1. On planet 2, acceleration due to gravity is -7.2 m/s². An object is dropped from a cliff and hi s the planet's surface 4 seconds later.

   a. How tall is the cliff?

   $a = -7.2$

   $v = -7.2t + 0$

   $p = -3.6t^2 + c$

   $0 = -3.6(4)^2 + c$

   $\boxed{57.6m = c}$

   b. What is the object's velocity at impact?

   $v(4) = -7.2(4)$

   $\boxed{= -28.8 \ m/s}$

2. A helicopter lifts off from earth ($a(t) = -32$ ft/sec²) and begins to climb at 20 ft/sec. A whee falls from the helicopter the instant that it is 100 feet above the ground.

   a. How long will it take the wheel to hit the ground?

   $a = -32$

   $v = -32t + 20$

   $p = -16t^2 + 20t + 100$

   $0 = -16t^2 + 20t + 100$

   $\boxed{t = 3.202}$

   $v(3.$

   b. What is the wheel's velocity at impact?

   $v(3.202) = \boxed{-82.464 \ m/s.}$

3. At what initial velocity must an object be thrown upward from ground level in order to reac he top of the St. Louis Arch (200 meters tall)? Use -9.8 m/s² as acceleration due to gravity.

   $a = -9.8$

   $v = -9.8t + c$

   $p = -4.9t^2 + ct + 0$

   ground level ✓

   $\begin{cases} 0 = -9.8t + c \\ 200 = -4.9t^2 + ct \end{cases}$

   $c = 9.8t$

   $200 = 4.9t^2$

   $6.388\cdots = t$

   $\boxed{c = 62.61 \ m}$