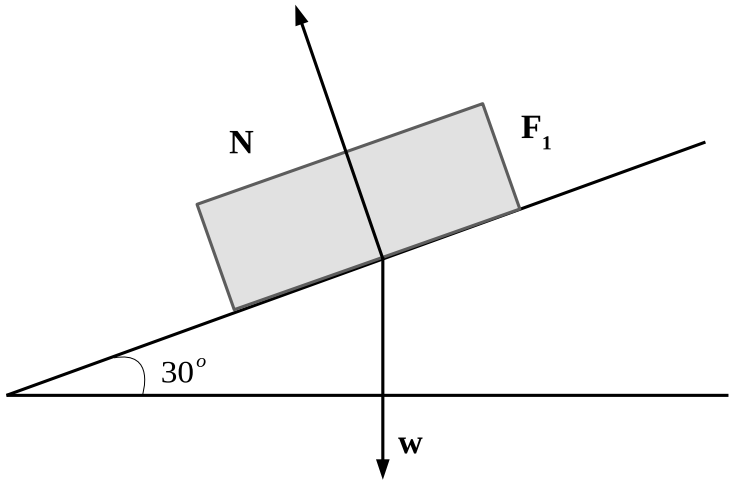
1. A marble rolls horizontally on a table top at a constant speed of 2.25 m/s. The marble rolls off the edge of the table and arcs towards the floor landing in a cup that is 1.50 m from the edge of the table. (No friction or air resistance). (a.) What is the height, h, of the table above the ground? (b.) What is the displacement $\vec{y}$ of the table top as measured from the top down to the ground?
2. The acceleration due to gravity on the surface of the moon is $g = -1.67$ m/s$^\circ$ (as compared to $g = -9.80$ m/s$^\circ$ on the earths surface). How much higher will a ball thrown straight up at an initial velocity of $v = +10.0$ m/s rise on the moon as compared to it being thrown up at the same initial velocity on the earth?
3. A block of mass m is pulled up at a 30° incline at constant velocity with a force $\vec{F}_1$ which is parallel to the incline. Ignore friction.



What is the relation between the normal force $\vec{N}$ and the weight $\vec{w} = m\vec{g}$ of the block?

4. Calculate the weight of a 50.0 kg astronaut aboard the International Space Station (ISS), which orbits the earth at a distance of about 220 km above the earth's $surface$. The radius of the earth is 6.38×10^6 m and its mass is 5.97×10^{24} kg. (Recall that $\vec{w} = \vec{F}_g$)

5. What is the ideal banking angle θ for a gentle turn of radius 1.20 km on an interstate highway with a speed limit of 105 km/h (about 65 mi/h)?

6. A toy dart gun uses a compressed spring to fire a dart of mass 0.100 kg horizontally. The spring in the toy has a spring constant $k = 250$ N/m and it is pushed in a distance of 6.0 cm from the relaxed position of the spring.
(a) What *speed* does the dart leave the barrel of the toy gun? (Hint: use conservation of energy). // (b) If the toy is held horizontally above the ground at a height of 1.32 m when it is fired, how far did the dart travel?