

# **My Fraction Number Story**

Math Connections: Children write and solve a number story about fractions. CS Connections: Children create an animation in Scratch to illustrate their number story, using blocks they have learned about across the year.

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### **Computational Thinking**

- SEQUENCE: Precision and completeness are important when writing instructions in advance.
- **DECOMPOSITION:** Problem decomposition is a useful early step in problem solving.

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**Reviewing Scratch Blocks** 

Materials

Blank Scratch workspace (for demonstration)

#### "I Can ..." Statements

Children read the explicit math and CS goals.

Children review the Scratch blocks they have used.

#### OCUS 50–60 min

Writing a Number Story Children write number stories that they will animate in Scratch.	Example Fraction Comparison Story project; Example Unit Fraction Addition Story project; Number Story Planning journal page 1	3.NF.1, 3.NF.3
<b>Planning the Project</b> Children plan how they will animate their fraction number stories in Scratch.	Example storyboard organizer; Blank storyboard organizers	
<b>Programming the Project</b> Children program their fraction number stories in Scratch.	Scratch (blank projects or starter projects); Number Story Planning journal page 2	

### "I Can ..." statements

- •I can decompose or break down a story into parts and create an animation.
- I can write precise instructions for all the actions that need to happen for my animation to work in Scratch.
- I can use previously learned Scratch blocks to animate a math number story.
- I can compare fractions with different wholes.
- •I can add unit fractions.

### **Anticipated Barriers**

- Children may over-complicate their story/program for the time allotted for this activity.
- Children may not be sufficiently familiar with all the blocks.
- Children may focus on programming the extensions (e.g., the physical appearance of their project) before addressing the required components.
- Children may have difficulty creating a story context for fractions with different wholes.

### **Student Options**

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

- Some children may want to physically act out the blocks.
- Some children may want options for collaborative work.
- Children may program stories at varying levels of complexity.
- Some children may want to physically model the fraction comparisons that frame the stories.

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# 1 Warm Up 5-10 min

## Reviewing Scratch Blocks

Explain to children that they will have the opportunity to create their own final projects in Scratch to demonstrate what they have learned about both fractions and programming.

Display a blank Scratch workspace. Review the Scratch blocks that children have used, shown in the table below. Display each block and encourage children to volunteer descriptions of what the block does and when they have used it.

Block	What does it do?	Where have you used it?
when P clicked	An event block that starts a script	All projects, including: Animal Number Story Fraction Circles 2
say for secs	Makes a speech bubble show for a sprite for a certain amount of time. For example, you can make a sprite say "Hello!" for 2 seconds.	Many projects, including: Animal Number Story Fraction Number-Line Mysteries
move steps	Moves a sprite a certain number of steps.	Animal Number Story The Frog and The Fly
start sound	Starts playing a certain sound. The sound can be from the Scratch library of sounds or an uploaded sound.	Sharing Equally
wait 1 seconds	Makes a sprite wait for a certain amount of time. For example, you can use the wait block between sprites speaking.	Many projects, including: Fraction Comic Animation The Frog and the Fly
think for secs	Makes a thought bubble show for a sprite for a certain amount of time. For example, you can make your sprite think "Hmm" for 3 seconds.	Fraction Comic Animation
show	Makes a sprite that was hidden appear on the screen.	Fraction Comic Animation
hide	Makes a sprite that was shown on the screen disappear.	Fraction Comic Animation
repeat	Repeats the instructions inside the block. For example, you can make your sprite move 20 steps three times.	The Frog and the Fly
switch costume to	Changes the costume (appearance) of a sprite.	Fraction Comic Animation
switch backdrop to	Changes the background of the project.	Many projects, including: Animal Number Story Fraction Comic Animation Number-Line Mysteries

"I Can ..." statements

- I can decompose or break down a story into parts and create an animation.
  - I can write precise instructions for all the actions that need to happen for my animation to work in Scratch.
  - I can use previously learned Scratch blocks to animate a math number story.
  - •I can compare fractions with different wholes.
  - •I can add unit fractions.

**Example Fraction Comparison Story** Example Fraction Comparison Stor

Lesson 8-8A

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To review the process of remixing projects, ask: *How do you remix a project?* **1**. Login to your Scratch account. **2**. Click on the "see inside" button. **3**. Click on the "remix" button. **4**. Change the name of the project. Note how Scratch helps to automatically give credit to the creator of the original project and makes a new url for the remixed project.

Explain that this a two-part activity. The first part is the planning stage. Remind children that programmers plan their programs to make sure that they accomplish the intended task. The second part will be creating their program.

## I Can ...

Display the "I Can ..." statements and remind children 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

50–60 min

## Writing a Number Story

 WHOLE CLASS
 SMALL GROUP
 PARTNER
 INDEPENDENT

Display this number sentence:  $\frac{1}{4}$  of 1 whole >  $\frac{1}{4}$  of  $\frac{1}{2}$ . Ask: *Is this number sentence true*? Yes. *How do you know*? Sample answer: The fraction  $\frac{1}{4}$  is the same, but each side is  $\frac{1}{4}$  of a different whole. When the whole is smaller, the part will also be smaller. *What number story could you tell about this number sentence*? Answers vary. Ask volunteers to share their answers. Then tell children you wrote the following number story about it: Abby and Dani each ate some cake. Abby ate  $\frac{1}{4}$  of a whole cake. Dani ate  $\frac{1}{4}$  of a cake. Who ate more cake?  $\frac{1}{4}$  of a whole is more than  $\frac{1}{4}$  of a half, so Abby ate more.

Next, display this number sentence:  $\frac{1}{5} + \frac{1}{5} + \frac{1}{5} = \frac{3}{5}$ . Ask: *Is this number sentence true?* Yes. *How do you know?* Sample answer: When I put three  $\frac{1}{5}$ s together, I get  $\frac{3}{5}$ . *What number story could you tell about this number sentence?* Answers vary. Ask volunteers to share their answers. Then tell children you wrote the following number story about it: Peter ran  $\frac{1}{5}$  of a mile. Then he ran  $\frac{1}{5}$  mile more. Then he ran  $\frac{1}{5}$  mile more. How far did he run? He ran  $\frac{3}{5}$  mile.

Tell the students they will be choosing a number sentence and writing, illustrating, and programming a number story based on the number sentence they choose. They can choose a fraction comparison number sentence or a number sentence showing a sum of unit fractions.

First open the Example Fraction Comparison Story project (<u>https://scratch.</u> <u>mit.edu/projects/313550727/</u>). Play the project and then ask:

• Which kind of number sentence is this story about? It is about a fraction comparison.



• In this Scratch project, what are the sprites saying and doing? One sprite ate  $\frac{1}{4}$  of a whole cake. The other sprite ate  $\frac{1}{4}$  of a half cake. They talk about which ate more.

Next, open the Example Unit Fraction Addition Story project (<u>https://scratch.mit.edu/projects/314166222/</u>). Play the project and then ask:

- Which kind of number sentence is this story about? It is about a sum of unit fractions.
- In this Scratch project, what are the sprites saying and doing? The sprite is talking about how far he ran. It moves on the screen to show how far.

Explain to children that they will choose one of the example projects as inspiration and create a similar project for their own number story. Brainstorm with children the things that need to be considered when designing the number story. Ask: *What can your number story be about?* Sample answer: My number story can be about almost anything, if it compares a fraction of two different wholes or adds unit fractions. In the fraction comparison example, Abby ate  $\frac{1}{4}$  of a whole cake and Deni ate  $\frac{1}{4}$ of a half cake and they were trying to find out who ate more cake. In the fraction addition example, Peter ran  $\frac{1}{5}$  mile three times.

Distribute page 1 of the number story planning journal pages and have children choose and complete Section A OR Section B. When children have written their stories, have them consider how they will program the stories in Scratch. Ask:

- What should you think about when programming your number story? Sample answers: The background of the animation, the number of sprites, the sequence of events, and so on.
- What could be the sequence of the events in your number story project? Sample answer: One sprite could say it has  $\frac{1}{2}$  of something, then another sprite could say it has  $\frac{1}{2}$  of something else. Then the sprites could compare the two halves to see which is more.

# Planning the Project

WHOLE CLASS SMALL GROUP

PARTNER INDEPENDENT

Now select and display the example storyboard organizer for one of the example number stories. Explain how the series of panels show the sequence of events in the example number story. Model filling in the details below some of the panels.

Explain that now children will plan their own Scratch projects using a storyboard organizer. Remind the children that if they have too many sprites, their program will be too complex to finish on time. Suggest no more than 4 sprites.

Display a list of requirements that children should use in their projects. For example, you may decide that the base project must include the following:

- At least two sprites
- At least one background
- At least 4 think or say blocks
- •At least one loop (repeat block)

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Adapt the list of requirements as needed for your students.

Distribute storyboard organizers and have children work independently on them. Some students may want more than one copy of the storyboard organizer if their stories have more than eight scenes. As children finish storyboarding, have them bring their journal pages to you. Help them to check the following:

- Is the math correct?
- Does the problem look too complicated to program? Does it need simplifying?
- Does the project include all the requirements you displayed earlier in the lesson?

You may also choose to have children review the work of their peers guided by the following questions:

- What is your number story about?
- How are your sprites going to interact?
- What Scratch blocks do you think you'll need?

### Programming the Project

WHOLE CLASS SMALL GROUP PARTNER INDEPENDENT

Children can move on to programming their number story after you have approved their planning and storyboard pages. They may start their own completely new Scratch project, or remix one of the student starter projects for this lesson, which have some backgrounds and art they might want to use. Student starter projects:

- Fraction Comparison (<u>https://scratch.mit.edu/projects/314184123/</u>)
- Unit Fraction Addition (<u>https://scratch.mit.edu/projects/314179283/</u>)

Keep the checklist of requirements displayed so children can refer to it while programming in Scratch. You may also want to display or distribute the Scratch Blocks Review Table for children to refer to as they work.

### Wrap Up

WHOLE CLASS SMALL GROUP PARTNER INDEPENDENT

Have children play each other's projects, including a code talk with questions to ask each other (see below). Distribute page 2 of the number story planning journal pages and have children complete Section C to reflect on their work. If time allows, after the code talk, choose 2–3 students to showcase their projects. Children may ask questions of their peers about the math and the computing in the Scratch project. For example, children might ask:

- What is the math problem in this story? Answers vary.
- What blocks are used in this story? Answers vary.
- What are you most proud of in this project? Answers vary.
- What was the hardest part of this project? Answers vary.

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

	Storybo	oard Organiz	er o
Scene 5 Duration: seconds	Scene 6 Duration: seconds	Scene 7 Duration: seconds	Scene 8 Duration: seconds
Costume:	Costume:	Costume:	Costume:
Action:	Action:	Action:	Action:
Costume: Action:	Costume: Action:	Costume: Action:	Costume: Action:
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Number	Story Plannir	Lesson SCRATCH	B-8A
Reflection	on		
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