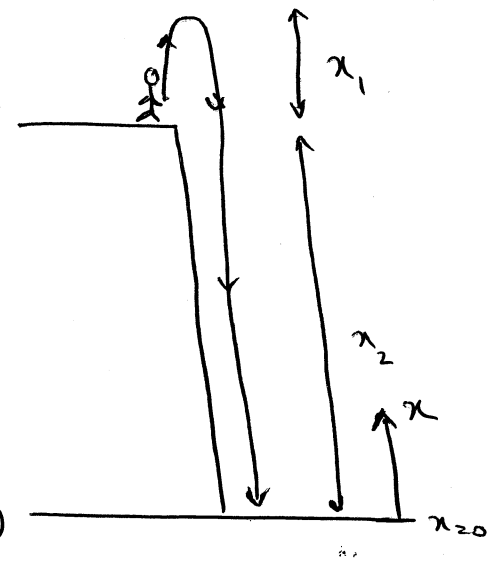
To solve this problem you can use different coordinate systems with arbitrary origin. Here we look at three of these coordinate systems

(I) $V_0 = 12.0\ m/s$, $X_0 = 70.0\ m$, $a = -9.8\ m/s^2$



(a) $X = X_0 + V_0 t + \frac{1}{2} a t^2$

$0 = 70.0\ m + 12.0\ m/s\ (t) + \frac{1}{2}(-9.8\ m/s^2)t^2$

$\Rightarrow -4.9\ t^2 + 12\ t + 70 = 0$

Solutions of a quadratic equation:

$$t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-12 \pm \sqrt{12^2 - 4(-4.9)(70)}}{2(-4.9)}$$

$\Rightarrow$ $t = -2.75$ → This answer is not acceptable b/c it is negative

$\boxed{t = 5.2\ s}$

(b) $V_f = V_0 + at \Rightarrow V_f = 12 + (-9.8)(5.2) \Rightarrow V_f = 12 - 50.96$

$\Rightarrow V_f = -38.96\ m/s$

Speed is the magnitude of the velocity vector

$\Rightarrow v = 39\ m/s$

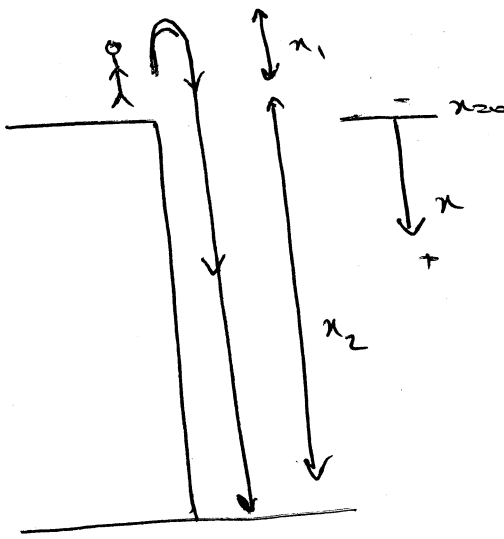
(c) $V_f^2 - V_0^2 = 2ad$

$0 - 12^2 = 2(-9.8)(x_1) \Rightarrow x_1 = 7.35\ m$

$\Rightarrow$ Total distance $= 2x_1 + x_2 = 2(7.35\ m) + 70\ m = 14.7\ m + 70\ m \Rightarrow \boxed{d = 84.7\ m}$

(II)

$v_o = -12.0\ m/s$, $x_o = 0\ m$, $a = 9.8\ m/s^2$



(a) $x = x_o + v_o t + \frac{1}{2} a t^2$

$+70 = 0 + (-12)\ m/s\ (t) + \frac{1}{2}(9.8) t^2$

$\Rightarrow 4.9 t^2 - 12 t + (-70) = 0$

$\Rightarrow$ $t = -2.75\ s$ → not acceptable

$t = 5.20\ s$

(b) $v_f = v_o + at \Rightarrow v_f = -12.0\ m/s + 9.8(5.2) \Rightarrow v_f = 38.96\ m/s$

speed is the magnitude of velocity $\Rightarrow v = 39\ m/s$

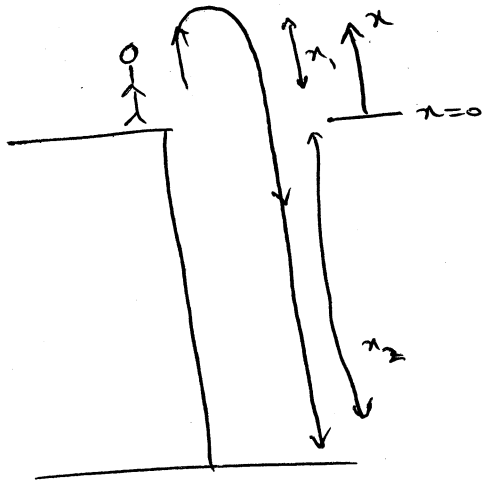
(c) $v_f^2 - v_o^2 = 2ad \Rightarrow 0 - (-12)^2 = 2(9.8)\, x_1 \Rightarrow x_1 = -7.35\ m$

distance is the magnitude of displacement for the first part of the movement

$\Rightarrow d = 70 + 2(7.35) = 84.7\ m$

(III) $V_0 = 12\ m/s$, $x_f = -70\ m$, $x_0 = 0$

$a = -9.8\ m/s^2$



(a) $x_f = x_0 + v_0 t + \frac{1}{2} a t^2$

$-70m = 0 + 12(t) + \frac{1}{2}(-9.8)\, t^2$

$\Rightarrow -4.9 t^2 + 12t + 70 = 0$

$t = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a} \Rightarrow \begin{cases} t = -2.75 & \text{not acceptable} \\ \boxed{t = 5.2\ s} \end{cases}$

(b) $v_f = v_0 + at \Rightarrow v_f = 12 + (-9.8)(5.2) \Rightarrow v_f = -38.9\ m/s$

speed is the magnitude of the velocity $\Rightarrow v = 39\ m/s$

(c) $v_f^2 - v_0^2 = 2ad$

$0 - (12)^2 = 2(-9.8)(x_1) \Rightarrow x_1 = 7.35\ m$

$\Rightarrow$ Total distance $= 2x_1 + x_2 = 2(7.35\ m) + 70\ m \Rightarrow \boxed{d = 84.7\ m}$