

CH02-3 Constant Net Force Examples

Summary of Analytic Method

Theory

$$\vec{p}_f = \vec{p}_i + \vec{F}_{\text{net}} \Delta t$$

$$\vec{p} = m\vec{v} \quad \text{if } |\vec{v}| \ll c$$

$$\vec{v}_{\text{avg}} = \left(\frac{\vec{v}_i + \vec{v}_f}{2} \right) \Delta t$$

$$\vec{r}_f = \vec{r}_i + \vec{v}_{\text{avg}} \Delta t$$

Free-fall

If you drop a tennis ball from rest from a height of 2 m, at what time will it hit the ground?

Poll

If you fill the tennis ball in the previous question with steel marbles and you repeat the experiment, will it take more time, less time, or the same time to hit the ground?

1. More time
2. Less time
3. The same time

Poll

If you double the initial height of the ball (so that you drop it from a height of 4 m), the time it takes to hit the ground is

1. Twice as long
2. 1.4 times as long
3. Four times as long

Projectile Motion

A basketball is released from a height of 2.0 m above the floor with an initial speed of 10 m/s at an angle of 55° . The basketball goes through the rim which is 3.0 m from the floor. (a) What is the maximum height of the basketball above the floor? (b) How far was the player standing from the rim when she released the ball?