

## Answer on Question #51810 – Math – Trigonometry

### Question

Without using tables, find the value of  $\tan 45^\circ$

- A 3
- B 5
- C 2
- D 1

### Solution

Take the unit circle, the triangle is right-angled, therefore  $x = \cos(\alpha)$ ,  $y = \sin(\alpha)$  and  $x^2 + y^2 = 1$ . Besides, the triangle is isosceles, therefore  $x = y$ .

If the triangle is right-angled and isosceles, then its interior angles are  $45^\circ$ ,  $45^\circ$ ,  $90^\circ$ .

Solving the system of equations

$$\begin{cases} x^2 + y^2 = 1, \\ x = y, \end{cases}$$

substitute  $y = x$  and the first equation gives

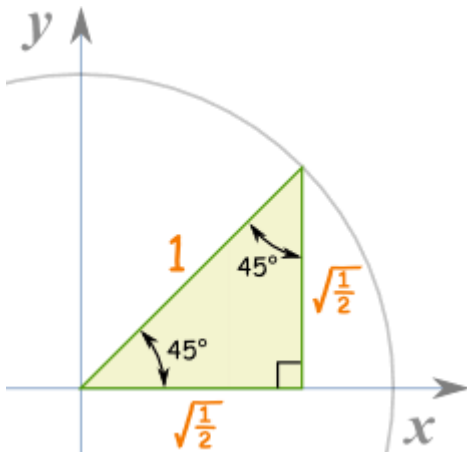
$$x^2 + x^2 = 1$$

$$2x^2 = 1$$

$$x = \sqrt{\frac{1}{2}}$$

$$x = \frac{\sqrt{2}}{2}.$$

Thus,  $x = y = \frac{\sqrt{2}}{2}$ . In other words,  $\cos(45^\circ) = \sin(45^\circ) = \frac{\sqrt{2}}{2}$ .



$$\tan 45^\circ = \frac{\sin 45^\circ}{\cos 45^\circ} = \frac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = 1;$$

**Answer: D 1.**