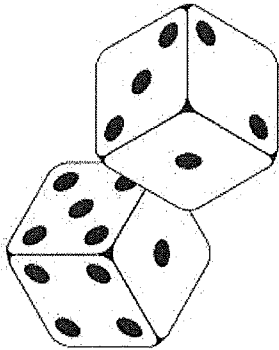


MATH GAMES!

**myPITA Fall Conference
2019**

**October 25-26, 2019
Rick Hansen Secondary**



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<https://bit.ly/2W4IHSp>

Resources thanks to:

Carole Fullerton - <https://mindfull.wordpress.com/>

Kim Sutton - <https://creativemathematics.com/>

NCTM - <https://www.nctm.org/>

Box Cars and One-Eyed Jacks -
<https://www.boxcarsandoneeyedjacks.com/>

Trevor Calkins- <https://poweroften.ca/>

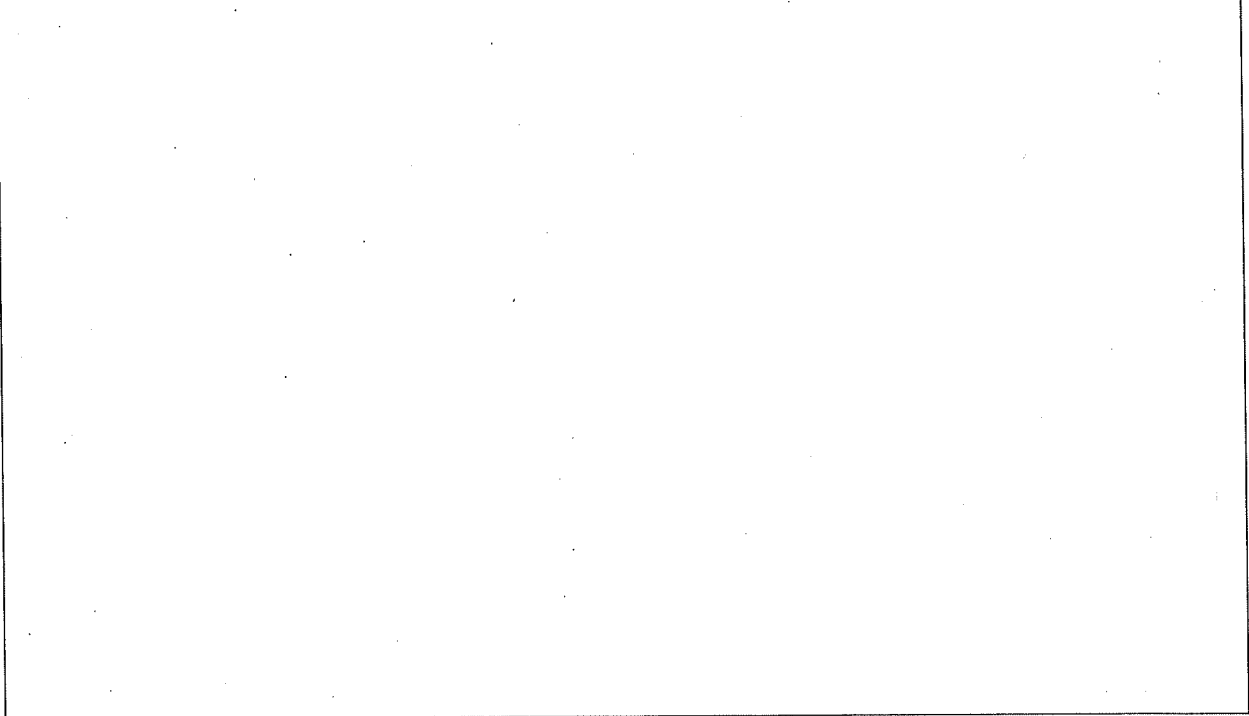
Other notable resources:

Math Makes Sense – Pearson

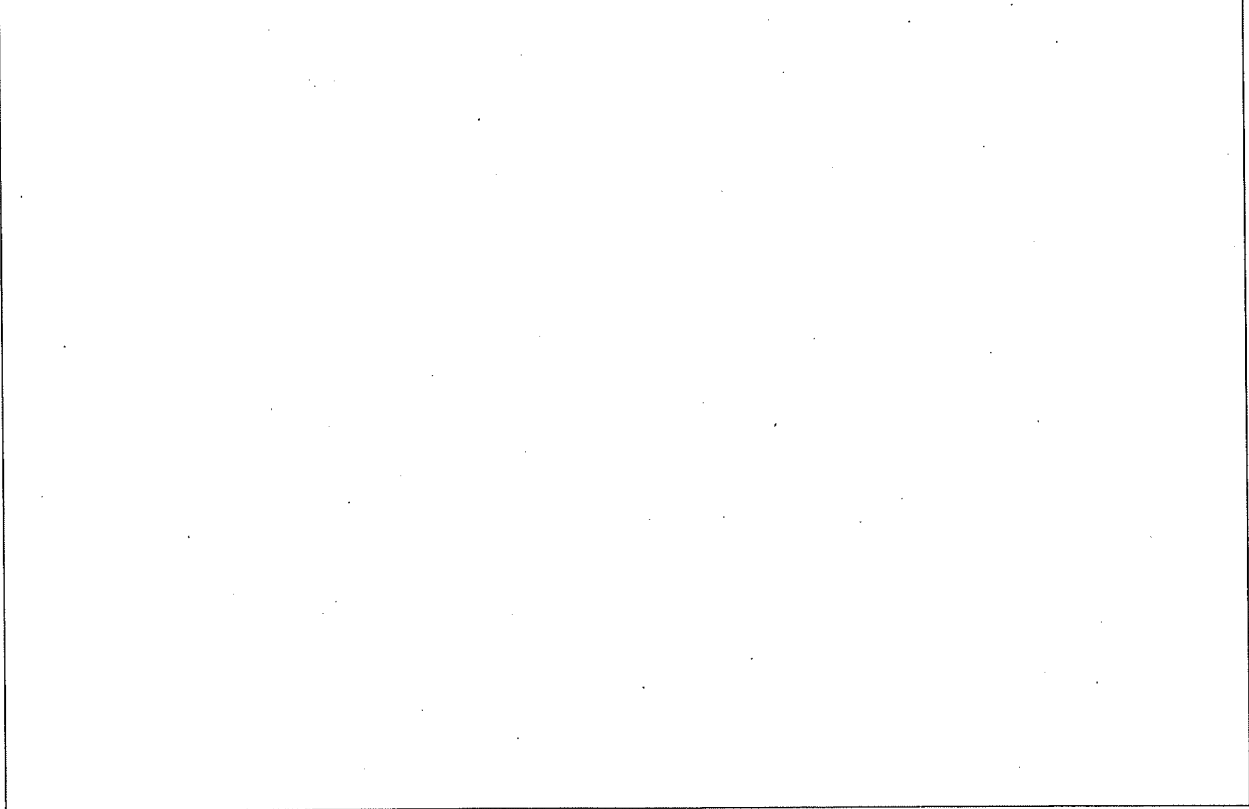
YouCubed Math – Jo Boaler

It's all about thinking – Collaborating to Support All Learners –
Brownlie, Fullerton, Schnellert

PLANTING NUMBERS ON THE NUMBER LINE:



PLACE VALUE AEROBICS:



BIG ROLLER

2 dice
2 players

Both players roll their die at the same time. The player with the biggest number wins one point.

The first player to earn five points is the winner.

ODD or EVEN

2 dice
2 players

Player One rolls two dice and adds the numbers together. If it's even, she wins a point. If it's odd, she loses her turn and the next player rolls.

The first player with 5 evens wins.

ROLL TO SIX

2 dice
2 players

Both players roll their die at the same time. Once a player rolls a one, he begins rolling again until he rolls a two, then a three and so on.

The first player to roll the numbers 1 to 6 wins.

GUESS MY NUMBER

2 dice
2 players

Player One rolls both dice and keeps the total secret from his partner.

Player Two guesses a number between 1 and 12. Player One tells him if the guess is too high, too low or just right. Then Player Two tries again.

When Player Two guesses the correct total, he wins and it's his turn to roll and have Player One figure out the sum.

Digit Cards

0

1

2

3

4

5

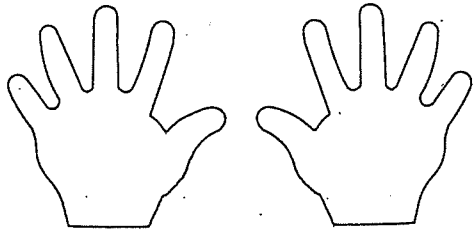
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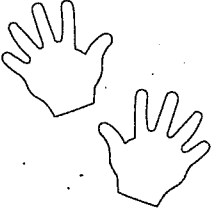
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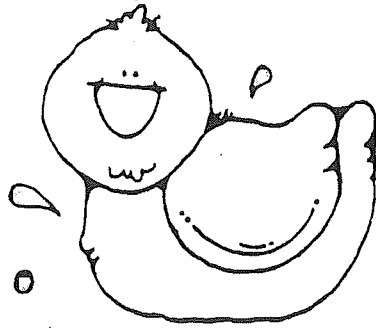
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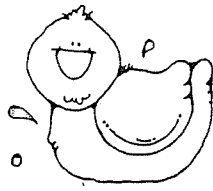


Partners for Ten Bump It

| | | | | |
|---|----|---|----|---|
| 2 | 10 | 9 | 4 | 6 |
| 8 | 3 | 5 | 0 | 1 |
| 6 | 4 |  | 10 | 7 |
| 0 | 9 | 5 | 8 | 3 |
| 1 | 2 | 4 | 6 | 8 |



Doubling Numbers

| | | | | |
|----|----|---|----|----|
| 14 | 18 | 4 | 10 | 0 |
| 6 | 14 | 16 | 8 | 6 |
| 16 | 2 |  | 14 | 10 |
| 12 | 16 | 18 | 4 | 14 |
| 10 | 12 | 2 | 8 | 12 |

SNAP!

WAR!

The Product Game

NAME: _____

Materials for each pair of students:

Several copies of the gameboard
2 paper clips
2 different colored markers

Allow your students to play the Product Game several times with their partners. Instruct them to look for interesting patterns and winning strategies.

Give them 10 minutes to free-write on their experience, asking them to reflect on strategies that worked or failed.

After they turn in their free-writes, facilitate a whole class discussion.

Product Games Rules

1. Player A puts a paper clip on a number in the factor list. Player A does not mark a square on the product grid because only one factor has been marked: it takes two factors to mark a product.
2. Player B puts the other paper clip on any number in the factor list (including the same number marked by Player A) and then shades or covers the product of the two factors on the product grid.
3. Player A moves either one of the paper clips to another number and then shades or covers the new product.
4. Each player in turn moves a paper clip and marks a product. If a product is already marked, the player does not get a mark for that turn. The winner is the first player to mark four squares in a row—up and down, across, or diagonally.

The Product Gameboard

| | | | | | |
|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 12 | 14 |
| 15 | 16 | 18 | 20 | 21 | 24 |
| 25 | 27 | 28 | 30 | 32 | 35 |
| 36 | 40 | 42 | 45 | 48 | 49 |
| 54 | 56 | 63 | 64 | 72 | 81 |

Factors:

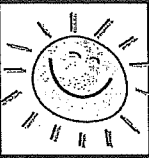

1 2 3 4 5 6 7 8 9

Source: Lappan et al. (1996c); used with permission.

| X | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|
| 1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 2 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| 3 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| 4 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 |
| 5 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 |
| 6 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 |
| 7 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 | 77 | 84 |
| 8 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 |
| 9 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90 | 99 | 108 |
| 10 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 |
| 11 | 11 | 22 | 33 | 44 | 55 | 66 | 77 | 88 | 99 | 110 | 121 | 132 |
| 12 | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 | 120 | 132 | 144 |

Sun and Moon

Multiples of 5

| | | | | | | | |
|---|---|----|----|----|----|----|--|
| 50 | 5 | 7 | 15 | 22 | 35 | 27 | 6 |
| 23 | | | | | | | 30 |
| 11 | | | | | | | 10 |
|  | | | | | | |  |
| 39 | | | | | | | 40 |
| 9 | | | | | | | 43 |
| 20 | 2 | 25 | 19 | 14 | 10 | 45 | 18 |

| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|
| 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 | 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 |

DIRECTIONS

Students play in partners. Player A is the sun and Player B is the moon.

Player A rolls the die and moves that number of spaces in either direction.

If Player A lands on a multiple of 5, she gets a point.

The first player to get 8 points wins!

Get to 1000

Skill: addition and multiplication

Materials: 6 sided dice

Game board

Pencil

Instructions:

The goal of the game is to reach a score of 1000 before your opponent.

Player one begins by rolling a six sided dice and they record the value under the # rolled. The player then chooses which multiple of ten they will multiply their dice value with by recording under the appropriate heading. Player one then records the product (the dice value multiplied by the multiple of 10) and records it under the appropriate heading. Player one then puts the total value under the total column.

Player two takes their turn and repeats the above steps.

Player one takes his/her next turn following the above instructions, however, in the total column the **new** value is formed by adding the last turns total with their second turn's product.

Play continues until a player reaches 1000. Players cannot go over 1000 and therefore players must begin to strategize which multiple of 10 would be wise to use to allow them to get close to 1000 without going over.

*****Encourage children to use the vocabulary (digit, value, multiple, product, total, addition/increased by/plus)

Alternative

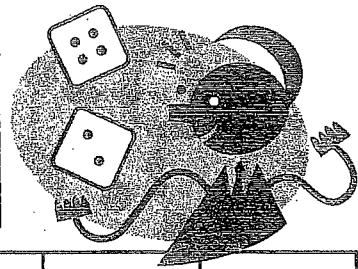
- Use a 12 sided dice.
- Make the game out of 100, 500, 2000 etc.
- Change the multiple (x 5's, or 3's, etc)
- After you get to 1000, you must go to back to zero
- You must use at least each value on the dice
- When you are near 1000 and you roll is too big, begin subtracting the amount from the total.

Get to 1000!

| Player #1 | | | | Player #2 | | | |
|-----------|---------------------|---------|-------|-----------|---------------------|---------|-------|
| # Rolled | $\times 1, 10, 100$ | Product | Total | # Rolled | $\times 1, 10, 100$ | Product | Total |
| 1. | | | | 1. | | | |
| 2. | | | | 2. | | | |
| 3. | | | | 3. | | | |
| 4. | | | | 4. | | | |
| 5. | | | | 5. | | | |
| 6. | | | | 6. | | | |
| 7. | | | | 7. | | | |
| 8. | | | | 8. | | | |
| 9. | | | | 9. | | | |
| 10. | | | | 10. | | | |

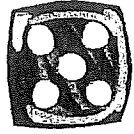
Do not go over 1000!

Contig

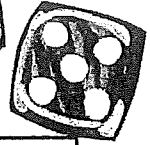
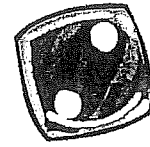


| | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |
| 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 44 | 45 | 48 | 50 | 54 | 55 |
| 60 | 64 | 66 | 72 | 75 | 80 | 90 | 96 |
| 100 | 108 | 120 | 125 | 144 | 150 | 180 | 216 |

1. Roll 3 dice and mark the sum of the 3 dice as the starter square.
2. Each player rolls the 3 dice and uses operations (addition, subtraction, multiplication, division) and all three dice numbers to form a new number on the Contig board. Put an X on this number.
3. Score 1 point for each marked square your new number touches.
4. Play 8 rounds.
5. Player with the highest score wins the game.



CONTIG JR.



| | | | | | | | |
|----|----|----|----|----|----|----|----|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 0 | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 0 | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |

Directions:

- The first player tosses 3 regular dice. The player may add all 3 together, add two of the numbers and subtract the third, etc. to get an answer using all 3 dice.
- The player marks that number with an X and scores 1 point for the round.
- Player 2 then tosses the 3 dice and uses the 3 numbers and the operations of addition and subtraction to make a new number. Player 2 marks that number with an X and scores 1 point.
- If Player 2 can make a number that touches Player 1's number on the board, Player 2 scores an additional point.
- Play continues with players trying to form numbers that touch X's on the board so that they get extra points. Player with the most points wins.

SWEET 16

"A REAL FAVOURITE"

LEVEL: Grade 6 and up

SKILLS: Order of operations, problem solving

PLAYERS: 1 (solitaire) or whole class in cooperative teams

EQUIPMENT: One thirty-sided (1-30) die, cards Ace - King (Ace = 1, Jack = 11, Queen = 12, King = 0)

GETTING STARTED: All teams build a 4 x 4 grid with sixteen random cards, face up.

The goal of the game is for each team to remove all the cards from their grid. All cards remaining at the end of a round equal their face value score AGAINST the team (e.g. 4 and 3 left - score against = 7). The lowest and best possible score per round is zero.

To begin, the teacher rolls a target number for the first round with the die. This number will be used by all cooperative teams. Teams now begin finding combinations that equal the target number rolled - all operations may be used. Players may take off three, four or five card combinations.

EXAMPLE: Grid was randomly drawn as follows:

| | | | |
|--------------|------------|----|---|
| King (0) | 4 | 10 | 2 |
| Jack (11) | 3 | 9 | 7 |
| 6 | Ace (1) | 8 | 6 |
| 5 | 4 | 10 | 2 |

Target rolled = 9

The team made the following combinations and removed the cards as follows:

1. (Jack) 11 - 2 + 0 (King) = 9
2. (10 + 8) - 9 = 9
3. (10 - 7) + 6 = 9
4. (4 + 5) x 1 = 9
5. (3 - 2) x (4 + 5) = 9

NO CARDS REMAIN - SCORE FOR ROUND ONE = 0

After each round a new grid is drawn and a new TARGET is rolled. Teams play five rounds and accumulate their score AGAINST one another. The lowest team score after five rounds wins.



TEACHING TIP:

Try not to give any strategy tips - let teams discover this as they play. An important part of this game is analyzing all sixteen cards carefully before removing any simple combinations. As well, it is important to analyze the number of large card values and the low card values. Other strategies may include dividing to get a 1 or subtracting to get a 0. Have teams record all combinations and take the time to discuss strategies, difficulties and successes!

Black cards are positive and all red cards are negative. Do not allow any two card combinations.

VARIATIONS:

PIG!

Roll the dice and collect points. You can go as long as you want, but roll the wrong number and you lose all your points from that turn!

Why We Love Pig

Pig is easy to learn and gives students abundant addition practice. But more centrally, Pig is mathematically very rich. Students get to articulate and defend strategies, and get their practice with addition in a complex task.

How to Play

Pig is a game for 2 to 6 players. Players take turns rolling a die as many times as they like. If a roll is a 2, 3, 4, 5, or 6, the player adds that many points to their score for the turn. A player may choose to end their turn at any time and "bank" their points. If a player rolls a 1, they lose all their unbanked points and their turn is over.

Beginner's Game: The first player to score 50 or more points wins.

Advanced Game: The first player to score 100 or more points wins.

Variations

Big Pig

This variation is played with two dice. It is like Pig: on your turn you can roll or hold. If you roll a 1, you lose your points for that turn and your turn ends. However, you roll a pair of 1s, add 25 to your turn total. If other doubles are rolled, the player adds twice the value of the dice to the turn total. Play to 150.

Odd Pig Out

Roll two dice and multiply them. You can keep rolling as long as the product is even. If the product is odd, you lose all unbanked points for that turn, and pass the dice. Play to 500.

Questions

There are several central questions in Pig:

- Does strategy matter?

- If it does, what is the best strategy?

Good questions for the teacher to ask the students:

- Do you have a strategy? What is it?

- How do you know your strategy works? How could you test it?

- If you don't think strategy matters, why not?

- What happens when you play your strategy against another student's different strategy?

- Between these two strategies (name two collected from the class), who do you think will win?

Possible student conjectures, true and false, that may arise:

- Strategy doesn't matter. The game is all luck.

- Strategy does matter.

Common strategies:

- Roll up to a specific value and then stop.

- Roll a certain number of times and then stop.

- Roll until your total will beat your opponents' and then stop.



Race Track Fractions

Math Tools:

- Fraction Meaning Statement
- Transparent Chips
- Double Dice
- Decahedron Double Dice
- Game Boards

Mathematical Intent:

The intent of the game is to play a game reinforcing Number Line fractions. The game boards provide a visual of size of fractions and equivalent fractions.

Vocabulary:

- one-whole
- one-half
- one-third
- one-fourth
- one-fifth
- one-sixth
- one-seventh
- one-eighth
- one-ninth
- one-tenths
- numerator
- denominator
- part-to-whole
- compare
- comparison
- equivalent
- number line

Ron Brown

Song Suggestions:

"Fraction Action"
(Math Concepts I & II)

"Equivalent Fractions"
(Mighty Math)

Race Track Fractions is a game to reinforce Number Line fractions: On the first version, each player needs five transparent chips, **Double Dice** and a game board. Each player places the five chips on the zeros. The object is to get all five chips all the way over to one. Order of play is determined. The first player rolls a fraction. The larger number is the denominator. The smaller number is the numerator. The player states the fraction and moves a chip that amount. The player may split the fraction to facilitate using that fraction.

For example:

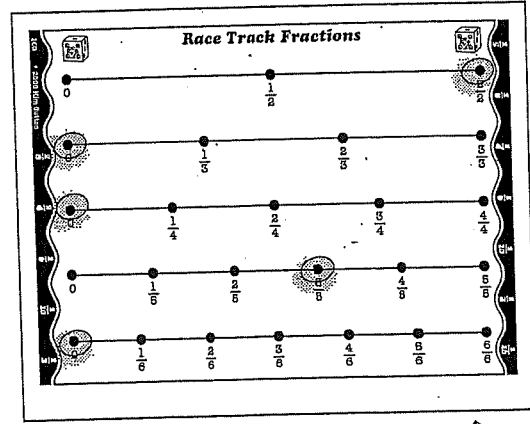
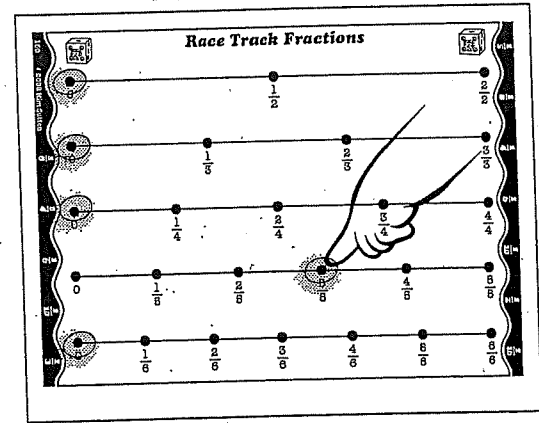
The player rolls the fraction $3/5$.

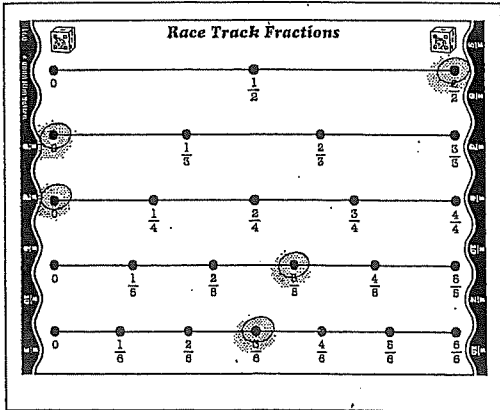
The next turn, the player rolls $5/5$.

Roll number three, the player rolls $3/6$.

Preparation for Lesson:

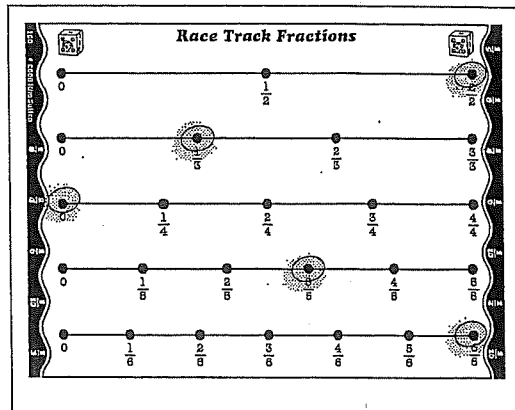
The teacher will read the book **Give Me Half!** by Stuart J. Murphy in preparation for the game. There are many titles of children's literature for teaching fractions. Any title can be substituted. The game boards can be run on cardstock front to back. The dice and transparent chips for the game can be gathered.



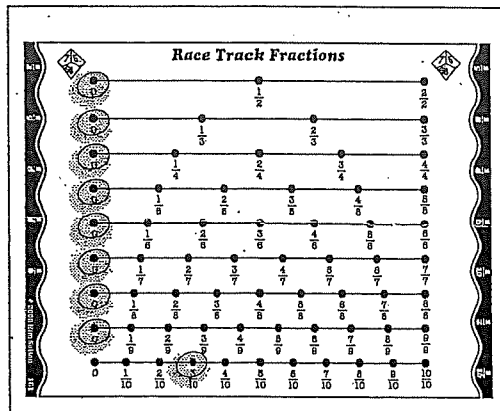


The next turn, the player rolls 5/6.

The game will continue until all the chips are moved over to one.



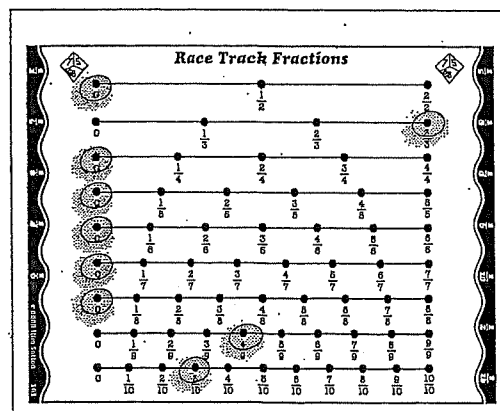
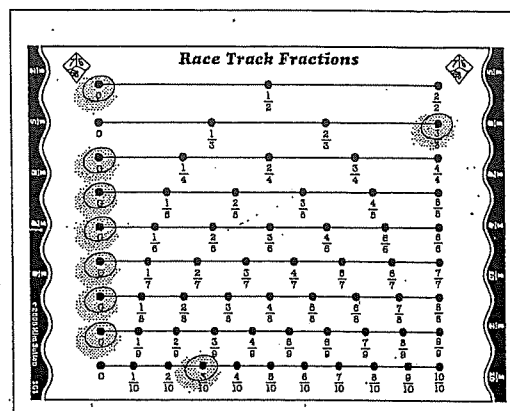
The second version of the game is played with the Advanced **Race Track Fractions** game board, nine chips and the **Decahedron Double Dice**. In this game, a zero rolled on the dice is a ten. The game is played just the same as the previous version.



For example:

The player rolls 3/10.

The second roll is 3/3.

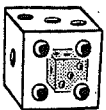
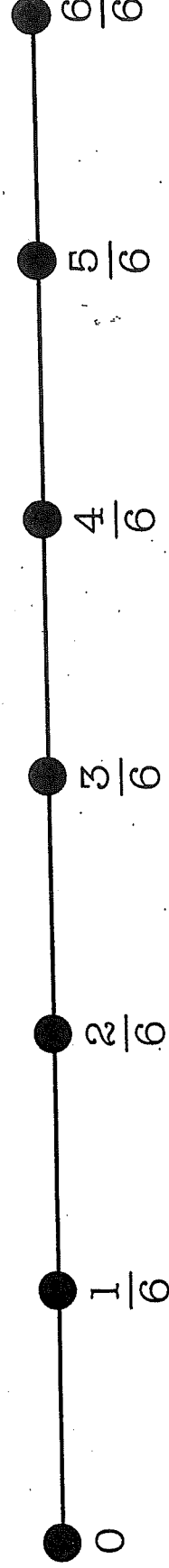
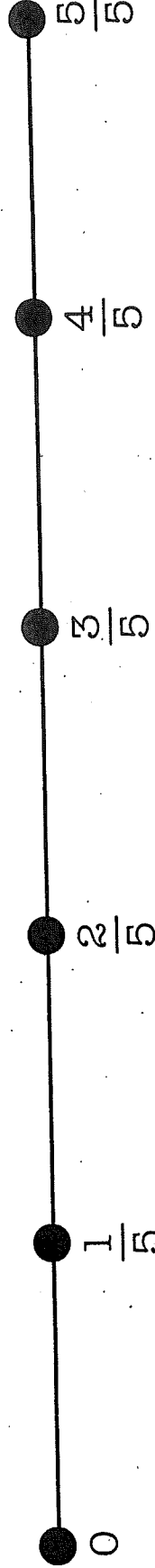
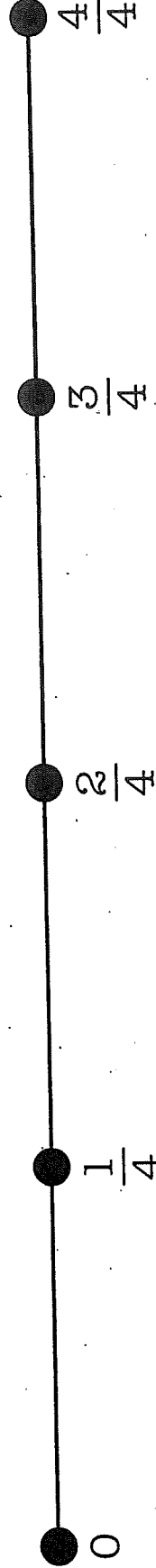
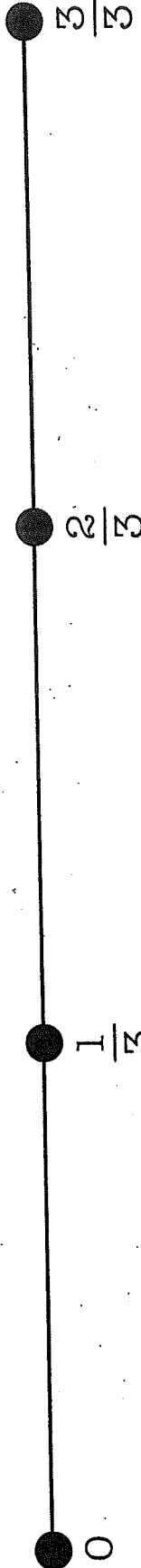
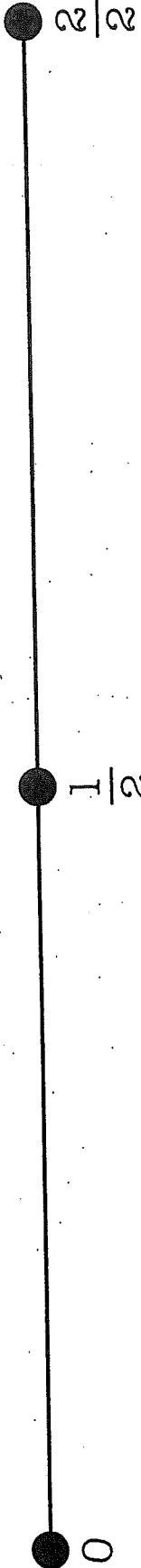
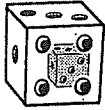


The player rolls 4/9 for the third roll.

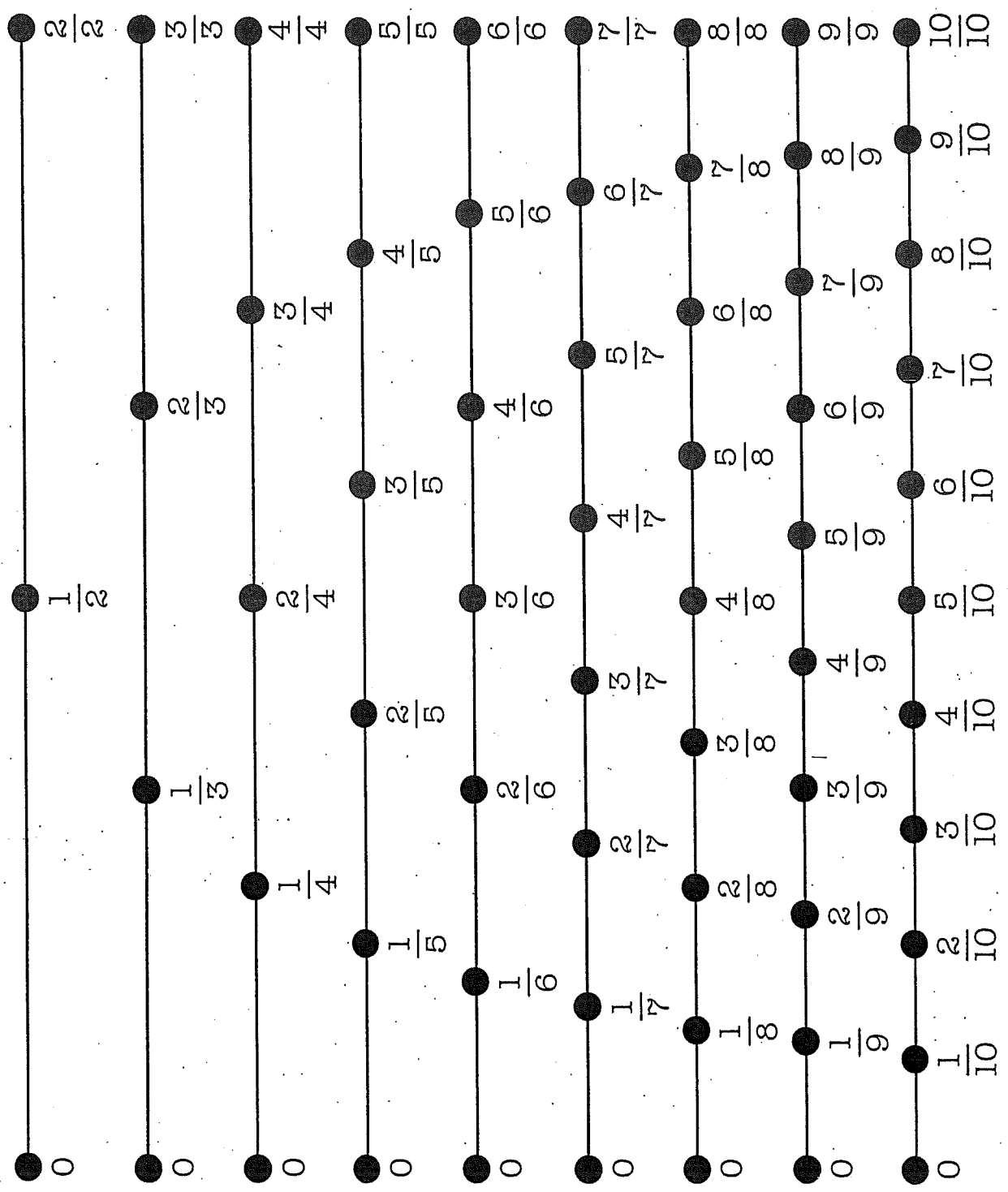
The game will continue until all nine chips are moved over to one. The inverse game can be played where the fraction rolled is what you take away from one-whole.

There are several versions of the "Race Track" format available in this manual. **Race Track Facts 0-12** and **Race Track Facts 0-18** are used for addition fact fluency. The game directions are found on page 45 of this manual. The game boards are found on pages 50-51 of this manual.

Race Track Fractions



Race Track Fractions



MEGA DICE SALE!

Must order min of 10 bags.

Six sided sponge dice _____ bags of 10 @ \$6.95 per bag
Six sided dice with #'s _____ bags of 10 @ \$6.95 per bag
Six sided dice with dots _____ bags of 10 @ \$3.95 per bag
Eight sided dice _____ bags of 10 @ \$6.50 per bag
Ten sided dice _____ bags of 10 @ \$6.50 per bag
Twelve sided dice _____ bags of 10 @ \$6.50 per bag
Twenty sided dice _____ bags of 10 @ \$6.50 per bag
Six sided double dice _____ bags of 8 @ \$4.95 per bag
Fraction dice _____ bags of 10 @ \$6.50 per bag

Assorted Dice:

ABC Dice (lower case abc) _____ bags of 4 @ \$6.95 per bag
Thirty sided dice _____ bags of 5 @ \$9.95 per bag
Place value dice _____ bags of 12 @ \$7.95 per bag
Place Value dice have 3 of each ones, tens, hundreds, & thousands dice
Decimal Dice _____ bags of 12 @ \$7.95 per bag
Decimal dice have 3 of each ones, 10ths, 100ths, & 1000ths dice
10 sided double dice _____ bags of 6 @ \$6.95 per bag
ten sided dice inside another ten sided dice
12 sided double dice _____ bags of 6 @ \$6.95 per bag
12 sided dice inside another twelve sided dice.
20 sided double dice _____ bags of 6 @ \$6.95 per bag
20 sided dice inside another 20 sided dice.
3 dice inside one dice _____ bags of 6 @ \$4.95 per bag
red, blue and white dice inside 1 big dice. Great for place value.
Blank Dice _____ bags of 12 @ \$4.50 per bag
Sorting Chips _____ bags of 300 @ \$6.95 per bag
50 of 6 different colors.

Timers:

1 minute sand timer _____ \$2.50 each
2 minute sand timer _____ \$2.50 each
3 minute sand timer _____ \$2.50 each

School: _____ Phone #: _____

Address: _____

Name of Purchaser: _____

Visa/ MC # or PO # _____ Expiry: _____

Email Address: _____

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