**Lesson One:**

**Introduction to Quality Talk**

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| Part | Content |
| Part 1 | Thinking about Math Discussions as Road Trips |
| Part 2 | Introduction to Authentic Questions and Test Questions |
| Practice | Authentic Questions and Test Questions |

# **Overview**

The teacher will introduce students to Quality Talk by using the analogy of *taking a road trip*. The purpose of this discourse lesson is to introduce authentic questions as a mechanism for promoting thinking and reasoning about mathematical concepts and properties through Quality Talk and to contrast authentic questions with test questions. This lesson sets the foundation for the following mini-lessons. Students will practice creating authentic questions in a small-group activity.

# **Objectives**

At the end of this lesson, students will be able to:

* understand the goal of Quality Talk,
* know the rules of Quality Talk discussions,
* identify authentic questions and test questions, and
* create authentic questions.

# **Materials**

Sticky notes

### **Part 1: Road Trip: Quality Talk**

### **[Slide 3: Introduction]**

Introduce Quality Talk by using the analogy of *taking a road trip*. Use any personal examples or student contributions that are relevant to the parallels between *planning and taking a road trip* and *thinking about and discussing a mathematics problem* that will make this concept clear and memorable.

**[Slides 4-6: Before, During, and After the Road Trip]**

The purpose of these slides is to show the students how activities involved in a road trip relate to their experiences when solving a mathematics problem. In order to solve mathematics problems more effectively, students need to think strategically before, during, and after solving. This ensures that students achieve a more thorough understanding of the problem and its solution.

Before the trip/solving the problem, planning and activating prior knowledge is important:

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| --- | --- |
| Road trip | Mathematics problem |
| Where am I going? | What is the problem asking? |
| What should I pack? | What do I know? Is there any important prior knowledge needed? |
| How do I get there? | What concepts and methods might help me? Like a driver, you create a map with some details in your head about the topic. This helps you find things while working on the solution (like landmarks when driving), making the mathematics problem (the trip) easier. |

During the trip/solving the problem, monitoring and regulating are important:

|  |  |
| --- | --- |
| Road trip | Mathematics problem |
| Are we driving too fast? | Do I need to slow down? |
| Does anything look familiar? | How does this connect to what I know? |
| Taking amazing photos. | Underline important parts of the problem. |
| Check the map when lost. | Revisit the problem when unsure. |

After the trip/solving the problem, reflecting on and evaluating are important:

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| --- | --- |
| Road trip | Reading |
| What did I see? | What are the key math concepts involved in this problem? |
| Did I see anything new? | What new understanding have I gained? |
| Talk about the trip. | Can I describe and justify my solution? |

### **[Slides 7-8: Conversations One and Two]**

In Conversations One and Two, Audrey and Jason talk about a road trip Jason took. Guide students through these conversations and compare them to show what Quality Talk should and should not sound like.

Conversation One

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| --- | --- |
| **Audrey** | How many miles was your trip to Washington, DC? |
| **Jason** | 218 miles. |
|  | How long did it take you to get there? |
|  | 231 minutes. |
|  | Okay. |

Work with your students to understand why this conversation did not show Quality Talk. Explain to students that the questions that Audrey asked were followed by very short answers, and they did not stimulate a good conversation. When Jason responded to the questions, he did not elaborate on his ideas. Audrey did not build on Jason’s responses, and the conversation ended awkwardly.

Conversation Two (Quality Talk)

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|  | What was the best part of your trip? |
|  | The best part of the trip was visiting the Smithsonian Air and Space Museum. It was cool to see the spacesuit Neil Armstrong wore on the moon! The Cosmic Coaster ride was really fun, too. Unfortunately, it made my mom sick! |
|  | I have been there too. It really is a cool museum. I did not ride the Cosmic Coaster when I was there. What was it like? |

Unlike Conversation One, this conversation shows Quality Talk. Guide the students to recognize that Audrey asked a better question than in Conversation One. In response, Jason was able to respond with more information, thus stimulating a richer conversation about the trip. Specifically, Audrey asked a question that could have more than one answer, and Jason responded by elaborating his answer with rich details and examples. Audrey listened attentively to what Jason said and asked a follow-up question about Jason’s trip.

### **[Slide 9: Quality Talk]**

The goal of Quality Talk is to have rich and fully engaged discussions that help students understand and think more deeply about **mathematical concepts and properties** and how they relate to the problems students are asked to solve.

This goal is achieved by having students:

* ask questions and listen to others’ responses,
* share their math evidence,
* connect their math thinking to others’ thinking, and
* challenge their math thinking and others’ thinking.

**[Slide 10: Rules]**

Introduce the rules of discussion. Post the rules where they can be seen during later group discussions. Here are the rules of Quality Talk:

* We don’t need to raise hands.
* We talk one at a time.
* We share our ideas and listen to each other.
* We give reasons to explain our ideas.
* We respect others’ opinions.
* We give others time to speak.
* We question/argue about ideas, not people.
* We consider others’ ideas.
* If we disagree, we ask: “Why…?” and “How…?”

### **Part 2: Introduction to Authentic Questions & Test Questions**

### **[Slide 11: Read]**

Inform students that they are going to learn about two types of questions: authentic questions and test questions.

### **[Slide 12: Road Trip and Quality Talk]**

Let students know that they can ask questions for many different reasons. Remind students of the road trip analogy and the two different conversations that Audrey and Jason had. Stress the importance of encouraging students to stop while they are trying to solve a problem to consider what they have done so far. Let students know that asking questions—even questions that they may think they already know the answers to—leads them to reflect on and better understand the solution to the problem. Importantly, when these questions are brought up in a Quality Talk discussion, other students may share different answers to the question.

### **[Slides 13-14: Introducing Test Questions and Authentic Questions]**

Introduce the idea of two different types of questions: *test* and *authentic* questions.

**Test questions** are questions where the answers can easily be found or determined. They generally have only one correct answer and can be answered in only one way. They are often answered with a number or in a few words.

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|  | Audrey: ***How many miles was your trip to Washington, D.C.?*** | |
|  | Jason: *218 miles*. |

**Authentic questions** are questions where the answers come from thinking about the problem. They can have more than one correct answer or approach and are open to argument, debate, and discussion. Answers to authentic questions should be supported by reasons and evidence from the problem, our own mathematical work and representations, or our own thinking about mathematical concepts, properties, and relationships.

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|  | Audrey: ***What was the best part of the trip?*** | |
|  | Jason: *The best part of the trip was visiting the Smithsonian Air and Space Museum. It was so cool to see the spacesuit Neil Armstrong wore on the moon! The Cosmic Coaster ride was really fun, too. Unfortunately, it made my mom sick!* |

### **[Slide 15: Questions about Math]**

Have student think about the problem: There are 8 students in line for ice cream, and one-half want vanilla. How many want vanilla ice cream?

Explain to students that when they are given a math problem, they can ask questions about the problem to help them solve it. On this slide, the math problem is in the purple box on the right. On the left side are two questions that Audrey came up with in order to help her solve the problem, one a test question and the other an authentic question.

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|  | Test question: **How many students are in line for ice cream?** |
|  | Authentic question: **What are some different ways to represent the “part” and “whole” in this situation?** |

Point out to students that there is only one correct answer to the test question (i.e., 8) and it can be found directly in the problem. On the other hand, there are multiple ways that students could answer the second question. Additionally, the answer cannot be found in the problem and requires student to think about the problem. Thus, the second question would be more helpful for Audrey as she tries to solve the problem.

### **[Slides 15: Question Tree]**

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* We use the Question Tree as a way to visually represent the types of questions for Quality Talk. The label for *authentic question* is at the top of the tree where there are many branches and leaves, because authentic questions stimulate rich discussions about the math problem and promote high-level thinking. The type of question called *test question* is at the bottom of the tree where there is a single, small branch and leaf. This is because test questions usually lead to single, short replies, and they do not generate much discussion about the problem.
* In Quality Talk we encourage students to ask authentic questions because they stimulate thinking and reasoning. Test questions generally don’t do that, so we discourage students from asking test questions in Quality Talk. One of the reasons why Conversation Two that Audrey and Jason had about Jason’s road trip was better than Conversation One was that Audrey asked authentic questions in Conversation Two, whereas she asked test questions in Conversation One.

### **[Slides 16-19]**

**Practice: Authentic Questions and Test Questions**

### **[Instruction]**

# In this practice, place students in small groups to generate questions about the problem. Provide each group with four sticky notes.

### **[Before]**

Have the students read “Jeffrey’s multiplication problem.” Let students know that they will be focusing on asking authentic and test questions based on this problem.

### **[During]**

Each small group should come up with at least two authentic questions and two test questions about the problem and write their questions on sticky notes (one question on each sticky note). Students can practice responding to the questions to figure out whether they are authentic questions or test questions.

### **[After]**

* Have one student from each group place their sticky notes on the Question Tree slide that is projected onto the board (Slide 19). Students should place the notes in the appropriate location (i.e., authentic questions on the big branches; test questions on the little branch).
* Have students give feedback to the other groups’ questions. If repeated questions come up, cluster them into groups so that they can be addressed at the same time.
* If time permits, select one authentic question and allow students to discuss in small groups.
* For future activities, collect all questions that were generated by students.

### **[Examples of Authentic and Test Questions]**

* Authentic questions:

1. What are some ways we could use what we know about multiplication?
2. How can the two zeros in the number 2300 help us to come up with solutions?

* Test questions:

1. What is the answer that Jeffrey got for his multiplication problem?
2. How many numbers did Jeffrey multiply to get his answer?