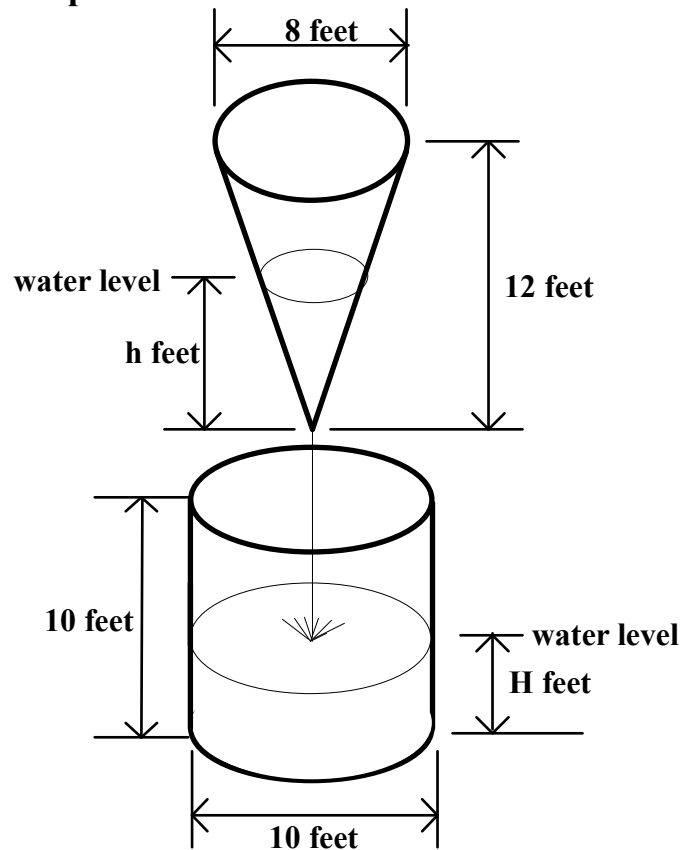# Advanced Challenge Level 2 Problem #21 _____

Water is draining out of a conical tank into a cylindrical tank. (Please refer to the diagram below.) The conical tank is 12 feet deep and has a diameter of 8 feet at the top. The cylindrical tank is 10 feet deep and has a diameter of 10 feet. Show your work carefully organized and explained.

The depth, h (feet), of water in the conical tank is changing at the rate of (0.5h – 8) feet per minute. Answer the following questions.

1. Write an expression for the volume of water in the conical tank as a function of h.

2. At what rate is the depth of the water in the conical tank changing when h = 5 feet?

3. At what rate is the volume of the water in the conical tank changing when h = 5 feet?

4. At what rate is the volume of the water in the cylindrical tank changing when h = 5 feet?

5. Let H be the depth of the water in the cylindrical tank. Write an expression for the volume of water in the cylindrical tank as a function of H.

6. At what rate is H changing when h = 5 feet?

7. At what rate is H changing when h = 12 feet?

8. At what rate is H changing when h = 2 feet?