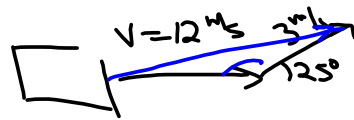


Adding Multiple Vectors

Homework questions? #5 and #6.

#6



Examples of Adding Multiple Vectors

Example 1:

A hiker walks 300 m E, then 200 m S30°E and then 100 m S30°W. What is her final displacement? How far, and which way will she have to go to return to the starting point?

Commutative
 $\vec{a} + \vec{b} = \vec{b} + \vec{a}$

$\Sigma d_x = d_1 + d_{2x} - d_{3x}$
 $= 300 + 100 - 50 \text{ m}$
 $= 350 \text{ m}$

$\Sigma d_y = d_{2y} + d_{3y}$
 $= 173 \text{ m} + 87 \text{ m}$
 $= 260 \text{ m}$

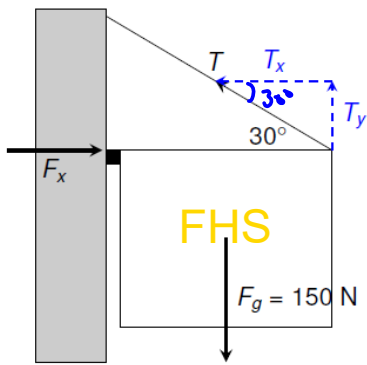
$c^2 = a^2 + b^2$
 $(\Sigma d)^2 = (260)^2 + (350)^2$
 $= 67600 + 122500$
 $= 190100$

$\tan \theta = \frac{350}{260}$
 $\theta = 53^\circ$

$\Sigma d = 436 \text{ m}$
 $\Sigma \vec{d} = 436 \text{ m } S53^\circ E$

Example 2 (an example in "statics"):

Consider a display sign hung by a wire and a bracket as shown. What is the tension in the wire and the force applied by the bracket?



$$\sum \vec{F} = 0$$

$$\sum \vec{F}_x = 0$$

$$\sum \vec{F}_y = 0$$

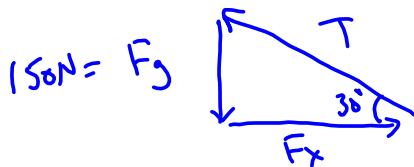
$$F_x = T_x$$

$$T_y = F_g = 150 \text{ N}$$

$$\begin{aligned} F_x &= T \cos 30^\circ \\ &= 300 \text{ N} \cos 30^\circ \\ &= \underline{\underline{260 \text{ N}}} \end{aligned}$$

$$T \sin 30^\circ = 150 \text{ N}$$

$$T = \underline{\underline{300 \text{ N}}}$$



Homework: p. 467 # 7(a) and (b), 8 and 9

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