

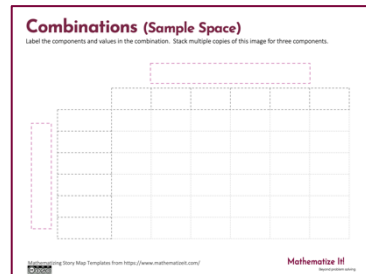
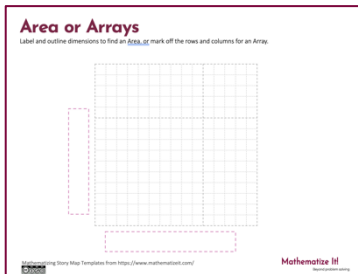
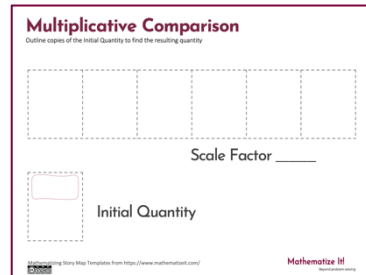
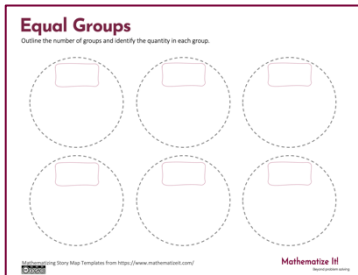
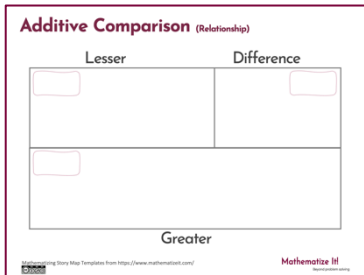
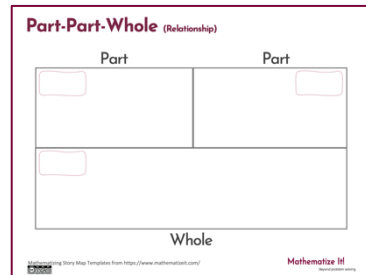
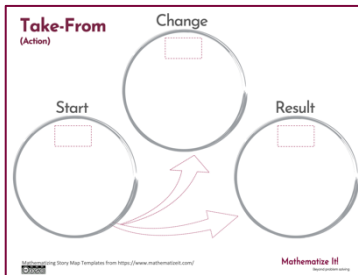
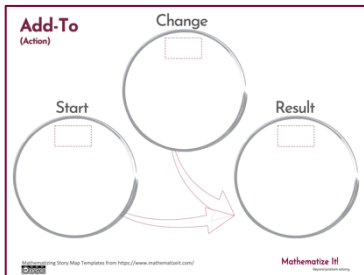
#9 Amanda Sits One Out

Part-Part-Whole
Both Parts Unknown

Making sense of word problems with
mathematical comprehension & operation sense.



Mathematizing Story Maps



Mathematize It!

Beyond problem solvin



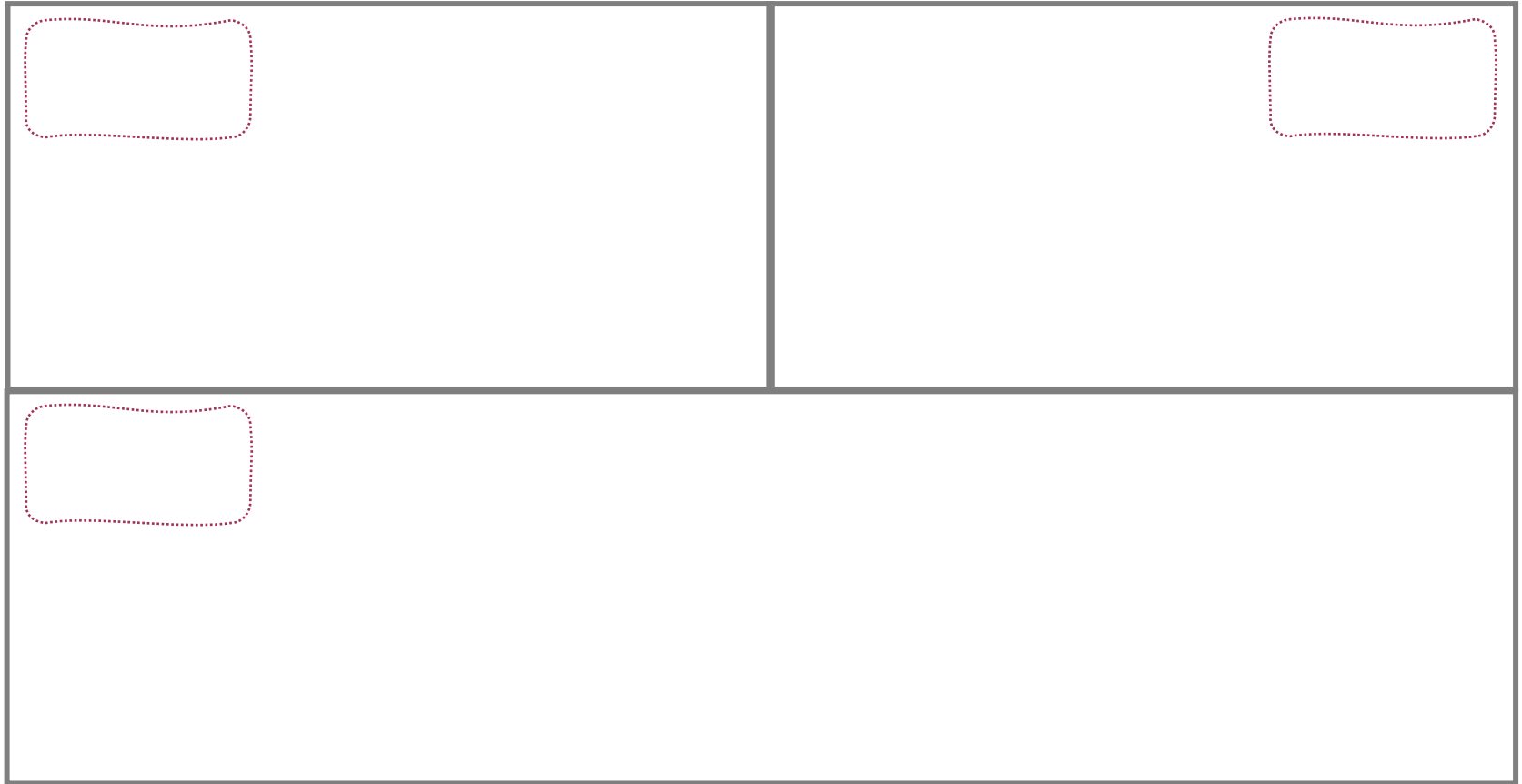
Sara Delano Moore and Kimberly Morrow-Leong

Mathematizing Story Map Templates from <https://www.mathematizeit.com/>

Part-Part-Whole (Relationship)

Part

Part



Whole

... Mathematizing Story Maps ...

How do your students approach word problems?

Key words don't always help. What are we supposed to underline in **CUBES** anyway?

Sometimes it feels like students just pick an operation and they don't know why!

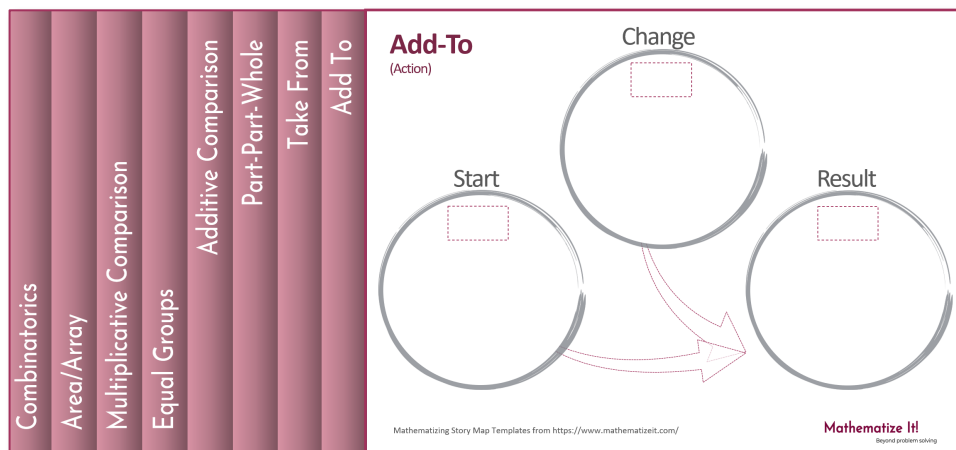
These strategies don't prepare students to formulate and solve **problems that matter** to them.

...
Prepare students to DO math!
...

Teacher Background

Mathematizing Story Maps encourage students to **model** with mathematics and find the math in their everyday lives. Opening stories are written to engage students first in thinking about the **story** and then about the mathematics.

Mathematizing Story Maps help students understand what the four familiar operations (+ - × ÷) can do. The more students know about how we use subtraction or when we use division, the more skills they will have to match a strategy to a problem.



Mathematizing Story Maps by Sara Delano Moore & Kimberly Morrow-Leong

Find more at [mathematizeit.com](https://www.mathematizeit.com)



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Beyond problem solving

How to teach the Mathematizing Story Maps

1. **Read the story**
 - a. Think about how your students might respond. What's familiar? What's not?
 - b. What mathematics is seen in the story? How might students **represent their thinking**?
2. **Choose tools you have and that students know.**
 - a. What **manipulatives** might your students use to represent the mathematics in the story? Consider counters, base ten materials, fraction tools, or more!
 - b. What **visual representations** might your students know (ten frames, number tracks, number lines, grid paper, etc.)
3. **Choose a Mathematizing Story Map**

We share a mathematizing story map for each of 8 categories of problem situations.



Mathematizing Story Maps help students act out or represent what is happening in a problem and make sense of it.



What will students do?

Most word problems (story problems) students encounter support their calculation skills. We need to build their understanding of **how to use math** to solve real problems.

- Find the story behind every mathematical problem situation
- Use one of 8 Mathematizing Story Maps to act it out or show
- Represent the story and choose an operation (+ – × ÷) that matches the story.
- **Resist answer-getting.** We pay attention to the process of solving problems

What's included?

Each mathematizing story map lesson includes:

- Teaching notes on 8 categories of problem situations.
- Teaching notes for the Mathematizing Story Maps
- A set of questions to pose that focus students on the mathematizing story.

To read more about problem situations and the four operations, check out the [Mathematize It!](#) book series.



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Teacher Notes

Mathematizing Story Maps



Amanda Sits One Out

Problem Type

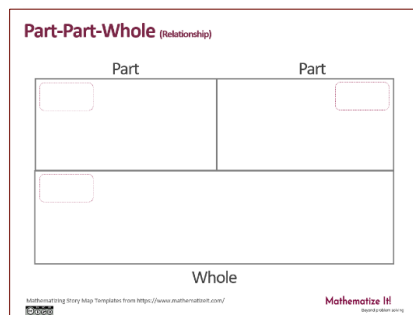
This story supports developing mathematical ideas around the Part-Part-Whole job of addition. These problem situations describe two subsets of a single combined set. There is no action in these problems; rather, the relationship between the two subsets is important. Students can represent the larger set and the subsets on the Mathematizing Story Map.

Missing Element

In this story, both of the parts are unknown. Students know the quantity in the combined set as well as the quantity in one of the groups. They are challenged to find one or more possible ways to distribute the total set into groups.

The Mathematizing Story Map

The Mathematical Story Map provided supports Part-Part-Whole job of addition by showing the two parts on the upper row of the bar model and using the longer lower bar to show the total when the two parts are considered together.



Action Situations	Add To	Result Unknown	Change Unknown	Start Unknown
	Take From	Result Unknown	Change Unknown	Start Unknown
Relationship Situations	Part-Part Whole	Total Unknown	One Part Unknown	Both Parts Unknown
	Additive Comparison	Difference Unknown	Greater Quantity Unknown	Lesser Quantity Unknown

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Day 1

Read the story at least once with your class. Talk about the story and support your students as they make sense of the events in the story as you would for any narrative.

You may wish to use the [Three Reads Strategy](#) (p.15) to support student understanding of the text itself.

Then encourage students to find the mathematics in the story with questions like these:

- *What are the groups or sets in this situation?*
- *How are the groups or sets related to each other?*
- *Do you use different words to describe the groups separately than you use together? (e.g., dogs & cats are pets or animals when combined)*

If students start calculating numbers right away, particularly if they are “number-plucking” or randomly doing calculations, refocus their attention on the relationship in the story.

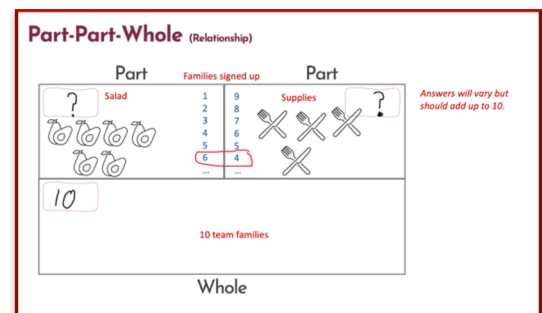
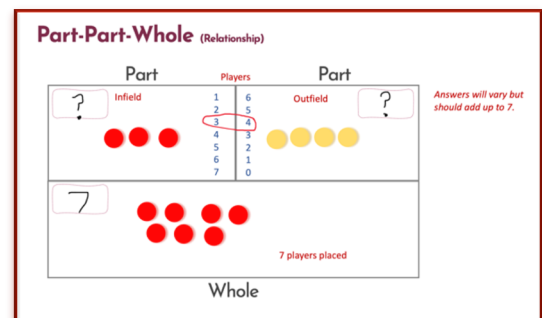
To focus on the story, create a [numberless word problem](#). Remove the numbers from the story as the class discusses it.

Encourage students to use manipulatives as they work on the Mathematizing Story Map to show the relationship that is in the story. Label the quantities and their units. Before ending for the day, give students the opportunity to record their thinking on paper.

Encourage students to use manipulatives and visuals to show their thinking about the math in the story. Students should translate their work from manipulatives and sketches to the mathematical story map.

Day 2

Reread the story and use the Mathematizing Story Map to retell it and act it out. Ask your students to translate their actions on the Mathematizing Story Map into an equation. Each student should be able to connect the elements of the story map to the narrative. Discuss the **quantities** in the story and what strategies students might use to find an answer to the question they have asked. Ask students to consider other mathematical stories (or variations on the current story) they can see in this narrative.



Day 3

Use the mathematizing story map to support solving the word problems provided. Take time for reading comprehension (does the story make sense?) before mathematical comprehension (what is happening in the story?) These questions can help students develop mathematical comprehension.

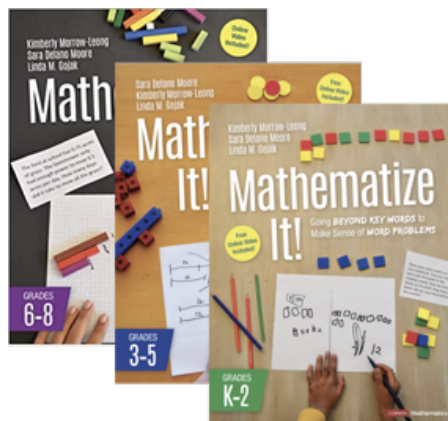
- *What are the groups or sets in this situation?*
- *How are the groups or sets related to each other?*
- *Do you use different words to describe the groups separately than you use together? (e.g., dogs & cats are pets or animals when combined)*

Encourage your students to use manipulatives and visuals to show their thinking about the math happening in each problem. Students should translate their work from manipulatives and sketches to the mathematical story map.

Days 4-5

Choose one or more of these options to continue developing student thinking.

- Continue working on the problems provided, focusing on the story map as a tool to develop mathematical comprehension and operation sense.
- Lead a discussion among students focusing on how the story map fits the narrative and problems provided. Use these questions to focus thinking on the job Part-Part-Whole is doing in these situations:
 - *What are the groups or sets in the story?*
 - *What are the relationships among those groups?*
 - *How are the groups represented on the Mathematizing Story Map? How is the total of all the groups represented on the map?*
 - *What would you do if you had more than two groups to represent?*
 - *What number sentence(s) can you write to show these relationships?*
- Ask students to develop new narratives or problems, either from scratch or as extensions of the current storyline, which can also be told using the same mathematical story map. Encourage students to explain the underlying connections which make the mathematics similar even if the story contexts are not the same.



To read more about problem situations and the four operations, check out the [Mathematize It!](#) book series.

Mathematizing Story Maps by Sara Delano Moore & Kimberly Morrow-Leong
Find more at mathematizeit.com



Mathematize It!

Beyond problem solving

Amanda Sits One Out Practice Problems

Use objects, pictures, numbers, and words to describe what is happening in each problem. Use a mathematizing story map to record your thinking.

The coach knows that the 12 students on his team come from two schools, but he doesn't know who goes to which school. How many students might come from each of the two schools?

The coach needs to assign the first 7 players to playing positions. Some players will be outfielders. Some players will be infielders. What are three possible ways the coach could make his first field placements?

The families are having a pot-luck meal after the softball game. The team is providing the pizza for the party. The 10 families can sign up to bring either a salad or supplies. What are three possible ways these 10 families might sign-up? For example, one combination would be 8 families signing up to bring supplies and 2 families signing up to bring salads. Which combination would be best for the party?

Part-Part-Whole Situations, Both Parts Unknown

Mathematizing Story Maps by Sara Delano Moore & Kimberly Morrow-Leong

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Beyond problem solving

Amanda Sits One Out Practice Problems

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Part-Part-Whole (Relationship)

Part	Players	Part
?	1 11	?
First school	2 10	Second school
?	3 9	?
?	4 8	?
?	5 7	?
?	6 6	?
?	...	?

Answers will vary but should add up to 12.

12

12 players on the team

Whole

The coach needs to assign the first 7 players to playing positions. Some players will be outfielders. Some players will be infielders. What are three possible ways the coach could make his first field placements?

Part-Part-Whole (Relationship)

Part	Players	Part
?	1 6	?
Infield	2 5	Outfield
?	3 4	?
?	4 3	?
?	5 2	?
?	6 1	?
?	7 0	?

Answers will vary but should add up to 7.

7

7 players placed

Whole

The families are having a pot-luck meal after the softball game. The team is providing the pizza for the party. The 10 families can sign up to bring either a salad or supplies. What are three possible ways these 10 families might sign-up? For example, one combination would be 8 families signing up to bring supplies and 2 families signing up to bring salads. Which combination would be best for the party?

Part-Part-Whole (Relationship)

Part	Families signed up	Part
?	1 9	?
Salad	2 8	Supplies
?	3 7	?
?	4 6	?
?	5 5	?
?	6 4	?
?	...	?

Answers will vary but should add up to 10.

10

10 team families

Whole

Part-Part-Whole Situations, Both Parts Unknown

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Beyond problem solving