Triangle Questions for SSC Exam.

Triangle Quiz 5

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

1. If the hypotenuse of a right triangle is 41 cm and the sum of the other two sides is 49 cm, find the difference between the other sides.

A. 30 cm B. 31 cm C. 32 cm D. 29 cm

2. A point D is taken from the side BC of a right-angled triangle ABC, where AB is hypotenuse. Then

A. $AB^2 + CD^2 = BC^2 + AD^2$ B. $CD^2 + BD^2 = 2AD^2$ C. $CD^2 + BD^2 = 2AD^2$ D. $AB^2 = AD^2 + BD^2$

3. In a right-angled triangle, the product of two sides is equal to half of the square of the third side i.e., hypotenuse. One of the acute angle must be

A. 60° B. 30° C. 45° D. 15°

4. ABC is an isosceles triangle such that AB = AC and AD is the median to the base BC with ∠ABC = 35°. Then ∠BAD is

A. 35° B. 55° C. 70° D. 110°

5. An isosceles triangle ABC is right-angled at B. D is a point inside the triangle ABC. P and Q are the feet of the perpendiculars drawn from D on the side AB and AC respectively of ΔABC. If AP = a cm, AQ = b cm and ∠BAD = 15°, sin 75° = ?

A. $\frac{2b}{\sqrt{3a}}$ B. $\frac{a}{2b}$ C. $\frac{\sqrt{3a}}{2b}$ D. $\frac{2a}{\sqrt{3b}}$

6. Which of the set of three sides can't form a triangle?

A. 5 cm, 6 cm, 7 cm B. 5 cm, 8 cm, 15 cm C. 8 cm, 15 cm, 18 cm D. 6 cm, 7 cm, 11 cm

7. If ΔABC ≅ ΔDEF and AB = 9.1 cm and DE = 6.5 cm. If perimeter of ΔDEF is 25 cm, then perimeter of ΔABC is

A. 36 cm B. 30 cm C. 34 cm D. 35 cm

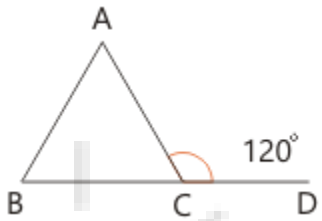
8. In a triangle ABC, AB + BC = 12 cm, BC + CA = 14 cm and CA + AB = 18 cm. Find the radius of the circle (in cm) which has the same perimeter as the triangle-

A. $\frac{5}{2}$ B. $\frac{7}{2}$ C. $\frac{9}{2}$ D. $\frac{12}{2}$

9. The sides of triangle are 3 cm, 4 cm and 5 cm. The area (in cm2) of the triangle formed by joining the mid-points of the sides of the triangle is:

A. 6 B. 2 C. $\frac{3}{2}$ D. $\frac{3}{4}$

10. In the figure given, ∠BAC : ∠ABC = 2 : 3 . Find the measure of ∠ABC.



A. 72° B. 120° C. 36° D. 108°

Correct Answers:

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

Explanations:

1. Traditional Method :

Let the other two sides be x and y.

Given, $x + y = 49$ cm

and, $41^2 = x^2 + y^2$ [By Pythagoras theorem]

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

$\Rightarrow 49^2 = 41^2 + 2xy$

$\Rightarrow 2401 = 1681 + 2xy$

$\Rightarrow 2xy = 2401 - 1681 = 720$

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

$\Rightarrow (x - y)^2 = 41^2 - 720 = 1681 - 720 = 961$

$\Rightarrow x - y = 31$ cm

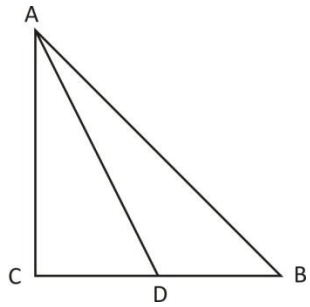
Intuitive Method :

Following the Pythagorean triples, if the hypotenuse is 41 units, the only possible combination of the other two sides must be 40 units and 9 units.

And therefore, the difference between the other two sides will be 40 - 9 = 31 cm.

Hence, option B is correct.

2.



In ΔABC,

$AB^2 = AC^2 + BC^2$ [By Pythagoras theorem]

$\Rightarrow AC^2 = AB^2 - BC^2$ ...(i)

In ΔACD,

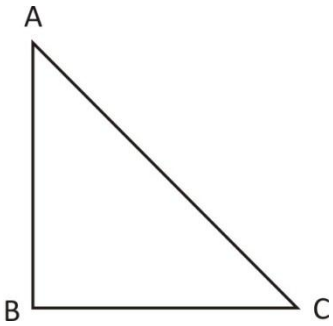
$AD^2 = AC^2 + CD^2$ [By Pythagoras theorem]

$\Rightarrow AD^2 = AB^2 - BC^2 + CD^2$ [From eq. (i)]

$\Rightarrow AB^2 + CD^2 = BC^2 + AD^2$

Hence, option A is correct.

3.



According to the question,

$AB \times BC = \frac{AC^2}{2}$

$\Rightarrow AC^2 = 2 \times AB \times BC$

$\Rightarrow AB^2 + BC^2 = 2 \times AB \times BC$ [By Pythagoras theorem, $AC^2 = AB^2 + BC^2$]

$\Rightarrow AB^2 + BC^2 - 2 \times AB \times BC = 0$

$\Rightarrow (AB - BC)^2 = 0$

$\Rightarrow AB = BC$

$\therefore \angle C = \angle A$

In ΔABC,

We know that the sum of the angles of a triangle is 180°.

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

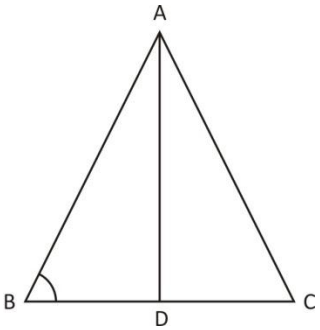
$\Rightarrow \angle A + 90° + \angle A = 180°$ [$\because \Delta ABC$ is an right-angled triangle]

$\Rightarrow 2\angle A = 180° - 90° = 90°$

$\Rightarrow \angle A = 45°$ and $\angle C = 45°$ [$\because \angle A = \angle C$]

Hence, option C is correct.

4.



AD is the median to the base BC.

$\therefore \angle ADB = 90°$

Given, $\angle ABC = 35°$

$\therefore \angle ABD = 35°$

In ΔABD,

We know that the sum of the angles of a triangle is 180°.

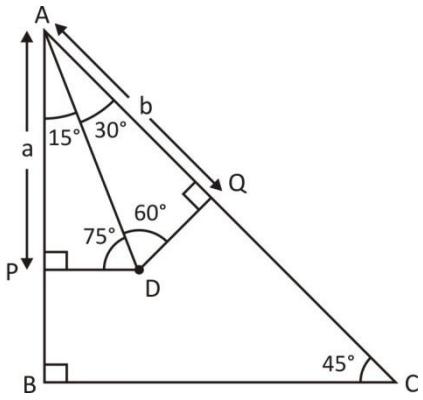
$\angle ABD + \angle ADB + \angle BAD = 180°$

$35° + 90° + \angle BAD = 180°$

$\angle BAD = 180° - 35° - 90° = 55°$

Hence, option B is correct.

5.



Given, ΔABC is an isosceles triangle and ∠B is right-angled.
∴ ∠A = ∠C
and ∠B = 90°
We know that the sum of the angles of a triangle is 180°.
∴ ∠A + ∠B + ∠C = 180°
⇒ ∠A + 90° + ∠A = 180° [∵ ∠B = 90° & ∠A = ∠C]
⇒ 2∠A = 180° – 90° = 90°
⇒ ∠A = 45° and ∠C = 45° [∵ ∠A = ∠C]
From ΔADP,
∠APD + ∠PAD + ∠ADP = 180° [∠BAD = 15° (given), ∴ ∠PAD = 15°]
⇒ 90° + 15° + ∠ADP = 180° [PD ⊥ AB ∴ ∠APD = 90°]
⇒ ∠ADP = 180° – 90° – 15° = 75°
Now, ∠A = ∠BAD + ∠DAC
⇒ 45° = 15° + ∠DAC
⇒ ∠DAC = 45° – 15° = 30°
∴ ∠DAQ = 30°
From ΔADQ,
∠AQD + ∠DAQ + ∠ADQ = 180°
⇒ 90° + 30° + ∠ADQ = 180° [DQ ⊥ AC ∴ ∠AQD = 90°]
⇒ ∠ADQ = 180° – 90° – 30° = 60°
Again from ΔADQ,

$$\sin 60° = \frac{AQ}{AD}$$

$$\Rightarrow \frac{\sqrt{3}}{2} = \frac{b}{AD}$$

$$\Rightarrow AD = \frac{2b}{\sqrt{3}}$$

Again from ΔADP,

$$\sin 75° = \frac{AP}{AD} = \frac{a}{2b/\sqrt{3}} = \frac{a\sqrt{3}}{2b}$$

Hence, option C is correct.

6. We know that sum of any two sides of a triangle must be greater than the 3rd side.
We can observe that option 'B' doesn't satisfy this condition as
5 + 8 > 15
Option B hence is the correct answer.
Hence, option B is correct.

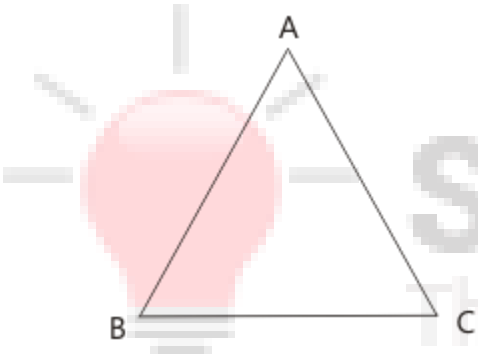
7. If two triangles are congruent,

$$\frac{\text{Per }(\Delta ABC)}{\text{Per }(\Delta DEF)} = \frac{AB}{DE}$$

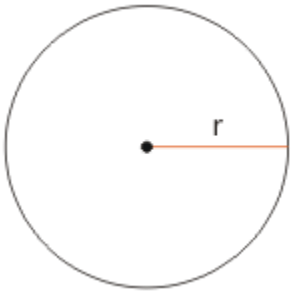
$$\frac{\text{Per }(\Delta ABC)}{25} = \frac{9.1}{6.5}$$

Per (ΔABC) = 35 cm
Hence, option D is correct.

8.



In ΔABC,
AB + BC = 12 cm
BC + CA = 14 cm
And, CA + AB = 18 cm
⇒ 2(AB + BC + CA) = 44 cm
⇒ AB + BC + CA = 22 cm

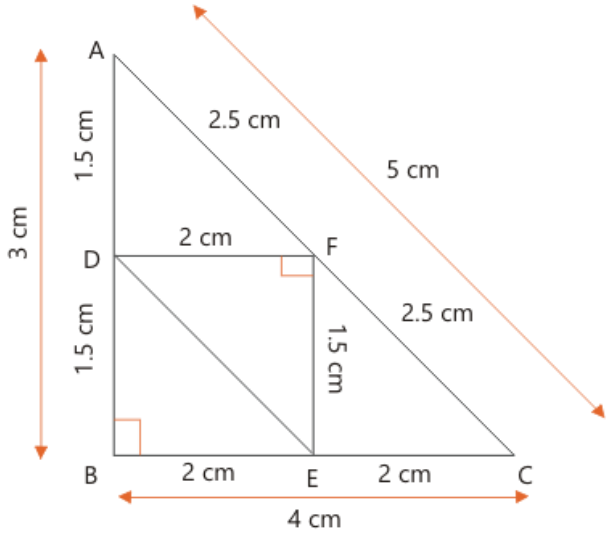


ATQ, 2πr = 22 cm

$\Rightarrow 2 \times \frac{22}{7} \times 22 \text{ cm} \Rightarrow r = \frac{7}{2} \text{cm}$

Hence, option B is correct.

9.



Sides are 3, 4 and 5 cm.
Triangle ABC is a right angled triangle where $\angle B = 90°$.

Therefore, area of the triangle $= \frac{1}{2} \times$ base $\times$ height

$= \frac{1}{2} \times 4 \times 3 = 6 \text{ cm}^2$

Applying the midpoint theorem which says that if we join the mid points of the sides of a tirangle, the 4 triangles thus made will be equal in areas.

$\therefore$ The area of the triangle DEF $= \frac{1}{4} \times$ area of triangle ABC

So, Area of $\Delta DEF = \frac{1}{4} \times$ Area of triangle ABC $= \frac{1}{4} \times 6 \text{ cm}^2$

$= \frac{3}{2} \text{cm}^2$

Hence, option C is correct.

10. Let $\angle A = 2x$ and $\angle B = 3x$
Then, $2x + 3x = 120°$ (exterior angle is equal to the sum of the interior opposite angles)
$\Rightarrow 5x = 120°$
$\Rightarrow x = 24°$
$\therefore \quad \angle ABC = 3x = 3 \times 24° = 72°$
Hence, option A is correct.