

## Questions with Answer Keys

MathonGo

## Q1 (20 July 2021 Shift 1)

If in a triangle ABC, AB = 5 units,  $\angle B = \cos^{-1}\left(\frac{3}{5}\right)$  and radius of circumcircle of  $\Delta ABC$  is 5 units, then the

area (in sq. units) of  $\Delta ABC$  is:

(1)  $10 + 6\sqrt{2}$

(2)  $8 + 2\sqrt{2}$

(3)  $6 + 8\sqrt{3}$

(4)  $4 + 2\sqrt{3}$

## Q2 (20 July 2021 Shift 2)

Let in a right angled triangle, the smallest angle be

$\theta$ . If a triangle formed by taking the reciprocal of

its sides is also a right angled triangle, then  $\sin \theta$  is

equal to:

(1)  $\frac{\sqrt{5}+1}{4}$

(2)  $\frac{\sqrt{5}-1}{2}$

(3)  $\frac{\sqrt{2}-1}{2}$

(4)  $\frac{\sqrt{5}-1}{4}$

# Properties of Triangles

JEE Main 2021 (July) Chapter-wise Questions

## Questions with Answer Keys

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# Answer Key

81 (2)

02 (2)

## Properties of Triangles

## JEE Main 2021 (July) Chapter-wise Questions

### Hints and Solutions

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$$\text{As, } \cos B = \frac{3}{5}$$

$$\Rightarrow B = 53^\circ$$

$$\text{As, } R = 5 \Rightarrow \frac{c}{\sin C} = 2R$$

$$\Rightarrow \frac{5}{\sin C} = 2R$$

$$\Rightarrow \frac{5}{10} = \sin C$$

$$\Rightarrow C = 30^\circ$$

$$\text{Now, } \frac{b}{\sin B} = 2R$$

$$\Rightarrow b = 2(5) \left(\frac{4}{5}\right) = 8$$

Now, by cosine formula

$$\cos B = \frac{a^2 + c^2 - b^2}{2ac}$$

$$\Rightarrow \frac{3}{5} = \frac{a^2 + 25 - 64}{2(5)a}$$

$$\Rightarrow a^2 - 6a - 3 = 0$$

$$\therefore a = \frac{6 \pm \sqrt{192}}{2} = \frac{6 \pm 8\sqrt{3}}{2}$$

$$\Rightarrow 3 + 4\sqrt{3} \quad (\text{Reject } a = 3 - 4\sqrt{3})$$

$$\text{Now, } \Delta = \frac{abc}{4R} = \frac{(3+4\sqrt{3})(8)(5)}{4(5)} = 2(3 + 4\sqrt{3})$$

$$\Rightarrow \Delta = (6 + 8\sqrt{3})$$

$\Rightarrow$  Option (3) is correct.

Q2

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## Properties of Triangles

## JEE Main 2021 (July) Chapter-wise Questions

### Hints and Solutions

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$$\angle A = \theta$$

$$\angle B = 90 - \theta$$

a = smallest side

$$c^2 = a^2 + b^2$$

$$\frac{1}{a^2} = \frac{1}{b^2} + \frac{1}{c^2}$$

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

$$\text{Use } a = 2R \sin A = 2R \sin \theta$$

$$b = 2R \sin B = 2R \sin(90 - \theta) = 2R \cos \theta$$

$$c = 2R \sin C = 2 \sin 90^\circ = 2R$$

$$\frac{4R^2 \cos^2 \theta}{4R^2 \sin^2 \theta} = 4R^2 \cos^2 \theta + 4R^2$$

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

$$1 - \sin^2 \theta = \sin^2 \theta (1 - \sin^2 \theta) + \sin^2 \theta$$

$$\sin^2 \theta = \frac{3-\sqrt{5}}{2}$$

$$\Rightarrow \sin \theta = \frac{\sqrt{5}-1}{2}$$

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