3-ACT MATH

Go for a Spin

Use this 3-Act Math task any time after Lesson 3-7.

3-ACT MATH PREVIEW

Page 108 This page gives students a preview of the 3-Act Math task for Topic 3. Read the robot's speech bubble to students.

Generate Interest Ask students about their favorite games. Say: What games do you like to play? What makes those games fun? Have them share their favorite games. Be prepared to have students share both indoor and outdoor games.

TASK OVERVIEW

Essential Understanding Many real-world problems can be represented with a mathematical model, but that model may not represent a real-world situation exactly.

Students use the 3-Act Math task to practice mathematical modeling. They:

- identify an important problem,
- identify the important information,
- develop a model that represents that situation,
- use the model to propose a solution, and
- test the appropriateness of that math model.

In the 3-Act Math for Topic 3, students draw on their conceptual understanding of addition and near doubles. They make use of representations and tools such as

- counters,
- cubes, and
- number lines.

TASK PLANNING

The following pages contain specific support for using this task with your class.

Before introducing the 3-Act Math task, consider when you'd prefer students to draw or write their answers on their Recording Sheets and when they should share their answers verbally.

For emerging readers and writers, you may wish to record student responses on the board in a numbered or color-coded list. Students could write the number that represents their response(s) or make a mark with the color that represents their answer(s). In some situations, it may be helpful to have each student in the class write his or her prediction on a sticky note; then use all of the sticky notes to create a chart or number line to represent the class predictions.

TASK CONTENT

In every task, students apply a variety of concepts and skills.

Lesson	Concept/Skill
1-2	Putting together
2-3	Near doubles
3-2	Using a number line to add

They also combine conceptual understanding with math practices and processes in every step of the task.

ACT 1: THE HOOK

BRAINSTORM

PLAY THE VIDEO WHOLE CLASS

The first screen shows a video of two children playing a board game. The first player spins the spinner, which lands on 8. She moves 8 spaces, spins again, and then moves 7 spaces. The second player also takes two turns and lands on the same space as the first player. Take advantage of your students' initial reactions to watching the video. Ask What do you notice about the video? What do you wonder?

BRAINSTORM QUESTIONS WHOLE CLASS

Item 1 **Make Sense** Start a discussion with students to develop a main question. Record interesting mathematical and *non*-mathematical observations and questions, and decide which are questions. Revisit this list at the end of the task.

Students may need help developing mathematical questions that are applicable to the situation. Help them refine their questions in the context of the task. Ask What is interesting about what is happening in this video? What might you want to know about what is going to happen next?

To encourage future work posing interesting, mathematical problems, ask Which question do you find most interesting? Which questions could we use mathematics to answer?

PREDICTION

POSE THE MAIN QUESTION WHOLE CLASS

Use the Main Question screen in Act 1 to pose the problem situation students will be tasked with modeling and solving.

MAIN QUESTION
What spins did the second player get?

MAKE PREDICTIONS INDIVIDUAL

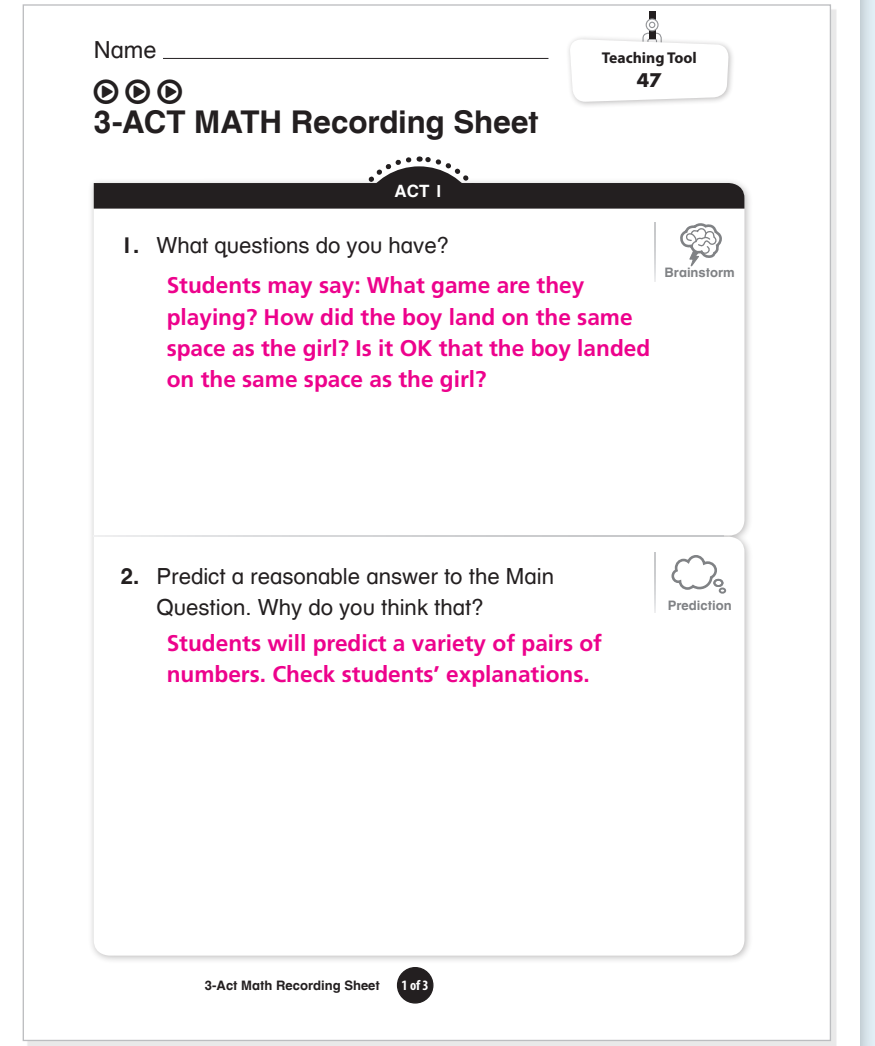
Item 2 Point out that the prediction is only an estimate. Do not give students time to make calculations.

SURVEY PREDICTIONS WHOLE CLASS

Construct Arguments Survey the class for a range of predictions. Help students understand it is equally important to think about unreasonable predictions to the Main Question. Ask What is a number too small to be the number the spinner landed on? What number is too big?

Point out that, without any information, you expect a wide range of predictions. Record student predictions. Ask Why do you think your prediction is the answer to the Main Question? Who has a similar prediction? Who has a different prediction?

3-ACT MATH RECORDING SHEET


Name _____

Teaching Tool 47

3-ACT MATH Recording Sheet

ACT 1

1. What questions do you have?

Brainstorm

Students may say: What game are they playing? How did the boy land on the same space as the girl? Is it OK that the boy landed on the same space as the girl?

2. Predict a reasonable answer to the Main Question. Why do you think that?

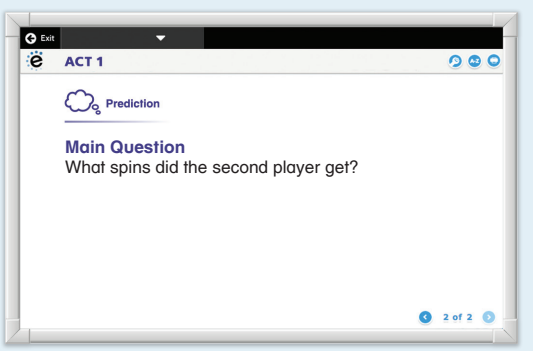
Prediction

Students will predict a variety of pairs of numbers. Check students' explanations.

3-Act Math Recording Sheet 1 of 3

Use any time after Lesson 3-7.

CONSIDER THE MAIN QUESTION



Have students consider what they know about the scenario so far. Encourage students to think about how that information can help them make a prediction to the Main Question.

ACT 2: THE MODEL

INFO

IDENTIFY IMPORTANT INFORMATION WHOLE CLASS

Item 3 Before showing any information, use the Information screen in Act 2 to give students time to think about what quantities are relevant to the problem situation. Ask What information do you need to answer the Main Question? I will only give you the information you ask for.

Use Appropriate Tools After discussing what information would be useful, ask How could you get that information? How would you use it? You can also have students complete the sentence frame "If I knew ____, then I could figure out ____."

REVEAL THE INFORMATION WHOLE CLASS

Use the Image Gallery screen in Act 2 to reveal each piece of information. Record information as students identify it and keep the information where students can refer to it. Have students discuss whether this information matches their expectations.

- On the second player's second spin, the spinner landed on 8.
- Both players' pieces are 15 spaces away from the starting point.

MODEL

DEVELOP A MODEL SMALL GROUP PARTNERS

Item 4 Model with Math To support productive struggle, observe. If needed, ask guiding questions that elicit thinking. What assumption do you need to make to use a math model? [Both players followed the rules of the game.]

EXTEND THE TASK INDIVIDUAL

Item 7 For early finishers, use the SEQUEL button on the Image Gallery screen to reveal the Sequel, shown on the next page. You can also assign the Sequel after Act 3 or as homework.

SHARE SOLUTION STRATEGIES WHOLE CLASS

Critique Reasoning Have students share their solution methods. If needed, use the Analyze Student Work screen in Act 2, also shown at the right.

UPDATE PREDICTIONS WHOLE CLASS

Explain to students that what they found in Act 2 is a mathematical answer. It's a newer, more accurate prediction based on modeling. Ask How does your new prediction compare to your original prediction? Do you think the real-world answer will match your answer exactly?

3-ACT MATH RECORDING SHEET

Teaching Tool 47

ACT 2

3. What information do you need? (Info)

Students may say: the numbers on the spinner, the numbers the players got on the spinner, the number the boy spun second

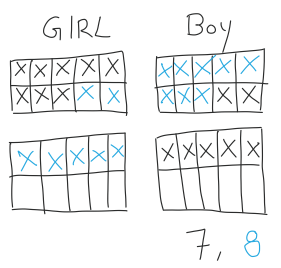
4. Show how you can find the answer to the Main Question. (Model)

Check students' work. See sample solutions below.

3-Act Math Recording Sheet 2 of 3

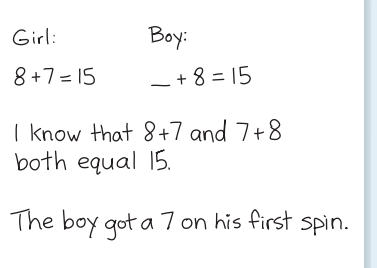
ANALYZE STUDENT WORK

Taylor's Work



Taylor says she used ten-frames to find the numbers. How did Taylor do that? Does her answer make sense? [Taylor used two ten-frames for the each player's spins. After she put in the boy's second spin, she counted out how many it took for the boy to end up on the same square as the girl. Her answer, that the boy spun 7 followed by 8, makes sense.]

Benjamin's Work



Benjamin says he used take-away to find the numbers. How did Benjamin do that? Does his answer make sense? [Benjamin wrote an equation with the girl's spins of 8 + 7 on the left and the boy's spins of ☐ + 8 on the right. He correctly found that the boy's first spin was 7, but he didn't answer the main question.]

ACT 3: THE SOLUTION

ANSWER

REVEAL AN ANSWER WHOLE CLASS

Item 5 The Act 3 video shows the second player spinning a 7 followed by an 8 and then moving his game piece to the same spot as the first player's piece. Have students record this real-world answer. To support the connection between variability and mathematical modeling, ask Why does our class have multiple answers, and the video has only one answer? Why are some of our predictions closer to the video than others?

MAIN QUESTION ANSWER
The second player spun a 7 and then an 8.

REFLECT

VALIDATE CONCLUSIONS WHOLE CLASS

Item 6 **Model with Math** Encourage students to discuss possible sources of error involved in using math to model this real-world situation. Accept a model as useful even if it is not perfect. Use the Reflect screen in Act 3 to ask How useful was your model at predicting the answer? Would you change your model after watching the video? How would you change it?

Reasoning You can also use the following question to test students' understanding of the real-world situation. What two spins would have gotten the second player past the first player? [The highest number on the spinner is 9. To get past the first player, the second player could have to have spun 8 twice, 8 and 9, 9 and 8, or 9 twice.]

REVISE THE MODEL INDIVIDUAL

Look for students to revise their models based on Act 3 before developing a model for the Sequel. Students may adopt a classmate's model as a result of the discussion in Act 2.

DISCUSS MATH PRACTICES WHOLE CLASS

If time allows, ask students the following questions to discuss how they incorporated math practices during the task.

Model with Math Explain how you modeled with math to represent the situation. How did doing that help you answer the Main Question?

Reasoning Explain how you found the boy's unknown spin. How did doing that help you answer the Main Question?

REVISIT BRAINSTORMING WHOLE CLASS

Item 1 To acknowledge that students have important ideas, use remaining class time to return to their list of questions. Answer as many as time allows. You can also assign interesting questions for homework, particularly for the students who asked those questions.

3-ACT MATH RECORDING SHEET

Teaching Tool 47

ACT 3

5. What is the answer shown in the video? Answer
7 and 8

6. Does your answer match the Act 3 video? If not, explain why? Reflect
Students may say: I forgot to include both of the boy's spins. I thought they both had to have the same spins.

SEQUEL

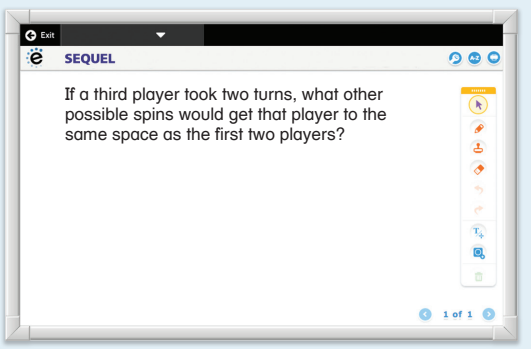
7. Show how you would answer the Sequel.
Students may say: If a third player spun a 9 followed by a 6 or a 6 followed by a 9, he or she would end up on the same space. Check students' work. Look for student answers that give both possibilities, highlighting an intuitive understanding of the commutative nature of addition.

3-Act Math Recording Sheet 3 of 3

SEQUEL

POSE THE SEQUEL INDIVIDUAL

Item 7 You can assign this similar problem situation involving near doubles for early finishers or as homework.



Sequel Answer Look for student answers of both 6 followed by 9 and 9 followed by 6. Giving both possibilities highlights a student's intuitive understanding of the commutative nature of addition.