Lesson
# 3-6A
Action Fractions
Math+CT

# Comparing Fractions: Slicing Sandwiches

**Math Connections:** Students compare fractions with the same denominator.
**CS Connections:** Students edit scripts to show and compare pairs of fractions. They use variables to represent numerators of fractions and work with conditionals to compare fractions.

**Computational Thinking**
- **REPETITION:** Computers use repeat commands.
- **CONDITIONALS:** Sometimes multiple conditions must be considered.
- **VARIABLES:** It can be helpful to use variables within programs.

## 1 Warm Up 5 min

| | Materials |
|---|---|
| **"I Can ..." Statements**<br>Students read the explicit math and CS goals. | |

## 2 Focus 35–40 min

| | | |
|---|---|---|
| **Math Message**<br>Students compare fractional shares of sandwiches. | | 4.NF.2 |
| **Slicing Sandwiches**<br>Students discuss their strategies for comparing the fractions in the Math Message. | | |
| **Slicing Sandwiches TIPP&SEE**<br>Students examine the use of parameters and Repeat blocks in the project. | *Comparing Fractions: Slicing Sandwiches* project; *Slicing Sandwiches TIPP&SEE* journal pages | |
| **Programming Fraction Comparisons**<br>Students build scripts to show fraction comparisons. | *Same Denominators: Slicing Sandwiches* journal pages | |

## "I Can ..." statements

- *I can compare fractions with like denominators.*
- *I can change the number in a repeat block.*
- *I can use operator blocks to show my understanding of inequalities.*

## Anticipated Barriers

- Students may struggle with multi-step problem solving.
- Some students may struggle with inequality symbols.

## Student Options

Consider these options for adapting the lesson to your students' preferences:

- Consider scaffolded graphic organizers to use alongside the number stories.
- Review comparison symbols as needed.

*"I Can ..." statements*

- *I can compare fractions with like denominators.*
- *I can change the number in a repeat block.*
- *I can use operator blocks to show my understanding of inequalities.*

# 1 Warm Up 5 min

## I Can ...

Display the "I Can ..." statements and remind students that these statements express the goals for today's lesson and can give them clues about what to expect. Carefully read each statement and ask them to use their thumbs to show how true they feel each statement is for them right now.

# 2 Focus 35–40 min

## Math Message

*Jen and Micah each have a sub sandwich. Both sandwiches are the same size. Jen cuts her sandwich into 5 equal pieces and eats 2 pieces. Micah cuts his sandwich into 5 equal pieces and eats 3 pieces. What fraction of their sandwich did each friend eat?* Jen: $\frac{2}{5}$; Micah: $\frac{3}{5}$ *Who ate more of their sandwich?* Micah *Draw a picture to show how you know.*

## Slicing Sandwiches

WHOLE CLASS | SMALL GROUP | PARTNER | INDEPENDENT

**Math Message Follow-Up** Once most of the students have completed the Math Message, ask volunteers to share their drawings. Expect students' drawings to look similar to what is shown below.

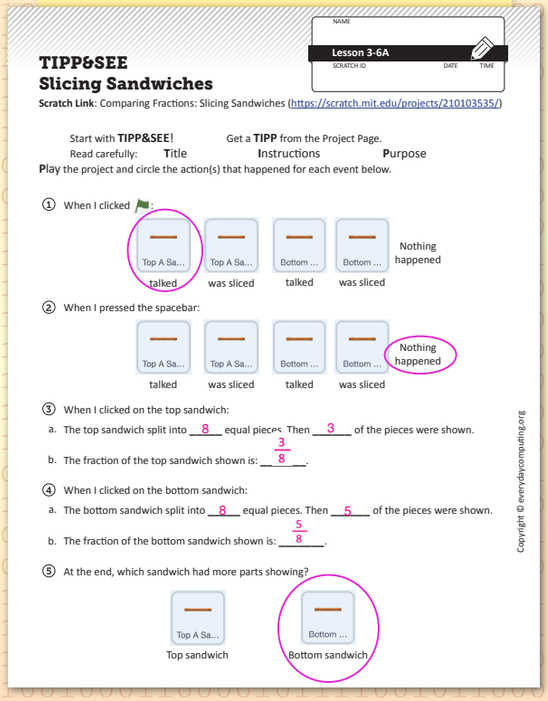
Jen's sandwich

Micah's sandwich

Ask:

- *What fraction of her sandwich did Jen eat?* $\frac{2}{5}$
- *What fraction of his sandwich did Micah eat?* $\frac{3}{5}$
- *What does the denominator of each fraction represent?* the number of equal pieces each friend cut their sandwich into
- *What does the numerator of each fraction represent?* the number of equal pieces each friend ate
- *Who ate more of their sandwich? How do you know?* Micah. Sample explanations: In my picture, Micah's sandwich has more shading. I know that when the pieces of each sandwich are the same size, the person who eats more pieces eats more of their sandwich.
- *Was it helpful to figure out that the fractions in this problem had the same denominator? Why?* Sample answer: Yes, because that means to compare the fractions I can focus on the numerator.

*Slicing Sandwiches TIPP&SEE* p. 1



**TIPP&SEE**
**Slicing Sandwiches**

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**Scratch Link**: Comparing Fractions: Slicing Sandwiches (https://scratch.mit.edu/projects/210103535/)

Start with **TIPP&SEE**! Get a **TIPP** from the Project Page.
Read carefully: **T**itle **I**nstructions **P**urpose
**P**lay the project and circle the action(s) that happened for each event below.

① When I clicked:
Top A Sa... talked | Top A Sa... was sliced | Bottom ... talked | Bottom ... was sliced | Nothing happened

② When I pressed the spacebar:
Top A Sa... talked | Top A Sa... was sliced | Bottom ... talked | Bottom ... was sliced | Nothing happened

③ When I clicked on the top sandwich:
a. The top sandwich split into 8 equal pieces. Then 3 of the pieces were shown.
b. The fraction of the top sandwich shown is: $\frac{3}{8}$.

④ When I clicked on the bottom sandwich:
a. The bottom sandwich split into 8 equal pieces. Then 5 of the pieces were shown.
b. The fraction of the bottom sandwich shown is: $\frac{5}{8}$.

⑤ At the end, which sandwich had more parts showing?
Top A Sa... Top sandwich | Bottom ... Bottom sandwich

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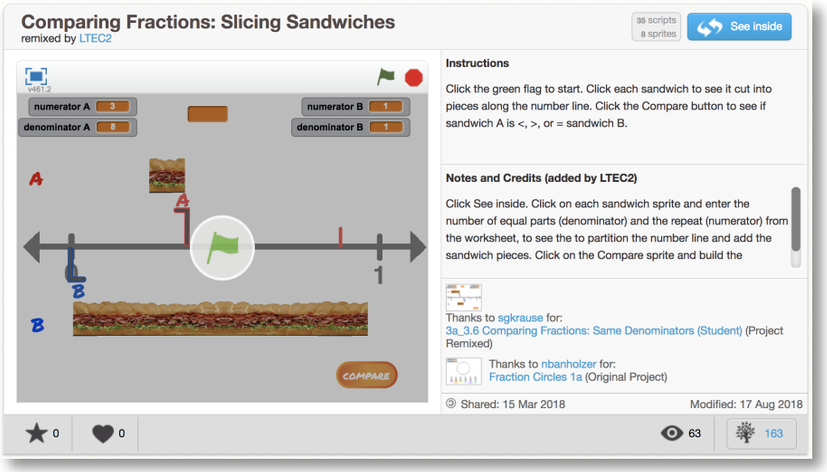
Ask a volunteer to help you write a number sentence that represents the number story. $\frac{2}{5} < \frac{3}{5}$

Tell students that today they will use Scratch to help them compare more fractions that have the same denominator. They will figure out rules that the computer can use to compare these fractions.

## Slicing Sandwiches *TIPP&SEE*

WHOLE CLASS | SMALL GROUP | **PARTNER** | **INDEPENDENT**

Distribute the Slicing Sandwiches TIPP&SEE journal pages. Have students open the Comparing Fractions: Slicing Sandwiches student project. (https://scratch.mit.edu/projects/210103535/)




Students should work independently to complete the pages, but discuss their answers with a partner or neighbor. Once students have completed the pages, go over the answers. Make sure students understand which block determines the size of the pieces and which determines the number of pieces, and how the numbers in these blocks relate to the numerator and denominator of the fraction they are representing.

Be sure to have a brief discussion about the Repeat block in the project. Ask: *How else could we tell the computer to show (for example) three pieces of the sandwich?* Take out the Repeat block and just include three Add piece A blocks. *Why might it be useful for us to use a Repeat block when we want to show lots of different fractions?* Sample answer: It is easier to just change the number in the Repeat block than to add and delete blocks every time the numerator changes.

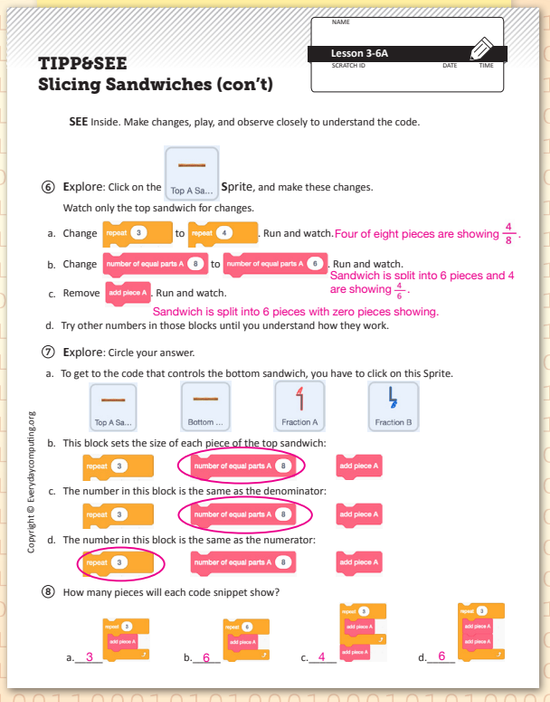
## Programming Fraction Comparisons

WHOLE CLASS | SMALL GROUP | **PARTNER** | **INDEPENDENT**

Distribute the Same Denominators: Slicing Sandwiches journal pages and have students complete page 1 alone or with a partner. When they are finished, have them copy their answers to Problems 1–4 on page 1 to the table in Problem 5 on page 2.

Have students look at the bottom of page 2 of the Same Denominators: Slicing Sandwiches student pages. Ask: *What are the orange pieces labeled Numerator A and Numerator B?* Variable blocks Ask a volunteer to remind

*Slicing Sandwiches TIPP&SEE* p. 2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**TIPP&SEE**
**Slicing Sandwiches (con't)**

**SEE** Inside. Make changes, play, and observe closely to understand the code.

⑥ **Explore:** Click on the Top A Sa... **Sprite**, and make these changes.
Watch only the top sandwich for changes.
a. Change repeat 3 to repeat 4. Run and watch. Four of eight pieces are showing $\frac{4}{8}$.
b. Change number of equal parts A 8 to number of equal parts A 6. Run and watch. Sandwich is split into 6 pieces and 4 are showing $\frac{4}{6}$.
c. Remove add piece A. Run and watch. Sandwich is split into 6 pieces with zero pieces showing.
d. Try other numbers in those blocks until you understand how they work.

⑦ **Explore:** Circle your answer.
a. To get to the code that controls the bottom sandwich, you have to click on this Sprite.
Top A Sa... Bottom ... Fraction A Fraction B
b. This block sets the size of each piece of the top sandwich:
c. The number in this block is the same as the denominator:
d. The number in this block is the same as the numerator:

⑧ How many pieces will each code snippet show?
a. 3 b. 6 c. 4 d. 6

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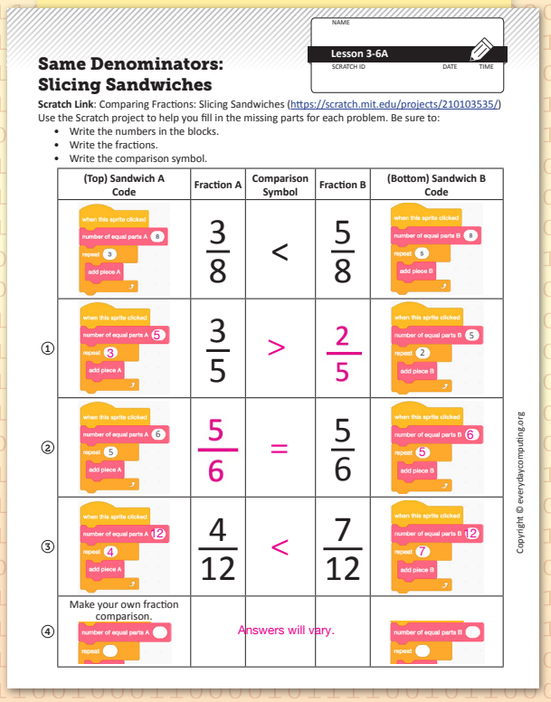
*Same Denominators: Slicing Sandwiches* p. 1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**Same Denominators: Slicing Sandwiches**

**Scratch Link**: Comparing Fractions: Slicing Sandwiches (https://scratch.mit.edu/projects/210103535/)
Use the Scratch project to help you fill in the missing parts for each problem. Be sure to:
- Write the numbers in the blocks.
- Write the fractions.
- Write the comparison symbol.

| | (Top) Sandwich A Code | Fraction A | Comparison Symbol | Fraction B | (Bottom) Sandwich B Code |
|---|---|---|---|---|---|
| | when this sprite clicked, number of equal parts A 8, repeat 3, add piece A | $\frac{3}{8}$ | < | $\frac{5}{8}$ | when this sprite clicked, number of equal parts B 8, repeat 5, add piece B |
| ① | when this sprite clicked, number of equal parts A 5, repeat 3, add piece A | $\frac{3}{5}$ | > | $\frac{2}{5}$ | when this sprite clicked, number of equal parts B 5, repeat 2, add piece B |
| ② | when this sprite clicked, number of equal parts A 6, repeat 5, add piece A | $\frac{5}{6}$ | = | $\frac{5}{6}$ | when this sprite clicked, number of equal parts B 6, repeat 5, add piece B |
| ③ | when this sprite clicked, number of equal parts A 12, repeat 4, add piece A | $\frac{4}{12}$ | < | $\frac{7}{12}$ | when this sprite clicked, number of equal parts B 12, repeat 7, add piece B |
| ④ | Make your own fraction comparison. number of equal parts A, repeat | Answers will vary. | | | number of equal parts B, repeat |

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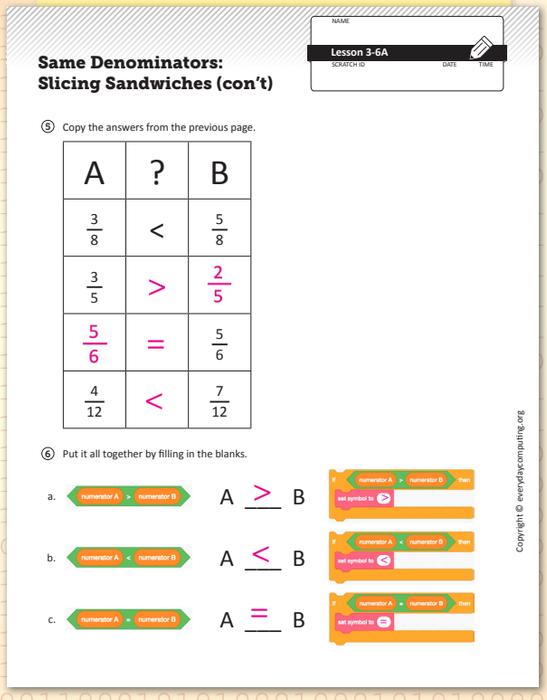
*Same Denominators: Slicing Sandwiches* p. 2



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**Same Denominators: Slicing Sandwiches (con't)**

⑤ Copy the answers from the previous page.

| A | ? | B |
|---|---|---|
| $\frac{3}{8}$ | < | $\frac{5}{8}$ |
| $\frac{3}{5}$ | > | $\frac{2}{5}$ |
| $\frac{5}{6}$ | = | $\frac{5}{6}$ |
| $\frac{4}{12}$ | < | $\frac{7}{12}$ |

⑥ Put it all together by filling in the blanks.

a. numerator A > numerator B — A ___ B

b. numerator A < numerator B — A ___ B

c. numerator A = numerator B — A ___ B



the class what a variable is. As needed, remind students that variables are used in computer programs as placeholders. They hold values that are assigned to them by the computer. They can only hold one value at a time but the values can be changed. Ask: *What values do you think these variables will hold when you run your program?* The numerators of the two fractions shown by the sandwiches.

Next, ask: *What are the yellow blocks you see on the right side of the table?* Conditionals Ask a volunteer to remind the class what a conditional is. Sample answer: A conditional is a statement that uses if-then. It has a condition to check and an action to do and connects them. Review that conditionals have two parts: A condition that comes after if, and an action that comes after then.

**If** (a statement that can be true or false),

**then** (an action that occurs if the statement is true).

Remind them of the example: *If it is cold outside, then I put on my jacket.* Ask students to share an example of a conditional with a partner, then have a few students share their examples with the class.

Draw students' attention to the conditions in the conditional blocks on the page. Ask:

- *What is the condition in the first conditional block?* Numerator A > numerator B
- *What does that condition mean?* It means the numerator for the fraction of Sandwich A that is shown is bigger than the numerator of the fraction of Sandwich B that is shown.
- *Was that condition true for any of the examples you did on page 1?* Yes
- *Which comparison symbol did you use when the condition was true?* >
- *Was that condition true for all the examples you did?* No

Point out that attaching an action to this condition will tell the computer what to do if numerator A is bigger than numerator B, but it won't tell the computer what to do if this isn't true. Students have to use more than one conditional so that the computer will know what to do for all the examples on their journal page.

Have students work with a partner to use the table they completed in Problem 4 to complete Problem 5. Then direct them to the Compare sprite in the Scratch project. Have them click on the sprite and use their completed journal pages to complete the script. When they are finished, have them run the program. They can click on the compare button to see the symbol set to <, >, or =. Have them edit the code for the two sandwich sprites to try out examples where fraction A is greater than, less than, and equal to fraction B to test out their code for the compare sprite.

## Wrap Up

WHOLE CLASS | SMALL GROUP | PARTNER | INDEPENDENT

When students have had sufficient time to work, bring them together for a whole class discussion. Ask students to Remix, Rename, Save, and Share their projects.

Suggested questions:

- *How were variables used in the Scratch project today?* To represent the numerators; to represent the number of sandwich pieces
- *How did using conditionals help us program the computer to compare fractions?* The conditionals helped us tell the computer which symbol to use for which examples.
- *What did the repeat block do on the sandwich sprites?* It showed the sandwich pieces, one by one
- *Did your project do anything you were not expecting it to do?* Answers vary.
- *What were some things that were difficult or confusing?* Answers vary.

**Now "I Can ..."** Review today's "I Can ..." statements and ask students to use their thumbs to show their opinion of each statement.

*"I Can ..." statements*

- *I can compare fractions with like denominators.*
- *I can change the number in a repeat block.*
- *I can use operator blocks to show my understanding of inequalities.*