

box cars and one-eyed jacks

T.G.I.F.
Thank Goodness It's Fun!

JOHN FELLING

BOOST 2017

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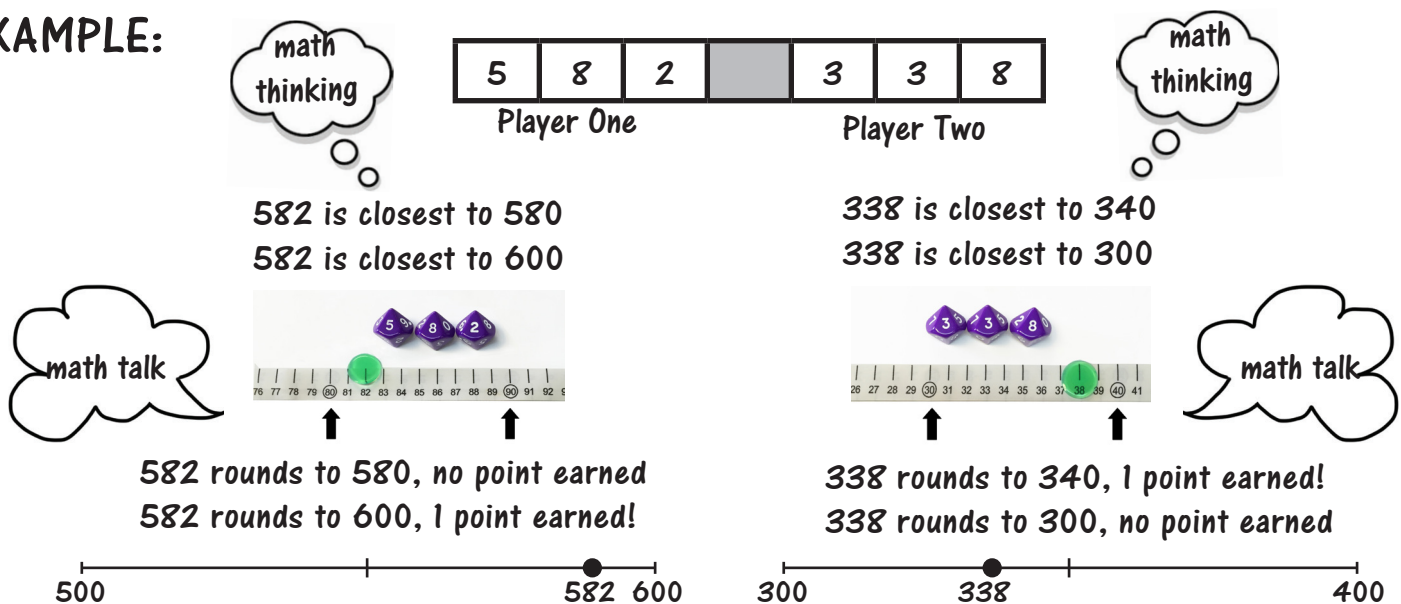
*Please include the
conference/workshop title*

SHAKE A ROUND

- LEVEL:** Grade 3 and up
- SKILL:** rounding to 10's and 100's place
- SET UP:** horizontal only, 1 shaker per 2 students, number line (optional)
- PLAYERS:** 2 (1 vs 1)
- GOAL:** to earn points for rounding up
- GETTING STARTED:**

One shaker is used for 2 students; use 0-9 dice in six slots, with middle slot left empty. Have students shake until **STOP** is called. Players round their number to 10's place. If their 10's place is rounded up, they earn 1 point. Players now round their number to 100's place. If their 100's place is rounded up, they earn 1 point. Players start the next round by shaking their shaker again.

EXAMPLE:



VARIATIONS:

1. Each student has a shaker with all 7 compartments filled with 0-9 dice. Students shake and then round to each place. They score 1 point for each time they have to Round Up.
2. Place Value Systems die rolled to identify one place value, highest value wins a point.
3. For a decimal version, fill the last 1, 2, or 3 compartments with a different color of 0-9 die.

Shake A Round

Rounding Games With Shakers and 0-9 Dice

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Shake Up Your Neighbor - Two students use one shaker filled with 0-9 dice (except middle). Students round to nearest 10's place and compare. Students get a point if they have to "round up" to the next ten's place. Students round to the nearest 100's place and compare. Students get a point if they have to "round up" to the next 100's place.

	Player One				Player Two		
Round One	5	8	2		3	3	8
Round Two	4	5	4		5	0	2

In Round One, Player One rounded 582 to closest 10's place 580 (no point). Player Two rounded 338 UP to closest 10's place 340 and scored 1 point. Still in Round One, Player One rounded 582 UP to closest 100's place 600 and scored a point. Player Two rounded 339 to closest 100's place 300 (no point).

In Round Two, Player One rounded 454 to closest 10's place 450 (no point). Player Two rounded 502 to closest 10's place 500 (no point). Still in Round Two, Player One rounded 454 UP to closest 100's place 500 and scored a point. Player Two rounded 502 to closest 100's place 500 (no point).

After two rounds Player One had 2 points and Player Two had 1 point

Round Up Your Points - Each student has a shaker with all 7 compartments filled with 0-9 dice. Students shake the shaker and then round to each place. They score 1 point for each time they have to Round Up.

Player One	6	5	3	9	2	1	0
Player Two	2	9	5	6	0	7	1

Player One rounded 6,539,210 to closest 10's place 6,539,210 no point, to closest 100's 6,539,200 no point, to closest 1000's place 6,539,000 no point, closest 10,000's place UP TO 6,540,000 POINT, closest 100,000's place 6,500,000 no point, closest 1,000,000's place UP TO 7,000,000 POINT. Player One earned 2 points for the round.

Player Two earned 4 points when 2,956,071 was Rounded Up in the 100's place to 2,956,100, Rounded Up in the 10,000's place to 2,960,000, Rounded Up in the 100,000's place to 3,000,000 (9 hundred thousand rounded up to 10 hundred thousands making it an extra million), and Rounded Up in the 1,000,000's place to 3,000,000.

Variation: After the students shake, a Place Value Systems die is rolled to identify a specific place value from 1's place to 100,000's place. Students round to that specific place and score a point if they can round up. If 1's is rolled, reroll.

Variation: Fill last 1, 2 or 3 compartments with a different color of 0-9 dice to have decimals 0.1's, 0.01's and 0.001's.

Shake A Minute

Middle Years Math Games That Just Take A Minute

Box Cars And One-Eyed Jacks ©2016

Front End Estimations - Adding and Subtracting 3-digit numbers. Students start with two shakers with middle compartments empty. They shake both shakers then stack them one on top the other and mentally start to add just the 100's place to see if there is a difference and then make a statement. Students may have to add the 10's and even the 1's if there are ties.

5	1	3		6	2	4
3	2	6		1	3	5

The sum of 500 + 300 something > The sum of 600 + 100 something
 Because
 800 something is larger than 700 something

Mixed Operations Shake Down - Students shake one shaker. Teacher rolls a target number (2 for example). Students must use all 7 of their shaker dice to create an equation who's answer = the target.

5	1	3	4	6	2	4
---	---	---	---	---	---	---

The student decided on the following $(6-5) \times 1 \times (4 \div 4) + 3 - 2 = 2$

I'm Balanced - Students start with one shaker with middle compartment empty. They then begin to make equations on each half using the 3 numbers on each half. Equations on both halves must have equal answers (ie be balanced). Students see how many "right answers" for one shake, they can get before the time is up. Students may elect to start a turn over by reshaking, however, they are not allowed to use any previous balanced equations (they may wish to do this if a shake has few or no balanced equation possibilities).

5	1	3		6	2	4
---	---	---	--	---	---	---

$$\begin{aligned} 5 - 1 - 3 &= 1 \\ 3 \times 5 + 1 &= 16 \\ 1 \times 5 + 3 &= 8 \end{aligned}$$

$$\begin{aligned} 1 &= 6 \div (4 + 2) \\ 16 &= 2 \times 6 + 4 \\ 8 &= 6 + 4 - 2 \end{aligned}$$

etc

BETWEENERS

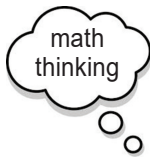
- LEVEL:** Grade 3 - 4
- CONCEPTS:** ordering whole numbers and decimals, analytical thinking
- PLAYERS:** 3 or 4
- EQUIPMENT:** 1 x 3-in-a-cube die per player, 1 recording sheet per player
- GOAL:** to have a between number in each round

GETTING STARTED:

To begin, each player records the names of all the players in the round on their recording sheets. All players shake their 3-in-a-cube die. On **STOP** players peek at their die, mentally figure all possible 3-digit numbers they can make from their roll and then record one of the possibilities next to their name on their recording sheet. Players then announce their numbers and record every player's number next to that player's name on their gameboard. Players compare all the recorded numbers in the round.

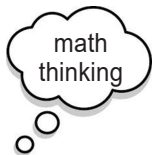
EXAMPLE:

STRATEGIZING...

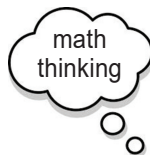


John: "456 is the least I can make but has the best chance to be the **BETWEEN** number for the round."

PLAYER	ROLL	NUMBER
JOHN	4,5,6	456
JANE	1,2,3	321
NORM	1,4,5	415



Jane: "321 is the greatest I can make but has the best chance to be the **BETWEEN** number for the round."



Norm: "541 is too large to win, 145 is too small to win, my best chance is either 451 or 415. 415 is closer to the middle and is my best chance to be the **BETWEEN** number."

"John's 456 is **GREATEST**. Jane's 321 is **LEAST**. Norm's 415 is **BETWEEN** 321 and 456." Players circle 415 and Norm earns a point for the round.



1. Four Player Version - Rules and scoring remain the same, however there can be two between numbers in a round, with two players earning points if their numbers fall between the greatest and least for the round.
2. Students must place a decimal point in their number (eg roll 4,6,1 - 46.1, 4.61, .461) Rules and scoring remain the same.

BETWEENERS



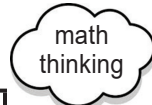
1. Players must make the largest number they can with their roll. They compare their numbers and the **BETWEEN** number wins a point.
2. Players roll one 10 sided double dice and play a 10's and 1's version. Players must decide which die (inside or outside) will represent the 10's and 1's place. Rules and scoring remain the same.



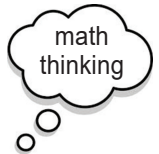
1. Players use their three numbers in a math sentence with the goal of having their answer being between the answers of their opponents.

EXAMPLE:

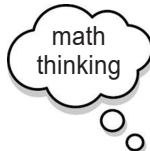
PLAYER	ROLL	NUMBER
JOHN	4,5,6	$5 \times (6 - 4) = 10$
JANE	1,2,3	$(2 + 1) \times 3 = 9$
NORM	1,4,5	$5 + 4 - 1 = 8$



John: "What makes a good **BETWEEN** answer? I'm thinking something between 8 and 15."

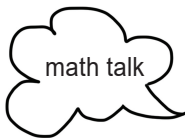


Jane: "3, 2 and 1 are small numbers so I need to maximize the answer I can get with them."



Norm: "Answers around 7 or 8 have been winners in the past few rounds so I want an answer close to those."

SCORES 1 POINT



John: "I first subtracted 4 from 6 so I had to place that in parentheses. I then multiplied the difference of $(6-4)$ by 5 to get an answer of 10."

Jane: "I placed $2+1$ in parentheses because I wanted to have that done first so I could multiply the sum of $(2+1)$ by 3 to give me a product of 9 for an answer."

Norm: "I added $5+4$ to get 9 then subtracted the 1 to get a final answer of 8."

Jane scores 1 point for having the "between answer".

JOURNAL WORK & EXTENSIONS:

1. Explain what would be the ideal **BETWEEN** number if you used two 10-sided double dice?

BETWEENERS & CUBIC MYSTERY RECORDING SHEET

PLAYER	ROLL	NUMBER

PLAYER	ROLL	NUMBER

PLAYER	ROLL	NUMBER

PLAYER	ROLL	NUMBER

PLAYER	ROLL	NUMBER

PLAYER	ROLL	NUMBER

PLAYER	ROLL	NUMBER

PLAYER	ROLL	NUMBER

HORSE RACE – PRIMARY ADDITION

LEVEL: K - 2

SKILLS: adding to 12, commutative property of addition, fact families

PLAYERS: 2 (1 vs 1)

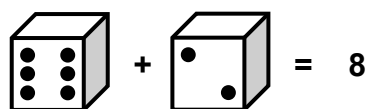
EQUIPMENT: tray of dice (each player needs 18 of their own color), gameboard

GOAL: to have the greatest number of dice on your side of the “racetrack” at the end of the game

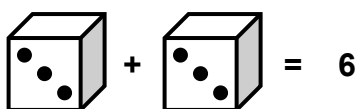
GETTING STARTED:

Each player takes 18 dice of one color and picks a side of the dice tray to be their “racetrack”. Each player picks up a pair of dice, rolls, and calculates their sum. The player with the greatest sum puts their dice into their side of the racetrack. Both players verbalize their sums.

EXAMPLE:



PLAYER ONE



PLAYER TWO

MATH TALK Player One says “8 is a greater sum than 6”

The player with the greatest sum places their dice in their side of the racetrack. The player with the least sum tosses their dice into the lid.

Players each pick up another pair of dice, roll and compare their next sums. In the event of a TIE or EQUAL SUM – both players put their two dice into their side of the racetrack.

Play continues until both players’ 18 dice have been rolled out. The player with the greatest number of dice on their side of the racetrack wins.

MATH JOURNAL WORK AND EXTENSIONS:

This game is full of opportunities to teach basic addition concepts, adding to 12.

1. Have players record a full game on the recording sheet. See example on page 56.
2. Have players highlight or color in examples of doubles, near doubles. Count how many were rolled in your game, and compare with the rest of the class.
3. As students are playing, observe the following:
 - Which students are identifying sums immediately?
 - Which students are counting on from the greatest addend? Least addend?
 - Which students are recognizing the doubles and doubles +1 and using these to add quickly or with immediate recall?

HORSE RACE – PRIMARY ADDITION

- Which students are still at a concrete level of touching the pips on the dice, and will need more practice with immediate recognition of patterns to 6?
4. As a class you can analyze the types of games that happened. When a game is complete, we have students determine if their Horse Race was: (see example on bottom corner of p. 56)
- Dead Heat – both players have the exact same amount of dice on their trays
 - Wipe Out – one player has at least 3 or more pairs greater in their side of the racetrack
 - Too Close to Call – basically the game is close throughout the play and is typically won by one or two pairs, right near the end of the game
5. You can also analyze as a class the following questions:
- How many doubles were rolled in the game? Keep track by tallying or taking counters each time doubles are rolled.
 - How many tie sums were rolled in your game? Compare your total with the rest of the class. How many of your tie sums were identical rolls? For example:

tie sums	$4 + 4 = 8$	$6 + 2 = 8$
tie sums with identical rolls	$3 + 3 = 6$	$3 + 3 = 6$
	PLAYER ONE	PLAYER TWO

This analysis helps students understand fact families, and that some sums have more than one roll or pair of addends that equal it.

- Which sums often had ties?
6. Have students work with the commutative property of addition which states:
- “The sum stays the same when the order of the addends is changed.”

$$6 + 4 = 4 + 6$$

$$\begin{array}{|c|c|} \hline \bullet & \bullet \\ \hline \bullet & \bullet \\ \hline \end{array} + \begin{array}{|c|c|} \hline \bullet & \bullet \\ \hline \bullet & \bullet \\ \hline \end{array} = \begin{array}{|c|c|} \hline \bullet & \bullet \\ \hline \bullet & \bullet \\ \hline \end{array} + \begin{array}{|c|c|} \hline \bullet & \bullet \\ \hline \bullet & \bullet \\ \hline \end{array}$$

We have the students cover up one addend with their hand and verbalize:


 $4 + 6 = 10$


 $6 + 4 = 10$

HORSE RACE – PRIMARY ADDITION

PLAYER
ONE

BOTH
PLAYERS

PLAYER
TWO

START

START

ROLL ON PLACE VALUE

		HUNDRED THOUSANDS	TEN THOUSANDS	THOUSANDS	HUNDREDS	TENS	ONES
ROUND ONE	PLAYER ONE						
	PLAYER TWO						
ROUND TWO	PLAYER ONE						
	PLAYER TWO						
ROUND THREE	PLAYER ONE						
	PLAYER TWO						

The goal of the game is to create the largest number. Players take turns rolling a die, placing it into the tray and announcing it's place value for that roll. After 6 rolls, players compare numbers. A point is earned by the player with the largest number. A Place Value Systems die is rolled to identify a specific place value (for example 100's) . A second point is earned by the player with the highest place value in that place. A third "upside down bonus point" is awarded to the player with the biggest number when the tray is rotated 180 degrees and the numbers are compared.

Let The Games Begin

All the Box Cars games are written using the same format. As a sample, we've chosen one of our basic games to familiarize you with our style.

LEVEL: Grade 1 - 7
 SKILLS: addition facts 1 - 10, 1 - 18 combinations
 PLAYERS: 2
 EQUIPMENT: Cards (Ace = 1)- 5, or (Ace = 1)- 9
 GETTING STARTED: Players divide cards evenly between themselves. Each player turns over two cards and adds them together. The highest sum gets all the cards. In the event of a tie; (ie: each player has the same sum), WAR is declared. Each player deals out three more cards face down and then turns over two more cards. These two cards are added together. The highest sum wins all of the cards. Play continues until one player has collected all of the cards.

Cards 1 - 5 Grade 1 - 2 Sums to 10
 Cards 1 - 9 Grade 2 - 3 Sums to 18

Player 1	Player 2
2 + 3	4 + 1
War is declared	
2 + 3	4 + 1

3 cards are turned
upside down.

4 + 3	6 + 2
-------	-------

Player 2 collects all of the cards Try

These Variations Place

Value War
 Subtraction War
 3 Addend War
 Multiplication War
 Integer War Fraction
 War
 Mixed Operations

Remember: War is a traditional game. However, due to the negative connotation you may want to change the term "war" to one of your own choice. We often call these our Buzz Games (ie. Three Card Buzz).

Salute

Box Cars "All Hands On Deck" Mystery Number (adapted)

Concepts: Missing Addend, Factor
Equipment: Cards 0-12 (J=11 Q=12 K=0)
Goal/Object: Figure Out value of the card on your head

Usually 3 players with one player taking the role of "General". The General says "salute". The other two players take the card from the top of their deck and WITHOUT LOOKING AT IT place it on their forehead so everyone else can see what the card on their forehead is. The General Adds the two cards together and says "The sum of your two cards is...." The two players then use the sum and the card they can see on their opponent's forehead to try and figure out their own card.

Variations: (1) Multiplication (take out 0s)
 (2) 4 Players (one General, 3 soldiers)
 (3) Red = neg integers / Black = pos integers

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"INSPIRATION STATION"

**DOUBLE DARE YOU
GRADES K-6**

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BETWEENERS

- LEVEL:** Grade 3-4
- CONCEPTS:** ordering whole numbers and decimals, analytical thinking
- PLAYERS:** 3 or 4
- EQUIPMENT:** 1 x 3-in-a-cube die per player, 1 recording sheet per player
- GOAL:** to have a between number in each round

GETTING STARTED:

To begin, record the names of all the players in the round on the recording sheets. All players shake their 3-in-a-cube die. On **STOP** players peek at their die, mentally figure out possible numbers they can make from their roll and then record one of the possibilities next to their name on their recording sheet. Players then in turn announce their numbers while their opponents record each player's number next to their name on that round. Players compare all the numbers in the round.

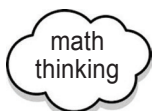
EXAMPLE:

PLAYER	NUMBER
JOHN	456
JANE	321
NORM	415

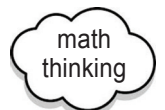
"John's 456 is **GREATEST**. Jane's 321 is **LEAST**. Norm's 415 is **BETWEEN** 321 and 456."

Players circle 415 and Norm earns a point for the round.

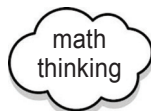
STRATEGIZING...



John: "456 is the least I can make but has the best chance to be the **BE-TWEEN** number for the round."



Jane: "321 is the greatest I can make but has the best chance to be the **BE-TWEEN** number for the round."



Norm: "541 is too large to win, 145 is too small to win, my best chance is either 451 or 415. 415 is closer to the middle and is my best chance to be the **BETWEEN** number."

BETWEENERS

VARIATIONS:

1. 4 Player Version - Rules and scoring remain the same, however there can be two between numbers in a round, with two players earning points if their numbers fall between...
2. Students must place a decimal point in their number (eg roll 4,6,1 - 46.1, 4.61, .0461) Rules and scoring remain the same.



primary

Players make the largest number they can with their roll. They compare their numbers and the **BETWEEN** number wins a point.



primary

Players roll one 0-9 double dice and play a 10's and 1's version. Players must decide which die (inside or outside) will represent the 10's and 1's place



middle years

Players use their three numbers in a math sentence with the goal of having the answer being between the answers of their opponents.

EXAMPLE:

PLAYER	NUMBER
JOHN	$5 \times (6 - 4) = 10$
JANE	$(2 + 1) \times 3 = 9$
NORM	$5 + 4 - 1 = 8$

math thinking

John: "What makes a good **BETWEEN** answer? I'm thinking something between 8 and 15."

math thinking

Jane: "3, 2 and 1 are small numbers so I need to maximize the answer I can get with them."

math thinking

Norm: "Answers around 7 or 8 have been winners in the past few rounds so I want an answer close to those."



math talk

John: "I first subtracted 4 from 6 so I had to place that in parentheses. I then multiplied the difference of (6-4) by 5 to get an answer of 10."

Jane: "I placed 2+1 in parentheses because I wanted to have that done first so I could multiply the sum of (2+1) by 3 to give me a product of 9 for an answer."

Norm: "I added 5+4 to get 9 then subtracted the 1 to get a final answer of 8."

BETWEENERS & CUBIC MYSTERY RECORDING SHEET

PLAYER	ROLL	NUMBER

PLAYER	ROLL	NUMBER

PLAYER	ROLL	NUMBER

PLAYER	ROLL	NUMBER

PLAYER	ROLL	NUMBER

PLAYER	ROLL	NUMBER

PLAYER	ROLL	NUMBER

PLAYER	ROLL	NUMBER

ORDER IN THE COURT

- LEVEL:** Grade 3-5
- CONCEPTS:** ordering fractions, equivalent fractions, fractions less than one and greater than one, analytical thinking
VARIATION: Primary - naming fractions to $\frac{1}{6}$, Middle Years - decimal equivalents, mixed numbers
- PLAYERS:** 1 vs 1
- EQUIPMENT:** 1 x 3-in-a-cube die per player, 1 recording sheet per player
- GOAL:** to correctly identify number as greatest, between or least in each round

GETTING STARTED:

Player One rolls the die and uses the two numbers to create a fraction less than one, then records it on an open space in the Least to Greatest gameboard. Students may use fraction pieces or the Fraction, Decimal, Percent Chart to help make decisions. Player Two takes their turn rolling the die, creating a fraction less than one and recording it on their gameboard. Players record their fractions as rolled. If they roll a 4 and a 6, they record $\frac{4}{6}$. Teachers may choose to have students convert their fractions to equivalent fractions with smaller denominators ($\frac{4}{6}$ rolled, $\frac{2}{3}$ recorded). If a player's roll creates a fraction that is equivalent to one already on their gameboard, they have to record it in the "rejects" section of their gameboard. Players continue taking turns. A player wins the round if, at the end of equal turns, they have recorded five non equivalent fractions before their opponent. A player "busts" if they roll a third reject. The player who wins the most rounds wins the games.



" $\frac{1}{2}$ is greater than $\frac{2}{6}$ and less than $\frac{3}{5}$ "

ROUND FOUR PLAYER TWO

LEAST			GREATEST	
$\frac{1}{6}$	$\frac{1}{4}$	$\frac{2}{6}$	$\frac{1}{2}$	$\frac{3}{5}$

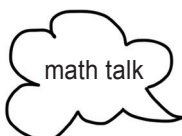
REJECTS			
$\frac{1}{4}$	$\frac{1}{3}$	—	BUST!



1. Use 12-sided double dice
2. Allow fractions greater than one by using the outside (top) number as the numerator and the inside (bottom) number as the denominator.
3. Use a 3-in-a-cube die to create mixed numbers such as $3\frac{1}{2}$.



Roll five regular double dice at once and line them up from least to greatest, stacking equivalent fractions on top of each other. Record the rolls on the gameboard, circling equivalent fractions.



" $\frac{2}{4}$ is equivalent to $\frac{3}{6}$ "

LEAST			GREATEST	
$\frac{1}{5}$	$\frac{1}{4}$	$\frac{2}{4}$	$\frac{3}{6}$	$\frac{3}{1}$

ORDER IN THE COURT RECORDING SHEET

ROUND ONE PLAYER ONE

LEAST

GREATEST

—	—	—	—	—
---	---	---	---	---

REJECTS

—	—	—
---	---	---

BUST!

ROUND ONE PLAYER TWO

LEAST

GREATEST

—	—	—	—	—
---	---	---	---	---

REJECTS

—	—	—
---	---	---

BUST!

ROUND TWO PLAYER ONE

LEAST

GREATEST

—	—	—	—	—
---	---	---	---	---

REJECTS

—	—	—
---	---	---

BUST!

ROUND TWO PLAYER TWO

LEAST

GREATEST

—	—	—	—	—
---	---	---	---	---

REJECTS

—	—	—
---	---	---

BUST!

ROUND THREE PLAYER ONE

LEAST

GREATEST

—	—	—	—	—
---	---	---	---	---

REJECTS

—	—	—
---	---	---

BUST!

ROUND THREE PLAYER TWO

LEAST

GREATEST

—	—	—	—	—
---	---	---	---	---

REJECTS

—	—	—
---	---	---

BUST!

ROUND FOUR PLAYER ONE

LEAST

GREATEST

—	—	—	—	—
---	---	---	---	---

REJECTS

—	—	—
---	---	---

BUST!

ROUND FOUR PLAYER TWO

LEAST

GREATEST

—	—	—	—	—
---	---	---	---	---

REJECTS

—	—	—
---	---	---

BUST!

TICK TOCK ROLL A CLOCK

WHAT YOU'LL NEED

Each Double Dicer needs one Three-in-a-Cube Die, paper, pencil.

TO BEGIN

Each player needs to draw a clock as illustrated below.

THE GOAL

To be the first Double Dicer to circle all the numbers on their clock.

LET'S ROLL

Player One rolls the die and may now add, subtract, multiply or divide the three numbers to target any number between 1-12.

EXAMPLE:



Roll is

2 3 6

Player One can circle on their clock, either:

$(2 \times 3) + 6 = \underline{12}$ OR $2 + 3 + 6 = \underline{11}$ OR $(6 \div 2) + 3 = \underline{6}$ etc.

- Players can circle only one number per roll.
- Players alternate rolling the die, analyzing their combinations, trying to be the first player to circle all the numbers on their clock.
- If a player is unable to find a combination for any of the remaining numbers, play continues to their opponent.

