

## UNIT VI: Worksheet 1

For each of the following problems write the fundamental mathematical model to use, rearrange it to the form required to solve the problem, then solve the problem. Be sure to label appropriately.

1. A body falls freely from rest on Earth. Find:
  - a. its displacement at  $t = 3\text{ s}$
  - b. the time for it to reach a speed of  $25\text{ m/s}$
  - c. the time required for it to fall  $300\text{ m}$
  - d. its speed after falling  $70\text{ m}$
2. Repeat question 1 for a body falling freely on the moon. The acceleration due to gravity there is  $1.7\text{ m/s}^2$ .
3. A ball is dropped from rest at a height of  $80\text{ m}$  above the ground.
  - a. What is its speed just as it hits the ground?
  - b. How long does it take for it to reach the ground?
4. A marble dropped from a bridge strikes the water in  $6.0\text{ s}$ . Calculate:
  - a. the speed with which it strikes the water
  - b. the height of the bridge

### Free Fall with $v_0 > 0$

5. A body is thrown downward with an initial speed of  $20\text{ m/s}$  on Earth. What is the:
  - a. acceleration of the object
  - b. displacement after  $4\text{ s}$
  - c. time required to reach a speed of  $50\text{ m/s}$
  - d. time required to fall  $300\text{ m}$  (Hint: factor the quadratic)
  - e. speed after falling  $100\text{ m}$
6. A student throws his worthless lab partner off a  $120\text{ m}$  high bridge with an initial downward speed of  $10\text{ m/s}$ 
  - a. How long does it take the deadbeat to hit the ground below?
  - b. How fast is he going at the moment of impact?
7. When a kid *drops* a rock off the edge of a cliff, it takes  $4.0\text{ s}$  to reach the ground below. When he *throws* the rock down, it strikes the ground in  $3.0\text{ s}$ . What initial speed did he give the rock?