Homework 11

§4.6#5, 7, 13, 17, 35(*b* and *c*), **34**, **36**, **Extra**

§4.6 #5. A plane is climbing at 500 feet per minute, and the air temperature is falling at 2°C per 1000 feet. What is the rate of change (as a function of time) of the air temperature just outside the plane?

§4.6 #7. The gravitational force, F, on a rocket at a distance, r, from the center of the earth is given by $F = \frac{k}{r^2}$ where $k = 10^{13}$ newton· km^2. When the rocket is 10^4km from the center of the earth, it is moving away at 0.2km/sec. How fast is the gravitational force changing at that moment. Give units. (A newton is a unit of force.)

§4.6 #13. A pyramid has height h and a square base with side length x. The volume of a pyramid is $V = \frac{1}{3}x^2h$. If the height remains fixed and the side of the base is decreasing by 0.002m/yr, at what rate is the volume decreasing when the height is 120m and the width is 150m?

§4.6 #17. A rectangle has one side of 8cm. How fast is the diagonal of the rectangle changing at the instant when the other side is 6cm and increasing at 3 cm per minute?

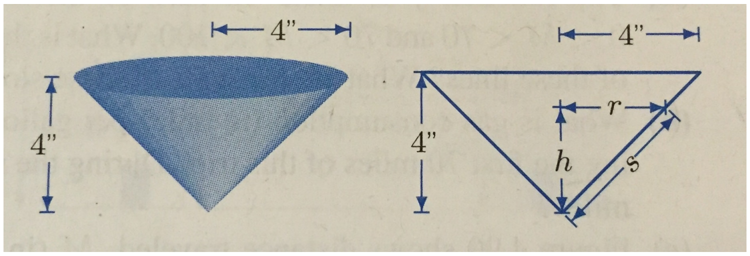
§4.6 #35b,c. A cone-shaped coffee filter of radius 6 cm and depth 10cm contains water, which drips out through a hole at the bottom at a constant rate of 1.5cm^3 per second.

b) Find the volume of water in the filter when the depth of the water is h cm.

c) How fast is the water level falling when the depth is 8cm?

§4.6 #**34**. A potter forms a piece of clay into a cylinder. As he rolls it, the length, L, of the cylinder increases and the radius, r, decreases. If the length of the cylinder is increasing at .1 cm per second, find the rate at which the radius is changing when the radius is 1 cm and the length is 5 cm.

§4.6 #**36**. Water is being poured into a cone-shaped container of height 4in and radius 4in. When the depth of the water is 2.5in, it is increasing at 3in/min. At that time, how fast is the surface area, A, that is covered by water increasing. [Hint: $A = \pi r s$ where r is the radius and s is the length of the hypotenuse of the triangle formed by the height and radius of the water.]



Extra. A clown invented cylindrical balloons. He blow air into the balloon at a rate of 300 cubic cm a second. The length of the balloon is increasing at 40 cm per second when its already 10 cm long and 2 cm in diameter. How fast is the radius of the balloon increasing at that time?