Fraction Fun
ID: 13434

Time required
45 minutes

Activity Overview
In this activity, students will explore patterns with fractions. The TI-73 Explorer will be used to facilitate the computations so students can concentrate on patterning.

Topic: Algebra
- *Finding patterns and expressing algebraically*
- *Estimating*
- *Making conjectures*

Teacher Preparation and Notes
- *Students should have previous experience with basic fraction addition and subtraction.*
- *TI-Navigator is not required for this activity, but an extension is given for those teachers that would like to use it.*
- ***To download the student worksheet and TI-Navigator files, go to education.ti.com/exchange and enter "13434" in the quick search box.***

Associated Materials
- *MGAct09_FractionFun_worksheet_TI73.doc*
- *MGAct09_FractionFun_Nav_01_TI73.act*
- *MGAct09_FractionFun_Nav_02_TI73.act*

Suggested Related Activities
To download the activity listed, go to education.ti.com/exchange and enter the number in the quick search box.
- *Skip Counting (TI-73 Explorer) — 4484*
- *Visual Fraction Exploration (TI-73 Explorer & TI-Navigator) — 8652*
- *Fraction Decimal Challenge (TI-73 Explorer) — 6681*
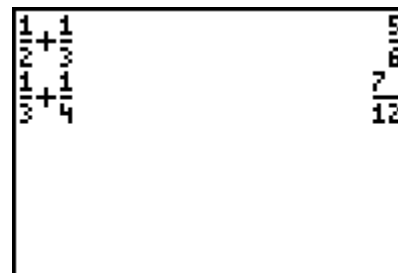
Problem 1 – Addition Patterns

In this problem, students will look at addition of fractions with denominators separated by one digit. Each fraction will have a numerator of 1. Then, students will look at patterns created when subtracting fractions that do not have consecutive denominators.

Questions 1–3

In Question 1, have students enter the addition problems

on the TI-73 to look for a pattern. To enter $\dfrac{1}{2} + \dfrac{1}{3}$ press

⒈ ⓑ⁄꜀ ⒉ ▸ ⊞ ⒈ ⓑ⁄꜀ ⒊ ⒠ɴᴛᴇʀ. Repeat with the same general key presses for each addition problem.

Students should notice that the numerator is the denominators in the problem added together and the new denominator is the product of the two original denominators.
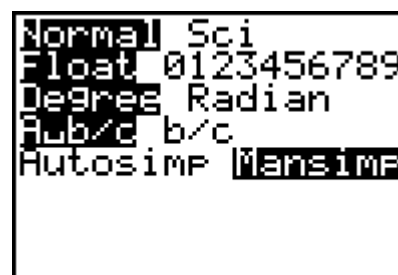
Questions 4–5

Students should create a table to keep track of the exploration done in this question. This will help them make a conjecture and see if a pattern exists. A student's table might look as follows.

Addition Problem	Prediction	Actual Result
$\dfrac{1}{2} + \dfrac{1}{4}$	$\dfrac{6}{8}$	$\dfrac{3}{4}$
$\dfrac{1}{3} + \dfrac{1}{5}$	$\dfrac{8}{15}$	$\dfrac{8}{15}$

If you would like, students can also change the MODE of the TI-73 to not automatically simplify. To do this, press ᴍᴏᴅᴇ and then use ▾ and ▸ to move to **Mansip** and press ᴇɴᴛᴇʀ. This will change the mode to Manual Simplification and will not reduce fractions to simplest form automatically. (A down arrow will appear to the right of the answer, indicating that it can be further simplified.)
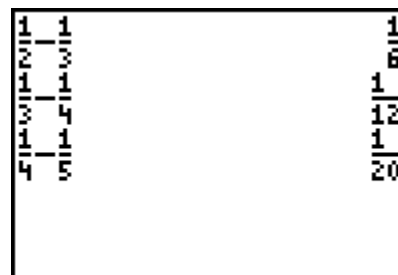
The problems that do not follow their expected pattern will be the fractions that were simplified by the TI-73 automatically.

Problem 2 – Subtraction Patterns

<u>Questions 6–7</u>

In Question 6, have students enter the subtraction problems on the TI-73 to look for a pattern. To enter $\frac{1}{2} - \frac{1}{3}$ press ⑴ Ⓑⁿᵉ ⑵ ▶ ⊟ ⑴ Ⓑⁿᵉ ⑶ [ENTER]. Repeat for each subtraction problem.

Students should notice that the numerator is a 1 and the new denominator is the product of the two original denominators.

<u>Question 8–9</u>

In Question 8, have students enter the subtraction problems on the TI-73 to look for a pattern. Repeat for each subtraction problem.

Students should notice a pattern. The new numerator is the difference in the numerators and the new denominator is the product of the two original denominators.

Extension

Have students look at multiplication and division patterns. What does division by fractions mean?

Change the fractions so that they share common denominators. Then divide the numerators. How does that answer compare to the calculator answer? Can you think why they are the same?

Extension – TI-Navigator™

1. For Questions 1 and 6, use the activity settings file
    MGAct09_FractionFun_Nav01_TI73.act to allow students to show the result they get for each addition and subtraction problem. The number line goes from 0 to 1 with steps of $\frac{1}{12}$.

    As students work different addition and subtraction problems, you may need to adjust the beginning and end of the number line and the step and tick mark settings below the number line.

2. For Question 4, use the activity setting file ***MGAct09_FractionFun_Nav02_TI73.act***. The activity is set up to allow students to input two lists, one element for the prediction and the other list for the actual result from the calculator screen. This will allow students to see their problems as well as other students' results to make predictions with more data.

3. Use **Screen Capture** or **Quick Poll** to monitor student progress and understanding throughout the lesson.

Solutions – student worksheet

Problem 1

1. Yes, students should see a pattern. Accept any description of pattern that fits the problem.

2. Students should see that the new numeraotr is the sum of the original denominators and the new denominator is the product of the original denominators.

3. $\dfrac{1}{a} + \dfrac{1}{a+1} = \dfrac{a+(a+1)}{a(a+1)}$

4.

Addition Problem	Prediction	Actual Result
$\dfrac{1}{2} + \dfrac{1}{4}$	$\dfrac{6}{8}$	$\dfrac{3}{4}$
$\dfrac{1}{3} + \dfrac{1}{5}$	$\dfrac{8}{15}$	$\dfrac{8}{15}$
Answers will vary based on problems created by students.	Predictions should follow algebraic pattern shown in Question 3.	

5. Problems that do not follow the pattern at those that have been simplified by the calculator automatically.

Problem 2

6. Yes, students should see a pattern. Accept any description of pattern that fits the problem. Students should see that the new numeraotr is 1 and the new denominator is the product of the original denominators.

7. $\dfrac{1}{a} - \dfrac{1}{a+1} = \dfrac{1}{a(a+1)}$

8. Students should see that the new numeraotr is the difference of the original denominators and the new denominator is the product of the original denominators. $\dfrac{1}{a} - \dfrac{1}{b} = \dfrac{b-a}{a \cdot b}$

9. Check students' answers.