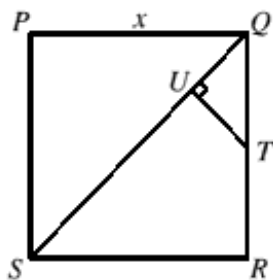




9. A square  $PQRS$  has sides of length  $x$ .  $T$  is the midpoint of  $QR$  and  $U$  is the foot of the perpendicular from  $T$  to  $QS$ . What is the length of  $TU$ ?

- A  $\frac{x}{2}$       B  $\frac{x}{3}$       C  $\frac{x}{\sqrt{2}}$       D  $\frac{x}{2\sqrt{2}}$       E  $\frac{x}{4}$



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9. **D** As  $T$  is the midpoint of  $QR$  then  $QT = \frac{1}{2}x$ .  
 Since  $\angle UQT = \angle SQR = 45^\circ$  and  $\angle QUT = 90^\circ$ ,  $\angle UTQ = 45^\circ$ .  
 Thus triangle  $QTU$  is isosceles with  $UQ = UT$ .  
 In triangle  $QTU$ , by Pythagoras' Theorem,  $QT^2 = QU^2 + TU^2$ .  
 Hence  $(\frac{1}{2}x)^2 = 2TU^2$  so  $TU^2 = \frac{1}{8}x^2$  giving  $TU = \frac{x}{2\sqrt{2}}$ .

