



SSC CGL Tier-2 13th September 2019 Maths

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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

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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

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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

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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°
- B 26°
- C 24°
- D 34°

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

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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 cm^2 , What is the volume (in cm^3) of the cone? (Take $\pi = 3.14$)

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

Answer: A

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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 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

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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

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

- A 75°
- B 55°
- C 80°
- D 70°

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

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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

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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

General Science Notes for SSC CGL

Question 29

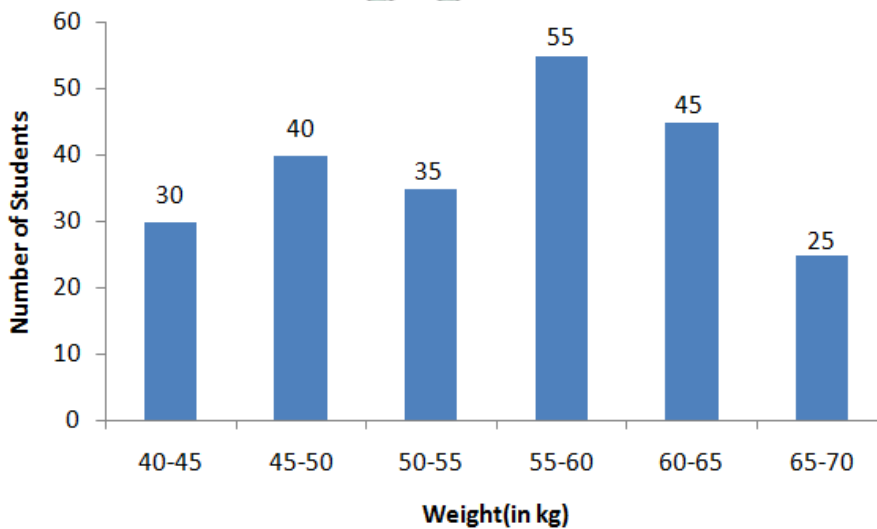
The value of $\frac{\sec^2 \theta}{\operatorname{cosec}^2 \theta} + \frac{\operatorname{cosec}^2 \theta}{\sec^2 \theta} - (\sec^2 \theta + \operatorname{cosec}^2 \theta)$ is:

- 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 centless 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

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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

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Question 35

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

$C = \frac{\sqrt[3]{7-2}(\sqrt{7}+2)}{\sqrt{7}+2}$

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

$C = \frac{\sqrt[3]{7-2}(\sqrt{7}+2)}{\sqrt{7}+2}$

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

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 = $5x = 5 \times 2.4 = 12$

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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

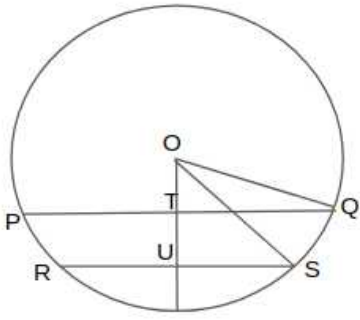
Question 39

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-

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

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

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

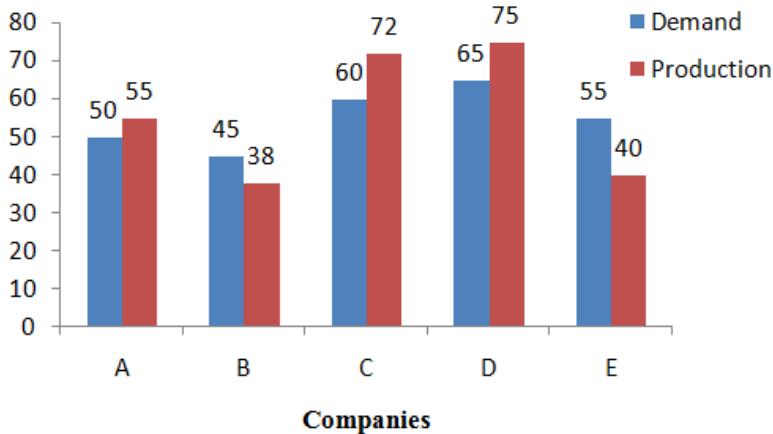
$$OT = \sqrt{225} = 15 \text{ cm}$$

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 motorcycles of B and C is:

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

Answer: D

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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

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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°

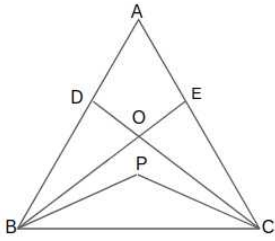
B 28°

C 32°

D 64°

Answer: D

Explanation:



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

In triangle BOC-

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

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

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

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

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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

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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,

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

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

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

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°

B 79°

C 82°

D 89°

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

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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

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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 cm^3) is:

A 90π

B 72π

C 60π

D 81π

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:

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

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

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

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

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

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

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

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

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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 $99 \div 11 \text{ of } 6 + (1\frac{1}{3} \times 1\frac{4}{5} \div 5) \times 2\frac{1}{6} \text{ of } 3 \div 3 \text{ of } 3$. 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:

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

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

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

$$9\frac{4}{9} \div 18 + \frac{13}{2}$$

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

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

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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

$$2x = 18000$$

$$x = 9000$$

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

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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

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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°
- B 54°
- C 50°
- D 36°

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

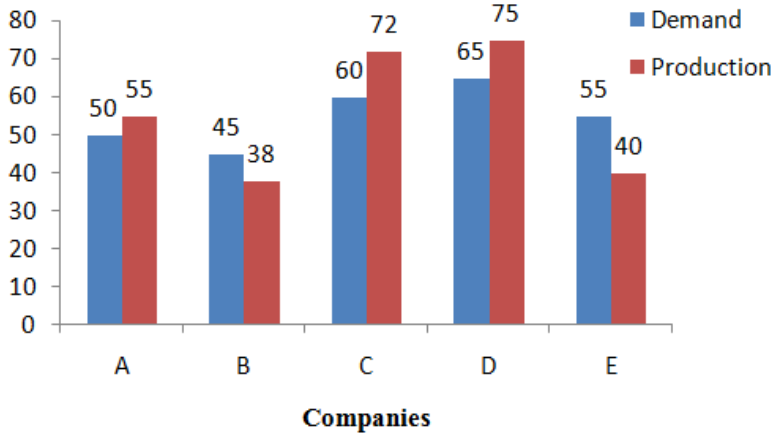
Answer: A

General Science Notes for SSC CGL

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

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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 = $37.5 + 1 = 38.5$

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

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

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

$$X = 41.5$$

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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 n 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:

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

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

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

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

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

$$2160 = 27n + 18n$$

$$n = 2160/45 = 48$$

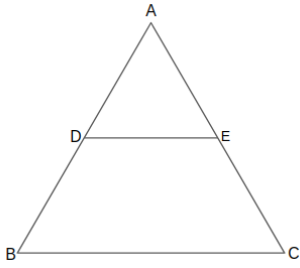
Question 79

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°
- B 54°
- C 68°
- D 48°

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 $\triangle ABC$ -

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

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

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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° and 30° , 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

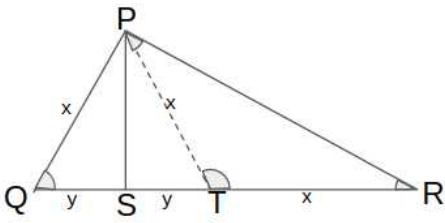
Question 81

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°
- B 50°
- C 40°
- D 30°

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 -

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

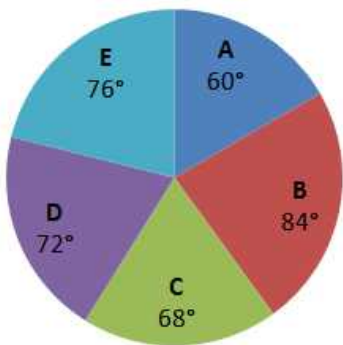
$3\theta = 180^\circ - 120 = 60^\circ$

$\theta = 20^\circ$

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

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

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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:

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

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

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

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

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

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

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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:

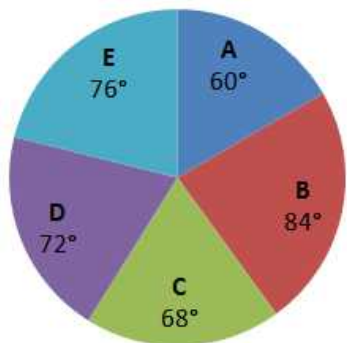
- A 64
- B 60
- C 72
- D 70

Answer: C

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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?

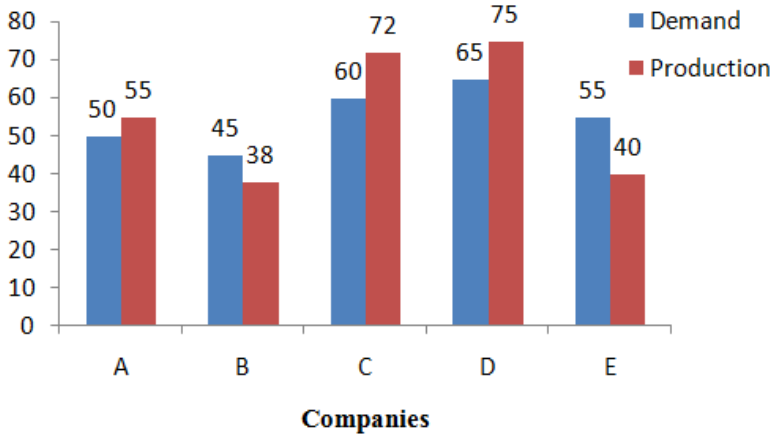
- A 4 : 5
- B 3 : 8
- C 2 : 3
- D 1 : 2

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

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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 612.75π
- B 468.75π
- C 600.2π
- D 600.5π

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 = $288\pi + 312.5\pi + 12.25\pi = 612.75\pi$

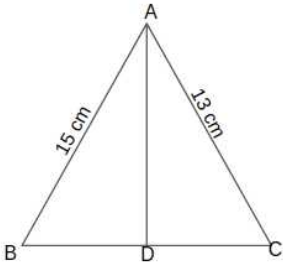
Question 93

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

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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

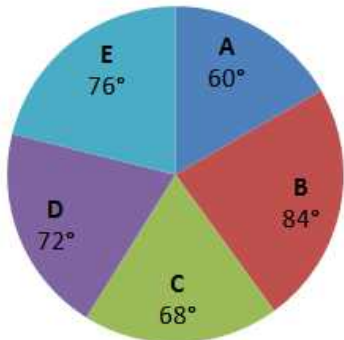
C ₹2,484

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° 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 $\frac{343\sqrt{2}}{6} \pi$

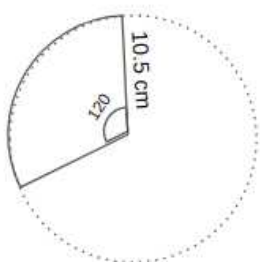
B $\frac{343\sqrt{3}}{6} \pi$

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

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

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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

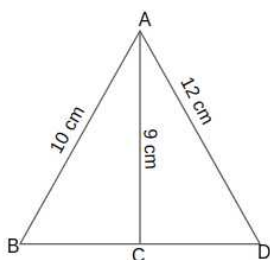
Question 99

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 $\triangle ABD$ 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 $\triangle ABC$

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

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

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

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

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

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