

**Video:** [**https://youtu.be/iV3l0pF5n\_E**](https://youtu.be/iV3l0pF5n_E)

**Video Summary:**

How does a company consider buying a new paper machine? How much will a loan cost the company and how long will it take the company to pay back the loan? In this video, you will calculate the interest on a loan for a new paper machine. You will also calculate how long it will take to pay back the interest on the loan.

**Georgia-Pacific - Biography**

With approximately 300 facilities across North America, South America and Europe, Georgia-Pacific is one of the world's leading manufacturers and marketers of bath tissue, paper towels and napkins, tableware, paper-based packaging, office papers, cellulose, specialty fibers, nonwoven fabrics, building products and related chemicals. In Northeastern Wisconsin, its Green Bay facilities make nationally-known products (Quilted Northern®, Angel Soft® and Compact® bath tissue; enMotion® and SofPul® paper towels; and Vanity Fair® and Mardi Gras® napkins) and packaging is produced in Sheboygan and Oshkosh. Each year, GP's Ecosourceä facility in Green Bay recycles nearly 100,000 tons of wastepaper - equal to 1.7 million trees - and saves 5 million cubic feet of landfill space. In addition, its Neenah-based research and development laboratory, iNNOVATION institute®, constantly develops creative and innovative products, and tests them in Green Bay using the latest technology available. For more information, visit: gp.com.

**Common Core Mathematical Content Standards:**

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

**7.EE.4a**: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations to solve problems by reasoning about quantities.

\*Teachers can extend this situation in 7th or 8th grade by graphing the situation or creating a similar situation to compare the two situations. (8.EE.5, 8.EE.8c)

**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 big do you think a paper machine is? How much might it cost? How long would it take to pay back the loan for a paper machine?

Discussion: The machine that makes this toilet paper is about the size of a football field. If you were to take the students to your gymnasium, you might have them imagine that the machine would fill the entire room, all the way to the ceiling! How could you calculate the cost of a loan for something this size?

**Part 1**

* Play Video (0:00-0:35), pause at (0:35) to answer the discussion questions.
* This paper machine is approximately the size of a football field. How much might a machine like this cost? How big of a loan would Georgia-Pacific need? Estimate how long it might take to pay for this machine.
* Have students discuss necessary information that they might need.
* Possible answers: cost of loan, the length of the loan, the interest rate, etc

**Part 2**

* Play Video (0:36-0:55), pause at (0:55) to answer the discussion questions.
* How much would the first year interest be for Georgia-Pacific’s loan?
* Have students work through this problem. Discuss methods and answers as necessary.
* Answers:

Interest = principal amount x interest rate

Interest = $100,000,000 x 0.068

Interest = $6,800,000

**Part 3**

* Play Video (0:56-1:24), pause at (1:24) to answer the discussion questions.
* Students will need to do two calculations for this problem. They need to find one-fourth of the total loan, as well add that to the interest owed.
* Have students work through this problem. Discuss methods and answers as necessary.
* Answers:

One-fourth of the total principal: $100,000,000 4 = $25,000,000

Interest plus one-fourth of total principal: $6,800,000 + $25,000,000

$31,800,000

**Part 4**

* Play Video (1:24-2:13), pause at (2:13) to answer the discussion questions.
* How long will it take to pay back the loan if they assume a profit of $4.25 per case of product and they can make 15,000 cases per day?
* Teachers can also use this example to have students graph the equation and use the graph to answer the final question.
* Have students work through this problem. Discuss methods and answers as necessary.
* Answers:

If we make a profit of $4.25 on each case of product, how many cases would we need to produce to pay off the amount this year?

Equation: 4.25x = 31,800,000 x stands for number of cases

$31,800,000 $4.25 = 7,482,352.94 cases of product

If we make 15,000 cases per day, how many days will that take?

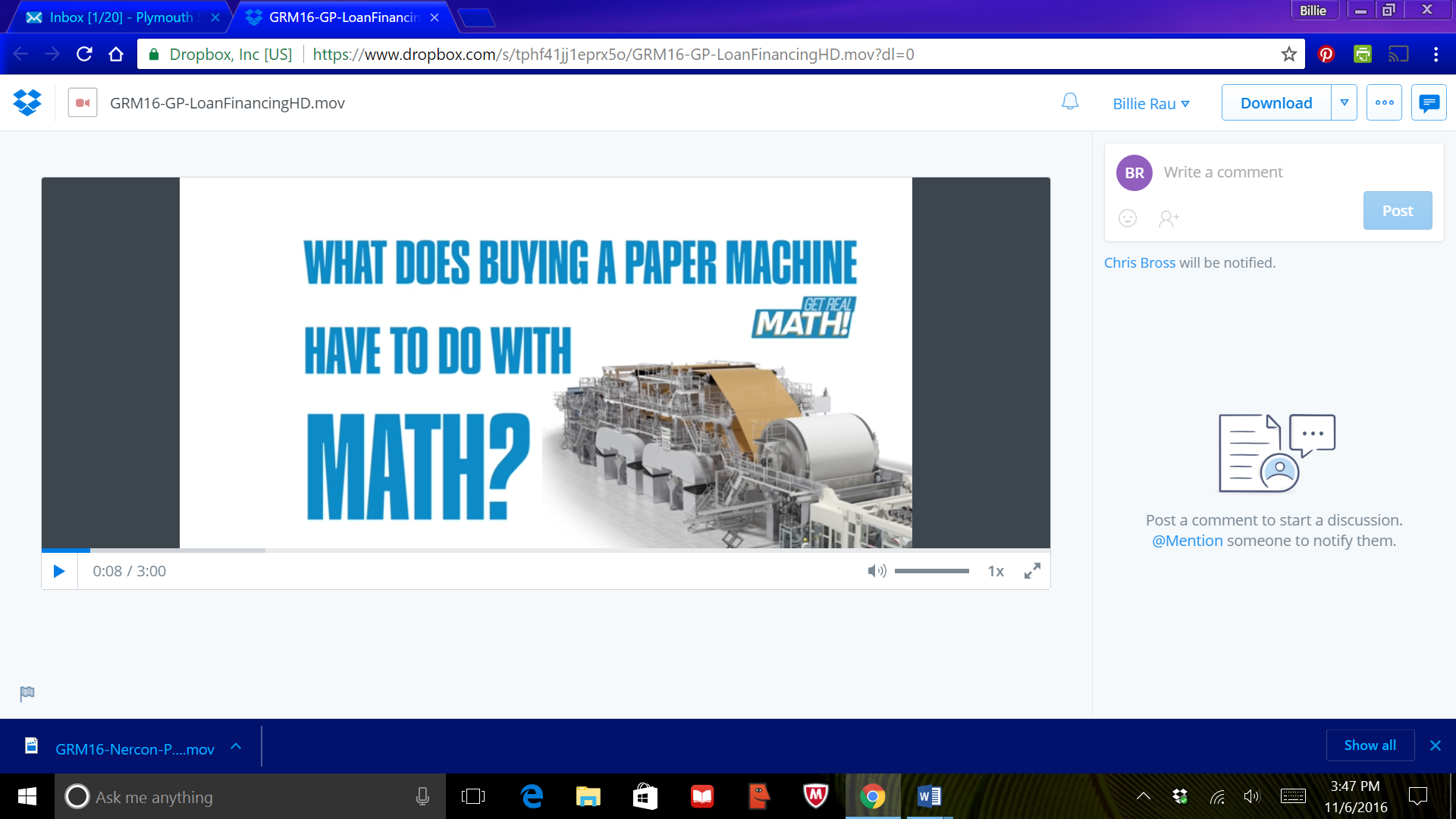
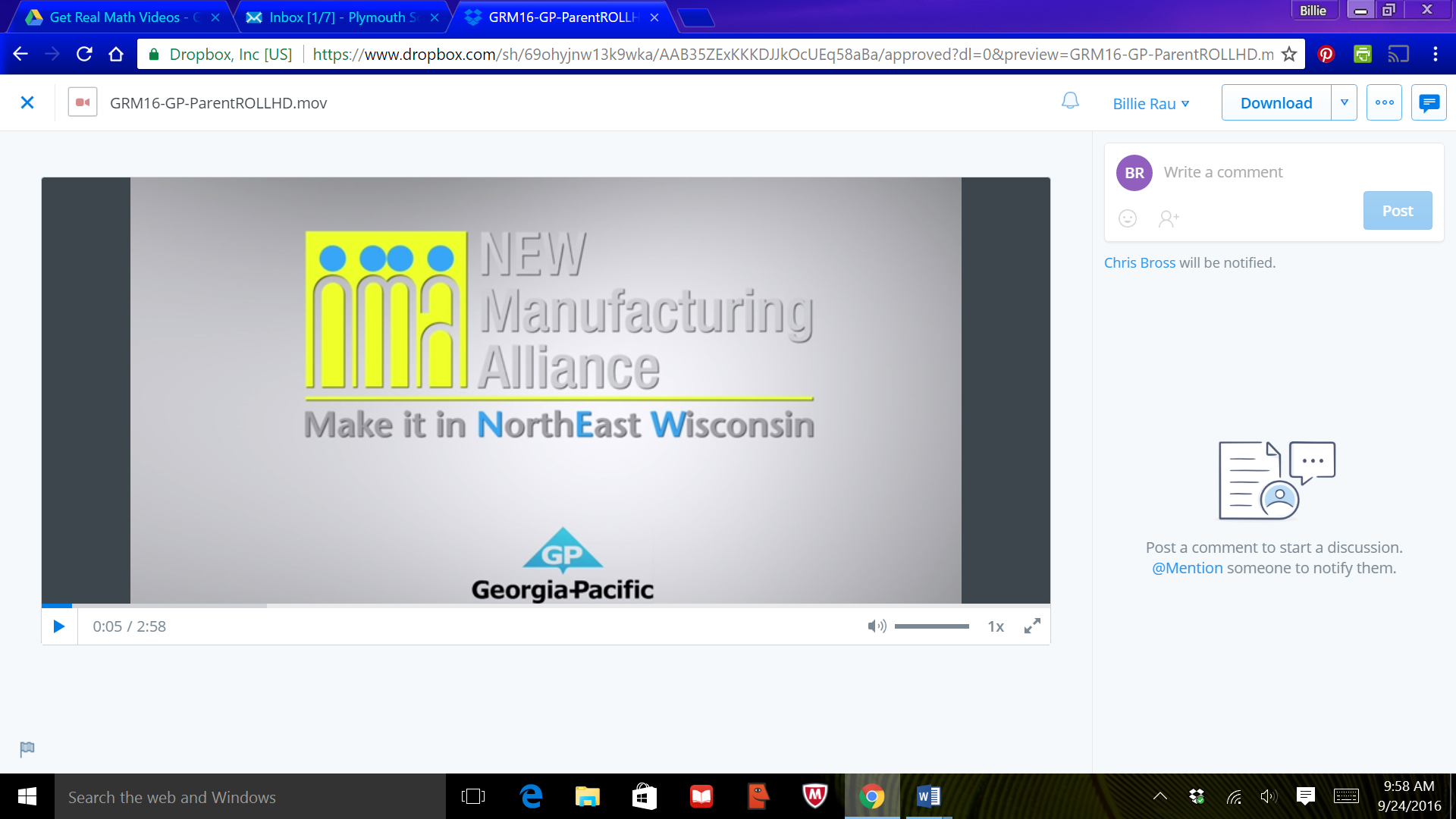
Equation: 15,000x = 7,482,352.94 x stands for number of days

7,482,352.94 15,000 = 498.82 days

About 499 days

**Part 5**

* Play Video (2:14-2:54).
* Teachers can extend the learning by changing the amount of the interest rate, the length of the loan, or even the profit or number of cases produced each day.
* This could become an example of comparing and graphing equations as well.



Student Work Page

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

How much might a paper machine cost? What might affect the amount of the loan? How long will it take to pay back the loan?

**Part 1**

What types of information might be needed to calculate the loan that Georgia-Pacific would need?

**Part 2**

How much is the first year’s interest on the loan?

**Part 3**

How much money does Georgia-Pacific want to pay back in the first year of the loan?

**Part 4**

How long will it take Georgia-Pacific to pay back the first year’s interest and one-fourth of the loan amount?