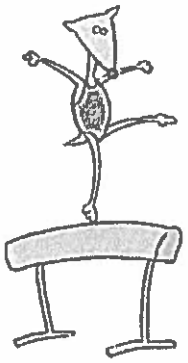
Notes:

PHYSICS 12

NEWTON'S FIRST LAW



Newton's First Law = The Law of Inertia

- An object remains moving at constant velocity (or it says at rest) unless acted upon by an unbalanced force.

Note: Constant velocity means no change in speed and/or no change in direction

Unbalanced Force = the net force is NOT zero

Net Force = vector sum of all forces acting on an object

INERTIA = Natural tendency of all objects to resist change in their state of motion or rest. Inertia is directly proportional to the mass of the object.

- The higher the mass, the greater the inertia

EQUILIBRIUM = a state during which all forces acting on an object are balanced.

Give an example of an object that experiences acceleration due to changes in direction and speed.

→ a car slows down going into a curve

Give an example of an object that experiences acceleration due to changes in speed only.

→ speeding up on a straight stretch of a road

Give an example of an object that experiences acceleration due to changes in direction only.

→ taking a ride on a merry-go-round when it is not speeding up and before it starts slowing down

Give an example of an object that is in equilibrium.

→ anything that moves at constant speed along a straight line.

→ anything that is at rest.

Give an example of an object that has greater inertia than you.

→ an aeroplane

→ Earth

$\|\vec{F}_{pull_2}\| = \sqrt{4477.0353}$

$\cong 67\ N$

$\theta = \tan^{-1}\left(\frac{42.9539}{51.3030}\right)$

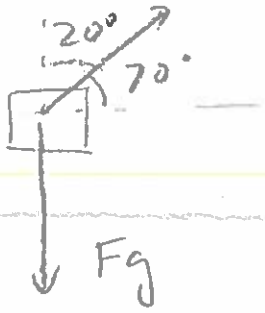
$\theta \cong 40°$

$\therefore \vec{F}_{pull_2} = 67\ N\ L40°D.$

1. What force do you have to exert on a 10.0 – kg object that is being pulled with force of 150.0N [Up20°Right] and is 1.0m above the ground in order to keep the object in equilibrium?

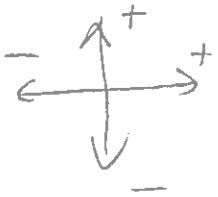
no F_N

Include a Free-Body Diagram.



$\vec{F}_{net} = [0, 0]$

FBD:



$\vec{F}_g = mg$

$= (10.0)(9.8)$

$= [0, -98.0]\ N$

$\vec{F}_{pull_{①}} = [150\cos 70°,\ 150\sin 70°]$

$= [51.3030,\ 140.9539]\ N$

$\vec{F}_{net} = \vec{F}_g + \vec{F}_{pull_{①}} + F_{pull_{②}}$

$[0, 0] = [0, -98.0] + [51.3030, 140.9539] + [x, y]$

x:

$0 = 0 + 51.3030 + x$

$x = -51.3030\ N$

y:

$0 = -98.0 + 140.9539 + y$

$y = -42.9539\ N$

$\therefore \vec{F}_{pull_{②}} = [-51, -43]\ N$ has to be exerted to maintain the object in equilibrium.