



The Role of Games in *Investigations*

Games provide opportunities for students to practice important mathematical concepts and skills and to develop and deepen their mathematical understanding and reasoning. Games are not isolated activities but are important tools for learning, woven throughout the curriculum, preceded and followed by related activities. The rationale for using games is as follows:

- Games provide engaging opportunities for students to deepen their understanding of numbers and operations, and to practice computation
- Games encourage strategic mathematical thinking as students find an optimal way (rather than just any way) of playing the game
- Games provide the teacher with opportunities to observe and assess and to work with individuals or small groups as other students are playing
- Games provide opportunities for families to do math together.

Games Support Fluency

Developing computational fluency with whole numbers is central to the elementary curriculum. Therefore, many of the *Investigations* games provide practice with skills and concepts that are critical to the development of computational fluency. These include:

- Estimating reasonable results
- Developing and practicing accurate and efficient strategies for computing
- Developing an understanding of the operations
- Knowing the basic addition and multiplication facts and their counterparts in subtraction and division.

One strand of related games that spans the curriculum involves making sums that equal or come close to important “landmarks” in the number system, such as 10, 20, 100, 1,000. In grade 3 the game is *Close to 100*. In this game students each get six cards and must use any four to make two two-digit numbers whose sum is as close as possible to 100. Consider for a minute the following hand.



What two two-digit numbers get you as close as possible to 100? Reflect on the strategies you

used. How many combinations did you try? What mathematical ideas and skills noted above did you employ? Did you decide that 56 and 42 brings you closest to 100? Did you decide on 61 and 41? Did you realize there were two possible winning combinations? As you can see such games provide opportunities for students to deepen their understanding of numbers and operations and to practice computation.

Games Support Strategic Thinking

Most students find games engaging (they want to play) and motivating (they want to play better, they want to win). Therefore, games provide a wonderful opportunity for meaningful practice over time, one that is not dependent on the teacher continually creating new problems or assignments. Moreover, as they play a game with a partner or small group, students discuss their strategies. They may try out others' ideas and methods as they search for what works best. This search for an optimal strategy encourages both strategic and flexible thinking.

Games Support the Range of Learners

While the class is engaged with a game, teachers have the opportunity to observe and assess students at work. Based on that information, teachers can adapt a game in particular ways, help students with the rules, and/or meet with students to: work on specific skills and concepts; introduce a variation of the game; present a challenge; or do further assessments.

For example, consider the K-1 game *Double Compare*. Each player is dealt two cards. The player with the larger total says "me" and takes the cards. This game focuses on counting, combining and comparing quantities. The curriculum encourages the teacher to observe students at work, with a focus on what strategies they are using to play the game. The curriculum also supports the teacher in thinking about what to do with that information – both in the unit and in the suggestions of "More Ways to Play".

For example, students who are having trouble counting accurately might build and compare cube towers; play with only the cards 1-6 (rather than to 10), or play the game of *Compare* (which involves comparing only two cards). *Investigations* also suggests ways to vary the game, to keep it interesting for students who would benefit from continued play. Such variations include saying "me" if you have the smaller total, or playing in groups of three. Students who need more challenge can play with wild cards (which can be any number), turn over three cards each (Triple Compare), or play a version that asks them not only to determine who has more, but *how many* more? *Investigations* also encourages the teacher to challenge students who are reasoning in sophisticated ways (e.g. "if we both have a 5, we only need to compare the other two numbers" or "if both of my numbers are bigger than both of her numbers, I have more") to articulate their strategies and to try them with other numbers.

Games Support Families

Games are a familiar and enjoyable activity for many families. Teachers can capitalize on this by sending home math games for families to play together. This allows parents to see the math curriculum in action, to explore mathematical ideas with their children, and to see their child's

growth as their mathematical thinking changes and develops over time. Games also provide an important way for parents to help children learn their math facts. Because of this, games are occasionally assigned for homework and the Student Math Handbook, at each grade level (available in English and Spanish) contains directions for all the games at that grade level.

Note: This essay is largely based on the section of “Using *Investigations*” that is about games in the curriculum. See *Implementing Investigations in Grades X*.