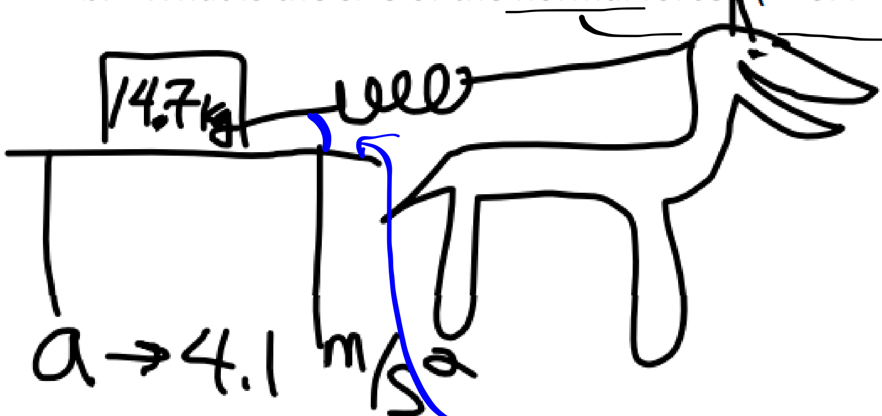
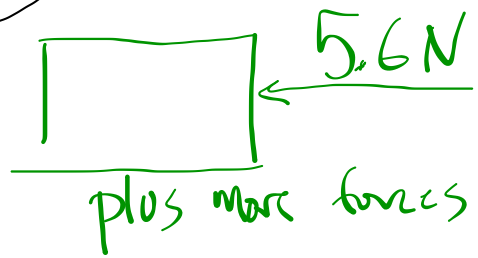
1. A box is being pulled along a horizontal table by a rope connected to a donkey's shoulders at an angle of 15° to the table. There is a spring between the rope and the box with $\boxed{k = 12.2\ \mathrm{N/cm}}$. The mass of the box is 14.7 kg. If friction is opposing the box's motion with a $\boxed{\text{constant force of } 5.6\ \mathrm{N},}$ and the box is accelerating at $4.1\ \mathrm{m/s^2}$ horizontally:
   a. How many centimeters does the spring stretch? (5.59 cm)
   b. What is the size of the normal force? (126.41 N)

The upward force from the table



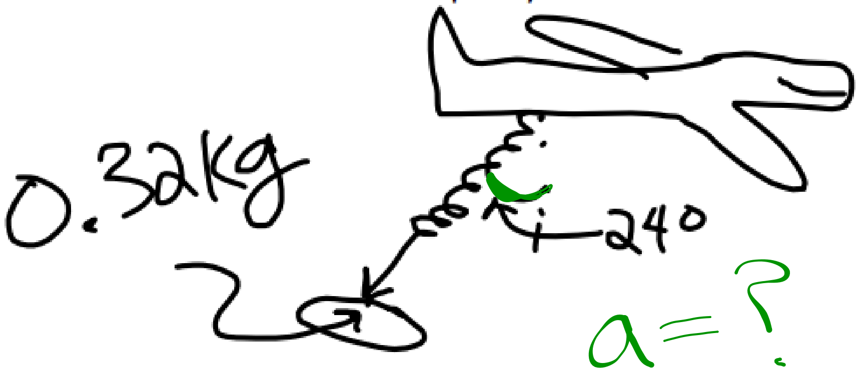


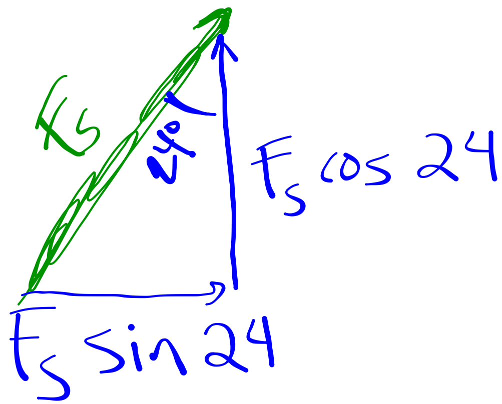
$F_s = kx$

$\theta = 15°$

(think about the x-, y-components of the spring's force)

2. A football with a mass of 0.32 kg is hooked to an airplane by a spring at a constant angle (with the vertical) of 24°. The spring is stretched out 11 cm. The football is not moving in the vertical direction.
    a. What is the spring constant of the spring (in N/cm)? (0.31 N/cm)
    b. How quickly is the football accelerating horizontally? (4.36 m/s²)



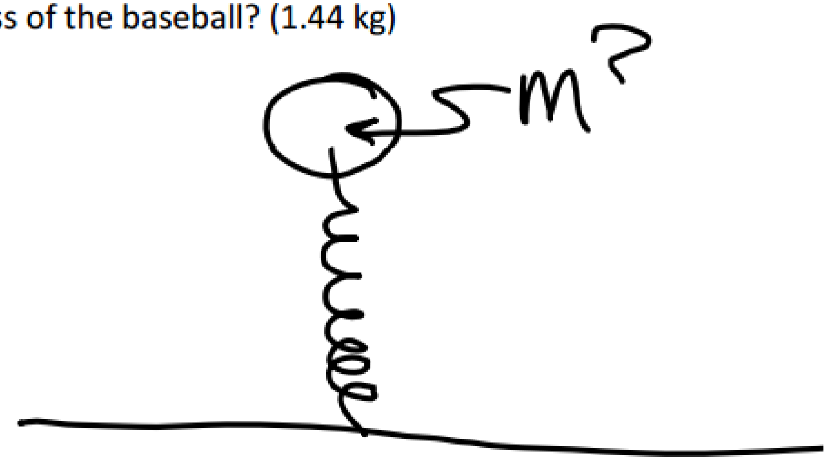


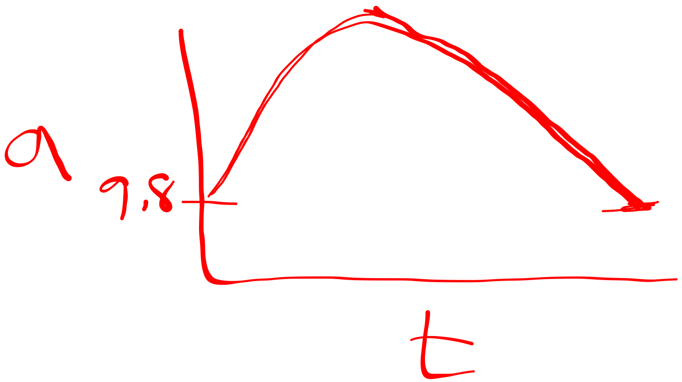
$F_s = kx$ ← given

calculate 1st

a

3. A baseball is thrown directly up into the air. It is attached to a spring that is hooked to the ground. The spring has a k of 0.41 N/cm. When the spring has stretched out 5.6 cm, the baseball has an instantaneous acceleration of 11.4 m/s^2 downward. What is the mass of the baseball? (1.44 kg)





How can you find the (constant) force of friction on a moving cart?

- The F_{Fr} is same no matter how fast the cart is moving/accelerating

* You will be able ~~to~~ easily measure:

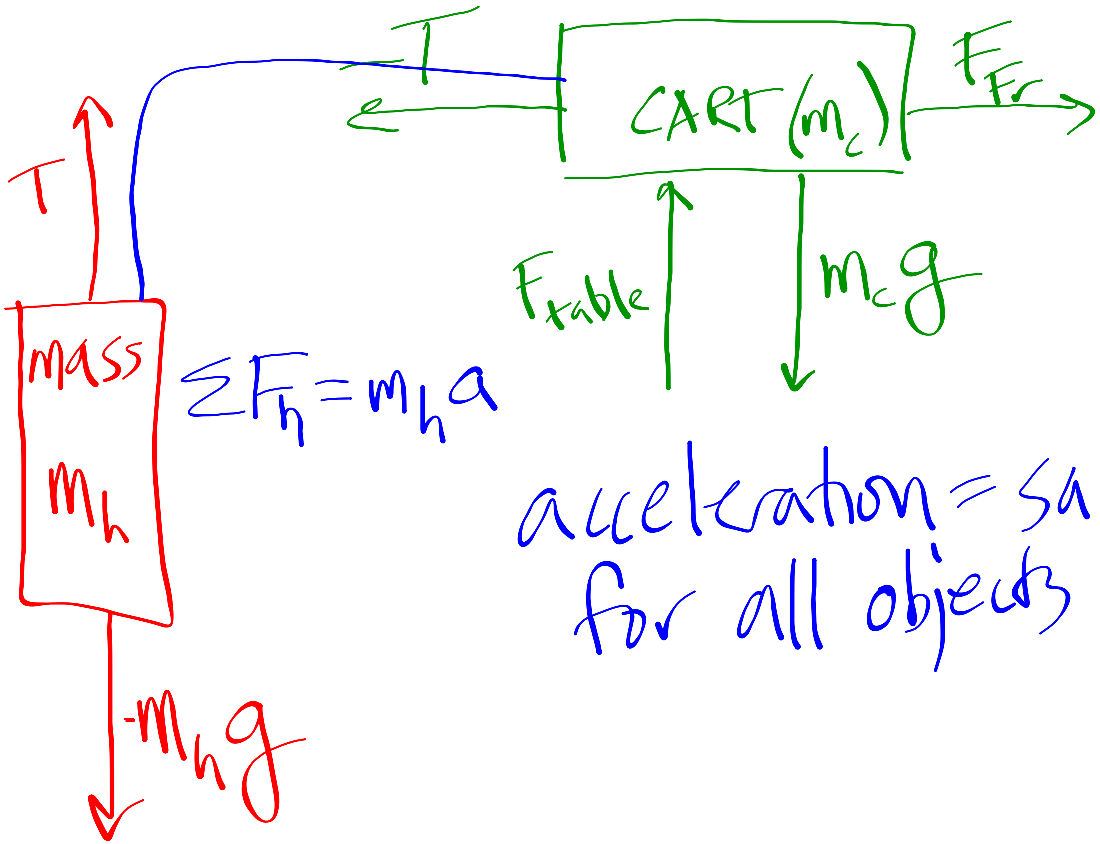
1. Masses
2. Displacement/position
3. Velocity of the cart (graphically/numerically)

instantaneous

Before you leave the classroom, you should know the following:

What will you measure & how will you use those measurements to calculate the actual # force of friction on your moving cart?

$\Sigma F_{cwt} = m_{cwt} a$



$\Sigma F_h = m_h a$

acceleration = same for all objects