



Homework 7.1 – Related Rates

1. (1 pt) [alfredLibrary/AUCI/chapter7/lesson1/relatedrates2pet.pg](#)

A 24-ft conical water tank with a downward-pointing vertex has a radius of 10 ft at its top. If water flows into the tank at a rate of 20 cubic ft/min, how fast is the depth of the water increasing when the water is 16 ft deep?

(HINT: In your picture, let r be the radius of the surface of the water, let h be the height of the water, and let V be the volume of the water. You must find dh/dt when h is 16, but you do not know r and dr/dt when h is 16. Use similar triangles to find these quantities.)

Answer: _____ ft/min

2. (1 pt) [alfredLibrary/AUCI/chapter7/lesson1/relatedrates5pet.pg](#)

A kite 50ft above the ground moves horizontally at a speed of 2ft/s. How fast is the angle between the string and the horizontal changing when 150ft of string has been let out?

Answer: _____ radians/sec

3. (1 pt) [alfredLibrary/AUCI/chapter7/lesson1/relatedrates4pet.pg](#)

A spotlight on the ground is shining on a wall 12m away. If

a woman 2m tall walks from the spotlight toward the building at a speed of 1.2m/s, how fast is the length of her shadow on the building changing when she is 6m from the building? (HINT: Use similar triangles formed between the spotlight and the woman, and between the spotlight and the wall.)

Answer: _____ m/s

4. (1 pt) [alfredLibrary/AUCI/chapter7/lesson1/relatedrates6pet.pg](#)

When air expands adiabatically (without gaining or losing heat), its pressure P and volume V are related by the equation $PV^{1.4} = C$ where C is a constant. Suppose that at a certain instant, the volume is 330 cubic centimeters, and the pressure is 99 kPa and decreasing at a rate of 10 kPa/minute. At what rate is the volume increasing at this instant? (Hint: The left-hand side of the related variables equation is a product.)

Answer: _____ cubic cm per min

(For your information, Pa stands for Pascal, which is equivalent to one Newton per square meter; kPa is a kiloPascal or 1000 Pascals.)