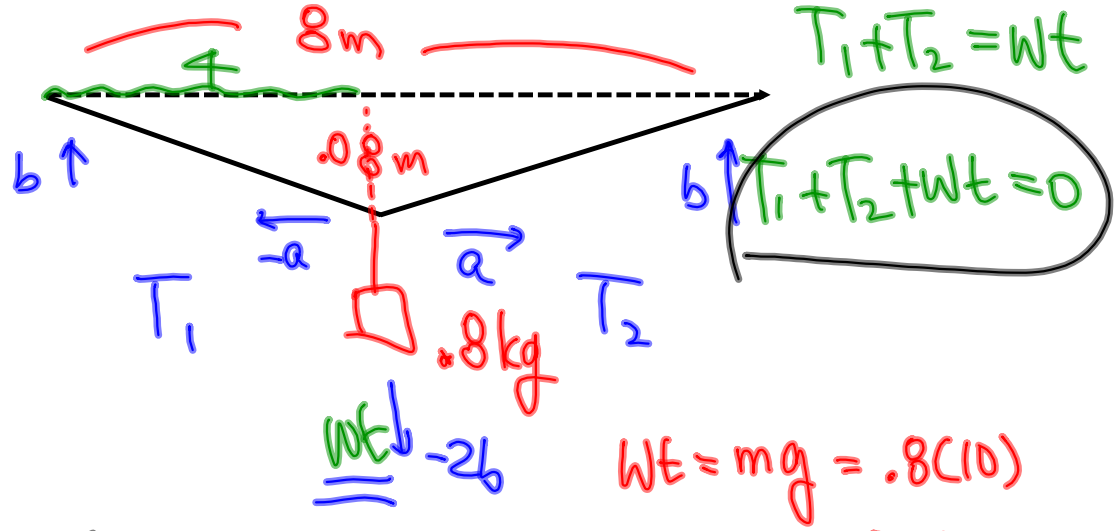
How do we operate with vectors?

A clothesline is tied between two poles, 8 m apart. The line is quite taut and has negligible sag. When a wet shirt with a mass of 0.8 kg is hung at the middle of the line, the midpoint is pulled down 8 cm. Find the tension in each half of the clothesline.



$T_1 + T_2 = Wt$

$T_1 + T_2 + Wt = 0$

$Wt = mg = .8(10)$

$= 8\ N$

$T_1 = -ai + bj \qquad T_2 = ai + bj$

$Wt = 0i - 2bj$

$2b = 8\ N$

$b = 4N$

$\frac{a}{b} = \frac{4}{.08}$

$\frac{a}{4} = \frac{4}{.08}$ $\quad a = 200N$

$T_1 = -200i + 4j \qquad |T_1| = 4\sqrt{2501}$

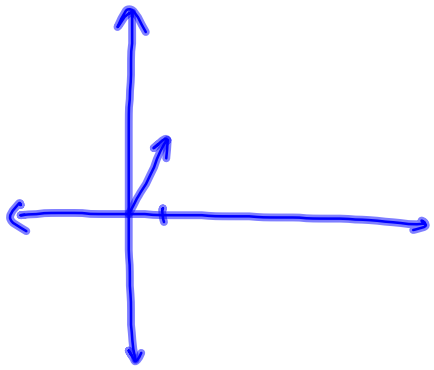
$= \sqrt{(200)^2 + 4^2}$

Dot product.

$\langle a, b \rangle \cdot \langle c, d \rangle = ac + bd$

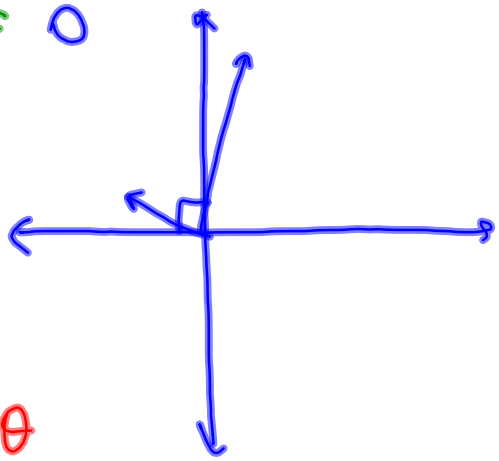
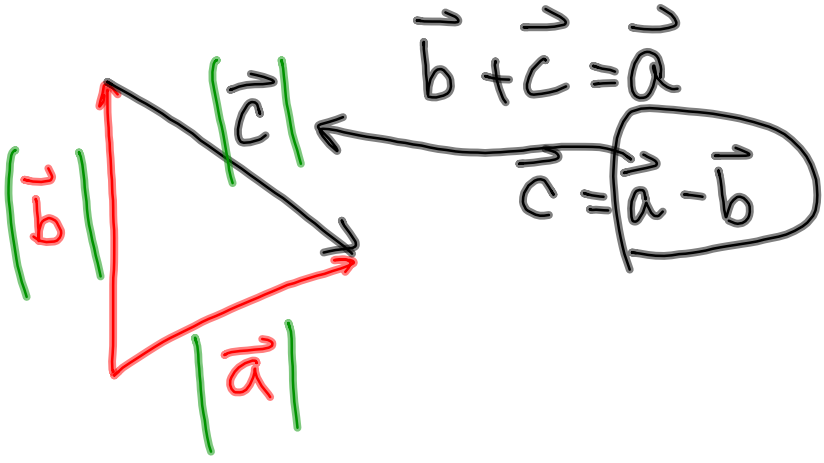
1) $\langle 1, 2 \rangle \cdot \langle 1, 2 \rangle = 5$

$|\langle 1, 2 \rangle| = \sqrt{5} \cdot \sqrt{5} = 5$



2) $\langle 1, 6 \rangle \cdot \langle -2, \frac{1}{3} \rangle = 0$

$\sqrt{37} \quad \sqrt{\frac{37}{9}}$



$\vec{a} \cdot \vec{b} = |\vec{a}||\vec{b}|\cos\theta$