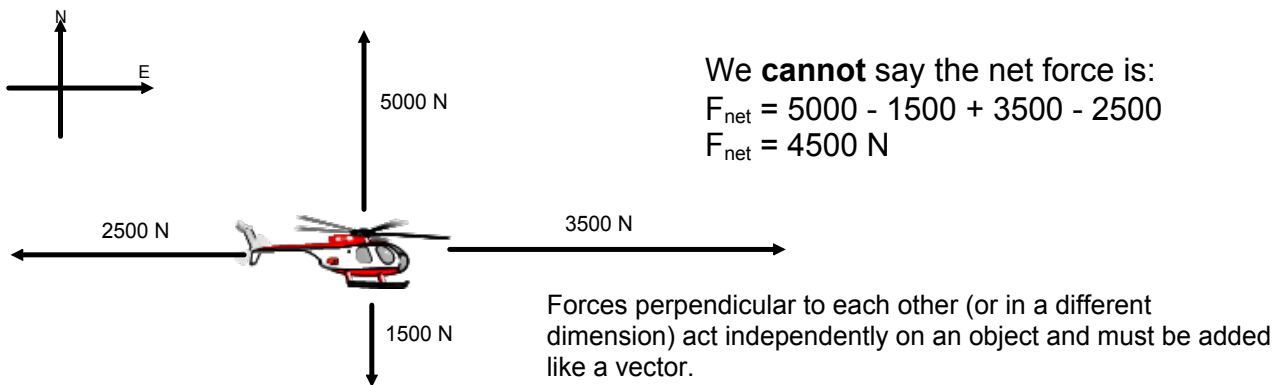


Net Force

The net force is the vector sum of all the forces acting on an object. Only forces acting in the same dimension (i.e. left and right or up and down) can be mathematically added (or subtracted).

Consider the four forces acting on the object below:



We can talk about the net force in each dimension:

$$F_{\text{net}} [\text{East}] = 3500 \text{ N} - 2500 \text{ N}$$

$$F_{\text{net}} [\text{E}] = 1000 \text{ N}$$

$$F_{\text{net}} [\text{North}] = 5000 \text{ N} - 1500 \text{ N}$$

$$F_{\text{net}} [\text{N}] = 3500 \text{ N}$$

To find the actual net force on the object we would need to do a scale diagram with the vectors or a calculation (grade 12).

Often to identify which direction we are focusing on we use the subscripts x and y. Like in your math class, x - horizontal direction and y - vertical direction. Directions are all in the way your set up your problem for analysis - your frame of reference.

The net horizontal force acting on a crate is 25 N [E]. If the applied force is 135 N [E] calculate the force of friction.

$$F_{net} = 25 \text{ N [E]}$$

$$F_a = 135 \text{ N [E]}$$

$$F_f = ?$$

$$\vec{F}_{net} = \sum \text{ Forces}$$

↑ Greek Capital Sigma means "sum of"

$$F_{net} = F_a + F_f$$

$$25 = 135 + F_f$$

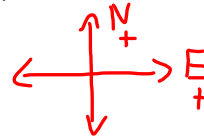
$$25 - 135 = 135 + F_f \quad -135$$

$$\boxed{-110 \text{ N} = F_f}$$

↑ direct West * Force of friction is always opposite motion.

A 62 kg crate is pulled at a constant velocity with an applied force of 337 N.

- Calculate the force of friction.
- Calculate the normal force on the crate.
- Calculate the coefficient of kinetic friction.

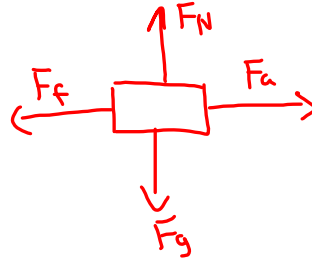


a) $m = 62 \text{ kg}$

$$F_{\text{net}} = 0 \text{ N}$$

$$F_a = 337 \text{ N [E]}$$

$$F_f = ?$$



$$F_{\text{net}} = \sum \text{ Forces (horizontally)}$$

$$F_{\text{net}} = F_a + F_f$$

$$0 = 337 + F_f$$

$$\boxed{-337 \text{ N} = F_f}$$

b) $F_N = ?$

$$|F_N| = |F_g| \rightarrow F_g = mg$$

The magnitudes equal each other

$$|F_N| = |mg| = |(62)(9.81)| = \boxed{608 \text{ N}}$$

c) $\mu = ?$ $|F_f| = \mu |F_N|$

$$F_f = -337 \text{ N}$$

$$F_N = 608 \text{ N}$$

$$337 = \mu(608)$$

$$\frac{337}{608} = \mu$$

$$\boxed{0.55 = \mu}$$

Attachments

forces-and-motion-basics_all.jar

forces-1d_all.jar

friction_en.jar