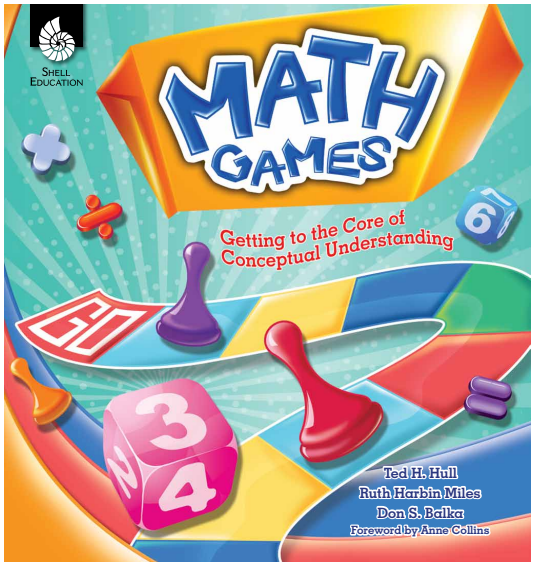
SHELL EDUCATION

Sample Pages from

Math Games: Getting to the Core of Conceptual Understanding



The following sample pages are included in this download:

- *Table of Contents*
- *Introduction excerpt*
- *Lesson plan or sample chapter selection*

For correlations to Common Core and State Standards, please visit http://www.teachercreatedmaterials.com/correlations.

Table of Contents

Engaging Students with Effective Motivational Strategies

There are many factors that influence student motivation. Teachers need to be consistent in using motivational strategies in their classrooms. Effective motivation of students occurs every day regardless of the lesson format or design planned for use. While research findings have generalized into specific ideas, the general natures of these ideas are frequently difficult to translate into specific, meaningful teacher actions. Engaging games and activities can serve as a gateway that assists teachers in transferring motivational strategies into daily lessons.

Motivational Research

In the 1970s, Madeline Hunter began focusing her research on effective teaching. One area of interest was student motivation. Hunter's book, rereleased in 2004, identifies six factors associated with motivation. These factors include:

- level of concern
- feeling tone
- success
- interest
- knowledge of results
- intrinsic and extrinsic motivation

Hunter's work focused on studying the science of teaching and attempted to identify best practices for student learning. She felt strongly that teachers controlled these factors and with practice could apply them effectively.

Jensen (1995, 264), using early brain research, created a list of factors for optimal motivation. The factors include:

- meaning derived from perceived needs and relevant content
- positive social bonding
- low stress and high challenge
- control over own learning
- a risk-free, playful, and safe learning climate.

Jensen states, "In fact, the argument is made that the learners' brain is in a better state for learning when traditional 'learning' is disguised. In other words, in areas when the learning is a 'by-product' of the activity, the learner may excel the most" (267). Engaging games fit this description exceptionally well.

Engaging Students with Effective Motivational Strategies *(cont.)*

The National Research Council (NRC), in the book *Engaging Schools* (2004, 172–175) identified the following list of motivational findings from research:

- close adult-student relationships
- cooperative learning
- consistent meaning and sense making
- active role in learning
- challenging projects requiring time and effort
- challenging curriculum
- emphases on achievement

The NRC emphasizes that the job of teachers is to create a setting where students take pleasure in learning. To do so, students need to see meaning in the learning and that the learning is worth their effort. These findings in 2004 closely match Jensen's list from 1995 (see previous page).

With a quick review, the similarities in findings are apparent. Wording emphases change, and rewording occurs, but the strategies and findings are fairly consistent. However, in 2006, Dweck added to these findings. Her research is significant and offers the idea of effort over innate ability. Dweck's work provides two significant ideas related to motivation. These ideas are *growth mind-set* and *effective effort*.

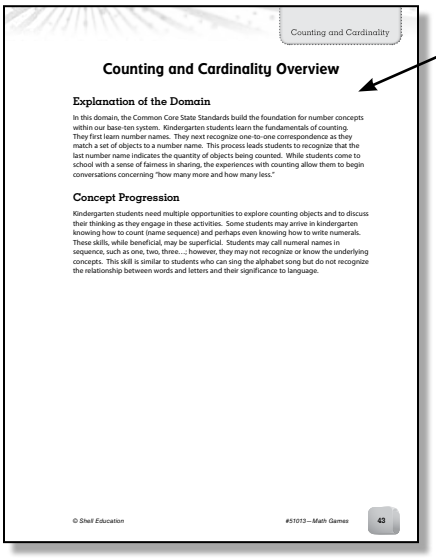
The belief in a "growth mind-set" is based on the idea that effort has the greatest influence on learning rather than some innate genetic talent. Teachers and students who believe in the growth mind-set realize that learning certain content may be difficult, but with effort, the learning is obtainable. The opposite belief, fixed mind-set, leads teachers and students to believe that some content is not obtainable to some individuals. The relationship between growth mind-set and high expectations is obvious. If teachers believe students can learn, then they can set high achievement goals for students and then work tirelessly to help students reach the goals.

Finally, new brain research is reinforcing this perception about motivation. According to Willis (2008):

> For example, choice, interest-driven investigations, collaboration, intrinsic motivation, and creative problem solving are associated with increased levels of such neurotransmitters as dopamine, as well as the pleasurable state dopamine promotes. Novelty, surprise, and teaching that connects with students' past experiences and personal interests and that is low in threat and high in challenge are instructional strategies that appear to be correlated with increased information passage through the brain's information filters, such as the amygdala and reticular activating system. Lessons in which students are engaged and interested in goals they helped to create have the potential to stimulate and restimulate networks of new memories as students actively process information in the construction of knowledge (427).

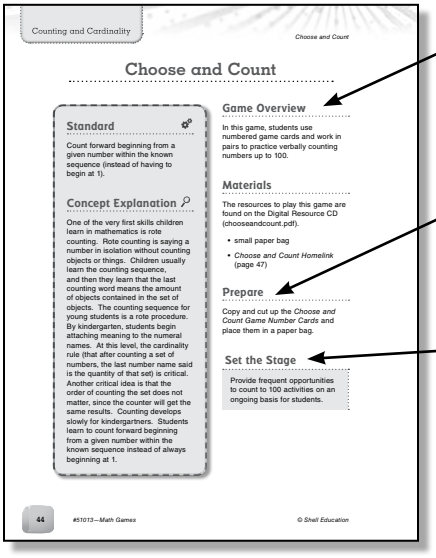
How to Use This Book

Each game provided in *Math Games* is based upon a common format. This format is designed to assist teachers in understanding how the game activities and lesson information address the standards of mathematical practice. Every game does not address every practice, but collectively, the games provide rich experiences for students with every practice.



Domain Overview

Each section of the book begins with a brief explanation of the domain and how students access and master the content of the domain.



Concept Explanation

This section explains the concept developed through the game in more detail.

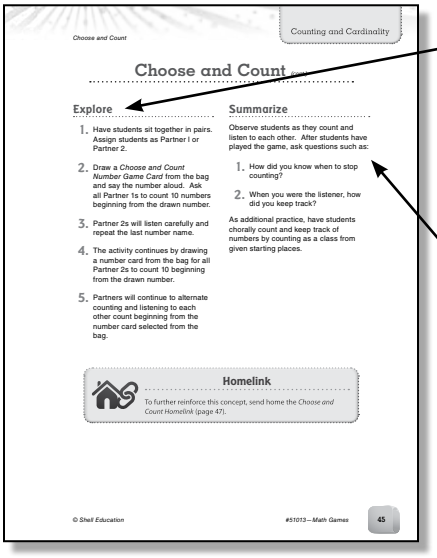
Prepare

This section explains how to prepare the game materials.

Set the Stage

In this phase of the lesson, the teacher provides students with critical information to lay the framework for conceptual understanding and game play.

How to Use This Book *(cont.)*



Choose and Count

Counting and Cardinality

Choose and Count (cont.)

Explore

1. Have students sit together in pairs. Assign students as Partner I or Partner 2.
2. Draw a *Choose and Count Number Game Card* from the bag and say the number aloud. Ask all Partner 1s to count 10 numbers beginning from the drawn number.
3. Partner 2s will listen carefully and repeat the last number name.
4. The activity continues by drawing a number card from the bag for all Partner 2s to count 10 beginning from the drawn number.
5. Partners will continue to alternate counting and listening to each other count beginning from the number card selected from the bag.

Summarize

Observe students as they count and listen to each other. After students have played the game, ask questions such as:

1. How did you know when to stop counting?
2. When you were the listener, how did you keep track?

As additional practice, have students chorally count and keep track of numbers by counting as a class from given starting places.

Homelink

To further reinforce this concept, send home the *Choose and Count Homelink* (page 47).

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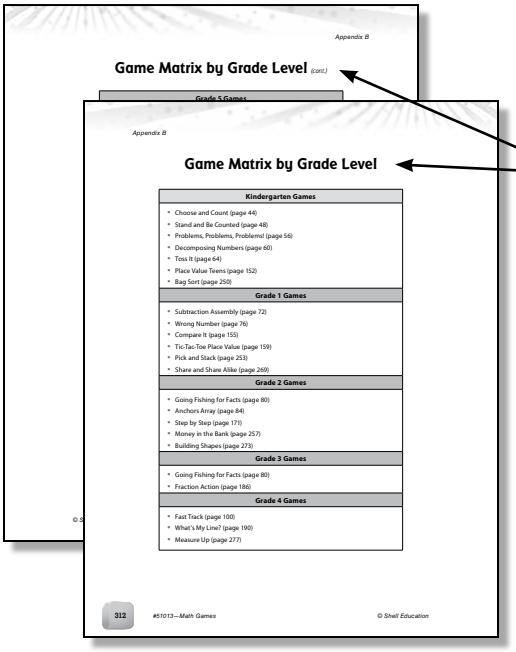
Explore

Here students are engaged in the game. Teachers are moving about the room collecting information pertaining to students' reasoning and thinking. Student pairs or groups that get stuck need to be offered hints or cues and not provided direct answers. Teachers encourage the pairs or teams to reason it out.

Summarize

Here the concept is presented and discussed. Students are encouraged to share their thoughts. Teachers gently guide the discussion with questions and provide opportunities for students to think. With difficult questions, students are provided opportunities to discuss possible solutions with their partner.



Appendix B

Game Matrix by Grade Level (cont.)

Grade 5 Games

Appendix B

Game Matrix by Grade Level

Kindergarten Games
• Choose and Count (page 44)
• Stand and Be Counted (page 48)
• Problems, Problems, Problems! (page 56)
• Decomposing Numbers (page 60)
• Toss It (page 64)
• Place Value Teens (page 152)
• Bag Sort (page 250)
Grade 1 Games
• Subtraction Assembly (page 72)
• Wrong Number (page 76)
• Compare It (page 155)
• Tic-Tac-Toe Place Value (page 159)
• Pick and Stack (page 253)
• Share and Share Alike (page 269)
Grade 2 Games
• Going Fishing for Facts (page 80)
• Anchors Away (page 84)
• Step by Step (page 171)
• Money in the Bank (page 257)
• Building Shapes (page 273)
Grade 3 Games
• Going Fishing for Facts (page 80)
• Fraction Action (page 186)
Grade 4 Games
• Fast Track (page 100)
• What's My Line? (page 190)
• Measure Up (page 277)

312 #51013—Math Games © Shell Education

Grade Level Game Matrix

This matrix found on pages 312–313 can be used to help determine which games are most appropriate for a specific grade level.

Digital Resource CD

All game resources and homelink letters can be found on the Digital Resource CD. For a complete list of files see pages 316–320.

Choose and Count

Standard

Count forward beginning from a given number within the known sequence (instead of having to begin at 1).

Concept Explanation

One of the very first skills children learn in mathematics is rote counting. Rote counting is saying a number in isolation without counting objects or things. Children usually learn the counting sequence, and then they learn that the last counting word means the amount of objects contained in the set of objects. The counting sequence for young students is a rote procedure. By kindergarten, students begin attaching meaning to the numeral names. At this level, the cardinality rule (that after counting a set of numbers, the last number name said is the quantity of that set) is critical. Another critical idea is that the order of counting the set does not matter, since the counter will get the same results. Counting develops slowly for kindergartners. Students learn to count forward beginning from a given number within the known sequence instead of always beginning at 1.

Game Overview

In this game, students will use numbered game cards and work in pairs to practice verbally counting numbers up to 100.

Materials

The resources to play this game are found on the Digital Resource CD (chooseandcount.pdf).

- small paper bag
- *Choose and Count Homelink* (page 47)

Prepare

Copy and cut up the *Choose and Count Game Number Cards* and place them in a paper bag.

Set the Stage

Provide frequent opportunities to count to 100 on an ongoing basis for students.

Choose and Count *(cont.)*

Explore

1. Have students sit together in pairs. Assign students as Partner I or Partner 2.
2. Draw a *Choose and Count Number Game Card* from the bag and say the number aloud. Ask all Partner 1s to count 10 numbers beginning from the drawn number.
3. Partner 2s will listen carefully and repeat the last number name.
4. The activity continues by drawing a number card from the bag for all Partner 2s to count 10 beginning from the drawn number.
5. Partners will continue to alternate counting and listening to each other count beginning from the number card selected from the bag.

Summarize

Observe students as they count and listen to each other. After students have played the game, ask questions such as:

1. How did you know when to stop counting?
2. When you were the listener, how did you keep track?

As additional practice, have students chorally count and keep track of numbers by counting as a class from given starting places.

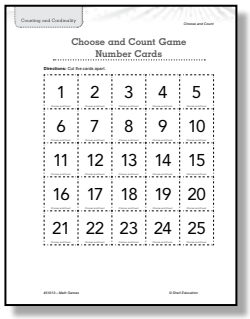
Homelink

To further reinforce this concept, send home the *Choose and Count Homelink* (page 47).

Choose and Count *(cont.)*

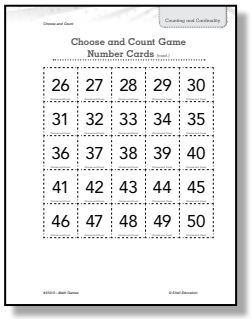
The following materials supporting this game can be found on the Digital Resource CD (chooseandcount.pdf).

Choose and Count Game Number Cards



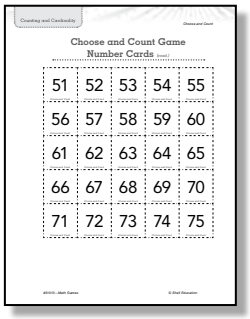
Choose and Count Game
Number Cards

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25



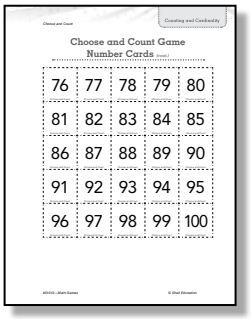
Choose and Count Game
Number Cards

26	27	28	29	30
31	32	33	34	35
36	37	38	39	40
41	42	43	44	45
46	47	48	49	50



Choose and Count Game
Number Cards

51	52	53	54	55
56	57	58	59	60
61	62	63	64	65
66	67	68	69	70
71	72	73	74	75



Choose and Count Game
Number Cards

76	77	78	79	80
81	82	83	84	85
86	87	88	89	90
91	92	93	94	95
96	97	98	99	100

Dear Family,

Your child is learning about counting and cardinality and should be able to:

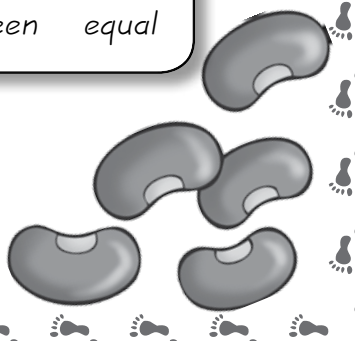
1. Know number names and count in sequence to 100.
2. Count to tell the number of objects.
3. Compare numbers.

Please try the following ideas with your child:

- Take a walk and count the number of steps you take.
- Count the number of cars that drive by your window in a five-minute span.
- Try scooping up two handfuls of pebbles or beans. Count the number of pebbles/beans in each hand. Compare. Which hand has more pebbles/beans?
- Look at all the numbers around you. There are numbers on houses and apartments, the television remote, license plates, food packages, telephone numbers, calendars, and much more. Ask your child to tell you the number he or she notices.

As you count and compare, use these math terms with your child:

number	count	small number	large number	less than
more than	even number	odd number	between	equal



Sincerely,