$r = 0.1 \text{m}$

$r = 0.5 \text{m}$

**WHAT LINEAR $\ddot{a}$\nANGULAR VELOCITY
MUST YOUR HAND
HAVE TO LIFT BUCKET
AT A RATE OF $0.5 \text{m/s}^2$?**

$m_{\text{bucket}} = 2 \text{kg}$

$V_{\text{bucket}} = 5000 \text{mL}$

$\rho_{\text{H}_2\text{O}} = 1 \text{g/cm}^3$

$\rho = \frac{m}{V}$
Possible units: 

\[
\begin{align*}
\frac{V}{\text{miles}} & \quad \text{hr.} & \quad \text{m} \quad \text{sec.} & \quad \text{bead.secs} & \quad \text{week} \\
\frac{w}{\text{revolutions}} & \quad \text{sec.} & \quad \frac{\text{rad}}{\text{sec.}} & \quad \frac{\text{degrees}}{\text{sec.}}
\end{align*}
\]

\[V_f = V_0 + at\]
\[ F_c = m a_c \]

- is a NET force
- does not get included in F.B.D.
- could be any force at all
- keeps something in a circular path
$T = 7.3 \text{ sec.}$

$r = \ ?$

$\text{yoyo}$

$180^\circ$
Negative because $F_{ty}$ is in the opposite direction than $F_g$. Therefore, it is equal to not $F_g$, but the opposite of it: $-F_g$. This also makes sense, because $F_g$ will equal a negative number (indicating downward direction) while $F_{ty}$ will now equal a positive number (indicating upwards direction) once numbers are plugged in for the variables.
What is the minimum coefficient of static friction required to keep the cat from sliding down the side of the washing machine?
\[ \omega = \frac{\pi}{\text{sec.}} \]

\[ m = 2 \text{kg} \]
\[ r = 0.4 \text{m} \]
\[ F_n = F_c = \mu F_N \]
\[ F_{\text{slip}} = F_{\text{fric}} = \mu F_N \]
\[ mg = \mu F_c = \mu m a_c \]
\[ \frac{v^2}{r} = \frac{\omega^2 r m}{\mu} \]
\[ v = \omega r \]
\[ n = \frac{v^2 r}{\mu} \]
\[ v = \omega r \]
\[ T = \frac{2\pi r}{\omega} \]
\[ F = ma \]
\[ KE = \frac{1}{2}mv^2 \]
\[ PE = mgh \]

\[ v_f = v_0 + at \]
\[ v_f^2 = v_0^2 + 2ad \]
\[ d = v_0 t + \frac{1}{2}at^2 \]

\[ F_{spring} = -kx \]
\[ PE_{spring} = \frac{1}{2}kx^2 \]
$F_c = ma$

$F_c = ma_x$

Diagram of particle motion with vectors.
This diagram is made assuming that the velocity of the roller coaster is constant throughout. In reality, a roller coaster's velocity would decrease as it goes up the ramp because it transfers some of its kinetic energy into potential energy.