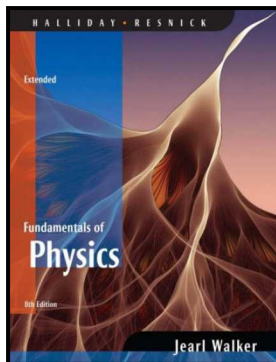


Workshop Physics

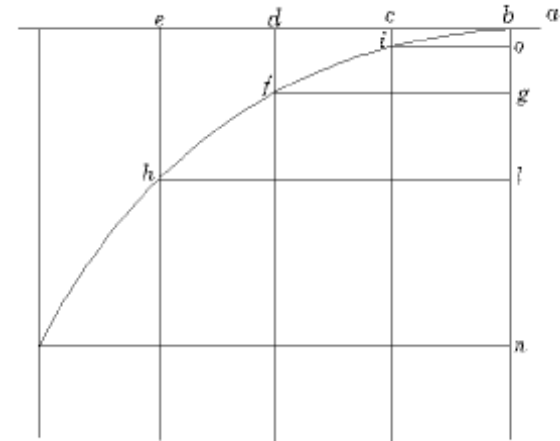
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University Physics I



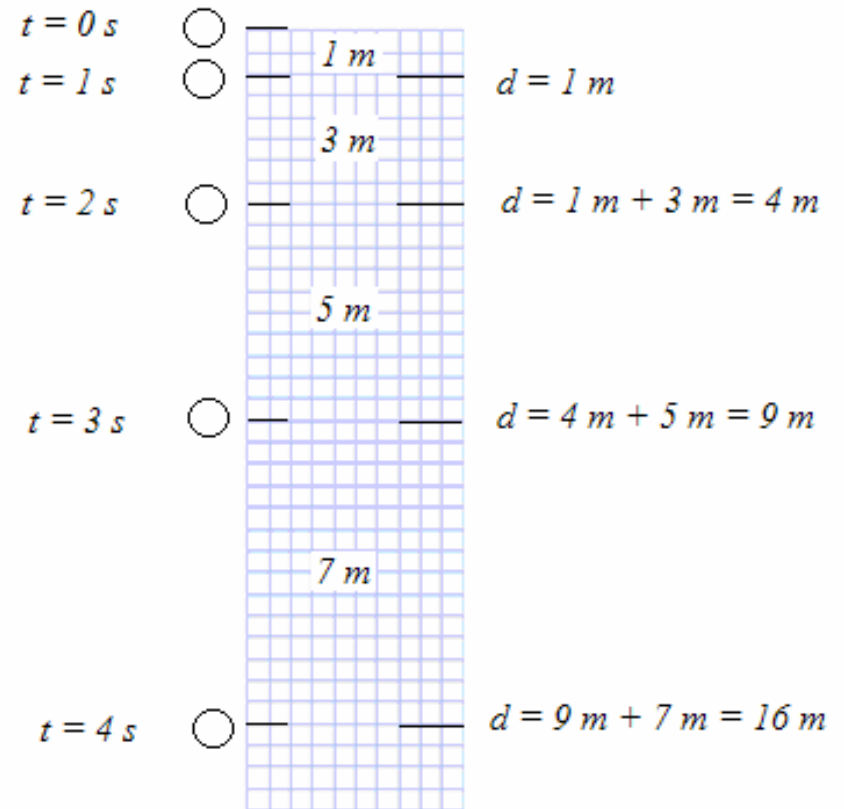
Week 2 : Day 2

- Galileo proposed that the distance a free falling body falls in successive time intervals is in the ratio of 1: 3: 5: 7: 9 ...
- He did experiments to verify this conjecture...



Interpreting Galileo

- From his combination of theory and experiment Galileo derived the Kinematics equations for constant acceleration
 - From the observed distances of fall for successive time intervals he deduced that the total distance an object would fall should be proportional to the square of the time.



➔ $d \propto t^2$

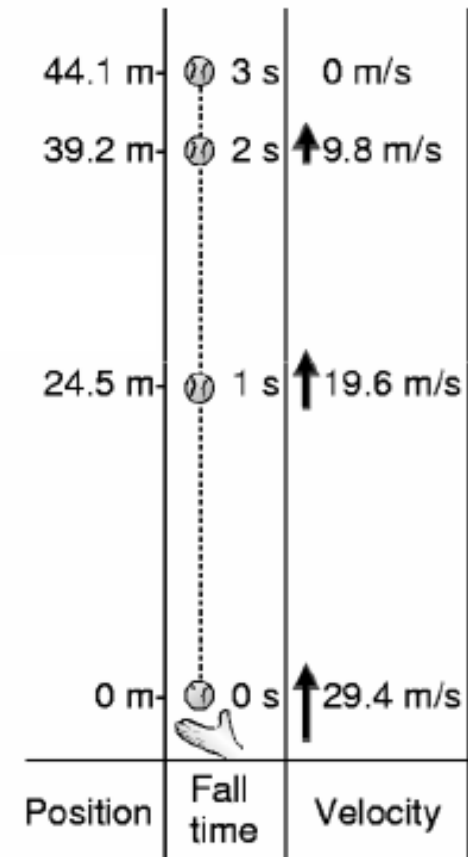
Example - Throwing a Ball Up (1D)

□ A ball is lobbed straight up in the air with a velocity of 29.4 m/s

- After 1 s it has slowed down to 19.6 m/s
- After 2 s it has slowed down to 9.8 m/s
- After 3 s it has slowed down to 0 m/s (max height reached)

$$\text{Velocity : } v(t) = v_0 - gt$$

$$\text{Height : } y(t) = v_0 t - \frac{1}{2} gt^2$$



Activity - Analyzing the Motion of a Ball Thrown Vertically

□ In this activity you should consider holding a ball, tossing it vertically, and then catching it.

- First predict the graphs of position, velocity, and acceleration for the ball and sketch these on the left on the figures below.
- Then do an experiment, with the aid of the computer and motion sensors, and measure graphs of position, velocity, and acceleration directly.

Analyzing the Motion of a Ball Thrown Vertically

Predict

1. Consider holding a ball, tossing it vertically, and then catching it. **Predict** the graphs of position, velocity, and acceleration for the ball and sketch these on the left on the figures below. **Include the time before you toss the object and after you catch it.**

