



# Module 1

## Topic: Using Mathematics as a Tool for Documenting Change

The purpose of this professional development session is to provide coaches with a few opportunities to view mathematics as a tool for documenting events ranging from discrete to continuous models. The primary focus is on the use of multiple representations in expressing phenomena and the relationships among these multiple representations.

### Mathematical Elements

- Using multiple representations
- The connections between symbolic and graphical representations
- Distinguishing cumulative and instantaneous change and ways in which graphs may represent each.
- Interpreting graphs without labels or scales.
- Learning about conventions pertaining to labeling coordinates.

### Pedagogical Elements

- Mathematical Practice of modeling with mathematics
- Developing skills to express regularities using multiple representations.
- Developing flexibility in student thinking
- Anticipate student responses
- Assessing different models

### Activities

#### Tasks

- **In & Out** – Add/remove a few coins from an envelope. This activity demonstrates several examples of change by putting in and taking out a number of coins each time. Highlight how to document instantaneous changes vs. cumulative change recordings and how we could draw information from each to describe the other.
  - Demonstration #1: Envelope is empty at the beginning
  - Demonstration #2: Envelope has an unknown quantity at the beginning
- **Toss ping-pong ball to partner** – Demonstrate a few examples of tossing a ball and ask the coaches to document the event. Highlight the different ways the event could be recorded according to height/time; distance traveled/time; velocity/time. Connections among these different representations should be made exclusive.
- **Describe a story** that could represent the graphs (on handout) without labels or scales.
- **Pour water into different** containers. Teachers record what they see and make a model that represents the volume.
- **Capture** the event: swimming in an Olympic pool.

#### Guided Questions for Debrief

- What types of events have a discrete nature?
- What types of events are continuous?
- What types of graphs might be suitable for documenting each type of change?
- How might you be able to connect children's school experiences with change (identifying patterns) to more sophisticated forms (arithmetic and geometric growth)?

## **Materials**

### **Technology**

- Laptop
- Document Projector
- Document Camera

### **Supplies**

- Chart Paper
- Markers
- Different coins/objects
- Envelope
- Different shape glass jars
- Ball



## Always, Sometimes, or Never True

### Interpreting Graphs without Labels or Scales

What kind of situation would result in the graph below? Make up a story that could explain the following graph. What units and numbers would you put on each axis to match your story?



