

# Program Principles

- All students need opportunities to learn mathematics in ways that are meaningful to them. A responsible mathematics program recognizes **many learning styles** and offers guidance to teachers as they plan for individual student differences.
- **Teacher understanding of mathematics** is a critical factor in students' success. Teacher understanding can and must be supported in program methodology and pedagogy.
- Students best develop conceptual mathematical understanding when they have opportunities to “do” math, to engage in **hands-on experiences** in which they explore concepts using a variety of tools and strategies in a rich mathematical context.
- Students demonstrate conceptual understanding by **communicating** and **modelling** their reasoning, and **connecting** a new concept or strategy to other contexts and concepts they have seen before.
- **Learning through problem solving** helps students make sense of the math. Students develop new knowledge and skills through meaningful problems.
- Mathematics understanding is deepened and enhanced when students have opportunities to **make connections** between mathematical concepts and other mathematics strands, other disciplines, and the real world.



- **Procedural fluency** with number is an essential skill for life. When students practise mental and written computational strategies effectively, they learn to use them accurately, efficiently, flexibly, and appropriately.
- **Parents** have a significant role to play in student learning. A mathematics program should help parents and teachers collaborate to reinforce what is learned in the classroom each day, promoting a positive attitude toward mathematics in the home.
- The purposeful use of **technology** in the mathematics classroom can enrich learning experiences for students, allowing them to explore and develop concepts, and extend critical thinking and problem-solving skills.
- A mathematics program should **support curriculum** implementation and assessment with 100% curriculum fit and practical teacher support – pacing guidelines; combined grades strategies; models for independent and group learning; performance-based assessment suggestions.
- Effective use of **assessment** is an integral part of mathematical teaching and learning. Teachers need to balance assessment purposes and methods with practical assessment tools that support teacher decision-making and feedback, student reflection, and reporting to parents.

**Investigation Integer Probability**

Work with a partner.

Four integer cards, labeled  $-3$ ,  $-2$ ,  $+1$ , and  $+3$ , are placed in a bag. Several draws (draws only from the bag, one card at a time) are made from the bag.

**Materials:**

- Four integer cards labeled  $-3$ ,  $-2$ ,  $+1$ , and  $+3$
- A bag

Write a prediction for the sum of all four integers. Is it more likely that the sum of any three cards drawn from the bag will be negative?

In this investigation, you will conduct several experiments to find out if his prediction is correct.

**Part 1**

- ▶ Place the integer cards in the bag.
- ▶ Draw three cards and add the integers. Is the sum negative or positive? Record the results in a table.

Integer 1	Integer 2	Integer 3	Sum

- ▶ Repeat the cards in the bag. Repeat the experiment until you have 20 sets of results.

**Part 2**

- ▶ Look at the results of your investigation in Part 1.
- ▶ If the first card James draws is negative, does it affect the probability of getting a negative sum? Use the results of Part 1 to support your thinking.
- ▶ If the first card James draws is positive, does it affect the probability of getting a negative sum? Use the results of Part 1 to support your thinking.

**Reflection Questions:**

- ▶ Look at the results of your table. Do the data support James' prediction? How can you tell?
- ▶ Compare your results with those of at least three other groups of classmates. Do you have 100 sets of results? Do the data support James' prediction? How can you tell?
- ▶ Use a diagram or other model to find the theoretical probability of getting a negative sum. Do the results match your experiment?
- ▶ Do you think the values of the integers make a difference? Find 4 integers (2 positive, 2 negative) for which James' prediction is correct.