Linear versus Nonlinear

Summary

Students will identify linear and nonlinear relationships in a variety of contexts.

Main Core Tie

Mathematics Grade 8

Strand: FUNCTIONS (8.F) Standard 8.F.4

Instructional Procedures

Activating Background Knowledge:
Students have previously examined linear and non-linear situations in a limited context.
We have defined a linear situation as one in which we are adding or subtracting by a consistent amount.
Anticipating Student Response:
We anticipate students will primarily examine rates of change by looking at differences in tables and by plotting points and looking for consistent slope.
We think students may misinterpret our definition of linear to include constant rate of change by multiplication as well as addition and subtraction.
Launch:
Launch of the activity involves a review and clarification of our current definition for linear relationships (a constant rate of change by adding or subtracting). This definition is posted prominently in the classroom and students are encouraged to refer to it as they decide on the linearity or nonlinearity of the situation in each task. No additional preparation will be given to students.
Monitoring of group work through each activity will identify common misinterpretations of the context of the situations, and clarification will be given if needed.
We will know if students understand linearity as we hear and see them correctly identify the amount being added or subtracted in linear situations or show there is no constant amount in nonlinear situations.
Explore:
As indicated previously, students should have some experience identifying linearity by examining rates of change and know the definition of linearity in terms of a constant change by addition or subtraction. No further instruction should be needed for students to complete the three activities of the task. (See handouts in the Materials section.)
Students are paired in groups that assure each students can and will be required to participate in their group and complete their own individual responses.
Approximately 20-25 minutes in needed for students to complete their work in pairs.
Monitoring student work:
You may wish to have a classroom poster with the definition for reference during the lesson. If needed, ask students to identify how this situation is changing, and if the change is constant. If needed, ask students, "If another student reads your responses, will they be convinced your responses are justified?"
If needed, ask students if this situation is similar to any of the other situations they have already examined.
Ask students in reporting out to restate another pair's findings in their own words.
Maintaining the level of cognitive demand:
Remind students that they will be responsible to report their results and justification to the class.
Avoid suggestions of specific strategies (number tables, graphs, etc.) students might use to identify

rates of change.
Discuss:
Have 4-5 pairs share their results on each of the three activities. Their report needs to identify the situation as linear or no- linear and a justification according to our definition as to why it is linear or non-linear.
Identify specific pairs to share in the whole class discussion so that as many different approaches as possible are represented.

Strategies for Diverse Learners

Students will complete the in class activities in carefully selected pairs so that each student must participate.
Sufficient time has been planned in reporting out so that each pair will have at least one opportunity to share their results and reasoning on at least one of the three activities.
Students that are not grasping the concept of linearity will have additional opportunities to revisit these activities both in the homework assignment and during our flex time instruction.

Extensions

The homework assignment extends this exploration into linearity through more challenging contexts.

Assessment Plan

Formative Assessment
We will know if students understand linearity as we hear and see them correctly identify the amount being added or subtracted in linear situations or show there is no constant change in nonlinear situations.

Authors

STEVEN JACKSON
VICKI LYONS
Angela Moulton
Mandy Richardson
Troy Van Komen
Nita Wood