

# Mathematics Strands

Although *Impact Mathematics: Algebra and More* provides the equivalent of a first-year algebra program, it is a truly integrated curriculum, incorporating content not only from algebra but also from number and operation, geometry, and probability and statistics. Although most chapters emphasize particular strands, the strands are connected and integrated throughout the program.

## **Algebra**

*Impact Mathematics* covers the equivalent of a first year algebra course. All three courses cover symbolic manipulation of expressions, multiple representations of algebraic relationships, and equation solving. The program makes algebra accessible to middle school students by using a unique exposure-to-mastery approach. Ideas are introduced informally at early stages and then revisited with increasing formality and depth. The following example shows how ideas about graphical representations of functions are carefully developed over the three courses.

**Course 1:** Students sketch and interpret graphs that involve real situations. If they were given technical treatment, these graphs would demand skills beyond those of most middle school students. However, the approach at this stage is quite informal. The intention is simply to show how changes in one quantity affect another quantity.

**Course 2:** Links are made between graphs and algebraic equations. Students explore linear functions in depth and are introduced to quadratic, reciprocal, and exponential functions. They begin to see that certain types of relationships occur frequently and that these relationships may be grouped according to both the shapes of their graphs and the characteristics of their equations.

**Course 3:** Students revisit function families in increasingly formal ways. They learn to recognize the type of function from its graph or equation. They use technology both to investigate how constants and coefficients affect graphs and to explore intercepts, maximum and minimum points, and lines of symmetry.

## **Geometry**

*Impact Mathematics* includes rich coverage of geometry topics. In Course 1, the focus is on two-dimensional geometry. Students learn terminology and basic properties associated with polygons and develop formulas for area and perimeter of two-dimensional figures. In Course 2, the focus shifts to three-dimensional geometry. Students gain experience visualizing and representing three-dimensional figures and they develop formulas for surface area and volume. Course 2 also emphasizes similarity in both two- and three-dimensional figures. Course 3 introduces students to symmetry and geometric transformations both on and off the coordinate plane.

## **Number and Operation**

The number and operation strand is most prominent in Courses 1 and 2 of *Impact Mathematics*. Course 1 builds a thorough understanding of fractions, decimals, and percents and the relationships among these representations. Course 1 also helps students develop and apply algorithms for fraction operations, and reviews methods for finding products and quotients of decimals. In Course 2, students investigate algorithms for operating with signed numbers. They also learn about operating with integer exponents and develop a sense of very large numbers. In addition, Course 2 emphasizes ratio, proportion, and percent and includes a variety of problems that require students to apply proportional reasoning. Course 3 extends student understanding of exponents, and makes connections between exponents and roots.

## **Probability and Statistics**

*Impact Mathematics* takes an exploratory approach to probability topics. In Course 1, students determine and compare experimental and theoretical probabilities, devise game winning strategies, and learn to design simple simulations. In Course 2, students are introduced to probabilities of dependent events. They analyze games to determine whether they are fair. In Course 3, students develop strategies for counting outcomes to determine the size of a sample space and look at probability distributions for various situations. Statistics coverage begins with measures of center and statistical displays in Course 1. In Course 2, the focus is on sampling, as well as box-and-whisker plots. In Course 3, students draw on all their statistical knowledge to solve complex problems involving real data.