Name: _____

CLASSWORK 94

1. The amount of money Lily gets is dependent on her hourly salary and how many hours she works. At the moment, Lily is getting paid $25 per hour and she is working 7 hours per day. Because of her contract, Lily's hourly wage is going up $0.50 per month. However, Lily is getting lazier, and the number of hours she works is decreasing by 0.3 hours per month.

a) How much is Lily's daily salary at this moment?

b) At what **instantaneous** rate is Lily's salary changing per month at this instant?

c) Is Lily's salary increasing or decreasing?

d) At what rate should she decrease her hours of work in order to make her paycheck stay exactly the same over time?

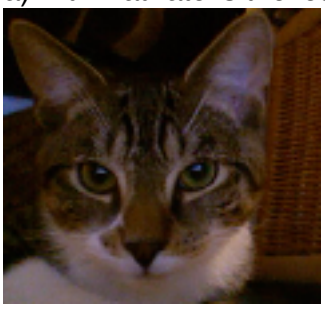
2. Lily currently weighs 120 pounds. She has a volume of .85 cubic meters. However, she is gaining weight-- again-- this time at a rate of 2 pounds per month. She finds that her volume is increasing by .05 cubic meters each month as she turns into the Goodyear Blimp.

a) Perhaps she will at least float better??? Calculate the instantaneous rate of change of Lily's **density**.

b) The volume of a person is kinda hard to calculate. Lily decides that her "volume-o-meter" is wrong and that she **must** really be maintaining a constant density. If that's true, how much is her volume **really** increasing per month?

3. Lily's kitten Leo really wants to see the great outdoors! (the courtyard behind her apartment) so she decides to put him on an elastic leash. The leash is tied to a pole at a height of 5 feet. However, as Leo tries to run away from the pole, the leash starts slipping down at a rate of .4 feet per minute. Having brought her protractor outside as well, Lily notices that that the angle created by the leash and the pole is now 40^{o} but changing at a rate of 2 degrees per second.

a) At what rate is the leash stretching? (lengthening)



Leo!

b) How fast is Leo running?

4. An object is travelling around the circle $x^2 + y^2 = 25$. At the point (0, 5) the object is moving in a clockwise direction at 3 m/s.

a) Draw a diagram of this moment. What direction is the object travelling?

b) Find the **object's acceleration** at this instant.

c) Show that contrary to popular belief, the object is actually not being forced OUT, but being forced in! (In other words, the acceleration is actually towards the center of the circle).

5. Lily suspects the M&M Mars company is trying to screw her over. The price of a bag of M&Ms at her local deli is now 65 cents but is rising by 2 cents per month. The number of M&Ms in an average bag is also increasing, however, at a rate of 1 M&M per month. Right now the average bag has 50 M&Ms in it.

a) What is the current price per M&M in a standard bag of M&Ms?

b) At what rate is the price per M&M changing? (Is Lily really going to have to pay more for her chocolate habit??)