

MILLION DOLLAR MATH  
on a  
DOLLAR STORE BUDGET®

# Math Shakers

Grades 4 - 8

John & Jane Felling

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## TABLE OF CONTENTS

Introduction		1
How To Use This Book		2
Materials		3
Math Journal		5
GAME	SKILLS	PAGE
Three Shaker Multiplication	multiplication with three factors, associative property of multiplication	9
Three Shaker Multiplication Recording Sheet		11
Hockey Shakers	three factor multiplication, three addend addition, addition with re-grouping, probability	12
Hockey Shakers Recording Sheet		13
Powerful Tens	multiplying by powers of ten, explain patterns	14
Powerful Tens Gameboard		15
Powerful Tens "Mental Math" Recording Sheet		16
Closest To 1000	multiplying by 1's, 10's and 100's, problem solving, probability	17
Closest To 1000 Recording Sheet		19
Closest To 10 000 Recording Sheet		20
Operation Mixed Ops	solving multi-step problems using + - × ÷, order of operations	21
Operation Mixed Ops Recording Sheet		23
Decimal Slam Dunk	subtraction with decimals to hundredths, rounding decimals to tenths	24
Decimal Slam Dunk Recording Sheet		26
Powerful Decimals	understand and explain patterns in the placement of the decimal point when multiplying	27

<b>Powerful Decimals Gameboard</b>		<b>28</b>
<b>Powerful Decimals Recording Sheet</b>		<b>29</b>
<b>Seven Up Add Up Exploring Mean Median Mode</b>	<b>exploring mean, median, mode, addition fact fluency</b>	<b>30</b>
<b>Seven Up Add Up Mean Median Mode Class Graph</b>		<b>32</b>
<b>Advanced Place Value Activities</b>		<b>33</b>
<b>Advanced Place Value Shakers</b>	<b>naming numbers from the 1,000's to millions, naming decimals, comparing numbers</b>	<b>35</b>
<b>Advanced Place Value Shakers Recording Sheet</b>		<b>36</b>
<b>Shake A Round</b>	<b>rounding to 10's and 100's place</b>	<b>37</b>
<b>Advanced Shake A Round</b>	<b>rounding numbers to specific place values, rounding to decimals</b>	<b>38</b>
<b>Advanced Shake A Round Recording Sheet</b>		<b>40</b>
<b>Millions Mambo</b>	<b>naming numbers to millions, comparing numbers, expanded notation</b>	<b>41</b>
<b>Millions Mambo Recording Sheet</b>		<b>43</b>
<b>Fraction Concepts with the Shakers</b>		<b>44</b>
<b>Proper Fraction Detectives</b>	<b>identifying and naming proper fractions, fraction vocabulary</b>	<b>45</b>
<b>Proper Fraction Detectives Recording Sheet</b>		<b>47</b>
<b>Fraction Action</b>	<b>identifying and naming proper fractions, improper fractions, fractions equal to 1, adding fractions (variation)</b>	<b>48</b>
<b>Fraction Action Recording Sheet</b>		<b>50</b>
<b>Fraction Open Number Lines</b>		<b>51</b>
<b>Equivalent Fraction Action</b>	<b>identifying proper and improper fractions, equivalent fractions</b>	<b>52</b>
<b>Equivalent Fraction Action Recording Sheet</b>		<b>54</b>
<b>Sum Fraction Action</b>	<b>adding proper and mixed fractions</b>	<b>55</b>
<b>Sum Fraction Action Recording Sheet</b>		<b>57</b>

Baseball Average Shake Up	comparing 3-digit decimal fractions $>$ $<$ , rounding, representing data using pie graphs	58
Baseball Average Shake Up Recording Sheet		60
Splitting The Bill	reading a restaurant bill, division, calculating percent, money	61
Splitting The Bill Recording Sheet		63
I'm Coordinated	plotting ordered pairs, predicting from a group of ordered pairs	64
I'm Coordinated Recording Sheet		66
Zero The Hero	adding integers, absolute value	67
I'm Balanced	solving linear equations with one variable, solving pairs of simultaneous linear equations	69
I'm Balanced Recording Sheet		70
Absolutely Fabulous	adding integers, comparing absolute values of integers	71
Decimation	dividing by tenths and other decimals	73
Divide and Conquer	dividing multi-digit dividends by multi-digit divisors, division to two decimal places, rounding to tenths, estimation	75
Point Counter Point	adding decimals	77
The Multiplier Effect	multiplying multi-digit factors, multi-digit subtraction, estimation	79
Math Shakers Recording Sheet 1		81
Math Shakers Recording Sheet 2		82

# SEVEN UP ADD UP EXPLORING MEAN MEDIAN MODE

**LEVEL:** Grade 4 and up


**SKILL:** exploring mean, median, mode, addition fact fluency

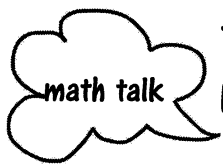
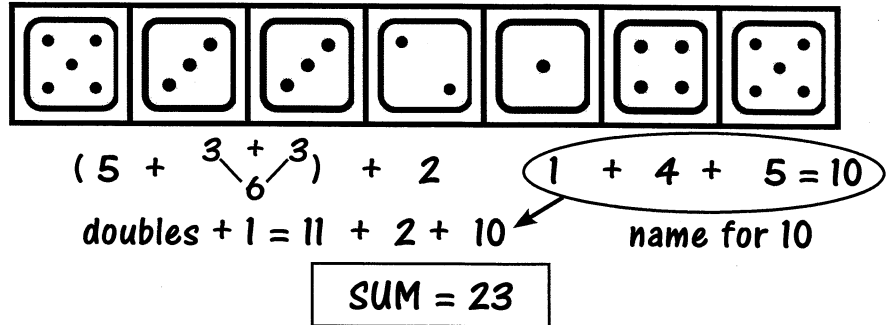
**SET UP:** vertical or horizontal, 1 die per slot, 1 shaker per pair or group

**PLAYERS:** 2 (cooperative) or small groups 3-4



**GOAL:** to calculate the mean, median and mode of the sum of seven dice

## GETTING STARTED:

Each pair or group needs their own shaker. Have students shake until  is called. Players then add up all seven dice in their shakers and calculate the sum. The sum is recorded onto the data sheet. Encourage students to use patterns to calculate their sums efficiently. As students work with their shakers remind them to find and add with patterns such as doubles, doubles + 1, names = 10, multiples. After players record their sums, shake again, calculate the next sum and continue until all 50 shakes have been completed and recorded.



To prepare students for this activity have them discuss what the greatest possible/least possible sums would be, given seven dice.

Greatest Sum =  = 42  
 Least Sum =  = 7

Have students discuss and predict what the average sum will be after 50 shakes. Have them record their thinking and their predictions before conducting the sample.

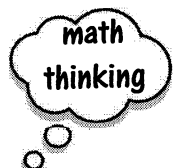
Theoretically the average sum would be as follows:

"opposite sides of a single die = 7

$$7 \div 2 = 3 \frac{1}{2}$$

$3 \frac{1}{2} \times 7$  dice in the shaker = 24.5

I predict the average sum will be 25."



# SEVEN UP ADD UP EXPLORING MEAN MEDIAN MODE

## FOLLOW UP ACTIVITIES:

1. Have students order their sums from least to greatest.
2. Have student put a box around the MODE, (the most frequently occurring data) and determine if data is single, bi-modal or tri-modal.
3. Have students find the MEDIAN and circle it. With a sample of 50 the midpoint is the 24th and 25th position in the set.
4. Have students calculate the MEAN by calculating the grand total sum, then dividing this by total number of shakes (50).
5. Have students compare their calculations to their predictions. How close were they? Did they have any unusual shakes (outliers)?
6. As a class, have groups compare their data. As a class, what was the greatest and least sum rolled? How close were these sums to the theoretical possibility?

Shake	Numbers	Sum	Shake	Numbers	Sum
1	3 2 6 1 5 5 6	= 28	26	6 5 4 1 5 2 5	= 28
2	5 1 6 1 3 6 1	= 23	27	4 2 6 4 1 5 1	= 23
3	2 4 5 3 1 1 3	= 19	28	3 2 2 2 3 3 5	= 18
4	4 2 4 3 2 5 2	= 22	29	4 1 2 5 4 5 2	= 23
5	4 2 6 6 3 6 5	= 32	30	4 5 2 6 1 3 1	= 22
6	5 3 6 6 5 4 4	= 33	31	2 4 3 4 6 4 2	= 25
7	4 2 6 6 3 6 5	= 32	32	1 3 6 3 6 1 2	= 22
8	5 2 3 6 1 4 4	= 25	33	1 3 4 1 5 4 5	= 22
9	6 6 2 1 1 5 4	= 25	34	3 2 4 4 5 1 3	= 22
10	6 4 2 5 1 2 2	= 22	35	4 3 1 6 6 3 6	= 29
11	2 1 6 4 3 4 3	= 23	36	1 2 4 2 4 2 5	= 20
12	5 2 1 2 2 5 1	= 18	37	2 3 4 1 5 2 6	= 23
13	5 3 1 1 3 3 1	= 17	38	1 2 1 1 3 3 5	= 16
14	6 3 6 3 2 6 6	= 32	39	3 1 6 3 3 6 2	= 24
15	4 5 5 6 3 1 1	= 25	40	6 4 5 2 6 3 4	= 30
16	6 5 6 4 1 3 2	= 27	41	2 4 6 4 6 3 4	= 28
17	3 5 3 1 1 1 1	= 15	42	1 4 2 1 5 2 2	= 17
18	6 6 4 5 6 4 1	= 32	43	3 3 6 2 3 5 3	= 25
19	5 2 4 4 4 1 5	= 25	44	1 5 3 5 4 3 6	= 27
20	6 2 5 3 6 3 2	= 27	45	4 6 5 6 3 1 1	= 26
21	4 5 3 2 4 1 2	= 21	46	4 6 1 3 6 4 5	= 29
22	2 4 2 1 2 2 1	= 14	47	1 5 4 4 4 3 5	= 26
23	6 5 6 5 6 3 3	= 34	48	6 4 2 3 2 2 2	= 21
24	2 6 4 6 5 1 2	= 26	49	5 6 3 1 2 3 5	= 25
25	2 5 1 5 2 2 1	= 18	50	5 6 3 4 4 3 6	= 31

MODE - most frequently occurring sum in our sample was: 25

MEDIAN - mid point of our sample was: 24/25 = 24.5

MEAN - total sum divided by sample (50) was: Sum = 1217 ÷ 50 = 24.34

Observed: 34 was greatest sum  
14 was least sum

# SEVEN UP ADD UP MEAN MEDIAN MODE CLASS GRAPH

Shake	Numbers	Sum	Shake	Numbers	Sum
1	=		26	=	
2	=		27	=	
3	=		28	=	
4	=		29	=	
5	=		30	=	
6	=		31	=	
7	=		32	=	
8	=		33	=	
9	=		34	=	
10	=		35	=	
11	=		36	=	
12	=		37	=	
13	=		38	=	
14	=		39	=	
15	=		40	=	
16	=		41	=	
17	=		42	=	
18	=		43	=	
19	=		44	=	
20	=		45	=	
21	=		46	=	
22	=		47	=	
23	=		48	=	
24	=		49	=	
25	=		50	=	

**MODE** - most frequently occurring sum in our sample was:

**MEDIAN** - mid point of our sample was:


**MEAN** - total sum divided by sample (50) was:

# MILLIONS MAMBO

- LEVEL:** Grade 4 and up
- SKILL:** naming numbers to millions, comparing numbers, expanded notation
- SET UP:** horizontal only, 1 die per slot, 1 shaker per student or pair
- PLAYERS:** 2 (cooperative pair)
- GOAL:** to read, compare and expand numbers up to the millions

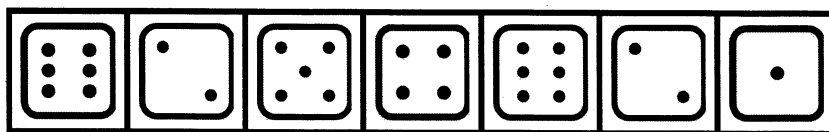
## GETTING STARTED:

Players will use their shakers to build numbers with values into the millions.

Each student needs their own shaker. Partners both shake their containers until  is called. Players hold their shakers horizontally and read their numbers out loud to each other. See chunking strategies found on page 33 if students are having difficulty with this.

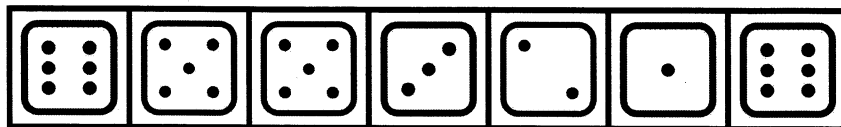
## EXAMPLE:

Player One



Six million, two hundred fifty-four thousand, six hundred twenty-one

Player Two



Six million, five hundred fifty-three thousand, two hundred sixteen

Players then compare their numbers by covering up and sliding down their shakers, verbalizing, "Player Two's number is greater by about three hundred thousand".

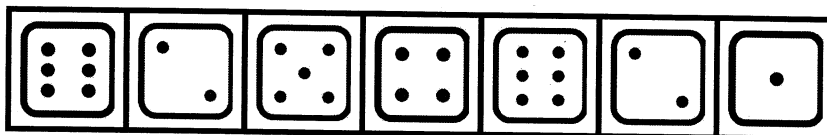
math  
thinking



# MILLIONS MAMBO

## FOLLOW UP ACTIVITIES:

1. The container can help students see and practice expanding numbers to the millions. Have students shake and place their number down.



Touch 6, say 6 million, touch the slots one at a time heading to the end of the shaker.

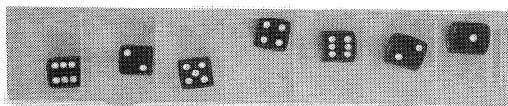
Six million has ... 1, 2, 3, 4, 5, 6 zeros.

Touch 2. Two hundred thousand has ... 1, 2, 3, 4, 5 zeros etc.

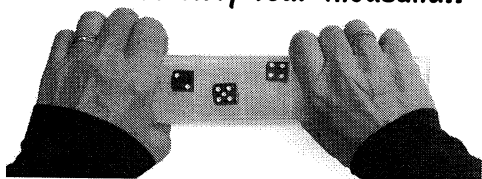
The slots represent each zero that specific place value has in it.

$$6\ 000\ 000 + 200\ 000 + 50\ 000 + 4000 + 600 + 20 + 1 = 6\ 254\ 621$$

Step One: Shake to create number.



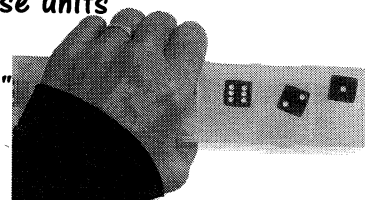
Step Three: "Chunk" the three numbers representing thousands "two hundred fifty-four thousand.."



Step Two: Cover all but slot representing millions. "Six million.."



Step Four: "Chunk" the three numbers representing base units (100's, 10's, 1's) "six hundred twenty-one."



SHAKE

NUMBER

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

EXPANDED NUMBER

$$6,000,000 + 300,000 + 60,000 + 2000 + 500 + 40 + 5$$

SHAKE

NUMBER

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

EXPANDED NUMBER

$$3,000,000 + 600,000 + 40,000 + 4,000 + 600 + 50 + 3$$

SHAKE

NUMBER

3	4	1	1	5	3	3	3
---	---	---	---	---	---	---	---

EXPANDED NUMBER

$$4,000,000 + 100,000 + 10,000 + 5,000 + 300 + 30 + 3$$

# MILLIONS MAMBO RECORDING SHEET

SHAKE                      NUMBER                      EXPANDED NUMBER

1

--	--	--	--	--	--	--

---

SHAKE                      NUMBER                      EXPANDED NUMBER

2

--	--	--	--	--	--	--

---

SHAKE                      NUMBER                      EXPANDED NUMBER

3

--	--	--	--	--	--	--

---

SHAKE                      NUMBER                      EXPANDED NUMBER

4

--	--	--	--	--	--	--

---

SHAKE                      NUMBER                      EXPANDED NUMBER

5

--	--	--	--	--	--	--

---

SHAKE                      NUMBER                      EXPANDED NUMBER

6

--	--	--	--	--	--	--

---

SHAKE                      NUMBER                      EXPANDED NUMBER

7

--	--	--	--	--	--	--

---

SHAKE                      NUMBER                      EXPANDED NUMBER

8

--	--	--	--	--	--	--

---

SHAKE                      NUMBER                      EXPANDED NUMBER

9

--	--	--	--	--	--	--

---

SHAKE                      NUMBER                      EXPANDED NUMBER

10

--	--	--	--	--	--	--

---

# SUM FRACTION ACTION

contributed by Nancy Paulson

- LEVEL:** Grade 5-8
- SKILL:** adding proper, improper and mixed fractions
- SET UP:** horizontal, 1 die in each slot (preferably 2 different colors of dice), 2 shakers per team
- PLAYERS:** 4 (2 vs 2)
- GOAL:** to have the greatest sum of seven fractions

## GETTING STARTED:

To begin, warm up and review the simpler fraction games on pages 46 to 48. Nancy loves to have her students pick their favorite baseball team and play nine INNINGS or rounds of this game.

Each team shakes their two containers until  is called.

The containers are then lined up horizontally to create seven fractions. Some fractions may be proper, mixed or equal to one. Teams must add their seven fractions and calculate their sum. The team with the greatest sum scores the point.

**TEACHING TIP:** Have students analyze the types of fractions rolled and look for compatible "friendly" fractions before doing their addition.

## EXAMPLE:

Team One:

numerator	5	2	6	6	3	1	2
denominator	5	2	6	4	3	5	5

$= 1 + 1 + 1 + 1\frac{1}{2} + 1 + \frac{3}{5} + \frac{2}{5}$   
 $= 5\frac{1}{2} + 1 + \frac{5}{5} = 6\frac{1}{2}$

Team Two:

numerator	1	3	3	6	5	6	1
denominator	3	2	2	1	1	1	6

$= \frac{1}{3} + \frac{3}{2} + \frac{3}{2} + 6 + 5 + 6 + \frac{1}{6}$   
 $= \frac{1}{3} + 3 + 20 + \frac{1}{6} = 20\frac{3}{6}$

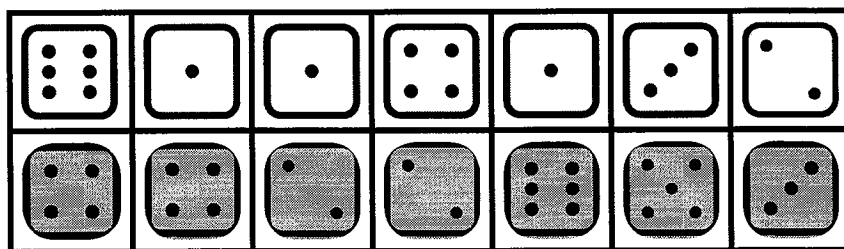
Team Two's sum is greater. They score this inning!

Teams shake new fractions for the second inning and calculate their new SUMS. The team with the most points after nine innings is the winner.

# SUM FRACTION ACTION

## FOLLOW UP ACTIVITIES:

1. Have students use the recording sheet and circle/color the "friendly fractions" or groupings they used to calculate their sum.
2. Have students list the pairs of "friendly fractions" they discovered while playing.
3. Run a Fraction World Series! Have the whole class play in teams for one round. Then "play off" - Greatest Sum vs Least sum, 2nd Greatest vs 2nd Least etc. Continue paring down until one team becomes the overall World Series Champion.
4. Have students include subtraction in the round.



$$\frac{6}{4} + \frac{1}{4} + \frac{1}{2} + \frac{4}{2} + \frac{1}{6} + \frac{3}{5} - \frac{2}{3}$$

5. Add six fractions in order, subtract the seventh. Greatest sum still wins the inning.

# SUM FRACTION ACTION RECORDING SHEET

**SHAKE 1**

numerator							
denominator							

**SHAKE 2**

numerator							
denominator							

**SHAKE 3**

numerator							
denominator							

**SHAKE 4**

numerator							
denominator							

**SHAKE 5**

numerator							
denominator							