

Water from a conical filter drips into a cup that is in the shape of a right circular cylinder. The dimensions of the cone and cup are given in the picture below. Let x represent the depth of the water in the filter and y the depth of the water in the cup. If $30\pi \text{ in}^3$ of water is poured into the filter and drips out of the filter at a rate of $3 \text{ in}^3 / \text{min.}$, then how fast is the water level in the cone changing when $x=1 \text{ in.}$? How fast is the water level in the cup changing when $x=1 \text{ in.}$? What is the depth of the water in the cup when $x=1 \text{ in.}$? Give exact values first, then approximate to the nearest 0.01.

