



Bipin Nambiar
(SBI PO 2018)



Shiraz Khan
(SBI Clerk 2018)



Kuldeep Yadav
(SBI PO 2018)



Rajat Saxena
(IBPS Clerk 2018)



Anupam Tyagi
(IBPS PO 2018)

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Mixed Math Questions for SSC 10+2 and CGL Tier-I exams

SSC Maths Quiz 6

Directions: Read the following questions carefully and choose the right answer.

1. A right circular cone is cut by 3 planes parallel to its base. The planes cut the altitude of the cone in four equal parts. Find out the ratio of volume of each part.

A. 1 : 7 : 19 : 37

B. 1 : 8 : 27 : 64

C. 1 : 9 : 16 : 25

D. 1 : 2 : 3 : 4

2. A merchant uses a weight of 125 gram instead of 100 gram while buying an article. He used 80 gram instead of 100 gram while selling. He marked up the price by 20% and then offers 20% discount. Find the overall profit or loss percentage.

A. 20%

B. 30%

C. 40%

D. 50%

3. if $x = \frac{\sqrt{\sqrt{5} + 1}}{\sqrt{\sqrt{5} - 1}}$,

then the value of $5x^2 - 5x - 1$ will be.

A. 0

B. 3

C. 4

D. 5

4. The ratio of the work done by 50 women to the work done by 25 men, in the same time is 4 : 3. If 18 women and 12 men can finish a piece of work in 5 days, then how many women can finish the same work in $\frac{20}{3}$ days?

A. 18

B. 27

C. 33

D. 30

5. Two varieties of sugar are mixed in the ratio 3 : 2 and sold for ₹80 per kg to make a profit of 25%. If the cost of the variety of sugar whose quantity is more is ₹40 per kg, what is the cost of the other variety of sugar?

A. Rs. 50

B. Rs. 48

C. Rs. 75

D. Rs. 100

6. *if $\sin 21^\circ - \sin 69^\circ$ is equal to.*

A. $\frac{x^2}{y\sqrt{(y^2 - x^2)}}$

B. $\frac{y^2}{y\sqrt{(y^2 - x^2)}}$

C. $\frac{x^2}{y\sqrt{(x^2 - x^2)}}$

D. $\frac{y}{x\sqrt{(x^2 - x^2)}}$

7. PQRSTU is a regular hexagon whose diagonals meet at point at O. Find the ratio of area of quadrilateral PQOU to the area of hexagon PQRSTU.

A. 1 : 2

B. 1 : 3

C. 1 : 4

D. 1 : 6

8. A boat goes to a place and return back in 45 hours. It can go 10 km upstream in 1 hour and 20 km downstream in the same time. Find the total distance covered by the boat in the whole journey.

A. 200 km

B. 600 km

C. 300 km

D. 250 km

9. In ΔABC , $\angle A = \angle B = 60^\circ$, $AC = \sqrt{34}$ cm. The lines AD and BD intersect at D with $\angle D = 90^\circ$. If $DB = 3$ cm, then the length of AD is:

A. 16

B. 5

C. 4

D. 25

10. Find the value of

$$\left(\frac{\sin 35^\circ}{\cos 55^\circ}\right)^2 + \left(\frac{\cos 55^\circ}{\sin 35^\circ}\right)^2 - 2 \cos 30^\circ.$$

A. 0

B. $1 - \sqrt{3}$

C. $2 - \sqrt{3}$

D. 3



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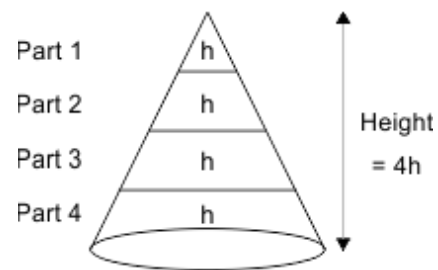
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Correct Answer:

1	2	3	4	5	6	7	8	9	10
A	D	C	B	D	A	B	A	B	C

Explanation:

1. Volume of cone, $V \propto r^3 \propto h^3$
Volume of 1st part, $a \propto h^3$
Volume of 2nd part, $b \propto 8h^3 - h^3 = 7h^3$
Volume of 3rd part, $c \propto 27h^3 - 8h^3 = 19h^3$
Volume of 4th part, $d \propto 64h^3 - 27h^3 = 37h^3$



Therefore, required ratio = $h^3 : 7h^3 : 19h^3 : 37h^3 = 1 : 7 : 19 : 37$

Hence, option A is correct.

2.
$$= \frac{125}{100} \times \frac{100}{80} \times \frac{120}{100} \times \frac{80}{100} = \frac{3}{2}$$

Therefore profit percentage = $\frac{1}{2} \times 100 = 50\%$

Thus, D is the correct answer.

3. According to the given question

we have,

$$x = \frac{\sqrt{\sqrt{5} + 1}}{\sqrt{\sqrt{5} - 1}} = \sqrt{\frac{\sqrt{5} + 1}{\sqrt{5} - 1}}$$

Now, Numerator and denominator multiplied by $(\sqrt{5}+1)$

$$x = \sqrt{\frac{(\sqrt{5} + 1) \times (\sqrt{5} + 1)}{(\sqrt{5} - 1)(\sqrt{5} + 1)}} = \sqrt{\frac{(\sqrt{5} + 1)^2}{5 - 1}} = \frac{\sqrt{5} + 1}{2}$$

Now we have also, $5x^2 - 5x - 1$

Put value of x in above equation

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

$$\Rightarrow 5\frac{(3+\sqrt{5})}{2} - \frac{5\sqrt{5}-5-2}{2}$$

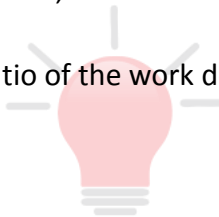
$$\Rightarrow \frac{15+5\sqrt{5}-5\sqrt{5}-7}{2} = \frac{8}{2} = 4$$

Hence, option C is correct.

4. Given that,

The ratio of the work done by 50 woman and 25 men is

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



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The ratio of the work done by man and one woman

$$= \frac{1}{150} : \frac{1}{100}$$

Let the time taken by one woman and one man to complete the work be $=150x$ and $100x$ respectively.

$$\frac{18 \times 5}{150x} + \frac{12 \times 5}{100x} = 1$$

$$x = \frac{6}{5}$$

Time taken by one woman and one man to complete the work be 180 days and 10 days respectively.

The number of woman worked for $20/3$ days to complete the work

$$= \frac{3}{20} \times 180 = 27$$

Hence, option B is correct.

5. Sale price of the mixture = Rs.80

$$\text{Cost price of mixture} = 80 \times \frac{100}{125} = \text{Rs. 64}$$

Rs. 40 Rs. x

\ /

Rs. 64

/ \

x - 64 24

$$\Rightarrow \frac{x - 64}{24} = \frac{3}{2} \Rightarrow x = \text{Rs. 100}$$

Hence, option D is correct.

6. $\sin 21^\circ = \frac{x}{y}$

$$\cos 21^\circ = (\sqrt{1 - (\sin 21^\circ)^2})$$

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

$$\Rightarrow \sec 21^\circ - \sin 69^\circ$$

According to the question,

$$\Rightarrow \sec 21^\circ - \sin 69^\circ$$

$$\Rightarrow \sec 21^\circ - \sin(90 - 21^\circ)$$

$$\Rightarrow \sec 21^\circ - \sin(90 - 21^\circ)$$

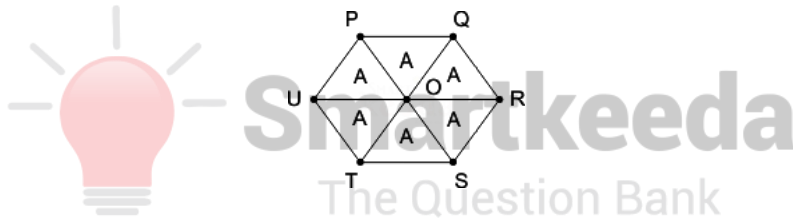
$$\Rightarrow \sec 21^\circ - \cos 21^\circ$$

$$\Rightarrow \frac{y}{\sqrt{y^2 - x^2}} - \frac{\sqrt{y^2 - x^2}}{y}$$

$$\Rightarrow \frac{x^2}{y\sqrt{y^2 - x^2}}$$

Hence, option A is correct.

7. We know that regular hexagonal consists of 6 equilateral triangles of same area.



Let the area of 1 equilateral be A.

Therefore area of hexagon = 6A

From figure, area of quadrilateral PQOU = 2A

Thus,

$$\frac{\text{ar of quad. PQOU}}{\text{ar of hexagon PQRSTU}} = \frac{2A}{6A} = \frac{1}{3}$$

Hence option B is the correct answer.

8. Let the speed of the boat = x km/h

And the speed of the stream = y km/h

According to the question:

$$x - y = 10$$

$$x + y = 20$$

adding both the equation we get

$$2x = 30$$

$$\Rightarrow x = 15 \text{ km/h}$$

$$\text{Hence, } y = 20 - 15 = 5 \text{ km/h}$$

Let total distance covered by the boat = $2d$

$$\frac{d}{15 - 5} + \frac{d}{15 + 5} = 45$$

$$\Rightarrow d \left(\frac{1}{10} + \frac{1}{20} \right) = 45$$

$$\Rightarrow \frac{3d}{20} = 45$$

$$\Rightarrow d = 300 \text{ km}$$

$$\text{Total distance covered by the boat} = 2d = 2 \times 300 = 600 \text{ km}$$

Hence option B is correct.

9. *in* $\triangle ABC$, $\angle A = \angle B = 60^\circ$
 $\Rightarrow \angle C = 60^\circ$
 $\Rightarrow \triangle ABC$ is an equilateral triangle with AB
 $= BC = \sqrt{34} \text{ cm}$

The lines AD and BD intersect at D with $\angle D = 90^\circ$

$\Rightarrow \triangle ADB$ is a right triangle with $DB = 3 \text{ cm}$ and $AB = \sqrt{34} \text{ cm}$

$$AB^2 = AD^2 + BD^2$$

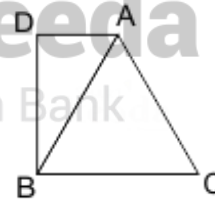
$$\Rightarrow (\sqrt{34})^2 = AD^2 + 3^2$$

$$\Rightarrow 34 = AD^2 + 9$$

$$\Rightarrow AD^2 = 25$$

$$\Rightarrow AD = \sqrt{25} = 5$$

Therefore, option (B) is correct.



$$\begin{aligned}
 10. \quad & \left(\frac{\sin 35^\circ}{\cos 55^\circ}\right)^2 + \left(\frac{\cos 55^\circ}{\sin 35^\circ}\right)^2 - 2 \cos 30^\circ \\
 & \Rightarrow \left(\frac{\sin(90 - 35^\circ)}{\cos 55^\circ}\right)^2 + \left(\frac{\cos(90 - 55^\circ)}{\sin 35^\circ}\right)^2 - 2 \cos 30^\circ \\
 & \Rightarrow \left(\frac{\cos 55^\circ}{\cos 55^\circ}\right)^2 + \left(\frac{\sin 35^\circ}{\sin 35^\circ}\right)^2 - 2 \cos 30^\circ \\
 & \Rightarrow 1 + 1 - 2 \times \frac{\sqrt{3}}{2} \\
 & \Rightarrow 2 - \sqrt{3}
 \end{aligned}$$

Hence, option C is correct.





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