



Construct vectors as shown.

$\Delta ZOY \sim \Delta TOX$ ,  
since all corresponding angles are equal.

Thus, all side lengths in  $\Delta TOX$  are proportional to all side lengths in  $\Delta ZOY$ .

Since  $2|\vec{OZ}| = |\vec{OX}|$

hence,  $k=2$  is the scale factor.

Thus,

$$|\vec{OX}| = 2|\vec{OZ}|$$

$$\text{and } \vec{OX} = 2\vec{OZ} \text{ or } \frac{1}{2}\vec{OX} = \vec{OZ}! \quad (1)$$

$$\text{Now, } \vec{TX} + \vec{OX} = \vec{TO} \quad (\text{Triangle Law}) \quad (2)$$

$$\text{and } \vec{TO} + \vec{OZ} = \vec{TZ} \quad (\text{Triangle Law}) \quad (3)$$

Sub (1) into (3)...

$$\vec{TO} + \frac{1}{2}\vec{OX} = \vec{TZ}$$

$$\frac{1}{2}\vec{OX} = \vec{TZ} - \vec{TO}$$

$$\vec{OX} = 2\vec{TZ} - 2\vec{TO} \quad (4)$$

Sub (4) into (2)...

$$\vec{TX} + 2\vec{TZ} - 2\vec{TO} = \vec{TO}$$

$$\vec{TX} + 2\vec{TZ} = 3\vec{TO}$$

$$\text{or } \frac{1}{3}\vec{TX} + \frac{2}{3}\vec{TZ} = \vec{TO}! \quad \square$$

Gr 10's...  
Math Contest  
Wed. Feb. 24