Task: Develop a Park

Suggested Timing
60–75 minutes with possible follow-up

Materials
• ruler
• compass
• protractor
• coloured pencils (optional)
• computer with spreadsheet software (optional)

Blackline Masters
Master 1 Project Rubric
Master 12 Percent Circles
BLM Develop a Park
BLM Area of Park
BLM Circle Template

Mathematical Processes
√ Communication
√ Connections
√ Mental Mathematics and Estimation
√ Problem Solving
√ Reasoning
√ Technology
√ Visualization

Specific Outcomes
SS1 Demonstrate an understanding of circles by:
 • describing the relationships among radius, diameter and circumference of circles
 • solving problems involving the radii, diameters and circumferences of circles.
SS2 Develop and apply a formula for determining the area of:
 • circles.
N5 Demonstrate an understanding of adding and subtracting positive fractions and mixed numbers, with like and unlike denominators, concretely, pictorially and symbolically (limited to positive sums and differences).
SP3 Construct, label and interpret circle graphs to solve problems.

Planning Notes
Introduce the task to the class. Explain that students are to develop a park area by creating a design for a park plan, calculate the area of the undeveloped park area, create a circle graph to display the park data, and then plan a wading pool and calculate its circumference and area. Have students work in pairs or individually. Encourage students to discuss their designs with a partner and then complete the task individually.

Note: Before beginning this task, students should have experience with developing and using common denominators, adding and subtracting fractions, constructing a circle graph, and calculating the circumference and area of a circle.

You may wish to use the following steps to introduce and complete this task:

1. a) Provide students with **BLM Develop a Park** and **BLM Area of Park**. Have students study the park area and consider the fractions that indicate the area for each activity as shown on the blackline master.
   b) As a class, you may wish to discuss different ways of dividing the park into sections. Clarify that students need to show each fractional section on the diagram they make on **BLM Area of Park**. They do not need to find the dimensions of each section.
2. You might have students brainstorm locations for the wading pool in the undeveloped section of the park.
3. Consider using the following prompts to help students start each part of the task:
   • How can you divide the park area into $\frac{1}{3}$, $\frac{1}{12}$, and $\frac{1}{4}$?
   • How can you find out what fraction of the park is undeveloped?
   • What percent of the park is used for each activity?
   • Will you create your circle graph with or without technology?
   • What is the central angle for each activity?
   • How will you show each central angle on the circle graph?
   • What is the sum of the central angles in your circle graph? What should it be?
   • Where will you place the wading pool? How big will it be?
   • How can you calculate the circumference and area of the pool?
4. Clarify that the task is to
   • show each of the following fractional sections of the park: $\frac{1}{3}$, $\frac{1}{12}$, $\frac{1}{12}$, and $\frac{1}{4}$ on a diagram of the park
   • calculate the fraction of the park that is undeveloped
   • create and label a circle graph to display the park data
   • design a circular wading pool
   • calculate the circumference and area of the pool, and show all calculations
5. Review **Master 1 Project Rubric** with students so that they will know what is expected.

Meeting Student Needs
• Students with motor difficulties may benefit from using **BLM Circle Template** or **Master 12 Percent Circles** to make their circle graphs. Alternatively, have students use technology.
• You may wish to change the activities planned for the park to coincide with activities that are popular in your community. For example, field lacrosse instead of baseball. Work with students to decide what sports should be included.
Gifted and Enrichment
• Challenge students to make as large a wading pool as possible and to justify their design.

• Challenge students to make an accurate park design. They might research the dimensions of a baseball diamond, a tennis court, or a skate park. Students may find the links in the following Web Link helpful.

Web Link
For information about the dimensions of a baseball diamond, a tennis court, and a skate park, check the links on the web page where you found these notes on **www.mathlinks7.ca**.

Assessment *of* Learning	Supporting Learning
Develop a Park Introduce the task to the class. Have students work together to develop a response and then provide separate designs.	• Use **Master 1 Project Rubric** to assist you in assessing student work. For notes on how to use this rubric for this challenge, see below. • To view student exemplars, follow the links.

The chart below shows the **Master 1 Project Rubric** for tasks such as this one and provides notes that specify how to identify the level of specific answers for this project.

Score/Level	Holistic Descriptor	Specific Question Notes
5 **(Standard of Excellence)**	❑ Applies/develops **thorough** strategies and mathematical processes making **significant** comparisons/connections that demonstrate a **comprehensive** understanding of how to develop a complete solution ❑ Procedures are **efficient and effective** and may contain a **minor mathematical error** that does not affect understanding ❑ Uses **significant** mathematical language to explain their understanding and provides **in-depth** support for their conclusion	• provides a complete solution, which may contain an incorrect unit or a minor error that does not affect the final conclusion
4 **(Above Acceptable)**	❑ Applies/develops **thorough** strategies and mathematical processes for making **reasonable** comparisons/connections that demonstrate a **clear** understanding ❑ Procedures are **reasonable** and may contain a **minor mathematical error** that may hinder the understanding in one part of a complete solution ❑ Uses **appropriate** mathematical language to explain their understanding and provides **clear** support for their conclusion	• provides a complete solution, which contains a minor communication error *or* • provides a complete solution with an error in fraction addition or an incomplete circle graph *or* • provides a complete solution with weak or no justification for #5c)
3 **(Meets Acceptable)**	❑ Applies/develops **relevant** strategies and mathematical processes making **some** comparisons/connections that demonstrate a **basic** understanding ❑ Procedures are **basic** and may contain a **major error or omission** ❑ Uses **common** language to explain their understanding and provides **minimal** support for their conclusion	• provides a correct solution for #1 to #4 *or* • provides a correct solution for #1, #2, and #5
2 **(Below Acceptable)**	❑ Applies/develops **some relevant** mathematical processes making **minimal** comparisons/connections that lead to a **partial solution** ❑ Procedures are **basic** and may contain **several major mathematical errors** ❑ Communication is **weak**	• completes #1, #2, and #3 *or* • completes #1, #2, and #4 with no undeveloped area identified
1 **(Beginning)**	❑ Applies/develops an **initial start** that may be **partially correct** or could have led to a correct solution ❑ Communication is **weak or absent**	• provides a correct response to #1 *or* • provides a correct response to #2

For student exemplars, follow the links.