



SSC CGL Tier-2 11th September 2019 Maths

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SSC CGL Tier-2 11th-September-2019 Quant

Instructions

For the following questions answer them individually

Question 1

The value of $7+8 \times 8 \div 8$ of $8+8 \div 8 \times 4$ of $4 \div 4$ of $4+4 \times 4 \div 4-4 \div 4$ of 2 is:

- A 7.8
- B 4.6
- C 8.7
- D 6.4

Answer: D

Explanation:

$7+8 \times 8 \div 8$ of $8+8 \div 8 \times 4$ of $4 \div 4$ of $4+4 \times 4 \div 4-4 \div 4$ of 2

On solving by the BODMAS rule,

$$7+8 \times 8 \div 8+8 \div 8 \times 4$$
$$= 4 \div 4+4 \times 4 \div 4-4 \div 4$$

$$7_1+1+1 \times 1_6$$
$$= 4+4 \times 1-2$$

$$7_1+1+1_6$$
$$= 4+4-2$$

$$= \frac{24}{4}$$

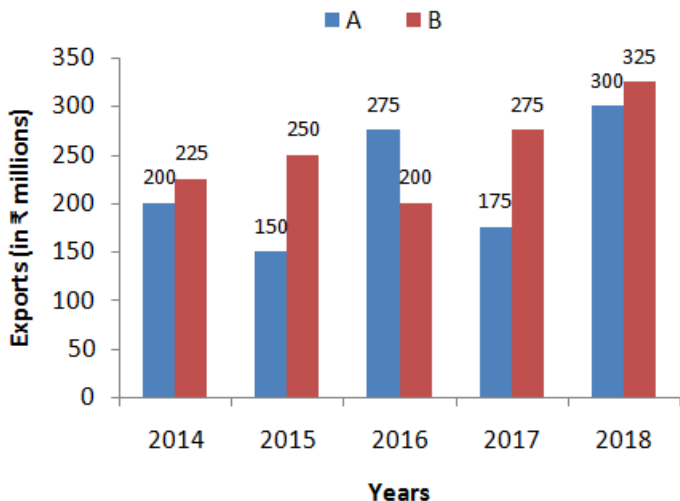
$$= \frac{96}{15} = 6.4$$

∴ The correct answer is option D.

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Question 2

The bar graph shows the exports of Cars of Type A and B (in ₹ millions).



In which year, the exports of cars of type A was 25% more than the average exports (per year) of cars of type A over the five years?

- A 2015
- B 2017
- C 2014

D 2016

Answer: C

Explanation:

Total export of cars of type A over the five years = $200 + 150 + 275 + 175 + 300 = 1100$

Average exports (per year) of cars of type A over the five years = $1100/5 = 220$

25% more than the average exports = $220 \times \frac{125}{100} = 275$

In 2016, the exports of cars of type A was 25% more than the average exports (per year) of cars of type A over the five years.

∴ The correct answer is option C.

Question 3

If $\sin \theta = \sqrt{3} \cos \theta$, $0^\circ < \theta < 90^\circ$, then the value of $2 \sin^2 \theta + \sec^2 \theta + \sin \theta \sec \theta + \operatorname{cosec} \theta$ is:

A $\frac{33 + 10\sqrt{3}}{6}$

B $\frac{19 + 10\sqrt{3}}{6}$

C $\frac{33 + 10\sqrt{3}}{3}$

D $\frac{19 + 10\sqrt{3}}{3}$

Answer: A

Explanation:

$\sin \theta = \sqrt{3} \cos \theta$, $0^\circ < \theta < 90^\circ$

$\Rightarrow \frac{\sin \theta}{\cos \theta} = \sqrt{3}$

$\Rightarrow \tan \theta = \sqrt{3}$

$\Rightarrow \theta = 60^\circ$

Now,

$2 \sin^2 \theta + \sec^2 \theta + \sin \theta \sec \theta + \operatorname{cosec} \theta$

$= 2 \sin^2 60^\circ + \sec^2 60^\circ + \tan 60^\circ + \operatorname{cosec} 60^\circ$

$= 2 \times \left(\frac{\sqrt{3}}{2}\right)^2 + 2^2 + \sqrt{3} + \frac{2}{\sqrt{3}}$

$= \frac{3}{2} + 4 + \sqrt{3} + \frac{2}{\sqrt{3}}$

$= \frac{3\sqrt{3} + 8\sqrt{3} + 6 + 4}{2\sqrt{3}}$

$= \frac{11\sqrt{3} + 10}{2\sqrt{3}}$

$= \frac{33 + 10\sqrt{3}}{6}$

∴ The correct answer is option A.

Question 4

To do a certain work, the ratio of efficiency of A to that of B is 3 : 7. Working together, they can complete the work in $10\frac{1}{2}$ days. They work together for 8 days. 60% of the remaining work will be completed by A alone in

A $5\frac{1}{2}$ days

B 5 days

C $6\frac{1}{2}$ days

D 4 days

Answer: B

Explanation:

Efficiency ratio of A to B = 3 : 7

Let the efficiency of A and B be 3x and 7x respectively.

Total efficiency = $3x + 7x = 10x$

Time taken by A and B to complete the work = $10\frac{1}{2}$ = $21/2$

Total work = days to complete the work \times efficiency = $10x \times 21/2 = 105x$

Work done in 8 days = $10x \times 8 = 80x$

Remaining work = $105x - 80x = 25x$

60% of the remaining work = $25x \times \frac{60}{100} = 15x$

Time taken by A to complete 15x work = $15x/3x = 5$ days

∴ The correct answer is option B.

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Question 5

The average of thirteen numbers is 47. The average of the first three numbers is 39 and that of next seven numbers is 49. The 11th number is two times the 12th number and 12th number is 3 less than the 13th number. What is the average of 11th and 13th numbers?

A 54.5

B 57

C 56

D 55.5

Answer: B

Explanation:

The average of thirteen numbers = 47

Sum of thirteen numbers = $47 \times 13 = 611$

The average of the first three numbers = 39

Sum of the first three numbers = $39 \times 3 = 117$

The average of the next seven numbers = 49

Sum of the next seven numbers = $49 \times 7 = 343$

11th number = 2 × 12th number

12th number = 13th number - 3

Sum of thirteen numbers = 611

Sum of the first three numbers + Sum of the next seven numbers + 11th number + 12th number + 13th number = 611

$117 + 343 + 2 \times 12\text{th number} + 12\text{th number} + 12\text{th number} + 3 = 611$

$4 \times 12\text{th number} = 151 - 3$

12th number = $148/4 = 37$

11th number = $2 \times 37 = 74$

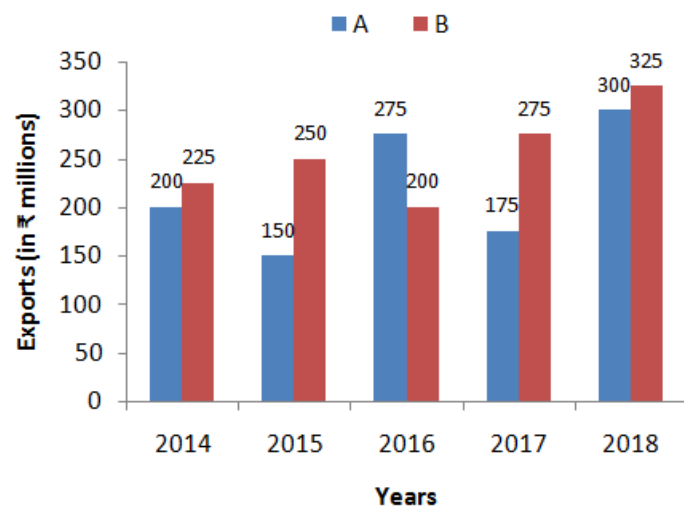
13th number = $37 + 3 = 40$

Average of 11th and 13th numbers = $\frac{74 + 40}{2} = \frac{114}{2} = 57$

∴ The correct answer is option B.

Question 6

The bar graph shows the exports of Cars of Type A and B (in ₹ millions).



What is the ratio of the total exports of cars of type A in 2014 and 2018 to the total exports of cars of type B in 2015 and 2016?

- A 11 : 10
- B 10 : 9
- C 5 : 4
- D 3 : 2

Answer: B

Explanation:

Total exports of cars of type A in 2014 and 2018 = $200 + 300 = 500$

Total exports of cars of type B in 2015 and 2016 = $250 + 200 = 450$

Ratio of the total exports of cars of type A in 2014 and 2018 to the total exports of cars of type B in 2015 and 2016 = $500 : 450 = 10 : 9$
 \therefore The correct answer is option B.

Question 7

If $x^8 - 1442x^4 + 1 = 0$, then possible value of $x - \frac{1}{x}$ is:

- A 5
- B 8
- C 4
- D 6

Answer: D

Explanation:

$$x^8 - 1442x^4 + 1 = 0$$

$$x^4 - 1442 + \frac{1}{x^4} = 0$$

$$x^4 + \frac{1}{x^4} = 1442$$

$$x^4 + \frac{1}{x^4} + 2 = 1442 + 2$$

$$(x^2 + \frac{1}{x^2})^2 = (38)^2$$

$$x^2 + \frac{1}{x^2} = 38$$

$$x^2 + \frac{1}{x^2} - 2 = 38 - 2$$

$$(x - \frac{1}{x})^2 = 6^2$$

$$x - \frac{1}{x} = 6$$

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

\therefore The correct answer is option D.

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Question 8

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

- A 4
- B -4
- C 3
- D 5

Answer: D

Explanation:

When graphs of the equations intersect at the point $P(\alpha, \beta)$ then,

$$3\alpha + \beta - 5 = 0 \quad \text{---(1)}$$

$$2\alpha - \beta - 5 = 0 \quad \text{---(2)}$$

On eq(1) + (2),

$$5\alpha - 10 = 0$$

$$\alpha = 2$$

From the eq(2),

$$3 \times 2 + \beta - 5 = 0$$

$$\beta = -1$$

Now,

$$3(\alpha + \beta) = 3 \times 2 - 1 = 6 - 1 = 5$$

\therefore The correct answer is option D.

Question 9

If $\sqrt{86 - 60\sqrt{2}} = a - b\sqrt{2}$, then what will be the value of $\sqrt{a^2 + b^2}$, correct to one decimal place?

A 8.4

B 8.2

C 7.8

D 7.2

Answer: C

Explanation:

$$\sqrt{86 - 60\sqrt{2}} = a - b\sqrt{2}$$

$$\sqrt{36 + 50 - 2 \times 30\sqrt{2}} = a - b\sqrt{2}$$

$$\sqrt{6^2 + (5\sqrt{2})^2 - 2 \times 6 \times 5\sqrt{2}} = a - b\sqrt{2}$$

$$\sqrt{(6 - 5\sqrt{2})^2} = a - b\sqrt{2}$$

$$6 - 5\sqrt{2} = a - b\sqrt{2}$$

On compare,

$$a = 6,$$

$$b = 5$$

Now,

$$\sqrt{a^2 + b^2}$$

$$= \sqrt{6^2 + 5^2}$$

$$= \sqrt{61} = 7.8$$

\therefore The correct answer is option C.

Question 10

The sides AB and AC of $\triangle ABC$ are produced to P and Q respectively. The bisectors of $\angle CBP$ and $\angle BCQ$ meet at R. If the measure of $\angle A$ is 44° , then what is the measure of $\frac{1}{2} \angle BOC$?

A 33°

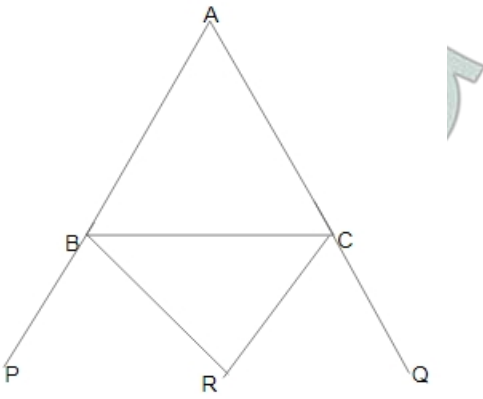
B 38°

C 34°

D 32°

Answer: C

Explanation:



$\angle BRC = 90^\circ - \angle A/2$
 $= 90^\circ - 44^\circ/2 = 90^\circ - 22^\circ = 68^\circ$
 $\frac{1}{2} \angle BOC = \frac{68^\circ}{2}$
 $\frac{1}{2} \angle BOC = 34^\circ$
 \therefore The correct answer is option C.

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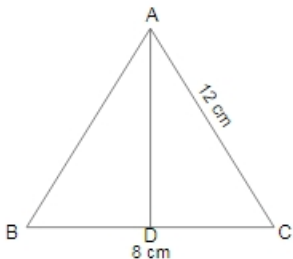
Question 11

In $\triangle ABC$, D is a point on side BC such that $\angle ADC = \angle BAC$. If CA = 12 cm, CB = 8 cm, then CD is equal to:

- A 12 cm
- B 15 cm
- C 18 cm
- D 16 cm

Answer: C

Explanation:



$\angle ADC = \angle BAC$
 $\angle ACB = \angle ACD$
 So, $\triangle ABC \sim \triangle DCA$,
 So, $\frac{BC}{AC} = \frac{AC}{CD}$
 $\frac{8}{12} = \frac{12}{CD}$
 $CD = 144/8 = 18$ cm
 \therefore The correct answer is option C.

Question 12

A person marks his goods x% above the cost price and allows a discount of 30% on the marked price. If his profit is 5%. then the value of x will be:

- A 50
- B 60
- C 45

D 35

Answer: A

Explanation:

let the cost price be 100.

Profit = 5%

Selling price = 105

Discount = 30%

Selling price = 70%

Marked price = $\frac{105}{70} \times 100 = \text{Rs. } 150$

$x\% = \frac{150 - 100}{100} \times 100 = \frac{50}{100} \times 100 = 50\%$

∴ The correct answer is option A.

Question 13

If $a^2 + b^2 + c^2 + 96 = 8(a + b - 2c)$, then $\sqrt{ab - bc + ca}$ is equal to:

A 6

B $2\sqrt{2}$

C 4

D $2\sqrt{3}$

Answer: C

Explanation:

$$a^2 + b^2 + c^2 + 96 = 8(a + b - 2c)$$

$$a^2 + b^2 + c^2 + 96 - 8a - 8b + 16c = 0$$

$$(a^2 - 8a + 16) + (b^2 - 8b + 16) + (c^2 + 16c + 64) = 0$$

$$(a - 4)^2 + (b - 4)^2 + (c + 8)^2 = 0$$

$$(a - 4)^2 = 0, (b - 4)^2 = 0, (c + 8)^2 = 0$$

$$a = 4,$$

$$b = 4,$$

$$c = -8$$

$$\sqrt{ab - bc + ca}$$

$$= \sqrt{4 \times 4 + 4 \times 8 - 4 \times 8}$$

$$= \sqrt{16 + 32 - 32}$$

$$= 4$$

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Question 14

A right circular cylinder of maximum volume is cut out from a solid wooden cube. The material left is what percent of the volume (nearest to an integer) of the original cube?

A 19

B 28

C 23

D 21

Answer: D

Explanation:

Side of cube = a

Volume of cube = a^3

For the maximum volume,

Height of right circular cylinder = a

Diameter = a

Radius = a/2

Volume of right circular cylinder = $\pi r^2 h = \frac{22}{7} \times \left(\frac{a}{2}\right)^2 \times a = \frac{11}{14}a^3$
= $0.78a^3$

Material left = $a^3 - 0.7857a^3 = 0.2143a^3$

Percentage material left = $\frac{0.2143a^3}{a^3} \times 100 = 21.43 \approx 21\%$

∴ The correct answer is option D.

Question 15

The ratio of the volumes of two cylinders is x : y and the ratio of their diameters is a : b, What is the ratio of their heights?

A $x : y$

B $ax : by$

C $x^2 : y^2$

D $a^2 : b^2$

Answer: C

Explanation:

The ratio of their diameters = a : b

The ratio of their radius = a : b

The ratio of the volumes of two cylinders = x : y

$\pi r_1^2 h_1 : \pi r_2^2 h_2 = x : y$

$a^2 h_1 : b^2 h_2 = x : y$

$h_1 : h_2 = xb^2 : ya^2$

∴ The correct answer is option C.

Question 16

The value of the expression $(\cos^6 \theta + \sin^6 \theta - 1)(\tan^2 \theta + \cot^2 \theta + 2)$ is:

A 0

B -1

C -3

D 1

Answer: C

Explanation:

$(\cos^6 \theta + \sin^6 \theta - 1)(\tan^2 \theta + \cot^2 \theta + 2)$

Assume any value of θ ,

Let the θ be 45° ,

$(\cos^6 45^\circ + \sin^6 45^\circ - 1)(\tan^2 45^\circ + \cot^2 45^\circ + 2)$

$(\left(\frac{1}{\sqrt{2}}\right)^6 + \left(\frac{1}{\sqrt{2}}\right)^6 - 1)(1 + 1 + 2)$

$(\frac{1}{8} + \frac{1}{8} - 1)(4)$

$\frac{3}{4} \times 4$

= -3

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Question 17

If A is 28% more than B and C is 25% less than the sum of A and B. Then by what percent will C be more than A (correct to one decimal place)?

- A 32.2%
- B 28%
- C 43%
- D 33.6%

Answer: D

Explanation:

Let the B = 100

A = 128

C = 25% less than the sum of A and B

$C = (100 + 128) \times \frac{75}{100} = 171$

Required percentage = $\frac{171 - 128}{128} \times 100 = \frac{43}{128} \times 100 = 33.6\%$

\therefore The correct answer is option D.

Question 18

A shopkeeper bought 120 quintals of wheat. 20% of it was sold at 25% less. At what percent gain should he sell the rest to gain 25% on the whole transaction?

- A $36\frac{1}{2}\%$
- B 40
- C $37\frac{1}{2}\%$
- D 35

Answer: C

Explanation:

Let the rate of 120 quintals be Rs.120.

For 25% gain = $120 \times \frac{125}{100} = \text{Rs.}150$

20% of the 120 quintals = $20 \times \frac{120}{100} = 24$ quintals

remaining wheat = $120 - 24 = 96$ quintals

20% of it was sold at 25% less

So, selling price of 20% wheat = $24 \times \frac{75}{100} = \text{Rs.}18$

Cost price for 96 quintals wheat = Rs.96

Selling price = $150 - 18 = 132$

Gain = $132 - 96 = 36$

Gain% = $\frac{36}{96} \times 100 = 37\frac{1}{2}\%$

\therefore The correct answer is option C.

Question 19

The value of $22.\overline{4} + 11.5\overline{67} - 33.5\overline{9}$ is:

- A $0.\overline{32}$
- B $0.\overline{412}$
- C $0.3\overline{1}$
- D $0.4\overline{12}$

Answer: D

Explanation:

$22.\overline{4} + 11.5\overline{67} - 33.5\overline{9}$

= $22.4444 + 11.56767 - 33.59999$

$$= \$22.44444 + 11.56767 - 33.59999\$$$

$$= \$0.41212\$$$

$$= \$0.4\overline{12}\$$$

∴ The correct answer is option D.

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Question 20

Anu sold an article for ₹480 at some profit. Had she sold it for ₹400, then there would have been a loss equal to one third of the initial profit. What was the cost price of the article ?

- A ₹450
- B ₹430
- C ₹425
- D ₹420

Answer: D

Explanation:

Let the profit be x when Anu sold at Rs.480.
 Loss of Anu when she sell an article on Rs. 400 = $x/3$
 Difference of selling price = $480 - 400$
 $x + x/3 = 80$
 $4x/3 = 80$
 $x = \text{Rs. } 60$
 Cost price of an article = $480 - 60 = \text{Rs. } 420$
 ∴ The correct answer is option D.

Question 21

In a school, $\frac{4}{9}$ of the number of students are girls and the rest are boys. $\frac{3}{5}$ of the number of boys are below 12 years of age and $\frac{5}{12}$ of the number of girls are 12 years or above 12 years of age. If the number of students below 12 years of age is 480, then $\frac{5}{18}$ of the total number of students in the school will be equal to:

- A 270
- B 315
- C 225
- D 240

Answer: C

Explanation:

Let the total student be x .
 Number of girls = $4x/9$
 Number of boys = $x - 4x/9 = 5x/9$
 Number of boys below 12 years = $5x/9 \times 3/5 = x/3$
 Number of girls are 12 years or above 12 years of age = $4x/9 \times 5/12 = 5x/27$
 Number of girls below 12 years = $\frac{4x}{9} - \frac{5x}{27} = \frac{7x}{27}$
 The number of students below 12 years of age = 480
 Number of boys below 12 years + number of girls below 12 years = 480
 $\frac{x}{3} + \frac{7x}{27} = 480$
 $16x/27 = 480$
 $x = 810$
 $\frac{5}{18}$ of the total number of students in the school = $810 \times \frac{5}{18} = 225$

Question 22

$\frac{(2 \sin A)(1 + \sin A)}{1 + \sin A + \cos A}$ is equal to:

- A $1 + \sin A - \cos A$
- B $1 - \sin A \cos A$
- C $1 + \cos A - \sin A$
- D $1 + \sin A \cos A$

Answer: A

Explanation:

$$\begin{aligned} & \frac{(2 \sin A)(1 + \sin A)}{1 + \sin A + \cos A} \\ &= \frac{(2 \sin A + 2 \sin^2 A)}{1 + \sin A + \cos A} \\ &= \frac{(2 \sin A + 2 - 2 \cos^2 A)}{1 + \sin A + \cos A} \\ & \quad (\text{because } \sin^2 A + \cos^2 A = 1) \\ &= \frac{(2 \sin A + 1 + \sin^2 A + \cos^2 A - 2 \cos^2 A)}{1 + \sin A + \cos A} \\ &= \frac{((\sin A + 1)^2 - \cos^2 A)}{1 + \sin A + \cos A} \\ & \quad (\text{because } (a)^2 - (b)^2 = (a + b)(a - b)) \\ &= \frac{(1 + \sin A + \cos A)(1 + \sin A - \cos A)}{1 + \sin A + \cos A} \\ &= (1 + \sin A - \cos A) \end{aligned}$$

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Question 23

A and B can do a piece of work in 6 days and 8 days, respectively. With the help of C, they completed the work in 3 days and earned ₹1,848. What was the share of C ?

- A ₹231
- B ₹924
- C ₹462
- D ₹693

Answer: A

Explanation:

Let the total work be 24 units.

(because LCM of 6, 8 and 3 is 24.)

Efficiency of A = $24/6 = 4$

Efficiency of B = $24/8 = 3$

Efficiency of A, B and C = $24/3 = 8$

Efficiency of C = $8 - 4 - 3 = 1$

Ratio of the efficiency of A, B and C = $4 : 3 : 1$

Total earning = 1848

Share of C = $\frac{1}{4 + 3 + 1} \times 1848 = \frac{1}{8} \times 1848 = \text{Rs. } 231$

∴ The correct answer is option A.

Question 24

If $x + y + z = 11$, $x^2 + y^2 + z^2 = 133$ and $x^3 + y^3 + z^3 = 881$, then the value of $\sqrt[3]{xyz}$ is:

- A -6
- B 6

C -8

D 8

Answer: A

Explanation:

$$(x + y + z)^2 = x^2 + y^2 + z^2 + 2(xy + yz + xz)$$

$$(11)^2 = 133 + 2(xy + yz + xz)$$

$$2(xy + yz + xz) = -12$$

$$xy + yz + xz = -6$$

$$x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - (xy + yz + xz))$$

$$881 - 3(xyz) = 11(133 + 6)$$

$$3xyz = 648$$

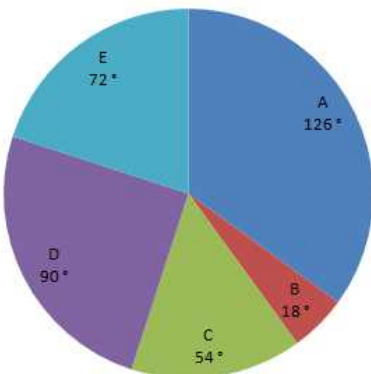
$$xyz = -216$$

$$\sqrt[3]{xyz} = -6$$

Question 25

The given pie chart shows the breakup of total number of the employees of a company working in different offices (A, B, C, D and E).

Total No. of employees = 2400



What is the number of offices in which the number of employees of the company is between 350 and 650?

A 1

B 4

C 2

D 3

Answer: D

Explanation:

$$1 \text{ employee} = \frac{360}{2400}$$

$$350 \text{ employees} = \frac{360}{2400} \times 350 = 52.5^\circ$$

$$650 \text{ employees} = \frac{360}{2400} \times 650 = 97.5^\circ$$

Number of offices in which the number of employees of the company is between 350 and 650 = number of offices in which the number of employees of the company is between 52.5° and 97.5°

= 3 offices

\therefore The correct answer is option D.

SSC CHSL Previous Papers (DOWNLOAD PDF)

Question 26

Pipes A, B and C can fill a tank in 30 h, 40 h and 60 h respectively. Pipes A, B and C are opened at 7 a.m., 8 a.m., and 10 a.m., respectively on the same day. When will the tank be full?

A 10.00 p.m.

- B 10.20 p.m.
- C 9.20 p.m.
- D 9.40 p.m.

Answer: C

Explanation:

Let the total work be 120 units.

(Because LCM of 30, 40 and 60 be 120.)

Efficiency of pipe A = $120/30 = 4$ units/hr

Efficiency of pipe B = $120/40 = 3$ units/hr

Efficiency of pipe C = $120/60 = 2$ units/hr

Work done by pipe A in 3 hr (7 am to 10 am) = $4 \times 3 = 12$

Work done by pipe B in 2 hr (8 am to 10 am) = $3 \times 2 = 6$

remaining work = $120 - 12 - 6 = 102$ units

At 10 am, all pipes are opened.

So, time taken by all pipes to complete the remaining work = $\frac{102}{4 + 3 + 2} = \frac{102}{9} = 11 \frac{3}{9} = 11 \text{ hr } 20 \text{ min}$

Time when tank will be filled = 10 am + 11 hr 20 min = 9.20 p.m.

Therefore The correct answer is option C.

Question 27

If the radius of a right circular cylinder is decreased by 20% while its height is increased by 40%, then the percentage change in its volume will be:

- A 1.04% increase
- B 10.4% decrease
- C No increase or decrease
- D 10.4% increase

Answer: B

Explanation:

Volume of right circular cylinder = $\pi r^2 h$

Now,

$r_1 = 0.8r$

$h_1 = 1.4h$

Volume of right circular cylinder = $\pi (0.8r)^2 \times 1.4h = 0.896\pi r^2 h$

Decrement in volume = $\pi r^2 h - 0.896\pi r^2 h = 0.104\pi r^2 h$

Percentage decrement in volume = $\frac{0.104\pi r^2 h}{\pi r^2 h} \times 100 = 10.4\%$

Therefore The correct answer is option B.

Question 28

The number of students in a class is 75, out of which $\frac{1}{3}$ are boys and the rest are girls. The average score in mathematics of the boys is $\frac{2}{3}$ more than that of the girls. If the average score of all the students is 66, then the average score of the girls is:

- A 52
- B 55
- C 54
- D 58

Answer: C

Explanation:

The number of students in a class = 75

Number of boys = $\frac{1}{3}$ of the total boys = $75/3 = 25$

Number of girls = $75 - 25 = 50$

Let the average score of girls be x .

Total score of girls = $50x$

Average score of boys = $x + 2x/3 = 5x/3$

Total score of boys = $25 \times \frac{5x}{3}$

Average score of all the students = 66

$\frac{50x + 125x/3}{75} = 66$

$\frac{150x + 125x}{75 \times 3} = 66$

$x = 14850/275 = 54$

So, the average score of the girls is 54.

General Science Notes for SSC CGL

Question 29

A shopkeeper allows 28% discount on the marked price of an article and still makes a profit of 20%. If he gains ₹30.80 on the sale of one article, then what will be the cost price of the article?

A ₹164

B ₹145

C ₹160

D ₹154

Answer: D

Explanation:

Let the cost price be 100%.

Profit = 20%

20% = 30.8

Cost price(100%) = $\frac{30.8}{20} \times 100 = \text{Rs. } 154$

∴ The correct answer is option D.

Question 30

In $\triangle ABC$, $\angle A = 52^\circ$ and O is the orthocenter of the triangle (BO and CO meet AC and AB at E and F respectively when produced). If the bisectors of $\angle OBC$ and $\angle OCB$ meet at P, then the measure of $\angle BPC$ is:

A 124°

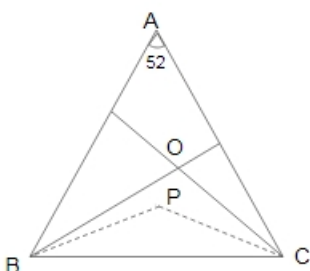
B 132°

C 138°

D 154°

Answer: D

Explanation:



By the orthogonal property,
 $\angle BOC = 180 - \angle A$
 $\angle OBC + \angle OCB = \angle A$
 $\angle BPC = 180 - \angle A/2$
 $\angle BPC = 180 - \angle 52/2 = 180 - 26 = 154^\circ$

Question 31

Let a, b and c be the fractions such that $a < b < c$. If c is divided by a , the result is $\frac{5}{2}$, which exceeds b by $\frac{7}{4}$. If $a + b + c = \frac{11}{12}$, then $(c - a)$ will be equal to:

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

Answer: D

Explanation:

ATQ,
 $\frac{c}{a} = \frac{5}{2}$
 $c = \frac{5a}{2}$
 $b = \frac{5}{2} - \frac{7}{4} = \frac{3}{4}$
 $a + b + c = \frac{11}{12} = \frac{23}{12}$
 $a + \frac{3}{4} + \frac{5a}{2} = \frac{23}{12}$
 $\frac{7a}{2} = \frac{23}{12} - \frac{3}{4}$
 $7a = \frac{23}{6} - \frac{3}{2}$
 $7a = \frac{7}{3}$
 $a = \frac{1}{3}$
 $c = \frac{5}{2} \times \frac{1}{3} = \frac{5}{6}$
 $c - a = \frac{5}{6} - \frac{1}{3} = \frac{1}{2}$

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Question 32

The value of $\frac{(253)^3 + (247)^3}{25.3 \times 25.3 - 624.91 + 24.7 \times 24.7}$ is 50×10^k , where the value of k is:

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

Answer: A

Explanation:

$\frac{(253)^3 + (247)^3}{25.3 \times 25.3 - 624.91 + 24.7 \times 24.7} = 50 \times 10^k$
 $\frac{(253 + 247)(253)^2 + (247)^2 - 253 \times 247}{\frac{1}{100}[(253)^2 - 253 \times 247 + (247)^2]} = 50 \times 10^k$
 $50000 = 50 \times 10^k$
 $50 \times 10^3 = 50 \times 10^k$
 $k = 3$

Question 33

Travelling at 60 km/h, a person reaches his destination in a certain time. He covers 60% of his journey in $\frac{2}{5}$ th of the time. At what speed (in km/h) should he travel to cover the remaining journey so that he reaches the destination right on time?

- A 40
- B 48
- C 42
- D 36

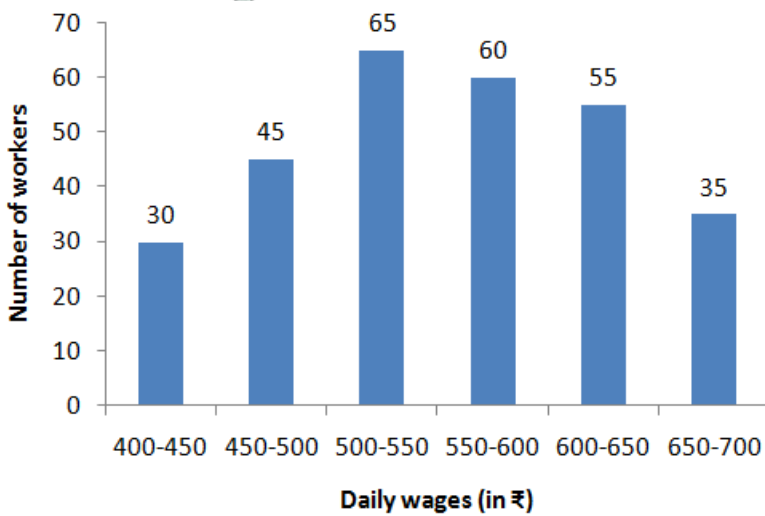
Answer: A

Explanation:

Let the distance be 60 km and time taken to cover the distance be 1 hr.
 Remaining distance = 40% of the total distance = $60 \times \frac{40}{100} = 24$ km
 Remaining time = $1 - \frac{2}{5} = \frac{3}{5}$ hr
 Speed = distance/time = $\frac{24}{3/5} = 40$ km/hr

Question 34

Study the graph and answer the question that follows.



What is the ratio of the total number of workers whose daily wages are less than ₹500 to the total number of workers whose daily wages are ₹600 and above?

- A 5 : 6
- B 6 : 7
- C 3 : 4
- D 15 : 11

Answer: A

Explanation:

Total number of workers whose daily wages are less than ₹500 = 30 + 45 = 75
 Total number of workers whose daily wages are ₹600 and above = 55 + 35 = 90
 ratio of the total number of workers whose daily wages are less than ₹500 to the total number of workers whose daily wages are ₹600 and above = 75 : 90 = 5 : 6
 \therefore The correct answer is option A.

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Question 35

The value of $\frac{(\cos 9^\circ + \sin 81^\circ)(\sec 9^\circ + \csc 81^\circ)}{(\sin 56^\circ \sec 34^\circ + \cos 25^\circ \operatorname{cosec} 65^\circ)}$ is:

- A 4
 B $\frac{1}{2}$
 C 2
 D $\frac{1}{4}$

Answer: C

Explanation:

$$\begin{aligned} & \frac{(\cos 9^\circ + \sin 81^\circ)(\sec 9^\circ + \operatorname{cosec} 81^\circ)}{\sin 56^\circ \sec 34^\circ + \cos 25^\circ \operatorname{cosec} 65^\circ} \\ &= \frac{(\cos 9^\circ + \sin(90 - 9^\circ))(\sec 9^\circ + \operatorname{cosec}(90 - 9^\circ))}{\sin 56^\circ \sec(90 - 56^\circ) + \cos 25^\circ \operatorname{cosec}(90 - 25^\circ)} \\ &= \frac{(\cos 9^\circ + \cos 9^\circ)(\sec 9^\circ + \sec 9^\circ)}{\sin 56^\circ \operatorname{cosec} 56^\circ + \cos 25^\circ \sec 25^\circ} \\ &= \frac{(2\cos 9^\circ)(2\sec 9^\circ)}{1 + 1} \\ &= \frac{4}{2} = 2 \end{aligned}$$

Question 36

If $(\sqrt{2} + \sqrt{5} - \sqrt{3}) \times k = -12$ then what will be the value of k ?

- A $(\sqrt{2} + \sqrt{5} + \sqrt{3})$
 B $(\sqrt{2} + \sqrt{5} + \sqrt{3})(2 - \sqrt{10})$
 C $(\sqrt{2} + \sqrt{5} - \sqrt{3})(2 + \sqrt{5})$
 D $(\sqrt{2} + \sqrt{5} + \sqrt{3})(2 - \sqrt{5})$

Answer: B

Explanation:

$$\begin{aligned} & (\sqrt{2} + \sqrt{5} - \sqrt{3}) \times k = -12 \\ & (1.414 + 2.236 - 1.732) \times k = -12 \end{aligned}$$

By the option B,

$$(1.414 + 2.236 - 1.732) \times (\sqrt{2} + \sqrt{5} + \sqrt{3})(2 - \sqrt{10}) = -12$$

$$(1.414 + 2.236 - 1.732) \times (1.414 + 2.236 + 1.732)(2 - 3.16) = -12$$

$$1.9 \times 5.3 \times (-1.16) = -12$$

$$-12 = -12$$

∴ The correct answer is option B.

Question 37

If θ lies in the first quadrant and $\cos^2 \theta - \sin^2 \theta = \frac{1}{2}$, then the value of $\tan^2 2\theta + \sin^2 3\theta$ is:

- A $\frac{7}{2}$
 B 3
 C 4
 D $\frac{4}{3}$

Answer: C

Explanation:

$$\cos^2 \theta - \sin^2 \theta = \frac{1}{2}$$

$$\cos^2 \theta - (1 - \cos^2 \theta) = \frac{1}{2}$$

$$2\cos^2 \theta - 1 = \frac{1}{2}$$

$$2\cos^2 \theta = \frac{3}{2}$$

$$\cos^2 \theta = \frac{3}{4}$$

$$\cos \theta = \frac{\sqrt{3}}{2}$$

$$\theta = 30^\circ$$

Now,

$$\tan^2 \theta + \sin^2 \theta$$

$$= \tan^2 30^\circ + \sin^2 30^\circ$$

$$= \tan^2 60^\circ + \sin^2 90^\circ$$

$$= 3 + 1 = 4$$

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Question 38

A sum of ₹18,000 is lent at 10% p.a. compound interest. compounded annually. What is the difference between the compound interest for 3rd year and 4th year?

A ₹220.60

B ₹217.80

C ₹221.80

D ₹215.40

Answer: B

Explanation:

$$\text{Compound interest} = P \left(1 + \frac{r}{100}\right)^t - P$$

$$\text{Amount at the end of 2 years} = 18000 \left(1 + \frac{10}{100}\right)^2$$

$$= 18000 (1.1)^2 = \text{Rs } 21780$$

$$\text{Amount at the end of 3 years} = 18000 \left(1 + \frac{10}{100}\right)^3 = \text{Rs } 23958$$

$$\text{Interest for 3rd year} = \text{Amount at end of 3rd year} - \text{Amount at end of 2nd year} = 23958 - 21780 = \text{Rs } 2178$$

$$\text{Amount at the end of 4 years} = 18000 \left(1 + \frac{10}{100}\right)^4 = \text{Rs } 26353.8$$

$$\text{Interest for 4th year} = \text{Amount at end of 4th year} - \text{Amount at end of 3rd year} = 26353.8 - 23958 = \text{Rs } 2395.8$$

$$\text{Difference between interest of 3rd year and of 4th year} = 2395.8 - 2178 = \text{Rs } 217.8$$

Question 39

What is the value of $\operatorname{cosec}(65^\circ + \theta) - \sec(25^\circ - \theta) + \tan^2 20^\circ - \operatorname{cosec}^2 70^\circ$?

A 0

B 1

C 2

D -1

Answer: D

Explanation:

$$\operatorname{cosec}(65^\circ + \theta) - \sec(25^\circ - \theta) + \tan^2 20^\circ - \operatorname{cosec}^2 70^\circ$$

$$= \operatorname{cosec}(65^\circ + \theta) - \sec(90^\circ - (65^\circ + \theta)) + \tan^2 20^\circ - \operatorname{cosec}^2 (90^\circ - 20^\circ)$$

$$= \operatorname{cosec}(65^\circ + \theta) - \operatorname{cosec}(65^\circ + \theta) + \tan^2 20^\circ - \sec^2 20^\circ$$

$$= \tan^2 20^\circ - \sec^2 20^\circ$$

$$= -(\sec^2 20^\circ - \tan^2 20^\circ) = -1$$

Question 40

The ratio of the income of A to that of B is 5 : 7. A and B save ₹4,000 and ₹5,000 respectively. If the expenditure of A is equal to $\frac{2}{3}$ of the expenditure of B, then the total income of A and B is:

- A ₹25,200
- B ₹24,000
- C ₹26,400
- D ₹28,800

Answer: B

Explanation:

The ratio of the income of A to that of B = 5 : 7

Let the income of A and B be $5x$ and $7x$.

Expenditure of A = $5x - 4000$

Expenditure of B = $7x - 5000$

The expenditure of A = $\frac{2}{3}$ of the expenditure of B,

$$5x - 4000 = (7x - 5000) \times \frac{2}{3}$$

$$15x - 12000 = 14x - 10000$$

$$x = 2000$$

$$\text{Total income of A and B} = 5x + 7x = 12x = 12 \times 2000 = 24000$$

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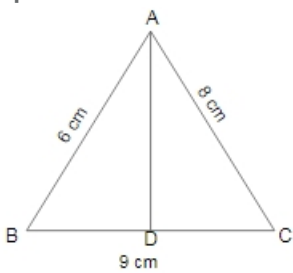
Question 41

In $\triangle ABC$, $AB = 6$ cm, $AC = 8$ cm, and $BC = 9$ cm. The length of median AD is:

- A $\frac{\sqrt{317}}{2}$ cm
- B $\frac{\sqrt{119}}{2}$ cm
- C $\frac{\sqrt{313}}{2}$ cm
- D $\frac{\sqrt{115}}{2}$ cm

Answer: B

Explanation:



In $\triangle ABC$, AD is median. D will be the mid point of BC .

$$BD = CD = BC/2 = 9/2 = 4.5 \text{ cm}$$

$$AB^2 + AC^2 = 2(AD^2 + BD^2)$$

$$6^2 + 8^2 = 2(AD^2 + (4.5)^2)$$

$$100/2 = AD^2 + 20.25$$

$$AD^2 = 29.75 = 119/4$$

$$AD = \frac{\sqrt{119}}{2}$$

Question 42

If a nine-digit number $389x6378y$ is divisible by 72, then the value of $\sqrt{6x + 7y}$ will be:

- A 6
- B $\sqrt{13}$
- C $\sqrt{46}$
- D 8

Answer: D

Explanation:

389x6378y is divisible by 72,

Factor of 72 = 8×9

So, number is divisible by 8 and 9 both.

Divisibility rule for 8,

78y (last three digits should be divisible by 8)

784 is divisible by 8 so,

Value of $y = 4$

Divisibility rule of 9,

$$3 + 8 + 9 + x + 6 + 3 + 7 + 8 + 4$$

$$= 48 + x$$

54 is divisible by 9

$$\text{So, } x = 54 - 48 = 6$$

Value of $\sqrt{6x + 7y}$

$$= \sqrt{6 \times 6 + 7 \times 4}$$

$$= \sqrt{36 + 28} = \sqrt{64}$$

$$= 8$$

Question 43

$$\frac{(1 + \cos \theta)^2 + \sin^2 \theta}{(\sec^2 \theta - 1) \sin^2 \theta} =$$

- A $\cos \theta (1 + \sin \theta)$
- B $2 \cos \theta (1 + \sec \theta)$
- C $\sec \theta (1 + \sin \theta)$
- D $2 \sec \theta (1 + \sec \theta)$

Answer: D

Explanation:

$$\frac{(1 + \cos \theta)^2 + \sin^2 \theta}{(\sec^2 \theta - 1) \sin^2 \theta}$$

$$= \frac{1 + \cos^2 \theta + 2 \cos \theta + \sin^2 \theta}{(1 - \sin^2 \theta)}$$

$$= \frac{2 + 2 \cos \theta}{\cos^2 \theta}$$

$$= 2(\sec^2 \theta + \sec \theta)$$

$$= 2 \sec \theta (1 + \sec \theta)$$

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Question 44

When 12, 16, 18, 20 and 25 divide the least number x , the remainder in each case is 4 but x is divisible by 7. What is the digit at the thousands' place in x ?

- A 5

B 8

C 4

D 3

Answer: B

Explanation:

$$\begin{aligned}\text{Number} &= (\text{LCM of } 12, 16, 18, 20 \text{ and } 25)k + 4 \\ &= 3600k + 4\end{aligned}$$

The number should be divisible by the 7 so,

$$\text{Value of } k = 5$$

$$\text{Number} = 3600 \times 5 + 4 = 18000 + 4 = 18004$$

The digit at the thousands' place = 8

Question 45

If $(a + b) : (b + c) : (c + a) = 7 : 6 : 5$ and $a + b + c = 27$, then what will be the value of $\frac{1}{a} : \frac{1}{b} : \frac{1}{c}$?

A $3 : 6 : 4$

B $3 : 2 : 4$

C $4 : 3 : 6$

D $3 : 4 : 2$

Answer: C

Explanation:

Let the $(a + b)$, $(b + c)$ and $(c + a)$ be $7x$, $6x$ and $5x$ respectively.

Now,

$$(a + b) + (b + c) + (c + a) = 7x + 6x + 5x$$

$$2(a + b + c) = 18x$$

Put the value of $(a + b + c)$,

$$2 \times 27 = 18x$$

$$x = 3$$

$$a + b = 7x = 3 \times 7 = 21$$

$$c = (a + b + c) - a - b = 27 - 21 = 6$$

$$b + c = 6x = 3 \times 6 = 18$$

$$b = 18 - 6 = 12$$

$$a + b + c = 27$$

$$a = 27 - 18 = 9$$

Now,

$$\frac{1}{a} : \frac{1}{b} : \frac{1}{c} = \frac{1}{9} : \frac{1}{12} : \frac{1}{6}$$

$$= 4 : 3 : 6$$

Question 46

PQRS is a cyclic quadrilateral in which $PQ = 14.4$ cm, $QR = 12.8$ cm and $SR = 9.6$ cm. If PR bisects QS, what is the length of PS?

A 15.8 cm

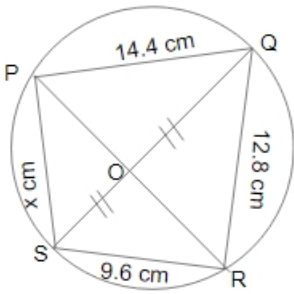
B 16.4 cm

C 13.6 cm

D 19.2 cm

Answer: D

Explanation:



By the property,

$$PQ \times QR = RS \times PS$$

$$14.4 \times 12.8 = 9.6 \times x$$

$$9.6x = 184.32$$

$$x = 19.2 \text{ cm}$$

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Question 47

In what ratio, sugar costing ₹60 per kg be mixed with sugar costing ₹42 per kg such that byselling the mixture at ₹56 per kg there is a gain of 12%?

A 5 : 6

B 8 : 9

C 4 : 5

D 5 : 7

Answer: C

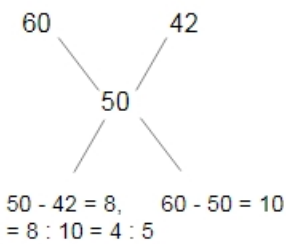
Explanation:

Selling price of mixture = 56

profit = 12%

Cost price of the mixture = $56 \times \frac{100}{112} = \text{Rs. } 50$

By allegation method,



∴ The correct answer is option C.

Question 48

When an article is sold for ₹355, there is a loss of 29%. To gain 21%, it should be sold for ₹:

A 629.20

B 580.80

C 605

D 635

Answer: C

Explanation:

Selling price = 355

Loss = 29%

Cost price = $\frac{355}{100 - 29} \times 100 = \frac{355}{71} \times 100 = \text{Rs. } 500$

For 21% gain,

Selling price = $500 \times \frac{121}{100} = \text{Rs. } 605$

∴ The correct answer is option Rs.605.

Question 49

$\left(\frac{1 - \tan \theta}{1 - \cot \theta}\right)^2 + 1 =$

A $\operatorname{cosec}^2 \theta$

B $\sec^2 \theta$

C $\sin^2 \theta$

D $\cos^2 \theta$

Answer: B

Explanation:

$\left(\frac{1 - \tan \theta}{1 - \cot \theta}\right)^2 + 1$

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

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

$= (-\tan \theta)^2 + 1$

$= \tan^2 \theta + 1 = \sec^2 \theta$

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Question 50

$\sqrt{\frac{\cot \theta + \cos \theta}{\cot \theta - \cos \theta}}$ is equal to:

A $\sec \theta + \tan \theta$

B $1 + \sec \theta \tan \theta$

C $1 - \sec \theta \tan \theta$

D $\sec \theta - \tan \theta$

Answer: A

Explanation:

$\sqrt{\frac{\cot \theta + \cos \theta}{\cot \theta - \cos \theta}}$

$= \sqrt{\frac{\cos \theta (\frac{1}{\sin \theta} + 1)}{\cos \theta (\frac{1}{\sin \theta} - 1)}}$

$= \sqrt{\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \sin \theta)(1 - \sin \theta)}}$

$= \sqrt{\frac{(1 + \sin \theta)^2}{1 - \sin^2 \theta}}$

$= \frac{1 + \sin \theta}{\cos \theta}$

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

Question 51

If $5 \sin \theta - 4 \cos \theta = 0$, $0^\circ < \theta < 90^\circ$, then the value of $\frac{5 \sin \theta - 2 \cos \theta}{5 \sin \theta + 3 \cos \theta}$ is:

A $\frac{3}{8}$

B $\frac{3}{7}$

C $\frac{2}{7}$

D $\frac{5}{8}$

Answer: C

Explanation:

$$5 \sin \theta - 4 \cos \theta = 0, 0^\circ < \theta < 90^\circ$$

$$5 \sin \theta = 4 \cos \theta$$

$$\tan \theta = \frac{4}{5}$$

Now,

$$\frac{5 \sin \theta - 2 \cos \theta}{5 \sin \theta + 3 \cos \theta}$$

$$= \frac{\cos \theta (5 \tan \theta - 2)}{\cos \theta (5 \tan \theta + 3)}$$

$$= \frac{5 \tan \theta - 2}{5 \tan \theta + 3}$$

$$= \frac{5 \times \frac{4}{5} - 2}{5 \times \frac{4}{5} + 3}$$

$$= \frac{4 - 2}{4 + 3}$$

$$= \frac{2}{7}$$

Question 52

If the radius of the base of a cone is doubled, and the volume of the new cone is three times the volume of the original cone, then what will be the ratio of the height of the original cone to that of the new cone?

A 1 : 3

B 4 : 3

C 2 : 9

D 9 : 4

Answer: B

Explanation:

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

$$\frac{v_1}{v_2} = \frac{(r_1)^2 (h_1)}{(r_2)^2 (h_2)}$$

$$\frac{h_1}{h_2} = \frac{(r_1)^2 (v_2)}{(r_2)^2 (v_1)}$$

$$\frac{h_1}{h_2} = \frac{(2r_1)^2 (v_2)}{(r_2)^2 (3v_2)}$$

$$h_1 : h_2 = 4 : 3$$

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Question 53

Abhi rows upstream a distance of 28 km in 4 h and rows downstream a distance of 50 km in 2 h. To row a distance of 44.8 km in still water, he will take:

A 2.8 h

B 3.2 h

C 2.4 h

D 2.2 h

Answer: A

Explanation:

Let the speed of boat be x and speed of stream be y .

Abhi rows upstream a distance of 28 km in 4 h.

So, speed in upstream = $28/4 = 7$ km/hr

$$x - y = 7 \text{ ---(1)}$$

Abhi rows downstream a distance of 50 km in 2 h.

$$\text{So, speed in downstream} = 50/2 = 25 \text{ km/hr}$$

$$x + y = 25 \text{ ---(2)}$$

On eq (1) + (2),

$$2x = 32$$

$$x = 16$$

$$\text{Time taken to row a distance of 44.8 km in still water} = 44.8/16 = 2.8 \text{ hr}$$

∴ The correct answer is option A.

Question 54

A sum of ₹8,400 amounts to ₹11,046 at 8.75% p.a. simple interest in certain time. What is the simple interest on the sum of ₹9,600 at the same rate for the same time?

A ₹2,990

B ₹3,012

C ₹2,686

D ₹3,024

Answer: D

Explanation:

$$\text{Simple interest} = \frac{\text{prt}}{100}$$

A sum of ₹8,400 amounts to ₹11,046 at 8.75% p.a.

$$\text{So, interest} = 11046 - 8400 = 2646$$

$$2646 = \frac{8400 \times 8.75 \times t}{100}$$

$$t = 2646/735 = 3.6 \text{ years}$$

$$\text{Interest when principle Rs. 9600} = \frac{9600 \times 8.75 \times 3.6}{100} = \text{Rs. } 3024$$

Question 55

If the diameter of the base of a cone is 42 cm and its curved surface area is 2310 cm^2 , then what will be its volume (in cm^3) ?

A 25872

B 19404

C 12936

D 38808

Answer: C

Explanation:

Diameter of the base of a cone = 42 cm

$$\text{radius}(r) = 42/2 = 21 \text{ cm}$$

Curved surface area = 2310 cm^2

$$\pi r l = 2310$$

$$\frac{22}{7} \times 21 \times l = 2310$$

$$l = 35$$

$$l^2 = r^2 + h^2$$

$$35^2 = 21^2 + h^2$$

$$h^2 = 1225 - 441 = 784$$

$$h = 28 \text{ cm}$$

$$\text{Volume} = \frac{1}{3} \pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times 21^2 \times 28$$

$$= 12936 \text{ cm}^3$$

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Question 56

If a cuboid of dimensions 32 cm \times 12 cm \times 9 cm is cut into two cubes of same size, what will be the ratio of the surface area of the cuboid to the total surface area of the two cubes?

- A 65 : 72
- B 37 : 48
- C 24 : 35
- D 32 : 39

Answer: A

Explanation:

For big cuboid,

$l = 32$ cm, $b = 12$ cm, $h = 9$ cm

$$\begin{aligned} \text{Surface area} &= 2(lb + bh + hl) \\ &= 2(32 \times 12 + 12 \times 9 + 9 \times 32) = 2(384 + 108 + 288) = 1560 \end{aligned}$$

Assume that cuboid is melted to same size of cube so,

$$l \times b \times h = 2 \times a^3$$

$$32 \times 12 \times 9 = 2 \times a^3$$

$$1728 = a^3$$

$$a = 12 \text{ cm}$$

$$\text{Surface area of cube} = 6 \times 12^2 = 864$$

$$\text{Ratio of the surface area of the cuboid to the total surface area of the two cubes} = 1560 : 2 \times 864 = 65 : 72$$

Question 57

When x is added to each of 2, 3, 30 and 35, then the numbers obtained in this order, are in proportion. What is the mean proportional between $(x + 7)$ and $(x - 2)$?

- A 7
- B 4
- C 6
- D 5

Answer: C

Explanation:

Order after adding x ,

$2 + x$, $3 + x$, $30 + x$, $35 + x$

Condition of proportion,

$$\frac{2 + x}{3 + x} = \frac{30 + x}{35 + x}$$

$$(2 + x)(35 + x) = (3 + x)(30 + x)$$

$$70 + 2x + 35x + x^2 = 90 + 3x + 30x + x^2$$

$$37x = 20 + 33x$$

$$x = 5$$

$$\text{Mean proportional between } (x + 7) \text{ and } (x - 2) = \sqrt{(x + 7)(x - 2)}$$

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

$$= \sqrt{36}$$

$$= 6$$

Question 58

The ratio of investment by A to that by B in a business is 14 : 15 and the ratio of their respective profits at the end of a year is 2 : 5. If A invested the money for 3 months, then for how much time (in months) B invested his money?

- A 7
- B 6
- C 5
- D 9

Answer: A

Explanation:

The ratio of investment by A to that by B in a business = 14 : 15

Let the B invest his money for x months.

Ratio of the profit of A to B = 2 : 5

$$14 \times 3 : 15 \times x = 2 : 5$$

$$42 : 15 \times x = 2 : 5$$

$$42 \times 5 = 30x$$

$$x = 7$$

So, B invest his money for 7 months.

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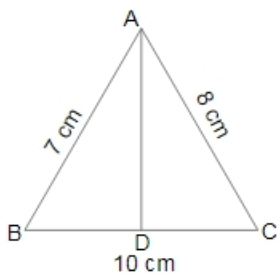
Question 59

In $\triangle ABC$, $AB=7\text{cm}$, $BC=10\text{cm}$, and $AC = 8\text{ cm}$. If AD is the angle bisector of $\angle BAC$, where D is a point on BC , then BD is equal to:

- A $\frac{16}{3}\text{cm}$
- B $\frac{15}{4}\text{cm}$
- C $\frac{14}{3}\text{cm}$
- D $\frac{17}{4}\text{cm}$

Answer: C

Explanation:



Let the $BD = x$,

$$DC = 10 - x$$

By angle bisector theorem,

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

$$\frac{x}{10 - x} = \frac{7}{8}$$

$$8x = 70 - 7x$$

$$15x = 70$$

$$x = 14/3\text{ cm}$$

$$BD = \frac{14}{3}$$

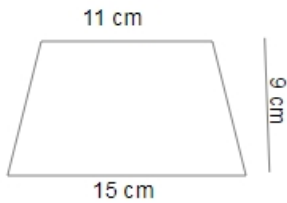
Question 60

The base of right prism is a trapezium whose parallel sides are 11 cm and 15 cm and the distance between them is 9 cm. If the volume of the prism is 1731.6 cm^3 , then the height(in cm) of the prism will be:

- A 15.6
- B 15.2
- C 14.8
- D 14.2

Answer: C

Explanation:



Volume = area of base \times height

Base area = $\frac{1}{2} \times (L_1 + L_2) \times h = \frac{1}{2} \times (11 + 15) \times 9 = 117 \text{ cm}^2$

Height = $\frac{\text{volume}}{\text{base area}} = \frac{1731.6}{117} = 14.8 \text{ cm}$

Question 61

Raghav spends 80% of his income. If his income increases by 12% and the savings decrease by 10%, then what will be the percentage increase in his expenditure?

- A 20.5
- B 16
- C 17.5
- D 22

Answer: C

Explanation:

Let the income of Raghav be Rs.100.

Expenditure = 80

Saving = Rs.20

Income increases by 12% and the savings decrease by 10%,

So, income = 112,

Saving = $20 \times \frac{90}{100} = 18$

Expenditure = $112 - 18 = 94$

Increment in his expenditure = $94 - 80 = 14$

Percentage increment in expenditure = $\frac{14}{80} \times 100 = 20\%$

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Question 62

The lateral surface area of a cylinder is 352 cm^2 . If its height is 7 cm, then its volume(in cm^3) is: (Take $\pi = \frac{22}{7}$)

- A 1408
- B 1078
- C 1243
- D 891

Answer: A

Explanation:

The lateral surface area of a cylinder = 352 cm^2 .

$$2\pi r h = 352$$

$$2\pi r \times 7 = 352$$

$$r = \frac{176}{7 \times 22/7} = 8$$

$$\text{Volume} = \pi r^2 \times h = \frac{22}{7} \times (8)^2 \times 7 = 1408 \text{ cm}^3$$

Question 63

What will be the compound interest on a sum of ₹31,250 for 2 years at 12% p.a., if the interest is compounded 8-monthly?

A ₹8,106

B ₹8,116

C ₹8,016

D ₹8,156

Answer: B

Explanation:

Interest is compounded 8-monthly so,

Time = $2 \times \frac{3}{2} = 3$ years

Rate = $\frac{12}{3/2} = 8\%$

P = 31250

Compound interest = $p \left(1 + \frac{r}{100} \right)^t - p$

$$= 31250 \left(1 + \frac{8}{100} \right)^3 - 31250$$

$$= 31250 \times \frac{108}{100} \times \frac{108}{100} \times \frac{108}{100} - 31250 = 39366 - 31250 = \text{Rs.}8116$$

Question 64

When 7897, 8110 and 8536 are divided by the greatest number x, then the remainder in each case is the same. The sum of the digits of x is:

A 14

B 5

C 9

D 6

Answer: D

Explanation:

Let the remainder be k.

$$7897 - k = ax$$

$$8110 - k = bx$$

$$8536 - k = cx$$

Common factor is x.

So difference between the numbers,

$$8110 - 7897 = 213$$

$$8536 - 8110 = 426$$

$$8536 - 7897 = 639$$

HCF of 213, 426 and 639 is 213.

$$x = 213$$

Sum of the digits of x = $2 + 1 + 3 = 6$

SSC CGL Important Questions PDF

Question 65

The ratios of copper to zinc in alloys A and B are 3 : 4 and 5 : 9, respectively. A and B are taken in the ratio 2 : 3 and melted to form a new alloy C. What is the ratio of copper to zinc in C?

- A 8 : 13
- B 3 : 5
- C 9 : 11
- D 27 : 43

Answer: D

Explanation:

Quantity of copper in alloy A = $\frac{3}{3+4} = \frac{3}{7}$

Quantity of zinc in alloy A = $\frac{4}{3+4} = \frac{4}{7}$

Quantity of copper in alloy B = $\frac{5}{5+9} = \frac{5}{14}$

Quantity of zinc in alloy B = $\frac{9}{5+9} = \frac{9}{14}$

A and B are taken in the ratio 2 : 3 and melted to form a new alloy C.

So,

Quantity of copper in alloy C = 2(quantity of copper in alloy A) + 3(quantity of copper in alloy B)
= $\frac{2 \times 3}{7} + \frac{3 \times 5}{14} = \frac{6}{7} + \frac{15}{14} = \frac{27}{14}$

Quantity of zinc in alloy C = 2(quantity of zinc in alloy A) + 3(quantity of zinc in alloy B)

= $\frac{2 \times 4}{7} + \frac{3 \times 9}{14} = \frac{8}{7} + \frac{28}{14} = \frac{43}{14}$

Ratio of copper to zinc in C = $\frac{27}{14} : \frac{43}{14} = 27 : 43$

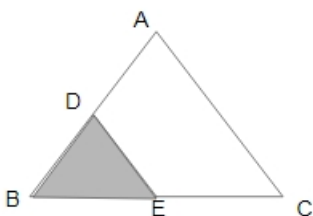
Question 66

In $\triangle ABC$, D and E are the points on sides AB and BC respectively such that $DE \parallel AC$. If $AD : DB = 5 : 3$, then what is the ratio of the area of $\triangle BDE$ to that of the trapezium ACED?

- A 4 : 25
- B 9 : 55
- C 9 : 64
- D 1 : 6

Answer: B

Explanation:



$\triangle ABC \sim \triangle DEB$

(because $DE \parallel AC$)

$\angle B$ is a common angle.

So, ratio area of the $\triangle BDE : \triangle ABC$

$(3)^2 : (3+5)^2 = 9 : 64$

Area of trapezium ACED = area of the $\triangle ABC - \triangle BDE = 64 - 9 = 55$

Ratio of the area of $\triangle BDE$ to that of the trapezium ACED = 9 : 55

Question 67

One year ago, the ratio of the age (in years) of A to that of B was 4 : 3. The ratio of their respective ages, 3 years from now, will be 6 : 5. What will be the ratio of respective ages of A and B, 9 years from now?

- A 7 : 6
- B 10 : 9
- C 9 : 8
- D 8 : 7

Answer: C

Explanation:

One year ago, the ratio of the age (in years) of A to that of B = 4 : 3

After 3 year, the ratio of the age (in years) of A to that of B = 6 : 5

After 3 year, let the age of A and B are 6x and 5x.

ATQ,

$$\frac{4x + 4}{3x + 4} = \frac{6}{5}$$

$$20x + 20 = 18x + 24$$

$$2x = 4$$

$$x = 2$$

After 9 year, the ratio of the age (in years) of A to that of B = 6x + 6 : 5x + 6

$$6 \times 2 + 6 : 5 \times 2 + 6 = 18 : 16 = 9 : 8$$

SSC CHSL Previous Papers (DOWNLOAD PDF)

Question 68

The sides of a triangle are 11 cm, 60 cm and 61 cm. What is the radius of the circle circumscribing the triangle?

- A 31.5 cm
- B 31 cm
- C 30 cm
- D 30.5 cm

Answer: D

Explanation:

Radius of the circle circumference = hypotenuse/2 = 61/2 = 30.5 cm

Question 69

A sum of ₹5,000 is divided into two parts such that the simple interest on the first part for $\frac{1}{5}$ years at $6\frac{2}{3}\%$ p.a. is double the simple interest on the second part for $\frac{3}{4}$ years at 4% p.a. What is the difference between the two parts?

- A ₹680
- B ₹600
- C ₹560
- D ₹620

Answer: B

Explanation:

Interest on 1st part = $\frac{1}{5} \times 6 \times \frac{20}{3} = 28\%$

Interest on 2nd part,

$\frac{3}{4} \times 4 = 11\%$

Let the principle of 1st and 2nd part be p and q respectively.

ATQ,

$28\%p = 11\%q$

$14p = 11q$

$p : q = 11 : 14$

$(11 + 14 = 25)$ units = 5000

Difference between the two parts = $14 - 11 = 3$ units

3 units = $\frac{5000}{25} \times 3 = \text{Rs. } 600$

So, difference between the two parts is Rs.600.

Question 70

If $x = \sqrt{1 + \frac{\sqrt{3}}{2}} - \sqrt{1 - \frac{\sqrt{3}}{2}}$, then the value of $\frac{\sqrt{2}-x}{\sqrt{2}+x}$ will be closest to:

- A 0.17
- B 0.12
- C 1.4
- D 1.2

Answer: A

Explanation:

$x = \sqrt{1 + \frac{\sqrt{3}}{2}} - \sqrt{1 - \frac{\sqrt{3}}{2}}$

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

$x^2 = 1 + \frac{\sqrt{3}}{2} + 1 - \frac{\sqrt{3}}{2} - 2\sqrt{1 + \frac{\sqrt{3}}{2}} \sqrt{1 - \frac{\sqrt{3}}{2}}$

$x^2 = 1 + \frac{\sqrt{3}}{2} + 1 - \frac{\sqrt{3}}{2} - 2\sqrt{1 - \frac{3}{4}}$

$x^2 = 2 - 2\sqrt{\frac{1}{4}}$

$x^2 = 2 - 2 \times \frac{1}{2} = 1$

$x = 1$ or $x = -1$

Now,

$\frac{\sqrt{2}-x}{\sqrt{2}+x}$

$= \frac{\sqrt{2}-x}{\sqrt{2}+x} \times \frac{\sqrt{2}-x}{\sqrt{2}-x}$

$= \frac{2 - 2\sqrt{2}x + x^2}{2 - x^2}$

Put the value of $x = 1$,

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

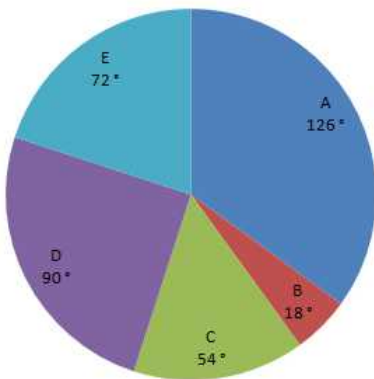
$= \frac{3 - 2\sqrt{2}}{1} = 0.17$

General Science Notes for SSC CGL

Question 71

The given pie chart shows the breakup of total number of the employees of a company working in different offices (A, B, C, D and E).

Total No. of employees = 2400



If the percentage of male employees in office C is 20% and that of female employees in E is 40%, then what is the ratio of the number of female employees in C to that of female employees in E?

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

Answer: A

Explanation:

Employees in office C = $2400 \times \frac{54}{360} = 360$

Female employees in office C = $360 - 20\% = 80\%$
 $= 360 \times \frac{80}{100} = 288$

Employees in office E = $2400 \times \frac{72}{360} = 480$

Female employees in office E = $480 \times \frac{40}{100} = 192$

Ratio of the number of female employees in C to that of female employees in E = $288 : 192 = 3 : 2$

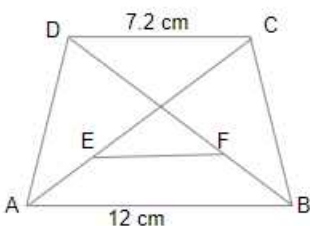
Question 72

In a trapezium ABCD, $DC \parallel AB$, $AB = 12$ cm and $DC = 7.2$ cm. What is the length of the line segment joining the midpoints of its diagonals?

- A 2.6 cm
- B 4.8 cm
- C 2.4 cm
- D 3.6 cm

Answer: C

Explanation:



By the property,

$$EF = \frac{AB - CD}{2}$$

$$= \frac{12 - 7.2}{2} = \frac{4.8}{2} = 2.4 \text{ cm}$$

Question 73

A number is first increased by 16% and then increased by 14%. The number, so obtained, is now decreased by 30%. What is the net increase or decrease percent in the original number(nearest to an integer)?

- A 6% increase
- B 7% decrease
- C No increase or decrease
- D 9% decrease

Answer: B

Explanation:

Let the number be x

ATQ,

Number is first increased by 16%,

So,

Obtained number = 1.16x

Obtained number is increase by 14%

So, obtained number = $1.16x \times \frac{114}{100} = 1.3224x$

Number is decreased by 30%

So, obtained number = $1.3224x \times \frac{70}{100} = 0.9256x$

Net decrement = $x - 0.9256x = 0.0744x$

Percentage decrement = $\frac{0.0744x}{x} \times 100 = 7.4\%$

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Question 74

Radha marks her goods 25% above the cost price. She sells 35% of goods at the marked price, 40% at 15% discount and the remaining at 20% discount. What is her overall percentage gain?

- A 11.25
- B 10
- C 11.75
- D 12.75

Answer: A

Explanation:

Let the cost price be Rs.100 and total goods be 100.

cost price of 100 goods = 10000

Radha marks her goods 25% above the cost price.

So, marked price = Rs.125

ATQ,

$\$125 \times 35 + 125 \times \{85\}{100} \times 40 + 125 \times \{80\}{100} \times 25$

$4375 + 4250 + 2500 = 11125$

Gain = $11125 - 10000 = 1125$

Percentage gain = $\frac{1125}{10000} \times 100 = 11.25\%$

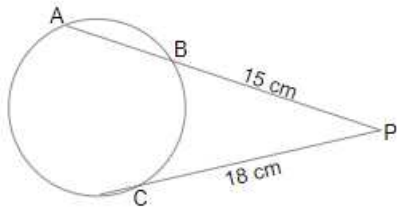
Question 75

Chord AB of a circle is produced to a point P, and is a point on the circle such that PC is a tangent to the circle. If PC = 18 cm, and BP = 15 cm, then AB is equal to:

- A 5.8 cm
- B 6.2 cm
- C 6.6 cm
- D 8.5 cm

Answer: C

Explanation:



By the property,

$$PC^2 = PA \times PB$$

$$(18)^2 = PA \times 15$$

$$PA = 324/15 = 21.6 \text{ cm}$$

$$AB = PA - PB = 21.6 - 15 = 6.6 \text{ cm}$$

Question 76

One of the factors of $(8^{2k} + 5^{2k})$, where k is an odd number, is:

- A 86
- B 88
- C 84
- D 89

Answer: D

Explanation:

$(8^{2k} + 5^{2k})$, k is odd number so,

Let the k be 1.

$$= (8^2 + 5^2)$$

$$= 64 + 25 = 89$$

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Question 77

The internal and external radii of a hollow hemispherical vessel are 6 cm and 7 cm respectively. What is the total surface area (in cm^2) of the vessel?

- A 183π
- B 189π
- C 177π
- D 174π

Answer: A

Explanation:

Total surface area of the vessel = External surface area + internal surface area + upper portion area

$$r_1 = 6 \text{ cm}$$

$$r_2 = 7 \text{ cm}$$

$$= 2\pi(r_2)^2 + 2\pi(r_1)^2 + \pi((r_2)^2 - (r_1)^2)$$

$$= \pi[2 \times 7^2 + 2 \times 6^2 + (7^2 - 6^2)]$$

$$= \pi[98 + 72 + 49 - 36] = 183\pi$$

Question 78

When the price of an item was reduced by 25%, then its sale was increased by x%. If there is an increase of 20% in the receipt of the revenue, then the value of x will be:

A 50

B 60

C 45

D 75

Answer: B**Explanation:**

Revenue = price \times sale

Let the price and sale be Rs.100 and 100 units.

$$\text{Revenue} = 100 \times 100 = \text{Rs.}10000$$

ATQ,

$$1.2 \text{ Revenue} = 100 \times \frac{75}{100} \times (100 + x)$$

$$1.2 \times 10000 = 75 \times (100 + x)$$

$$12000 = 75 \times (100 + x)$$

$$x = 160 - 100 = 60$$

Question 79

In a constituency, 55% of the total number of voters are males and the rest are females. If 40% of the males are illiterate and 40% of the females are literate, then by what percent is the number of literate males more than that of illiterate females?

A $22\frac{8}{11}\%$ B $18\frac{2}{9}\%$ C $22\frac{2}{9}\%$ D $18\frac{2}{11}\%$ **Answer: C****Explanation:**

Let the total number of voters be 100.

Number of male voters = 55

Number of female voters = 100 - 55 = 45

Literate males = 100% - 40% = 60% of the total males

$$= 55 \times \frac{60}{100} = 33$$

Illiterate females = 100% - 40% = 60% of the total females

$$= 45 \times \frac{60}{100} = 27$$

$$\text{Required percentage} = \frac{33 - 27}{27} \times 100 = \frac{6}{27} \times 100 = 22\frac{2}{9}\%$$

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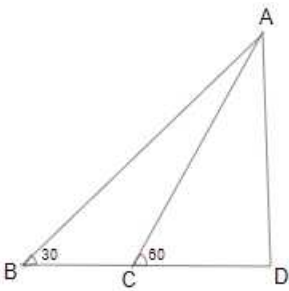
Question 80

From the top of a tower, the angles of depression of two objects on the ground on the same side of it, are observed to be 60° and 30° respectively and the distance between the objects is $400\sqrt{3}$ m. The height (in m) of the tower is:

- A 800
- B $800\sqrt{3}$
- C 600
- D $600\sqrt{3}$

Answer: C

Explanation:



$$BC = 400\sqrt{3} \text{ m}$$

In $\triangle ACD$,

$$\tan 60^\circ = \frac{\sqrt{3}}{1} = \frac{AD}{CD}$$

In $\triangle ABD$,

$$\tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3} = \frac{AD}{BD}$$

$$BC = BD - CD = 3 - 1 = 2 \text{ units}$$

$$2 \text{ units} = 400\sqrt{3}$$

$$\sqrt{3} \text{ units} = \frac{400\sqrt{3}}{2} \times \sqrt{3} = 600 \text{ m}$$

The height of the tower = 600 m.

Question 81

A train travelling at the speed of x km/h crossed a 200 m long platform in 30 seconds and overtook a man walking in the same direction at the speed of 6 km/h in 20 seconds. What is the value of x ?

- A 50
- B 54
- C 56
- D 60

Answer: D

Explanation:

Length of the train be l m.

A train travelling at the speed of x km/h crossed a 200 m long platform in 30 seconds

So, length = speed \times time

$$(l + 200) = 30x$$

$$l = 30x - 200 \text{ ---(1)}$$

$$\text{Speed of man} = 6 \text{ km/hr} = 6 \times \frac{5}{18} = \frac{5}{3} \text{ m/sec}$$

$$\text{Relative speed} = x - \frac{5}{3}$$

$$\frac{l}{20} = \frac{3x - 5}{3}$$

put the value of l ,

$$\frac{30x - 200}{20} = \frac{3x - 5}{3}$$

$$90x - 600 = 60x - 100$$

$$30x = 500$$

$$x = 50/3 \text{ m/sec} = \frac{50}{3} \times \frac{18}{5} = 60 \text{ km/hr}$$

Question 82

Let $x = (633)^{24} - (277)^{38} + (266)^{54}$. What is the units digit of x ?

A 7

B 6

C 4

D 8

Answer: D

Explanation:

$x = (633)^{24} - (277)^{38} + (266)^{54}$ For the unit digit,

$$24 = 4 \times 6 + 0(\text{remainder})$$

$$38 = 4 \times 9 + 2(\text{remainder})$$

$$54 = 4 \times 13 + 2(\text{remainder})$$

Now,

(Base number unit digit)^{remainder}

$$= (3)^0 - (7)^2 + (6)^2$$

On consider unit digit,

$$= 1 - 9 + 6 = 7 - 9$$

$$\text{or } 17 - 9 = 8$$

8 is the units digit of x .

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Question 83

Three solid metallic spheres whose radii are 1 cm, X cm and 8 cm, are melted and recast into a single solid sphere of diameter 18 cm. The surface area (in cm^2) of the sphere with radius x cm is:

A 144π

B 72π

C 64π

D 100π

Answer: A

Explanation:

$$\text{Volume of solid sphere} = \frac{4}{3} \pi r^3$$

$$\text{Radius of single solid sphere} = 18/2 = 9 \text{ cm}$$

Volume of single solid sphere = Volume of three solid metallic spheres

$$\frac{4}{3} \pi (9)^3 = \frac{4}{3} \pi [1^3 + x^3 + 8^3]$$

$$729 = 1 + x^3 + 512$$

$$x^3 = 216$$

$$x = 6 \text{ cm}$$

$$\text{Surface area} = 4\pi r^2 = 4\pi 6^2 = 144\pi$$

Question 84

The value of $\left(2\frac{6}{7}\right)^4 \div \left(\frac{1}{5}\right)^2 \times \left(\frac{2}{3}\right)^9 \div \left(\frac{3}{4}\right)^2 \times 2\frac{2}{3} \div \left(\frac{1}{2}\right)^4$ is:

- A 5
- B 8
- C $\frac{1}{8}$
- D $\frac{1}{5}$

Answer: A

Explanation:

$$\begin{aligned} & \left(2\frac{6}{7} \div 4\frac{1}{5} \div \frac{2}{3}\right) \times 1\frac{9}{10} \div \left(\frac{3}{4} \times 2\frac{2}{3} \div \frac{1}{2} \div \frac{1}{4}\right) \\ &= \left(\frac{20}{7} \div \frac{21}{5} \div \frac{2}{3}\right) \times \frac{10}{9} \div \left(\frac{3}{4} \times \frac{8}{3} \div \frac{1}{2} \div \frac{1}{4}\right) \\ &= \left(12 \div \frac{2}{3}\right) \times \frac{10}{9} \div \left(\frac{3}{4} \times \frac{4}{3} \div \frac{1}{4}\right) \\ &= 18 \times \frac{10}{9} \div \left(\frac{3}{4} \times \frac{16}{3}\right) \\ &= 18 \times \frac{10}{9} \div 4 \\ &= 18 \times \frac{10}{9} \times \frac{1}{4} = 5 \end{aligned}$$

Question 85

An article is sold at a certain price. If it is sold at $33\frac{1}{3}\%$ of this price, there is a loss of $33\frac{1}{3}\%$. What is the percentage profit when it is sold at 60% of the original selling price?

- A 20
- B 30
- C $33\frac{1}{3}\%$
- D $17\frac{1}{3}\%$

Answer: A

Explanation:

Let the selling price of an article be Rs. 100.
 Now,
 Selling price = $100 \times \frac{1}{3} = 33.33$
 Loss = $33\frac{1}{3}\%$
 $(100 - 33.33)\%$ of the cost price = 33.33
 66.67% of the cost price = 33.33
 Cost price = $\frac{33.33}{66.67} \times 100 = 50$
 60% of the original selling price = 60
 Profit = $60 - 50 = 10$
 Profit percentage = $\frac{10}{50} \times 100 = 20\%$

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Question 86

If $a^3 + b^3 = 218$ and $a + b = 2$, then the value of ab is:

- A 34
- B -35
- C -31
- D 32

Answer: B

Explanation:

$$(a + b)^3 = a^3 + b^3 + 3ab(a + b)$$

$$(2)^3 = 218 + 3ab(2)$$

$$-6ab = 218 - 8 = 210$$

$$ab = -210/6 = -35$$

Question 87

In $\triangle ABC$, $\angle A = 58^\circ$. If I is the in center of the triangle, then the measure of $\angle BIC$ is:

A 109°

B 123°

C 112°

D 119°

Answer: D

Explanation:

$$\angle BIC = 90^\circ + \frac{\angle A}{2}$$

$$\angle BIC = 90^\circ + \frac{58^\circ}{2} = 90^\circ + 29^\circ = 119^\circ$$

Question 88

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

A 11

B 7

C 19

D 10

Answer: B

Explanation:

$$2\sqrt{2}x^3 - 3\sqrt{3}y^3 = \left(\sqrt{2}x - \sqrt{3}y\right)\left(Ax^2 + By^2 + Cxy\right)$$

$$\text{(because } a^3 - b^3 = (a - b)(a^2 + ab + b^2)\text{)}$$

On comparison,

$$A = (\sqrt{2})^2 = 2$$

$$A = (-\sqrt{3})^2 = 3$$

$$C = \sqrt{2}\sqrt{3} = \sqrt{6}$$

Now,

$$A^2 + B^2 - C^2$$

$$= 2^2 + 3^2 - (\sqrt{6})^2$$

$$= 4 + 9 - 6$$

$$= 7$$

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Question 89

A circle is inscribed in $\triangle ABC$, touching AB, BC and AC at the points P, Q and R respectively. If $AB - BC = 4$ cm, $AB - AC = 2$ cm and the perimeter of $\triangle ABC = 32$ cm, then $PB + AR$ is equal to:

A 12 cm

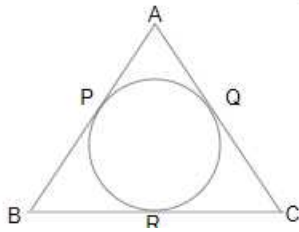
B 13 cm

C $\frac{33}{5}$ cm

D $\frac{38}{3}$ cm

Answer: D

Explanation:



Perimeter = 32 cm

$AB + BC + AC = 32$ cm ---(1)

$AB - BC = 4$ cm ---(2)

$AB - AC = 2$ cm ---(3)

On eq(1) + (2) + (3),

$3AB = 38$

$AB = PB + AR = 38/3$

Question 90

If each interior angle of a regular polygon is $\left(128\frac{4}{7}\right)^\circ$, then what is the sum of the number of its diagonals and the number of its sides?

A 15

B 19

C 17

D 21

Answer: D

Explanation:

Interior angle = $180 - \frac{360}{n}$

$128\frac{4}{7}^\circ = 180 - \frac{360}{n}$

$\frac{900}{7}^\circ = 180 - \frac{360}{n}$

$\frac{360}{n} = 180 - \frac{900}{7}$

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

Side(n) = 7

Number of diagonals = $\frac{n(n-3)}{2} = \frac{7(7-3)}{2}$

= $\frac{28}{2} = 14$

Sum of the number of its diagonals and the number of its sides = $7 + 14 = 21$

Question 91

If the radius of a sphere is increased by 4 cm, its surface area is increased by 464π cm². What is the volume (in cm³) of the original sphere?

A $\frac{15625}{6}\pi$

B $\frac{35937}{8}\pi$

C $\frac{11979}{2}\pi$

D $\frac{15625}{8}\pi$

Answer: A

Explanation:

$$\begin{aligned} \text{Difference in the surface area} &= 464\pi \\ 4\pi(r+4)^2 - 4\pi r^2 &= 464\pi \\ 4\pi[r^2 + 16 + 8r - r^2] &= 464\pi \\ 16 + 8r &= 116 \\ r &= 100/8 = 25/2 \text{ cm} \\ \text{Volume of the sphere} &= \frac{4}{3}\pi r^3 \\ &= \frac{4}{3}\pi (25/2)^3 = \frac{15625}{6}\pi \end{aligned}$$

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Question 92

The sum of the digits of a two-digit number is $\frac{1}{7}$ of the number. The units digit is 4 less than the tens digit. If the number obtained on reversing its digits is divided by 7, the remainder will be:

- A 4
- B 5
- C 1
- D 6

Answer: D

Explanation:

Let the number be $(10a + b)$.

ATQ,

$$a + b = \frac{10a + b}{7}$$

$$7a + 7b = 10a + b$$

$$6b = 3a$$

$$2b = a \text{ ---(1)}$$

$$a - b = 4 \text{ ---(2)}$$

From eq (1) and (2),

$$2b - b = 4$$

$$b = 4$$

$$a = 4 \times 2 = 8$$

$$\text{Number} = 10a + b = 10 \times 8 + 4 = 84$$

$$\text{reverse of the number} = 48$$

$$\text{Remainder after divide by 7} = 48/7 = 6$$

Question 93

The graph of the equation $x - 7y = -42$, intersects the y-axis at $P(\alpha, \beta)$ and the graph of $6x + y - 15 = 0$, intersects the x-axis at $Q(\gamma, \delta)$, What is the value of $\alpha + \beta + \gamma + \delta$?

- A $\frac{17}{2}$
- B 6
- C $\frac{9}{2}$
- D 5

Answer: A

Explanation:

The graph of the equation $x - 7y = -42$, intersects the y-axis at $P(\alpha, \beta)$

$$\text{So, } x = 0$$

$$0 - 7y = -42$$

$$y = 6$$

$$\alpha = 0$$

$$\beta = 6$$

graph of $6x + y - 15 = 0$, intersects the x-axis at $\left(\frac{\gamma}{\delta}, 0\right)$

$$\text{So, } y = 0$$

$$6x - 15 = 0$$

$$x = \frac{5}{2}$$

$$\gamma = \frac{5}{2}$$

$$\delta = 0$$

Now,

$$\alpha + \beta + \gamma + \delta$$

$$= 0 + 6 + \frac{5}{2} + 0 = \frac{17}{2}$$

Question 94

In quadrilateral $ABCD$, the bisectors of $\angle A$ and $\angle B$ meet at O and $\angle AOB = 64^\circ$. $\angle C + \angle D$ is equal to:

A 136°

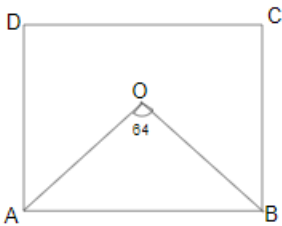
B 128°

C 116°

D 148°

Answer: B

Explanation:



In $\triangle AOB$,

$$\angle OAB + \angle OBA + \angle O = 180^\circ$$

$$\angle OAB + \angle OBA = 180 - 64 = 116^\circ$$

$\angle OAB$ and $\angle OBA$ is the bisector of $\angle A$ and $\angle B$.

So,

$$\angle A + \angle B = 2 \times 116 = 232^\circ$$

$$\angle A + \angle B + \angle C + \angle D = 360$$

$$\angle C + \angle D = 360 - 232 = 128^\circ$$

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Question 95

'A' started a business with a capital of ₹54,000 and admitted 'B' and 'C' after 4 months and 6 months, respectively. At the end of the year, the profit was divided in the ratio 1 : 4 : 5. What is the difference between the capitals invested by 'B' and 'C'?

A ₹1,08,000

B ₹1,62,000

C ₹2,16,000

D ₹3,24,000

Answer: C

Explanation:

Investment of A = ₹54,000

Time = 12 months

Let the investment of B and C be x and y respectively.

Time of the invest for B = 12 - 4 = 8 months

Time of the invest for C = 12 - 6 = 6 months

Profit share of A, B and C = $54000 \times 12 : x \times 8 : y \times 6 = 324000 : 4x : 3y$

$1 : 4 : 5 = 324000 : 4x : 3y$

From first two,

$1 : 4 = 324000 : 4x$

$x = 324000$

Now

From first and third,

$1 : 5 = 324000 : 3y$

$y = 540000$

Difference between the capitals invested by 'B' and 'C' = $540000 - 324000 = \text{Rs. } 216000$

Question 96

A and B started their journeys from X to Y and Y to X, respectively. After crossing each other, A and B completed the remaining parts of their journeys in $6\frac{1}{8}$ h and 8 h respectively. If the speed of B is 28 km/h, then the speed (in km/h) of A is:

A 40

B 42

C 32

D 36

Answer: C

Explanation:

By the formula,

Ratio of the speed = $\sqrt{\frac{\text{inverse ratio of the time}}$

$\frac{S_a}{S_b} = \sqrt{\frac{t_b}{t_a}}$

$S_b = 28 \text{ km/hr}$

$t_a = 6\frac{1}{8} = \frac{49}{8}$

$t_b = 8$

$\Rightarrow \frac{S_a}{28} = \sqrt{\frac{8}{\frac{49}{8}}}$

$\Rightarrow \frac{S_a}{28} = \sqrt{\frac{64}{49}}$

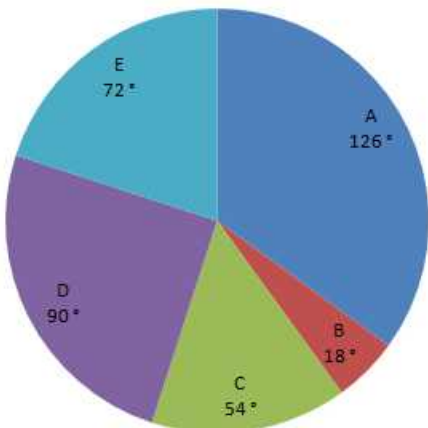
$\Rightarrow \frac{S_a}{28} = \frac{8}{7}$

$S_a = 32 \text{ km/hr}$

Question 97

The given pie chart shows the breakup of total number of the employees of a company working in different offices (A, B, C, D and E).

Total No. of employees = 2400



If 40% of the number of employees in office A are shifted equally to office B and E, then what is the difference between the number of employees in B and that in C?

- A 72
- B 120
- C 82
- D 130

Answer: A

Explanation:

Employees in office A = $2400 \times \frac{126}{360} = 840$
 40% employees of office A = $840 \times \frac{40}{100} = 336$
 Number of employee in equal two parts = $336/2 = 168$
 Employees in office B = $2400 \times \frac{18}{360} = 120$
 Total employees in office B after shifting = $120 + 168 = 288$
 Employees in office C = $2400 \times \frac{54}{360} = 360$

Difference between the number of employees in B and that in C = $360 - 288 = 72$

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Question 98

The volume of a right pyramid is $45\sqrt{3} \text{ cm}^3$ and its base is an equilateral triangle with side 6 cm. What is the height (in cm) of the pyramid?

- A 15
- B 18
- C 12
- D 20

Answer: A

Explanation:

Side of equilateral triangle = 6 cm
 Area of equilateral triangle = $\frac{\sqrt{3}}{4} a^2 = \frac{\sqrt{3}}{4} 6^2 = 9\sqrt{3}$
 The volume of a right pyramid = $\frac{1}{3} \times 9\sqrt{3} \times h = 45\sqrt{3}$
 $h = 15 \text{ cm}$

Question 99

A certain number of persons can complete a work in 34 days working 9 h a day. If the number of persons is decreased by 40%, then how many hours a day should the remaining persons work to complete the work in 51 days?

- A 9
- B 8
- C 12
- D 10

Answer: D

Explanation:

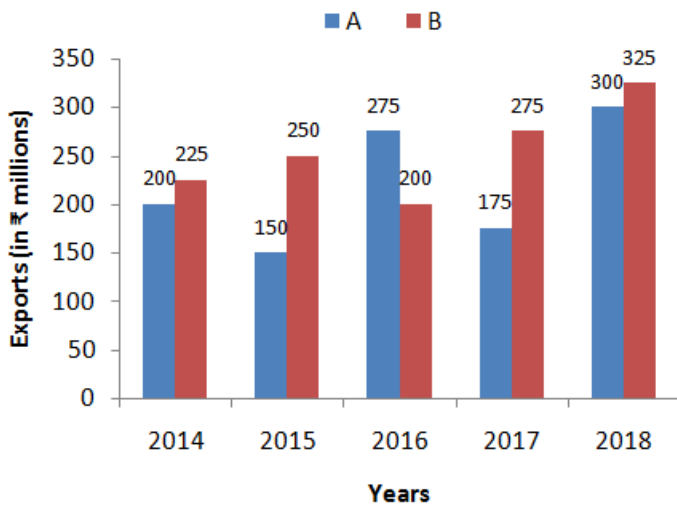
Let the number of persons be x.
 Total work = $34 \times 9x = 306x$

Now, number of person = $0.6x$
 $0.6x \times 51 = 306x$
 $x = 306/30.6 = 10$

\therefore 10 hours a day should the remaining persons work to complete the work in 51 days.

Question 100

The bar graph shows the exports of Cars of Type A and B (in ₹ millions).



The total exports of cars of type A in 2014 to 2017 is approximately what percentage less than the total exports of cars of type B in 2015 to 2018?

- A 31.3
- B 30.4
- C 14.3
- D 23.8

Answer: D

Explanation:

The total exports of cars of type A in 2014 to 2017 = $200 + 150 + 275 + 175 = 800$

The total exports of cars of type B in 2015 to 2018 = $250 + 200 + 275 + 325 = 1050$

Required percentage = $\frac{1050 - 800}{1050} \times 100 = \frac{250}{1050} \times 100 = 23.8\%$

\therefore The correct answer is option D.

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