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Hands-On Activity

Student Worksheet

HOW MANY LICKS?



Directions:

Today you will use a piece of string to measure the circumference of a Tootsie Roll Pop as you consume it. You will record the circumference in increments of 30 seconds, then use your data to determine the rate of change of the circumference and the volume of the Tootsie Roll Pop.

Materials:

* Tootsie Roll Pop
* String
* Ruler
* Timer
* Graphing Calculator

Goals:

Students will calculate the radius of a sphere.

Students will determine the rate of change using collected data.

Objectives:

Given a lollipop and the appropriate materials, students will determine the rate of change of the lollipop’s circumference and volume with 90% accuracy.

Procedure:

Data Collection

Step 1:

1. Measure the circumference of your lollipop by wrapping the string around the middle of the lollipop.
2. Mark the circumference on the string
3. Remove the string from the lollipop
4. Lay it flat on the ruler
5. Record the measurement in the table on the next page

Step 2:

1. Place the lollipop in your mouth and start a timer for 30 seconds
2. Begin to consume the lollipop (no chewing or biting)
3. Take the lollipop out at the end of the 30 seconds
4. Repeat step 1 with the new circumference

Step 3: Repeat steps 1 and 2 until you have collected data for 300 seconds

|  |  |  |
| --- | --- | --- |
| Time (Seconds) | Circumference (centimeters) | Radius |
| 0 |  |  |
| 30 |  |  |
| 60 |  |  |
| 90 |  |  |
| 120 |  |  |
| 150 |  |  |
| 180 |  |  |
| 210 |  |  |
| 240 |  |  |
| 270 |  |  |
| 300 |  |  |

Data Calculations

Step 4: After you have finished your lollipop and collected all of your data, calculate the radius for each circumference recorded.

Step 5: Create a scatter plot of the radii with respect to time (t).



* Find the Line of Best Fit for your data

Data Analysis

1. Is your equation reasonable? Test at least 2 values and compare them to the data you collected.
2. How fast does the volume of the Tootsie Roll Pop decrease when the radius is ¼ its original value?

* Find the rate of change of the volume

Extension

3. How would the rate of change for the volume change if you had a lollipop with a larger radius?

4. What about with a smaller radius?

5. What would happen if the rate of change was larger?

6. How about if it were smaller?