LinkBot Equation Verification

By this point we know that there is a relationship between degrees the wheels rotate and the distance the bot travels. We completed a linkbot motion worksheet and discovered that the relationship is 0.03 inches traveled for every one degree the wheel rotates.

Remember that this information helps us to calculate how far our bot will travel according to a specified number of degrees. We can use this math concept along with the speed of our robot to create linear equations for our bots.

Example:

A LinkBot named “Wild Bill” travels at a speed of 300 degrees per second. What is the function that models “Wild Bill’s” speed?

Explanation:

We know that speed is a ratio that compares a distance with time. A speed ratio we hear often is miles per hour. Miles are a measure of distance and hours are a measure of time. 25 miles per hour would mean that the object would travel a total distance of 25 miles if it traveled at a constant rate of speed for 1 hour.

Since we know that “Wild Bill’s” speed is constant, we should model his speed with a linear function. We are familiar with linear functions that are in slope-intercept form and look like $y = mx + b$ with m representing slope and b representing the y-intercept.

Answer:

We will start our answer with the basic form of a linear equation in slope-intercept form: $y = mx + b$ or $d = rt + b$ (distance equals rate times time plus a head start)

We are assuming that our distance units will be in inches and our time units will be in seconds. Therefore, x = time in seconds and y = distance in inches. The slope will need to be calculated and show the relationship or rate between inches and seconds. Our y-intercept will be 0 in this example because we are starting at zero distance traveled in zero seconds. So,
$y = mx$ or $d = rt$

Using the relationship of inches per degree, we take “Wild Bill’s” speed of 300 degrees per second and multiply by 0.03 to get 9 inches. Because “Wild Bill’s” speed was 300 degrees per second and we just converted to inches, we can say the speed is actually 9 inches per second. This makes our equation:
$y = 9x$ or $d = 9t$

1) Use the speed in degrees that you picked to calculate the slope of LinkBot 1 and write a linear equation that models its speed.

2) Does this equation match the equation you wrote from the data in part 1? If not, explain why you think there are differences.

3) Moving forward, are you going to use the equation you generated from the data or the equation you calculated? Why?

4) Use the speed in degrees that you picked to calculate the slope of LinkBot 2 and write a linear equation that models its speed.

5) Does this equation match the equation you wrote from the data in part 2? If not, explain why you think there are differences.

6) Moving forward, are you going to use the equation you generated from the data or the equation you calculated? Why?