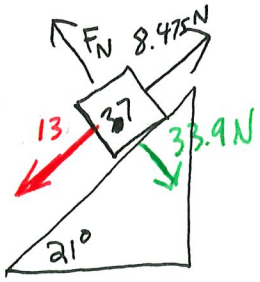
Inclines with friction

Example 1: A 3.7 kg block is placed on a 21° incline with a coefficient of friction of 0.25. What will be the acceleration of the block down the incline?



$F_{g\parallel} = \sin 21° \times 3.7kg \times 9.8 \frac{m}{s^2} = 13.0N$

$F_{g\perp} = \cos 21° \times 3.7kg \times 9.8 \frac{m}{s^2} = 33.9N$

$F_N = 33.9\ N$

$F_{fric} = \mu F_N = 0.25 \times 33.9N$
$= 8.475\ N$

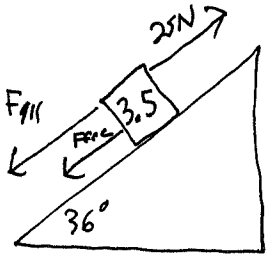
$F_{net} = 13 - 8.475 = 4.525N$

$a = \frac{F_{net}}{m} = \frac{4.525N}{3.7kg} =$ **1.2 m/s² down ramp**

Example 2: A 3.5 kg block is pulled upwards on a 36° incline by a force of 25 N. The coefficient of friction between the block and the incline is 0.23. What will be the acceleration of the block and in which direction?

$F_{g\parallel} = \sin 36^\circ \times 3.5\,kg \times 9.8\,m/s^2$

$= 20.16\,N$



~~$F_{fric} =$~~

$F_{g\perp} = \cos 36^\circ \times 3.5\,kg \times 9.8\,m/s^2$

$= 27.75\,N$

$F_{fric} = \mu F_N = 0.23 \times 27.75\,N$

$= 6.382\,N$

$F_{net} = 25\,N - F_{g\parallel} - F_{Fric}$

$= -1.542\,N$ But 6.38 is MAX friction

$F_{net} = 0$

$a = 0$