UNIT 4

Equations and Functions

General Outcome

Develop algebraic and graphical reasoning through the study of relations.

Specific Outcomes

RF1 Demonstrate an understanding of operations on, and compositions of, functions.

RF14 Graph and analyze rational functions (limited to numerators and denominators that are monomials, binomials or trinomials).

Specific Outcomes

PCBT1 Apply the fundamental counting principle to solve problems.

PCBT2 Determine the number of permutations of n elements taken r at a time to solve problems.

PCBT3 Determine the number of combinations of n different elements taken r at a time to solve problems.

PCBT4 Expand powers of a binomial in a variety of ways, including using the binomial theorem (restricted to exponents that are natural numbers).

***Pre-Calculus 12*, pages 426–427**

Suggested Timing
45–60 min

Blackline Masters
Master 1 Holistic Project Rubric
Master 2 Ana-Holistic Project Rubric
BLM U4–1 Unit 4 Project Checklist

What's Ahead

In Unit 4, students explore equations and functions, particularly how they are used to model real-world situations. In Chapter 9, students explore rational functions, first using transformations. They then consider the graphs of rational functions and are introduced to the concepts of holes and asymptotes. Finally, they connect graphs to rational equations. In Chapter 10, students are introduced to combining two or more functions, and how real-world situations can be modelled by doing so. They explore how mathematical operations are performed on functions, including addition, subtraction, multiplication, and division. Then, in section 10.3, students work with composite functions. In Chapter 11, students are introduced to permutations, combinations, and the binomial theorem.

Planning Notes

Whenever possible, have students work in small groups or pairs. This enables them to discuss the concepts and the context of the question, and learn problem-solving strategies from one another. Some of these concepts can be intimidating for students, particularly those who are struggling or who have difficulty seeing the application of mathematics. Emphasize the real-world applications as much as possible, and give students the opportunity to discuss further how these concepts may be reflected in their lives, and in their future careers.

Also, make use of the resources on the Internet as much as possible. Suggest that students explore the different resources provided at www.mcgrawhill.ca/school/learningcentres. Encourage them to go beyond this resource and explore how these concepts are found in real-world situations. When students find applications that are particularly relevant, interesting, or surprising to them, ask them to share their findings with the class. They might even create a digital or web project that highlights this aspect of mathematics, and reveals it to others.

Unit 4 Project

In the Unit 4 Project, students choose a topic from Unit 4 and generate a creative work that demonstrates their understanding of it, and communicates the concept to others. This work may be a digital product, a song, a piece of artwork, or some other creative piece of students' choosing. You should discuss their choice of medium before they begin their project.

With the class, read and discuss the introductory notes for the Unit 4 Project. You may wish to point out the Project Corners throughout Chapters 9, 10, and 11. These features are not mandatory but are recommended because they provide helpful information about the Unit 4 Project. You may wish to provide students with **BLM U4–1 Unit 4 Project Checklist**. Students can use the checklist as they prepare their project. Have students collect all their work for the Unit 4 Project in a portfolio.

Students do best if they know exactly how they will be evaluated. One way to increase student motivation is to work with the class to create a specific rubric for the project. You may wish to use **Master 1 Holistic Project Rubric** as a template and review the general holistic points within the 1–5 scoring levels. Alternatively, you may wish to use **Master 2 Ana-Holistic Project Rubric** and decide whether you will score the work out of 5 or out of 20. See the Web Link below for a specific rubric in each style.

For additional information on the Unit 4 Project, see pages 427, 456, 498, 545, and 549 in the student resource, or pages 231, 257, 279, and 299 in this Teacher's Resource.

Web Link

For a holistic rubric and an ana-holistic rubric related to the Unit 4 Project, go to www.mcgrawhill.ca/school/learningcentres and follow the links.