MATH MARVELS

Purposeful Practice of Basic Skills

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Students love to play games and games are strong motivators to learning. MATH MARVELS includes a multitude of games with which students practice standards-based skills and problem-solve as they bring each game to life. The goal of this unit is to give students a purpose for learning and playing games that reinforce the skills necessary for success in mathematics.

Students experience decision making, working with groups, and considering practical aspects as they reinforce their own learning. Students practice mathematical skills using place value, computation, mental math, number sense, logic, and strategic thinking. Working together to play a game, students communicate orally about their mathematical thinking. Writing their analysis of the game provides insights into their mathematical understanding. MATH MARVELS benefits students in the following ways:

Knowledge

- Place value
- Number facts
- Number sense
- Probability
- Organization of time

Skills

- Problem-solving abilities
- Mental math
- Strategic (algebraic) thinking
- Estimation
- Number operations
- Logic
- Communication of mathematical ideas
- Organization of groups
- Elapsed time scheduling

Attitudes

- Positive attitudes toward mathematics
- Appreciation of the benefits of working in groups toward a common goal
- Confidence in decision making
- Understanding the necessity for developing strategies necessary for game proficiency

PURPOSE

OVERVIEW

OVERVIEW

Games provide development of multiple abilities in children in a positive setting. They reinforce a sense of personal responsibility for learning. Rather than the narrow "Is it right?" and "What's my grade?" mentality, reinforcing skills through games develops a non-threatening atmosphere for learning mathematics. Games allow children to be more involved as they learn. Seeing, hearing, and doing simultaneously leads to maximum retention of skills. Second language learners find games a non-threatening means to practice their language skills while improving mathematics skills.

Games work best if they are both challenging and accessible to students of differing ability levels. To hold interest, games need to be engaging and "win-able." For a game to be sustained over time it needs to be repeatable—to have situations or numbers change enough to make it a "new" game each time. Games need to allow multiple approaches and solutions. They should require strategic or algebraic thinking where repeated playing allows improvement of skills while building understanding of the strategy or logic underlying the game.

Parents, the community, and/or other classes participate in the product of this innovative learning unit. Students plan and prepare for a *Math Game Day* or *Night* culminating event. They learn a wide variety of games ranging in difficulty and skill level and make decisions about appropriate games for the intended participants. They plan how the games will be organized for the event. Real-life applications are integrated in the organizational details of determining space, audience, and time frames.

Weeks 1 and 2
During the first two weeks of the unit, students learn, play, and evaluate two to three games each day. Students work cooperatively in pairs, small groups, and as a class as they are challenged to use a variety of math skills to learn and practice each game. At the end of Week 2, the class discusses the game evaluations and determines which games will be played during the culminating *Math Game Day/ Night* event.

Week 3
Students work in pairs to prepare for their culminating event. Each student pair is responsible for thoroughly learning and developing instructions for one game. During Days 12–14, student pairs teach other pairs their games as they develop a cohesive plan for *Math Game Day/Night*. Day 15 is the culmination *Math Game Day/Night* event. Each student pair teaches their game to the participants in attendance.

1. **Before You Begin**
   Carefully and thoroughly read this entire Teacher Guide *before* beginning. Determine what games and variations are appropriate for your class and your *Math Game Day/Night* audience. It will be helpful to consider your students' skill levels and what skills you want to reinforce with your students. Try out the games yourself so you will be able to teach the games to your students.

   Throughout the Teacher Guide, Interact employs certain editorial conventions to identify materials.
   a. In preparing materials, *Class set* means *one per student*.
   b. One *Day* on the **Unit Time Chart** is 45 minutes–one hour.
   c. All transparency masters and student handouts are listed by name using ALL CAPITAL LETTERS.
   d. Teacher reference pages are named in **Bold**.
   e. Special events are named using *Italics* (e.g., *Math Game Day/Night*).

2. **Timing**
   Your class will need at least three weeks for the planning, preparation of the games and materials, and to hold your *Math Game Day/Night* event.

   Weeks 1 & 2:
   - Pre-planning for event (flyers, etc.)
   - Learning games
   - Choosing games

   Week 3:
   - Game preparation
   - Game Preview days
   - *Math Game Day/Night*

3. **Grouping Students**
   Determine how students will work together. This unit is designed for students to work in small groups or pairs during Days 2–10 and in pairs during Days 11–14.

4. **Games**
   There are 32 games from which to choose. See the **Game Chart** on page 14 for information on the recommended grade levels and content standards for each game. Older students can teach and play some of the games with students as young as Kindergarten or first grade.

SETUP DIRECTIONS

Before beginning this unit, choose a game to model for students on Day 1. **Place It!** works well for a variety of abilities and grade levels. During Days 2–10 you will teach two to three games a day, for a total of 18–27 games. Select these games based on grade level, student needs, and the type of culminating event you have planned. Once students evaluate the games, you will select the games to use during your culminating *Math Game Day/Night*. During Days 11–14, students work in pairs as they learn and teach others how to play one of the games selected for your *Math Game Day/Night* event.

TEACHING TIP

Overhead cards are helpful to teach many of these games. If you do not have any, make a set by copying a deck of cards (Ace–10) onto a transparency and cutting them apart.

Game markers can be beans, buttons, or any other manipulative that can be used for game pieces. Markers that have a flat side, so they do not roll away, are recommended. Keep containers of different kinds/colors of game markers to be used for all games that need them. Each container should have 20–25 markers. Or create one container for each student using a zippered baggie or film canister with 15–25 markers per student. When a game calls for only seven markers (e.g., **Dicey**) that would be all that students would take out.

TEACHING TIP

The minimum materials needed for teaching the games: one deck of cards per student, three dice per two students, and 20 game markers per student.

5. **Materials**

Prior to beginning MATH MARVELS, assemble the following materials in the quantities indicated in *Italics*. The materials are organized by game for your convenience.

- Overhead projector — *one*

101 (grades 4–6)

- Deck of cards (Ace–10) — *one per game*

Aim for Zero (grades 2–5)

- Paper (for recording) — *one per game*
- Pencils — *one per player*

Apple Tic-Tac-Toe (grades 1–2)

- Container (for counters) — *one per game*
- Counters (two-colored) — *10 per game*
- Game markers (different color per player) — *15+ per player*

Close to 30 (grades 3–5)

- Deck of cards (Ace–10) — *one per game*

Color Squares (grades K–6)

- Crayon or marker (two colors) — *one per player*
- Grid paper — *one per game (Optional)*

Columns and Rows (grades 5–6)

- Game markers (different color per player) — *12 per player*
- Paper (to record scores) — *one per player*
- Pencils — *one per player*

TEACHING TIP

Two-colored counters are those that are red on one side and white or yellow on the other.

GAME CHART
TEACHER REFERENCE

The majority of the games have variations that offer challenges to higher grades and ability levels.

Game	Grade Levels	Mathematical Content	Page Number
101	4–6	Mental Math Number Operations	37
Aim for Zero	2–5	Number Operations (Subtraction) Mental Math Strategic Thinking	38
Apple Tic-Tac-Toe*	1–2	Number Facts (Addition)	39
Close to 30	3–5	Number Operations (Subtraction)	43
Color Squares*	K–6	Strategic Thinking Logic	45
Columns and Rows	5–6	Number Operations Mental Math Integers Strategic Thinking	47
Counting Coordinates	4–6	Number Operations Integers Coordinates	49
Cover It	3–6	Number Sense	51
Dicey	2–6	Number Operations Mental Math Probability	54
Digit Place	4-5	Number Sense Place Value Estimation Mental Math	56
Draw to Win	2–5	Place Value Number Sense Probability	58
Fast Facts*	4–6	Number Operations Mental Math	61
Finding 10s	1–3	Number Sense Number Facts	62
Four in a Row	5–6	Equivalent Fractions	63
Fraction Battle	5–6	Comparing Fractions	65
Highest Wins	K–6	Mental Math Number Operations	68

APPLE TIC-TAC-TOE

GAME BOARD II