

Video: <https://youtu.be/On6JmB02Buk>

**Video Summary:**

Manufacturers want to make sure that they can make quality products while still being cost efficient. Sometimes there is an opportunity to upgrade a machine, which costs money but still may be more cost effective in the long run. How do companies figure out how much an upgrade will save them?

When manufacturers talk about how much product they create per year, how much does that really mean?

**Rockline Industries- Biography**

Rockline is one of the largest producers of consumer products, specializing in wet wipes and coffee filters.  Our passion is delivering customer solutions based on innovation, service, and best value.   We are a family owned company since 1976, and have grown from 35 people to an organization of over 2,500 Associates developing, making, and shipping our products around the world.   These products include disposable paper products like coffee filters, disposable wipes, and baking cups.

One thing that hasn’t changed throughout our history is our desire to be the best in the world.   Our values are best expressed in our desire to do business **RRITE**.  To us this means we must:

**Renew** - As a family owned business with no stock price or dividend pressures, we invest all earnings back into the business. This is both in process and in our people to drive growth and continuous improvement.  We recruit top talent in all areas, and provide the best technology available.

**Respect** - We foster a culture of respect in all of our relationships. This includes our Associates, customers, suppliers, the environment, and the communities in which we operate. Our Operating Principles support high performance and guide our decision making. We treat others as we want to be treated.

**Integrity**- Nothing is more important than Rockline’s reputation. We strive to “Do the right thing” - always.

**Teamwork** – Our Associates work together in cross functional teams to meet customer needs and expectations, as well as internal goals and objectives. Individual goals are secondary to team goals.

**Excellence** - Achieving best in the world status starts with our Associates. We strive to be “Best in class” in all we do.

Rockline’s most valued assets are our Associates and the knowledge and experience they possess. From our President and CEO, Randy Rudolph - ***“ At Rockline, we are about our people – good people. Quality  people.  People you can depend on who take pride in their work. These people are what we call the Rockline Advantage .”***

**Common Core Mathematical Content Standards:**

**6.NS.3:** Fluently add, subtract, multiply and divide multi-digit decimals using the standard algorithm for each operation.

**6.NS.2:** Fluently divide multi-digit numbers using the standard algorithm.

**6.RP.3d**: Use ratio reasoning to covert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

**7.EE.4a:** Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. Solve word problems leading to equations of the form px+q=r, where p q, and r, are specific rational numbers.

**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 do cupcake liners or coffee filters get made? How can the company save money while making this product?

Discussion: Baking cups and coffee filters are printed out of many large continuous rolls of paper. It creates many layers of paper that have holes cut out of the middle of it. Brainstorm possible ways that companies could save money on paper or save “waste” of the paper. (Cut holes closer together, smaller rolls of paper, etc)

**Part 1**

* Play Video (0:00-1:15), pause at (1:15) to answer the discussion questions.
* The employees are trying to decide if the project will save the company money and waste paper in the long run. The first problem is to find out how much money the company actually spends on paper per year. Rockline uses 700,000 pounds of paper each year and each pound costs $1.25.
* Have students work through this problem. Discuss methods and answers as necessary.
* Answers:

700,000 pounds of paper x $1.25 per pound = $875,000

**Part 2**

* Play Video (1:15 – 1:43), pause at (1:43) to answer the discussion questions.
* Now that the employees know how much the company uses, they need to calculate how much of a 13 inch roll the 12 ½ inch roll is. As a teacher, you might want to use a bar diagram to show how much the difference is and how it turns out to be 1/26 th of the 13 inch roll. Then you will want to use that information to calculate how much money would be saved per year.
* Have students work through this problem. Discuss methods and answers as necessary.
* Answers:

**13 inch roll**

**12 ½ inch roll**

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**Divided into 26 half inch sections**

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**From the 26 half inch sections, you can see that 1 of them is the extra piece.**

So the answer to the first question is that the extra half inch on the 13 inch roll is 1/26th of the width.

Using this information to calculate how much money would be saved per year, you would divide the cost by 26.

$875,000 ÷ 26 = $33,653.85

This amounts to $33,653.85 in savings per year.

**Part 3**

* Play Video (1:43 – 2:28), pause at (2:28) to answer the discussion questions.
* The employees want to use the savings per year to find out if the project will pay for itself within the two year time frame set by Rockline Industries. They will use the cost of the project and the savings per year to calculate how long it will take to pay for the project.
* Answers:

$40,000 ÷ $33,653.85 per year = 1.189 year

1.189 years x 365 days per year = 1 year and 69 days

**Part 4**

* Play Video (2:28 – 3:45), pause at (3:45) to answer the discussion questions.
* As a bonus type question, the employees want to know how much 700,000 pounds of paper really turns out to be. The company has decided to use the idea of how many coffee filters it makes each year to relate back to the 700,000 pounds of paper. They explain that one “nest” of coffee filters is 2 inches tall and that each additional nest of filters adds ¼ inch to the height of the stack. Knowing that the company made about 240,000,000 nests of filters in 2016, how tall would that stack reach?
* Answers:

y = height of one nest of coffee filters + height of additional stack (number of nests – first nest)

y = 2 + 0.25 (x – 1)

y = 2 + 0.25 (240,000,000 – 1)

y = 60,000,001.75 inches

Change to miles

y = 60,000,001.75 inches ÷ 12 inches per foot

y = 5,000,000.145 feet ÷ 5280 feet per mile

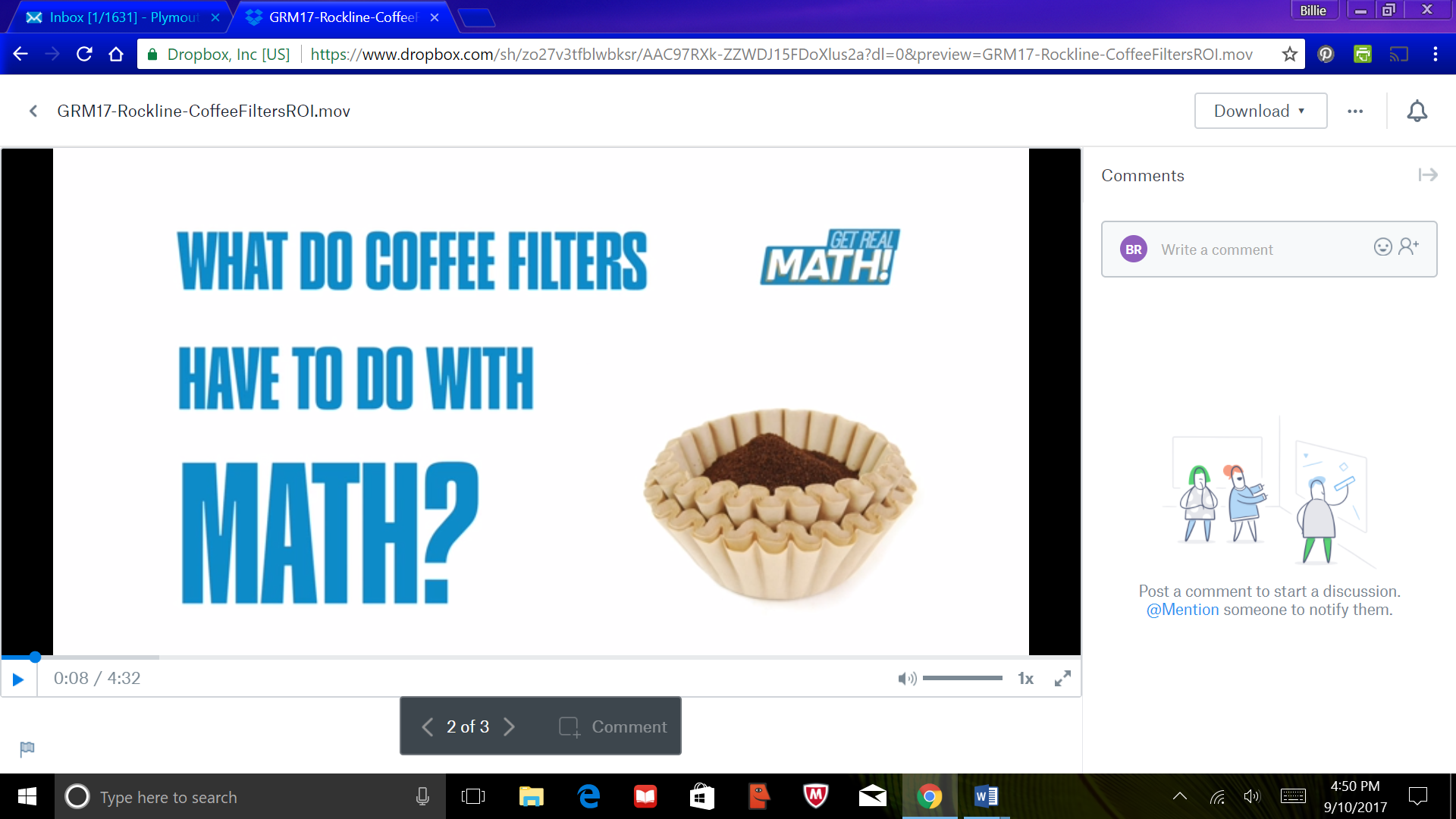
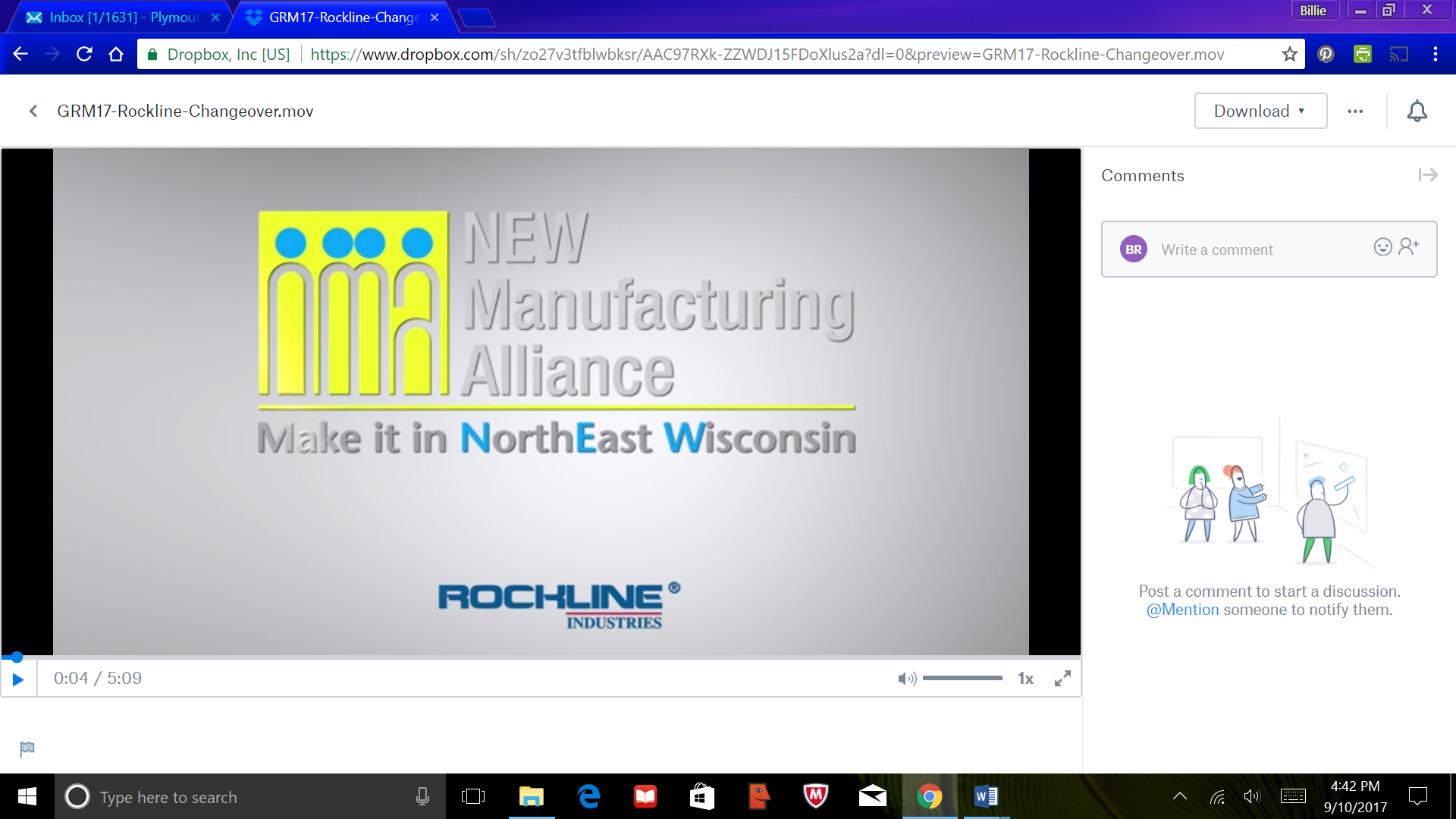
y = 946.969 miles

**Part 5**

* Play Video (3:45 -4:32).
* Bonus information if you want to try another problem using an equation: How tall is a stack of baking cups (or cupcake liners) if Rockline Industries makes about the same number of nests per year? The baking cup nests are 1 ¼ inch tall and each additional nest adds ½ inch to the height of the stack.

y = 1.25 + 0.5(x – 1) y = 1893.93 miles

Student Work Page



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

**Part 1**

Calculate how much money Rockline Industries spends on paper each year.

**Part 2**

What portion of a 13 inch roll is a 12 ½ inch roll?

How much does that portion coast over an entire year?

**Part 3**

How long will it take for the project to pay for itself?

**Part 4**

How many miles tall is the stack of coffee filters?