

Day 4: Sequence Wrap-up

Mathematics Content: The primary mathematics content of this lesson is data analysis, including ranking of data, aggregating ranked data, and weighting ranks. Other mathematical ideas involved are average and the relationship between summing the data ranks and averaging the data ranks, the notion of rate, and symbolizing mathematical relationships.

Mathematical Goals: The primary goals of the lesson are for students to be engaged in (a) explaining their systems and understanding other students' systems for analyzing the crime data and deciding on Nashville's safety, and (b) determining how to give some categories of crime data more weight.

Goals for Classroom Norms: The students are expected to listen to others, ask questions of each other, explain their thinking so that others can understand, and for all students to be involved in the lesson.

Materials: students' lists and systems for the second data set for the Crime problem, calculators, newspaper articles, large copy of the example of the three cities crime data, markers, masking tape, homework problems (not weighted, weighted)

Discussion of Class Activities:

Small Group: Have the students finish their lists for the second set of data for the Crime Problem. Some groups may need to rank the cities and/or add information to clarify their systems.

Whole Class: Have several groups share their systems so that all types of systems are presented. Sequence the sharing of systems so that the discussion moves toward more sophisticated ways of reasoning. Discuss the similarities and differences among the systems, with the goal of having students understand why different systems might produce different rankings. Ask groups to represent their processes symbolically. If no systems reflect a system of weighting, revisit the idea of weighting by having the students consider a problem involving three cities with contrived data (Metropolis, Gotham City and Pleasantville). Use the students' systems to illustrate the point that either totaling the rates or totaling (or averaging) the ranks without weighting will result in the three cities being tied. Continue discussion of weighting by having students reconsider the second data set for the Crime problem using a weighted system.

Possible Questions to Ask to Prompt Students' Thinking:

What is your procedure or system?

How is your system similar to this other system? How is your system different from the other system?

How can you use symbols to explain the procedure you used?

What difference does it make if we use the rates or if we use ranks?

Why does adding the rates or adding the ranks for the data for the three cities result in a tie?

How can we make the categories that we think are more important count for more?

Assessing Students' Understandings:

Are students able to understand why totaling the rates or totaling the ranks for the data for the three cities results in a tie?

Are students' analysis methods becoming more sophisticated? Are they using things they have learned through the whole-class discussion?

Do students understand the relationship between totaling ranks and averaging ranks? Do they understand that the order for these two cases will be the same?

Are students able to explain their methods?

Are students able to explain why a certain criterion's total would have a better or worse rank than another criterion's total?

Are students able to symbolize their systems and explain what the symbols mean?

Teaching Notes: The primary goals in having groups share their systems for deciding whether or not Nashville is safe is to enable students to understand different solution processes, and to move the students toward representing mathematical relationships symbolically.

One of the main goals for this lesson is to move students toward a system involving weighting so as to give more priority to categories that are deemed more important.

If inaccuracies arise between two systems that should have produced like rankings, have students quickly check the arithmetic since it is likely that errors were made in calculating.