

**Video:** [**https://youtu.be/k\_sk5xfmMfw**](https://youtu.be/k_sk5xfmMfw)

**Video Summary:**

How do companies keep product from falling off the assembly lines, especially as the product turns corners? How do they make sure that the product does not fall over while going around corners? In this video, you will calculate arc lengths to determine the length of guide rail needed to go around a corner of a conveyor.

**Nercon Eng. & Mfg., Inc. - Biography**

**Nercon Eng. & Mfg., Inc.**has been engineering and manufacturing conveyor and consumer goods packaging equipment for over 38 years.  We are known for our expertise in design.  Our growing business currently employs about 150 people.  With the Nercon Corporate and Engineering office located in Neenah, Wisconsin and the production facility in Oconto, Wisconsin, our local family-owned business has been an active part of both the Fox Valley and Oconto area communities.

**Common Core Mathematical Content Standards:**

**HS.G.C.5:** Find arc lengths and areas of sectors of circles.

**\*\*This could possibly be done in 7th grade using the idea that you only want a certain percent of a circle .**

**\*\*7.EE.3**: Solve multi-step real-life and mathematical problems posed with rational numbers in any form.

**\*\*7.G.4:** Know the formulas for the area and circumference of a circle and use them to solve problems.

**Common Core Mathematical Practice Standards:**

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Model with mathematics

**Teacher note:** *Please preview the entire video and pre-work solutions in order to anticipate students’ needs, misconceptions and materials unique to your classroom.*

The student work page at the end of the lesson will give students a place to jot down ideas and work through answers as they are following along with the video.

**Pre-Activity Discussion**

Question to ask students: How might companies keep product on a conveyor belt as it turns corners?

Discussion: The conveyors in this video are for industry and look much different than the conveyor belts in grocery stores. Companies use “guide rails” as a guard to keep product on the conveyors. These rails are like fences and sometimes taller fences are needed depending on the height of the product being sent through the corners.

**Part 1**

* Play Video (0:00-0:46), pause at (0:46) to answer the discussion questions.
* What information might be needed to calculate the length of a guide rail going around a corner?
* Have students discuss necessary information that they might need.
* Answers: the radius of the corner, the degree of the turn, the width of the conveyor to calculate both the inner and

the outer guide rail

**Part 2**

* Play Video (0:47 – 1:12), pause at (1:12) to answer the discussion questions.
* The students need to use the information given to find the length of each guide rail, the inner rail and the outer rail.
* Have students work through this problem. Discuss methods and answers as necessary.
* Answers:

Inner Arc Length

Arc Length = *C* ()

Arc Length = 2)

Arc Length = 2)

Arc Length = (150.8)()

Arc Length = 31.42”

Outer Arc Length

Arc Length = *C* ()

Arc Length = 2)

Arc Length = 2)

Arc Length = (204.2)()

Arc Length = 42.54”

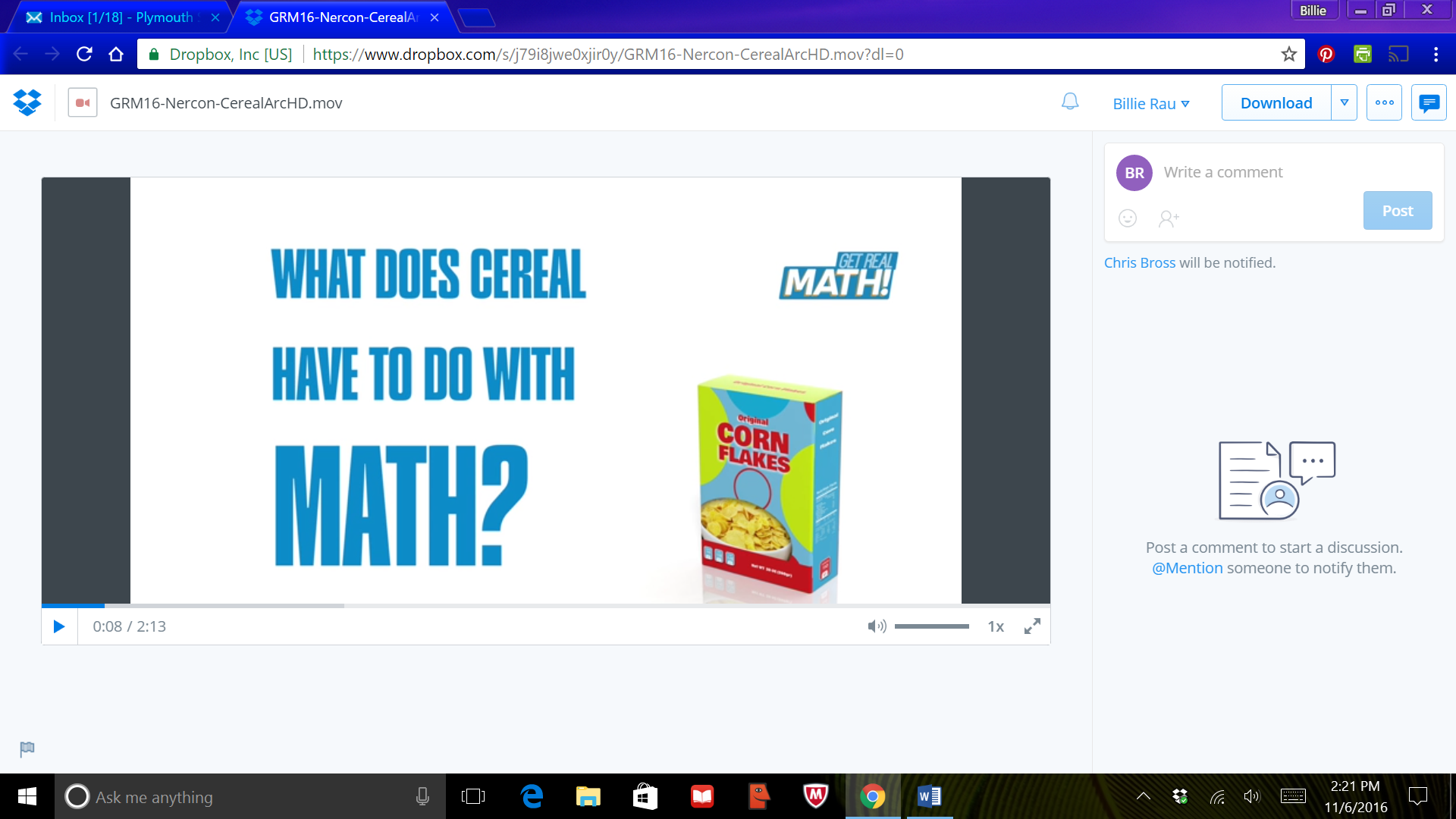
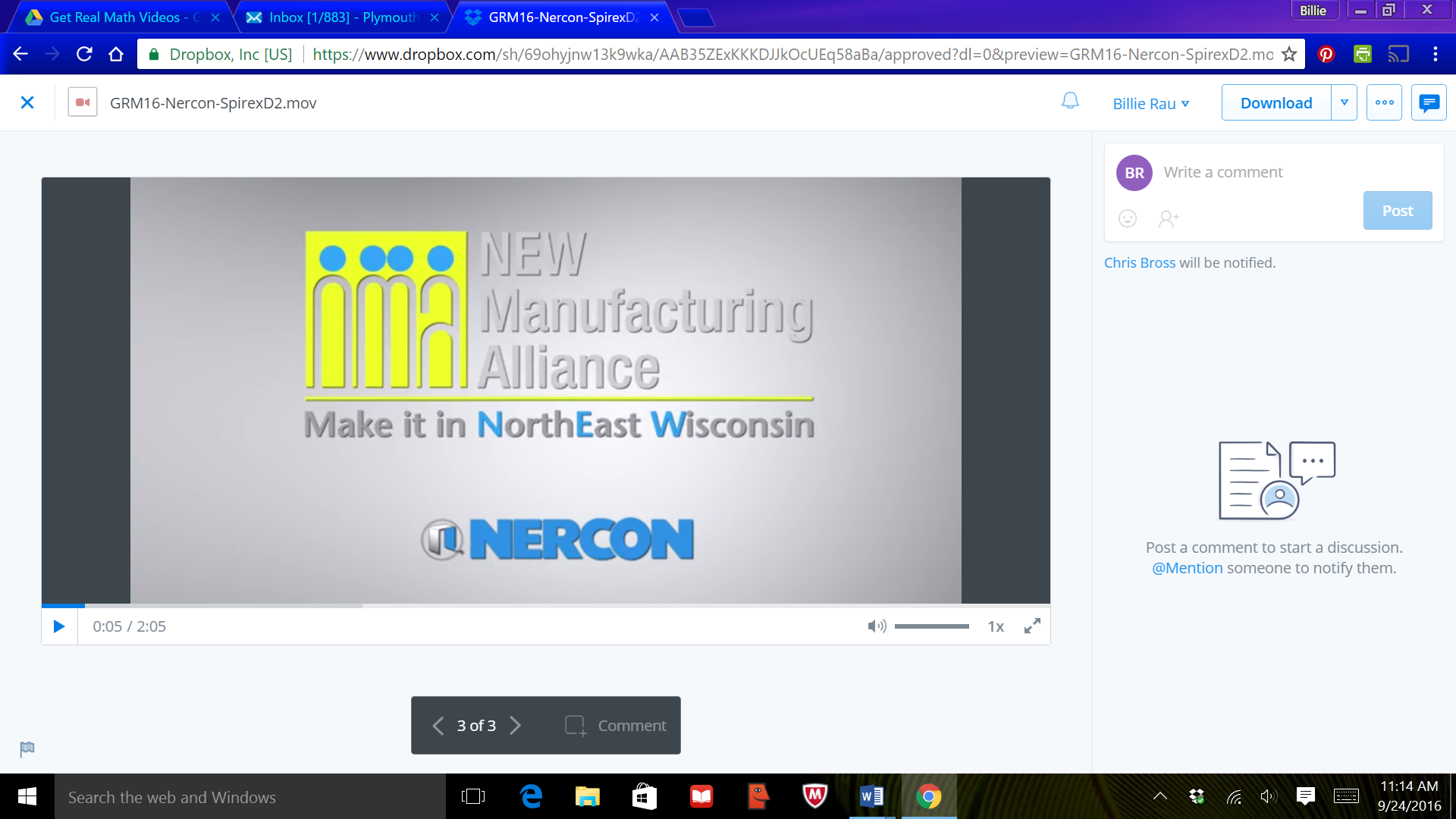
Inner Length + Outer Length

31.42” + 42.54” = 73.96”

**Part 3**

* Play Video (1:13 – 2:11).

Student Work Page



Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is a guide rail? How are they used?

**Part 1**

What types of information might be needed

to order materials for new guide rails?



**Part 2**

What is the total length of wider guide rail needed? Calculate both the inner and the outer guide rails.