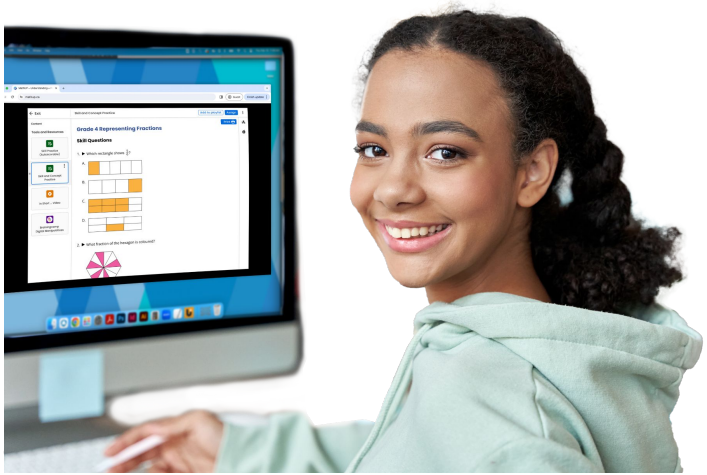
Rubicon | A SAVVAS Company

MATH UP CLASSROOM



Consolidating and Differentiating Math Instruction

Rubicon | A SAVVAS Company

MATH UP

Everyone is a MATH PERSON

Rubicon | A SAVVAS Company

M

ichelle Skene

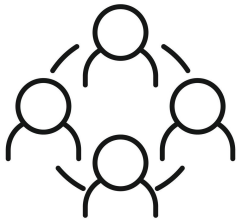
National Math Consultant
(Canada)

Beware of Random Acts of Math!

intentional

in · ten · tion · al

Adjective: Done on purpose; deliberate.



Observational Assessment in This Topic

Observational assessment data can be collected throughout the topic for both assessment for learning and assessment of learning. Use the following **list** to guide your observations.

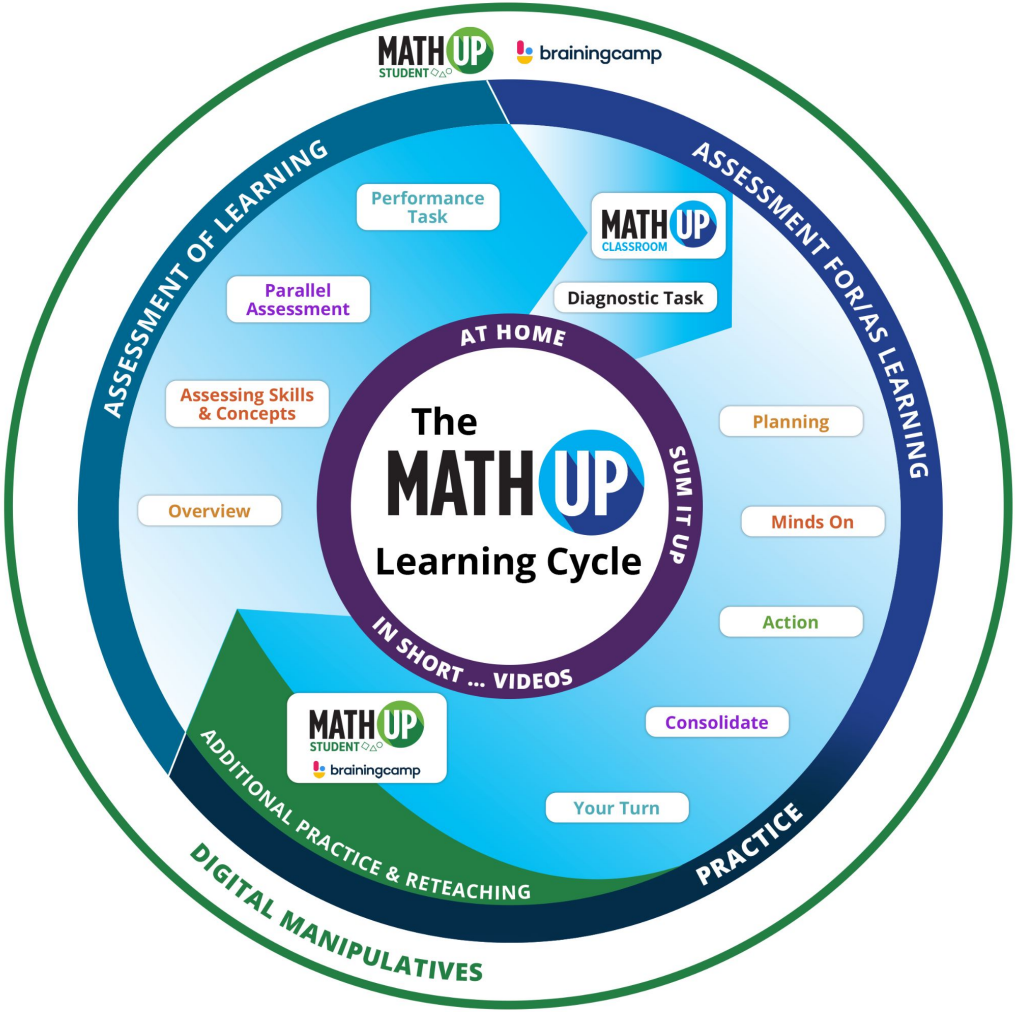
Note when students have shown that they can do the following:

- use the relationship between the numerator and the denominator to estimate the size of a fraction
- interpret equivalence as another name for the same amount
- observe relationships among fractions using various representations of those fractions, including equivalent fractions
- vary their strategies for comparing fractions depending on the numbers involved

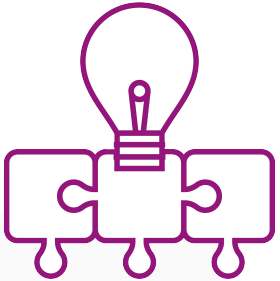
Representing, Comparing, and Ordering Fractions

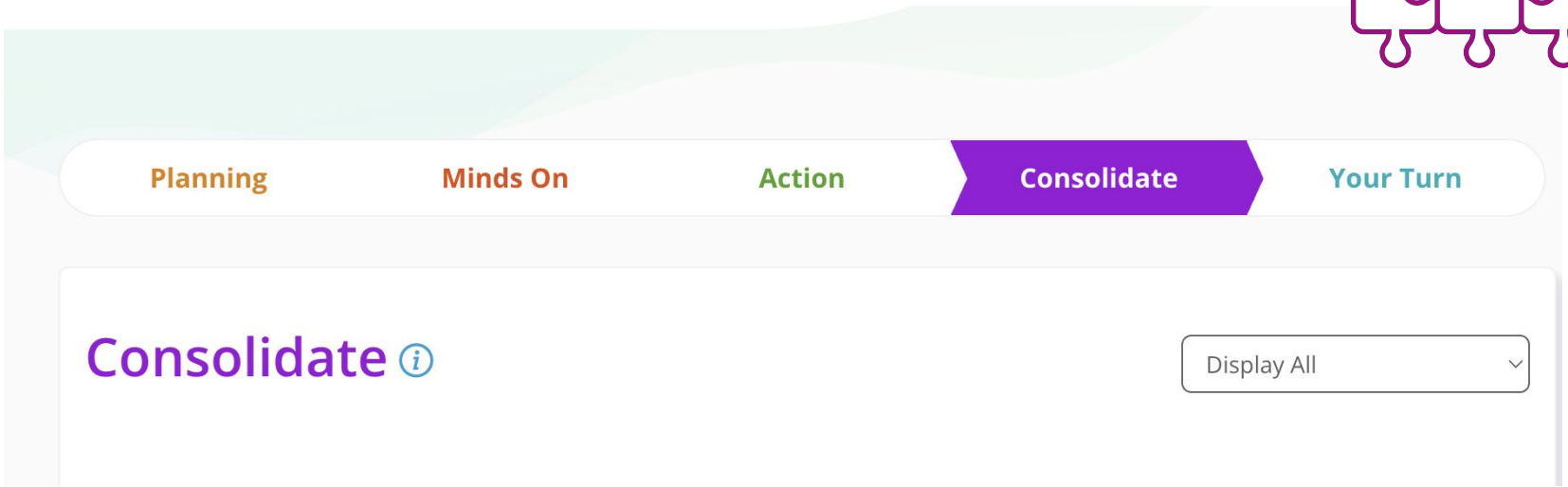
Note when students show that they can do the following:

Names:	Use the relationship between the numerator and the denominator to estimate the size of a fraction	Interpret equivalence as another name for the same amount	Observe relationships among fractions using various representations of those fractions, including equivalent fractions	Vary their strategies for comparing fractions depending on the numbers involved



Let’s Consolidate Consolidation





Consolidation allows us to…

- summarize discussions and emphasize key mathematical ideas
- bring students together as a learning community to share and analyze a variety of solutions
- encourage students to justify their answers
- ask questions to clarify any misconceptions
- use the Learning Goal and Success Criteria to gather assessment for and as learning data

Consolidation…

Are they noticing the thing I really wanted them to notice?

Taking it up!

MATH UP Name: _____ Date: _____

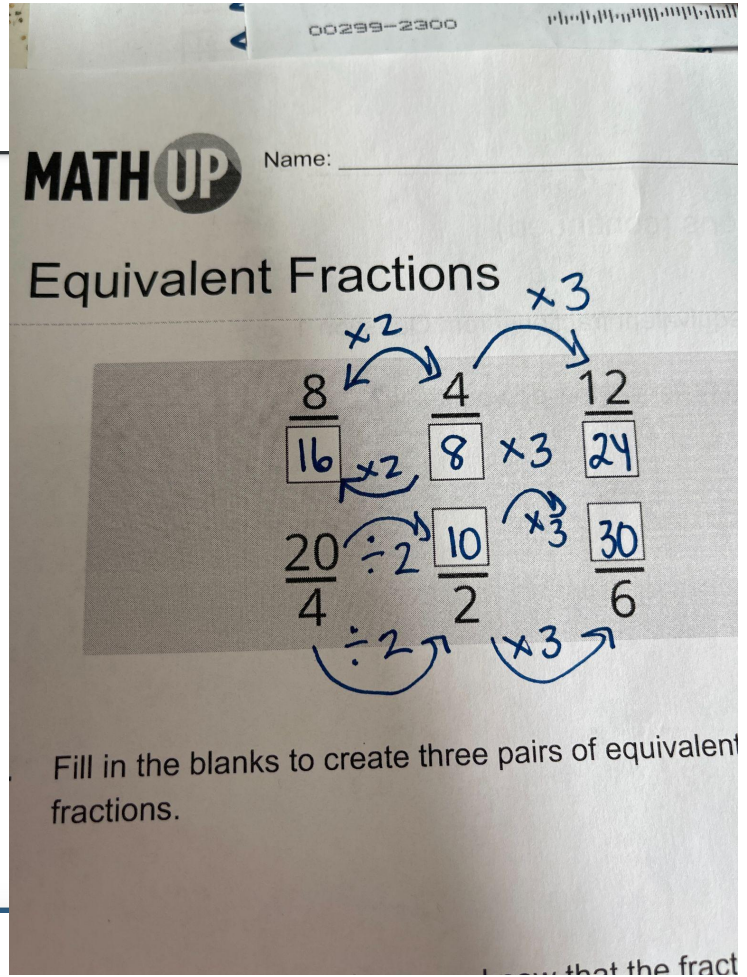
Equivalent Fractions

$\frac{8}{\square}$ $\frac{4}{\square}$ $\frac{12}{\square}$

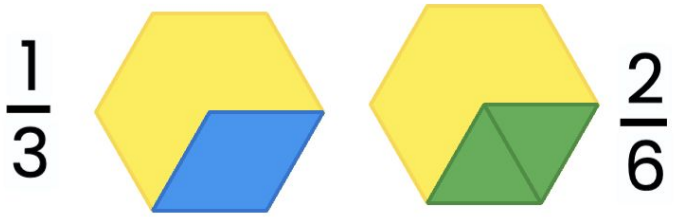
$\frac{20}{4}$ $\frac{\square}{2}$ $\frac{\square}{6}$

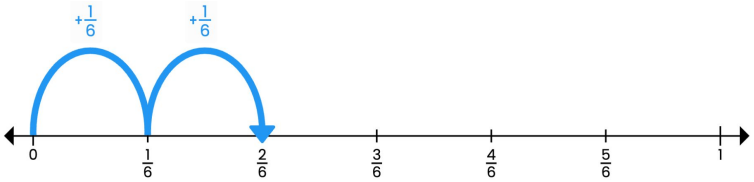
1. Fill in the blanks to create three pairs of equivalent improper fractions.

2. Use models to show how you know that the fraction pairs from Question 1 are equivalent.

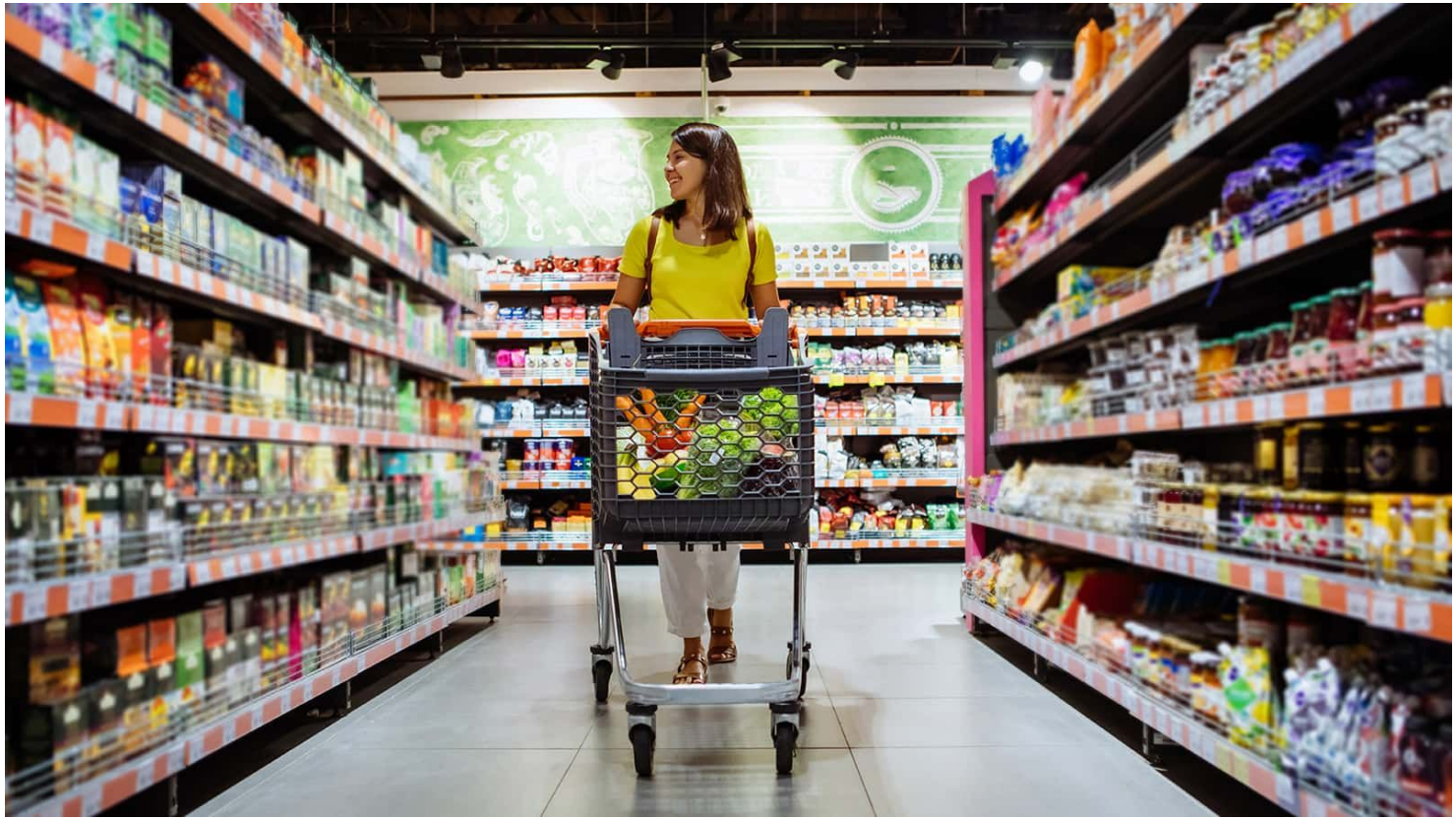


Show and Tell





Consolidate



Observational Assessment in This Topic

Observational assessment data can be collected throughout the topic for both assessment for learning and assessment of learning. Use the following **list** to guide your observations.

Note when students have shown that they can do the following:

- compare and order fractions using models
- use the relationship between the numerator and the denominator to estimate the size of a fraction
- use and interpret fractions greater than 1
- represent and compare improper fractions in a variety of ways
- estimate the size of a given improper fraction in relation to the nearest whole number(s)
- interpret equivalence as another name for the same amount
- vary their strategies for comparing mixed numbers and improper fractions depending on the numbers involved (i.e., they do not always rename improper fractions as mixed numbers or vice versa)

Lesson Level

And the Point Is ...

This Action Task focuses on improper-fraction and mixed-number equivalence since students have already had experience with proper-fraction equivalence. Note that proper-fraction equivalence is reviewed when comparing mixed numbers.

Students use models to show equivalence (i.e., fractions are equivalent when they describe the same area or are in the same position on a number line). However, students might begin to notice the following multiplicative relationships:

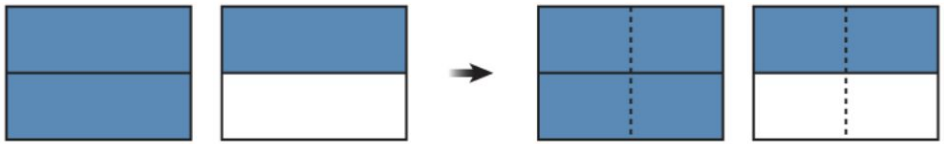
- The numerators and denominators of the two fractions relate in the same way (e.g., $\frac{8}{3} = \frac{16}{6}$ because $2 \times 8 = 16$ and $2 \times 3 = 6$).

Visible

1. What does it mean when we say that two fractions are equivalent fractions?
   E.g., If two fractions are equivalent, they describe the same amount of the same whole.
   OR If two fractions are equivalent, they are at the same spot on a number line.

Visible

2. How can you use a model to show that two fractions are equivalent?
   E.g., You can show a model for one fraction and then divide its parts into smaller equal parts to show the other one.



$\frac{3}{2}$ = $\frac{6}{4}$

Visible

4. a) What did you notice about the numerators and denominators of your equivalent improper fractions?

E.g., The numerators and the denominators of the equivalent fractions are related in the same way. When the numerator of the second fraction is double the numerator of the first fraction, the denominator of the second fraction is also double the denominator of the first fraction. For $\frac{3}{2}$ and $\frac{6}{4}$, 6 is double 3 and 4 is double 2.

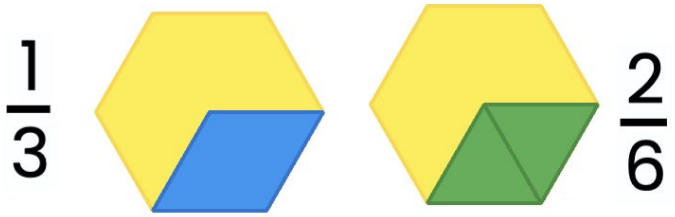
b) How could you use what you noticed to help you create an equivalent fraction? Use an example to explain.

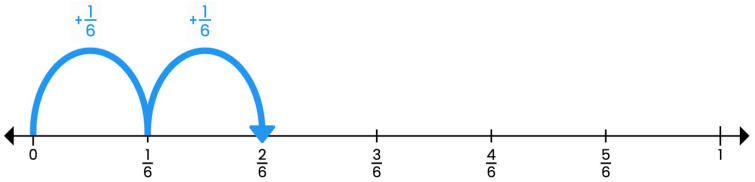
E.g., I could multiply or divide the numerator and denominator by the same number; for example,

$$\frac{6}{4} \rightarrow \frac{6 \times 2}{4 \times 2} \rightarrow \frac{12}{8}$$

$$\frac{6}{4} \rightarrow \frac{6 \div 2}{4 \div 2} \rightarrow \frac{3}{2}$$

Consolidating





Connections and Generalizations…

Are they noticing the thing I really wanted them to notice?

Progressing Student Thinking

Techniques to Deepen Understanding:

1. Why do you think that?
2. Convince me!
3. I hope some of you give me the answer I am expecting and I hope that some of you surprise me
4. Tell me why?
5. What's the first thing you thought about?
6. What did you notice here?
7. Does that work for every pair of fractions?

Exposing all student to interesting questions is equity. Not all students are responsible for the harder numbers but they are learning about it

- recognize that the size, colour, and shape of items in a fraction of a group or set model are irrelevant
- recognize the need for equal-sized parts for fractions of an area and for equal sections along a number line
- count forward by unit fractions on a number line beyond 1
- view a fraction as a number, including as a sum of unit fractions or the product of a whole number and a unit fraction
- create fractions of a given size
- observe relationships among fractions using various representations of those fractions, including equivalent fractions
- recognize and use the terms numerator and denominator

Differentiating Instruction

1. You don’t have to do it all! You can make changes!
2. Learning Trajectories
3. Open Questions – Allowing multiple entry points and solutions.
4. Parallel Tasks – Offering questions at different levels of complexity.
5. Games and Activities - Different options for different students at different times

Not going to sugarcoat it!

1. Time Constraints

- Lesson Planning Takes Longer –Pacing Pressure

2. Limited Resources & Support

3. Student Variability

- Wide Range of Readiness and Gaps in Prior Knowledge

4. Classroom Management Challenges

- Independent Work Struggles
- Keeping All Students On-task

You don’t have to do it all!

- **Making Thoughtful Choices**
  - **There is no need to complete every question in a resource.**
  - Instead, **choose a few high-impact questions** and go deep.
  - Example: Instead of assigning 10 fraction problems, use **one rich question**:
    - *Without giving the answer how do you know 5+7 is the same as 6+6?*
    - This single question **encourages discussion, justification, and differentiation**.
    - Addition, number sense, compensation, quantity

But I have so much to cover!

MATH UP

YOU'VE GOT THIS!

Rubicon | A SAVVAS Company

Topic Planning

Representing Fractions

In This Topic — About 8 days

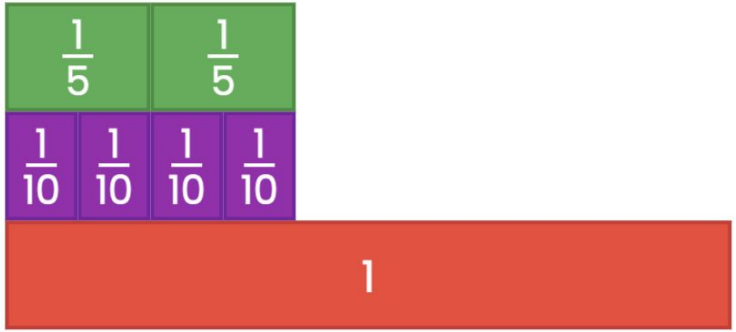
- DT — Assessment for Learning: Diagnostic Task
- 1 — Fractions of an Area
- 2 — Fractions of a Set
- 3 — Fractions on the Number Line
- 4 — Different Ways to Represent Fractions
- 5 — Equivalent Fractions

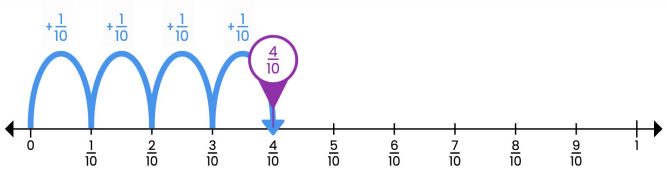
Topic Overview: Representing Fractions

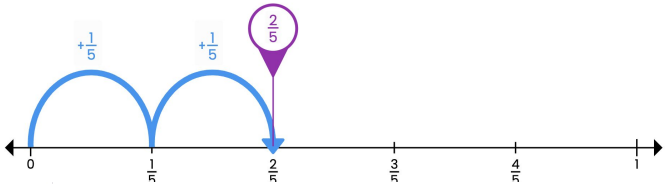
- recognize that the size, colour, and shape of items in a fraction of a group or set model are irrelevant
- recognize the need for equal-sized parts for fractions of an area and for equal sections along a number line
- count forward by unit fractions on a number line beyond 1
- view a fraction as a number, including as a sum of unit fractions or the product of a whole number and a unit fraction
- create fractions of a given size
- observe relationships among fractions using various representations of those fractions, including equivalent fractions
- recognize and use the terms numerator and denominator

The power of a good question

1. The fractions $\frac{2}{5}$ and $\frac{4}{10}$ are different names for the same amount.
   Show how you know this is true.
   Use more than one type of model to show this.
   Make sure one of the models is a number line.
   E.g., I used fraction strips to show that $\frac{2}{5}$ is the same length as $\frac{4}{10}$.



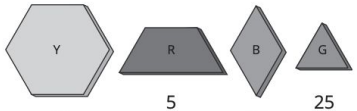




Pattern Block Roll

What You Need

- 2 number cubes
- Pattern blocks for each player in these numbers:



How to Play

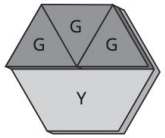
- Play with a partner or in a small group.
- Each player starts with 5 yellow, 5 red, 10 blue, and 25 green pattern blocks.
- Players take turns doing the following:
  – rolling two number cubes to create a fraction that is 1 or less,
  – modelling the fraction using his or her pattern blocks, and
  – discarding the blocks used in the model.
- If players cannot create a model, they can roll one or both number cubes again, but one time only. If they still can't create a model, they pass.
- The player with the fewest blocks left after 5 rounds wins.

Example

Cassidy rolls a 3 and a 6 and creates the fraction $\frac{3}{6}$:

$\frac{3}{6}$

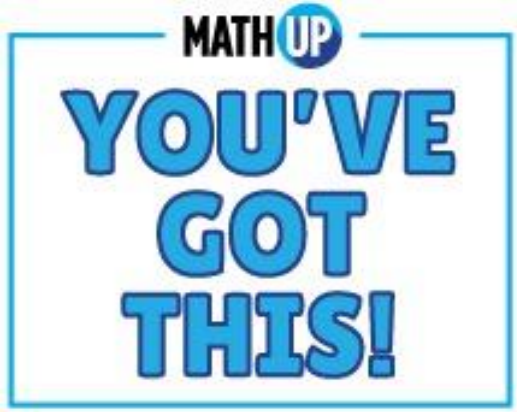
Cassidy models $\frac{3}{6}$ using his blocks:



$\frac{3}{6}$ of the yellow pattern block is covered with green pattern blocks.

Cassidy discards his yellow and green pattern blocks.

MATH UP CLASSROOM



Rubicon | A SAVVAS Company

But where's the time!?

Observational Assessment in This Topic

Observational assessment data can be collected throughout the topic for both assessment for learning and assessment of learning. Use the following **list** to guide your observations.

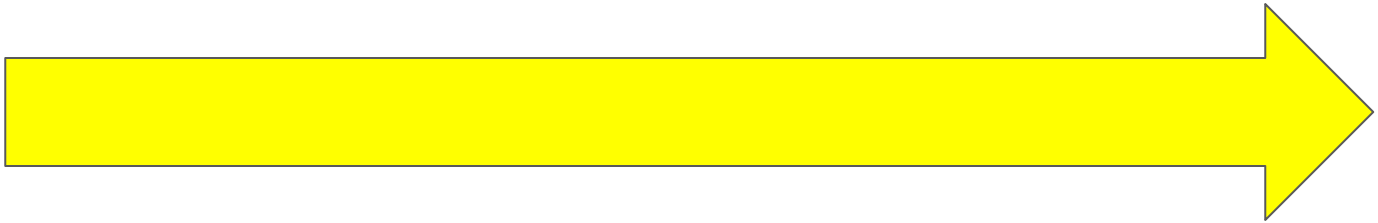
Note when students show that they can do the following:

- recognize the need for equal-size parts for fractions of a shape, and for equal sections dividing the distance from 0 to 1 for fractions on a number line
- recognize that the size, colour, and shape of items in a fraction of a group or set model are irrelevant
- count forward by unit fractions (e.g., $\frac{1}{10}$, $\frac{1}{5}$, $\frac{1}{3}$, and so on) on a number line
- view a fraction as a number
- create fractions of a given size
- observe relationships among fractions using various representations of those fractions
- appropriately recognize and use the terms numerator and denominator

Start your planning here…

- recognize that the size, colour, and shape of items in a fraction of a group or set model are irrelevant
- recognize the need for equal-sized parts for fractions of an area and for equal sections along a number line
- count forward by unit fractions on a number line beyond 1
- view a fraction as a number, including as a sum of unit fractions or the product of a whole number and a unit fraction
- create fractions of a given size
- observe relationships among fractions using various representations of those fractions, including equivalent fractions
- recognize and use the terms numerator and denominator

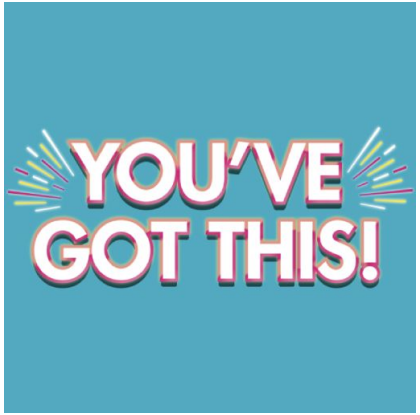
Go Slow to Go Fast



You can make changes!

Too hard?

- Use the toggle button
- Use the edit option



Visible

1. Choose 2 numbers more than 50 on the 100-chart. They cannot be right below 50.

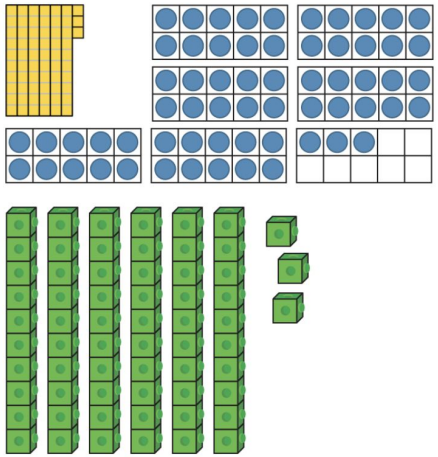
Visible

2. Represent each number in as many ways as you can.

Visible

3. For each model you make, tell one thing it helps you see about the number. Tell a different thing each time.

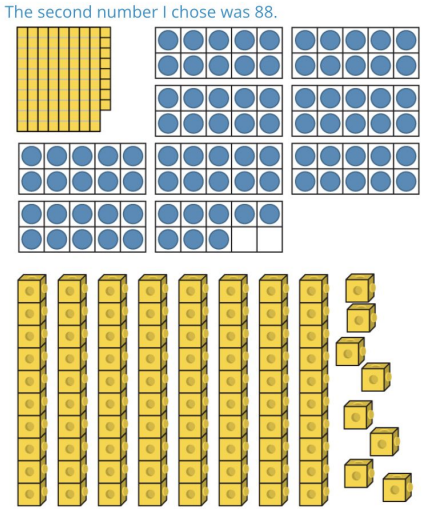
E.g., The first number I chose was 63.



Some Ways to Alter Questions

1. Go back to build up
2. Number complexity
3. Number of responses
4. Representation (kind)
5. Representation (variety)

88



8 tens and 8 ones

Figure 4

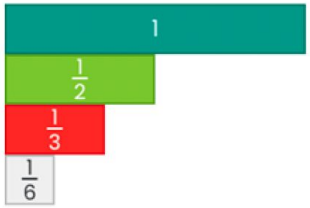
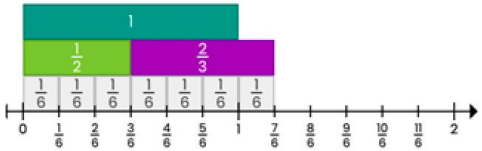
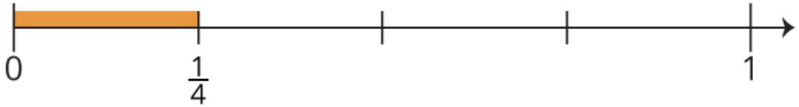


Figure 5

Figure 6





You can use three of those units to show three-fourths.

Open Questions

Explore pattern blocks.

Talk about some things you notice.

"There are triangles and squares!"
"Some are pointy, and some are flat."

"The triangles are small, and the squares are bigger."
"Some shapes fit together to make other shapes."

"The angles of the triangles are 60 degrees."
"I can make a fraction like 1/2 with the yellow hexagon and the green triangles.

"I can use the blocks to show fractions, like 1/6 of a hexagon."
"If I put two green triangles together, they make a straight line."

"I can use the blocks to model symmetry and create reflections."
"Some shapes have the same area but different forms, like a triangle and a rhombus."

The hexagon can be decomposed into six equilateral triangles. The interior angles of the hexagon, for instance, sum to 720°, and each triangle has an interior angle of 60°.

Most questions can be opened up…

- Offer versions of the question at varying levels of difficulty. Example:
  - Basic: “What is one pair of numbers that add to 10?”
  - Open: “What are all the pairs of numbers that add to 10?”

Concept Task

Visible

1. Describe some patterns in the following counting sequence.
   Start at 90. Skip count forward by 5s. Stop at 150.
   E.g., All of the numbers end with a 5 or a 0.
   The tens digits change every other number.
   The numbers switch back and forth between even and odd.

Visible

2. Alfred is skip counting forward.
   In his count, he says 82 and 142.
   What numbers could Alfred be counting by?
   Explain your thinking.
   E.g., Alfred could be counting by 1s since you say every number.
   He could be skip counting by 2s since 82 and 142 are both even numbers.
   He could be skip counting by 5s since you would say every number ending in 2 or 7.
   He could be skip counting by 10s since you say every number ending in 2.
   He could be skip counting by 20s since you say every 2nd number that ends in 2.

Parallel Task

Visible

. Describe some patterns in the following counting sequence.
   Start at 30. Skip count forward by 5s. Stop at 80.
   E.g., All of the numbers end with a 5 or a 0.
   The tens digits change every other number.
   The numbers switch back and forth between even and odd.

Visible

. Alfred is skip counting forward.
   In his count, he says 12 and 62.
   What numbers could Alfred be counting by?
   Explain your thinking.
   E.g., Alfred could be counting by 1s since you say every number.
   He could be skip counting by 2s since 12 and 62 are both even numbers.
   He could be skip counting by 5s since you would say every number ending in 2 or 7.
   He could be skip counting by 10s since you say every number ending in 2.

You've got this!

Going Back ... Going Forward

Grade 3

Fractions

1. Fractions of an Area
2. Fractions of a Set
3. Fractions of Other Measures
4. Fair Shares

The Grade 3 Fractions topic includes representing simple fractions in a variety of ways. This is extended in Grade 4 to include fractions as numbers on a number line. There is also increased attention to equivalent fractions in Grade 4.

Grade 4

Representing Fractions

1. Fractions of an Area
2. Fractions of a Set
3. Fractions on the Number Line
4. Different Ways to Represent Fractions
5. Equivalent Fractions

Comparing and Ordering Fractions

1. Fair Shares
2. Relating Numerators and Denominators to Estimate

Grade 5

Representing, Comparing, and Ordering Fractions

1. Strategies for Comparing Fractions
2. Relating Numerators to Denominators
3. Representing Fractions Greater Than One
4. Equivalent Fractions
5. Comparing Fractions and Mixed Numbers

The Grade 5 Fractions topic includes representing mixed numbers and improper fractions. It also extends learning about comparing fractions.

Identifying and Addressing Stumbling Blocks:

- Common Challenges:
  - Misunderstanding the question.
  - Limited strategies or tools to approach the problem.
  - Fear of making mistakes.
- Solutions:
  - Rephrase or clarify the question - not reading test
  - Provide examples or partially worked solutions.
  - Create safe learning spaces

Do it together!

They don’t have to do it all!

Key Shift:

- Your turn “sheets” do **not have to be worked on alone. Students do not need to read and write their responses**.
- The real goal: **Listening to their thinking, watching their strategies, and responding to what they do.**
- Example: Instead of handing out a worksheet, pose a **verbal question** and observe student responses in small groups or whole class.

Combined Grades...Where do you start planning?

Hidden

The chart below shows how much of the task each student has done so far.

Student	[illegible]e	Nisha	Jade	Joni	Marcy
					
How much of the task is done	$\frac{2}{3}$	$\frac{2}{10}$	$\frac{9}{10}$	$\frac{5}{6}$	$\frac{1}{3}$

3

- create a whole when given a fraction
- recognize that any fraction situation represents more than one fraction simultaneously
- move from fractions of areas to fractions of sets or other measures
- recognize that in fractions of a set, the size of the items in the set is irrelevant
- determine **fair shares** that result in amounts **more than 1 or less than 1**
- predict, in limited situations, how the **fair-share amounts might change**

4

- recognize that the size, colour, and shape of items in a fraction of a group or set model are irrelevant
- recognize the need for equal-sized parts for fractions of an area and for equal sections along a number line
- **count forward by unit fractions** on a number line beyond 1
- view a fraction as a number, including as a **sum of unit fractions or the product of a whole number** and a unit fraction
- create fractions of a given size
- observe relationships among fractions using various representations of those fractions, including equivalent fractions
- recognize and use the terms **numerator and denominator**

Putting it all together!

MATH UP

Suggested Paths for a Combined Grades 3/4 Class

Grade 3 Path	Grade 4 Path
A Patterns	A Patterns
N Skip Counting	
N Adding and Subtracting Numbers Less Than 100	
D Collecting, Organizing, and Describing Data	D Describing and Summarizing Data
N Fractions	N Representing Fractions
SS Working With 3-D Objects	SS Shapes and Angles
N Representing Multiplication and Division	N Simple Multiplication and Division
N Multiplying and Dividing * * Representing Multiplication and Division	N Using Place Value to Multiply and Divide * * Simple Multiplication and Division
SS Location and Movement	SS Location and Transformations

Grades 3/4 Sample Topics: Fractions and Representing Fractions

For example, consider a fractions topic in both grades.

When considering a Diagnostic Task, you could use different tasks for different groups of students. The tasks tend to be simple enough not to require a lot of teacher intervention.

When preparing assessment for learning, consider the essential understandings in each situation and look at any details you want to monitor.

This chart shows suggested topic and lesson matches to involve both grades.

Grade 3	Grade 4
Topic: Fractions	**Topic: Representing Fractions**
Lesson 1: Fractions of an Area	Lesson 1: Fractions of an Area
Lesson 2: Fractions of a Set	Lesson 2: Fractions of a Set
Grade 3 students might engage in practice activities involving fractions of an area or fractions of a set.	Lesson 3: Fractions on the Number Line
Lesson 3: Fractions of Other Measures	Lesson 4: Different Ways to Represent Fractions
Lesson 4: Fair Shares	*Grade 4 students might engage in practice activities involving representing fractions in a variety of ways or other activities.*
Grade 3 students might engage in practice activities involving fair shares or other activities.	Lesson 5: Equivalent Fractions

Lessons on Fractions of a Set

This chart shows suggestions for adapting these lessons to involve both grades.

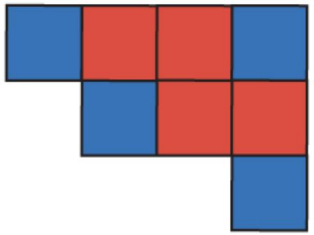
Grade 3 Lesson 2: Fractions of a Set	Grade 4 Lesson 2: Fractions of a Set
Grade 3 Minds On Activity	
Grade 3 Action Task with the following adaptation to Question 3 to add challenge: • A fraction of the first 10 shapes of a pattern is triangles. Choose a fraction and create a fraction core for the pattern. Show several possible pattern cores of different lengths.	
Grade 3 Consolidate Questions	
Grade 3 Your Turn: What You Learned	Grade 4 Your Turn: What You Learned
Grade 3 Your Turn Questions	Grade 4 Your Turn Questions
Grade 2 Games, Puzzles, and Supporting Activities	Grade 3 Your Turn Questions

Minds On Activity

Provide square tiles, including red ones. Students could work in pairs.

- Use tiles to build a shape that is close to $\frac{5}{8}$ red.
- Tell what fraction is red.

E.g.,



My shape has 4 red and 4 blue squares, so it is $\frac{4}{8}$ red. I think $\frac{4}{8}$ is close to $\frac{5}{8}$.

Grade 3 Action Task with the following adaptation to Question 3 to add challenge:

4/10 of the first 10 shapes in a pattern are triangles.

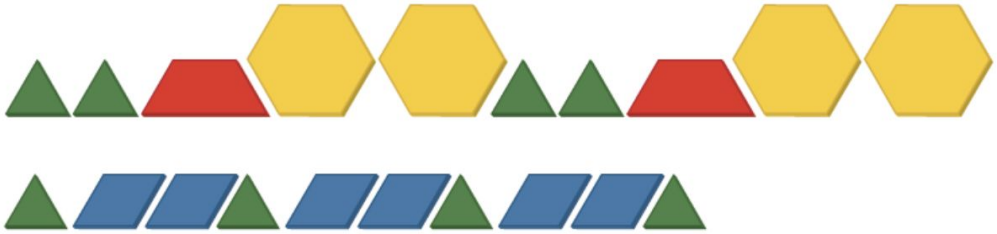
What fraction of the pattern core could be triangles?
Show several possibilities. Use a different size of core for each one.
Show your thinking.

A fraction of the first 10 shapes of a pattern is triangles. Choose a fraction and create a fraction core for the pattern. Show several possible pattern cores of different lengths.

Consolidate Questions

Ensure students have their work from the Action Task handy. Have student pairs share their work for Action Question 1 with another student pair, then conduct a math congress for Action Question 2.

Discuss the following Consolidate Questions as a class.



Visible

1. In Action Question 1, were the fractions of your pattern cores always the same as the fractions of the first 10 shapes?

   E.g., Sometimes. For example, when I made my core 10 shapes long, then the fraction of the core was the same as the fraction of the first 10 shapes.

   But when I used an ABB pattern, the fraction of the core that was triangles was $\frac{1}{3}$, and the fraction of the first 10 shapes was $\frac{4}{10}$. So, those were different.

3

Your Turn Questions

Have students answer these questions individually or in pairs. Provide fraction rectangles, fraction rectangle mats, and counters.

Visible

1. What fraction of each set below is red?

a)

$\frac{2}{5}$

b)

$\frac{7}{8}$

c)

$\frac{10}{10}$ OR 1

Visible

2. Use counters or square tiles to model each of the following fractions. Sketch each model.

a) $\frac{2}{3}$

E.g.,

b) $\frac{3}{8}$

E.g.,

c) $\frac{4}{6}$

E.g.,

4

Your Turn Questions

Provide square tiles and counters. Have students answer the questions below individually or in pairs.

If time is limited, you might assign only Questions 1a), 2, and 5, and, if possible, 3a).

Visible

1. Use a combination of square tiles and counters to show each fraction.

a) $\frac{2}{10}$

E.g.,

b) $\frac{3}{8}$

E.g.,

c) $\frac{1}{3}$

E.g.,

d) $\frac{4}{5}$

E.g.,

Games & Activities: Creating Time for Small-Group Teaching

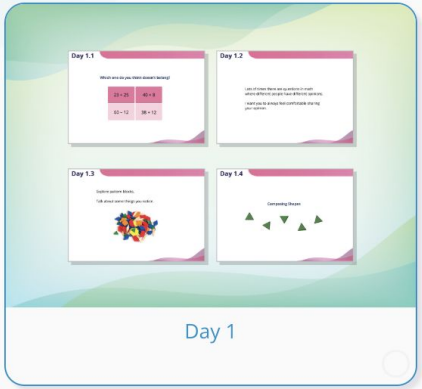
- **Games and Activities Help Free Up the Teacher**
  - Students stay engaged while the teacher works with small groups.
  - Encourages **meaningful practice**

Math games should feel structured, purposeful, and fun—never hectic. Strong routines and clear expectations will let students **enjoy learning math while giving you time to focus on small-group instruction.**

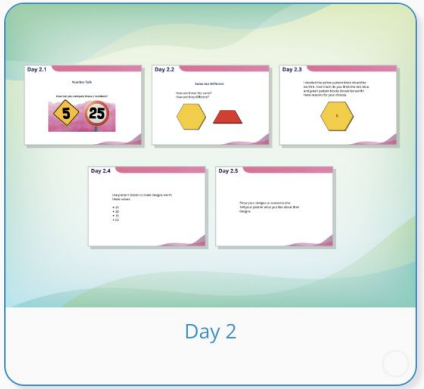
The First 20 Days of MathUP

Grade 3

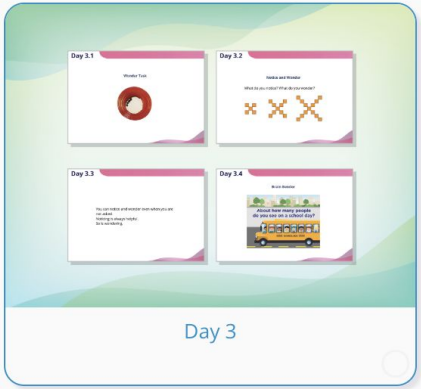
Hide Completed



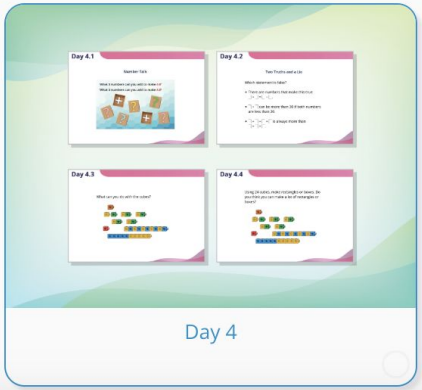
Day 1



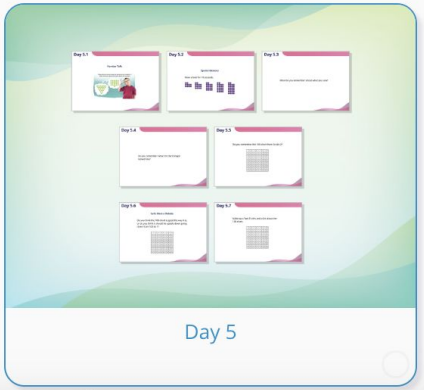
Day 2



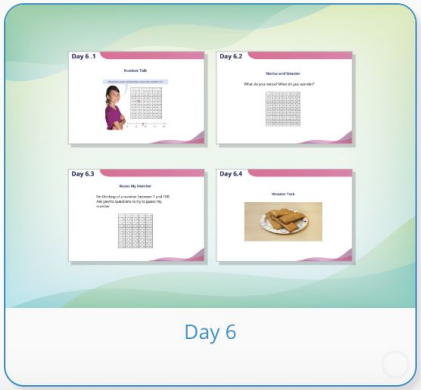
Day 3



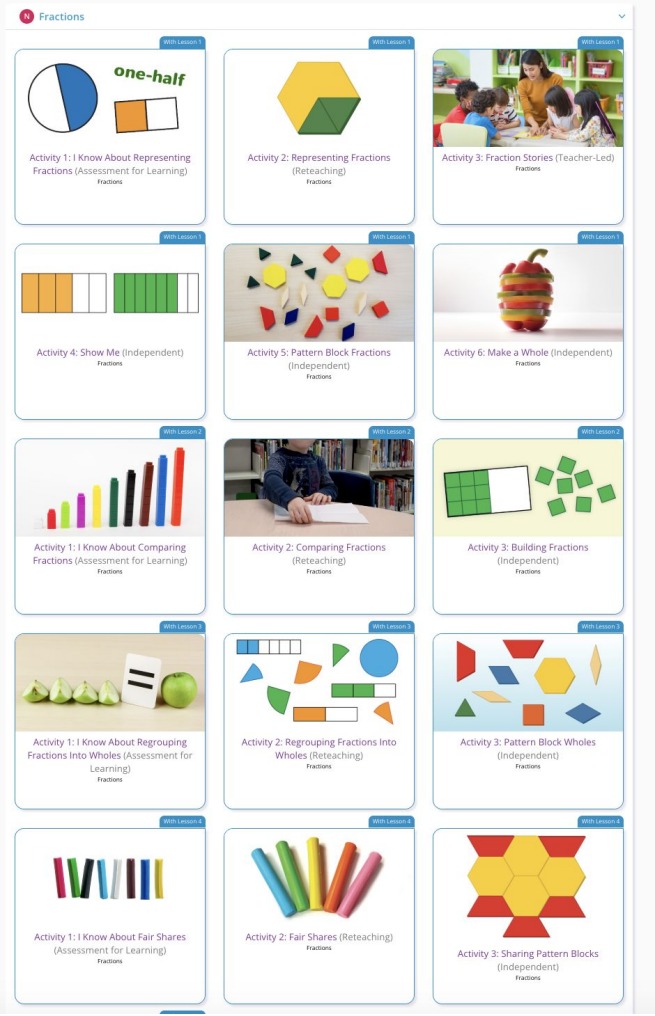
Day 4



Day 5



Day 6



Find and stick with your favourites!

Race to 100 and Back

How to Play

- Play with a partner or in a small group. Each player needs a different colour of counter.
- Each player rolls 2 number cubes and creates a two-digit starting number. Use the smaller number rolled as the tens digit.
  - Place your counter on your starting number on the 100-chart.
- On your turn, roll the number cubes and create a two-digit number. Use the smaller number as the tens digit. Move forward that number of spaces.
- Players take turns rolling and moving their counters until they land on any number in the bottom row of the 100-chart.
  - If you roll a number that takes your counter past 100, miss a turn.
- Once you reach the bottom row, go backwards by subtracting the number you roll each time.
- The first player to land in the top row of the 100-chart wins.

What You Need

- 2 number cubes (1–6)
- Coloured counters
- 100-chart

Example

Isla rolls a 2 and a 5. She places a counter on her start number 25.

On her turn, Isla rolls a 2 and a 3. She moves her counter 23 spaces:

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	Start	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	~~45~~	~~46~~	~~47~~	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

That's 2 rows down and 3 spaces right since 23 is 2 tens and 3 ones. She lands on 48.

Race to 100 and Back 100-Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Key to Success: Establish Routines First

- Students must know:
  - Where materials are.
  - How to start and end an activity.
  - What to do if they need help (e.g., "Ask 3 before me").
- Once routines are **solid**, students can work independently, freeing the teacher for targeted support.

🟢 Build a Positive Math Game Culture

- A well-run game routine **feels familiar** so students can focus on learning, not logistics.

🟠 Have a Plan Fast Finishers

- Have **extension tasks** ready for early finishers.

🔵 Manage Materials Efficiently

- Store games in **labeled bins or folders** for easy access.
- Assign a **materials manager** to prevent lost pieces.

🟣 Set Up Routines Before You Start

- Model & practice **game expectations** before independent play.
- Start with **simple games** to establish the routine first.