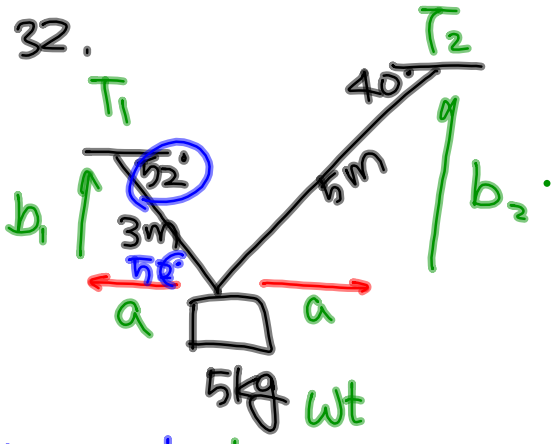
32.



$a = a$

$b_1 + b_2 + wt = 0$

$a\tan 52^\circ + a\tan 40^\circ - 50\,N = 0$

$a = \dfrac{50}{\tan 52^\circ + \tan 40^\circ} = 23.6\,N.$

$\tan 52^\circ = \dfrac{b_1}{a}$

$b_1 = a\tan 52^\circ$

$b_2 = a\tan 40^\circ$

$b_1 = (23.6)\tan 52^\circ = 30.2\,N$

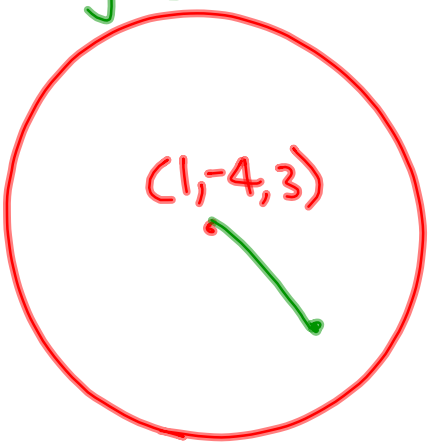
$b_2 = 19.8\,N$

$\vec{T_1} = -23.6\,i + 30.2\,j$, $|T_1| = 38.3\,N$

$\vec{T_2} = 23.6\,i + 19.8\,j$, $|T_2| = 30.8\,N.$

11. Find an equation of the sphere with center $(1, -4, 3)$ and radius 5. What is the intersection of this sphere with the xz-plane?

$y=0$

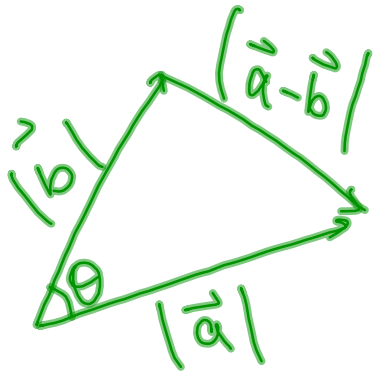


$$d=5=\sqrt{(x-1)^2+(y+4)^2+(z-3)^2}$$

$$(x-1)^2+(y+4)^2+(z-3)^2=25$$

$$(x-1)^2+4^2+(z-3)^2=25$$

$$(x-1)^2+(z-3)^2=9$$



$\vec{a} = \langle a_1, a_2 \rangle$

$\vec{b} = \langle b_1, b_2 \rangle$

$\vec{a} - \vec{b} = \langle a_1 - b_1, a_2 - b_2 \rangle$

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

By Law of cosine,

$a_1 \cdot b_1 + a_2 \cdot b_2 =$

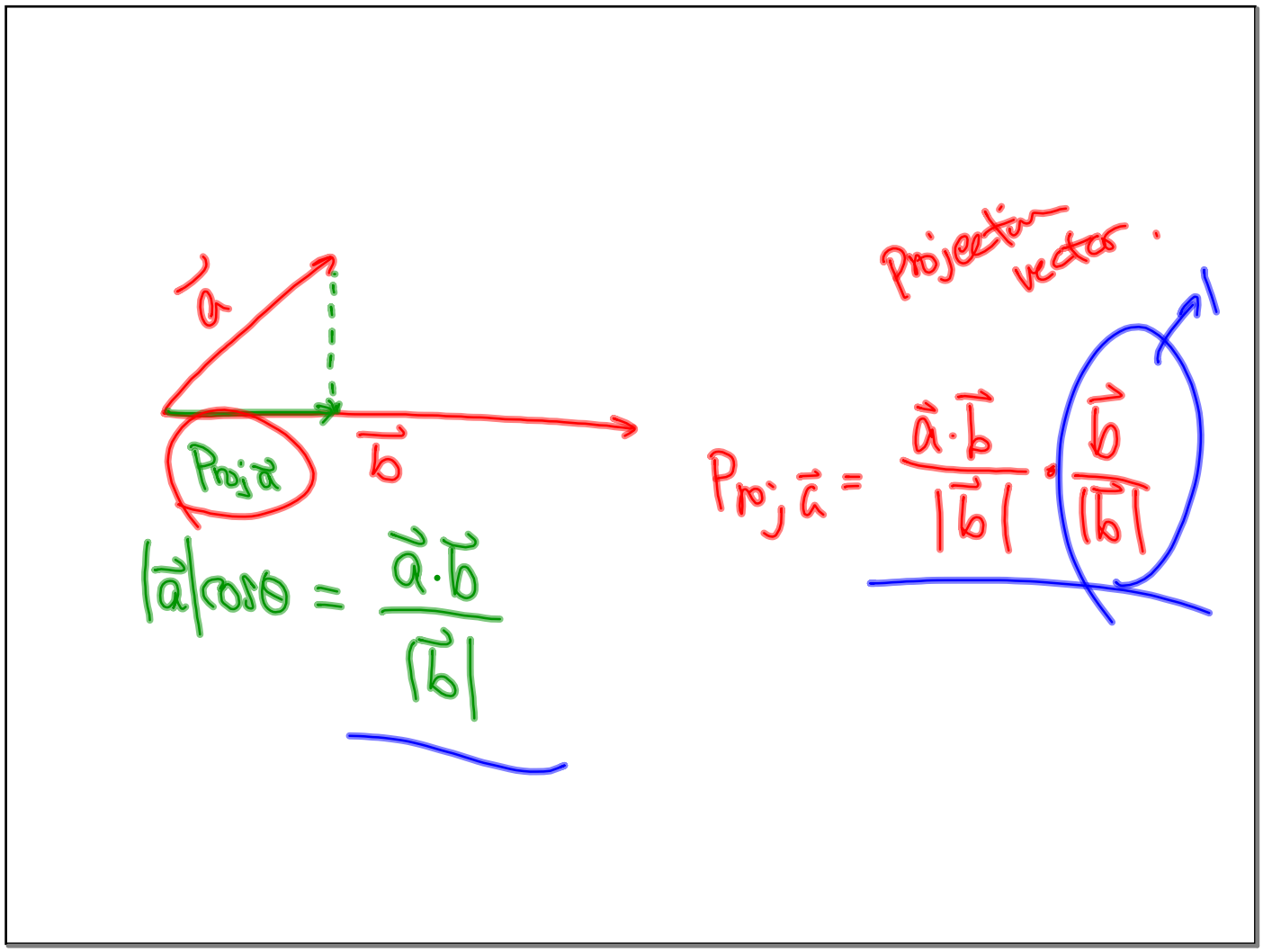
$$|\vec{a}-\vec{b}|^2 = |\vec{a}|^2 + |\vec{b}|^2 - 2|\vec{a}||\vec{b}|\cos\theta$$

$$(a_1-b_1)^2 + (a_2-b_2)^2 = a_1^2 + a_2^2 + b_1^2 + b_2^2 - 2|\vec{a}||\vec{b}|\cos\theta$$

$$a_1^2 - 2a_1b_1 + b_1^2 + a_2^2 - 2a_2b_2 + b_2^2 =$$

$$a_1^2 + a_2^2 + b_1^2 + b_2^2 - 2|\vec{a}||\vec{b}|\cos\theta$$

$$-2(a_1b_1 + a_2b_2) = -2|\vec{a}||\vec{b}|\cos\theta$$


$\vec{a}$
$\vec{b}$
Proj $\vec{a}$
$|\vec{a}|\cos\theta = \frac{\vec{a}\cdot\vec{b}}{|\vec{b}|}$
Projection vector.
$\text{Proj}_{\vec{b}}\vec{a} = \frac{\vec{a}\cdot\vec{b}}{|\vec{b}|}\cdot\frac{\vec{b}}{|\vec{b}|}$