

**box cars and one-eyed jacks**

## **DEALING WITH DIVERSITY**

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**APRIL 8, 2017**

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***Please include the  
conference/workshop title***

# Why play Math Games?

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## NCTM - National Council of Teachers of Mathematics

1. Games promote problem solving and strategic thinking.
2. When played repeatedly, games support computational fluency.
3. Games present opportunities for practice - naturally motivating & fun.
4. Games present opportunities for students to have discourse with peers.
5. Games allow students to develop familiarity with the number system and benchmark numbers.
6. Games help students develop **NUMBER SENSE!**

# LET'S BUILD A MATH JOURNAL

- ONE GAME A WEEK...TEACH MONDAY
- . PLAY/PRACTICE ALL WEEK
- . FRIDAY CAPTURE A WORK SAMPLE

## STRUCTURE

**S** = SKILLS

**P** = PLAYERS

**E** = EQUIPMENT

**G** = GOALS

**GS** = GETTING STARTED

USE YOUR NOODLING VISUAL LIBRARY!

# Table of Contents

<i>GAME NUMBER</i>	<i>GAME NAME</i>	<i>CONCEPTS COVERED</i>

# Math Glossary

WORD	MEANING OR EXAMPLE

*Game Number:* \_\_\_\_\_

*Title:* \_\_\_\_\_

*Players:* \_\_\_\_\_ *Skills:* \_\_\_\_\_

*Equipment:* \_\_\_\_\_

*How to Play:*

*Goal:*

# LET'S RETELL...

## MATH JOURNAL PROMPTS

### AT THE BEGINNING....

**FIRST**

☐ THEN...

☐ AFTER THAT...

☐ NEXT...

**FINALLY**

**LAST**

**AT THE END**

**KNOTS ON A STRING...**

# LET'S NOODLE...

## VISUAL NOTETAKING IDEAS

DICE	CARDS
GOAL	TAKE TURNS
RULE TWIST	PLAYERS
BONEYARD	MATH TALK
MATH THINKING	OTHER...



# SNAPPY SUITS

**LEVEL:** Pre-Kindergarten - Kindergarten

**SKILLS:** count using one-to-one correspondence, recognizing same/different, identify objects in a group as  $>$   $<$  or  $=$

**PLAYERS:** 2

**EQUIPMENT:** deck of cards (remove Jokers, Jacks, Queens & Kings), gameboard

**GOAL:** to recognize and match the 4 suits, then count using one-to-one correspondence how many were collected of each suit

## GETTING STARTED:

Cards are divided evenly between the two players. Each player flips over one card. If they are the same suit, (ie: two hearts, two spades etc.), the first player to say “snap” keeps both cards. Play continues until cards run out. The player with the most cards is the winner. In the event of a tie, players leave their cards down and whoever wins the next round collects all the accumulated cards.

## MATH JOURNAL WORK AND EXTENSIONS:

Students may want to play multiple rounds of this game before moving on to journaling and extensions to ensure they have cards to work with for the activities.









1. Have students count how many cards of each suit they have and write the number on their gameboard. Have students complete the sentences in the boxes and then sort their cards in the gameboard boxes.
2. Discuss with the class that for instance 12 hearts is greater than or more than 4 spades. Or that 8 clubs is less than 14 diamonds. Demonstrate for them using phrases such as, “The suit I have the most of is diamonds with 14 cards. The suit I have the 2nd most of is hearts because I have 12 hearts. The next suit I have the most of is clubs. I have 8 clubs. The suit I have the least of is spades. I only have 4 spades.”
3. Another option is to have them stretch their cards out in rows to see which suit makes the longest train to the shortest train.



**SNAPPY SUITS GAMEBOARD**

 I have 5 clubs	 I have 4 diamonds
 I have 5 hearts	 I have 6 spades
The suit I have the most of is  I collected 6 The suit I have the least of is  I collected 4	

# SNAPPY SUITS GAMEBOARD

	
I have _____  's	I have _____  's
	
I have _____  's	I have _____  's

The suit I have the most of is \_\_\_\_\_. I collected \_\_\_\_\_.

The suit I have the least of is \_\_\_\_\_. I collected \_\_\_\_\_.

# HORSE RACE - PRIMARY ADDITION

**LEVEL:** K - 2

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

**PLAYERS:** 2 (1 vs 1)

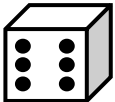
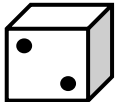
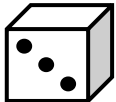
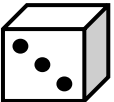
**EQUIPMENT:** tray of dice (each player needs 18 of their own color), gameboard

**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:

	+		=	8			+		=	6
<b>PLAYER ONE</b>						<b>PLAYER TWO</b>				

### 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.

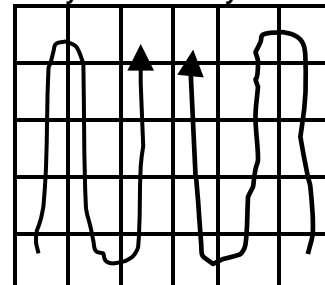
**Level 1 :** Addition to 12 - Players roll two dice and add them

**Level 2 :** Addition to 18 - Players roll three dice and add them.

**Level 3:** Multiplication to 36 - Players roll two dice and multiply them

**Level 4:** Multiplication to 72 - Players roll three dice, choose two to add together, then multiply the sum by the third.

Player One    Player Two

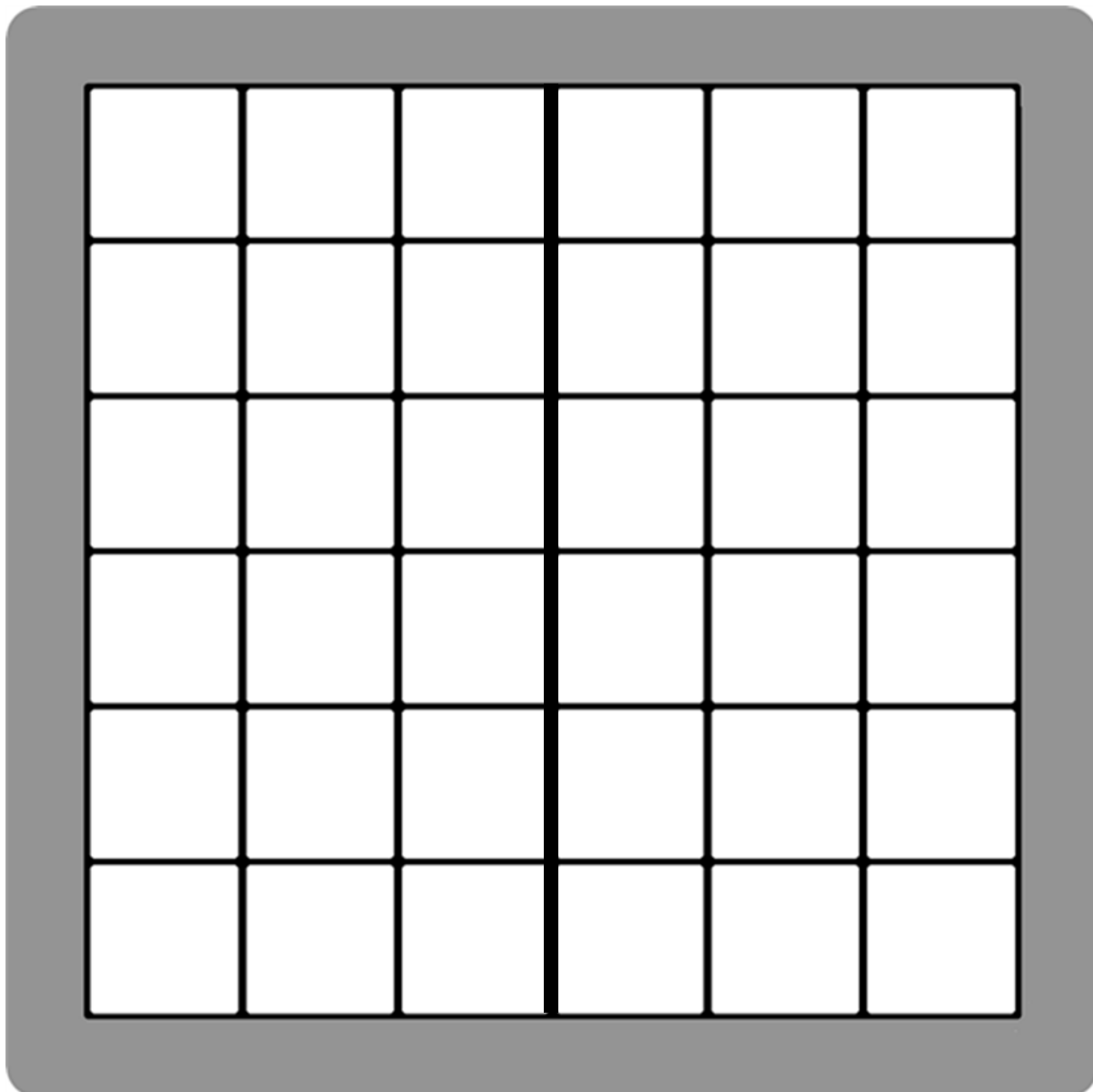


Add dice to the track along a curving path to simulate the race!

# WARP 18

PLAYER  
ONE

PLAYER  
TWO



- ▶ Explore Associative Property of Addition.
- ▶ Each player takes 18 dice of their own color.
- ▶ Each player rolls 3 dice and adds.
- ▶ Player with the greatest sum places them into their side of the tray, least sum places in lid.
- ▶ Players need to verbalize how they calculated sums.
- ▶ Player with the most dice in their side of the tray at the end of the game wins.

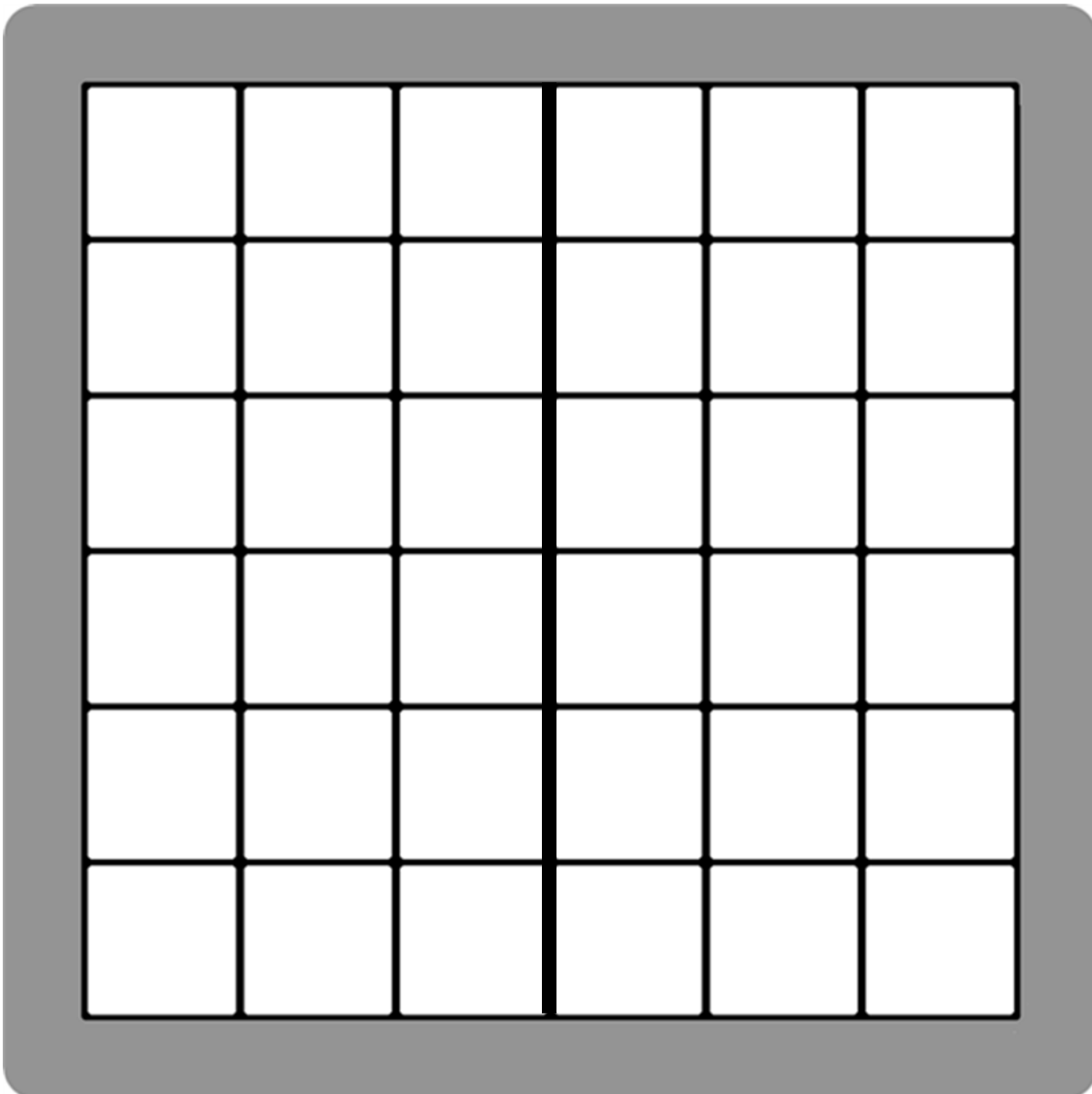
## Horse Race

[illegible]

# 36 / 72 SLAM DUNK

PLAYER  
ONE

PLAYER  
TWO



- ▶ Each player takes 18 dice of own color.
- ▶ Each player rolls 2 or 3 dice, multiplies.
- ▶ Player with greatest product places them into their side of the tray, least product places in lid.
- ▶ Player with the most dice in their side of the tray at the end of the game wins.

# 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.

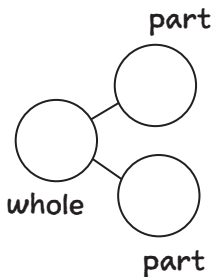
**Variations: (1) Multiplication (take out 0s)**

**4 Players (one General, 3 soldiers)**

**Red = neg integers / Black = pos integers**

# SALUTE SIGNS AND SYMBOLS $+/ -$

choose 3 Salute rounds to record

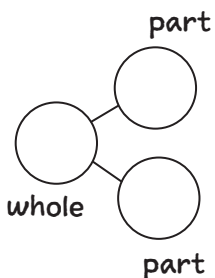


_____	+	_____	=	_____
_____	+	_____	=	_____
_____	=	_____	+	_____
_____	=	_____	+	_____
_____	-	_____	=	_____
_____	-	_____	=	_____

Vocabulary: addend,  
sum, minuend,  
subtrahend, difference

# SALUTE SIGNS AND SYMBOLS $\times / \div$

choose 3 Salute rounds to record



_____	$\times$	_____	=	_____
_____	$\times$	_____	=	_____
_____	=	_____	$\times$	_____
_____	=	_____	$\times$	_____
_____	$\div$	_____	=	_____
_____	$\div$	_____	=	_____



What did you see?  
What did you notice?

Vocabulary: factor,  
product, divisor,  
dividend, quotient



# Human Number Line Activities

-> Hand students lanyards (randomly) and instruct them to create a number line. [They will have to figure out what their number is, decide where they belong, and find who they should stand next to or in between.]

-> Counting on: After students have created a number line, hand a single card to a student in the class that is NOT part of the number line. They will have to find the number EQUAL to their number (give them a high five and say “equal to”) and count on (1, 2 or 3 more) and then shoot off of the number line back to their spot. **Example:** *Hand student the number 3. They will walk up to the number 3 in the human number line, say “three, equal to!” give a high five then take one step to be in front of the 4, saying “four” and then another step to 5 saying “five.” Then shoot back to their spot.*

-> Guesstimate: After students have created a number line, hand a single card to a student in the class that is NOT part of the number line. The number must be kept a secret from the student you are handing it to. They will put the number on their forehead where the human number line students can see but they cannot. They must walk up to a student in the number line and ask, “Is my number greater than (giving a thumbs up), less than (giving a thumbs down), or equal to (giving a flat hand) your number?” The student will answer and this will wipe out part of the number line. Students that are no longer options based on the answer will either sit down or turn their numbers around backwards to eliminate the distraction of those choices. This process will continue until they discover their match.

# 100's, 10's AND 1's HORSE RACE

PLAYER  
ONE

PLAYER  
TWO

HUNDREDS

TENS

ONES

HUNDREDS

TENS

ONES


# BETWEEN FRIENDS RECORDING SHEET

G	
B	
L	

G	
B	
L	

G	
B	
L	

G	
B	
L	

G	
B	
L	

G	
B	
L	

G	
B	
L	

G	
B	
L	

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L	B	G

L	B	G

L	B	G

L	B	G

L	B	G

L	B	G

# HOW PERFECT ARE YOU?







**LEVEL:** 2 - 3

**SKILLS:** probability, frequency and distribution, tallying, analyzing and interpreting data

**PLAYERS:** cooperative groups of 2 or 3

**EQUIPMENT:** tray of dice, recording sheet


**GOAL:** the goal of this cooperative activity is to explore probability by analyzing the distribution of 36 rolled dice.

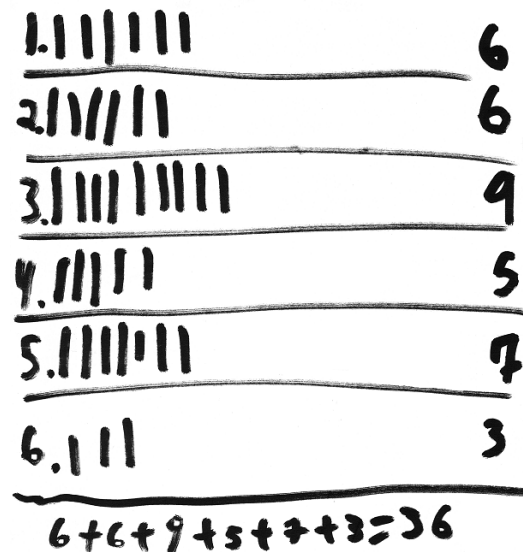
**GETTING STARTED:** Students will be conducting and gathering multiple samples of rolling all 36 dice at once and calculating the total number of ones , twos , threes , fours , fives  and sixes  rolled in one single toss.

To begin, have students super mush their dice and freeze them. They can then place their roll onto the sorting sheet or tallying chart. See example on page 126.

## EXAMPLE:

How many were rolled of each?

Note students did not use the proper tallying . This activity would be followed up by teaching proper tallying.

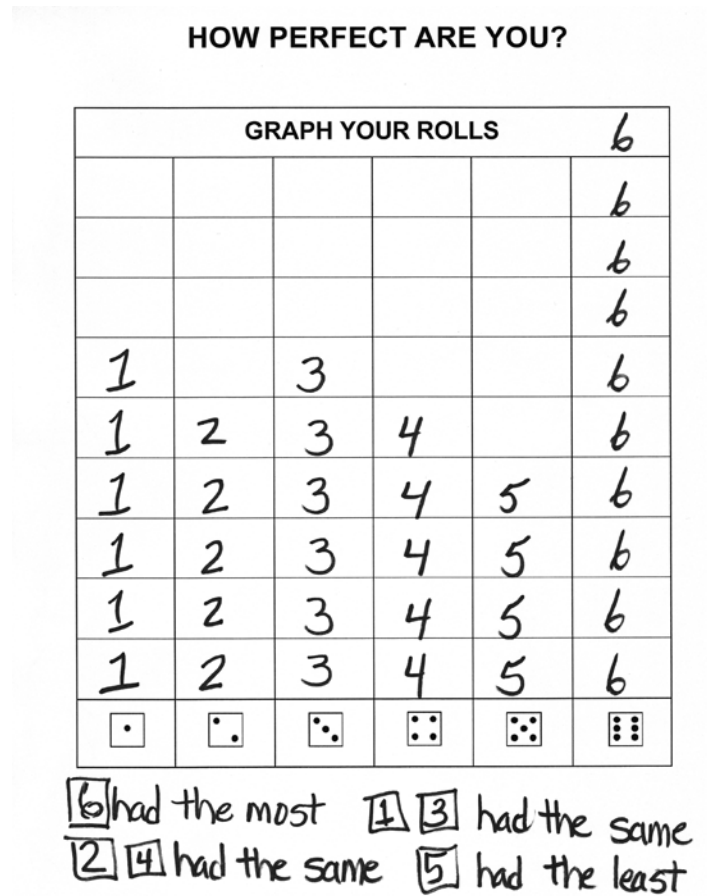
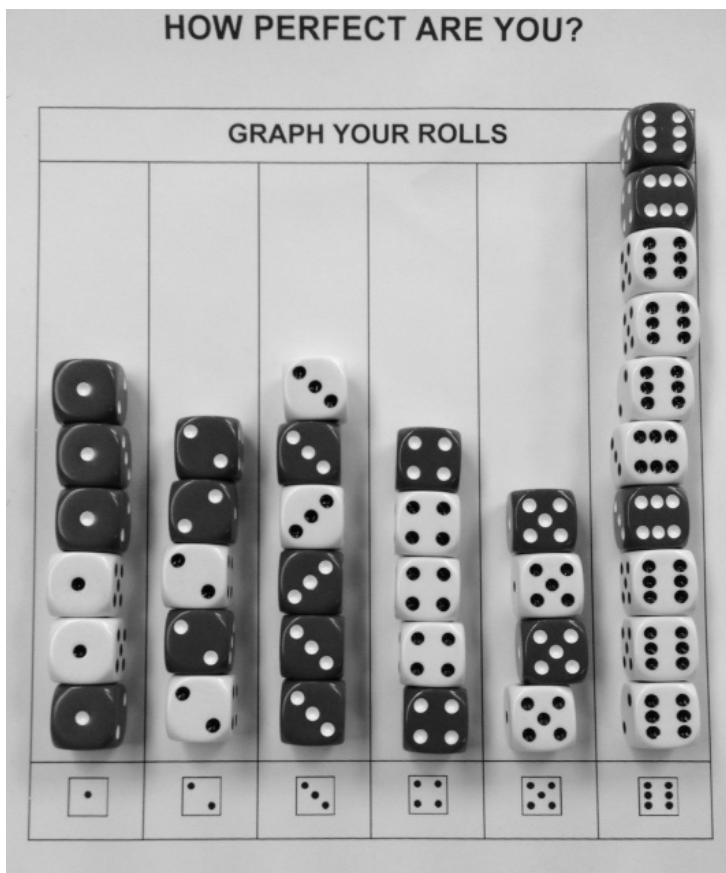


## JOURNAL WRITING AND EXTENSIONS







1. Have students take their rolled sample and graph it.
2. Describe the shape of your graph and describe the distribution of your roll - even, skewed?
3. A perfect distribution would be a distribution of 6 x 1's, 6 x 2's, 6 x 3's, 6 x 4's, 6 x 5's, 6 x 6's. How does your sample compare to the perfect distribution?
4. Have students conduct the sampling by rolling 1 die at a time instead of one "super mush" roll. Does it affect the distribution in any way?

# HOW PERFECT ARE YOU?

- Record your "nearest to perfect" sample.
- Record any unusual samples you had. Describe the result.



# HOW PERFECT ARE YOU?

GRAPH YOUR ROLLS					
					

# SQUARE DOUBLING - ADDITION

**LEVEL:** 2 – 3

**SKILLS:** patterning, doubles, addition with multiple addends, problem solving, probability

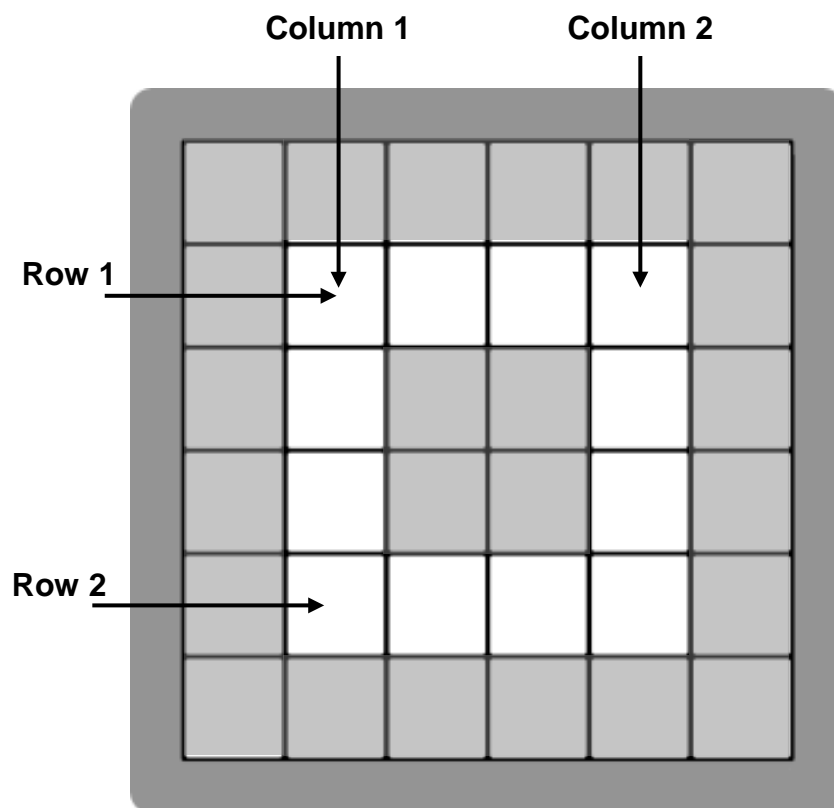
**PLAYERS:** 2 (1 vs 1)

**EQUIPMENT:** tray of dice (each player needs 12 dice of their own color), one player will play in the black tray and the other in the clear lid

**GOAL:** to create the highest total sum of all twelve numbers in your square pattern.

## GETTING STARTED:

Each player will be building a square pattern with their 12 dice as shown. There are two possible rows that can score at the end of the round, and two possible columns that can also score.



In order for a row or column to score it must contain a double. Doubles do not have to be side by side for a row or column to score. Rows and columns are summed using the face value of the dice at the end of the game.

Player One begins by rolling a die and placing it into any empty space on their square. Player Two now takes their turn. Players continue to alternate turns, rolling and placing their dice trying to build at least a set of doubles in each row and column.

# SQUARE DOUBLING - ADDITION

If a player rolls a number they don't think will help them score, they can re-roll it as a "reject roll". Only four reject rolls are allowed per player, per game.

If all four dice in a row or column have different numbers, they add no points to the player's score at the end of the game. The player with the highest score wins the game.

**EXAMPLE: Player One only**

	Column One			Column Two	
Row One					
Row Two					

No doubles, no score

**Column 1:**  $5 + 6 + 1 + 3 = 0$

**Column 2:**  $(1) + 3 + 5 + (1) = 10$

**Row 1:**  $5 + (4) + (4) + 1 = 14$

**Row 2:**  $(3) + 5 + (3) + 1 = 12$

**TOTAL SUM:** 36

## REJECT ROLLS

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## VARIATIONS:

- To increase difficulty, the players will roll 20 dice and fill in the outside edge of the dice tray. Since rows and columns in this variation have six spaces, players must place three-of-a-kind in a column or row to score. NOTE: Teams will have to roll and record on sheet (see p. 115) as there are only 18 dice of each color.

## MATH JOURNAL WORK AND EXTENSIONS:

Have students discuss the following questions:

- What strategy did you use when you played the first few rounds? How did it change? What tips would you give a new player?
- What could you expect to get for a sum once you get "good" at playing?
- What would be the greatest possible sum? The least? Would this, or could this ever happen? Explain.



# SQUARE DOUBLING - ADDITION

## RECORDING SHEET


Column 1: \_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ = \_\_\_\_

Column 2: \_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ = \_\_\_\_

Row 1: \_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ = \_\_\_\_

Row 2: \_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ = \_\_\_\_

TOTAL SUM:

REJECT ROLLS

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Column 1: \_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ = \_\_\_\_

Column 2: \_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ = \_\_\_\_

Row 1: \_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ = \_\_\_\_

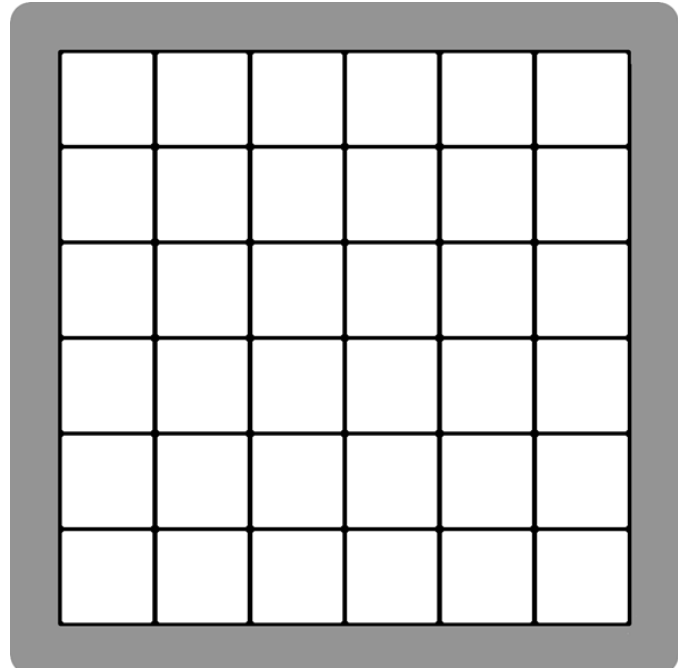
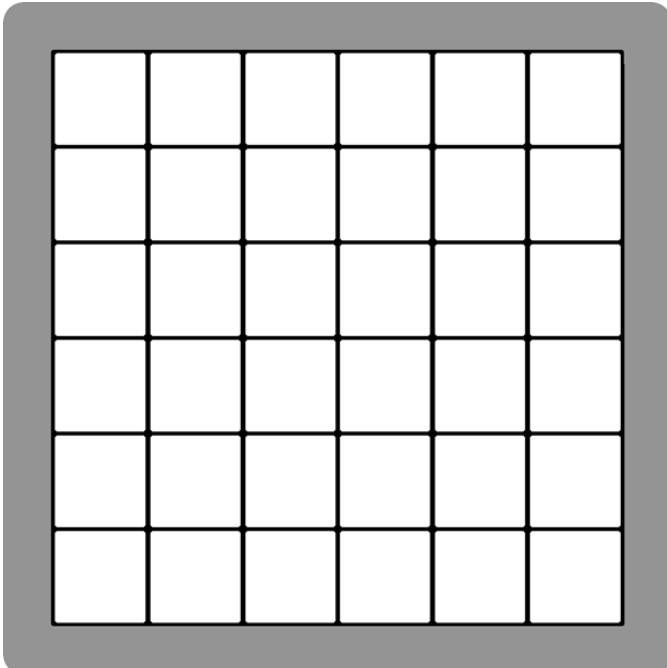
Row 2: \_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ = \_\_\_\_

TOTAL SUM:

REJECT ROLLS

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# PRIMARY SUPER MUSH



_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Object of the Game: Get all the dice into the tray with no dice leftover.

Preparation: Partners "Super Mush" the dice for about 10-15 seconds, thoroughly mixing them. Next, partners choose a "Target Number" (randomly / by rolling a die / flipping over a card).

How to Play: Partners work together and use 2, 3, 4 or 5 dice to create a math sentence that equals the target number. They put the dice into the tray. Partners again use between 2 to 5 dice to create another math sentence that equals the target number and place those dice into the tray as well. Partners continue to select dice to make math sentences until all the dice are in the tray or until they can't make a math sentence that equals the target.