Question 43

A painting of mass one kilogram is to be hung on a wall using two light strings. Unfortunately the painting is not quite horizontal. One string makes an angle of 46^0 with the vertical and has a tension of magnitude T_1 newtons. The other string makes an angle of 44^0 with the vertical and has a tension of magnitude T_2 newtons, as shown in the diagram below.
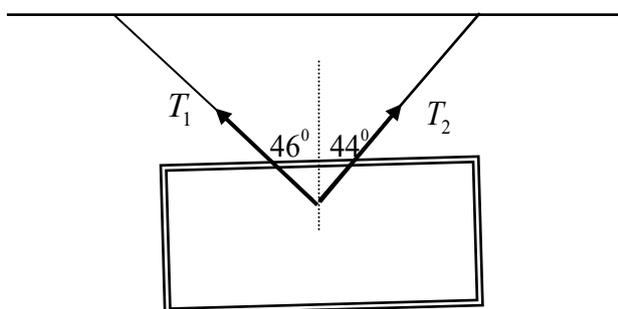
Which of the following is true?

A. $\dfrac{T_1}{T_2} = \tan\left(44^0\right)$

B. $\dfrac{T_1}{T_2} = \tan\left(46^0\right)$

C. $T_1 + T_2 = g$

D. $T_1^2 + T_2^2 = g^2$

E. $T_1 = T_2$

ANSWER A

resolving horizontally gives

$$T_1 \sin\left(46^0\right) = T_2 \sin\left(44^0\right) \quad \Rightarrow \quad \frac{T_1}{T_2} = \frac{\sin\left(44^0\right)}{\sin\left(46^0\right)} = \frac{\sin\left(44^0\right)}{\cos\left(44^0\right)} = \tan\left(44^0\right)$$