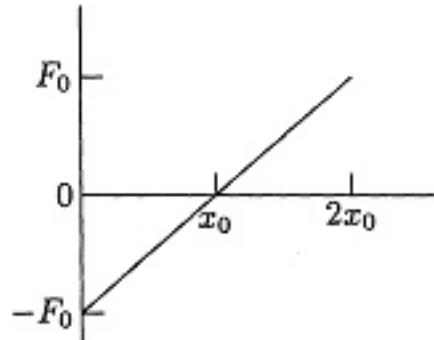


33. (a) The graph shows  $F$  as a function of  $x$  assuming  $x_0$  is positive. The work is negative as the object moves from  $x = 0$  to  $x = x_0$  and positive as it moves from  $x = x_0$  to  $x = 2x_0$ .



Since the area of a triangle is (base)(altitude)/2, the work done from  $x = 0$  to  $x = x_0$  is  $-(x_0)(F_0)/2$  and the work done from  $x = x_0$  to  $x = 2x_0$  is  $(2x_0 - x_0)(F_0)/2 = (x_0)(F_0)/2$ . The total work is the sum, which is zero.

(b) The integral for the work is

$$W = \int_0^{2x_0} F_0 \left( \frac{x}{x_0} - 1 \right) dx = F_0 \left( \frac{x^2}{2x_0} - x \right) \Big|_0^{2x_0} = 0.$$