

Big Ideas in Math

Taken from “Good Questions: Great Ways to Differentiate Mathematics Instruction” by Marian Small

Number and Operations

1. There are many ways to represent numbers.
2. Numbers tell how many or how much.
3. Number benchmarks are useful for relating numbers and estimating amounts.
4. By classifying numbers, conclusions can be made about them.
5. The patterns in the place value system can make it easier to interpret and operate with numbers.
6. It is important to recognize when each operation (addition, subtraction, multiplication, or division) is appropriate to use.
7. There are many different ways to add, subtract, multiply, or divide numbers.
8. It is important to use and take advantage of the relationships between the operations in computational situations.

Geometry

1. Shapes of different dimensions and their properties can be described mathematically.
2. There are always many representations of a given shape.
3. New shapes can be created by either combining or dissecting existing shapes.
4. Shapes can be located in space and relocated by using mathematical processes.

Measurement

1. A measurement is a comparison of the size of one object with the size of another.
2. The same object can be described by using different measurements.
3. The numerical value attached to a measurement is relative to the measurement unit.
4. Units of different sizes and tools of different types allow us to measure with different levels of precision.
5. The use of standard measurement units simplifies communication about the size of the objects.
6. Knowledge of the size of benchmarks assists in measuring.
7. Measurement formulas allow us to rely on measurements that are simpler to access to calculate measurements that are more complicated to access.

Algebra

1. A group of items form a pattern only if there is an element of repetition, or regularity, that can be described with a pattern rule.
2. Any pattern, algebraic expression, relationship, or equation can be represented in many ways.
3. Patterns are all around us in the everyday world.
4. Many number, geometry, and measurement ideas are based on patterns.
5. Arranging information in charts or tables can make patterns easier to see.
6. Variables can be used to describe relationships.

Data Analysis and Probability

1. Many data collection activities are based on the sorting of information into meaningful categories.
2. To collect useful data, it is necessary to decide, in advance, what source or collection method is appropriate and how to use that source or method effectively.
3. Sometimes a large set of data can be usefully described by using a summary statistic, which is a single meaningful number that describes the entire set of data. The number might describe the values of individual pieces of data or how the data are distributed or spread out.
4. Graphs are powerful data displays because they quickly reveal a great deal of information.
5. An experimental probability is based on past events, and a theoretical probability is based on analyzing what could happen. An experimental probability approaches a theoretical one when enough random samples are used.
6. In probability situations, one can never be sure what will happen next. This is different from most other mathematical situations.
7. Sometimes a probability can be estimated by using an appropriate model and conducting an experiment.