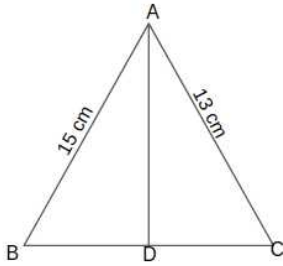
**Question 93**

The bisector of  $\angle A$  in  $\triangle ABC$  meets  $BC$  in  $D$ . If  $AB = 15\text{cm}$ ,  $AC = 13\text{cm}$  and  $BC = 14\text{cm}$ , then  $DC = ?$

- A 8.5 cm
- B 7.5 cm
- C 6.5 cm
- D 8 cm

Answer: C

Explanation:



From the angle bisector theorem-

$$\frac{AB}{BD} = \frac{AC}{DC}$$

$$BD = BC - DC$$

$$\frac{AB}{BC-DC} = \frac{AC}{DC}$$

$$\frac{15}{14-DC} = \frac{13}{DC}$$

$$\Rightarrow 15 \times DC = 13 \times 14 - 13 \times DC$$

$$\Rightarrow 28 \times DC = 182$$

$$\Rightarrow DC = 6.5 \text{ cm}$$

**Question 94**

A certain loan was returned in two equal half yearly instalments each of ₹6,760, If the rate of interest was 8% p.a., compounded yearly, how much was the interest paid on the loan?

- A ₹750
- B ₹810
- C ₹790
- D ₹770

Answer: D

**Question 95**

A sum is divided among A, B, C and D such that the ratio of the shares of A and B is 2 : 3, that of B and C is 1 : 2 and that of C and D is 3 : 4. If the difference between the shares of A and B is ₹648, then the sum of their shares is:

- A ₹2,052
- B ₹2,160

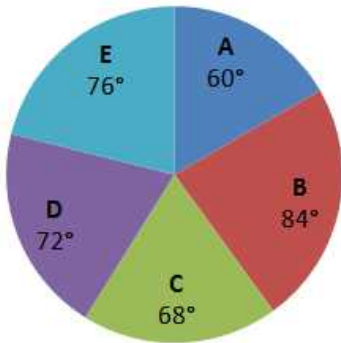
C ₹2,484

D ₹1,944

Answer: A

#### Question 96

The given pie-chart shows the break-up of total marks obtained by a student in five subjects A, B, C, D and E. The maximum marks in each subject is 150 and he obtained total of 600 marks.



What is the difference between the marks obtained by the student in subjects B and D?

A 20

B 27

C 30

D 12

Answer: A

#### Question 97

A sector of radius 10.5 cm with the central angle  $120^\circ$  is folded to form a cone by joining the two bounding radii of the sector. What is the volume (in  $cm^3$ ) of the cone so formed?

A  $\frac{343\sqrt{2}}{6} \pi$

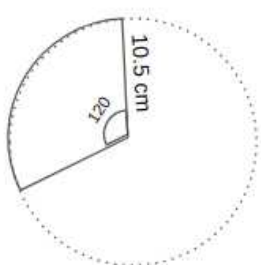
B  $\frac{343\sqrt{3}}{6} \pi$

C  $\frac{343\sqrt{3}}{12} \pi$

D  $\frac{343\sqrt{2}}{12} \pi$

Answer: D

Explanation:



When a sector of a circle is folded to form a cone.

The slant height of the cone = radius of the circle = 10.5cm

The base of the cone forms a sector of circle equal in length to the length of the arc.

Perimeter of the sector of the circle = length of base of cone

$$2 \times \pi \times r \times \frac{\text{angle}}{360} = 2 \times \pi \times r_1$$

(Let the radius of cone  $r_1$ )

$$r_1 = \frac{10.5}{3} = 3.5 \text{ cm}$$

Height of cone =  $h$

by pythagoras theorem-

$$h^2 = (10.5)^2 - (3.5)^2$$

$$h^2 = 110.25 - 12.25$$

$$h = \sqrt{98}$$

Volume of cone =  $\frac{1}{3} \times \pi \times r^2 \times h$

$$= \frac{1}{3} \times \pi \times (3.5)^2 \times \sqrt{98} = \frac{\pi \times 85.75 \sqrt{2}}{3} = \frac{343\sqrt{2}}{12} \pi$$

### Question 98

A certain sum amounts to ₹4,205.55 at 15% p.a. in  $2\frac{2}{5}$  years, interest compounded yearly. The sum is:

- A ₹3,200
- B ₹3,500
- C ₹2,700
- D ₹3,000

Answer: D

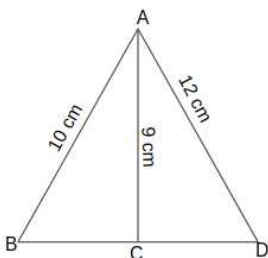
### Question 99

In  $\triangle ABD$ ,  $C$  is the midpoint of  $BD$ . If  $AB = 10\text{cm}$ ,  $AD = 12\text{cm}$  and  $AC = 9\text{cm}$ , then  $BD = ?$

- A  $2\sqrt{41} \text{ cm}$
- B  $2\sqrt{10} \text{ cm}$
- C  $\sqrt{41} \text{ cm}$
- D  $\sqrt{10} \text{ cm}$

Answer: A

Explanation:



Let the  $BC = CD = x \text{ cm}$ .

$BD = 2x$

According to heron's formula, the area of  $\Delta ABD$  is:

$$s = \frac{a+b+c}{2}$$

$$s = \frac{10+12+2x}{2} = 11 + x$$

$$a = 10 \text{ cm}, b = 12 \text{ cm}, c = 2x \text{ cm}$$

$$\text{area} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{(11+x)(11+x-10)(11+x-12)(11+x-2x)} = \sqrt{(11+x)(1+x)(x-1)(11-x)}$$

$$= \sqrt{(121-x^2)(1-x^2)}$$

Similarly in  $\Delta ABC$

$$s = \frac{10+9+x}{2} = \frac{19+x}{2}$$

$$\text{Area of } \triangle ABC = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{\left(\frac{19+x}{2}\right)\left(\frac{19+x}{2}-10\right)\left(\frac{19+x}{2}-9\right)\left(\frac{19+x}{2}-x\right)}$$

$$= \sqrt{\frac{(361-x^2)(x^2-1)}{16}}$$

AC is a median so,

$$\text{Area of } \triangle ABC = (1/2) \text{Area of } \triangle ABD$$

$$\sqrt{\frac{(361-x^2)(x^2-1)}{16}} = (1/2) \times \sqrt{(121-x^2)(1-x^2)}$$

$$\frac{(361-x^2)(x^2-1)}{16} = (1/4) \times (121-x^2)(1-x^2)$$

$$(361-x^2)(x^2-1) = 4 \times (121-x^2)(1-x^2)$$

$$361-x^2 = 484-4x^2$$

$$x^2 = 41$$

$$x = \sqrt{41}$$

$$BD = 2x = 2\sqrt{41}$$

#### Question 100

A sum of ₹10,500 amounts to ₹13,825 in  $3\frac{4}{5}$  years at a certain rate per cent per annum simple interest. What will be the simple interest on the same sum for 5 years at double the earlier rate?

A ₹8,470

B ₹8,750

C ₹8,670

D ₹8,560

Answer: B