1. A cone $C$ has height 1 and its base has radius 1. The cone is positioned upright, centered around the $y$-axis. The apex (the top point) of the cone $C$ is at $(0, 1, 0)$; the base of the cone is lying in the $xz$-plane; and the center of the base is at the origin.

A transformation $f$ maps the cone $C$ to have the following shape, centered on the $x$-axis with the apex of the cone at the origin, now with height equal 3 and base radius equal to $\frac{1}{2}$:

Express the transformation $f$ as a composition of a translation $T_u$, a rotation $R_{\theta, v}$, and a non-uniform scaling $S_{(a, b, c)}$. (The composition may not necessarily be in that order!) Use the usual “$\circ$” notation to denote composition. There are many possible correct answers.

**Most common answer:** $T_{<3, 0, 0>} \circ R_{\pi/2, <0, 0, 1>} \circ S_{<\frac{1}{2}, \frac{3}{2}, \frac{1}{2}>}$

**Other equally good, correct answers:**

$T_{<3, 0, 0>} \circ S_{<3, \frac{3}{2}, \frac{3}{2}>} \circ R_{\pi/2, <0, 0, 1>}$

$S_{<3, \frac{3}{2}, \frac{3}{2}>} \circ R_{\pi/2, <0, 0, 1>} \circ T_{<0, 1, 0>}$

$S_{<3, \frac{3}{2}, \frac{3}{2}>} \circ T_{<1, 0, 0>} \circ R_{\pi/2, <0, 0, 1>}$

$R_{\pi/2, <0, 0, 1>} \circ S_{<\frac{3}{2}, 3, \frac{3}{2}>} \circ T_{<0, 1, 0>}$

$R_{\pi/2, <0, 0, 1>} \circ T_{<0, -3, 0>} \circ S_{<\frac{3}{2}, 3, \frac{3}{2}>}$.

**Another correct answer:**

$T_{<3, 9, 0>} \circ R_{\pi/4, <1, -1, 0>} \circ S_{<\frac{3}{2}, 3, \frac{3}{2}>}$

Many other correct answers are possible.