[GeoGebra - Fraction Division 1](#)
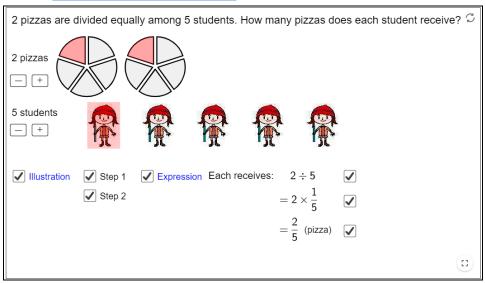
Tech Tool Evaluation

Name & Link to Tech Tool: [GeoGebra - Fraction Division 1](#)

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Brief Description: This tech tool models *a ÷ b* division. The dividend is represented as pizzas and the divisor is represented as students. Users can choose between having one to six pizzas and one to six students. The dividend and divisor are then shown as a word problem and as visuals. The applet guides users through solving the division problem as an illustration and as an expression.

Technical & Cost considerations: This applet is free to use. It works on computers and mobile devices. It can be projected onto a SmartBoard for class instruction.

Tags:
Math Domain
- Number & Operations

Grade Level
- 3-5

Tool/Resource Type
- TECH TOOL-Math Specific

Evaluation

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1. What mathematics is being learned?

Standards

Common Core standards

- CCSS.MATH.CONTENT.5.NF.B.3: Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

- CCSS.MATH.PRACTICE.MP2: Reason abstractly and quantitatively.

- - This applet guides users through decontextualizing an *a* ÷ *b* division word problem into pizza and student symbols. Then, they need to put the problem back into context for the quotient. The quotient also needs to be the appropriate unit of pizzas, not students.
- CCSS.MATH.PRACTICE.MP4: Model with mathematics.
  - This applet models a common real world situation where food needs to be divided equally among people. In addition, pizzas provide clear circle models.
- CCSS.MATH.PRACTICE.MP6 Attend to precision.
  - Students need to distinguish between what represents pizzas and what represents students. The pizzas (dividend) are being divided among students (divisor). In writing the answer, students need to understand that the unit is pizza(s).
- CCSS.MATH.PRACTICE.MP7 Look for and make use of structure.
  - This applet visualizes the concept that $\frac{a}{b}$ = *a* ÷ *b*. This is an important pattern for students to recognize in order to support their understanding of fraction division. Furthermore, the guided steps show why Keep Change Flip works for fraction division.

<u>NCTM standards</u>
- NCTM Connections
  - With this tech tool, students build connections between division, fractions, and the Keep Change Flip algorithm.

Proficiency Strands

- **Conceptual Understanding** - This applet guides students through the problem solving steps of *a* ÷ *b* division. Students view side-by-side how to solve the problem as an illustration and as an expression. This helps show the connection between the mathematics and the representation.
- **Adaptive Reasoning** - This applet provides opportunities for students to discuss the relationship between division, fractions, and the Keep Change Flip algorithm.

Additional comments on what is being learned:

This tech tool walks students through each step and does the math automatically. As a result, this tech tool can serve as a good introduction to fraction division. Teachers can supplement this tech tool with guiding questions that help students explicitly see the connection between division, fractions, and the Keep Change Flip algorithm.

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2. How is the mathematics represented?

The mathematics is represented symbolically, numerically, and as a virtual manipulative. An expression such as 5 ÷ 4 is represented symbolically as five pizzas divided equally among four students. Students interact with the applet to see each problem solving step. They can see the steps solved through illustrations and expressions. With the expressions, students see the mathematical algorithm steps. The technology allows for students to seamlessly change the dividend and divisor to create new problems. One aspect to consider, however, is that when there is a problem such as 5 ÷ 4, the applet walks through dividing all five pizzas into fourths. Another way to solve this problem is to realize that since there are more pizzas than students, each student will receive one whole pizza. From there, the next step would be to divide the remaining pizza into fourths. This leads to the same quotient of each student receiving 1¼ pizzas. Depending on the lesson's objectives, a teacher might need to supplement this applet with their own visual of the other way to solve when the dividend is larger than the divisor.

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3. What role does technology play?

The technology provides a quick way for students to visualize *a* ÷ *b* division. Students can choose between one to six pizzas and one to six students. They can select to see the problem solving steps as an illustration and as an expression. The technology allows for precise sections and color coding - the circle's sections are clear, equal, and color coded according to the given problem. While the applet has a maximum amount (six) of pizzas and students, I believe that the applet's purpose is to help introduce students to *a* ÷ *b* division. Even if a student needs to solve a problem such as 15 ÷

7, the applet helps them know how to visualize and solve a simpler problem in order to solve a problem with a larger dividend and divisor. A potential disadvantage of the technology is that students can aimlessly click through the problem solving steps, since they do not need to solve anything themselves. To prevent this, a teacher should provide specific instructions and discussion questions to productively engage students with the tech tool.

Affordances of Technology for Supporting Learning

- **Computing & Automating -** This applet guides students through solving $a \div b$ division problems. Students do not need to solve any problems themselves. They click on each step to view the problem solving procedure.
- **Representing Ideas & Thinking -** This applet represents $a \div b$ division as a pizzas being equally divided among b students. It connects division to fractions and Keep Change Flip.

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4. How does the technology fit or interact with the social context of learning?

This applet can be used for whole class instruction, group work, and individual work. It is a tool for students to visualize $a \div b$ division. Discussion questions are provided for students to collaborate on. The checklist for each step provides an opportunity for discussion during the problem solving.

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5. Additional Comments

This tech tool best works as a visual reminder on how $a \div b$ division works. Since there is a maximum setting of six pizzas and six students, users see limited problems. Nonetheless, this tech tool helps build conceptual understanding of $a \div b$ division and how it relates to fractions and Keep Change Flip. GeoGebra has a similar [tech tool] available for $p/q \div b$ division (e.g. 4½ ÷ 3).