$\qquad$ \#: $\qquad$
For each of the following problems on a separate sheet of paper draw a simple picture, make a force diagram, a motion map, write the fundamental mathematical model (think unit 3 (formula)) 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 (with no air resistance). Find:
a. its displacement at $\mathrm{t}=3 \mathrm{~s}$
b. the time for it to reach a speed of $25 \mathrm{~m} / \mathrm{s}$
c. the time required for it to fall 300 m
d. its speed after falling 70 m
2. Repeat question 1 for a body falling freely on the moon. The acceleration due to gravity there is $1.7 \mathrm{~m} / \mathrm{s}^{2}$.
3. A ball is dropped from rest at a height of 80 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 s . Calculate:
a. the speed with which it strikes the water
b. the height of the bridge

## Free Fall with $\mathbf{V}_{\mathrm{yi}} \neq \mathbf{0}$ ( $\mathbf{V}_{\mathrm{iy}}$ IS NOT EQUAL TO ZERO SYD!)

5. A body is thrown downward with an initial speed of $20 \mathrm{~m} / \mathrm{s}$ on Earth. What is the:
a. acceleration of the object
b. displacement after 4 s
c. time required to reach a speed of $50 \mathrm{~m} / \mathrm{s}$
d. time required to fall 300 m (Hint: factor the quadratic)
e. speed after falling 100 m
6. A student throws his worthless lab partner off a 120 m high bridge with an initial downward speed of $10 \mathrm{~m} / \mathrm{s}$
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 s to reach the ground below. When he throws the rock down, it strikes the ground in 3.0 s . What initial speed did he give the rock?
