

Name_____

Phys 2010 (NSCC), Fall 2006
Problem Set #3

1. A cart rolling down an inclined track starts from rest and accelerates at $3.30 \frac{\text{m}}{\text{s}^2}$. At 1.2 s, how far has it rolled down the slope and what is its speed?

2. What is the acceleration of a cart rolling down a slope if it starts from rest and rolls 2.0 m in 1.35 s?

3. A train is travelling down a straight track at $15 \frac{\text{m}}{\text{s}}$ when the engineer applies the brakes, resulting in an acceleration of $-1.0 \frac{\text{m}}{\text{s}^2}$ as long as the train is in motion. How far does the train move in the time that it takes to come to a halt?

4. If we drop a rock, how far does it fall in 5.0 s? What is its speed at that time?

5. From her bedroom window a girl drops a water-filled balloon to the ground, 6.0 m below. If the balloon is released from rest, how long is it in the air?

6. A rock is thrown straight upward from ground level; it reaches a maximum height of 65.0 m. (a) What was the initial speed of the rock? (b) How long did it take to get to maximum height?

7. A rock is thrown straight *downward* from a height of 50.0 m with an initial speed of $10.0 \frac{\text{m}}{\text{s}}$. What is its speed when it reaches the ground? (Be careful; the initial *velocity* is $-10.0 \frac{\text{m}}{\text{s}}$.)

8. A particle moving in two dimensions has an initial velocity in the $+x$ direction, with initial speed $20.0 \frac{\text{m}}{\text{s}}$ (so $v_{0x} = 20.0 \frac{\text{m}}{\text{s}}$, $v_{0y} = 0$). It undergoes a constant acceleration with $a_x = 0$ and $a_y = -6.0 \frac{\text{m}}{\text{s}^2}$. What is the speed of the particle at $t = 4.0 \text{ s}$?
(Recall the definition of speed: $v = \sqrt{v_x^2 + v_y^2}$.)