46. Let $y$ be the height of the rocket. Its velocity is $y'$. We are told that $\theta = 30^\circ$ and $\theta' = 2^\circ$/sec.

\[
\tan \theta = \frac{y}{5} \quad \text{or} \quad y = 5 \tan \theta
\]

\[
y' = (5 \sec^2 \theta) \theta' = (5 \sec^2 30^\circ) (2) = 5 \left( \frac{\sqrt{3}}{3} \right) (2) = \frac{40}{3}
\]

47. Let $\phi$ represent the angle through which the wheel and rear sprocket (gear) of the bicycle turns. If we let $x$ represent the distance covered by the bicycle, then, assuming no slipping on the point of the wheel, $x$ is also the distance measured along the edge of the tire when it turns. When $\phi$ is measured in radians, we have $x = 14 \phi$ (radius x angle). Now the rear sprocket turns through the same angle. Let $s$ represent the length of chain that travels over the sprocket. Then $s = 2\phi$. But the same amount of chain has gone around the front sprocket, so $s = 5\theta$. Therefore $2\phi = s = 5\theta$ or $\phi = \frac{5}{2} \theta$. Now we have

\[
x = 14\phi = 14 \left( \frac{5}{2} \theta \right) = 35 \theta \quad \text{or} \quad x' = 35 \theta'
\]