An object of mass $m$ can only move on the $+x$ axis. It is subjected to a force in the $+x$ direction given by

$$F(x) = \frac{\alpha m}{x^2}$$

where $\alpha$ is a given positive constant and $x$ is the distance from the origin. Suppose no other force acts on the object. Further, you are given that at some time the object is located at $x = a$ and has velocity $v_0$ in the $+x$ direction.

What will be the velocity of this object when it is at $x = b$ (where $b > a$)? Express your answer in terms of $\alpha$, $a$, $b$, $v_0$, and numerical factors.

IMPORTANT: First work this out on a separate sheet of paper. After you are finished, copy down only a few essential steps here. WRITE NEATLY, or NO CREDIT.

Simplify your answer a lot. You have all weekend, so you better not turn in some ugly mess. Be careful with your signs.

Answer: _______________________________