

Name: \_\_\_\_\_

1. The acceleration of a particle is  $\mathbf{a}(t) = \beta t \mathbf{i} - g \mathbf{j}$ . Where  $\mathbf{a}$  is acceleration in two dimensions,  $\beta$  and  $g$  are constants,  $t$  is time, and  $\mathbf{i}$  and  $\mathbf{j}$  are unit vectors along the x- and y- axis. The particle starts at the origin  $(0, 0)$ , and has an initial velocity  $\mathbf{v}(0) = v_0 \mathbf{i} + \mathbf{j}$ . Find the position vector,  $\mathbf{r}(t) = x(t) \mathbf{i} + y(t) \mathbf{j}$ . Remember,  $\mathbf{a}(t) = \frac{d^2 \mathbf{r}(t)}{dt^2}$

2. Find the acceleration of each mass in this Atwood's machine.

