Newton's Second Law

F = ma

Class Practice

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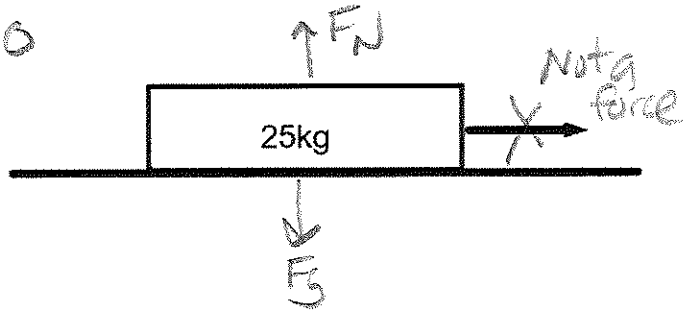
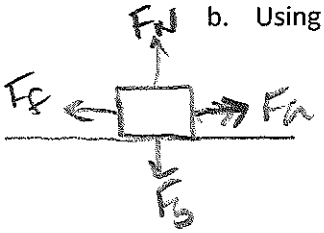
1. 200N Block is hanging on a wire, what is the
   a. Tension on the string? 200 N
   b. Mass of the block? 20

$F_g = m \cdot g \quad \frac{F_g}{g} = m \quad \frac{200}{10} = 20$

2. A 25kg block is sliding across a frictionless surface at a constant speed of 10m/s in the direction of the arrow
   a. What is the net force on the block? 0
   b. What is the acceleration? 0
   c. Draw all forces on the block.



3. A block is sliding cross a rough surface level surface. at a constant velocity.
   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.



$\Sigma F = ma \quad a = \frac{\Sigma F}{m} \quad a = \frac{(F_a - F_f)}{m} \quad a = \frac{(F_a - mgu)}{m}$

Note: Subtraction

Numerator goes Larger/Smaller

   c. Using your formula from above,
      i. On the moon (smaller g) the block would (accelerate faster/slower/same)
      ii. Doubling the force will cause the acceleration to (increase/ double/ ½ / decrease) increase due to being on top.

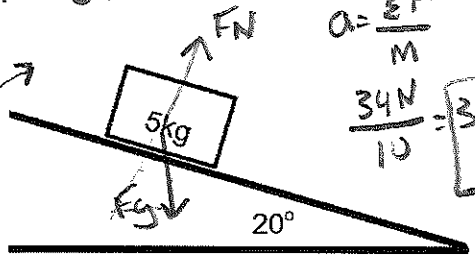
   d. A 10kg block is pulled by a 25N force on a rough surface (u_k = 0.5). What is the acceleration?

$a = \frac{(25 - 10 \cdot 10 \cdot .5)}{10} = -2.5\ m/s^2$

4. A block is sliding down a frictionless surface as seen in the picture below.
   a. What is the weight of the block? $F_w = mg \quad 5 \cdot 10 = 50N$
   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

$\cos\theta = \frac{x}{F_g} \quad \sin\theta = \frac{y}{F_g}$

$100 \cdot \cos(20) = 93N \quad 100 \cdot \sin(20) = 34N$



e) $a = \frac{\Sigma F}{m} \quad \frac{34N}{10} = 3.4\ m/s^2$