

WAMC Lab

Math Concept(s): Ratios and Proportions

Source / Text: CORD Algebra I (Vol. 1, Chapter 2)

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Short Description (Be sure to include where in your instruction this lab takes place):

This is a ratios and proportions lab that uses newspaper page design, more specifically photo resizing, to reinforce the main principles of ratios and proportions.

Lab Plan

Lab Title: Pages (and Math)

Prerequisite skills: Ability to use a ruler, work through CORD Algebra I (Vol. 1, Ch. 2).

Lab objective: Reinforce principles of ratios and proportions, plus highlight an industry that at first glance wouldn't be associated with math.

Standards: (Note SPECIFIC relationship to Science, Technology, and/or Engineering)

Mathematics K–12 Learning Standards:

- A-APR 1 - Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
- A-CED 1 - Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

Standards for Mathematical Practice:

- 1. Making sense of problems and persevere in solving them;
- 6. Attend to precision;
- 7. Look for and make use of structure.

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

- [CCSS.ELA-Literacy.RST.11-12.3](#)
Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

K-12 Science/Engineering Standards

- [HS-ETS1-2 Engineering Design](#)
Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Technology

- HS-T5.b – Students collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)

- Global Awareness Financial/Economic/Business/Entrepreneurial Literacy Civic Literacy
 Health/Safety Literacy Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION

Creativity and Innovation

- Think Creatively
 Work Creatively with Others
 Implement Innovations

Critical Thinking and Problem Solving

- Reason Effectively
 Use Systems Thinking
 Make Judgments and Decisions
 Solve Problems

Communication and Collaboration

- Communicate Clearly
 Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS

Information Literacy

- Access and Evaluate Information
 Use and manage Information

Media Literacy

- Analyze Media
 Create Media Products

Information, Communications and

Technology (ICT Literacy)

- Apply Technology Effectively

LIFE & CAREER SKILLS

Flexibility and Adaptability

- Adapt to Change
 Be Flexible

Initiative and Self-Direction

- Manage Goals and Time
 Work Independently
 Be Self-Directed Learners

Social and Cross-Cultural

- Interact Effectively with Others
 Work Effectively in Diverse Teams

Productivity and Accountability

- Manage Projects
 Produce Results

Leadership and

- Responsibility
 Guide and Lead Others

- Be Responsible to Others

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Pages (And Math)

This is a lab that will show students that math is present even in industries and jobs you don't expect to see math (algebraic expressions).

Materials

- Pens (Blue and Red)
- Paper
- Several editions of newspapers
- Ruler (a pica pole/ruler is preferred, but a standard ruler will do)
- Calculator (allowed, but give credit to those who work out the problems by hand)

This will be a classroom lab. Make sure all of the students have the materials available at hand. The photos on the pages will be different sizes, which will allow you to expand or contract the photos as you see fit. Select newspaper pages that have at least two photos (the front page or a section front are the best bets).

First, talk about proportions and ratios (CORD Algebra I, Vol. 1, Chapter 2) with the students again. Make sure they know that they will be using these formulas and properties to execute this lab.

Second, do a sample page for them. Expand a photo and contract a photo to show the students how it is done. You measure the photo's length and height by inches. Then, show the student how it relates to the columns (the width of text) on the page. Expand or contract the photo. Relative to the columns, you will know the length of the new photo, so you will have to find the height of the photo.

Thus: $4.25:6 = 6.5:x$ (Length:Height = New Length:New Height). (Answer is $4.25:6 = 6.5:9.18$)

Then, have the students pick a photo on their page and expand it. Make sure they are measuring the photo correctly and have the right proportional and ratio down to solve the problem. They should be putting their answers down, along with a note on what photo they sized, on a separate piece of paper to turn in to you at the end.

Since each student will have a unique page, the students won't be able to cheat for their answers. However, students can help each other out to get the answers.

After a bit of time, stop the students and go over one of their pages. You will have an idea of whether they have picked up the concept here.

Once the students are on track, you can start to throw some curves and twists into the lab. Have the students find the length of the photos by adding 3-5 inches of height to the photo or introduce journalistic typography units – picas and points – for them to convert and use.

Point of reference: 6 picas = 1 inch / 72 points = 1 inch (Picas are a widely used measuring unit for paginators. Points are usually used for the size of type, especially in headlines.)

You can have the students convert the size of the photos (or text boxes or column width) from inches to picas/points and vice versa. This uses the same proportions and ratio formulas as expanding/contrast photos.

At the end, collect their work and talk about what they learned. The work they turn in should contain several propositional problems and solutions for summative assessment and can be their exit ticket (formative assessment) at the end of class.

Formative assessment: Exit ticket (their work turned in), walk around class to see if the students are measuring the photos correctly and have the proportional ratio down.

Summative assessment: The work turned in, an additional question or two on an end-of-chapter test related to the lab.

Question: You are in charge of redesigning a section front for the student newspaper. You have two photos: a 3 col x 8 inch and a 2 col by 5 inch to resize. The 2-column photo needs to be 4 columns and the 3-column photo needs to be a 2-column photo. You are working on a page with 2-inch columns.

What are the proportional ratios for these photos and their new sizes? (Extra credit if the work is done by hand and using picas/points.)

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Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

- Manage Goals and Time/Work Independently/Be Self-Directed Learners (This is primarily a solo lab, so students should be able to work on this without additional prompting after the initial instructions).
- Critical Thinking and Productivity/Accountability will also be applied.

Cooperative Learning:

- This is primarily a solo lab, but students can help each other, if needed. Peer-to-peer instruction is a long-term goal that this lab can facilitate.

Timeline:

- One class period (45-50 minutes).

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Page design/paginator skills discussed, plus a discussion of math in non-math settings.

Career Applications

- Journalism in-office skills: Paginator/photographer/editor

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