

**Solution:**

$$\tan 45^\circ = 1$$

$$\tan 60^\circ = \sqrt{3}$$

$$(\tan 45^\circ + \tan 60^\circ)^2 = (1 + \sqrt{3})^2 = 1 + 2\sqrt{3} + 3 = 4 + 2\sqrt{3}$$

**Answer:**  $(\tan 45^\circ + \tan 60^\circ)^2 = 4 + 2\sqrt{3}$