Cause of motion - force

Types of forces

   weight $W = mg$

                 response of mass to gravity

   tension (T) - force delivered by rope, string, chain, etc.

   *normal (N) - the force that is always perpendicular to the surface and
           always points such that it tends to prevent the object from
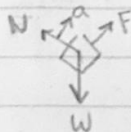   accelerating through the surface

   friction (f) - the force that exists between two surfaces that tend to
           oppose the relative motion between surfaces

What push directed along a 20° smooth incline is necessary to give a 40 kg cart
an acceleration of 0.5 m/s² up the incline?
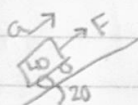
2nd law $\vec{F}_{net} = m\vec{a}$

$W_\perp = W\cos\theta$

$W_{||} = W\sin\theta$

$\perp \Rightarrow \vec{F}_{net} = 0$
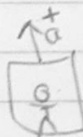
$|| \Rightarrow \vec{F}_{net} = m\vec{a}$

   $F - W\sin\theta = m\vec{a}$

   $F = 40(9.8)\sin20 + 40(0.5)$

   $F = 154N$

Elevator

2nd law $N - W = m\vec{a}$

$\vec{F}_{net} = m\vec{a}$ $N = W + m\vec{a}$