

## THE LAW OF FALLING BODIES VIDEO NOTES

**Instructions:** Please answer the following questions about the *Falling Bodies* video. Answer each question completely and use complete sentences.

1. What is the “Law of Falling Bodies”?
2. Describe the Falling Penny and Feather demonstration.
3. Describe the who, what, when etc. of the moon example given in the video.
4. What did Leonardo DaVinci do related to this topic?
5. What was the experiment that Galileo used to determine his law of odd integers?
6. What did Galileo conclude with this experiment?
7. How does this compare with what DaVinci had concluded?
8. How does the video relate Galileo’s experimental conclusion with 20<sup>th</sup> century America?
9. What is a derivative?
10. How are derivatives used to determine instantaneous speed of a falling body?
11. Who “invented” the derivative?
12. What are the three equations that satisfy the law of falling bodies?

## THE LAW OF FALLING BODIES VIDEO NOTES ANSWER KEY

**Instructions:** Please answer the following questions about the Falling Bodies video. Answer each question completely and use complete sentences.

1. What is the “Law of Falling Bodies”?  
*All objects in a vacuum fall with the same constant acceleration. ( $g = -9.80 \text{ m/s}^2$ )*
2. Describe the Falling Penny and Feather demonstration.  
*In a vacuum (all air removed) the penny and feather fall at the same rate and hit the bottom at the same time!*
3. Describe the who, what, when etc. of the moon example given in the video.  
*In 1971, Apollo 15 astronaut, David Scott, successfully conducted a similar experiment using a hammer and feather dropped on the moon!*
4. What did Leonardo DaVinci do related to this topic?  
*DaVinci theorized that an object would fall a greater distance with each time interval. He also theorized that this amount of distance fallen would successive integers.*
5. What was the experiment that Galileo used to determine his law of odd integers?  
*Galileo timed a ball as it rolled down a track at increasing inclines.*
6. What did Galileo conclude with this experiment?  
*He found that the distance an object falls in successive intervals follows a pattern of odd integers. (1 unit, 3 units, 9 units, etc...). This means that the total distance fallen follows a pattern of perfect squares!*
7. How does this compare with what DaVinci had concluded?  
*Galileo’s results were correct, only odd integers applied to falling bodies!*
8. How does the video relate Galileo’s experimental conclusion with 20<sup>th</sup> century America?  
*They use a tower drop ride at an amusement park. Fun!*
9. What is a derivative?  
*A derivative is used to describe the rate at which something is changing.*
10. How are derivatives used to determine instantaneous speed of a falling body?  
*Derivatives allow us to look at smaller and smaller intervals of time. Derivatives also help us see that acceleration in free fall is constant, which leads us to our 3 equations for falling bodies.*
11. Who “invented” the derivative?  
*The derivative was “invented” by Sir Isaac Newton! (NOT Gottfried Wilhelm Leibniz! ☺)*
12. What are the three equations that satisfy the law of falling bodies?

$$a = g = -9.80 \text{ m/s}^2$$

$$\Delta v = at \text{ (since } v_2 \text{ or } v_1 \text{ is } 0 \text{ m/s and } a = g) \Rightarrow v = g \cdot t$$

$$d = vt + \frac{1}{2}at^2 \text{ (since } v_2 \text{ or } v_1 \text{ is } 0 \text{ m/s and } a = g) \Rightarrow d = \frac{1}{2}gt^2$$