

Games - Are Students Learning or Just Having Fun?

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Overview

The Everyday Mathematics Program uses games as a motivational way for students to learn. The program takes the mathematical concepts students should know and incorporates them into games, so that the students could enjoy learning. The games are used as a way for students to practice skills teachers present in the classroom in a way that is not tedious and boring. The teachers could continually teach new concepts and use the games to practice previous skills. The students could also play the games at home. Many of the games that the Everyday Mathematics Program would use include material students have at home, which makes it more convenient. They would also be able to share their learning experience with others at home. The program states that the games are not used so that the students are in continual competition, but they are a way for students to practice skills without the typical paper and pencil. They are not to be used as time-killers or rewards. The games are simply a way for students, grades K through 5, to learn basic skills with excitement and be ready to conquer additional learning obstacles as they travel through their learning experience. This unit is designed for teachers to see how games may and may not work in the classroom, and give a quick reference of games for teachers to use when students are struggling with basic skills needed to succeed in middle school.

Rationale

I chose to research Everyday Math games because throughout my teaching experience, I often hear complaints about the Everyday Mathematics lacking the drill students need to learn a skill. The program uses the games for students to practice skills, and states that **YOU MUST PLAY THE GAMES**. When I noticed the strong emphasis on games as opposed to drill, I decided to research why the program felt that games were more effective.

When being compared to drill exercises, the program favors games for several reasons. One of the reasons why the program favors games is because drill tends to become tedious and gradually loses its effectiveness. On the other hand, playing a game relieves the tedium -- children enjoy them. Children often wish to play the games during lunch, recess and their free time. Another reason is that drill exercises aim primarily at building fact and operations skills. Practicing through games shares those same objectives, but at the same time, the games in the program often reinforce other skills. For example, calculator skills, money exchange and shopping skills, logic, geometric intuition, and probability and chance intuition because most games involve numbers that are generated randomly. Using games to practice number skills also greatly reduces the need for worksheets. Because the numbers in most games are

generated randomly, the games can be played over and over without repeating the same problems. Many of their games come with variations that allow the players to progress from easy to more challenging versions. Games practice, therefore, offers an almost unlimited source of problem material.

I think the program has very good intentions, but as a teacher who actually teaches the program, I see both positive and negative aspects of the program when it comes to the games.

I believe that the games are a very motivating way to get students to learn. It helps the students who would ordinarily shut down, because when it comes to working or learning new things, they actually want to participate. I also think it is very good for communication skills and teaching students how to deal with situations that may arise in the real world. Often I've seen students working with students they haven't talked to all year. But, when it came to a game, they were willing to play with anyone who wanted to play with them. Also, whenever a situation occurred whereas there was a disagreement, the students would tend to handle the altercation on their own. What was important to them was not to fight or get the teacher involved, but to continue playing the game. The games are also a way for students to get peer help instead of teacher help all the time. I've read research that states the positive outcomes of peer help versus teacher help, because a student can relate to the explanation of another student their age as opposed to a teacher who may see things from a different point of view. Another positive aspect of the games is that the teacher is able to use informal assessment. While the students are playing the games the teacher can walk around and observe those who are picking up the new skills and those who are going to need more practice. It eliminates some of the test anxiety students get when they see a paper with TEST written across the top.

There are also negative aspects of the games. Many teachers do not always get to the games. One lesson has about three different concepts you need to present to the students for that day. After those concepts are presented, the program then tells teachers to play a particular game to practice a skill from a previous lesson. By this time it is either time to get to something else or the students are so mentally drained that they would like to move on to something else. What about the students who do not have self control? When they hear the word "game," they think of time to have fun and lose the concept that the games are for learning. When they get upset because they have lost or because someone cheated, either a fight breaks out or the game pieces are flying across the room. You can't always get rid of the students because they are there to learn just as the others; therefore, many teachers skip the games to avoid those situations -- then the student practice is lost.

For a classroom where all the students get along, the students are very well behaved. The students are very eager to learn and the math games would be wonderful. As a teacher, there are few classrooms that consist of all the students being that way. The Everyday Math program puts too much emphasis on the games as the way for students to practice skills, and in reality the games are not played. I

think the games should be used as alternative practice techniques, but not the primary source for practicing skills.

The program does understand that the issue of competition is something that many teachers criticized when it came to the games and therefore tried to make teachers understand that there are many good things fair competition can generate -- such as, excitement, feistiness, independence and challenge. They also promote the idea that game rules may be changed to fit the players' needs for fairness, harmony, and equality. It is possible to modify most of their games so that children practice the same number skills, but work cooperatively. The challenge and excitement will come from the process: working together, making some joint decisions, doing one's best, and having fun. Yet, again, I say that some students have a very hard time working with other students. And, to avoid the conflict, many teachers would rather not deal with the games so much as the primary source of practice.

While attending the Looking at Everyday Mathematics class, I've noticed that teachers are unaware of the game practices teachers use at each grade level. The class contains a mixture of elementary, middle, and high school teachers. Through discussion we were able to enlighten each other of what is presented at the levels we teach. I found that quite often routines are lost due to lack of communication throughout the students learning experience. Teachers come up with many different creative ways to have students practice and that is wonderful, but often the practice from the curriculum is lost. If teachers knew what practices were used previously to a student entering their class, then continuing the same practices could result in more positive outcomes. For example, a student may enter the 6th grade lacking basic multiplication skills. If there was a game taught back in the 3rd grade that focused on basic multiplication, the 6th grade teacher should still be able to incorporate that game into their lesson to allow the student the practice they would need. It would be something the student was already aware of and it would show consistency throughout the educational system. Often times it's hard for teachers to communicate if they are not in the same building. I decided to look through all of the games the Everyday Mathematics curriculum has to offer and see which games would be helpful for teachers who are not in the elementary schools to use for students who enter middle school lacking basic skills. (It is hard for teachers to grasp the fact that students enter middle school lacking basic skills, but in reality it does happen). It is hard for a teacher to move on to more difficult concepts if a student does not have the basics, therefore, I searched for games middle school teachers could use for basic multiplication, division, fractions, and simple algebra.

Multiplication Wrestling

Objective: The students will multiply numbers to get the largest product of two 2-digit numbers.

Classroom Use: Teachers could have the students work with a partner to practice multiplication skills.

Standard: Mathematics Standard #2.

Materials: 1 deck of 0-9 number cards (4 of each number for a total of 40 cards).

Summary: This game allows students to use different multiplication strategies to multiply multi-digit numbers.

(Directions and Game Pieces in Game Index)

Multiplication Bullseye

Objective: The students will multiply numbers to try to find a product that falls within a target range.

Classroom Use: Teachers could have students work with a partner to practice multiplication skills.

Standard: Mathematics Standard #2.

Materials: 1 deck of number cards, four each of the numbers 0-9, a 6-sided die, calculator.

Summary: This game allows students to practice multiplication skills and also make important decisions about what numbers to form so that the product falls within the target range. Estimation is another skill that will play a part in being able to play this game successfully.

(Directions and Game Pieces in Game Index)

Multiplication Coin-Drop/Division Coin-Drop

Objective: The students will multiply or divide numbers to get the most pennies from the bank.

Classroom Use: The teacher could have students of 2-4 players working in small groups to practice multiplying and dividing numbers.

Standard: Mathematics Standard #2.

Materials: 5 pennies for each player, another 5 pennies per player to be in the bank, playing mat (depends on if you are playing with multiplication or division), slate.

Summary: This game allows students to practice multiplication and division skills.

(Directions and Game Pieces in Game Index)

Fraction Action, Fraction Friction

Objective: The students will add fractions to get as close as possible to a sum of 2.

Classroom Use: The teacher could have students of 2 or 3 working in small groups to practice adding fractions.

Standard: Mathematics Standard #1.

Materials: 1 set of Fraction Action, Fraction Friction cards, calculator.

Summary: This game allows students to practice adding fractions with like and unlike denominators. The student selects as many fraction cards as needed to get as close to 2 as possible. The student that correctly adds their fractions and gets a sum closest to 2 is the winner of the round.

(Directions and Game Pieces in Game Index)

Fraction Percent Concentration

Objective: The students will determine if the fraction and the percent given are equivalent.

Classroom Use: The teacher could have students of 2 or 3 working in small groups to practice identifying fractions and percents that are equivalent. The teacher decides which fractions and percents to put on the tiles depending on the students.

Standard: Mathematics Standard #1.

Materials: 1 set of Fraction/Percent Tiles, calculator

Summary: This game is similar to the game of Memory. It allows students to practice finding fractions and percents that are equivalent. According to the students ability the fractions could range in difficulty.

(Directions and Game Pieces in Game Index)

Algebra Election

Objective: The students will solve algebra problems in order to win electoral votes from a state.

Classroom Use: The teacher could have two teams, each team containing two students to practice solving algebra problems.

Standard: Mathematics Standard #5.

Materials: 4 pennies or other small counters, scratch paper, 1 six-sided die, 32 Problem cards, pencil, an Electoral Vote Map.

Summary: This is a game that incorporates both mathematics and geography. It allows the students to solve algebra problems in order to win states electoral votes. It includes

using a map and also should be used as a way for students to become familiar with the importance of voting.

(Directions and Game Pieces in Game Index)

Additional Everyday Mathematics Games List Grades 4-6

Arithmetic Election

Spoon Scramble

Angle Tangle

Spreadsheet Scramble

Baseball Multiplication

Top-It Subtraction/Multiplication

Beat the Calculator

Top-It Pos. and Neg. Numbers/Fractions

Build-It

World Tour Mancala

Buzz

Nine Men's Morris

Bizz-Buzz

Penny Toss

Broken Calculator

Five Eyes

Calculator 10,000

Patollii

Credits/Debits Game

Doggone Decimal

Division Dash

Estimation Squeeze

Exponent Ball
Factor Captor
Frac-Tac-Toe
Getting to One
Grid Search
Hidden Treasure
High-Number Toss
High –Number Toss-Decimal Version
Name That Number
Polygon Sort
Scientific Notation Toss
Solution Search

As I read through my paper, I thought about the experiences I've had with the Everyday Mathematics Program. There were a few questions that I could not erase from my mind. Why do students enter middle school still not knowing basic multiplication facts? Are they getting enough practice? That's when I decided to explore the Everyday Mathematics Games Curriculum to see how many of the games actually have the students practice multiplication skills.

I found the program has a game called Array Bingo that is played in the 2nd grade, which has the students identify facts pictorially. The students are able to see how rows and columns are associated with multiplication. They also play Multiplication Coin-Drop and Multiplication Draw. Both of the games have the students practice basic multiplication facts 0-9. In the 3rd grade, the students are introduced to several games which have the students practice multiplication, such as: Baseball Multiplication, Calculator Multiplication, and Multiplication Bingo. These games allow the students to multiply numbers 0-10. They also involve the students in a different thinking process. Instead of the students finding the products, they are given the products and have to name the factors or they have to find products of numbers that fall into a particular range. The students still play Multiplication Coin-Drop and Multiplication Draw, but the rules change to increase the level of difficulty. In the 4th grade, the students are introduced to Multiplication Top-It and Multiplication Wrestling. These multiplication games have the students practice two-digit multiplication facts. Baseball Multiplication is played again, but at the two-digit level. Finally, in the 5th grade, the students are introduced to Multiplication Bullseye, which has the students practice multi-digit multiplication facts. The students also exercise estimation skills when playing this game. Multiplication Wrestling and Multiplication Top-It are played from 4th grade and Baseball Multiplication from 3rd grade, at a higher level of difficulty.

Following this spiral of games shows me that the program has very good intentions when it comes to having the students practice multiplication skills throughout a student's elementary learning experience, but I'm not convinced that the games are very effective at having the students confidently know their multiplication.

I feel that games ultimately put the students in the mind frame of “I want to win the game,” instead of “I need to learn this concept.”

Conclusion

Overall, I think the idea of having students practice skills through games is a good idea. However, I feel that the Everyday Mathematics program depends too much on the games as a way for students to practice skills. The games just simply do not work for all students. It should be at the teacher’s discretion whether or not they feel a game would benefit the students learning experience. The games should be used as an alternative resource for practicing skills, not the primary resource.

Game Instructions

and

Game Pieces

Multiplication Bullseye

Materials: number cards (4 each of the numbers 0 through 9), a 6-sided die, a calculator

Number of players: 2

Directions: Shuffle the cards and place them facedown on the playing surface. The players will take turns.

At each turn the player will:

1. Roll the die. Look up the target range of the product in the table.

| Number on Die | Target Range of Product |
|---------------|-------------------------|
| 1 | 500 or less |
| 2 | 501- 1000 |
| 3 | 1001- 3000 |
| 4 | 3001- 5000 |
| 5 | 5001- 7000 |
| 6 | More than 7000 |

2. Draw 4 cards from the top of the deck.

3. Use the cards to try to form 2 numbers whose product falls within the target range.

Please Do Not Use a Calculator. You need not use all 4 cards and you may not begin with 0.

4. Use the calculator to multiply the 2 numbers to determine whether the product falls within the target range. If it does, you have hit the bull's-eye and score 1 point. If it doesn't, you score 0 points.

The game ends when each player has had 5 turns. The player with the most points wins the game.

Sample turn

A player:

Rolls a 2. The target range of the product is between 501- 1000.

The player turns over a 5, 7, 2, and 9 from the deck of cards.

The player uses estimation to try to form 2 numbers whose product falls within the range- for example, 72 and 9.

The player finds the product to be 648 on the calculator.

Since the product is between 501- 1000, the player has hit the bull's-eye and scores 1 point.

Multiplication Wrestling

Materials: 1 deck of 0-9 number cards (4 of each number)

Number of players: 2

Object of the game: To get the largest product of two 2-digit numbers.

Directions: shuffle the cards and place them facedown. Each player draws 4 cards and forms two 2-digit numbers. Each player must pick a pair of numbers to use so that the problem will give her or him the highest product.

Example:

Player 1 draws

| | | | |
|---|---|---|---|
| 7 | 8 | 5 | 4 |
| 7 | 8 | 5 | 4 |

Player 1 forms 75 and 84.

Player 2 draws

| | | | |
|---|---|---|---|
| 6 | 9 | 1 | 4 |
| 6 | 9 | 1 | 4 |

Player 2 forms 64 and 91.

Each player creates two “wrestling teams” by writing each number as a sum of tens and ones.

Player 1:

| | | |
|--------|---|--------|
| 75 | * | 84 |
| Team 1 | | Team 2 |
| Team 2 | | |
| (70+5) | | (80+4) |
| (90+1) | | |

Player 2:

| | | |
|--------|---|----|
| 64 | * | 91 |
| Team 1 | | |
| | | |
| (60+4) | | |

Next, each player’s two wrestling teams wrestle each other in this way: Each member of the first team(for example,70 and 5) is multiplied by each member of the second team(for example, 80 and 4). Then the four products are added.

Player1:

(70+5) * (80+4)

$$(70*80) + (70*4) + (5*80) + (5*4) =$$

$$5600 + 280 + 400 + 20 = 6300$$

Player 2:

$$(60+4) * (90+1)$$

$$(60*90) + (60*1) + (4*90) + (4*1) =$$

$$5400 + 60 + 360 + 4 = 5824$$

The player with the larger result wins the round. To find the winner's score, subtract the loser's result from the winner's result and record the difference on the score sheet. For example, Player 1 scores 476 points for Round 1 because $6300 - 5824 = 476$. Player 2 scores no points.

| Player's Names | <i>Player 1</i> | <i>Player 2</i> |
|-----------------------|-----------------|-----------------|
| Round 1 | 476 | 0 |
| Round 2 | | |
| Round 3 | | |
| Total | | |

In each round, each player draws 4 new cards to form two new numbers. Play 3 rounds. Add the totals. The highest total wins the game.

Players may use a calculator to find the winner's score for a round and their total score for the game. They may also use a calculator to check a player's score for a round by multiplying the two numbers. (For example, to check Player 1's score, multiply $75 * 84$.)

Multiplication Coin-Drop

Materials: 5 pennies per player, another 5 pennies per player to be in the bank, playing mat, slate

Number of players: 2-4

Directions: Each player starts with five pennies. Place the playing mat on a soft, flat surface. In each round, players drop one of their pennies onto the game mat from about 1 foot above the mat. If the penny lands on a line between squares, the player moves the penny to either of the two squares. If the penny lands so that it touches more than one square, the player must decide which of the squares to use. If the penny does not land on the mat or lands on a square that already has a penny on it, the player tries again.

On their slates, players write the product of the numbers in the square on which their penny landed. The player with the highest product takes a penny from the bank.

Leave the coins on the mat and play another round. The player with the most counters at the end of 5 rounds wins the game.

Division Coin Drop

Materials: 5 pennies per player, another 5 pennies per player to be in the bank, playing mat, slate

Number of players: 2-4

Directions: *Division Coin Drop* is played in the same way as *Multiplication Coin Drop* except that the player with the highest quotient wins a round.

Multiplication Coin Drop Playing Mat

| | | | | | |
|--------------|--------------|--------------|--------------|--------------|--------------|
| 5 * 2 | 3 * 4 | 7 * 3 | 6 * 2 | 3 * 5 | 5 * 1 |
| 4 * 7 | 8 * 4 | 6 * 5 | 3 * 9 | 7 * 5 | 8 * 6 |
| 1 * 9 | 6 * 6 | 3 * 2 | 2 * 7 | 3 * 3 | 8 * 9 |
| 7 * 7 | 6 * 4 | 5 * 9 | 8 * 4 | 3 * 6 | 4 * 4 |
| 2 * 2 | 4 * 3 | 2 * 8 | 3 * 6 | 5 * 6 | 4 * 7 |
| 5 * 5 | 8 * 7 | 3 * 7 | 9 * 9 | 2 * 2 | 5 * 8 |
| 9 * 4 | 2 * 4 | 8 * 8 | 2 * 9 | 7 * 9 | 4 * 5 |
| 5 * 7 | 6 * 7 | 5 * 3 | 4 * 2 | 6 * 9 | 6 * 7 |

Multiplication Coin Drop Playing Mat (Advanced)

| | | | | | |
|-----------------|-----------------|-----------------|----------------|-----------------|-----------------|
| 30 * 4 | 3 * 500 | 5 * 20 | 60 * 2 | 70 * 3 | 500 * 1 |
| 80 * 300 | 700 * 5 | 4 * 70 | 3 * 900 | 6 * 50 | 800 * 60 |
| 60 * 40 | 3 * 600 | 70 * 7 | 800 * 4 | 50 * 9 | 400 * 4 |
| 400 * 3 | 50 * 6 | 20 * 20 | 30 * 6 | 20 * 8 | 400 * 7 |
| 80 * 7 | 2 * 200 | 50 * 50 | 90 * 90 | 300 * 70 | 50 * 8 |
| 2 * 40 | 70 * 90 | 900 * 40 | 2 * 900 | 800 * 8 | 4 * 50 |
| 600 * 6 | 30 * 300 | 100 * 9 | 20 * 7 | 30 * 20 | 80 * 9 |
| 600 * 7 | 6 * 900 | 50 * 700 | 40 * 20 | 50 * 3 | 6 * 700 |

Division Coin-Drop Playing Mat

| | | | | | |
|---------------|---------------|---------------|---------------|---------------|---------------|
| 14 ÷ 2 | 3 ÷ 3 | 15 ÷ 5 | 81 ÷ 9 | 10 ÷ 2 | 27 ÷ 9 |
| 49 ÷ 7 | 48 ÷ 6 | 16 ÷ 4 | 35 ÷ 5 | 28 ÷ 4 | 15 ÷ 3 |
| 14 ÷ 7 | 63 ÷ 9 | 12 ÷ 6 | 30 ÷ 3 | 30 ÷ 6 | 60 ÷ 6 |
| 54 ÷ 6 | 6 ÷ 2 | 18 ÷ 2 | 35 ÷ 7 | 72 ÷ 8 | 35 ÷ 7 |
| 45 ÷ 9 | 24 ÷ 8 | 27 ÷ 3 | 18 ÷ 2 | 45 ÷ 5 | 48 ÷ 8 |
| 72 ÷ 9 | 18 ÷ 6 | 20 ÷ 4 | 36 ÷ 9 | 24 ÷ 4 | 32 ÷ 4 |
| 12 ÷ 3 | 90 ÷ 9 | 28 ÷ 7 | 9 ÷ 3 | 36 ÷ 6 | 64 ÷ 8 |
| 21 ÷ 7 | 12 ÷ 3 | 36 ÷ 4 | 40 ÷ 5 | 56 ÷ 8 | 42 ÷ 6 |

Division Coin-Drop Playing Mat (Advanced)

| | | | | | |
|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| $3600 \div 60$ | $640 \div 80$ | $2800 \div 70$ | $120 \div 30$ | $90 \div 9$ | $9000 \div 3$ |
| $7200 \div 8$ | $350 \div 70$ | $1800 \div 2$ | $540 \div 6$ | $600 \div 200$ | $35000 \div 70$ |
| $280 \div 40$ | $1500 \div 300$ | $16000 \div 40$ | $490 \div 7$ | $48000 \div 6$ | $3500 \div 50$ |
| $240 \div 4$ | $32000 \div 4$ | $200 \div 4$ | $7200 \div 900$ | $180 \div 60$ | $360 \div 9$ |
| $56000 \div 80$ | $420 \div 6$ | $3600 \div 4$ | $2100 \div 700$ | $12000 \div 30$ | $40000 \div 5$ |
| $3000 \div 60$ | $60 \div 6$ | $12000 \div 60$ | $140 \div 7$ | $6300 \div 900$ | $30 \div 3$ |
| $100 \div 2$ | $2700 \div 9$ | $1500 \div 500$ | $1400 \div 20$ | $300 \div 3$ | $8100 \div 90$ |
| $45000 \div 50$ | $480 \div 8$ | $2700 \div 300$ | $450 \div 9$ | $2400 \div 8$ | $180 \div 2$ |

Fraction Action, Fraction Friction

Materials: 1 set of Fraction Action, Fraction Friction cards - A deck of 16 Fraction Action, Fraction Friction cards includes one card for each of the following fractions (for several fractions there are 2 cards): $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{1}{6}$, $\frac{5}{6}$, $\frac{1}{12}$, $\frac{5}{12}$, $\frac{7}{12}$, $\frac{11}{12}$; calculator

Number of players: 2 or 3

Object of the game: To gather a set of fraction cards with a sum as close as possible to 2, without going over.

Directions: Shuffle the Fraction Action, Fraction Friction cards. Deal one card to each player. The player with the fraction closest to $\frac{1}{2}$ begins the game.

Players return their cards to the deck. Shuffle the deck again. Place the file facedown between the players.

Players take turns. At each turn:

1. The player takes a card from the top of the pile and places it face up on the playing surface.
2. At each turn, the player must announce one of the following:

“Action!”

This means that the player would like an additional card. The player believes that the sum of the cards is not close enough to 2 to win the hand and that with an additional card, there is a good chance that the sum of the cards will be even closer to 2, without becoming greater than 2.

“Friction!”

This means that the player does not want an additional card. The player believes that the sum of the cards is close enough to 2 to win the hand and that with an additional card, there is a good chance that the sum of the cards will be greater than 2.

Play continues until all players have announced, “Friction!” or have a set of cards whose sum is greater than 2. The player whose sum is closest to 2 without going over is the winner of the hand. Players may check each other’s sums on their calculators.

Reshuffle the cards and begin again. The winner of the game is the first player to win 5 hands.

Fraction Action, Fraction Friction Card Deck

| | | | |
|-------------|-------------|--------------|--------------|
| 1/2 | 1/3 | 2/3 | 1/4 |
| 3/4 | 1/6 | 1/6 | 5/6 |
| 1/12 | 1/12 | 5/12 | 5/12 |
| 7/12 | 7/12 | 11/12 | 11/12 |

Fraction/Percent Concentration

Materials: 1 set of Fraction/Percent Cards, calculator

Number of players: 2 or 3

Directions: Place the cards facedown on the playing surface. Create 2 separate piles—a fraction pile and a percent pile. Mix up the cards in each pile.

Players take turns. At each turn, a player turns over a fraction card and a percent card. If the fraction card and the percent card are equivalent, the player keeps the cards. If the cards do not match, the player turns the cards facedown.

Players use a calculator to check each other's matches. A player who makes a mistake loses his or her next turn.

The game ends when all cards have been taken. The player with the most cards wins.

Fraction/Percent Cards

| | | | |
|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| 10% | 20% | 25% | 30% |
| 40% | 50% | 60% | 70% |
| 75% | 80% | 90% | 100% |
| $\frac{1}{2}$ | $\frac{1}{4}$ | $\frac{3}{4}$ | $\frac{1}{5}$ |
| $\frac{2}{5}$ | $\frac{3}{5}$ | $\frac{4}{5}$ | $\frac{1}{10}$ |
| $\frac{3}{10}$ | $\frac{7}{10}$ | $\frac{9}{10}$ | $\frac{2}{2}$ |

Algebra Election and Arithmetic Election

These directions apply to both Algebra Election and Arithmetic Election with two exceptions. First, each game has its own set of 32 Problem Cards. Second, in Arithmetic Election players have the option of using a calculator as explained in the Notes section.

Materials: 4 pennies or other small counters; 1 six-sided die; pencil; scratch paper; 32 Problem Cards, calculator; an Electoral Vote Map.

Number of players: 2 teams, each with 2 players

Object of the game: Players move their counters on a map of the United States. For each state, or the District of Columbia (DC), a player lands on, the player tries to win that state's electoral votes by solving a problem. The first team to collect 270 or more votes wins the election. Winning-team members become president and vice president.

Directions:

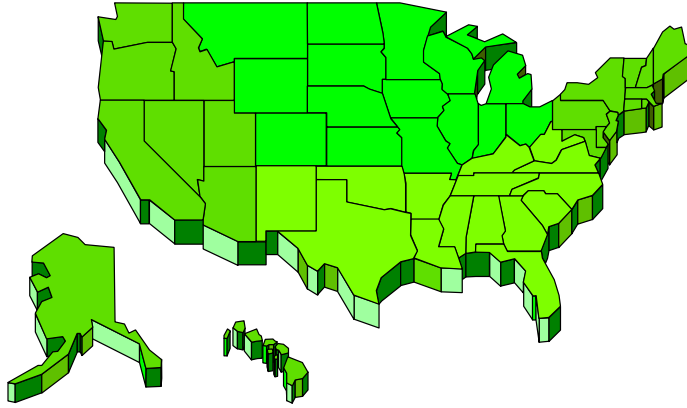
1. Each player puts a counter in Iowa (IA).
2. One member of each team rolls the die. The team with the higher roll goes first.
3. Turns alternate between teams and partners:
Team 1-Player 1; Team 2-Player 1; Team 1-Player 2; Team 2-Player 2.
4. Shuffle the Problem Cards and place them facedown in a pile.
5. The first player rolls the die. The result tells how many moves the player must make from the current state. Each new state counts as one move. Moves can be in any direction but must pass between states that share a common border.

Exception: Players can get to and from Alaska by way of Washington, and to and from Hawaii by way of California. Once a player has been in a state, the player cannot return to the state on the same turn.
6. The player makes the indicated number of moves and puts the counter in the last state landed on. The map names how many electoral votes the state has.
7. The player takes the top Problem Card. The state's number of electoral votes is substituted for x in the problem(s) on the card. The player solves the problem(s) and offers an answer. The other team checks the answer with a calculator.

8. If the answer is correct, the player's team wins the state's electoral votes. They do the following:
 - Write the state's name and its electoral votes on a scratch paper.
 - Write their first initials in pencil on the state to show that they have won it.Once a state is won, it is out of play. The opposing team may land on the state, but they cannot get its votes.
9. If the partners do not solve the problem(s) correctly, the state remains open. Any player may land on it and try to win its votes in a later turn.
10. The next player rolls the die and moves her or his counter.
11. The first team to get at least 270 votes wins the election.

Notes

- In the rules, "state" means "state or District of Columbia (DC)."
- Partners may explain the problem to each other. Each player, however, must answer the problem on her or his own.
- If a player does not want to answer a card, the player can say "Pass," and draw another card. A player may declare "Pass" twice during each round (32 cards).
- Some Problem Cards have several problems. In order to win a state's votes, the player must answer all questions correctly.
- For Arithmetic Election: Each player has three changes to use a calculator to solve problems during a game. One of the four players should keep track of how many times each person uses a calculator.
- It is helpful to have a strategy. Partners should look at the map to see which states have the most votes, and then work together to win those states.
- When all of the Problem Cards have been used, shuffle and use them again.
- Each player begins a turn from the last state she or he landed on.
- Some people who have played the game suggest the following:
 1. Agree on a time limit for answering problems.
 2. Give 1 extra point if the player can name the capital of the state landed on.
- A shorter version of the game can be played by going through all 32 cards just once. The team with the most votes is then declared the winner.



*If your marker does not fit on the state, put your marker on the state name.

| | | | |
|---------------|----|-----------------|----|
| Alabama | 9 | Nebraska | 5 |
| Alaska | 3 | Nevada | 4 |
| Arizona | 8 | New Hampshire | 4 |
| Arkansas | 6 | New Jersey | 15 |
| California | 54 | New Mexico | 5 |
| Colorado | 8 | New York | 33 |
| Connecticut | 8 | North Carolina | 14 |
| Delaware | 3 | North Dakota | 3 |
| Florida | 25 | Ohio | 21 |
| Georgia | 13 | Oklahoma | 8 |
| Hawaii | 4 | Oregon | 7 |
| Idaho | 4 | Pennsylvania | 23 |
| Illinois | 22 | Rhode Island | 4 |
| Indiana | 12 | South Carolina | 8 |
| Iowa | 7 | South Dakota | 3 |
| Kansas | 6 | Tennessee | 11 |
| Kentucky | 8 | Texas | 32 |
| Louisiana | 9 | Utah | 5 |
| Maine | 4 | Vermont | 3 |
| Maryland | 10 | Virginia | 13 |
| Massachusetts | 12 | Washington | 11 |
| Michigan | 18 | Washington D.C. | 3 |
| Minnesota | 10 | West Virginia | 5 |
| Mississippi | 7 | Wisconsin | 11 |
| Missouri | 11 | Wyoming | 3 |

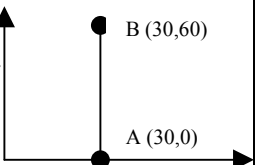
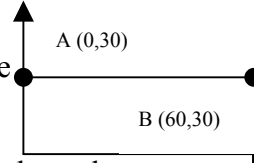
Montana

3

Algebra Election Cards, Set 1

| | | | | | | | | | | | | | | | |
|--|---|---|---|---|-----------------|---|------|----|------|----|------|----|-------|----|--|
| Find: x squared x to the fourth power $1/x$ | Find n . (Hint: n could be a negative number.) $1000 - n - x$ $1000 + n = -x$ | Complete $x * 10^6 =$ _____ million $x * 10^9 =$ _____ billion $x * 10^{12} =$ _____ | What is the value of n ? $--20 + x = n$ $--100 + (-x) = n$ | | | | | | | | | | | | |
| Insert parentheses in $10 * x - 10$ so that its value is greater than 0 and less than 100. | Find n . (Hint: n could be a negative number.) $n + 10 = x$ $n - 10 = x$ | What is the value of n ? $n = ((5 * x) - 4)/2$ | What is the value of n ? $20 + (-x) = n$ $--20 - (-x) = n$ | | | | | | | | | | | | |
| $T = B - (2 * h/1000)$ If $B = 80$ and $H = 100x$ What does T equal? | Find n . $n = (2 * x)/10$ $n + 1 = (2 * x)$ | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td rowspan="4" style="width: 40%; padding: 5px;"> Suppose you earn x dollars per hour. Complete the table. </td> <td style="width: 10%; padding: 5px;">Time</td> <td style="width: 10%; padding: 5px;">Earnings</td> <td rowspan="4" style="width: 40%; padding: 5px;"> Which is greater: X_2 or 10_3? X_3 or 10_4? </td> </tr> <tr> <td style="padding: 5px;">1 hr</td> <td style="padding: 5px;">\$</td> </tr> <tr> <td style="padding: 5px;">2 hr</td> <td style="padding: 5px;">\$</td> </tr> <tr> <td style="padding: 5px;">4 hr</td> <td style="padding: 5px;">\$</td> </tr> <tr> <td style="padding: 5px;">10 hr</td> <td style="padding: 5px;">\$</td> <td></td> </tr> </table> | Suppose you earn x dollars per hour. Complete the table. | Time | Earnings | Which is greater: X_2 or 10_3 ? X_3 or 10_4 ? | 1 hr | \$ | 2 hr | \$ | 4 hr | \$ | 10 hr | \$ | |
| Suppose you earn x dollars per hour. Complete the table. | Time | Earnings | | Which is greater: X_2 or 10_3 ? X_3 or 10_4 ? | | | | | | | | | | | |
| | 1 hr | \$ | | | | | | | | | | | | | |
| | 2 hr | \$ | | | | | | | | | | | | | |
| | 4 hr | \$ | | | | | | | | | | | | | |
| 10 hr | \$ | | | | | | | | | | | | | | |
| Tell whether each is true or false. $10 * x > 100$ $\frac{1}{2} * x * 100 < 10_3$ $X_3 * 1000 > 4 * 10_4$ | What number is this? $x * 10_2$? $x * 10_5$? | A boulder dropped off a cliff falls approximately $16 * X_2$ feet in x seconds. How many feet is that? | Which is less: $X_3 10/10$ or $(x + 10)_2$? $10 * x_2$ or $(x + 10)_3$? | | | | | | | | | | | | |

Algebra Election Cards, Set 2

| Is $1/x$ greater than, Less than, or equal to $1/10$? | Is point (x,x)  To the left of To the right Of, or on the Line through points A and B? | Tel which is correct for each: $<$, $=$, or $>$. $x < = > 30 - x$ $x < = > 20 - x$ $x < = > 10 - x$ | What is n ? $5 + 2 * x = n + x$ | | | | | | | | | | | | | |
|---|---|--|---|------|--|------|--|------|--|-------|--|--|--|--|---|---|
| Subtract. $X - 100 = ?$ $X - (-100) = ?$ | What is the value of n ? $10 + (-x) = n$ $-10 - (-x) = n$ | Name a number n such that $x - n$ is a negative number greater than -10 . | $\frac{x + \Delta \quad 200 \text{ oz}}{\Delta}$ 1 Δ weighs _____ ounces | | | | | | | | | | | | | |
| Add. $-25 + x = ?$ $x + 3 - 10 = ?$ | What is the median of 4, 8, 12, 13 and x ? | Suppose you have 10 markers and $2 * x$ markers. What is your balance? | Insert parentheses so that the equation is true. $10 * x + 4 = 10 * x + 40$ | | | | | | | | | | | | | |
| Suppose you travel x miles per hour. Complete the table. | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Time</th> <th style="width: 15%;">Distance</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1 hr</td> <td style="width: 60%;"></td> </tr> <tr> <td style="text-align: center;">2 hr</td> <td></td> </tr> <tr> <td style="text-align: center;">4 hr</td> <td></td> </tr> <tr> <td style="text-align: center;">10 hr</td> <td></td> </tr> <tr> <td style="text-align: center;"> </td> <td></td> </tr> </tbody> </table> | Time | Distance | 1 hr | | 2 hr | | 4 hr | | 10 hr | | | | If $(2 * x + n = 100$, what is the value of n ? | Suppose you have x markers and 40 markers. What is your balance. | Is point (x,x) above  below, or on the line through points A and B? |
| Time | Distance | | | | | | | | | | | | | | | |
| 1 hr | | | | | | | | | | | | | | | | |
| 2 hr | | | | | | | | | | | | | | | | |
| 4 hr | | | | | | | | | | | | | | | | |
| 10 hr | | | | | | | | | | | | | | | | |
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