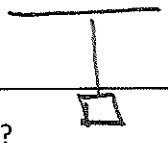
Newton's Second Law

F = ma

Student Practice

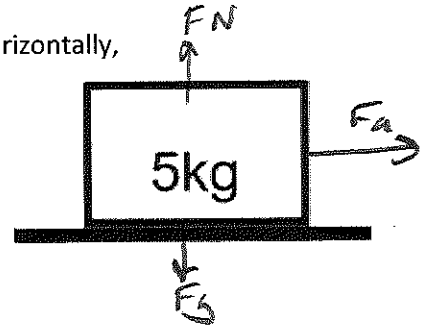


---

1. A 50kg block is hanging from a wire. What is the tension on the wire?

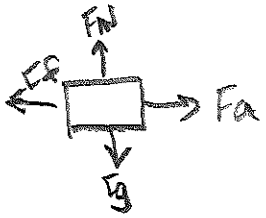
$50 \cdot 10 = \boxed{500N}$

2. A 5kg block is pushed on a frictionless surface with a 10N force horizontally,
   a. Draw all force vectors
   b. Calculate the acceleration of the block.



$a = \frac{\Sigma F}{m} \quad \frac{10}{5} = \boxed{2 m/s^2}$

3. A block is sliding cross a rough surface level surface.
   a. Draw all forces acting on the block.
   b. Using the variables, F_a, M, g, u, derive a formula for the acceleration of the block.



$\Sigma F = ma$

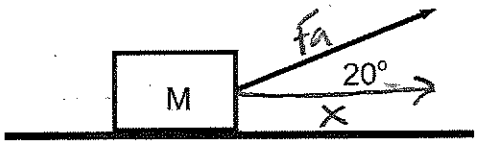
$a = \frac{\Sigma F}{m}$

$a = \frac{F_a - F_f}{m}$

$a = \frac{F_a - F_N \mu}{m}$

$a = \frac{F_a - mg\mu}{m}$

4. A block is pulled along as shown in the picture below on a frictionless surface.
   Using variables, M, g, Fa and trig functions derive a formula for the acceleration of the block.



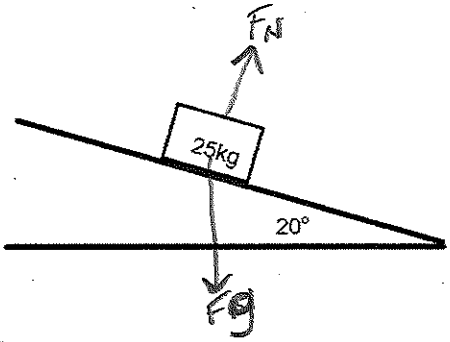
$\Sigma F = m \cdot a$

$a = \frac{\Sigma F}{m} = \frac{F_x}{m} = \frac{F_a \cos(\theta)}{m}$

$\cos\theta \quad \frac{X}{F_a}$

$F_a \cdot \cos\theta = X$

5. A block is sliding down a frictionless surface as seen in the picture below.
   a. What is the weight of the block? $25 \cdot 10 = 250N$
   b. Draw all force vectors on the block
   c. Calculate the force normal.
   d. Calculate the force ramp.
   e. Calculate the acceleration down the ramp



$\sin(20) \cdot 250 = 85N$

$\cos\theta = \frac{F_N}{F_g}$

$a = \frac{\Sigma F}{m} \quad \frac{85}{25} = \boxed{3.4 m/s^2}$

$F_g \cdot \cos\theta = F_N$

$250 \cdot \cos(20) = 234N$