



# Ssc Cgl Tier II Previous Year Question Paper Overview

Here, you can solve all the questions asked in Ssc Cgl Tier II Previous Year Question Paper on 2022-02-03 in the Morning exam. The detailed solutions are also provided for every previous year question and some of these questions can be asked again in your Ssc Cgl Tier II exam. There are 100 questions in the exam and 120 minutes are provided for the Ssc Cgl Tier II exam. The Cutoff of the exam was 140 marks hence you should try to score at least 150 marks.

## Ssc Cgl Tier II Previous Year Question Paper : Questions and Solutions

### Question 1 :

The curved surface area of a right circular cone is  $2310 \text{ cm}^2$  and its radius is 21 cm. If its radius is increased by 100% and height is reduced by 50%, then its capacity (in liters) will be (correct to one decimal place): (Take  $(\pi = \frac{22}{7})$ )

Difficulty : Moderate

Average Time : 50 Seconds

### Options :

1. 27.8
2. 28.2
3. 26.7
4. 25.9

### Solution :

The correct answer is **option 4** i.e. **25.9**

$$\pi r l = 2310 \text{ and } r = 21 \text{ cm.}$$

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

$$l = 35 \text{ cm.}$$

$$\text{The height of the circular cone} = \sqrt{l^2 - r^2}$$

$$h = \sqrt{35^2 - 21^2}$$

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



If its radius is increased by 100% and height is reduced by 50% then,

$r = 42\text{cm}$  and  $h = 14\text{ cm}$ .

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

Volume of the cone =  $\frac{1}{3} \times \frac{22}{7} \times 42 \times 42 \times 14 = 25872\text{ cm}^3$ .

One knows that,

$1\text{ cm}^3 = 1\text{ ml}$

$25872\text{ cm}^3 = 25872/1000 = 25.872\text{ l}$

= 25.9 liters.

**Question 2 :**

A person saves  $\frac{1}{3}$  of his income. If the saving increases by 22% and the expenditure increases by 10%, then the percentage increase in his income is:

**Difficulty : Moderate**

**Average Time : 65 Seconds**

**Options :**

1. 18%
2. 14%
3. 16%
4. 22%

**Solution :**

The correct answer is **option 2** i.e. **14%**

Let the income be  $300x$ .

Savings =  $\frac{1}{3} \times 300x = 100x$ .

Expenditure =  $200x$ .

Savings increased by 22%.

New savings =  $100x \times 122\% = 122x$ .

Expenditure increased by 10%.

New expenditure =  $200x \times 110\% = 220x$ .



$$\text{New income} = 220x + 122x = 342x.$$

$$\% \text{ increase in the income} = (342x - 300x)/300x \times 100 = 14\%.$$

**Question 3 :**

P can finish a work in 18 days. When he had worked for 5 days, Q joined him. If both of them together completed the remaining work in  $(\frac{13}{5})$  days, then in how many days can Q alone finish  $66 (\frac{2}{3})\%$  of the same work?

**Difficulty : Moderate****Average Time : 53 Seconds****Options :**

1. 5
2. 4
3. 2
4. 3

**Solution :**

The correct answer is **option 4** i.e. **3**.

P finished the work in 18 days.

Let the efficiency of P is 1 unit/day.

$$\text{Total work} = 18 \times 1 = 18 \text{ units.}$$

P work for 5 days,

$$\text{Remaining work} = 18 - 5 = 13 \text{ units.}$$

(P + Q) complete the remaining work in  $\frac{13}{5}$  days.

$$\text{The combined efficiency of (P + Q)} = 13 / (\frac{13}{5}) = 5 \text{ units.}$$

$$\text{Efficiency of Q} = 5 - 1 = 4 \text{ units/day.}$$

$$66 (\frac{2}{3})\% \text{ of work} = \frac{2}{3} \times 18 = 12 \text{ units.}$$

$$\text{Time taken by Q to complete 12 units of work} = 12/4 = 3 \text{ days.}$$

**Question 4 :**

In  $(\Delta)ABC$ ,  $AB = 20$  cm,  $BC = 7$  cm and  $CA = 15$  cm. Side BC is produced to D such that  $(\Delta)DAB \sim (\Delta)DCA$ . DC is equal to:

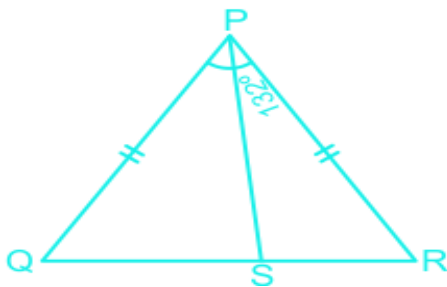
**Difficulty : Moderate****Average Time : 57 Seconds**

**Options :**

1. 9 cm
2. 8 cm
3. 10 cm
4. 7 cm

**Solution :**

The correct answer is **option 1** i.e. **9 cm**.



Let  $CD = x$  and  $(\Delta)AD = y$ .

$DAB \sim (\Delta)DCA$

$$AD/CD = AB/AC = BD/AD.$$

$$y/x = 20/15 = (7 + x)/y$$

$$4/3 = (7 + x)/y$$

$$4y = 21 + 3x \dots\dots\dots(1)$$

$$y/x = 20/15$$

$$3y = 4x \dots\dots\dots(2)$$

On solving equation 1 and 2 we get,

$$x = 9 \text{ and } y = 12.$$

**Question 5 :**

The areas of three adjacent faces of a cuboidal solid block of wax are 216 cm<sup>2</sup>, 96 cm<sup>2</sup> and 144 cm<sup>2</sup>. It is melted and 8 cubes of the same size are formed from it. What is the lateral surface area (in cm<sup>2</sup>) of 3 such cubes?

**Difficulty :** Moderate

**Average Time :** 63 Seconds

**Options :**

648

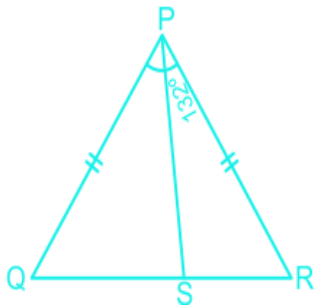
2. 432

3. 576

4. 288

**Solution :**

The correct answer is **option 2** i.e. **432**



By hit and trial, we get the paired values of l, b, and h as follows,

$$lh = 216 (18 \times 12) \dots \dots \dots (1)$$

$$bh = 96 (12 \times 8) \dots \dots \dots (2)$$

$$lb = 144 (18 \times 8) \dots \dots \dots (3)$$

$$l = 18 \text{ cm, } b = 8 \text{ cm, } h = 12 \text{ cm.}$$

The volume of the cuboid = volume of 8 cubes.

$$l \times b \times h = 8 \times a^3$$

$$18 \times 12 \times 8 = 8 \times a^3$$

$$a = 6.$$

$$\text{The lateral surface area of 3 such cubes} = 3 \times 4a^2$$

$$= 3 \times 4 \times 6^2$$

$$= 432 \text{ cm}^2$$

**Question 6 :**

The ratio of the incomes of A and B in 2020 was 5:4. The ratios of their individual incomes in 2020 and 2021 were 4 : 5 and 2 : 3, respectively. If the total income A and B in 2021 was Rs. 705600, then what was the income (in Rs.) of B in

2021?

Difficulty : Moderate

Average Time : 69 Seconds

Options :

1. 345600
2. 279700
3. 360000
4. 425900

Solution :

The correct answer is **option 1** i.e. **345600**.

Here it is given that the ratio of the incomes of A and B in 2020 was 5:4.....(1)

The ratios of their individual incomes in 2020 and 2021 were 4 : 5 and 2 : 3, respectively.

A's incomes in 2020 and 2021 were 4 : 5 .....(2)

B's incomes in 2020 and 2021 were 2 : 3.....(3).

To make the components of the ratio equal, multiply the equation 1 by 4, 2 by 5 and 3 by 8.

The ratio of the incomes of A and B in 2020 becomes 20 : 16.

A's incomes in 2020 and 2021 become = 20 : 25

B's incomes in 2020 and 2021 become = 16 : 24.

Total income of A and B in 2021 =  $25x + 24x = 49x$

$49x = 705600$

$x = 14400$ .

Income of B in 2021 =  $24x = 14400 \times 24 = 345600$ .

Question 7 :

In a medical transaction, 17 times the cost price is equal to 8 times the sum of the cost price and the selling price. What is the gain or loss percentage?

Difficulty : Moderate

Average Time : 65 Seconds

Options :



Loss 15%

2. Gain 17.5%

3. Gain 12.5%

4. Loss 30%

**Solution :**

The correct answer is **option 3** i.e. **Gain 12.5%**

$$17 \times CP = 8(CP + SP).$$

$$17CP = 8CP + 8SP$$

$$9CP = 8SP$$

$$CP : SP = 8 : 9$$

$$\text{Profit \%} = \frac{1}{8} \times 100 = 12.5\%$$

**Question 8 :**

In an examination, B obtained 20% more marks than those obtained by A and A obtained 10% less marks than those obtained by C. D obtained 20% more marks than those obtained by C. By what percentage are the marks obtained by D more than those obtained by A?

**Difficulty : Moderate**

**Average Time : 46 Seconds**

**Options :**

1.  $33\frac{1}{3}\%$

2.  $13\frac{1}{3}\%$

3.  $43\frac{1}{3}\%$

4.  $23\frac{1}{3}\%$

**Solution :**

The correct answer is **option 1** i.e.  $33\frac{1}{3}\%$

In an examination, B obtained 20% more marks than those obtained by A.

Let the marks obtained by A =  $90x$ .

Marks obtained by B =  $90x \times 120\% = 108x$ .

A obtained 10% less marks than those obtained by C.

Marks obtained by C =  $90x \times 100/90 = 100x$ .

D obtained 20% more marks than those obtained by C,

Marks obtained by D =  $100x \times 120\% = 120x$ .

Required% =  $(120x - 90x)/90 \times 100 = 33.33\%$ .

**Question 9 :**

The value of  $\frac{(2.53)^3 + (2.47)^3}{25.3 \times 25.3 - 624.91 + 24.7 \times 24.7}$  is  $5 \times 10^k$ , where the value of k is?

**Difficulty : Moderate****Average Time : 59 Seconds****Options :**

1. -2
2. -1
3. 1
4. 2
5. 5

**Solution :**

The correct answer is **option 1** i.e. is **-2**

$$\frac{(2.53)^3 + (2.47)^3}{25.3 \times 25.3 - 624.91 + 24.7 \times 24.7}$$

As we know that,

$$a^3 + b^3 = (a + b)(a^2 + b^2 + ab)$$

$$\frac{(2.53 + 2.47)(2.53 \times 2.53 - 6.2491 + 2.47 \times 2.47)}{(2.53 \times 2.53 - 6.2491 + 2.47 \times 2.47)100}$$

$$5 \times 10^{-2} = 5 \times 10^k$$

$$k = -2$$

**Question 10 :**

The driver of a car, which is travelling at a speed of 75 km/h, locates a bus 80 m ahead of him, travelling in the same direction. After 15 seconds, he finds that the bus is 40 m behind the car. What is the speed of the bus (in km/h)?

**Difficulty : Moderate****Average Time : 61 Seconds****Options :**





44.2

2. 42.5

3. 47.5

4. 46.2

5. 48.5

**Solution :**

The correct answer is **option 4** i.e. **46.2 km/hr**

Let the speed of the bus be 'a' km/hr.

Time  $\times$  speed = distance

Distance travelled = 80 + 40 = 120m

Relative speed = (75 - a).

$15 \times (75 - a) \times 5/18 = 80 + 40$

$375 - 5a = 144$

$a = 46.2$  km/hr.

**Question 11 :**

The value of  $17(\frac{1}{2})\%$  of  $3(\frac{1}{4})\%$  of  $33(\frac{1}{3})\%$  of 7200 is:

**Difficulty : Moderate****Average Time : 43 Seconds****Options :**

1. 7.65

2. 11.68

3. 13.65

4. 9.65

**Solution :**

The correct answer is **option 3** i.e. **13.65**

$35/200 \times 13/400 \times 1/3 \times 7200 = 13.65.$

**Question 12 :**



A1 and A2 are two regular polygons. The sum of all the interior angles of A1 is  $1080^\circ$ . Each interior angle A2 exceeds its exterior angle by  $132^\circ$ . The sum of the number of sides A1 and A2 is:

**Difficulty : Moderate**

**Average Time : 38 Seconds**

**Options :**

1. 21

2. 22

3. 23

4. 24

**Solution :**

The correct answer is **option 3** i.e. **23**.

The sum of all the interior angle of side  $n = (n - 2) \times 180$

$$(n - 2) \times 180 = 1080$$

$$n = 8$$

Number of sides of  $A_1$  polygon = 8.

For  $A_2$ ,

interior angle =  $132 +$  Exterior angle.

Let the exterior angle be  $x$  then interior angle =  $132 + x$ .

We know that, Exterior angle + interior angle of the same exterior angle =  $180$  ( linear pair)

$$x + 132 + x = 180$$

$$2x = 48$$

$$x = 24.$$

Number of sides of  $A_2 = 360/24 = 15$

Required sum =  $15 + 8 = 23$ .

**Question 13 :**

Study the given graph and answer the question that follows. In 2020, the production of cement by company C increased by the same percentage as in 2019, over its previous year. The production (in million tonnes) of cement by company C in 2020 (correct to one decimal place) was:

**Difficulty : Moderate****Average Time : 64 Seconds****Options :**

1. 454.6
2. 455.8
3. 457.1
4. 452.4

**Solution :**The correct answer is **option 3** i.e. **457.1**

Production of cement by company C in 2018 = 350

Production of cement by company C in 2019 = 400

% increase =  $\frac{400-350}{350} \times 100 = 14.28\%$ .Production of cement by company C in 2020 =  $400 \times 114.28\% = 457.1$ .**Question 14 :**The value of  $\frac{3(\operatorname{cosec}^2 26^\circ - \tan^2 64^\circ) + (\cot^2 24^\circ - \sec^2 248^\circ)}{\cot(22^\circ - \theta) - \operatorname{cosec}^2(62^\circ + \theta) - \tan(\theta + 68^\circ) + \tan^2(28^\circ - \theta)}$  is:**Difficulty : Moderate****Average Time : 40 Seconds****Options :**

1. 3
2. 4
3. -1
4. -2

**Solution :**The correct answer is **option 4** i.e. **-2**

We know that,

$$\operatorname{cosec}^2(\theta) - \cot^2(\theta) = 1.$$

$$= \frac{3(\operatorname{cosec}^2 26^\circ - \tan^2 64^\circ) + (\cot^2 24^\circ - \sec^2 248^\circ)}{\cot(22^\circ - \theta) - \operatorname{cosec}^2(62^\circ + \theta) - \tan(\theta + 68^\circ) + \tan^2(28^\circ - \theta)}$$



$$= \frac{3(\operatorname{cosec}^2 26^\circ - \cot^2(90 - 26^\circ)) + (\cot^2 42^\circ - \operatorname{cosec}^2(90 - 42^\circ))}{\tan(90 - 22^\circ + \theta) - \operatorname{cosec}^2(62^\circ + \theta) - \tan(\theta + 68^\circ) + \cot^2(90 - 28^\circ + \theta)}$$
$$= (3 - 1)/(0 - 1) = -2.$$

**Question 15 :**

The value of  $(11.\bar{4}) + 22.5\bar{67} - 33.5\bar{9}$  is:

Difficulty : Moderate

Average Time : 51 Seconds

**Options :**

1.  $(40.\bar{12})$
2.  $(4.\bar{12})$
3.  $(0.4\bar{12})$
4.  $(0.04\bar{12})$

**Solution :**

The correct answer is **option 3** i.e.  $(0.4\bar{12})$

$$(11.\bar{4}) = (114 - 11)/9 = 103/9.$$

$$(22.5\bar{67}) = (22567 - 225)/990 = 22342/990.$$

$$(33.5\bar{9}) = (3359 - 335)/90.$$

$$103/9 + 22342/990 - 3024/90$$

$$408/990 = (0.4\bar{12})$$

**Question 16 :**

P and Q start a shop with a capital of Rs. 150000 and Rs. 450000, respectively. After a year, out of the profit of Rs. 200000. P gets his share of profit plus some money as his salary that is not a part of the profit. If P gets a total of Rs. 90000, what is the amount of salary (in Rs. ) that he received?

Difficulty : Moderate

Average Time : 60 Seconds

**Options :**

1. 20000
2. 25000



50000

4. 40000

**Solution :**

The correct answer is **option 4** i.e. **40000**.

Here they invest their money for the same time period so the ratio of the profit share is equal to the ratio of their investment.

Ratio of the profit share =  $150000 : 450000 = 1 : 3$ .

Part of the money received by A =  $1/4$  of  $200000 = 50,000$ .

Salary received by A =  $90000 - 50000 = 40000$ .

**Question 17 :**

If 91% of A is 39% of B, and B is x% of A, then the value of x is:

**Difficulty : Moderate**

**Average Time : 44 Seconds**

**Options :**

1.  $\frac{200}{3}\%$

2.  $\frac{700}{3}\%$

3.  $\frac{400}{3}\%$

4.  $\frac{500}{3}\%$

**Solution :**

The correct answer is **option 2** i.e.  $\frac{700}{3}\%$

91% of A is 39%

$91A = 39B$

$A/B = 39/91 = 3/7$ .

% required =  $7/3 \times 100 = 700/3$ .

$x = 700/3\%$ .

**Question 18 :**

The average of n numbers is 45. If 60% of the numbers are increased by 5 each and the remaining numbers are decreased by 10 each, then what is the average of the numbers so obtained?

**Difficulty : Moderate****Average Time : 47 Seconds****Options :**

1. 42
2. 43
3. 46
4. 44

**Solution :**

The correct answer is **option 4** i.e. **44**

The average of 'n' number is 45.

Sum of n number =  $45 \times n = 45n$ .

60% of n =  $.6n$

Increased in the sum =  $6n \times 5 = 3n$

40% of n decreased by 10 =  $.4n \times 10 = 4n$

Decreased in the sum =  $4n$

New sum =  $45n + 3n - 4n = 44n$

New average =  $44n/n = 44$ .

**Question 19 :**

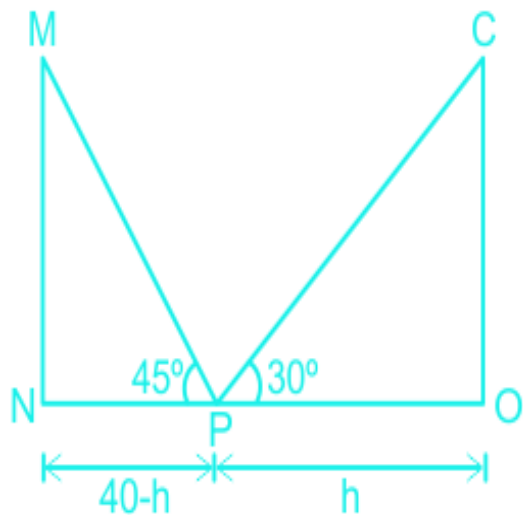
ABCD is a cyclic quadrilateral, Sides AB and DC, when produced, meet at E and sides AD and BC when produced, meet at F. If (ngle) ADC =  $76^\circ$  and (ngle) AED =  $55^\circ$ , then (ngle) AFB is equal to:

**Difficulty : Moderate****Average Time : 54 Seconds****Options :**

1.  $34^\circ$
2.  $26^\circ$
3.  $29^\circ$
4.  $27^\circ$

**Solution :**

The correct answer is **option 4** i.e.  $27^\circ$



In  $\triangle AED$ ,

$$\angle AED + \angle ADE + \angle DAE = 180$$

$$\angle DAE = 180 - 76 - 55 = 49^\circ.$$

$$\angle ADC + \angle ABC = 180$$

$$\angle ABC = 180 - 76 = 104^\circ.$$

In  $\triangle ABF$ ,

$$\angle BAF + \angle ABF + \angle AFB = 180$$

$$\angle AFB = 180 - 104 - 49 = 27^\circ.$$

**Question 20 :**

If  $\cos(\theta) = \frac{12}{13}$ , then the value of  $\frac{\sin \theta (1 - \tan \theta)}{\tan \theta (1 + \operatorname{cosec} \theta)}$  is:

Difficulty : Moderate

Average Time : 70 Seconds

**Options :**

1.  $\frac{25}{78}$
2.  $\frac{35}{234}$
3.  $\frac{35}{108}$
4.  $\frac{25}{156}$

**Solution :**

The correct answer is **option 2** i.e.  $\frac{35}{234}$

$$\cos \theta = \frac{12}{13} = B/H$$

$$P = \sqrt{169 - 144} = 5$$

$$\frac{\sin \theta (1 - \tan \theta)}{\tan \theta (1 + \operatorname{cosec} \theta)} = \frac{P/H(1 - B/H)}{B/H(1 + H/P)}$$

$$= \frac{5/13(1 - 5/12)}{5/12(1 + 13/5)}$$

$$= \frac{(5/13 \times 7/12)}{(3/2)} = 35/234.$$

**Question 21 :**

If  $(x^2 - 3x + 1 = 0)$ , then the value of  $\frac{(x^4 + \frac{1}{x^2})}{(x^2 + 5x + 1)}$  is

**Difficulty : Moderate****Average Time : 51 Seconds****Options :**

1.  $\frac{9}{4}$

2.  $\frac{27}{8}$

3.  $\frac{5}{2}$

4. 2

**Solution :**

The correct answer is **option 1** i.e.  $\frac{9}{4}$

$$x^2 - 3x + 1 = 0$$

$$x + 1/x = 3$$

On cubing both sides we get,

$$x^3 + 1/x^3 + 3(x + 1/x) = 27$$

$$x^3 + 1/x^3 = 27 - 9 = 18.$$

$$\frac{(x^4 + \frac{1}{x^2})}{(x^2 + 5x + 1)} \dots \dots (1)$$

Divide the N and D by x we get,

$$\frac{(x^3 + \frac{1}{x^3})}{(x + 5 + \frac{1}{x})} = \frac{18}{3 + 5} = 18/8 = 9/4.$$

**Question 22 :**





A shopkeeper marks an article at such a price that after giving a discount of  $12\frac{1}{2}\%$  on the marked price, he still earns a profit of 15%. If the cost price of the article is Rs. 385, then the sum of the marked price and the selling price (in Rs.) of the article is:

**Difficulty : Moderate**

**Average Time : 65 Seconds**

**Options :**

1. 948.75
2. 849.50
3. 984.75
4. 954.75

**Solution :**

The correct answer is **option 1** i.e. **948.75**.

Discount =  $12.5\% = \frac{1}{8}$ .

CP = 385.

SP =  $385 \times 115\% = 442.75$ .

MP =  $442.75 \times \frac{100}{87.5} = 506$ .

Sum of MP and SP =  $506 + 442.75 = \text{Rs } 948.75$ .

**Question 23 :**

A and B worked together and received a total of Rs. 18000 for 15 days. A's efficiency in the work was 5 times that of B's. The daily wage of A (in Rs.) was:

**Difficulty : Moderate**

**Average Time : 41 Seconds**

**Options :**

1. 800
2. 600
3. 1200
4. 1000

**Solution :**

The correct answer is **option 4** i.e. **1000**.



One gets the daily wages in terms of their efficiency.

A's efficiency : B's efficiency = 5 : 1.

Per day wage of A and B =  $18000/15 = 1200$

A's one day wage =  $5/6 \times 1200 = 1000$ .

**Question 24 :**

If  $x = 32.5$ ,  $y = 34.6$  and  $z = 30.9$ , then the value of  $x^3 + y^3 + z^3 - 3xyz$  is  $0.98k$ , where  $k$  is equal to:

Difficulty : Moderate

Average Time : 42 Seconds

**Options :**

1. 1033
2. 933
3. 1026
4. 921

**Solution :**

The correct answer is **option 1** i.e. **1033**.

$$x^3 + y^3 + z^3 - 3xyz = 0.98k$$

$$(32.5)^3 + (34.6)^3 + (30.9)^3 - 3 \times 32.5 \times 34.6 \times 30.9 = 0.98k.$$

$$34328.125 + 41421.736 + 29503.629 - 104241.15 = 0.98k$$

$$1012.34 = 0.98k$$

$$k = 1033.$$

**Question 25 :**

If  $(\frac{\sec \theta - \tan \theta}{\sec \theta + \tan \theta}) = \frac{1}{7}$ ,  $\theta$  lies in the first quadrant, then the value of  $(\frac{\operatorname{cosec} \theta + \cot^2 \theta}{\operatorname{cosec} \theta - \cot^2 \theta})$  is:

Difficulty : Moderate

Average Time : 44 Seconds

**Options :**



$$\frac{19}{5}$$

2.  $\frac{22}{3}$

3.  $\frac{37}{12}$

4.  $\frac{37}{19}$

**Solution :**

The correct answer is **option 1** i.e.  $\frac{19}{5}$ .

$$\frac{\sec \theta - \tan \theta}{\sec \theta + \tan \theta} = \frac{1}{7}$$

By using componendo and dividend we get,

$$\frac{(\sec \theta - \tan \theta) + (\sec \theta + \tan \theta)}{(\sec \theta - \tan \theta) - (\sec \theta + \tan \theta)} = \frac{8}{-6}$$

$$-\operatorname{Cosec} \theta = -\frac{4}{3}$$

$$\operatorname{Cosec} \theta = \frac{4}{3} = \frac{H}{P}$$

$$B = \sqrt{16 - 9} = \sqrt{7}$$

$$\frac{\operatorname{cosec} \theta + \cot^2 \theta}{\operatorname{cosec} \theta - \cot^2 \theta} = \frac{(4/3 + 7/9)}{(4/3 - 7/9)} = 19/5.$$

**Question 26 :**

A sum of money at simple interest amounts to Rs. 6000 in 4 years and to Rs. 6750 in 7 years at the same rate per cent p.a. of interest. The sum (in Rs.) is:

**Difficulty : Moderate**

**Average Time : 79 Seconds**

**Options :**

1. 5100

2. 4800

3. 4000

4. 5000

**Solution :**

The correct answer is **option 4** i.e. **5000**.

The sum of money becomes 6000 in 4 years and 6750 in 7 years.



Interest earned in 3 years =  $6750 - 6000 = 750$

1 year interest =  $750/3 = 250$ .

4 year interest =  $250 \times 4 = 1000$

Principal =  $6000 - 1000 = 5000$ .

**Question 27 :**

The sum of the digits of the least number which when divided by 36, 72, 80 and 88 leave the remainders 16, 52, 60 and 68 respectively, is:

Difficulty : Moderate

Average Time : 40 Seconds

**Options :**

1. 17

2. 11

3. 14

4. 16

**Solution :**

The correct answer is **option 4** i.e. **16**.

let's check for the difference of the divisor and remainder in each case.

$$36 - 16 = 20$$

$$72 - 52 = 20$$

$$80 - 60 = 20$$

$$88 - 68 = 20$$

In all cases the difference is constant,

Required number = LCM of (36, 72, 80, 88)k - 20.

LCM of (36, 72, 80, 88) = 7920.

For the least value of the number one should put  $k = 1$ .

$$7920 \times 1 - 20 = 7900$$

Required sum of digits =  $7 + 9 + 0 + 0 = 16$ .

**Question 28 :**

The expression  $(\tan(\theta) + \cot(\theta))(\sec(\theta) + \tan(\theta))(1 - \sin(\theta))$ ,  $0^\circ < \theta < 90^\circ$ , is equal to:

**Difficulty : Moderate**

**Average Time : 54 Seconds**

**Options :**

1.  $\sec(\theta)$
2.  $\operatorname{cosec}(\theta)$
3.  $\cot(\theta)$
4.  $\sin(\theta)$

**Solution :**

The correct answer is **option 2** i.e.  $\operatorname{cosec}(\theta)$ .

$$(\tan(\theta) + \cot(\theta))(\sec(\theta) + \tan(\theta))(1 - \sin(\theta))$$

$$\left(\frac{\sin(\theta)}{\cos(\theta)} + \frac{\cos(\theta)}{\sin(\theta)}\right) \times \left(\frac{1}{\cos(\theta)} + \frac{\sin(\theta)}{\cos(\theta)}\right) \times (1 - \sin(\theta))$$

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

$$\left[\frac{1}{\cos^2(\theta)\sin(\theta)}\right] \times (\cos^2(\theta)) = \frac{1}{\sin(\theta)}$$

$$= \operatorname{cosec}(\theta).$$

**Question 29 :**

A sum of Rs. 8400 amounts to Rs. 11046 at 8.75% p.a. simple interest in a certain time. What will be the simple interest (in Rs. ) on a sum of Rs. 10800 at the same rate for the same time?

**Difficulty : Moderate**

**Average Time : 95 Seconds**

**Options :**

1. 3402
2. 3204
3. 3024
4. 3420

**Solution :**



The correct answer is **option 1** i.e. **3402**.

$$\text{Interest earned} = 11046 - 8400 = 2646$$

$$\text{Time} = (2646 \times 100)/(8400 \times 8.75)$$

$$\text{Time} = 3.6 \text{ years.}$$

Interest earned on 10800 in 3.6 years at the rate of 8.75%.

$$(10800 \times 3.6 \times 8.75)/100 = 3402.$$

**Question 30 :**

The circumference of the base of a cylindrical vessel is 264 cm and its height is 50 cm. The capacity (in litres) of the vessel is: (take  $\pi = \frac{22}{7}$ )

**Difficulty : Moderate**

**Average Time : 41 Seconds**

**Options :**

1. 277.2
2. 278.4
3. 280.6
4. 267.4

**Solution :**

The correct answer is **option 1** i.e. **277.2**.

$$2\pi r = 264.$$

$$2 \times \frac{22}{7} \times r = 264.$$

$$r = 42.$$

$$\text{Volume of cylinder} = (\pi r^2 h) = \frac{22}{7} \times 42 \times 42 \times 50 = 277200 \text{ cm}^3 .$$

$$1 \text{ cm}^3 = 1 \text{ ml.}$$

$$\text{Volume} = 277.2 \text{ litres.}$$

**Question 31 :**

The value of  $(9 \div [\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{6}] \div (\frac{3}{4} - \frac{1}{3}))$  of  $\frac{2}{9}$  is:



Difficulty : Moderate

Average Time : 44 Seconds

Options :

1.  $\frac{540}{173}$
2.  $\frac{340}{173}$
3.  $\frac{480}{173}$
4.  $\frac{2540}{173}$

Solution :

The correct answer is **option 1** i.e.  $\frac{540}{173}$

$$\left( \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{6} \right) \div \left( \frac{3}{4} - \frac{1}{3} \right) \text{ of } \frac{2}{9}$$

$$\left( \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{6} \right) \div \frac{5}{54}$$

$$\left( \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{6} \right) \times \frac{9}{5}$$

$$\frac{173}{60}$$

$$\frac{540}{173}$$

Question 32 :

A well with inner radius 3m, is dug 6 m deep. The soil taken out of it has been spread evenly all around it to a width of 2 m to form an ambankment. The height (in m) of the ambankment is:

Difficulty : Moderate

Average Time : 60 Seconds

Options :

1.  $4\frac{1}{2}$
2.  $4\frac{1}{4}$
3.  $3\frac{1}{4}$
4.  $3\frac{3}{8}$

Solution :

The correct answer is **option 4** i.e.  $3\frac{3}{8}$

The volume of the soil dug out = volume of the embankment.

$$22/7 \times 3 \times 3 \times 6 = 22/7(5^2 - 3^2) \times h$$

$$54 = 16 \times h$$

$$h = 54/16 = 3\left(\frac{3}{8}\right)$$

**Question 33 :**

The expression  $\frac{\tan^6 \theta - \sec^6 \theta + 3 \sec^2 \theta \tan^2 \theta}{\tan^2 \theta + \cot^2 \theta + 2}$ ,  $0^\circ < \theta < 90^\circ$ , is equal to:

**Difficulty : Moderate****Average Time : 48 Seconds****Options :**

1.  $\sec^2 \theta \operatorname{cosec}^2 \theta$
2.  $-\sec^2 \theta \operatorname{cosec}^2 \theta$
3.  $\cos^2 \theta \sin^2 \theta$
4.  $-\cos^2 \theta \sin^2 \theta$

**Solution :**

The correct answer is **option 4** i.e.  $-\cos^2 \theta \sin^2 \theta$

Shortcut method :

Put  $\theta = 45^\circ$ . (because  $0^\circ < \theta < 90^\circ$ )

$\sec 45 = \sqrt{2}$ ,  $\tan 45 = 1$ ,  $\cot 45 = 1$ ,  $\cot 45 = 1$  and  $\operatorname{cosec} 45 = \sqrt{2}$

$$= \frac{1 - 8 + 3 \times 2 \times 1}{1 + 1 + 2}$$

$$= -1/4.$$

Now put  $\theta = 45$  in the option as well.

Option 1 =  $2 \times 2 = 4$  not matches with our answer.

Option 2 =  $-2 \times 2 = -4$  (not matches with our answer)

Option 3 =  $1/2 \times 1/2 = 1/4$  (not matches with our answer)

Option 4 =  $-1/2 \times 1/2 = -1/4$  . matches with the answer.

**Question 34 :**

A trader bought 640 kg of rice. He sold a part of the rice at 20% profit and the rest at 5% loss. He earned a profit of 15% in the entire transaction. What is the ratio of the quantity of rice that he sold at a loss of 5% to that of the quantity that he sold at a profit of 20%?



**Difficulty : Moderate****Average Time : 95 Seconds****Options :**

1. 1 : 3
2. 4 : 1
3. 1 : 4
4. 3 : 1

**Solution :**

The correct answer is **option 3** i.e. **1 : 4**.

By using alligations we get,

$$\frac{\text{Quantity of the Rice sold at 20\% profit}}{\text{Quantity of the rice sold at the loss of 5\%}} = \frac{115-95}{120-115} = \frac{4}{1}$$

The ratio of the quantity of rice that he sold at a loss of 5% to that of the quantity that he sold at a profit of 20% = 1 : 4.

**Question 35 :**

571 + 572 + 573 + 574 + 575 is divisible by which of the following number?

**Difficulty : Moderate****Average Time : 45 Seconds****Options :**

1. 71
2. 69
3. 89
4. 73

**Solution :**

The correct answer is **option 1** i.e. **71**.

$$5^{71} + 5^{72} + 5^{73} + 5^{74} + 5^{75}$$

$$5^{71} (1 + 5 + 25 + 125 + 625) = 571 (781)$$

$$781 = 71 \times 11.$$



So one can say that,

$5^{71} + 5^{72} + 5^{73} + 5^{74} + 5^{75}$  will always be divisible by 71.

**Question 36 :**

Let  $x, y, z$  be fractions such that  $x < y < z$ . If  $z$  is divided by  $x$ , the result is  $\frac{5}{2}$ , which exceeds  $y$  by  $\frac{7}{4}$ . If  $x + y + z = 1$  ( $\frac{11}{12}$ ), then the ratio of  $(z - x) : (y - x)$  is:

Difficulty : Moderate

Average Time : 51 Seconds

**Options :**

1. 6 : 5
2. 9 : 5
3. 5 : 6
4. 5 : 9

**Solution :**

The correct answer is **option 1** i.e. **6 : 5**.

$$z/x = 5/2$$

$$y = 5/2 - 7/4 = 3/4.$$

$$x + y + z = 1 \left(\frac{11}{12}\right)$$

$$2x + 3/4 + 5x = 23/12$$

$$7x = 14/12$$

$$x = 1/6$$

$$y = 2x = 2 \times 1/6 = 1/3.$$

$$z = 5x = 5 \times 1/6 = 5/6$$

$$(z - x) : (y - x) = (5/6 - 1/3) : (3/4 - 1/3) = (1/2) : (5/12) = 6 : 5.$$

**Question 37 :**

If  $(\Delta)ABC$ ,  $D$  and  $E$  are points on the sides  $BC$  and  $AB$ , respectively, such that  $(\angle)ACB = (\angle)DEB$ . If  $AB = 12$  cm,  $BE = 5$  cm and  $BD : CD = 1 : 2$ , then  $BC$  is equal to:

Difficulty : Moderate

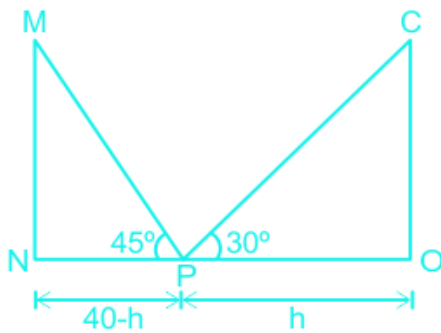
Average Time : 49 Seconds

**Options :**

- 1.  $8\sqrt{3}$  cm
- 2.  $5\sqrt{5}$  cm
- 3.  $6\sqrt{5}$  cm
- 4.  $6\sqrt{3}$  cm

**Solution :**

The correct answer is **option 3** i.e.  $6\sqrt{5}$  cm.



In  $\triangle ABC$  and  $\triangle BDE$ ,

$\angle ACB = \angle DEB$ ,  $\angle B$  is common,

so one can say that  $\triangle ABC$  and  $\triangle BDE$  are similar by AA criteria.

$$BD : AB = DE : AC = BE : BC$$

$$BD : AB = BE : BC$$

$$= x/12 = 5/3x$$

$$3x^2 = 60$$

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

$$BC = 3x = 3 \times 2\sqrt{5} = 6\sqrt{5}$$

**Question 38 :**

An athlete runs 8 times around a circular field of radius 7 m in 3 minutes 40 seconds. His speed (in km/h) is: ((Take  $\pi = \frac{22}{7}$ ))

Difficulty : Moderate

Average Time : 80 Seconds

Options :



$$\left(\frac{72}{25}\right)$$

2.  $\left(\frac{118}{25}\right)$

3.  $\left(\frac{144}{25}\right)$

4.  $\left(\frac{108}{25}\right)$

5.  $\left(\frac{108}{35}\right)$

**Solution :**

The correct answer is **option 3** i.e.  $\left(\frac{144}{25}\right)$

The radius of the field = 7 m.

Distance travelled by an athlete =  $8 \times 2 \times \frac{22}{7} \times 7 = 352\text{m}$

Time taken = 3 minutes 40 seconds =  $180 + 40 = 220$  secs.

Speed =  $\frac{352}{220} \times \frac{18}{5} = \frac{144}{25}$  km/hr.

**Question 39 :**

Three numbers are in the ratio  $(\frac{1}{2}:\frac{2}{3}:\frac{3}{4})$ . If the difference between the greatest number and the smallest number is 33, then HCF of the three numbers is:

**Difficulty : Moderate**

**Average Time : 51 Seconds**

**Options :**

1. 9

2. 5

3. 13

4. 11

**Solution :**

The correct answer is **option 4** i.e. **11**.

Let the three numbers be a, b and c.

$$a : b : c = \left(\frac{1}{2}:\frac{2}{3}:\frac{3}{4}\right)$$

Multiply the ratio by the LCM of (2, 3, 4), 12 we get,

$$a : b : c = 6 : 8 : 9.$$

The difference between the greatest number and the smallest number is 33,

$$9x - 6x = 33$$

$$3x = 33$$

$$x = 11.$$

one can see that in the ratio we don't have any common part.

Now we know the value of x. Only x is common in the ratio. The HCF of all three numbers = 11.

**Question 40 :**

Study the given graph and answer the question that follows. The ratio of the total production of cement by company A in 2016 and company C in 2018 to the total production of cement by company B in 2017 and 2019 is:

**Difficulty : Moderate****Average Time : 63 Seconds****Options :**

1. 9 : 8
2. 7 : 6
3. 8 : 7
4. 10 : 9

**Solution :**

The correct answer is **option 1** i.e. **9 : 8**

The total production of cement by company A in 2016 and company C in 2018 = 280 + 350 = 630.

The total production of cement by company B in 2017 and 2019 = 200 + 360 = 560

Required ratio = 630 : 560 = 9 : 8.

**Question 41 :**

The number of students in a class is 45, out of which  $33\frac{1}{3}\%$  are boys and the rest are girls. The average score of girls in Science is  $66\frac{2}{3}\%$  more than that of boys. If the average score of all the students is 78, then the average score of girls is:

**Difficulty : Moderate****Average Time : 48 Seconds**

**Options :**

1. 78
2. 54
3. 90
4. 65

**Solution :**

The correct answer is **option 3** i.e. **90**.

Number of boys =  $\frac{1}{3} \times 45 = 15$

The number of girls = 30.

The average score of girls in Science is  $66\frac{2}{3}\%$  more than that of boys.

Let the average score of boys be  $3x$  and for girls be  $5x$ .

According to the question,

$$(15 \times 3x + 30 \times 5x) = 45 \times 78.$$

$$45x + 150x = 3510.$$

$$x = 18.$$

$$\text{Average score of girls} = 5x = 5 \times 18 = 90.$$

**Question 42 :**

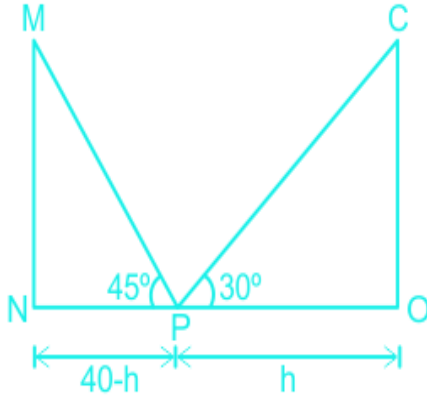
In a square ABCD, diagonals AC and BD intersect at O. The angle bisector of (ngle) CAB meets BD and BC at F and G, respectively. OF : CG is equal to:

**Difficulty : Moderate****Average Time : 55 Seconds****Options :**

1. 1 : 2
2. 1 : 3
3.  $1 : \sqrt{2}$
4.  $1 : \sqrt{3}$

**Solution :**

The correct answer is **option 3** i.e.  $1 : \sqrt{2}$



Let the side of a square be  $x$ .

Diagonal of the square =  $\sqrt{2}x$ .

According to the angle bisector theorem in triangle ABC,

$$AB : AC = BG : GC = x : \sqrt{2}x = 1 : \sqrt{2} \dots\dots\dots(1)$$

According to the angle bisector theorem in triangle ABO,

$$AB : OA = BF : FO = x : (x\sqrt{2}) = \sqrt{2} : 1 \dots\dots\dots(2)$$

In ratios 1 and 2, AB is not same so one needs to make AB same in both the ratio,

Multiply the first ratio by  $\sqrt{2}$  we get

$$AB : AC = BG : GC = \sqrt{2} : 2.$$

$$AB : OA = BF : FO = \sqrt{2} : 1$$

$$OF : GC = 1 : \sqrt{2} .$$

**Question 43 :**

A sum of Rs. 5000 is divided into two parts such that the simple interest on the first part for  $4\frac{1}{5}$  years at  $6\frac{2}{3}\%$  p.a. is double the simple interest on the second part for  $2\frac{3}{4}$  years at 4% p.a. The ratio of the second part to the first part is:

**Difficulty : Moderate**

**Average Time : 93 Seconds**

**Options :**



11 : 14

2. 11 : 13

3. 14 : 11

4. 13 : 11

**Solution :**

The correct answer is **option 3** i.e. **14 : 11**

Let the two parts be 'x' and '5000 - x'.

$$(x \times 21/5 \times 20/3)/100 = (2 \times (5000 - x) \times 11/4 \times 4)/100$$

On solving further we get,

$$x = 2200.$$

$$\text{Second part} = 5000 - 2200 = 2800$$

$$\text{Required ratio} = 2800 : 2200 = 14 : 11.$$

**Question 44 :**

The distance between two places A and B is 140 km. Two cars x and y start simultaneously from A and B respectively. If they move in the same direction, they meet after 7 hours. If they move towards each other, they meet after one hour. What is the speed (in km/h) of car y if its speed is more than that of car x?

**Difficulty : Moderate**

**Average Time : 54 Seconds**

**Options :**

1. 60

2. 100

3. 80

4. 90

5. 110

**Solution :**

The correct answer is **option 3** i.e. **80**.

Let the speed of Car x and y be 'a' and 'b' km/hr.

If they move in the same direction, they meet after 7 hours



$$140/(b - a) = 7$$

$$(b - a) = 20 \dots \dots \dots (1)$$

If they move towards each other, they meet after one hour,

$$140/(a + b) = 1$$

$$a + b = 140 \dots \dots \dots (2).$$

on adding eq (1) and (2) we get,

$$2b = 160$$

$$b = 80 \text{ km/hr.}$$

**Question 45 :**

Study the given pie charts and answer the question that follows. If the ratio of the number of boys to that of the girls who passed from institute A is 5 : 6 and 40% of the students who passed from institute D are boys, then the ratio of the number of boys who passed from institute A to that of boys who passed from institute D is:

**Difficulty : Moderate****Average Time : 64 Seconds****Options :**

1. 25 : 24
2. 4 : 3
3. 5 : 4
4. 3 : 2

**Solution :**

The correct answer is **option 3** i.e. **5 : 4**.

Number of students passed from institute A = 22% of 1200 = 264.

Number of boys and girls who passed from institute A ,

$$\text{Boys} = 5/11 \times 264 = 120$$

$$\text{Girls} = 6/11 \times 264 = 144.$$

Number of students passed from institute D = 20% of 1200 = 240

Number of boys = 40% of 240 = 96.

Number of girls = 240 - 96 = 144.



The ratio of the number of boys who passed from institute A to that of boys who passed from institute D is,

$$120 : 96 = 5 : 4.$$

**Question 46 :**

The value of  $(\frac{3}{70} + \frac{1}{42} + \frac{1}{66} + \frac{3}{286} + \frac{1}{130} + \frac{1}{170})$  is:

Difficulty : Moderate

Average Time : 51 Seconds

**Options :**

1.  $\frac{7}{85}$
2.  $\frac{11}{85}$
3.  $\frac{9}{85}$
4.  $\frac{3}{85}$

**Solution :**

The correct answer is **option 3** i.e.  $\frac{9}{85}$ .

$$\left(\frac{3}{70} + \frac{1}{42} + \frac{1}{66} + \frac{3}{286} + \frac{1}{130} + \frac{1}{170}\right)$$

$$\left(\frac{18+10}{420} + \frac{13+9}{858} + \frac{1}{130} + \frac{1}{170}\right)$$

$$\left(\frac{28}{420} + \frac{22}{858} + \frac{1}{130} + \frac{1}{170}\right)$$

$$\left(\frac{1}{15} + \frac{1}{39} + \frac{1}{130} + \frac{1}{170}\right)$$

$$\left(\frac{1}{15} + \frac{10+3}{390} + \frac{1}{170}\right)$$

$$\left(\frac{1}{15} + \frac{13}{390} + \frac{1}{170}\right)$$

$$\left(\frac{1}{15} + \frac{1}{30} + \frac{1}{170}\right)$$

$$\left(\frac{34+17+3}{510}\right)$$

$$\frac{54}{510}$$

$$9/85.$$

**Question 47 :**

The monthly salary of a person was Rs. 160000. He used to spend on three heads--- Personal and family expenses (P), Taxes (T) and Education load (E). The rest were his savings. P was 50% of the income, E was 20% of P, and T was 15%

of E. When his salary got raised by 30%, he maintained the percentage level of P, but E became 30% of P and T became 20% of E. The sum of the two savings (in Rs.) is:

**Difficulty : Moderate**

**Average Time : 80 Seconds**

**Options :**

1. 211680
2. 128160
3. 118620
4. 162810

**Solution :**

The correct answer is **option 2** i.e. **128160**

Salary of a person = 160000.

$P = 1/2 \times 160000 = 80000$ .

$E = 20\% \text{ of } 80000 = 16000$

$T = 15\% \text{ of } 16000 = 2400$ .

$\text{Savings} = 160000 - 80000 - 16000 - 2400 = 61600$

Now his income increased by 30%

$\text{New salary} = 160000 \times 130\% = 208000$ .

$\text{New } P = 50\% \text{ of } 208000 = 104000$ .

$\text{New } E = 30\% \text{ of } 104000 = 31200$

$\text{New } T = 20\% \text{ of } E = 31200 = 6240$ .

$\text{Savings} = 208000 - 104000 - 31200 - 6240 = 66560$ .

$\text{Total savings} = 61600 + 66560 = 128160$ .

**Question 48 :**

The radius of a spherical balloon is inflated from 7 cm to 10.5 cm. The percentage increase in its surface area is:

**Difficulty : Moderate**

**Average Time : 48 Seconds**

**Options :**



150%

2. 125%

3. 120%

4. 135%

**Solution :**

The correct answer is **option 2** i.e. **125%**

$$\text{Initial surface area} = 4 \times \frac{22}{7} \times 7 \times 7 = 616 \text{ cm}^2$$

$$\text{Final surface area} = 4 \times \frac{22}{7} \times 10.5 \times 10.5 = 1386 \text{ cm}^2.$$

$$\text{Increase in the surface area} = 1386 - 616 = 770.$$

$$\% \text{ increase} = \frac{770}{616} \times 100 = 125\%.$$

**Question 49 :**

The volume of a cylinder is 4312 cm<sup>3</sup>. Its curved surface area is one-third of its total surface area. Its curved surface area (in cm<sup>2</sup>) is:

**Difficulty : Moderate****Average Time : 43 Seconds****Options :**

1. 572

2. 528

3. 660

4. 616

**Solution :**

The correct answer is **option 4** i.e. **616**.

$$\text{CSA} : \text{TSA} = 1 : 3$$

$$(2\pi rh) : 2\pi r(h + r) = 1 : 3$$

$$h / (h + r) = 1 : 3$$

$$3h = h + r$$

$$2h = r$$

$$\pi r^2 h = 4312$$

$$\frac{22}{7} \times 2h \times 2h \times h = 4312$$

$$h = 7$$

$$r = 2 \times 7 = 14 \text{ cm.}$$

$$\text{Curved surface area} = (2\pi rh) = 2 \times \frac{22}{7} \times 14 \times 7 = 616 \text{ cm}^2.$$

**Question 50 :**

The graphs of the equations  $7x + 11y = 3$  and  $8x + y = 15$  intersect at the point P, which also lies on the graph of the equation:

**Difficulty : Moderate****Average Time : 53 Seconds****Options :**

1.  $2x + y = 2$
2.  $2x - y = 1$
3.  $3x + 5y = 1$
4.  $3x + 2y = 3$

**Solution :**

The correct answer is **option 3** i.e.  $3x + 5y = 1$ .

The line which passes through the intersection point of the given two lines will also be satisfied by the point of intersection.

$$7x + 11y = 3 \dots\dots\dots(1)$$

$$8x + y = 15 \dots\dots\dots(2)$$

On solving equation (1) and (2) we get,

$$x = 2 \text{ and } y = -1.$$

(2, -1) satisfy only option 3.

**Question 51 :**

A dealer gains 20% by selling an article at 25% discount on its marked price. If the cost price of the article is decreased by 15%. how much discount percentage should he now give on the same marked price so as to earn the same percentage of

profit as before?

**Difficulty : Moderate**

**Average Time : 57 Seconds**

**Options :**

1. 32.50%
2. 35%
3. 36.25%
4. 37.75%

**Solution :**

The correct answer is **option 3** i.e. **36.25%**.

Let the CP = 100x

SP = 100x × 120% = 120x.

MP = 120x × 100/75 = 160x.

Now the CP is decreased by 15%,

CP = 100x × 85% = 85x.

SP of an article to gain 20% = 85x × 120% = 102x.

Discount = 160x - 102x = 58x.

Discount% = 58x/160x × 100 = 36.25%.

**Question 52 :**

Study the given graph and answer the question that follows. The average production of cement by company B in 2015, 2016 and 2018 is what percentage less than the average production of cement by company C in 2015 and 2017?

**Difficulty : Moderate**

**Average Time : 51 Seconds**

**Options :**

1.  $7\left(\frac{3}{7}\right)\%$
2.  $7\left(\frac{1}{7}\right)\%$
3.  $5\left(\frac{1}{3}\right)\%$



$$6\left(\frac{2}{3}\right)\%$$

**Solution :**

The correct answer is **option 4** i.e.  $6\left(\frac{2}{3}\right)\%$

The average production of cement by company B in 2015, 2016 and 2018 =  $(150 + 180 + 300)/3 = 630/3 = 210$ .

The average production of cement by company C in 2015 and 2017 =  $(200 + 250)/2 = 450/2 = 225$ .

Required% =  $(225 - 210)/225 \times 100 = 6\left(\frac{2}{3}\right)\%$ .

**Question 53 :**

The total surface area of a solid hemisphere is 942 cm<sup>2</sup>. Its volume (in cm<sup>3</sup>) is closest to: (Take  $\pi = 3.14$ )

**Difficulty : Moderate****Average Time : 49 Seconds****Options :**

1. 2089
2. 2093
3. 2037
4. 2097

**Solution :**

The correct answer is **option 2** i.e. **2093**.

$$3\pi r^2 = 942$$

$$r = 10.$$

$$\text{Volume of the sphere} = \frac{2}{3} \times \pi \times 10 \times 10 \times 10 = 2093.33 \text{ cm}^3.$$

**Question 54 :**

Two pipes A and B can fill a tank in 12 minutes and 24 minutes, respectively, while a third pipe C can empty the full tank in 32 minutes. All the three pipes are opened simultaneously. However, pipe C is closed 2 minutes before the tank is filled. In how much time (in minutes) will the tank be full?



Difficulty : Moderate

Average Time : 50 Seconds

Options :

1. 9
2. 10
3. 12
4. 8

Solution :

The correct answer is **option 2** i.e. **10**.

Total work = LCM of (12, 24, 32) = 96 units.

Efficiency of A =  $96/12 = 8$  units/minutes.

Efficiency of B =  $96/24 = 4$  units/minutes.

Efficiency of C =  $96/32 = 3$  units/minutes.

Let the tank fill in 't' minutes.

Work done by A =  $8 \times t = 8t$ .

Work done by B =  $4 \times t = 4t$ .

Work done by C in (t - 2) minutes =  $3(t - 2)$

$$8t + 4t - 3t + 6 = 96$$

$$9t = 90$$

$$t = 90/9 = 10 \text{ minutes.}$$

Question 55 :

AB is a chord in the minor segment of a circle with centre O. C is a point on the minor arc (between A and B). The tangents to the circle at A and B meet at a point P. If  $(\text{ngle})ACB = 108^\circ$ , then  $(\text{ngle})APB$  is equal to:

Difficulty : Moderate

Average Time : 62 Seconds

Options :

1.  $36^\circ$
2.  $54^\circ$

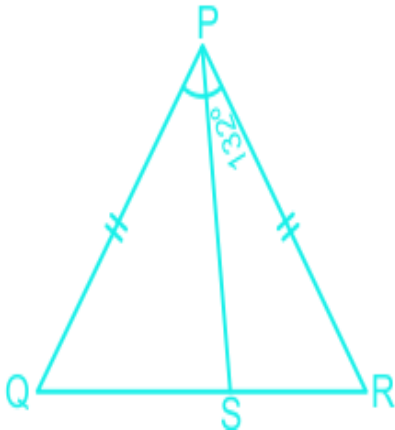


27°

4. 18°

**Solution :**

The correct answer is **option 1** i.e. **36°**.



$$\angle ACB = 108^\circ$$

$$\angle ACB + \angle ADB = 180^\circ$$

$$\angle ADB = 180 - 108 = 72^\circ.$$

$$\angle AOB = 2 \times \angle ADB$$

$$\angle AOB = 2 \times 72 = 144^\circ.$$

$$\angle AOB + \angle APB = 180$$

$$\angle APB = 180 - 144 = 36^\circ.$$

**Question 56 :**

A solid metallic sphere of radius 4 cm is melted and recast into spheres of 2 cm each. What is the ratio of the surface area of the original sphere to the sum of surface areas of the spheres, so formed?

**Difficulty : Moderate**

**Average Time : 67 Seconds**

**Options :**

1. 2 : 1

2. 2 : 3

3. 1 : 2

1 : 4

**Solution :**

The correct answer is **option 3** i.e. **1 : 2**

The volume of a big metallic sphere = Volume of n small metallic sphere

Number of small metallic sphere =  $(4 \times 4 \times 4)/(2 \times 2 \times 2) = 64/8 = 8$ .

The ratio of the surface area of a big sphere: Surface of 8 small surface area

=  $4 \times 4 : 8 \times 2 \times 2$

= 16 : 32

= 1 : 2.

**Question 57 :**

Two circles of radius 13 cm and 15 cm intersect each other at points A and B. If the length of the common chord is 24 cm, then what is the distance between their centres?

Difficulty : Moderate

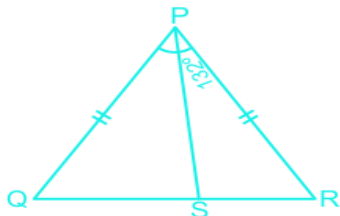
Average Time : 50 Seconds

**Options :**

1. 12 cm
2. 16 cm
3. 14 cm
4. 18 cm

**Solution :**

The correct answer is **option 3** i.e. **14 cm**.



From the figure,



Let C is the mid point of AB.

So one can say that,

$\triangle AOC$  and  $\triangle BOC$  are congruent

and  $\triangle AOC$  and  $\triangle BOC$  are congruent to each other.

Now one can say that OO' is a straight line.

in  $\triangle AOC$ ,

$$OC^2 = OA^2 - AC^2 = 169 - 144 = 25$$

$$OC = 5.$$

In  $\triangle AOC$ ,

$$OC^2 = O'A^2 - AC^2 = 225 - 144 = 81.$$

$$O'C = 9.$$

$$OO' = OC + O'C = 5 + 9 = 14 \text{ cm.}$$

**Question 58 :**

The value of  $15 \div 8 - \frac{5}{4}$  of  $(\frac{8}{3} \times \frac{9}{16}) + (\frac{9}{8} \times \frac{3}{4}) - (\frac{5}{32} \div \frac{5}{7}) + \frac{3}{8}$

**Difficulty : Moderate****Average Time : 80 Seconds****Options :**

1. 0

2. 1

3. 2

4. 3

**Solution :**

The correct answer is **option 2** i.e. **1**.

$$15 \div 8 - \frac{5}{4} \text{ of } \left( \frac{8}{3} \times \frac{9}{16} \right) + \left( \frac{9}{8} \times \frac{3}{4} \right) - \left( \frac{5}{32} \div \frac{5}{7} \right) + \frac{3}{8}$$

$$15 \div 8 - \frac{5}{4} \text{ of } \left( \frac{8}{3} \times \frac{9}{16} \right) + \left( \frac{9}{8} \times \frac{3}{4} \right) - \left( \frac{5}{32} \times \frac{7}{5} \right) + \frac{3}{8}$$



$$15 \div 8 - \left(\frac{5}{4}\right) \text{ of } \left(\left(\frac{3}{2}\right) + \left(\frac{27}{32}\right) - \left(\frac{7}{32}\right) + \frac{3}{8}\right)$$

$$15/8 - \left(\frac{15}{8}\right) + \left(\frac{27}{32}\right) - \left(\frac{7}{32}\right) + \frac{3}{8}$$

$$32/32$$

$$= 1.$$

**Question 59 :**

By selling an article for Rs. 2200, a profit of 10% is earned. If the same article is sold for Rs. 2600, then what will be the gain percentage?

**Difficulty : Moderate****Average Time : 66 Seconds****Options :**

1. 20%
2. 15%
3. 37%
4. 30%

**Solution :**

The correct answer is **option 4** i.e. **30%**

By selling an article for Rs. 2200, a profit of 10% is earned,

$$\text{CP of an article} = 2200 \times 100/110 = 2000.$$

Now the selling price of an article = 2600

$$\text{Profit \%} = 600/2000 \times 100 = 30\%.$$

**Question 60 :**

If  $(\sqrt{1+\sqrt{3}})^2 - \sqrt{1-\sqrt{3}} = C$ , such that  $c > 0$ , then find the value of  $c$

**Difficulty : Moderate****Average Time : 40 Seconds****Options :**

1. 1
2. 4
3. 3



2

**Solution :**

The correct answer is **option 1** i.e. **1**.

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

On squaring both sides we get,

$$C^2 = 1 + \left(\frac{\sqrt{3}}{2}\right) + 1 - \left(\frac{\sqrt{3}}{2}\right) - 2 \times \left(\sqrt{\left(1 + \frac{\sqrt{3}}{2}\right) \times \left(1 - \frac{\sqrt{3}}{2}\right)}\right)$$

$$C^2 = 2 - 1$$

$$C^2 = 1$$

$$C = +1, -1.$$

as  $c > 0$ ,  $c = 1$

**Question 61 :**

A dealer offers a cash discount of 20% and still makes a profit of 20%. If he further sells 8 articles at a rate of 6 articles, then how much percentage above the cost price does he mark on each article?

**Difficulty : Moderate****Average Time : 58 Seconds****Options :**

1. 77.5%

2. 100%

3. 112.5%

4. 87.5%

**Solution :**

The correct answer is **option 2** i.e. **100%**

Let the CP of an article be 100x.

SP of an article to get the profit of 20% = 120x.

Loss incurred by selling 8 articles at the rate of 6 articles =  $(8 - 6)/8 \times 100 = 25\%$

Selling price of the article before incurred loss =  $120 \times 100/75 = 160x$ .



MP of the article before discount of 20% =  $160x \times 100/80 = 200x$ .

Required % =  $(200x - 100x)/100x \times 100 = 100\%$ .

**Question 62 :**

Let p, q, r and s be positive natural numbers having three exact factors including 1 and the number itself. If  $q > p$  and both are two digit numbers, and  $r > s$  and both are one-digit numbers, then the value of the expression  $(\frac{p-q-1}{r-s})$  is:

Difficulty : Moderate

Average Time : 58 Seconds

**Options :**

1. -s-1
2. s-1
3. 1-s
4. s+1

**Solution :**

The correct answer is **option 1** i.e. -s-1

One can solve this by hit and trial,

Having only three-factor means the number must be a square of a prime number.

$r > s$  and both are one - digit numbers,

The only possible value of r and s is 9 and 4.

If  $q > p$  and both are two-digit numbers, then the only possible value of p and q is 49 and 25

$$\left(\frac{p-q-1}{r-s}\right) = (25 - 49 - 1)/(9 - 4)$$

$$= -25/5 = -5$$

$$-5 = -4 - 1$$

$$-5 = -s - 1.$$

**Question 63 :**

A sum of Rs. 50250 is divided into two parts such that the simple interest on the first part for  $7\frac{1}{2}$  years at  $8\frac{1}{3}\%$  p.a. is  $\frac{5}{2}$  times the simple interest on the second part for  $5\frac{1}{4}$  years at 8% p.a. What is the difference (in Rs.) between the two parts?

Difficulty : Moderate

Average Time : 71 Seconds

**Options :**

1. 10275
2. 12750
3. 12570
4. 15270

**Solution :**

The correct answer is **option 2** i.e. **12750**.

Let the two parts be 'x' and  $(50250 - x)$

$$(x \times 15/2 \times 25/3)/100 = 5/2 \times [(50250 - x) \times 21/4 \times 8]/100$$

$$25x = (50250 - x) \times 42$$

$$x = 31500$$

$$\text{Second part} = 50250 - 31500 = 18750$$

$$\text{Difference of both the parts} = 31500 - 18750 = 12750.$$

**Question 64 :**

If  $27x^3 - 64y^3 = (Ax + By)(Cx^3 - Dy^2 + 12xy)$ , then the value of  $4A + B + 3C + 2D$  is:

Difficulty : Moderate

Average Time : 43 Seconds

**Options :**

1. 5
2. 3
3. -3
4. -4

**Solution :**

The correct answer is **option 2** i.e. **3**.

$$27x^3 - 64y^3 = (Ax + By)(Cx^2 - Dy^2 + 12xy)$$

$$(3x)^3 - (4y)^3 = (3x - 4y)(9x^2 + 16y^2 + 12xy)$$

$$(3x - 4y)(9x^2 + 16y^2 + 12xy) = (Ax + By)(Cx^2 - Dy^2 + 12xy)$$

On comparing we get,

$$A = 3, B = -4, C = 9 \text{ and } D = -16.$$

$$4A + B + 3C + 2D$$

$$= 4 \times 3 - 4 + 3 \times 9 + 2 \times -16$$

$$= 12 - 4 + 27 - 32$$

$$= 3.$$

**Question 65 :**

The expression  $(\frac{\cos^4 \theta - \sin^4 \theta}{\cos \theta + \sin \theta} + 2 \sin^2 \theta + 3) \{(\operatorname{cosec} \theta + \cot \theta + 1)(\operatorname{cosec} \theta - \cot \theta + 1)\}$ ,  $0^\circ < \theta < 90^\circ$  is equal to:

**Difficulty : Moderate**

**Average Time : 58 Seconds**

**Options :**

1.  $\frac{1}{2} \sin \theta$
2.  $2 \sin \theta$
3.  $\sec \theta$
4.  $2 \operatorname{cosec} \theta$

**Solution :**

The correct answer is **option 2** i.e.  **$2 \sin \theta$**

$$\frac{\cos^4 \theta - \sin^4 \theta}{\cos \theta + \sin \theta} + 2 \sin^2 \theta + 3 \{(\operatorname{cosec} \theta + \cot \theta + 1)(\operatorname{cosec} \theta - \cot \theta + 1)\},$$
$$0^\circ < \theta < 90^\circ = \frac{(\cos^2 \theta)^2 - (\sin^2 \theta)^2}{\cos \theta + \sin \theta} + 2 \sin^2 \theta + 3 \{(\operatorname{cosec} \theta + 1 + \cot \theta)(\operatorname{cosec} \theta + 1 - \cot \theta)\}$$

$$= \frac{1 + 3}{(\operatorname{cosec} \theta + 1)^2 - (\cot \theta)^2}$$

$$= \frac{4}{(\operatorname{cosec}^2 \theta + 1 + 2 \operatorname{cosec} \theta) - (\cot^2 \theta)}$$





$$= (4)/(2 \operatorname{cosec}(\theta))$$

$$= 2 \sin(\theta).$$

**Question 66 :**

The value of  $(0.3)^{\left[\frac{(200-146)}{(3 \times 3 \times 3)} - 3\right]}$  is:

**Difficulty : Moderate**

**Average Time : 63 Seconds**

**Options :**

1.  $\frac{10}{3}$
2.  $\frac{5}{3}$
3.  $\frac{7}{3}$
4.  $\frac{8}{3}$

**Solution :**

The correct answer is **option 1** i.e.  $\frac{10}{3}$

$$(0.3)^{\left[\frac{(200-146)}{(3 \times 3 \times 3)} - 3\right]} = (0.3)^{\left[\frac{54}{27} - 3\right]}$$

$$= (0.3)^{-1} = 10/3.$$

**Question 67 :**

The expression  $\frac{\{(1 - \sin \theta + \cos \theta)^2 (1 - \cos \theta) \sec^3 \theta \operatorname{cosec}^2 \theta\} \{(\sec \theta - \tan \theta)(\tan \theta + \cot \theta)\}}{\theta^0 \theta^9 \theta^0}$  is equal to:

**Difficulty : Moderate**

**Average Time : 47 Seconds**

**Options :**

1.  $\sin \theta$
2.  $2 \cos \theta$
3.  $\cot \theta$
4.  $2 \tan \theta$

**Solution :**

The correct answer is **option 4** i.e.  $2 \tan \theta$

Shortcut = Put  $\theta = 45^\circ$ .

$$\frac{\{(1 - \sin \theta + \cos \theta)^2 (1 - \cos \theta) \sec^3 \theta \operatorname{cosec}^2 \theta\} \{(\sec \theta - \tan \theta)(\tan \theta + \cot \theta)\}}{\theta^0 \theta^9 \theta^0}$$

$\sin^2 \theta + \cos^2 \theta = 1$

$$\left(1 - \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}\right)^2 + \left(1 - \frac{1}{\sqrt{2}}\right)^2 = 2 \left(1 - \frac{1}{\sqrt{2}}\right)^2 + \frac{1}{2} \left(1 - \frac{1}{\sqrt{2}}\right)^2 = \frac{5}{2} \left(1 - \frac{1}{\sqrt{2}}\right)^2$$

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

Now put  $\theta = 45^\circ$  in options

option 1 =  $\sin \theta = \frac{1}{\sqrt{2}}$

option 2 =  $2 \cos \theta = \sqrt{2}$

option 3 =  $\cot \theta = \frac{1}{\sqrt{2}}$

option 4 =  $2 \tan \theta = 2$  ( matches with our answer).

**Question 68 :**

In  $\triangle ABC$ ,  $\angle A = 50^\circ$ , BE and CF are perpendiculars on AC and AB at E and F, respectively BE and CF intersect at H. The bisectors of  $\angle HBC$  and  $\angle HCB$  intersect at P.  $\angle BPC$  is equal to:

Difficulty : Moderate

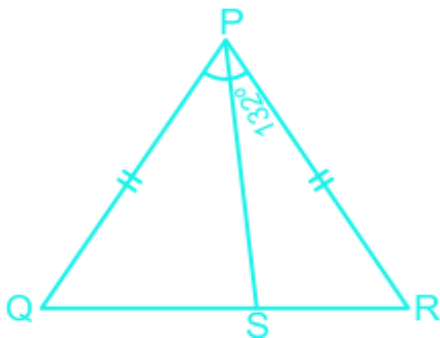
Average Time : 95 Seconds

Options :

1.  $155^\circ$
2.  $100^\circ$
3.  $115^\circ$
4.  $120^\circ$

**Solution :**

The correct answer is **option 1** i.e.  $155^\circ$



In Quadrilateral AFHE,



$$50 + 90 + 90 + \angle FHE = 360$$

$$\angle FHE = 180 - 50 = 130^\circ$$

$$\angle FHE = \angle BHC = 130^\circ \text{ (VOA)}$$

$$\angle BPC = 90 + \frac{1}{2} \times 130 = 90 + 65 = 155^\circ.$$

### Question 69 :

If  $(\frac{\sqrt{26-7\sqrt{3}}}{\sqrt{14+5\sqrt{3}}}) = \frac{b+a\sqrt{3}}{11}$ ,  $b > 0$  then what is the value of  $(\sqrt{b-a})$ ?

Difficulty : Moderate

Average Time : 53 Seconds

### Options :

1. 5
2. 25
3. 12
4. 9

### Solution :

The correct answer is **option 1** i.e. **5**.

$$\left(\frac{\sqrt{26-7\sqrt{3}}}{\sqrt{14+5\sqrt{3}}}\right) = \frac{b+a\sqrt{3}}{11}$$

On rationalization of the LHS part we get,

$$\left(\frac{\sqrt{26-7\sqrt{3}}}{\sqrt{14+5\sqrt{3}}}\right) \times \sqrt{\frac{14-5\sqrt{3}}{14-5\sqrt{3}}}$$

$$\left(\frac{\sqrt{364 - 130\sqrt{3} - 98\sqrt{3} + 105}}{\sqrt{196 - 75}}\right) = \left(\frac{b+a\sqrt{3}}{11}\right)$$

$$\left(\frac{\sqrt{469 - 228\sqrt{3}}}{11}\right) = \frac{b+a\sqrt{3}}{11}$$

On squaring both sides we get,

$$469 - 228\sqrt{3} = b^2 + 3a^2 + 2ab\sqrt{3}.$$

$$(19)^2 + 3(-6)^2 + 2 \times 19 \times (-6) = b^2 + 3a^2 + 2ab\sqrt{3}.$$

on comparing we get,

$$a = -6 \text{ and } b = 19,$$

$$\sqrt{b-a} = \sqrt{19-(-6)} = 5.$$

### Question 70 :



Study the given pie charts and answer the question that follows. The number of students who passed from institute C exceeds the number of students who appeared from institute E is  $x$ . The value of  $x$  lies between:

**Difficulty : Moderate**

**Average Time : 79 Seconds**

**Options :**

1. 18 and 22
2. 14 and 18
3. 10 and 14
4. 22 and 26

**Solution :**

The correct answer is **option 2** i.e. **14 and 18**

The number of students who passed from institute C =  $1200 \times 18\% = 216$ .

The number of students who appeared from institute E =  $\frac{40}{360} \times 1800 = 200$

$216 - 200 = 16$ .

$x = 16$ .

**Question 71 :**

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

**Difficulty : Moderate**

**Average Time : 46 Seconds**

**Options :**

1.  $\frac{2\sqrt{3}}{27}$
2.  $\frac{5\sqrt{3}}{27}$
3.  $\frac{2\sqrt{3}}{9}$
4.  $\frac{7\sqrt{3}}{54}$

**Solution :**

The correct answer is **option 4** i.e.  $\frac{7\sqrt{3}}{54}$



$$\frac{\sin^2 \theta}{\cos^2 \theta - 3 \cos \theta + 2} = 1$$

$$\sin^2 \theta = \cos^2 \theta - 3 \cos \theta + 2$$

$$\sin^2 \theta = \cos^2 \theta - 3 \cos \theta + 2(\sin^2 \theta + \cos^2 \theta)$$

$$\sin^2 \theta + 3 \cos^2 \theta - 3 \cos \theta = 0$$

$$(1 + \cos \theta)(1 - \cos \theta) + 3 \cos \theta(\cos \theta - 1) = 0$$

$$(1 - \cos \theta)(1 - 2 \cos \theta) = 0$$

$$\cos \theta = 1 \text{ and } \cos \theta = 1/2$$

$$\theta = 0^\circ \text{ and } 60^\circ$$

$$\frac{\tan^2 \theta + \sin^2 \theta}{\tan \theta + \sin \theta} = \frac{\tan^2 60^\circ + \sin^2 60^\circ}{\tan 60^\circ + \sin 60^\circ}$$

$$\frac{(\frac{1}{\sqrt{3}})^2 + (\frac{1}{2})^2}{\frac{1}{\sqrt{3}} + \frac{1}{2}} = \frac{7\sqrt{3}}{54}$$

### Question 72 :

Study the given pie charts and answer the question that follows. The number of students who appeared from institute B is what percentage more than the total number of students who passed from institutes A and C?

Difficulty : Moderate

Average Time : 113 Seconds

### Options :

1.  $16\frac{2}{3}\%$
2.  $15\frac{1}{3}\%$
3.  $14\frac{1}{7}\%$
4.  $7\frac{2}{7}\%$

### Solution :

The correct answer is **option 1** i.e.  $16\frac{2}{3}\%$

The number of students who appeared from institute B =  $\frac{112}{360} \times 1800 = 560$

The total number of students who passed from institutes A and C =  $(22\% + 18\%)$  of 1200.

$$1200 \times \frac{40}{100} = 480$$

$$\text{Required \%} = \frac{560 - 480}{480} \times 100 = 16\frac{2}{3}\%$$

**Question 73 :**

Three sides of a triangle are  $(\sqrt{a^2+b^2})$ ,  $(\sqrt{(2a)^2+b^2})$  and  $(\sqrt{a^2+(2b)^2})$  units. What is the area (in unit squares) of the triangle?

**Difficulty : Moderate****Average Time : 53 Seconds****Options :**

1.  $\frac{5}{2}ab$
2.  $3ab$
3.  $4ab$
4.  $\frac{3}{2}ab$

**Solution :**

The correct answer is **option 4** i.e.  $\frac{3}{2}ab$

Here we don't know anything about the values of a and b so let's suppose,

a = b then the respective sides become,

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

$$\sqrt{(2a)^2 + b^2} = \sqrt{4a^2 + a^2} = \sqrt{5a}$$

$$\sqrt{a^2 + (2b)^2} = \sqrt{a^2 + 4a^2} = \sqrt{5a}$$

Now one can say that the triangle must be an isosceles triangle.

$$\text{Area of an isosceles triangle} = \frac{b}{4} \times \sqrt{4a^2 - b^2}$$

$$\frac{\sqrt{2}a}{4} \times \sqrt{4 \times (\sqrt{5a})^2 - (\sqrt{2a})^2}$$

$$= \frac{3}{2} \times a^2 = \frac{3}{2} ab.$$

**Question 74 :**

If  $(\frac{\sqrt{38-5\sqrt{3}}}{\sqrt{26+7\sqrt{3}}}) = \frac{a+b\sqrt{3}}{23}$ ,  $b > 0$  , then the value of  $(b - a)$  is:

**Difficulty : Moderate****Average Time : 71 Seconds****Options :**

1. 7
2. 18



29

4. 11

**Solution :**

The correct answer is **option 3** i.e. **29**.

$$\frac{\sqrt{38-5\sqrt{3}}}{\sqrt{26+7\sqrt{3}}} = \frac{a+b\sqrt{3}}{23}$$

On rationalizing the LHS part we get,

$$\frac{\sqrt{38-5\sqrt{3}}}{\sqrt{26+7\sqrt{3}}} \times \sqrt{\frac{26-7\sqrt{3}}{26-7\sqrt{3}}}$$

$$\sqrt{\frac{1093 - 396\sqrt{3}}{529}} = \frac{a + b\sqrt{3}}{23}$$

$$\sqrt{1093 - 396\sqrt{3}} = a + b\sqrt{3}$$

On squaring both sides we get,

$$1093 - 396(\sqrt{3}) = a^2 + 3b^2 + 2ab(\sqrt{3})$$

On factorizing the given expression we get,

$$(-11)^2 + (18)^2 - 2 \times -11 \times 18 = a^2 + 3b^2 + 2ab(\sqrt{3})$$

On comparing we get,

$$a = -11 \text{ and } b = 18$$

$$b - a = 18 - (-11) = 29.$$

**Question 75 :**

In an examination, the number of students who passed and the number of students who failed were in the ratio 25 : 4. If one more student had appeared and passed and the number of failed students was 3 less than earlier, the ratio of passed students to failed students would have become 22 : 3. What is the difference between the number of students who, initially, passed the examination and the number of students who failed the examination?

**Difficulty : Moderate****Average Time : 86 Seconds****Options :**

1. 132
2. 126
3. 174
4. 150

**Solution :**

The correct answer is **option 2** i.e. **126**.

Let the number of students who passed be  $25x$  and the number of students who failed be  $4x$ .

Total student =  $25x + 4x = 29x$ .

1 student joins and pass the examination,

Total student =  $29x + 1$

Failed students =  $4x - 3$

Passed students =  $29x + 1 - 4x + 3 = 25x + 4$ .

According to the question,

$$(25x + 4)/(4x - 3) = 22/3$$

$$x = 6.$$

Required difference =  $25x - 4x = 21x$

$$21x = 21 \times 6 = 126.$$

**Question 76 :**

What is the area (in unit squares) of the triangle enclosed by the graphs of  $2x + 5y = 12$ ,  $x + y = 3$  and the  $x$  - axis?

**Difficulty :** Moderate

**Average Time :** 53 Seconds

**Options :**

1. 2.5

2. 3.5

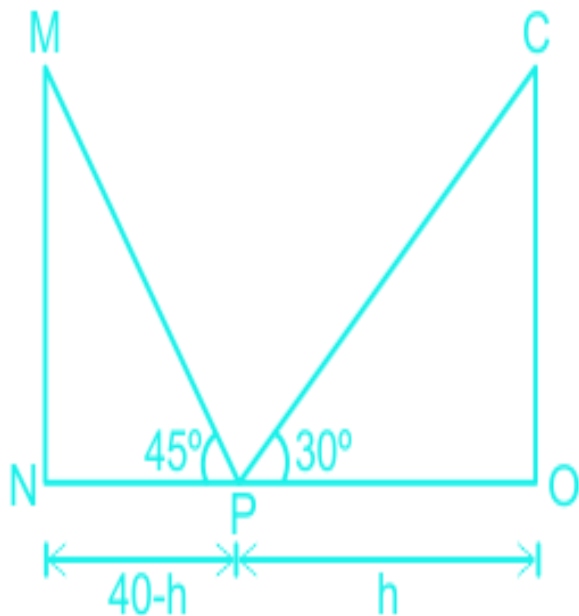
3. 3

4. 4

**Solution :**

The correct answer is **option 3** i.e. **3**





For  $2x + 5y = 12$ ,

x	1	6
y	2	0

$x + y = 3$

x	0	3
y	3	0

$y = 0$

Co - ordinates of the triangle,

(1,2) , (3,0) and (6,0)

Area of triangle =  $\frac{1}{2} \times \text{base} \times \text{height}$ .

$$\frac{1}{2} \times 3 \times 2 = 3 \text{ unit}^2.$$

**Question 77 :**

In  $(\Delta)PQR$ , the bisector of  $(\text{ngle})R$  meets side  $PQ$  at  $S$ ,  $PR = 10\text{cm}$ ,  $RQ = 14 \text{ cm}$  and  $PQ = 12 \text{ cm}$ . What is the length of  $SQ$ ?

Difficulty : Moderate

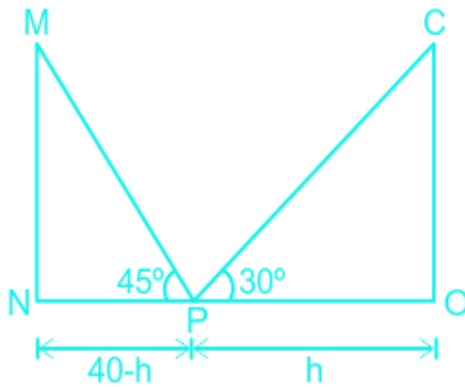
Average Time : 66 Seconds

Options :

1. 5 cm
2. 6 cm
3. 7 cm
4. 8 cm

Solution :

The correct answer is **option 3** i.e. **7 cm**.



By using the angle bisector theorem we get,

$$PR/PQ = PS/SQ$$

$$10/14 = (x - 12)/x$$

$$10x = 14x - 168$$

$$24x = 168$$

$$x = 7.$$

Question 78 :

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

Difficulty : Moderate

Average Time : 46 Seconds

Options :

1. 749

843

3. 746

4. 849

**Solution :**The correct answer is **option 2** i.e. **843**

$$x + 1/x = 3 \dots\dots\dots(1)$$

On squaring both sides we get,

$$x^2 + 1/x^2 + 2 = 9$$

$$x^2 + 1/x^2 = 7 \dots\dots\dots(2)$$

on squaring both sides we get,

$$x^4 + 1/x^4 + 2 = 49$$

$$x^4 + 1/x^4 = 49 - 2$$

$$x^4 + 1/x^4 = 47 \dots\dots\dots(3)$$

$$x + 1/x = 3$$

On cubing both sides we get,

$$x^3 + 1/x^3 + 3(3) = 27$$

$$x^3 + 1/x^3 = 27 - 9 = 18 \dots\dots\dots(4)$$

On multiplying eq (3) and (4)

$$(x^4 + 1/x^4)(x^3 + 1/x^3) = 47 \times 18$$

$$x^7 + 1/x^7 + x + 1/x = 846.$$

$$x^7 + 1/x^7 = 846 - 3 = 843.$$

**Question 79 :**

In equilateral (Delta)ABC, D and E are points on the sides AB and AC, respectively, such that AD = CE. BE and CD intersect at F. The measure (in degrees) of (ngle)CFB is:

Difficulty : Moderate

Average Time : 71 Seconds

Options :

120°

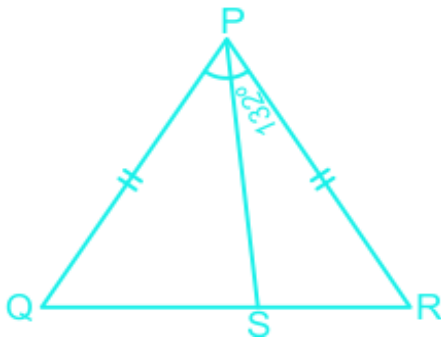
2. 135°

3. 125°

4. 105°

**Solution :**

The correct answer is **option 1** i.e. **120°**.



In  $\triangle ADC$  and  $\triangle BEC$ ,

$AD = EC$  (given),  $\angle BAE = \angle BCE$  and  $AC = BC$ .

So  $\triangle ADC$  and  $\triangle BEC$  are congruent to each other.

So,  $\angle EBC$  and  $\angle DCA$  are equal (let  $\theta$ )

$\angle FCB = 60 - \theta$ .

By using the triangle sum property in  $\triangle BFC$  we get,

$$\angle BFC + \angle FCB + \angle FBC = 180^\circ$$

$$\angle BFC = 180 - \theta - 60 + \theta$$

$$\angle BFC = 120^\circ$$

**Question 80 :**

The volume of a right circular cone is  $308 \text{ cm}^3$  and the radius of its base is  $7 \text{ cm}$ . What is the curved surface area (in  $\text{cm}^2$ ) of the cone? (Take  $\pi = \frac{22}{7}$ )

Difficulty : Moderate

Average Time : 89 Seconds

Options :



$$22\sqrt{21}$$

2.  $44\sqrt{21}$

3.  $22\sqrt{85}$

4.  $11\sqrt{85}$

**Solution :**

The correct answer is **option 3** i.e.  $22\sqrt{85}$

Here it is given that,

The volume of a right circular cone is  $308 \text{ cm}^3$ .

$$\frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times h = 308$$

$$h = 6$$

$$\text{Slant height} = \sqrt{r^2 + h^2} = \sqrt{7^2 + 6^2} = \sqrt{85}$$

$$\text{Curved surface area of cone} = \frac{22}{7} \times 7 \times \sqrt{85} = 22\sqrt{85}.$$

**Question 81 :**

In  $(\Delta)ABC$ , D is a point on BC such that  $(\angle)ADB = 2(\angle)DAC$ ,  $(\angle)BAC = 70^\circ$  and  $(\angle)B = 56^\circ$ . What is the measure of  $(\angle)ADC$ ?

**Difficulty :** Moderate

**Average Time :** 60 Seconds

**Options :**

1.  $72^\circ$

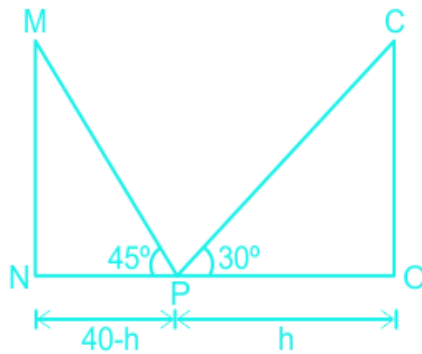
2.  $54^\circ$

3.  $74^\circ$

4.  $81^\circ$

**Solution :**

The correct answer is **option 1** i.e.  $72^\circ$



In  $\triangle ABC$ ,

$$\angle A + \angle B + \angle C = 180$$

$$70 + 56 + \angle C = 180$$

$$\angle C = 180 - 126 = 54^\circ$$

$$\angle ADB = \angle DAC + \angle ACD \text{ (Exterior angle sum property)}$$

$$2\theta = \theta + 54$$

$$\theta = 54^\circ$$

$$\angle ADC = 180 - 2\theta \text{ (Linear pair with } \angle ADB)$$

$$\angle ADC = 180 - 108 = 72^\circ$$

### Question 82 :

The ratio of the investments of A and B in a business is 7 : 5, and the ratio of their profits at the end of a year is 2 : 5. If A invested the money for 6 months, then for how much time (in months) has B invested his money?

Difficulty : Moderate

Average Time : 84 Seconds

### Options :

1. 12

2. 21

3. 24

4. 18

### Solution :

The correct answer is **option 2** i.e. **21**.



We know that,

Profit's share = Amount invested  $\times$  Time period

Let the amount invested by A and B be  $7x$  and  $5x$

The profit share of A and B be  $2y$  and  $5y$ .

Let B invest the money for  $a$  years.

$$7x \times 6 = 2y$$

$$x/y = 1/21 \dots \dots (1)$$

$$5x \times a = 5y$$

$$x/y = 1/a \dots \dots (2)$$

On comparing equation (1) and (2) we get,

$$1/21 = 1/a$$

$$a = 21 \text{ months.}$$

**Question 83 :**

A cylindrical tube, open at both ends, is made of a metal sheet which is 0.5 cm thick. Its outer radius is 4 cm and length is 2m. How much metal (in  $\text{cm}^3$ ) has been used in making the tube?

**Difficulty :** Moderate

**Average Time :** 60 Seconds

**Options :**

1.  $800 \sqrt{\pi}$
2.  $450 \sqrt{\pi}$
3.  $750 \sqrt{\pi}$
4.  $550 \sqrt{\pi}$

**Solution :**

The correct answer is **option 3** i.e.  $750 \sqrt{\pi}$

Outer radius (R) = 4 cm.

Inner radius (r) =  $4 - 0.5 = 3.5$  cm.

Length of the cylinder =  $2\text{m} = 2 \times 100 = 200$  cm.



The volume of the metal sheet is used =  $\pi(R^2 - r^2)h$

$$= \pi(16 - 12.25) \times 200 = 750\pi$$

**Question 84 :**

A vessel contained a solution of acid and water, in which water was 64%. Four litres of the solution was taken out of the vessel and the same quantity of water was added. If the resulting solution contains 30% acid, the quantity (in litres) of the water in the solution, at the beginning in the vessel, was:

**Difficulty : Moderate****Average Time : 64 Seconds****Options :**

1. 11.36
2. 15.36
3. 8.64
4. 12.64

**Solution :**

The correct answer is **option 2** i.e. **15.36**

Let the initial solution of the solution be 100a.

Quantity of Water = 64a.

Quantity of Acid = 36a.

According to the question,

Quantity of water in 4 litre solution =  $4 \times 64/100 = 2.56$  litres

Quantity of water in the final solution =  $64a - 2.56 + 4 = (64a + 1.44)$

Quantity of Acid in the mixture after replacement =  $(36a - 1.44)$ .

According to the question,

$$(64a + 1.44)/(36a - 1.44) = 7/3$$

On solving this equation we get,

$$a = 0.24$$

Quantity of water in the beginning =  $64a = 64 \times 0.24 = 15.36$  litres.

**Question 85 :**



If  $x^4 + y^4 + x^2y^2 = 17\left(\frac{1}{16}\right)$  and  $x^2 - xy + y^2 = 5\left(\frac{1}{4}\right)$ , then one of the values of  $(x - y)$  is:

Difficulty : Moderate

Average Time : 58 Seconds

Options :

1.  $\left(\frac{5}{2}\right)$
2.  $\left(\frac{3}{4}\right)$
3.  $\left(\frac{5}{4}\right)$
4.  $\left(\frac{3}{2}\right)$

Solution :

The correct answer is **option 1** i.e.  $\left(\frac{5}{2}\right)$

$$x^2 - xy + y^2 = 5\left(\frac{1}{4}\right) \dots\dots\dots(1)$$

$$(x^4 + y^4 + x^2y^2) = (x^2 - xy + y^2)(x^2 + xy + y^2)$$

$$(x^2 + xy + y^2) = (273/16)/(21/4)$$

$$(x^2 + xy + y^2) = 3.25\dots\dots\dots(2)$$

Subtract eq (1) from (2) we get,

$$-2xy = 2$$

$$xy = -1.$$

Put the value of  $xy$  in eq (1) we get,

$$x^2 + y^2 = 21/4 - 1$$

$$x^2 + y^2 - 2xy + 2xy = 17/4$$

$$(x - y)^2 = 17/4 + 2 = 25/2$$

$$x - y = 5/2.$$

**Question 86 :**

The base of a right pyramid is a square of side  $8(\sqrt{2})$  cm and each of its slant edges is of the length of 10 cm. What is the volume (in  $\text{cm}^3$ ) of the pyramid?

Difficulty : Moderate

Average Time : 75 Seconds

Options :

256

2. 224

3.  $426\left(\frac{2}{3}\right)$ 4.  $96\left(\sqrt{2}\right)$ **Solution :**

The correct answer is **option 1** i.e. **256**.

Diagonal of a square =  $8\left(\sqrt{2}\right) \times \left(\sqrt{2}\right) = 16$

Half of the diagonal of square =  $\frac{1}{2} \times 16 = 8$  cm.

The slant height( hypotenuse) is 10 cm and the base is 8 cm.

(Height of the pyramid)<sup>2</sup> =  $10^2 - 8^2 = 100 - 64 = 36$

h = 6 cm.

Volume of the pyramid =  $\frac{1}{3} \times$  Area of base  $\times$  height of the pyramid

$V = \frac{1}{3} \times 8\left(\sqrt{2}\right) \times 8\left(\sqrt{2}\right) \times 6 = 256 \text{ cm}^3$ .

**Question 87 :**

The base of a right prism is a triangle whose sides are 8 cm, 15 cm and 17 cm, and its lateral surface area is 480 cm<sup>2</sup>. What is the volume (in cm<sup>3</sup>) of the prism?

**Difficulty : Moderate****Average Time : 66 Seconds****Options :**

1. 540

2. 600

3. 720

4. 640

**Solution :**



The correct answer is **option 3** i.e. **720**.

(8 - 15 - 17) are pythagorean triplet.

The perimeter of the triangle =  $8 + 15 + 17 = 40$

Let the height of the prism be 'h'.

$40 \times h = 480$ .

$h = 12$  cm.

Area of base =  $\frac{1}{2} \times 8 \times 15 = 60$  cm<sup>2</sup>.

Volume of prism = Area of base  $\times$  height

$V = 60 \times 40 = 2400$  cm<sup>3</sup>.

**Question 88 :**

X and Y travel a distance of 90 km each such that the speed of Y is greater than that of X. The sum of their speeds is 100 km/h and the total time taken by both is 3 hours 45 minutes. The ratio of the speed of X to that of Y is:

**Difficulty : Moderate**

**Average Time : 55 Seconds**

**Options :**

1. 2 : 3
2. 1 : 3
3. 2 : 4
4. 1 : 4
5. 3 : 2

**Solution :**

The correct answer is **option 1** i.e. **2 : 3**.

Let the speed of X and Y be 'a' and 'b' km/hr where  $b > a$ .

$a + b = 100$  km/hr.

$\frac{90}{b} + \frac{90}{a} = \frac{15}{4}$

$\frac{[90(a + b)]}{ab} = \frac{15}{4}$

$\frac{(90 \times 100)}{ab} = \frac{15}{4}$



$$a^2 - 100a + 2400 = 0$$

$$(a - 60)(a - 40) = 0$$

$$a = 60, 40.$$

If  $a = 60$  then  $b = 40$  which is not possible.

If  $a = 40$  then  $b = 60$ .

Ratio of speed of X and Y =  $a : b = 40 : 60 = 2 : 3$ .

**Question 89 :**

Pipes A, B and C can fill a tank in 20, 30 and 60 hours, respectively. Pipes A, B and C are opened at 7 a.m., 8 a.m. and 9 a.m. respectively, on the same day. When will the tank be full?

**Difficulty : Moderate**

**Average Time : 59 Seconds**

**Options :**

1. 4:40 p.m.
2. 5:40 p.m.
3. 6:20 p.m.
4. 7:20 p.m.

**Solution :**

The correct answer is **option 2** i.e. **5:40 p.m.**

Pipes A, B and C can fill a tank in 20, 30 and 60 hours.

Let the total work will be LCM of (20, 30, 60) = 60 units.

Efficiency of A =  $60/20 = 3$  units/ hour.

Efficiency of B =  $60/30 = 2$  units/ hour

Efficiency of C =  $60/60 = 1$  units/hour.

Work done by A till 9 am =  $3 \times 2 = 6$  units

Work done by B till 9 am = 2 units.

Total work done till 9am =  $6 + 2 = 8$  units

Remaining work =  $60 - 8 = 52$ .

Time taken by all the pipes to fill the tank =  $52/6 = 8$  hours and 40 minutes.

9 am + 8 hours 40 minutes = 5 : 40 pm.

**Question 90 :**

If a nine-digit number  $789x6378y$  is divisible by 72, then the value of  $xy$  is:

**Difficulty : Moderate**

**Average Time : 59 Seconds**

**Options :**

1. 10
2. 12
3. 8
4. 15

**Solution :**

The correct answer is **option 3** i.e. **8**.

Co prime factors of  $72 = 9$  and  $8$ .

Divisibility for  $8 =$  the last three digits of a number is divisible by  $8$ .

$78y$  must be divisible by  $8$ .

The possible value of  $y$  is  $4$ .

Divisibility for  $9 =$  The sum of the digits of a number must be divisible by  $9$ .

$7 + 8 + 9 + x + 6 + 3 + 7 + 8 + 4 = 52 + x$ .

At  $x = 2$ ,  $(52 + x)$  will become divisible by  $9$ .

$x \times y = 4 \times 2 = 8$ .

**Question 91 :**

Two pillars A and B of the same height are on opposite sides of a road which is  $40$  m wide. The angles of elevation of the tops of the pillars A and B are  $30^\circ$  and  $45^\circ$ , respectively, at a point on the road between the pillars. What is the difference (in m) of the point from the foot of pillar A?

**Difficulty : Moderate**

**Average Time : 61 Seconds**

**Options :**

1.  $40(\sqrt{3}) - 1$

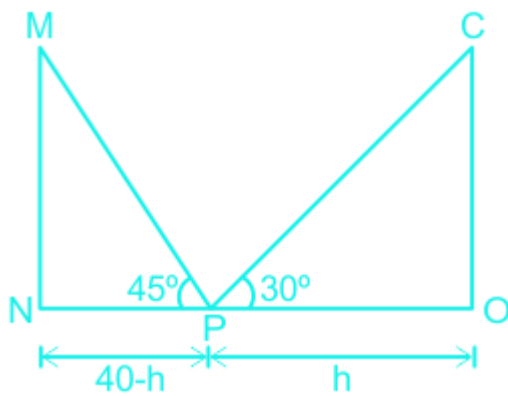
$20(2 - \sqrt{3})$

3.  $20(3 - \sqrt{3})$

4.  $39\sqrt{3}$

**Solution :**

The correct answer is **option 3** i.e.  $20(3 - \sqrt{3})$



In  $\triangle PDC$ ,

$\tan 45 = DC/PD$

$DC = PD = h$

$PN = 40 - h$

In  $\triangle PNM$ ,

$\tan 30 = MN/NP$

$1/\sqrt{3} = h/(40 - h)$

$40 - h = h\sqrt{3}$

$h = 40/(\sqrt{3} + 1)$

$h = 20(\sqrt{3} - 1)$

$PN = 40 - h = 40 - 20(\sqrt{3}) + 20$

$PN = 20(3 - \sqrt{3})$ .

**Question 92 :**

A lady sold an article for Rs. 960 at some profit. Had she sold it for Rs. 800, then there would have been a loss equal to  $\frac{1}{3}$  of the initial profit. What was the profit percentage of the article?



**Difficulty : Moderate****Average Time : 76 Seconds****Options :**

1.  $\frac{150}{7}\%$
2.  $\frac{50}{7}\%$
3.  $\frac{10}{7}\%$
4.  $\frac{100}{7}\%$

**Solution :**

The correct answer is **option 4** i.e.  $\frac{100}{7}\%$

Let the CP be  $100x$

If SP is 960 then profit will be,

$$\text{Profit} = 960 - 100x$$

If SP = 800 then loss =  $\frac{1}{3}(960 - 100x)$

$$\text{Loss} = 100x - 800$$

$$\frac{1}{3}(960 - 100x) = 100x - 800$$

$$960 - 100x = 300x - 2400$$

$$400x = 3360$$

$$x = 8.4$$

$$\text{CP} = 100 \times 8.4 = 840.$$

$$\text{Profit} = 960 - 840 = 120$$

$$\text{Profit}\% = \frac{120}{840} \times 100 = 100/7\%.$$

**Question 93 :**

In  $(\Delta)ABC$ ,  $AB = 48$  cm,  $BC = 55$  cm and  $AC = 73$  cm. If  $O$  is the centroid of the triangle, then the length (in cm) of  $BO$  (correct to one decimal place) is:

**Difficulty : Moderate****Average Time : 58 Seconds****Options :**

1. 25.6

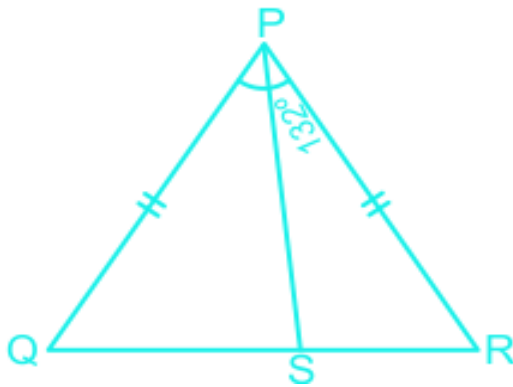
24.3

3. 20.4

4. 18.3

**Solution :**

The correct answer is **option 2** i.e. **24.3**.



(48 - 55 - 73) is a Pythagorean triplet.

So  $AD = DC = BD = 73/2$

$BO = 2/3$  of  $BD = 2/3 \times 73/2 = 24.3$ .

**Question 94 :**

Study the given histogram and answer the question that follows. The total number of neon lamps lifetime of 800 or more hours is approximately what percentage more than the total number of neon lamps having a lifetime of 400 or more hours but less than 800 hours?

**Difficulty : Moderate**

**Average Time : 49 Seconds**

**Options :**

- 1. 22.7%
- 2. 12.5%
- 3. 32.2%
- 4. 31.8%

**Solution :**

The correct answer is **option 2** i.e. **12.5%**



The total number of neon lamps lifetime of 800 or more hours = 1350

The total number of neon lamps having a lifetime of 400 or more hours but less than 800 hours = 225 + 260 + 340 + 375 = 1200

Required % =  $(1350 - 1200)/1200 \times 100 = 12.5\%$

**Question 95 :**

In  $(\Delta)PQR$ ,  $PQ = PR$  and  $S$  is a point on  $QR$  such that  $(\angle)PSQ = 96^\circ + (\angle)QPS$  and  $(\angle)QPR = 132^\circ$ . What is the measure of  $(\angle)PSR$ ?

Difficulty : Moderate

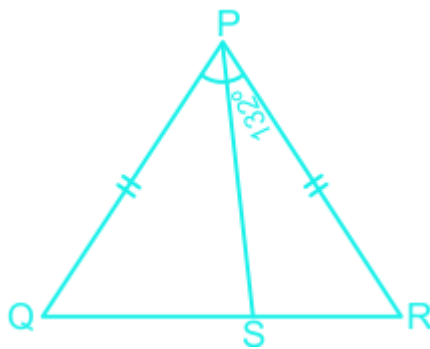
Average Time : 45 Seconds

**Options :**

1.  $45^\circ$
2.  $56^\circ$
3.  $54^\circ$
4.  $52^\circ$

**Solution :**

The correct answer is **option 3** i.e.  $54^\circ$



$$(\angle)QPR + (\angle)PRQ + (\angle)PQR = 180$$

$$132 + x + x = 180$$

$$2x = 48$$

$$x = 24^\circ$$

$$(\angle)PSQ + (\angle)PQS + (\angle)QPS = 180$$

$$96^\circ + (\angle)QPS + (\angle)QPS + 24 = 180$$

$$\angle QPS = 30^\circ$$

$$\angle QSP = 96 + 30 = 126^\circ.$$

$$\angle QSP + \angle PSR = 180^\circ \text{ (Linear pair)}$$

$$\angle PSR = 180 - 126 = 54^\circ.$$

**Question 96 :**

The sum of the three fractions A, B and C ( $A > B > C$ ) is  $\frac{121}{60}$ . When C is divided by B, the resulting fraction is  $\frac{9}{10}$ , which exceeds A by  $\frac{3}{20}$ . What is the difference between B and C?

**Difficulty : Moderate****Average Time : 79 Seconds****Options :**

1.  $\frac{1}{15}$
2.  $\frac{1}{10}$
3.  $\frac{3}{10}$
4.  $\frac{7}{15}$

**Solution :**

The correct answer is **option 1** i.e.  $\frac{1}{15}$

According to the question,

$$C/B = 9/10 \dots\dots\dots(1)$$

$$A = 9/10 - 3/20$$

$$A = 15/20 = 3/4$$

$$A + B + C = 121/60$$

$$B + C = 121/60 - 3/4 = 76/60$$

$$10x + 9x = 76/60 \dots\dots\dots(\text{from eq 1})$$

$$x = 1/15$$

$$C = 10x = 10 \times 1/15 = 10/15$$

$$B = 9x = 9 \times 1/15 = 9/15$$

$$C - B = 10/15 - 9/15 = 1/15.$$

**Question 97 :**



Mixture A contains chocolate and milk in the ratio 4 : 3 and mixture B contains chocolate and milk in the ratio 5 : 2. A and B are taken in the ratio 5 : 6 and mixed to form a new mixture. The percentage of chocolate in the new mixture is closest to:

Difficulty : Moderate

Average Time : 58 Seconds

Options :

1. 35%
2. 69%
3. 31%
4. 65%

Solution :

The correct answer is **option 4** i.e. **65%**

	Chocolate	Milk	Total
A	4 units	3 units	7 units
B	5 units	2 units	7 units

A and B mixed in the ratio of 5 : 6.

5 times of A contains 20 units of Chocolate and 15 units of Milk and 6 times of B contains 30 units of Chocolate and 12 units of milk.

Total Chocolate and Milk in the new mixture = 20 + 30 : 15 + 12 = 50 : 27.

Required % =  $50/77 \times 100 = 64.93 = 65\%$

Question 98 :

The expression  $\frac{(1-2 \sin^2 \theta \cos^2 \theta)(\cot \theta + 1)\cos \theta}{(\sin^4 \theta + \cos^4 \theta)(1+\tan \theta)\operatorname{cosec} \theta} - 1$ ,  $0^\circ < \theta < 90^\circ$ , equals:

Difficulty : Moderate

Average Time : 61 Seconds

Options :

1.  $\cos^2 \theta$
2.  $-\sin^2 \theta$



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

4.  $-\sec^2(\theta)$

**Solution :**

The correct answer is **option 2** i.e.  $-\sin^2(\theta)$

Shortcut : put  $\theta = 45^\circ$  ( $0 < \theta < 90$ )

on putting  $\theta = 45$  we get,

$$[(1 - 2 \times \frac{1}{2} \times \frac{1}{2})(1 + 1) \times \frac{1}{\sqrt{2}}] / [(1/4 + 1/4)(1 + 1)(\sqrt{2})] - 1$$

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

Now put  $\theta = 45^\circ$  in option as well

$$\text{Option 1} = \cos^2 45 = \frac{1}{2}$$

$$\text{Option 2} = -\sin^2 45 = -\frac{1}{2} \text{ ( matches with the answer)}$$

$$\text{Option 3} = \sec^2 45 = 2$$

$$\text{Option 4} = -\sec^2 45 = -2.$$

**Question 99 :**

The average of 25 numbers is 64. The averages of the first 13 numbers and that of the last 13 numbers are 62.8 and 72.2, respectively. If the 12th number is 61, and if the 12th and 13th numbers are excluded, then what is the average of the remaining numbers (correct to one decimal place)?

Difficulty : Moderate

Average Time : 81 Seconds

**Options :**

1. 59.2

2. 62.2

3. 60.2

4. 61.5

**Solution :**

The correct answer is **option 3** i.e. **60.2**.

Average = Sum of observation  $\times$  no of observation

$$\text{Sum of 25 numbers} = 25 \times 64 = 1600$$

Sum of first 13 number =  $13 \times 62.8 = 816.4$

Sum of last 13 number =  $13 \times 72.2 = 938.6$

13 number =  $816.4 + 938.6 - 1500 = 155$

If 12 and 13 number is removed then sum of the remaining 23 numbers =  $1600 - 61 - 155 = 1384$

Required average =  $1384/23 = 60.2$ .

**Question 100 :**

The value of  $\frac{(\cos 9^\circ + \sin 81^\circ)(\sec 9^\circ + \operatorname{cosec} 81^\circ)}{\operatorname{cosec}^2 271^\circ + \cos^2 215^\circ - \tan^2 219^\circ + \cos^2 275^\circ}$  is:

Difficulty : Moderate

Average Time : 44 Seconds

**Options :**

1. 1
2. 4
3. -3
4. 2

**Solution :**

The correct answer is **option 4** i.e. **2**

$$\sin(90 - \theta) = \cos \theta$$

$$\sec(90 - \theta) = \operatorname{cosec} \theta$$

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

$$= \frac{(\cos 9^\circ + \sin 81^\circ)(\sec 9^\circ + \operatorname{cosec} 81^\circ)}{\operatorname{cosec}^2 271^\circ + \cos^2 215^\circ - \tan^2 219^\circ + \cos^2 275^\circ}$$

$$= \frac{(\sin 81^\circ + \sin 81^\circ)(\operatorname{cosec} 81^\circ + \operatorname{cosec} 81^\circ)}{\sec^2 219^\circ + \sin^2 275^\circ - \tan^2 219^\circ + \cos^2 275^\circ}$$

$$= (2 \times 2)/2 = 2.$$

## Ssc Cgl Tier II Previous Year Question Paper Analysis

The analysis of Ssc Cgl Tier II Previous Year Question Paper held on 2022-02-03 in the Morning exam is as follows:

1. 100 questions were moderate.
2. The safe score is 140 marks.



100 questions were asked from Quantitative Aptitude and 100 questions were asked from Quantitative Aptitude  
4. 0 questions should have been skipped if you were short of time.

# Ssc Cgl Tier II Previous Year Question Paper Topic Wise Weightage

## Quantitative Aptitude

1. Simplification - 7
2. Average - 3
3. Percentage - 4
4. Data Interpretation - 7
5. Time And Work - 4
6. Time Speed And Distance - 4
7. Interest - 4
8. Ratios And Proportion - 4
9. Geometry - 15
10. Trigonometry - 11
11. Mensuration - 11
12. Algebra - 10
13. Number System - 4
14. Coordinate Geometry - 2
15. Mixtures And Alligations - 2
16. Partnership - 1
17. Profit And Loss - 7



# Ssc Cgl Tier II Previous Year Question Paper Tips and Tricks



1. Try to solve Ssc Cgl Tier II Previous Year Question Paper without taking any help from the solutions.
2. Ssc Cgl Tier II Previous Year Question Paper require proper usage of concept so firstly read the question thoroughly and then use the right concept.
3. In case you're not able to solve the question in less than 30 seconds in the exam then you should skip the question and move to the next question.

## Daily Current Affairs



KD Live is providing [Current Affairs](#) on a daily basis for SSC and a [Current Affairs Quiz](#) too for the practice.

## KD Live Free Offerings





KD Live is Offering Every Information and Study Material required for the self study. Please click on the following links for accessing those.

- [Study Plan](#)
- [General Science](#)
- [General Awareness](#)
- [General Knowledge](#)
- [Quantitative Aptitude](#)
- [Logical Reasoning](#)
- [English Language](#)
- [Today In History](#)
- [Syllabus](#)
- [Know Your State](#)
- [Know Your Country](#)
- [Know Your City](#)
- [Know Your Leader](#)
- [Books And Authors](#)
- [Daily Vocabulary](#)
- [Daily Editorial](#)
- [Latest Notifications](#)
- [Exam Dates](#)
- [Admit Card](#)
- [Exam Results](#)
- [Exam Cutoff](#)
- [Exam Eligibility](#)
- [Exam Pattern](#)







[Answer Key](#)  
[Important Days](#)

## Further Guidance on Ssc Cgl Tier II Previous Year Question Paper

For Asking any query on Ssc Cgl Tier II Previous Year Question Paper please mail [Send Email](#) or you can fill the form at [KD Live](#).

### About KD Live

KD live has an expertise in providing apt explanations for the Ssc Cgl Tier II Previous Year Question Paper since 2008. More than 10 lakh aspirants have cleared competitive exams under the guidance of Neetu Mam. Study.kdcampus.live is providing free information on various topics and for the Ssc Cgl Exam you can refer the following link [Click Here](#) however if you want to practice more questions then please refer the following link [Click Here](#).

### About Neetu Mam

Neetu Mam is primarily passionate for the English language and teaching from the last 20 years however for the Ssc Cgl Tier II Previous Year Question Paper. She has guided her team to provide the best explanation for the question.