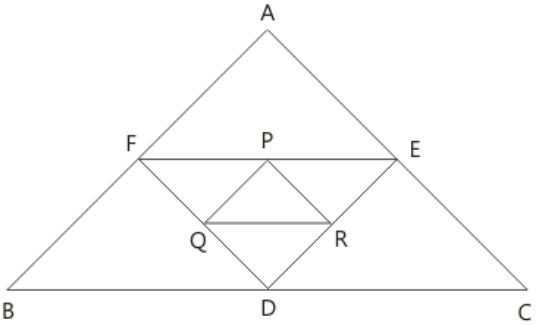
Triangle Questions for CGL Tier 1, CGL Tier 2, SSC 10+2, Railways Exams.

Triangle Quiz 7

Directions: Kindly study the following Questions carefully and choose the right answer:

1. In the above figure, if area of triangle ABC is 64 sq. units, then find the area of triangle PQR, where D, E and F are mid points of sides of ΔABC and P, Q and R are midpoints of sides of ΔDEF.

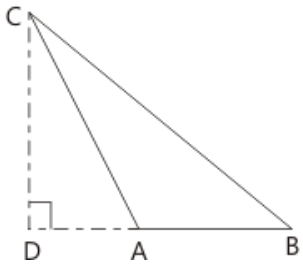


A. 4 sq units B. 6 sq units C. 8 sq units D. 16 sq units

2. Two medians PS and RT of ΔPQR intersect at G at right angles. If PS = 9 cm and RT = 6 cm, then the length of RS in cm is

A. 10 B. 6 C. 5 D. 3

3. In the adjoining figure, if BC = a, AC = b, AB = c and ∠CAB = 120° , then the correct relation is :



A. $a^2 = b^2 + c^2 + 2\,bc$ B. $a^2 = b^2 + c^2 - 2\,bc$ C. $a^2 = b^2 + c^2 + bc$ D. $a^2 = b^2 + c^2 - bc$

4. The length of side AB and side BC of a scalene triangle ABC are 12 cm and 8 cm respectively. The value of angle C is 59°. Find the length of side AC.

A. 12 B. 10 C. 14 D. 16

5. The coordinates of the in centre of the triangle whose sides are 3x – 4y = 0, 5x + 12y = 0 and y – 15 = 0, are

A. (1, 8) B. (–1, 8) C. (2, 8) D. (2, –8)

6. If AD, BE, CF arc the medians of a ΔABC then the correct relation between the sum of the squares of sides to the sum of the squares of median is

A. $2(AB^2 + BC^2 + AC^2) = 3(AD^2 + BE^2 + CF^2)$
B. $4(AB^2 + BC^2 + AC^2) = 3(AD^2 + BE^2 + CF^2)$
C. $3(AB^2 + BC^2 + AC^2) = 4(AD^2 + BE^2 + CF^2)$
D. None of the above

7. If in ΔABC and ΔDEF, ∠A = 50°, ∠B = 70°, ∠C = 60°, ∠D = 60°, ∠E = 70° and ∠F = 50°, which of the following is correct?

A. ΔABC ~ ΔDEF B. ΔABC ~ ΔEDF C. ΔABC ~ ΔDFE D. ΔABC ~ ΔFED

8. ABC is an equilateral triangle inscribed in a circle with AB = 8 cm. Suppose bisector of angle B meets AC at X and circle at Y, then what is the value of 2 × BX × BY?

A. 136 cm^2 B. 128 cm^2 C. 116 cm^2 D. 74 cm^2

9. In a ΔABC, ∠A = 90° and AD ⊥ BC where D lies on BC. If BC = 5 cm, AC = 3 cm, then Δ ABC = Δ ACD = ?

A. 22 : 7 B. 20 : 6 C. 25 : 9 D. 23 : 8

10. The perimeter of two similar triangles Δ ABC and Δ PQR are 45cm and 30cm respectively. If PQ = 16cm find AB

A. 20 cm B. 22cm C. 24cm D. 26cm

Correct Answers:

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

Explanations:

1. Given that,

D, E and F are midpoints of BC, CA and AB and P, Q and R are midpoints of EF, FD and DE
we know that,

Area of ΔABC = 4 ΔDEF

But area of ABC = 64 sq. cm.

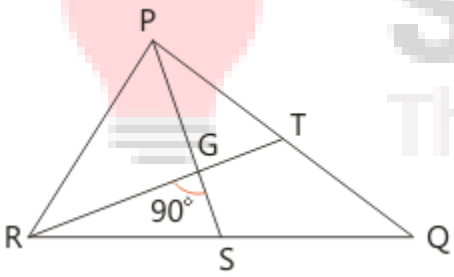
$4\ \Delta DEF = 64 \Rightarrow \Delta DEF = \frac{64}{4} = 16$ sq. units

And area ΔDEF = 4 ΔPQR

$\Rightarrow 4\ \Delta PQR = 16 = \frac{16}{4} = 4$ sq. units.

Hence, option A is correct.

2. PS = 9 cm



$\Rightarrow GS = \frac{1}{3} \times 9 = 3$ cm

RT = 6 cm

$\Rightarrow RG = \frac{2}{3} \times 6 = 4$ cm

$\therefore RS = \sqrt{3^2 + 4^2} = \sqrt{9 + 16} = 5$ cm

Hence, option C is correct.

3. Since ∠A is an obtuse angle in Δ ABC, so

$BC^2 = AB^2 + AC^2 + 2\ AB.\ AD$

$= AB^2 + AC^2 + 2\ AB.\ \frac{1}{2} AC$

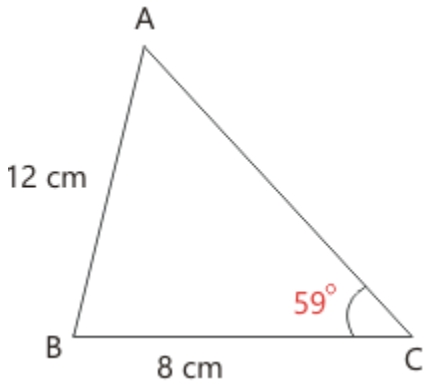
$[\because\ AD = AC \cos 60° = \frac{1}{2} AC\ ]$

$= AB^2 + AC^2 + AB\ .\ AC$

$\therefore\ a^2 = b^2 + c^2 + bc.$

Hence, option C is correct.

4.



Given, AB = 12 cm, BC = 8 cm,

∠C = 59°

Let ∠A = Θ

$\therefore\ \angle B = 180° - (59° + \Theta) = 121° - \Theta$

Now, let us see the choices. If AC = 12 cm, triangle would not be scalene. Hence, option A is ruled out. If AC = 10 cm, AB will become the largest side and ∠C the largest angle. But ∠C = 59°. Hence option B is ruled out. So, AC is either 14 cm or 16 cm. In any case, ∠B will be the largest angle and ∠A (say Θ) the smallest:

Also, $\angle B = 180° - (59° + \Theta) = 121° - \Theta$

By sine formula,

$$\frac{8\text{ cm}}{\sin \Theta} = \frac{12\text{ cm}}{\sin 59°} = \frac{AC}{\sin (121° - \Theta)}$$

Thus, $\frac{8\text{ cm}}{\sin \Theta} \approx \frac{12\text{ cm}}{\sin 60°}$

or, $\sin \Theta \approx \frac{8\text{ cm} \times \sin 60°}{12\text{ cm}} = \frac{2}{3} \times \frac{\sqrt{3}}{2} = \frac{1}{\sqrt{3}} = 0.577$

$\therefore\ \cos \Theta = \sqrt{1 - \frac{1}{3}} = \sqrt{\frac{2}{3}}$

$\therefore\ \sin (121° - \Theta) \approx \sin (120° - \Theta) = \sin 120° \cos \Theta - \cos 120° \sin \Theta$

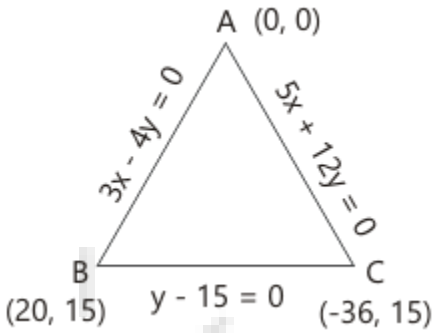
$= \frac{\sqrt{3}}{2} \times \sqrt{\frac{2}{3}} - \frac{-1}{2} \times \frac{1}{\sqrt{3}} = \frac{1}{\sqrt{2}} + \frac{1}{2\sqrt{3}} = 0.996$

Now, $\frac{AC}{\sin(121° - \Theta)} \approx \frac{8\ cm}{\sin\Theta}$

or, AC = $\frac{8\ cm \sin(120° - \Theta)}{\sin\Theta} = \frac{8 \times 0.996}{0.577} = 13.809 \approx 14$ cm.

Hence, option C is correct.

5.



3x – 4y ≡ 0 **...(i)**
5x + 12y ≡ 0 **....(ii)**
y – 15 ≡ 0 **...(iii)**

From (i) and (ii), A = (0, 0)
From (i) and (iii), B = (20, 15)
From (ii) and (iii), C = (–36, 15)

BC = $\sqrt{(20 + 36)^2 + (15 - 15)^2} = 56$

AB = $\sqrt{(20)^2 + (15)^2} = 39$

AC = $\sqrt{36^2 + 15^2} = 39$

Let (α, β) be the incentre co-ordinates of ΔABC

$\alpha = \frac{56 \times 0 + 39 \times 20 + 25\ (-36)}{56 + 39 + 25}$

$= \frac{-\ 900 + 780}{120} = \frac{-120}{120} = -1$

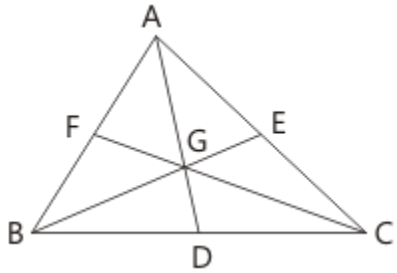
$\beta = \frac{56 \times 0 + 39 \times 15 + 25(15)}{56 + 39 + 25} = 8$

∴ (α, β) (–1, 8)
Hence, option B is correct.

6. Let G be the centroid of ΔABC.

In ΔABC,

[∵ The sum of the squares of any two sides is equal to twice the square of the half of the third side together with the square of the median bisecting the third side]



$\therefore\ AB^2 + AC^2 = 2AD^2 + 2\left(\frac{1}{2}BC\right)^2$ **....(i)**

$\Rightarrow\ AB^2 + BC^2 = 2AD^2 + \frac{1}{2}BC^2$

$BC^2 + AB^2 = 2BE^2 + \frac{1}{2}AC^2$ **....(ii)**

$BC^2 + AC^2 = 2CF^2 + \frac{1}{2}AB^2$ **....(iii)**

Adding (i), (ii) and (iii), we get

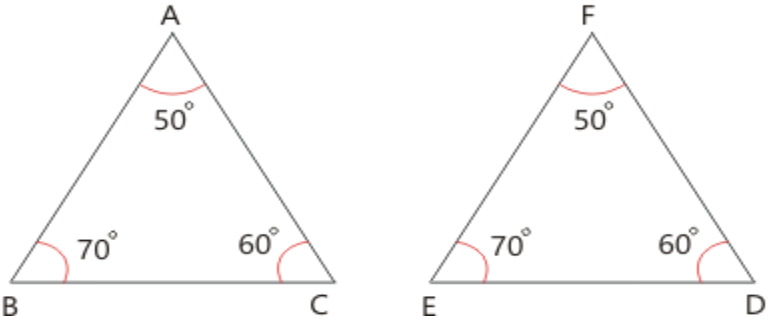
$2(AB^2 + BC^2 + AC^2 = 2(AD^2 + BE^2 + CF^2)$

$+\frac{1}{2}(AB^2 + BC^2 + AC^2)$

$\therefore\ 3(AB^2 + BC^2 + AC^2) = 4(AD^2 + BE^2 + CF^2)$

Hence, option C is correct.

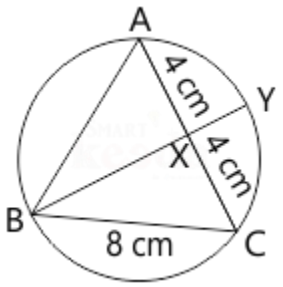
7.



Clearly, ΔABC ~ ΔFED

Hence, option D is correct.

8.



$CX = AX = \frac{8}{2} = 4$ cm

And $BX = \frac{\sqrt{3}}{2} \times 8 = 4\sqrt{3}$ cm

BY and AC are two chords of circle

Therefore $BX \times XY = CX \times AX$

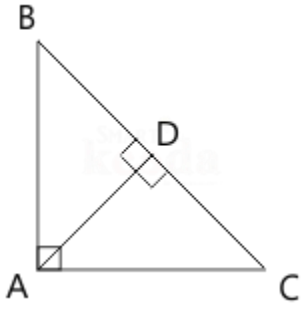
$XY = \frac{4 \times 4}{4\sqrt{3}} = \frac{4}{\sqrt{3}}$ cm

$BY = BX + XY = 4\sqrt{3} + \frac{4}{\sqrt{3}} = \frac{16}{\sqrt{3}}$ cm

Hence, $2 \times BX \times BY = 2 \times 4\sqrt{3} \times \frac{16}{\sqrt{3}} = 128\ cm^2$

Therefore, option (B) is correct.

9.

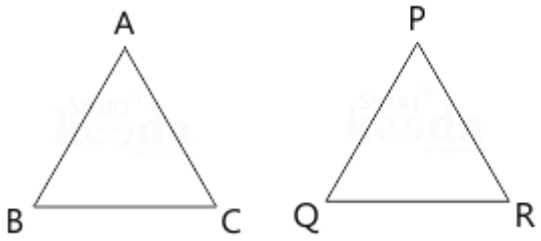


In Δ ABC, AD ⊥ BC Δ BAC ~ Δ ADC ∴ Ratio of area of triangles = Ratio of square of their corresponding sides.
hence,

$\frac{\text{area of BAC}}{\text{Are of ADC}} = \frac{(BC)^2}{(AC)^2} = \frac{25}{9}$

Ratio = 25 : 9
Hence, option (C) is correct.

10.



In similar triangle, Δ ABC and Δ PQR

$$\frac{AB}{PQ} = \frac{AC}{PR} = \frac{BC}{QR} = \frac{\text{Perimeter of ABC}}{\text{Perimeter of PQR}}$$

$$\frac{AB}{16} = \frac{45}{30}$$

$$\Rightarrow AB = \frac{45}{30} \times 16$$

$$\Rightarrow \frac{3}{2} \times 16 = 24\text{cm}$$

Hence, option (C) is correct.