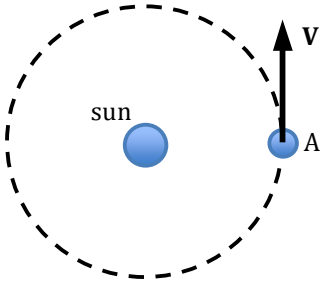
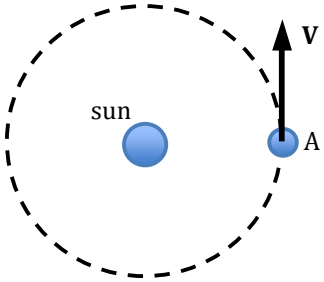
Name _____

My Solar System PhET Instructor's Guide
http://phet.colorado.edu/en/simulation/my-solar-system

1. Select Sun & Planet, start, watch orbit. Show grid to verify circular orbit. Select Reset, then Set body 2's v_y = 140, show result. Keep system centered and show traces on.



2. Select reset, then set body 2's V to (v_x, v_y) = (20, 120).



3. Can you find an equation for the velocity at A that results in a circular orbit?

$Mv^2/r = GmM/r^2$, $V_{circ} = \text{sqrt}(GM/r)$

4. What is the equation for the escape velocity of the planet? How does it compare to the velocity for a circular orbit?

$\frac{1}{2}\, mv^2 - GmM/r^2 = 0$, $V_{esc} = \text{sqrt}(2GM/r)$. $V_{esc} = \text{sqrt}(2)v_{circ}$

Test: 120*sqrt(2) ~ 169.7. Set simulation to fast. Vy = 165 is closed, but planet returns slowly, at clock ~ 600. Vy = 168 and great gives an open orbit.

5. To see this orbit, select Sun & Planet, set the following:

Body 1: m = 200, x = -100, y = 0, vx = 0, vy = -50.
Body 2: m = 300, x = 100, y = 0, vx = 0, vy = 108.

Note that the suns are always opposite each other, with their center of mass fixed.