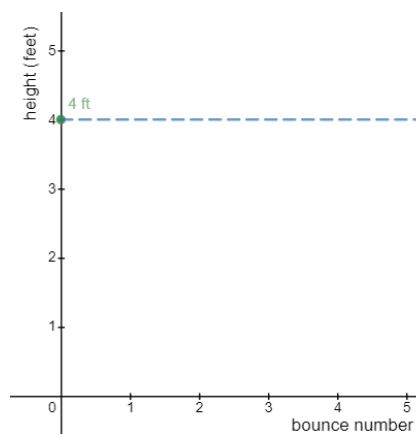




You own a tennis ball manufacturing company. An angry employee just added a bunch of BAD tennis balls to a shipment. Your job is to figure out which tennis balls are bad. Go to [student.desmos.com](http://student.desmos.com) and type in the code to start the activity.

1. **(Slide 1)** What do you think makes a tennis ball bad?
  
2. For **slides 2-5**, how did you determine if the tennis balls were good or bad?
  
3. **(Slide 8)** Once you have made a ball that would meet the regulations set by the International Tennis Federation, fill in the table below with the bounce heights for each corresponding bounce number. Then sketch a graph of the heights.

Bounce #	Height (ft.)
0	4
1	
2	
3	
4	
5	



4. **(Slide 9)** Which type of function best models your tennis ball?
  
5. **(Slide 10)** Write your equation below. What do you think the values in the equation mean?
  
6. **(Slides 11-14)** Using your equation in number 5, determine which of the four balls are actually good. Explain.
  
7. **(Slide 15)** What advice can you offer another student for determining if a tennis ball is good or bad when you know the heights of the first four bounces?

## Lesson 3.1—Exponential Functions

Important Ideas:

### Check Your Understanding

1. A billionaire hires you to mow her lawn. For pay, she'll give you 1 penny for the first job and then double your pay each time you complete a job.
  - a. How much money should you expect to make on the third job?
  - b. Write a rule that gives how much money you will make on the  $n$ th job.
  - c. On which job will you first make over a million dollars per job?
2. Identify whether the following scenarios represent exponential growth, decay, or neither. Give a reason for your answer.
  - a. You buy a car that loses 20% of its value every year.
  - b. A restaurant job shares 3% of its total sales for each shift with its employees.
  - c. The battery life on your phone decreases by 10% every hour.
  - d. You deposit money into an account that pays 4% interest each quarter.
3. If the initial population of rats was 20 and grew to 25 after the first year, which of the following functions best models the population of rats,  $P$ , with respect to the number of years,  $t$ , if the population growth of rats is considered to be exponential?
  - a.  $P = 5t + 20$
  - b.  $P = 20(1.25)^t$
  - c.  $P = 20(1.2)^t$
  - d.  $P = 5t^2 + 20$