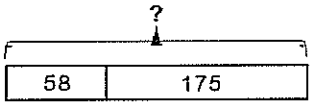
Tape Diagram

Grade Level 1 –5



Rachel collected 58 seashells. Sam gave her 175 more.How many seashells did she have then?

Description

Tape diagrams, also called bar models, are pictorial representations of relationships between quantities used to solve word problems. Students begin using tape diagrams in 1st grade, modeling simple word problems involving the four operations. It is common for students in 3rd grade to express that they don't need the tape diagram to solve the problem. However, in Grades 4 and 5, students begin to appreciate the tape diagram as it enables students to solve increasingly more complex problems.

At the heart of a tape diagram is the idea of *forming units*. In fact, forming units to solve word problems is one of the most powerful examples of the unit theme and is particularly helpful for understanding fraction arithmetic.

The tape diagram provides an essential bridge to algebra and is often called "pictorial algebra."

Like any tool, it is best introduced with simple examples and in small manageable steps so that students have time to reflect on the relationships they are drawing. For most students, structure is important. RDW (read, draw, write) is a process used for problem solving:

- Read a portion of the problem.
- Create or adjust a drawing to match what you've read. Label your drawing.
- Continue the process of reading and adjusting the drawing until the entire problem has been read and represented in the drawing.
- Write and solve an equation.
- Write a statement.

There are two basic forms of the tape diagram model. The first form is sometimes called the part-whole model; it uses bar segments placed end-to-end (Grade 3 Example below depicts this model), while the second form, sometimes called the comparison model, uses two or more bars stacked in rows that are typically left justified. (Grade 5 Example below depicts this model.)

Rather than talk to students about the 2 forms, simply model the most suitable form for a given problem and allow for flexibility in the students' modeling. Over time, students will develop their own intuition for which model will work best for a given problem. It is helpful to ask students in a class, 'Did anyone do it differently?' and allow students to see more than one way of modeling the problem, then perhaps ask, "Which way makes it easiest for you to visualize this problem?"

Grade 3 Example

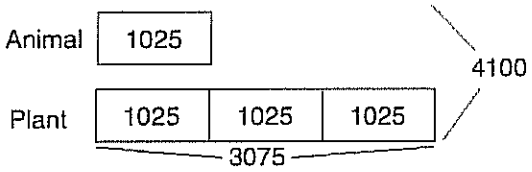
Sarah baked 256 cookies. She sold some of them. 187 were left. How many did she sell?

256 – 187 = ☐

Sarah sold ☐ cookies.

Grade 5 Example

Sam has 1025 animal stickers. He has 3 times as many plant stickers as animal stickers. How many plant stickers does Sam have? How many stickers does Sam have altogether?



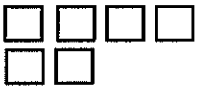
1 unit = 1025
3 units = 3075
2 units = 2050
4 units = 4100

1. He has 3075 plant stickers.
2. He has 4100 stickers altogether.

Instructional Strategies

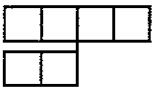
- Modeling two discrete quantities with small individual bars where each individual bar represents one unit. (This serves as an initial transition from the Unifix© cube model to a pictorial version.)

Bobby's candy bars
Molly's candy bars

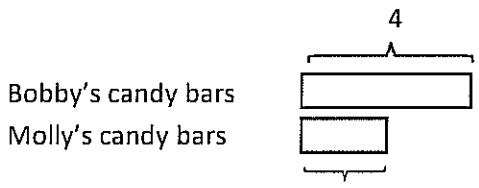


- Modeling two discrete quantities with incremented bars where each increment represents one unit.

Bobby's candy bars
Molly's candy bars



- Modeling two quantities (discrete or continuous) with non-incremented bars.



- Modeling a part-part-whole relationship where the bars represent known quantities, the total is unknown.
- Modeling a part-part-whole relationship with one part unknown.
- Modeling addition and subtraction comparisons.
- Modeling with equal parts in multiplication and division problems.
- Modeling with equal parts in fraction problems.