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The Question Bank

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

SSC Math's Quiz 7

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

1. **If $\sin \alpha + (\sin \alpha)^2 = 1$,**

   then the value of

   $(\cos \alpha)^{12} + 3(\cos \alpha)^{10} + 3(\cos \alpha)^8 + (\cos \alpha)^6 - 1$ is

   A. 0

   B. 1

   C. -1

   D. 2

2. **One flies a kite with a thread 180 meter long. If the thread of the kite makes an angle of 60° with the horizontal line, then the height of the kite from the ground (assuming thread to be in straight line) is**

   A. 50 meter

   $B.\ 90\sqrt{3}\ meter$

   $C.\ 75\sqrt{3}\ meter$

   D. 90 meter

3. **If a + b + c = 0 then the value of**

   $$\frac{a^2}{a^2 - bc} + \frac{b^2}{b^2 - ca} + \frac{c^2}{c^2 - ab}$$ **is:**

   A. 4

   B. 2

   C. 1

   D. 0

4. **Three cubes of metal whose edges are in the ratio 3 : 4 : 5, are melted and one cube is formed. If the diagonal of the cube is 12√3 cm, then find the edge of the largest among three cubes.**

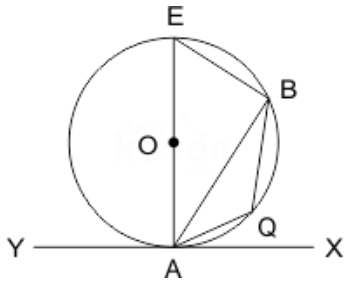
   A. 15 cm

   B. 12.5 cm

   C. 17.5 cm

   D. 10 cm

5. **In the figure given below, YAX is a tangent to the circle with center O. If ∠BAX = 70° and ∠BAQ = 40°, then what is ∠ABQ equal to**



   A. 20°

   B. 30°

   C. 35°

   D. 40°

6. **In an examination the marks of Anil was 28.57% less than that of Barun's marks and Barun's marks was 11.11% less than that of Chandan's marks. If the difference between the marks obtained by Anil and Chandan is 80.5 then find the marks obtained by Barun?**

   A. 196

   B. 225.5

   C. 140

   D. 184

7. **Rohan borrowed some money at 10% per annum for first 6 years, 5% per annum for next three years 13% per annum for the period after 9 years. If the interest paid by him at the end of 12 year is Rs 22800, then find how much did he borrowed.**

   A. 30000

   B. 25000

   C. 20000

   D. 35000

8. **A shop of electronic goods remains closed on Monday. The average sales per day for remaining six days of a week is Rs. 13240 & the average sale of Tuesday to Saturday is Rs. 13924. The sales on Sunday is:**

   A. Rs. 2379

   B. Rs. 201888

   C. Rs. 21704

   D. None of these

9. **A pump can be used for filling as well emptying a tank. The capacity of the tank is 2400 m^3. The emptying tank capacity is 10 m^3 per minute higher than its filling capacity and the pump needs 8 minutes lesser to empty the tank than it needs to fill it. What is the filling capacity of the pump?**

   A. 60 m^3/min

   B $70m^3/min$

   $C.$ $50\ m^3/min$

   D. None of these

10. **The length of the sides of a triangle are 9 cm, 12 cm and 15 cm. Find the length of the perpendicular from the opposite vertex to the side whose length is 15 cm.**

    A. 4.8 cm

    B. 6.4 cm

    C. 7.2 cm

    D. 6.8 cm

Explanation:

1. $\sin\alpha + (\sin\alpha)^2 = 1$

$\Rightarrow \sin\alpha = 1 - (\sin\alpha)^2$

$\Rightarrow \sin\alpha = (\cos\alpha)^2$

According to the question,

we have $(\cos\alpha)^{12} + 3(\cos\alpha)^{10} + 3(\cos\alpha)^8 + (\cos\alpha)^6 - 1$

$\Rightarrow ((\cos\alpha)^4 + (\cos\alpha)^2)^3 - 1$

$\Rightarrow ((\sin\alpha)^2 + (\cos\alpha)^2)^3 - 1 = 1 - 1 = 0$

Hence, option A is correct.

2. AB = length of thread = 180 meter

$\angle PQR = 60°$

In Δ PQR

$\text{Sin } 60° = \frac{PR}{PQ} = \frac{\sqrt{3}}{2} = \frac{PR}{180}$

so, $\frac{PR}{180} = \frac{\sqrt{3}}{2}$

$PR = 180 \times \frac{\sqrt{3}}{2} = 90\sqrt{3}$

Hence, option B is correct.

3. $a + b + c = 0$ $a = -b - c$ or $a^2 = (b + c)^2$ Therefore given expression,

$$\frac{a^2}{a^2 - bc} + \frac{b^2}{b^2 - ca} + \frac{c^2}{c^2 - ab}$$

$$= \frac{(b + c)^2}{(b + c)^2 - bc} + \frac{b^2}{b^2 + c(b + c)} + \frac{c^2}{c^2 + b(b + c)}$$

$$= \frac{(b+c)^2}{(b^2+c^2+bc)} + \frac{b^2}{b^2+c^2+bc} + \frac{c^2}{b^2+c^2+bc}$$

$$= \frac{b^2+c^2+2bc+b^2+c^2}{b^2+c^2+bc}$$

$$= 2\,\frac{b^2+c^2+bc}{b^2+c^2+bc}$$

$= 2$

Hence, option (B) is correct.

4. Let the edges of the cubes be 3x, 4x and 5x cm

We know that diagonal of a cube with side 'a' = a √3

Side of the new cube = $\frac{12\,3}{\sqrt{3}} = 12$

Therefore equating volumes we get, $(3x)^3 + (4x)^3 + (5x)^3 = 12^3$ (27 + 64 + 125) ×

$x^3 = 1728$

$x^3 = \frac{1728}{216} = 8$

x = 2 So the edge of the largest cube will be 5 × 2 = 10 cm

Hence, option (D) is correct.

5. ∠ABE = 90°

(Semicircle Angle)

∠BAX = 70°

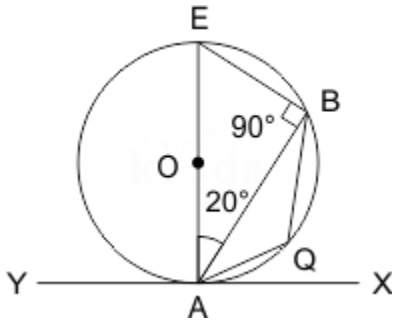
∠EAB = 20°

In ABE

∠AEB = 180° – (90° + 20) = 70°

∠BQA = 180° – 70° = 110°

(Cyclic quadrilateral)



∠BAQ = 40° (Given)

So, ∠ABQ = 180° – (110° + 40°)

∠ABQ = 30°

Hence, option B is correct.

6. Let Barun's marks = B, Anil's marks = A and Chandan's marks = C

According to question:

A = 28.57% less then B = 71.43% of B (we know that 1/7 = 14.28% approximately)

So, $A = \frac{5}{7} \times B$

A: B = 5: 7 ----(I)

And B = 11.11% less than C , B = (8/9) × C

B: C = 8: 9 --------(II)

A: B: C = 40 : 56 : 63

A = 40X

B = 56X

C = 63X

According to question, C – A = 23X = 80.5

So, the value of x = 3.5

Now the marks obtained by Barun = 56x = 56 × 3.5 = 196

Hence, option A is correct.

7. Let x be the amount borrowed by Rohan

Therefore , according to question

$$\frac{x \times 10 \times 6}{100} + \frac{x \times 5 \times 3}{100} + \frac{x \times 13 \times 3}{100} = 22800$$

Solving above equation we get ,

$$\frac{114x}{100} = 22800$$

x = 20000

Hence, option C is the correct.

8. Tuesday to Sunday = Rs. 13240 × 6 = Rs.79440

Tuesday to Saturday = 13924 × 5 = Rs.69620

Sale on Sunday = 79440 – 69620 = Rs.9820

Hence, option D is correct.

9. Let the filling capacity be x m^3

Emptying capacity = x + 10

According to the question,

$\Rightarrow \frac{2400}{x} - \frac{2400}{x+10} = 8$

$\Rightarrow \frac{x+10-x}{(x+10)\,x} = \frac{1}{300}$

$\Rightarrow 3000 = x\,(x+10)$

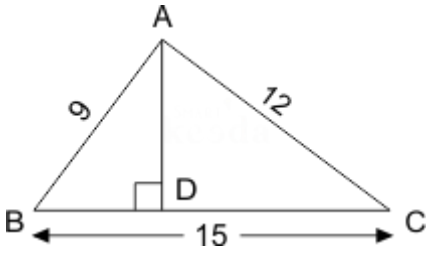
Alternate Method:

Using option C,

50 × 60 = 3000 satisfies

Hence, option C is correct.

10. Lengths of the sides of a triangle are 9 cm, 12 cm and 15 cm



$\because 9^2 + 12^2 = 15^2$

$\therefore$ This is right angled triangle

$\because \Delta$ ABC and Δ ADC are similar triangles

Then, AD = $\frac{AB \times AC}{BC} = \frac{9 \times 12}{15}$ = 7.2 cm

Hence, option C is correct.