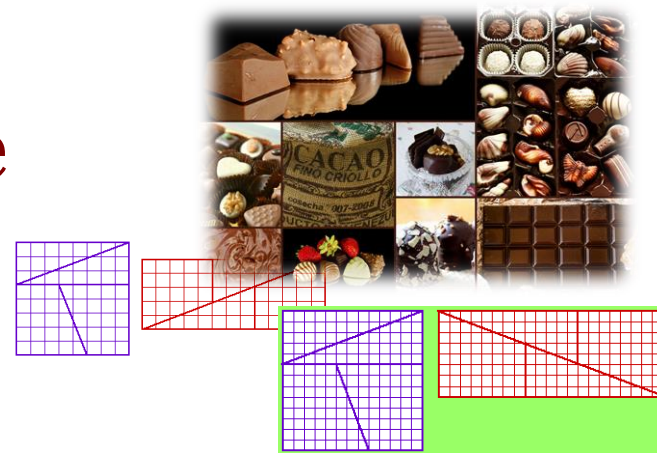




TLJ CONSULTING GROUP

creating & sharing mathematical experiences

The Mathematics of Chocolate



Created by

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The Mathematics of Chocolate

For Teachers:

About National Chocolate Day

From the National Day Calendar website:

National Chocolate Day is observed annually on October 28. While there are many specific chocolate related holidays throughout the year, National Chocolate Day celebrates all things chocolate. As America's favorite flavor, chocolate is well deserving of its own day of honor and celebration.

Chocolate comes from the seed of the tropical Theobroma cacao tree. Cacao, which has been cultivated for at least three millennia, is grown in Mexico, Central America and Northern South America. The earliest known documentation of using cacao seeds is from around 1100 BC. The cacao tree seeds have a very intense, bitter taste that must be fermented to develop the flavor.

Once the seeds have been fermented, the beans are dried, cleaned and roasted. After roasting, the shell is removed to produce cacao nibs. The cacao nibs are then ground into cocoa mass, which is pure chocolate in rough form. The cocoa mass is usually liquefied then molded with or without other ingredients. At this point in the process, it is called chocolate liquor. The chocolate liquor may then be processed into two components: cocoa solids and cocoa butter.

- Unsweetened baking chocolate – cocoa solids and cocoa butter in varying proportions.
- Sweet chocolate – cocoa solids, cocoa butter or other fat and sugar.
- Milk chocolate – sweet chocolate with milk powder or condensed milk.
- White chocolate – cocoa butter, sugar and milk but no cocoa solids.

Research has found that chocolate, when eaten in moderation, can lower blood pressure.

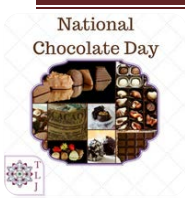
Use #NationalChocolateDay to post on social media.

HISTORY

National Chocolate Day was created by the National Confectioners Association.

<http://www.nationaldaycalendar.com/national-chocolate-day-october-28/>

So where's the math?? Keep reading.....



NRich has three great activities relating to chocolate for students in upper elementary through secondary:

Chocolate Bars: NRich: <http://nrich.maths.org/1275>

An interactive game based on an old favorite: musical chairs with a twist – candy bars and fractions.

Chocolate: NRich: <https://nrich.maths.org/34>

An excellent problem for helping younger mathematicians develop their concepts of fractions. It's not so much to do with arithmetical manipulation of fractions, but more with exploring and developing ideas. By encouraging learners to share their methods, there is an opportunity to discuss which might be the 'best' (this might depend on the individual's preference too)

Chocolate Maths: NRich: <https://nrich.maths.org/793>

A mathamagic trick involving chocolate!

Pulled from my old files:

Discrepant Event: Area lost or gained: Infinite Chocolate Problem:

How would you like to have a way to have your chocolate bar and eat it too!? I have included an activity sheet that I have used with my own students as well as a nice video with no words – that can be used as a make meaning prompt with the activity sheet as a kinesthetic follow-up.

<https://www.youtube.com/watch?v=ltqHJTY8Fhk>

Interesting Facts about Chocolate: Use these any way you wish.

Where's the math? Use these as the beginning of a math discussion.

What questions come to mind? Present the statement/fact and ask students what questions does it make them think of or what questions might need to be answered to fully understand/validate the fact.

Convert that! In the facts with units, give the students just one of the units (for example: The World's Largest Chocolate Bar Weighed 5,792 kg) and have the students estimate how much that is in another unit (in this case pounds) and then have them perform the conversion.

Have fun and enjoy Chocolate Day!



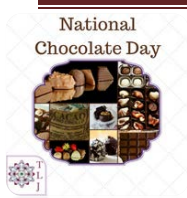


Interesting Facts About Chocolate

- ❖ It takes approximately 400 cacao beans to make one pound (450 gr.) of chocolate.
<http://facts.randomhistory.com/chocolate-facts.html>
- ❖ The World's Largest Chocolate Bar Weighed 5,792 kg (12,770 lb).
<http://www.guinnessworldrecords.com/world-records/largest-chocolate-bar>
- ❖ Eating dark chocolate every day reduces the risk of heart disease by one-third.
<http://www.livescience.com/15827-chocolate-heart-disease-stroke.html>
- ❖ The average chocolate bar contains 8 insect parts.
<http://abcnews.go.com/blogs/lifestyle/2012/03/bugging-out-chocolate-allergy-linked-to-roaches/>
- ❖ 100 pounds of chocolate are eaten in the U.S. every second. During your lifetime, you'll eat about 60,000 pounds!
http://www.huffingtonpost.com/2015/04/07/chocolate-random-facts_n_7012584.html
- ❖ Scientists can reduce the fat in chocolate by 20% by passing it through an electric field.
<http://www.latimes.com/science/sciencenow/la-sci-sn-chocolate-electric-beam-20160620-snap-story.html>
- ❖ Reports predict that the global chocolate market will grow to \$98.3 billion in 2016 from \$83.2 billion in 2010.
<http://www.candyindustry.com/articles/83849-global-chocolate-market-worth-98-3-billion-by-2016>
- ❖ Cacao trees can live to be 200 years old, but they produce marketable cocoa beans for only 25 years.
Off, Carol. 2006. *Bitter Chocolate: The Dark Side of the World's Most Seductive Sweet*. New York, NY: The New Press.
- ❖ Nearly all cacao trees grow within 20 degrees of the equator, and 75% grow within 8 degrees of either side of it. Cacao trees grow in three main regions: West Africa, South and Central America, and Southeast Asia/Oceania.
Off, Carol. 2006. *Bitter Chocolate: The Dark Side of the World's Most Seductive Sweet*. New York, NY: The New Press.
- ❖ Each cacao tree can produce approximately 2,500 beans. It takes a cacao tree four to five years to produce its first beans.
Stanes, Sara Jayne. 2005. *Chocolate: Discovering, Exploring, Enjoying*. New York, NY: Ryland Peters & Small
- ❖ U.S. chocolate manufacturers use about 3.5 million pounds of whole milk every day to make milk chocolate.

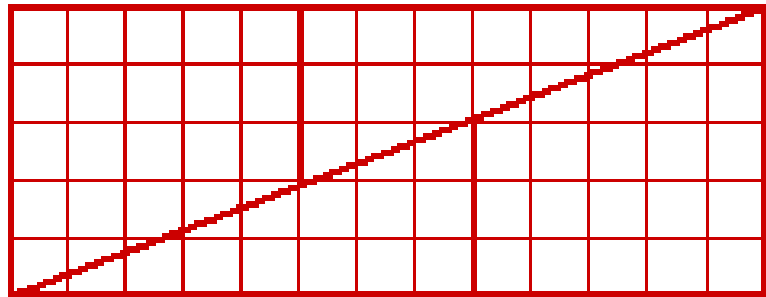
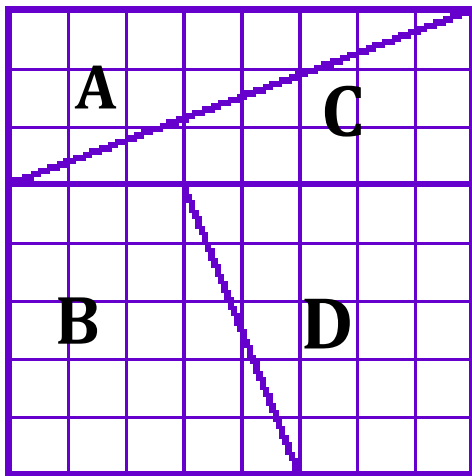


- <http://www.candyusa.com/story-of-chocolate/>
- ❖ Approximately 70% of the nearly \$500 million spent on candy during the week leading up to Easter is for chocolate.
<http://www.marketingcharts.com/traditional/easter-beats-valentines-day-for-chocolate-candy-lovers-8596/>
 - ❖ Approximately 71 million pounds of chocolate candy is sold during the week leading up to Easter. Only 48 million pounds of chocolate is sold during Valentine's week. In contrast, over 90 million pounds of chocolate candy is sold in the last week of October leading up to Halloween.
<http://www.marketingcharts.com/traditional/easter-beats-valentines-day-for-chocolate-candy-lovers-8596/>
 - ❖ Research suggests that dark chocolate boosts memory, attention span, reaction time, and problem-solving skills by increasing blood flow to the brain. Studies have also found that dark chocolate can improve the ability to see in low-contrast situations (such as poor weather) and promote lower blood pressure, which has positive effects on cholesterol levels, platelet function, and insulin sensitivity.
<http://www.cnn.com/2006/HEALTH/12/20/health.chocolate/>
 - ❖ The country whose people eat the most chocolate is Switzerland, with 22 pounds eaten per person each year. Australia and Ireland follow with 20 pounds and 19 pounds per person, respectively. The United States comes in at 11th place, with approximately 12 pounds of chocolate eaten by each person every year.
<http://www.candyusa.com/story-of-chocolate/>
 - ❖ In 2002, Marshall Field's in Chicago made the largest box of chocolate. It had 90,090 Frango mint chocolates and weighed a whopping 3,326 pounds.
<http://diaryofamadinvalid.blogspot.com/2016/10/facts-about-chocolate.html>

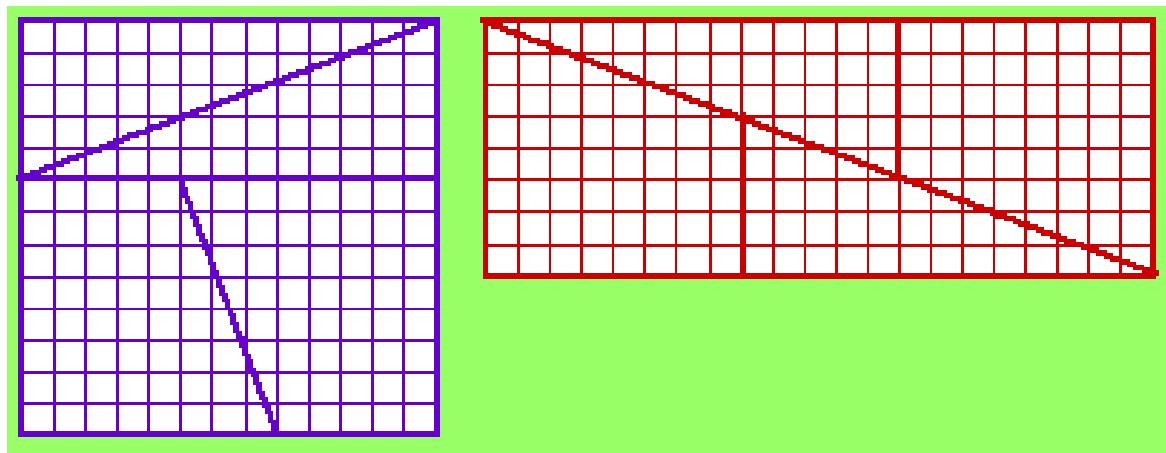


AREA LOST OR GAINED?⁵

In the following diagram, the pieces A through D on the left are arranged into an 8x8 square with an area of 64 square inches. On the right, the same pieces are arranged into a 5x13 rectangle of area 65 square inches. So where did the extra square inch come from?



Cut these out and try it for yourself. What if you had a 13 X 13?





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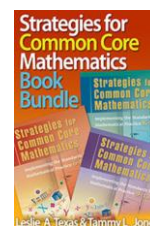
Help your students develop logical reasoning and critical thinking skills. The strategies in this book have been implemented in hundreds of classrooms around the country, and have been proven to increase student engagement, promote higher-order thinking and in-depth reasoning, and improve overall achievement.



Q Pyramids & Overlay: Tools for Effective Questioning

A powerful set of tools – the Q-Pyramid and Overlay, connect the four opportunities for questioning to the LRP Graphic Organizer. Students and teachers can use the Q-Pyramid to support moving the learning and the learner forward wherever they engage in the Logical Reasoning Process. The Q-Pyramid is arranged with the LRP Graphic Organizer serving as the base of the pyramid while the faces correspond to the appropriate opportunities for questioning. The general set of questions for each of the four opportunities that exist within the work of the task are included on each face.

Math teachers, curriculum coordinators, and district math supervisors get practical ideas on how to engage students in mathematical practices, develop problem-solving skills, and promote higher-order thinking. Learn how to scaffold activities across grades and get strategies you can implement immediately in your classroom.



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