Whooo's Practicing Math This Summer?

Have a Hoot of a Time With

Fun Math Games to Promote Summer Learning!

Madison Public Schools

Grades K-4

2016

June 2016

Dear Parents and Families,

Summertime is a great time to help children investigate mathematical concepts in a variety of exciting ways. Playing games, telling math stories, solving real world problems, and using technology are just a few fun ways to help our students retain their number sense and to further develop their fact fluency.

In Elementary Mathematics instruction, we are placing emphasis on how children understand mathematical problems and strategies, rather than memorization of rules, algorithms, and formulas. In this packet, you will find the strategies your child is learning in school to develop fluency with addition and multiplication facts. We encourage you to refer to these strategies while playing games at home with your child.

Jo Boaler, professor at Stanford University, writes, " It is really important to communicate 'growth mindset' messages to students… the latest research is telling us that students can reach any levels in math because of the incredible plasticity of the brain." Our goal is to help your children believe in themselves and speak the language of mathematics more fluently. This packet provides many ideas for how to develop your child's numeracy skills through fun and engaging math games and activities this summer. Attached is the form, "*Ten Ways I Practiced Math During the Summer*" to complete and return to the Math Specialist at your elementary school at the beginning of the 2016-2017 school year.

Happy Learning! Best wishes for a safe, fun-filled, mathematical summer!

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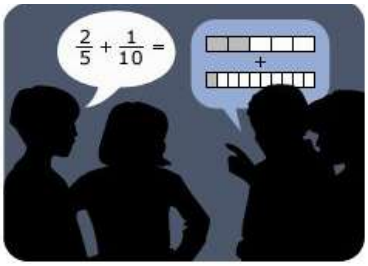


QUESTIONS TO ASK TO HELP YOUR CHILD TO BECOME MATHEMATICALLY PROFICIENT

1 Make sense of problems and persevere in solving them.	• How would you describe the problem **in your own words**? • What do you know that is **not stated** in the problem? • Would it help to create a diagram? Make a table? Draw a picture? • Can you plan a way to solve this problem and stick through it?
2 Reason abstractly and quantitatively.	• What does it mean when… • Can you use pictures and words to describe numbers? • Can you use numbers to describe pictures and words?
3 Construct viable arguments and critique the reasoning of others.	• What do you think about what ____ said? • Do you agree? Why/why not? • Can you explain what _____ is saying? • Can you explain why his/her strategy works? • How is your strategy similar to ____'s? • Can you convince the rest of us that your answer makes sense?
4 Model with mathematics.	• What number sentence represents your drawing/picture? • How could we use symbols to represent what's happening?
5 Use appropriate tools strategically.	• How did using that tool help you solve the problem? • If we didn't have access to that tool, what other one would you have chosen? • What might be the best tool to help us solve this problem? Why?
6 Attend to precision.	• Can you tell me why that is true? • How did you reach your conclusion? • How does your answer connect to the question? Does it make sense? • Can you make a model to show that? • Can you convince the rest of us that your answer makes sense? • What new words did you use today? How did you use them?
7 Look for and make use of structure.	• How do you know your rule/equation will always work? • Are there patterns that help us understand these numbers? Shapes?
8 Look for and express regularity in repeated reasoning.	• Is there a shortcut / algorithm you could use? • Do the solutions have anything in common?

Real World Math Fun to Create at Home

Order Dinner Out for Your Family

Choose a local restaurant from which you can order dinner.

- Using a menu from the restaurant, determine what you would order for each family member. Keep in mind that it should be a balanced, healthy meal.
- Determine the total cost to order those items.

Plan a Fun Day for your Family

Choose what you will do for the day and plan a time schedule.

- Figure out if there is a cost associated with any of the activities you have planned. Calculate the total cost.
- If you need to travel, figure out the route you will take and the amount of time it will take you to travel.
- Plan for meals.

Geometry Fun!

Go on a scavenger hunt around the house and collect 2-D and 3-D shapes.

- Build something with them listing all of the shapes you used.
- Sort them by attribute

Build some 3-D shapes using mini-marshmallows or playdough and toothpicks!

- How many corners does your shape have? How many edges?

Design a Garden

Create a plan for a garden in your yard.

- Decide on the size and shape of the garden.
- Calculate its area and perimeter.
- Plan out what plants you will include in your garden, where you will place them in the garden, and how they should be spaced.

Create an Obstacle Course

Create a number (5-10) of fun stations to get you up and moving this summer!

- For example: long jump, skip count jump rope, find hidden objects in a pool/sandbox/ball pit, squeeze a soggy sponge into a measuring cup…be creative!
- For extra math emphasis, add flags to each event that need to be grabbed. Have a fact or problem written on each flag that needs to be solved in order to pass to the next station.
- Use a timer to see how quickly you and your friends can get through the course. You could graph your results and try it more than once to see if you get faster with practice!

Observing Nature

You can do this at the beach or in your backyard! Tally up how many birds, bugs, flowers, trees you see. Can you add them up? Make a bar graph? Try to make up word problems with the data you collected!

Plan a Trip Using Public Transportation

Choose a means of transportation such as Shoreline East Train or Metro North. (You might plan a trip from Madison to Pizza Works in Old Saybrook or from Madison to New Haven to visit Yale Art Museum.)

- Decide where you will begin your trip and where you will end.
- Find a time schedule for the chosen transportation and determine when you will need to leave, how long it will take, how long you will remain at your destination and when you will return home.

You can get really creative with this type of project and give yourself an imaginary amount of money and plan a trip to a place you need to fly to. Then, look into flight schedules and costs.

Calculate the Amount of Gas Used by the Family Car

When filling the car up at the gas station, it's a great time to begin discussing how many miles the car drives per gallon of gas. Keep track of the number of miles traveled for each tank of gas and how many gallons the car used. Together figure out how many miles the car traveled per gallon of gas. Investigate whether this changes when driving more on the highway versus around town.

How Long Did You Read?

Here's a way to practice your reading and your time skills. Look at the clock before you begin a book. Write down the time you started. When you finish reading, look at the clock to see what time you finished.

Can you read the hour and minute? Can you figure out the number of minutes you read?

Math Apps

Number Sense (Grade K-1)

Subitize Tree	NCTM's Concentration	NCTM's Okta's Rescue	Number Flash	Park Math
				

Number Sense/ Place Value (Grade 1 - 3)

Greg Tang's Ten Frame Mania	Greg Tang's Math Limbo	Zap Zap Math	Marble Math Jr	
				

Free Apps from the Math Learning Center, the publisher of Bridges in Mathematics

Geoboard	Number Frames	Number Rack	Pattern Shapes	Money Pieces
				
Math Vocabulary Cards	**Number Line**	**Number Pieces**	**Number Pieces Basic**	
				

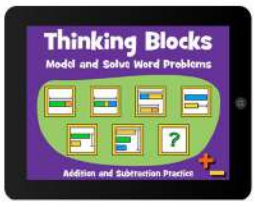
Addition & Subtraction Fact Fluency

Math Tappers Addition 	Math Lines 	Make Ten Plus 	Hungry Fish 	Franklin's Friends of Ten 
Math Run Panda 	Math Slide Addition and Subtraction 	NCTM's Deep Sea Duel 	Sushi Monster- Addition/ Subtraction 	Kakooma Addition 

Multiplication & Division Fact Fluency

Fruit Plate Math 	Math Tappers Multiples 	Math Slide Multiplication 	Kakooma Multiplication 	Wuzzit Trouble 

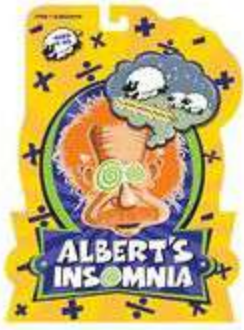
Logic/Math Reasoning

Qwirkle 	NCTM KenKen 	2048 	Thinking Blocks 	Name That Number 

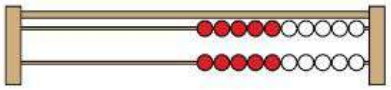
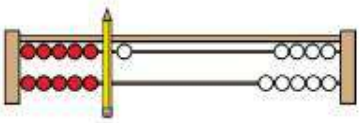
www.recommendedwebsites.com

http://illuminations.nctm.org/	National Council of Teachers of Mathematics official site for interactive Math games in all areas of number and operations; algebra; geometry; measurement; and data analysis and probability. Some of our favorites include: **Gr. K-2**: Okta's Rescue, Ten Frames, Grouping and Grazing, Concentration, How Many Under the Shell. **Gr. 3 -5**: Deep Sea Duel, the Factor Game, the Product Game, Daily KenKen.
http://www.gregtangmath.com http://summer.gregtangmath.com/	Games that have high *math density* where every moment is spent calculating and thinking mathematically, not doing unrelated activities often found in other games. Great computational and abstract thinking skills needed for higher math. We especially recommend NumTanga, Ten Frame Mania, Mqth Limbo, Coin Bubble, Kakooma, Break Apart and Satisfraction. See the "Summer" hyperlink for a challenge and submit your gameboard by September 15th to be entered to win a prize!
http://bedtimemath.org/	A nightly math problem to get kids fired up about math in their everyday lives. There is also an app version.
http://www.mathplayground.com	There are so many great games on this website. The games are broken down by topic: addition, subtraction, multiplication, division, fractions, and even geometry. Be sure to try the Thinking Blocks activity. It is a great way to practice word problems.
http://sheppardsoftware.com/math.htm	Again, this website has hundreds of games divided up by topic including the ones mentioned above in addition to: measurement, rounding, decimals, money, time and place value! Some of the kids favorites include: Monkey Drive & Fruit Splat.
http://www.fuelthebrain.com/	Browse by category. This website offers some great models for topics such as adding and subtracting on a number line, building numbers with base ten blocks and dividing with an area model.
http://catalog.mathlearningcenter.org/apps	This link provides you with a list of all of the free APPS provided by the Math Learning Center, the publisher of Bridges in Mathematics, that your children are using at school.
http://www.mathlearningcenter.org/resources/families	This page provides you with a link to an Amazon virtual library with a list of math books for kids. In addition to the links we have provided, it gives a list of online activities by grade level.
http://www.coolmath-games.com/	This site has an array of different math games including our favorites Math Lines and Number Twins.
http://www.mrnussbaum.com	An academic amusement park, where practice, assessment, standards, competition, reinforcement blend together.
http://www.abcya.com	Grade level specific interactive activities. Gr 1& 2: Try 100 Number Chart, 100 Number Grid, Base Ten Fun Gr 3 & 4: Try Place Value Hockey, Fraction Fling

Great Board, Card, and Dice Games for Practicing Math Skills

I Sea 10! 	**Pop for Addition & Subtraction** 	**Math Dice Jr.** 
Sumoku 	**Albert's Insomnia** 	**Mathological Liar** 
Free Range Fractions 	**Qwirkle** 	**Blokus** 

Addition Fact Strategies

Counts All	This is the earliest stage of understanding addition. Children count from one to find the sum. They often use manipulatives or count on their fingers. For 5 + 2, a child will count, "1, 2, 3, 4, 5, 6, 7."	
Counts On	Students understand that it is faster to start with the larger addend and count on.	3 + 6 = 6, 7, 8, 9
Zeros & Ones	Children understand that when you add any number to zero, the sum stays the same. When adding one, the sum grows by 1.	5 + 0= 5 5 + 1 = 6
Doubles	Students come to recognize doubles facts as 'numbers that have a partner' on the number rack, or you can see them in a mirror. They should also notice that sums are always even. Committing these facts to memory will aid in the next strategy.	3 + 3 = 6 7 + 7 = 14 8 + 8 = 16 9 + 9 = 18
Near Doubles (Doubles +/- 1)	Once your child is confident with doubles facts, he/she can be led to recognize doubles plus or minus one facts as close neighbors.	 2+3 3+4 4+5 5+6 6+7 7+8 8+9
Make 10	Begin to recognize "partners" of numbers that make 10. Since our number system is based on 10, when children are good at recognizing the combinations (i.e. 2 + 8; 4 + 6) they can begin to apply this to larger computation (i.e. 12 + 38; 24 + 17)	1 + 9 2 + 8 3 + 7 4 + 6 5 + 5
Add Ten	Students recognize that adding a single digit number to 10 means 10 and some more. This understanding helps children to use strategies to add double digit numbers with ease by using methods that involve place value splitting.	6 + 10 = 16
Near Ten (Add 9)	Since adding 10 to any number is 'easy', students quickly become comfortable seeing 9 as a next-door neighbor to 10. They can add 10 and then take 1 away. Or he/she can choose to take 1 from the other addend to 'make the 9 into a 10'.	9 + 4 = 10 + 4 -1 = 13 **OR** **9 + 4 = 13** (1) (3)

Two Apart Strategy	For numbers that are two apart, students can also apply this idea of giving and taking in order to realize that this is the same sum as double the number inbetween.	$6 + 8 = 7 + 7$
Use known facts / Break Apart	However, if a child has mastered ten facts, he or she could choose to manipulate other facts into ten facts.	$8 + 5 = 8 + 2 + 3$ The 5 could be broken into 2 + 3. The 2 can be quickly added to 8 and now we have an easier fact: 10 + 3.

Fact Fluency Games: Addition

Dice Combinations:

Materials: dice and calculators

Use two dice. Roll the dice and say how many dots are on each die just by looking. Then add the number of dots. Enter the number into your calculator to keep progressive scores. The first person to reach a given number such as 100 wins. Variation: include three dice or dice of varying numbers, like a 4-9 die.

The Game of Pig:

Materials: a pair of dice

Use two dice. Roll dice as many times as you like, adding the dots on the dice and keep a running total of the sum of your rolls. However, if you roll a 1 on one of the dice, your turn is over and 0 is scored for that round. If 1s come up on both dice, your turn is over and your total for the game thus far becomes 0. The first person to reach 100 wins.

Addition War

Materials: a deck of cards

Deal out the deck of cards evenly between players. Face cards can be 10s or removed from the deck. Each player turns over the top two cards and adds them. The player with the larger sum takes all four cards. Variation: each player draws 1, player to announce sum first wins the match. **Variation for subtraction:** the player with the larger number takes the two cards. They will also take as many beans or counters as the difference between the two numbers turned over (Ex: 6 and 4 are turned over, the player who turned over the 6 gets to take 2 beans). **Add difficulty:** have each player turn over two cards each turn and add the sum of the cards.

Addition "Go Fish":

Materials: a deck of cards

Use Aces as 1s and 2 – 9 from a deck of cards. Deal out 7 cards to each player. Place the remaining cards face down in the middle. Begin by players looking through their hands to see if they have matches, or combinations of 2 cards that will add to 10. Play begins as players take turns asking others for numbers they need to make a ten. **Variation:** use flashcards or index cards with addition facts written but no answers. Matches/pairs are made by matching sums. (i.e. 3+ 2 and 4 +1 are a match). Players ask another for a sum for a card they have in their hand.

Addition Memory:

Materials: flashcards/index cards with addition facts w/o answers

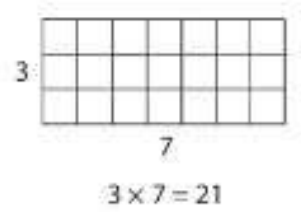
Place the cards face down on a table or the floor in an orderly fashion. On each player's turn, he or she turns over two cards and determines the sum on each card. If the sums are equal, the player has made a match and keeps the

cards. (Thus, 8+1 and 3+6 can be a match.) If the sums are not equal, the two cards are turned back over and left in their same place.

Sum Cross Out:

Materials: *2 dice and paper*

Each player writes 15 numbers using the numbers 1 - 9. Numbers may be used multiple times and not all numbers need to be used. The dice are rolled and the sum of the dice is determined. All players cross that sum out in any way possible on their lists. Thus, if you have the numbers, 1, 1, 1, 1, 2, 2, 2, 3, 3,5, 5, 5, 5, 6, 6 written on your paper and you roll a 7, you can cross out any combinations equaling 7. You could cross out 2 and 5; or 1, 3, and 3; or 6 and 1; etc. The game ends when one player crosses out all of his or her numbers **or** when no one can cross out a combination on their sheets.

Multiplication Fact Strategies			
Repeated Addition		As students begin learning multiplication, they see the connection between multiplication and repeated addition.	3 x 4 = 4 + 4 + 4 6 x 5 = 5 + 5 + 5 + 5 + 5 + 5
Visualizing Arrays		The array provides a visual model for multiplication. The numbers being multiplied correspond to the dimensions of the rectangle and the product of those numbers correspond to the area of the rectangle.	 3 x 7 = 21
x 0	Zero Property	The product of any number and 0 is 0.	4 x 0 = 0 0 x 65 = 0
x 1	Identity Property	The product of any number and 1 is that number.	5 x 1 = 5 1 x 43 = 43
x 10	Times Ten	Focus on the base ten aspect of our number system. Discuss moving a place.	6 x 10 = 60 45 x 10 = 450

x 5	Half Ten	To multiply by 5, multiply by 10 and then divide the result in half. 5 = 10 ÷ 2	5 x 3= (10 x 3) ÷ 2 = 30 ÷ 2 = 15 5 x 18 = (10 x 18) ÷2= 180÷2=90
x 2	Doubles	To multiply by 2, double the other number or think of the addition doubles.	2 x 5 = 5 + 5 = 10 14 x 2 = 14 + 14 = 28
x 4	Double-Double	To multiply by 4, double the other number and then double the result. 4 = 2 + 2	4 x 6 = 2 x (2 x 6) = 2 x 12 = 24 4 x 24 = 2 x(2x24) = 2 x 48= 96
x 8	Double-Double-Double	To multiply by 8, double the other number, double the result and double it again. 8 = 2 x 2 x 2	8 x 6 = ((6x2) x2) x 2= (12x2)x2= 24 x2= 48 8 x 43 = ((43x2) x2) x 2= (86 x 2) x 2= 172 x 2 = 344
x 9	Ten Minus a Set	To multiply by 9, multiply the number first by ten and then subtract a set of that number. 9 = 10 - 1	9 x 6 = (10 x 6) – 6= 60 – 6 = 54 9 x 45 = (10 x 45) – 45 = 450 – 45 = 405
x 3	Double Plus a Set	To multiply by 3, double the other number than add one more set of that number. 3 = 2 + 1	3 x 6 = (2 x 6) + 6 3 x 15 = (2 x 15) + 15
x 6	Half Ten Plus a Set	To multiply by 6, carry out the steps for multiplying by 5 and then add a set. 6= 5 + 1	6 x 7 = ((10 x 7) ÷ 2) + 7 = 42 6 x 42 = ((10 x 42) ÷2) + 42= (420÷2) + 42= 210 + 42 = 252

Fact Fluency Games: Multiplication

Multiplication War:

As with War and Addition War, each player turns over the top two cards from his or her deck and multiplies them. The player with the larger product takes all four cards.

Multiplication "Go Fish":

Matches or pairs are made by matching products. On a player's turn, he or she asks another player for a product that would make a match with a card in his or her hand. Otherwise, the player is told to "Go Fish."

Multiplication "Memory":

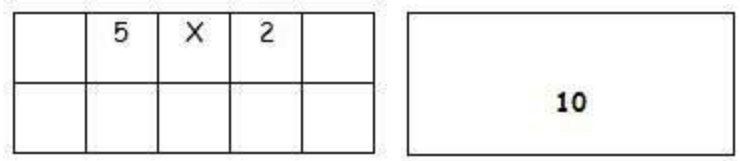
As with other Memory games, players take turns flipping two cards. If the products are equal, the player has made a match and keeps the cards. If products are not equal, the cards are turned back over.

Array Games:

Materials: graph paper

Make rectangular arrays for the multiplication facts, and cut them out. Then, label the dimensions on one side and the answer on the other side. For example:

Front: **Back:**



You can then use the arrays to look at the dimensions and give the total or, given the total, state the dimensions. Another variation could be a game of "big array, small array" in which you lay 5 large arrays out for each player. Take turns finding two arrays that can cover a big array completely for a "match".

Draw the Array Game:

Materials: graph paper, pair of dice

Each player gets a piece of graph paper. On a player's turn, he rolls the dice. The dice will tell the player the dimensions of a rectangle to draw on the graph paper. So, if the player rolls a 3 and a 4, the player draws a 3 by 4 rectangle on the graph paper. Inside the rectangle, the player records 3 X 4 = 12. Then, the next player rolls. Play continues until one of the players can't place a rectangle on the graph paper because there is no room left. Each player figures out the total number of squares covered on the graph paper. The winner has covered the most squares.

Multiplication Baseball

Materials: pair of dice, coins or small markers to use as players around the bases.

Decide who will be up to bat first. The other player will be the pitcher. The pitcher rolls the dice. The player up to bat must find the product of the dice rolled. Use the following game board to move your game pieces around the bases. After 3 outs, players switch rolls.

Baseball Multiplication Record Sheet
(Game Master 5)

Scoreboard

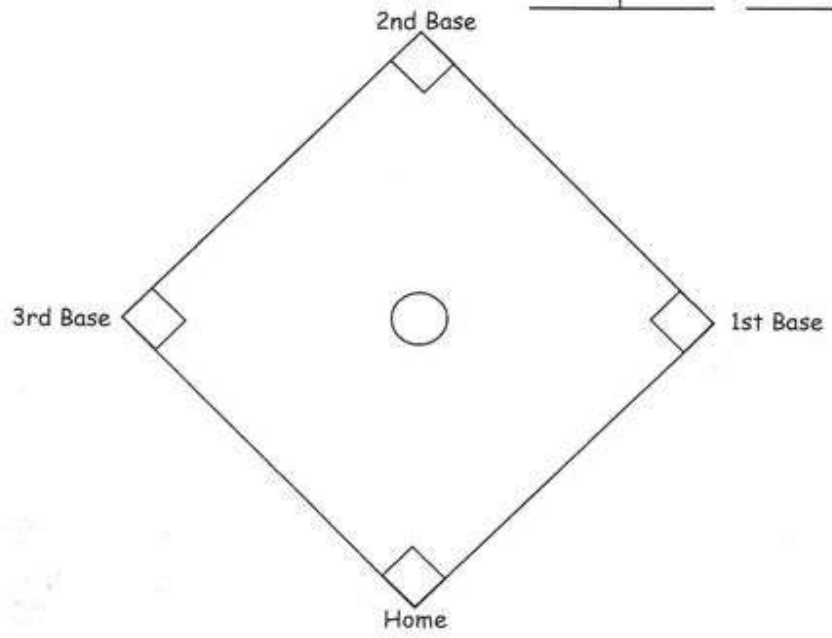
Inning	1	2	3	4	5	6	7
Team 1							
Team 2							

Runs and Outs Table

Team 1		Team 2	
Runs	Outs	Runs	Outs

Scoring Chart
(for regular dice)

36 = Home run (score a run)
26-35 = Triple (go to 3rd base)
16-25 = Double (go to 2nd base)
6-15 = Single (go to 1st base)
5 or less = Out (record an out)



Fact Fluency Games: Division

Division "Go Fish"

Materials: Flashcards or index cards with division facts written on them but no answers

Matches or pairs are made by matching quotients. (16 ÷ 4 and 8 ÷ 2 are a match) Players ask another for a quotient that would make a match with a card in his or her hand. Thus if the player has 12 ÷ 3 in his hand, he would ask another player for a 4. If that player has 24 ÷ 6 or any other card equaling 4, a match has been made, or "go fish".

Division Memory:

Materials: division flashcards/index cards with division facts written w/o answers

Place cards face down on a table or the floor. On each player's turn, he or she turns over two cards and determines the quotient on each. If the quotients are equal, the player has made a match and keeps the cards. (Thus, 24 ÷ 8 and 6 ÷ 2 can be a match.) If the quotients are not equal, the two cards are turned back over and left in their place. The game ends when all matches are made. The winner is the player with the most matches.

Get Seven:

Materials: 48 cards with one of the following written:

4 ÷ 1	8 ÷ 2	12 ÷ 3	16 ÷ 4	20 ÷ 5	24 ÷ 6
5 ÷ 1	10 ÷ 2	15 ÷ 3	20 ÷ 4	25 ÷ 5	30 ÷ 6
6 ÷ 1	12 ÷ 2	18 ÷ 3	24 ÷ 4	30 ÷ 5	36 ÷ 6
7 ÷ 1	14 ÷ 2	21 ÷ 3	28 ÷ 4	35 ÷ 5	42 ÷ 6
28 ÷ 7	32 ÷ 8	36 ÷ 9	40 ÷ 10	44 ÷ 11	48 ÷ 12
35 ÷ 7	40 ÷ 8	45 ÷ 9	50 ÷ 5	55 ÷ 11	60 ÷ 12
42 ÷ 7	48 ÷ 8	54 ÷ 9	60 ÷ 10	66 ÷ 11	72 ÷ 12
49 ÷ 7	56 ÷ 8	63 ÷ 9	70 ÷ 7	77 ÷ 11	84 ÷ 12

Lay cards face down. Each player draws seven cards, hiding cards from the other players. The remaining cards are removed except for one which remains face down. The first player chooses one he does not want and places it face down in front of the player to his left, and then picks up the extra card left on the table. Play rotates clockwise. Each player passes an unwanted card face down to the player on his/her left and then picks up the one given by the player on the right. The objective is to get seven cards with the same quotient. The game continues with players always placing one card on the table before picking up the next one.

What's Up?

Materials: Cards: 1, 3, 5, 7, 7, 9. Cards: 1, 2, 4, 6, 6, 8. List on lined paper 10-81.

Players take turns, rotating clockwise. To start, a player crosses out any unused number on the numbered list. All players use the same numbered list. He or she then choose one of the two sets of index cards and chooses one. Next, the player divides the number on the index card into the number he or she just crossed out and finds the remainder. The remainder for the division problem is the player's score for that round. Players keep a cumulative sum of their scores from round to round.A player who notices another player make a mistake acquires that player's score for the turn.The game ends when all of the numbers on the list have been crossed out. The player with the largest cumulative score at the end of the game wins. ****To shorten:** use numbers between 20 and 60.

Ten Ways I Practiced Math
Summer 2016

Parents: *Visit www.madison.k12.ct.us for our Summer Math Packet for 100s of ideas!*

My favorite way was:

_____

_____ _____

Signature of Student *Signature of Parent/Guardian*

Grade _____ Teacher's Name_____

~ Please return to the math specialist at your school ~