Kinematic Equations: x-Direction

Equations

- $v = \Delta x/\Delta t$ → for CONSTANT velocity only
- $a = \Delta v/\Delta t$
- $v(t) = at + v_i$
- $x(t) = \frac{1}{2}at^2 + v_i t + x_i$
- $v(t)^2 = v_i^2 + 2(a\Delta x)$
- $\Delta x = \frac{t}{2}(v_f + v_i)$

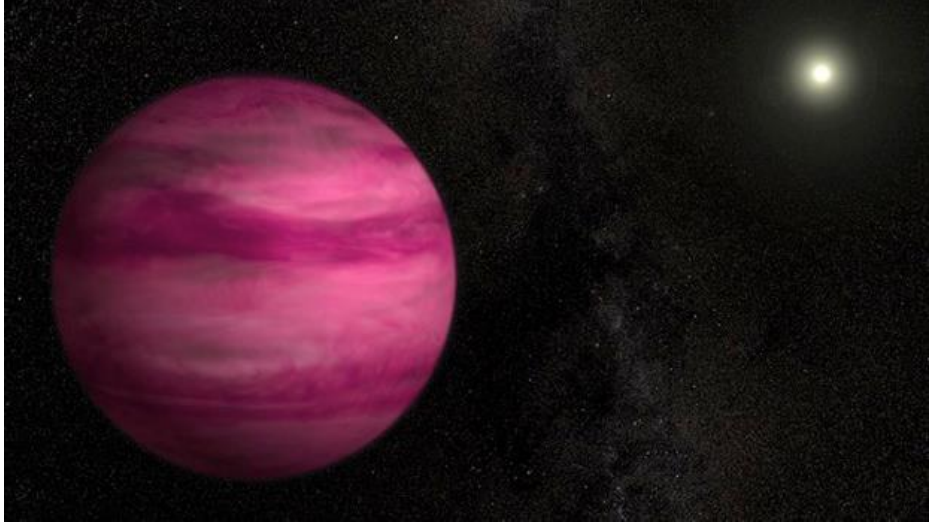
Let's Practice

- A field hockey player strikes the ball at their end of the field and the ball travels toward the center of the field. The ball has an initial velocity of 10 m/s. The friction between the field and the ball creates an acceleration of -1 m/s^2.
- What is the final position of the ball?
- How long does it take to stop?
- Where is the ball at t = 1 s?
- What's a motion diagram look like?
- How about x vs. t, v vs. t, a vs. t?

Practice

A car traveling at 35 m/s decelerates uniformly at a rate of 10 m/s^2 to a velocity of 25 m/s in the same direction. How long does it take for the car to reach the new speed?

Practice



On a newly discovered planet, the acceleration due to gravity is 6.0 m/s^2 an astronaut steps off the top of a spaceship on the planet and lands on the surface in 3.8 seconds. How tall is the spaceship?

Practice

Katniss drops her backpack from a tree, 20 meters above the ground. Her friend, Peeta, is 10 meters away from the drop point, and is running at constant speed of 3.0 m/s to catch the backpack. Will Peeta get there in time? Explain your answer.