Properties of Triangles

Question1

If $\triangle ABC$ is right angled at C, then the value of $\tan A + \tan B$ is

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Options:

A. $a + b$

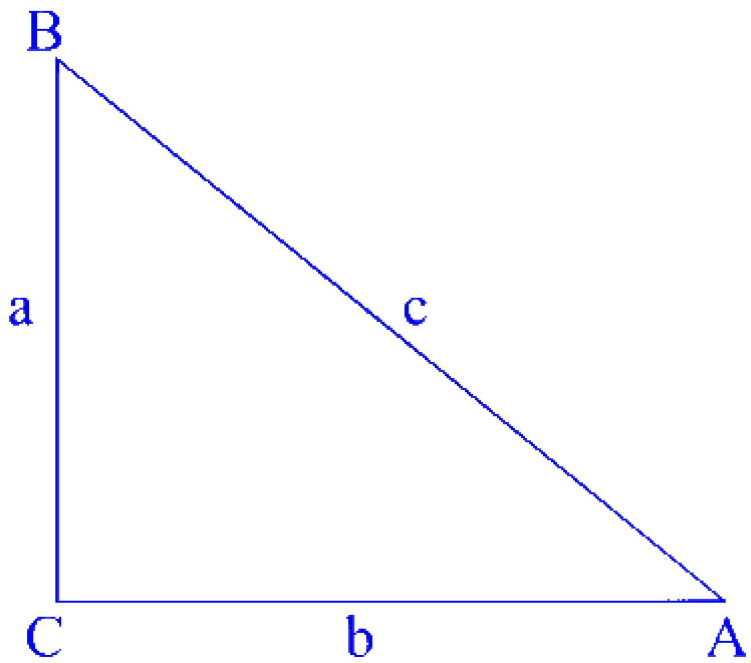
B. a^2/bc

C. c^2/ab

D. b^2/ac

Answer: C

Solution:



$\because \tan A = \frac{a}{b}, \tan B =$

$$\therefore \quad \tan A + \tan B = \frac{a}{b} + \frac{b}{a}$$
$$= \frac{a^2 + b^2}{ab}$$
$$= \frac{c^2}{ab} \quad [\because c^2 = a^2 + b^2]$$

Question2

The area of a triangle with vertices $(-3, 0)$, $(3, 0)$ and $(0, k)$ is 9 sq units, find the value of k is

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Options:

A. -9

B. 6

C. 3

D. 9

Answer: C

Solution:

We know that areas of a triangle with vertices (x_1, y_1), (x_2, y_2) and (x_3, y_3) is given by

$$\Delta = \frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$$

$$\therefore \Delta = \frac{1}{2}\begin{vmatrix} -3 & 0 & 1 \\ 3 & 0 & 1 \\ 0 & k & 1 \end{vmatrix}$$

Expanding along C_2

$9 = \frac{1}{2}[-k(-3-3)]$

$\Rightarrow 18 = 3k + 3k = 6k$

$\therefore k = \frac{18}{6} = 3$

Question3

The area of triangle with vertices $(K, 0), (4, 0), (0, 2)$ is 4 sq units, then value of K is

KCET 2017

Options:

A. 8

B. 0 or 8

C. 0

D. 0 or -8

Answer: B

Solution:

To find the value of K for which the area of the triangle with vertices $A(K, 0)$, $B(4, 0)$, and $C(0, 2)$ is 4 square units, we proceed as follows:

We begin with the coordinates of the vertices:

$A(K, 0)$

$B(4, 0)$

$C(0, 2)$

The formula for the area of a triangle given its vertices (x_1, y_1), (x_2, y_2), and (x_3, y_3) is:

Area $= \frac{1}{2}|x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)|$

Substituting the coordinates of A, B, and C into the formula, we get:

Area $= \frac{1}{2}|K(0 - 2) + 4(2 - 0) + 0(0 - 0)| = 4$

This simplifies to:

$\frac{1}{2}|-2K+8| = 4$

Solving for $|-2K+8|$, we multiply both sides by 2:

$|-2K+8| = 8$

This equation gives two possible solutions:

$-2K+8 = 8$

$-2K+8 = -8$

Solving the first equation:

$-2K+8 = 8$

$-2K = 0$

$K = 0$

Solving the second equation:

$-2K+8 = -8$

$-2K = -16$

$K = 8$

Thus, the possible values of K are 0 or 8.
