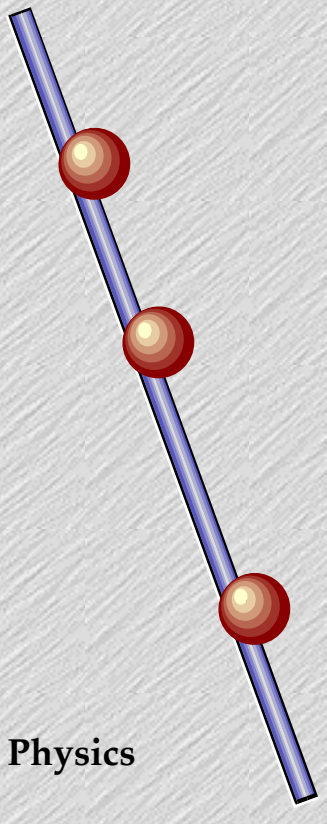
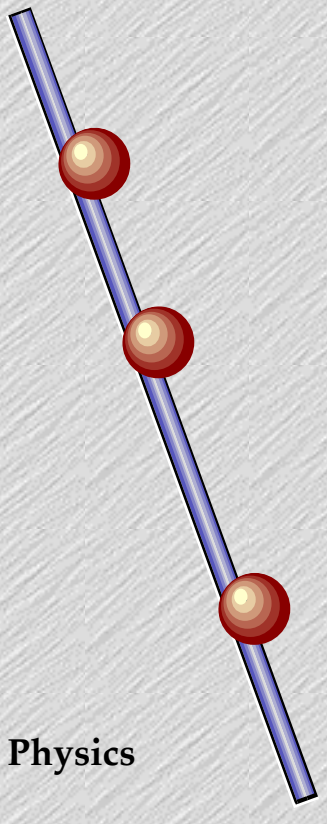
Astronaut Problem (#40)



A Floog on a distant planet wants to determine its acceleration due to gravity. The Floog throws a rock straight up with a velocity of +15 m/s and measures a time of 20.0 s before it returns to its hand. What is the acceleration (magnitude and direction) due to gravity on this planet.

Key Phrases



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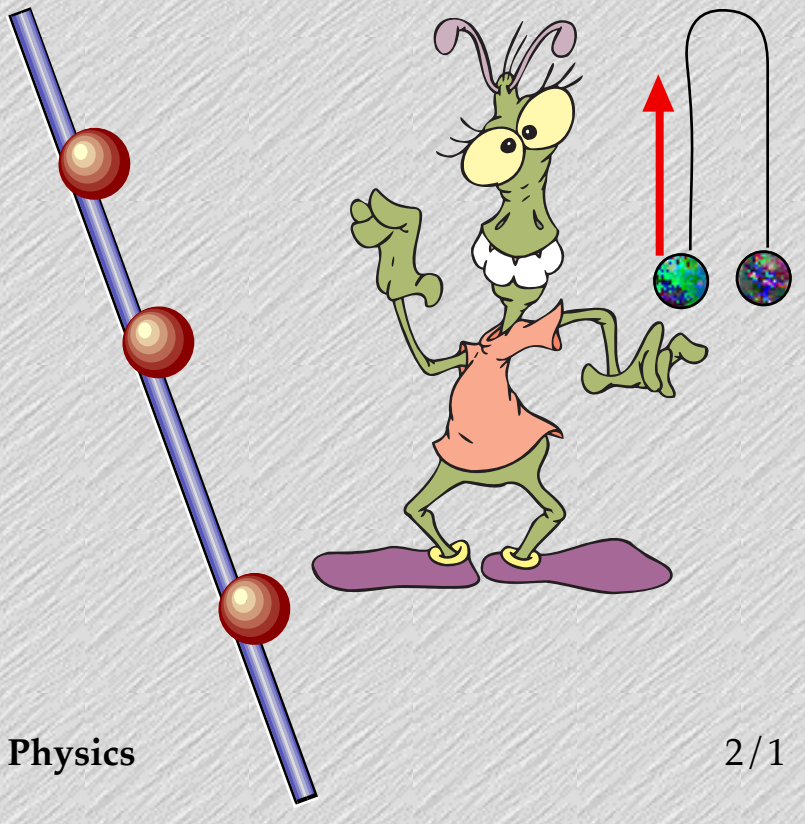

$$x = x_0 + v_i t + \frac{1}{2} a t^2$$

We know t and v but not anything about the height. Or do we? Look at the phrase "returns to her hand."

$$\Delta x = 0$$

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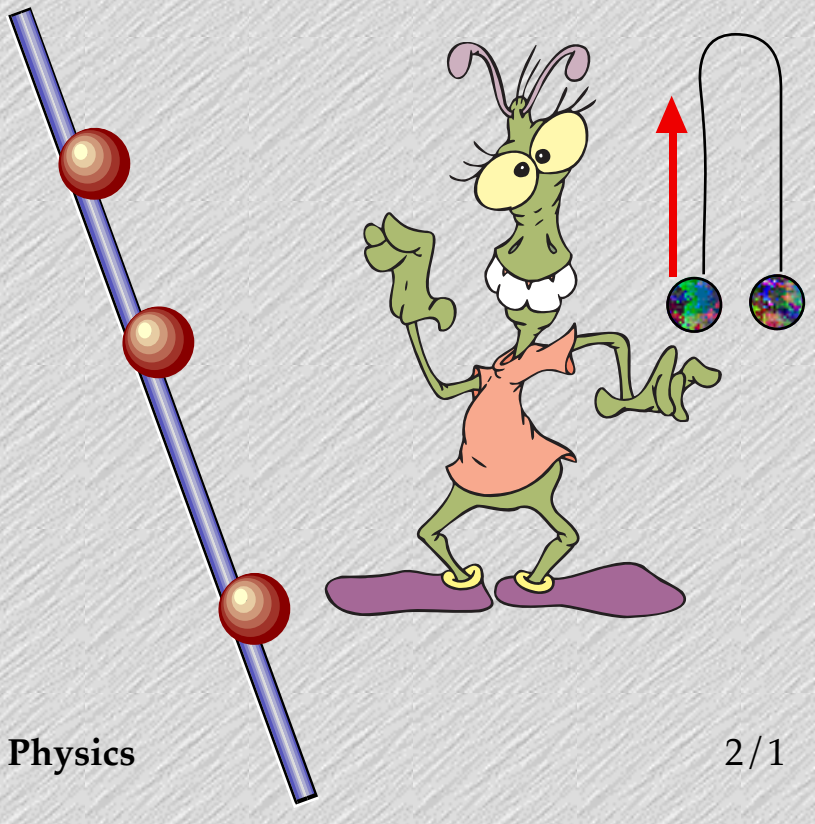

$$0 = \Delta x = v_i t + \frac{1}{2} a t^2$$

solve for a

$$a = -\frac{2v_i}{t}$$

$$a = -\frac{2 \cdot 15 \frac{m}{s}}{20\,s} = -1.5 \frac{m}{s^2}$$