Kinematics 1-D Motion: Free Fall: The Calculations: Guided Notes

I. How fast does one fall in free fall?

A. Ignoring air resistance, an object accelerates downward at _____.

B. An object falls _____ faster each _____ it falls.

II. Terminal velocity

A. What is terminal velocity?

B. Force of gravity pulling _____ is balanced by the _____ of air resistance pushing _____.

C. When the two forces are _____, the person stops _____ and falls to the earth at a _____ velocity.

D. This speed is between ____ and _____ mph.

E. Dependent on _____ and the _____ of the diver.

III. Free Fall Equations

A. How fast is the object falling?

B. How fast is the object falling?

C. How far has the object fallen?

D. How far has the object fallen?

E. Landing Speed?

IV. Practice 1:

A. A diver jumps from 10,000 ft. How far down will the diver be after 5 s?

B. What is the speed of the diver at this time?

C. How far down will the diver be after 5 seconds?

D. What is the speed of the diver at this time?

V. Practice 2:

A. Michael drops a pencil down the stairs from the 3rd floor. Where is the pencil 1.5s later?

B. How fast is the pencil falling at 1.5 s?

VI. Practice 3: Elevator Key anyone?

A. The single cable supporting the school elevator breaks when the elevator is at rest on the 3rd floor (120m). There are no kittens in the elevator. With what speed does the elevator strike the ground?

B. How long did it fall?

VII. Your turn to practice

A. We are standing on top of the building for a great experiment. Dewey and Baker decided to jump off (or perhaps they were pushed) at exactly the same moment as we drop a stone. There is no air resistance. All three are propelled vertically downward at 12.0 m/s. The roof is 30m off the ground.

B. Who/what reaches the ground first? How long does it take for the stone to reach the ground? What is the speed of the stone at impact?