

Meeting the Standards with a Deck of Cards

TMTA Session 981

Saturday, September 22, 2007, 11:00 a.m. – 11:45 a.m.

Session Description

In this interactive session, participants will use a deck of cards to engage in activities that are correlated to the national and state mathematics standards.

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Games

Integer War
Salute
Fraction War
24 with playing cards
Set with playing cards
Area
Quiz Time

Standards References

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: Author. (See <http://standards.nctm.org/>.)

Tennessee Department of Education. (n.d.). *Curriculum standards mathematics*. Retrieved September 20, 2007, from <http://state.tn.us/education/ci/standards/>

Integer War

Using a standard deck of cards, or the cards from 1 (ace) to 10, cards are dealt to each student. Each student turns over a card. The first student to correctly add the numbers on the cards wins the hand and receives the cards. After all cards are played, the student with the most cards wins the game.

Variations – addition (positive only), multiplication (positive only), integers (black is positive, red is negative); the jack, queen, and king cards can be counted as 10, or as 11, 12, and 13, respectively.

NCTM Standard 1, Number and Operations

Understand meanings of operations and how they relate to one another.

Grades 3-5

Understand various meanings of multiplication and division.

Understand the effects of multiplying and dividing whole numbers.

Compute fluently and make reasonable estimates.

Grades 3-5

Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.

Tennessee Curriculum Standards, Number and Operations

1.3 Solve problems, compute fluently, and make reasonable estimates.

Grade 3 - Mentally calculate the sum or difference of any two numbers up to 100.

Grade 4 - Multiply and divide efficiently and accurately with single-digit whole numbers.

Grade 5 - Add, subtract, multiply, and divide whole numbers and decimals.

Grade 6 - Select and use appropriate methods and tools for computing with whole numbers, fractions, decimals, and percents in problem-solving situations (e.g., mental computation, estimation, calculators, computers, paper and pencil).

Grade 7 - Select and use appropriate methods and tools for computing with whole numbers, fractions, decimals, percents, and integers in problem solving situations (e.g., mental computation, estimation, calculators, computers, paper and pencil).

Grade 8 - Select and use appropriate methods and tools for computing with whole numbers, fractions, decimals, percents, and integers in problem-solving situations (e.g., mental computation, estimation, calculators, computers, paper and pencil).

Salute

One general and two privates are needed for this game. Each private has half of a deck of cards, using 1 (ace) through 10. When the general says, “salute,” each private deals one card away from the deck and holds it face-up on his or her forehead. The general computes and states the product of the two numbers (positive only). Each private must find the value of the card on his or her forehead.

Variation – integers (black is positive, red is negative).

NCTM Standard 1, Number and Operations

Understand meanings of operations and how they relate to one another.

Grades 3-5

Understand various meanings of multiplication and division.

Understand the effects of multiplying and dividing whole numbers.

Compute fluently and make reasonable estimates.

Grades 3-5

Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.

Tennessee Curriculum Standards, Number and Operations

1.3 Solve problems, compute fluently, and make reasonable estimates.

Grade 3 - Mentally calculate the sum or difference of any two numbers up to 100.

Grade 4 - Multiply and divide efficiently and accurately with single-digit whole numbers.

Grade 5 - Add, subtract, multiply, and divide whole numbers and decimals.

Grade 6 - Select and use appropriate methods and tools for computing with whole numbers, fractions, decimals, and percents in problem-solving situations (e.g., mental computation, estimation, calculators, computers, paper and pencil).

Grade 7 - Select and use appropriate methods and tools for computing with whole numbers, fractions, decimals, percents, and integers in problem solving situations (e.g., mental computation, estimation, calculators, computers, paper and pencil).

Grade 8 - Select and use appropriate methods and tools for computing with whole numbers, fractions, decimals, percents, and integers in problem-solving situations (e.g., mental computation, estimation, calculators, computers, paper and pencil).

Fraction War

Each student has a numerator and a denominator. The student who has the larger fraction receives the cards. After all cards are played, the student with the most cards wins the game.

NCTM Standard 1, Number and Operations

Understand numbers, ways of representing numbers, relationships among numbers, and number systems

Grades 6-8

Work flexibly with fractions, decimals, and percents to solve problems.

Compare and order fractions, decimals, and percents efficiently and find their approximate locations on a number line.

Tennessee Curriculum Standards, Number and Operations

1.2 Understand operations and how they relate to one another.

Grade 6 - Understand the meaning and effects of arithmetic operations on fractions and decimals.

Grade 7 - Understand the meaning and effects of arithmetic operations with fractions and decimals.

Grade 8 - Understand the meaning and effects of arithmetic operations with fractions, decimals, and integers.

1.3 Solve problems, compute fluently, and make reasonable estimates.

Grade 6 - Analyze procedures for computing with fractions, decimals, and integers.

Grade 7 - Analyze procedures for computing with fractions, decimals, and integers.

Grade 8 - Develop and analyze procedures for computing with fractions, decimals, and integers.

24 with playing cards

Using a standard deck of cards, or cards from 1 (ace) to 10, place four cards face-up on the table. Each student, in turn, will use the cards to find a value of 24 using the correct order of operations for addition, subtraction, multiplication, and division. The student takes the cards used. Empty slots are filled with new cards. Play continues until the deck is used. If a value of 24 cannot be reached, add another card to the table. The jack, queen, and king cards can be counted as 10 and/or as 11, 12, and 13, respectively.

NCTM Standard 1, Number and Operations

Understand meanings of operations and how they relate to one another.

Grades 3-5

Understand various meanings of multiplication and division.

Understand the effects of multiplying and dividing whole numbers.

Compute fluently and make reasonable estimates.

Grades 3-5

Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.

NCTM Standard 6, Problem Solving

Grades P-12

Apply and adapt a variety of appropriate strategies to solve problems.

Monitor and reflect on the process of mathematical problem solving.

NCTM Standard 7, Reasoning and Proof, Grades P-12

Select and use various types of reasoning and methods of proof.

NCTM Standard 8, Communication, Grades P-12

Use the language of mathematics to express mathematical ideas precisely.

Tennessee Curriculum Standards, Number and Operations

1.3 Solve problems, compute fluently, and make reasonable estimates.

Grade 3 - Mentally calculate the sum or difference of any two numbers up to 100.

Grade 4 - Multiply and divide efficiently and accurately with single-digit whole numbers.

Grade 5 - Add, subtract, multiply, and divide whole numbers and decimals.

Grade 6 - Select and use appropriate methods and tools for computing with whole numbers, fractions, decimals, and percents in problem-solving situations (e.g., mental computation, estimation, calculators, computers, paper and pencil).

Grade 7 - Select and use appropriate methods and tools for computing with whole numbers, fractions, decimals, percents, and integers in problem solving situations (e.g., mental computation, estimation, calculators, computers, paper and pencil).

Grade 8 - Select and use appropriate methods and tools for computing with whole numbers, fractions, decimals, percents, and integers in problem-solving situations (e.g., mental computation, estimation, calculators, computers, paper and pencil).

Set with playing cards

Place 12 cards, face up, on the table as a 3 by 4 array. When a set can be seen, the student says, “set,” and removes the cards. After all cards have been played, the winner is the student with the most cards.

Sets include the following:

Three of a kind, e.g., 7 of hearts, 7 of diamonds, 7 of clubs

Three in a row, all of the same suit, e.g., 3 of hearts, 4 of hearts, 5 of hearts

Three in a row, all different suits, e.g., 8 of clubs, 9 of hearts, 10 of diamonds

Ace can be before 2 or after king.

NCTM Standard 2, Algebra

Understand patterns, relations, and functions

Grades 3-5

Describe, extend, and make generalizations about geometric and numeric patterns.

Represent and analyze patterns and functions, using words, tables, and graphs.

Grades 6-8

Represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic rules.

NCTM Standard 7, Reasoning and Proof, Grades P-12

Select and use various types of reasoning and methods of proof.

NCTM Standard 10, Representation, Grades P-12

Use representations to model and interpret physical, social, and mathematical phenomena.

Tennessee Curriculum Standards, Algebra

2.1 Sort and classify objects by size, number, and other properties.

Grade 3 - Sort objects by two or more attributes; Devise, carry out, and explain a sorting scheme for a group of objects; Identify the rules by which objects or numbers have been sorted.

See <http://www.setgame.com/>

Area

1. Find the length, width, perimeter, and area of the playing card using U.S. customary units.
2. Find the length, width, perimeter, and area of the playing card using metric units.
3. If the playing card is an irregular shape, trace it on a piece of graph paper (square-inch or square-centimeter) to estimate the area.
4. Place one vertex of the playing card at the origin on a coordinate plane of square-inch paper. To the nearest inch, label all vertices. Use both portrait and landscape orientations in each of the four quadrants.

NCTM Standard 3, Geometry

Specify locations and describe spatial relationships using coordinate geometry and other representational systems.

Grades 3-5

Make and use coordinate systems to specify locations and to describe paths.

Apply transformations and use symmetry to analyze mathematical situations.

Grades 3-5

Predict and describe the results of sliding, flipping, and turning two-dimensional shapes.

Identify and describe line and rotational symmetry in two- and three-dimensional shapes and designs.

Grades 6-8

Describe sizes, positions, and orientations of shapes under informal transformations such as flips, turns, slides, and scaling.

Examine the congruence, similarity, and line or rotational symmetry of objects using transformations.

NCTM Standard 4, Measurement

Understand measurable attributes of objects and the units, systems, and processes of measurement.

Grades 3-5

Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute.

Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.

Grades 6-8

Understand both metric and customary systems of measurement.

Apply appropriate techniques, tools, and formulas to determine measurements.

Grades 3-5

Develop strategies for estimating the perimeters, areas, and volumes of irregular shapes.

Tennessee Curriculum Standards, Geometry

3.3 Recognize and apply flips, slides, and turns.

Grade 3 - Predict and describe the results of sliding, flipping, and turning in two-dimensional shapes.

3.2 Specify locations and describe spatial relationships using coordinate geometry.

Grade 4 - Use appropriate mathematical language to find and specify points on a grid using whole number coordinates.

Grade 5 - Find and specify points in Quadrant I of a coordinate system.

3.3 Apply transformations and use symmetry to analyze mathematical situations.

Grade 4 - Investigate, predict, and describe the results of transformations of two-dimensional geometric figures (i.e., slides, flips, turns); Describe a motion that will show that two shapes are congruent.

Grade 5 - Investigate, predict, and describe the results of transformations of two-dimensional figures (i.e., slides, flips, turns); Describe line and rotational symmetry in two-dimensional figures; Describe a motion or a series of motions that will show that two shapes are congruent.

Grade 6 - Investigate, predict, and describe the results of transformations of two-dimensional figures (e.g., slides, flips, turns); Describe line and rotational symmetry in two-dimensional figures; Describe a motion or a series of motions that will show that two shapes are congruent.

Grade 7 - Relate symmetry and congruence to reflections about a line.

Grade 8 - Relate symmetry and congruence to reflections about a line.

Tennessee Curriculum Standards, Measurement

4.1 Demonstrate understanding of units of measure and measurable attributes of objects.

Grade 3 - Demonstrate understanding of the concepts of perimeter, area, and capacity.

4.1 Understand measurable attributes of objects and the units, systems, and processes of measurement.

Grade 4 - Demonstrate understanding of the concepts of length, perimeter, area, weight, capacity, volume, time, and angle measure; Apply appropriate estimation strategies using standard units of measure.

Grade 5 - Demonstrate understanding of the concepts of length, perimeter, circumference, area, weight, capacity, volume, elapsed time, and angle measure; Demonstrate understanding that measurements are approximations.

Grade 6 - Understand both metric and customary systems of measurement.

Grade 7 - Understand both metric and customary systems of measurement.

Grade 8 - Understand both metric and customary systems of measurement.

Quiz Time

For a 10-item, true-false quiz, a student decides to use a deck of playing cards to select answers. Red will represent “true” and black will represent “false.” After randomly drawing a card and recording the answer, replace the card within the deck so that each card will be as likely to be drawn for each of the quiz items. What the student doesn’t know is that the teacher made up the answer key in the same manner. Using two decks of cards, simulate the teacher’s answer key and the student’s answers. Approximately what percent of quiz items will be correct? Write this value as a fraction, a decimal, and a percent.

Variation – Use the four card suits, clubs, diamonds, hearts, and spades, to represent multiple-choice answers, “a,” “b,” “c,” and “d.” Approximately what percent of quiz items will be correct? Write this value as a fraction, a decimal, and a percent.

NCTM Standard 5, Data Analysis and Probability **Understand and apply basic concepts of probability**

Grades 3-5

Predict the probability of outcomes of simple experiments and test the predictions.

Understand that the measure of the likelihood of an event can be represented by a number from 0 to 1.

NCTM Standard 9, Connections, Grades P-12

Recognize and apply mathematics in contexts outside of mathematics.

NCTM Standard 10, Representation, Grades P-12

Create and use representations to organize, record, and communicate mathematical ideas.

Use representations to model and interpret physical, social, and mathematical phenomena.

Tennessee Curriculum Standards, Data Analysis

5.4 Understand and apply basic concepts of probability.

Grade 4 - Predict the probability of outcomes of simple experiments.

Grade 5 - Use a sample space to predict the probability of an event; Understand that the measure of the likelihood of an event can be represented as a number from 0-1.

Grade 6 - Model situations by devising and carrying out experiments and simulations.

Grade 7 - Connect the symbolic representation of a probability to an experiment.

Grade 8 - Connect the symbolic representation of a probability to an experiment.