

Munroe Mental Math



A resource package for Munroe families.

INTRODUCTION

École Munroe Middle School's Mental Math Strategies Focus

At École Munroe Middle School, practicing mental math at home is essential for students in grades 6-8.

Mental math improves quick thinking, problem-solving, and understanding of math concepts. Encouraging this practice helps with efficient and accurate calculations, vital for complex topics. Use math games and real-life scenarios, like cooking or shopping, to make learning enjoyable and relevant.

This document offers strategies and games used in the classroom to support your child's mental math practice at home. Thank you for supporting your child's learning both at home and at school.



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FOUNDATIONAL STRATEGIES

Strategy 1: Standard Algorithm

This strategy is quite common and wonderful for doing math with pencil and paper. We move from right to left, beginning with the ones place and carrying over tens when we get to 10. This continues in the tens place by carrying over hundreds when we get to 100, and so on and so forth. It can be difficult to keep track of this in your head, though, which is why it is a great strategy when you are using a pencil and a paper.

Examples:

$$\begin{array}{r} \overset{1}{1} \overset{1}{7}3 \\ + \quad 67 \\ \hline 240 \end{array}$$

$7 + 3 = 10$, remember 0, carry 1
 $1 + 7 + 6 = 14$, remember 4, carry 1
 $1 + 1 = 2$, remember 2
Reverse 0, 4, 2 to 2, 4, 0 and mentally reassign place value to **240**.

$$\begin{array}{r} \$91 \\ \times 13 \\ \hline 273 \\ 910 \\ \hline \$1183 \end{array}$$

$1 \times 3 = 3$, remember 3
 $9 \times 3 = 27$, remember 27
Rearrange mentally into 273.
Add a place-holder zero.
 $1 \times 1 = 1$, remember 1
 $9 \times 1 = 9$, remember 9
Rearrange mentally into 910.
 $3 + 0 = 3$, remember 3
 $7 + 1 = 8$, remember 8
 $2 + 9 = 11$, remember 11
Rearrange mentally and reassign place value and units to **1183**.

FOUNDATIONAL STRATEGIES

Strategy 2: Memorization/Automaticity

Memorizing basic math facts can help make mental math faster and easier. For example, memorizing the multiplication table up to 12 helps to speed up problem solving with multiplication. It is still important to understand why these facts are true, and not every fact needs to be memorized, but it is helpful as we move into more complex problems.

Multiplication Chart:

	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

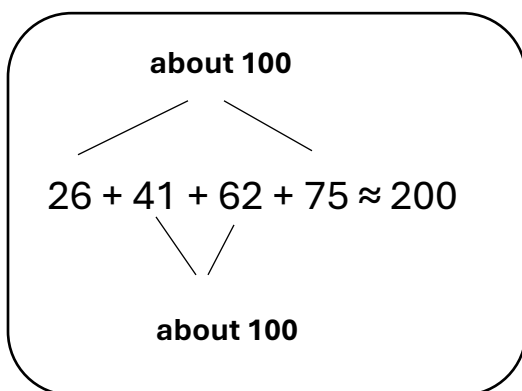
ESTIMATION STRATEGIES

Strategy 3: Rounding Using Compatible Numbers

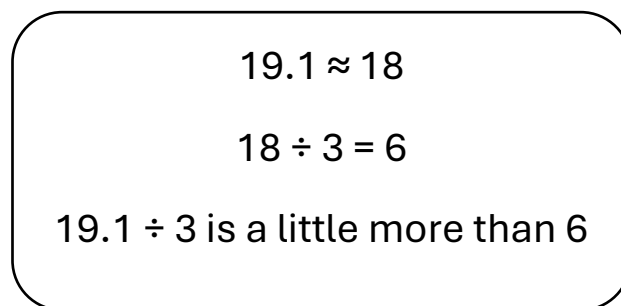
Precision is not the goal when estimating, so we can use strategies like this to help estimate answers quickly. Compatible numbers are ones that add up to a whole of some kind. For example, 4 and 6, 3 and 7, or 2 and 8 all make 10. We can use this for tens and hundreds and other values, too; 30 and 70 or 60 and 40 make 100. We can also round up or down to make other calculations easier. For example, instead of multiplying 3.8×7 we can multiply 4×7 since 3.8 is close to 4.

Examples:

Estimate: $26 + 41 + 62 + 75 =$



Estimate: $19.1 \div 3 =$



ESTIMATION STRATEGIES

Strategy 4: Rounding – Half-Round Up

When rounding, we take the place value that we would like to round and follow this rule: round down if the value is 1-4, round up if the value is 5-9. Rounding is helpful as it will always give a 0 in the last place value, making the number easier to work with.

Examples:

Estimate: $234 - 187 =$

$$\begin{aligned} 2\,342 - 1\,879 &\approx \\ \approx 2\,300 - 1\,900 &= \mathbf{400} \end{aligned}$$

Estimate: $62.4 \times 38.9 =$

$$\begin{aligned} 62.4 \times 38.9 \\ \approx 60 \times 40 &= \mathbf{2\,400} \end{aligned}$$

ADDITION STRATEGIES

Strategy 5: Adding From Left to Right

This addition strategy helps us to add without needing to remember about carrying any numbers over. We simply add each place value together and then add those new numbers together to get the final sum.

Examples:

$$46 + 38 =$$

$$40 + 30 = 70$$

$$6 + 8 = 14$$

$$70 + 14 = \mathbf{84}$$

$$25.6 + 13.7 =$$

$$20 + 10 = 30$$

$$5 + 3 = 8$$

$$30 + 8 = 38$$

$$0.6 + 0.7 = 1.3$$

$$38 + 1.3 = \mathbf{39.3}$$

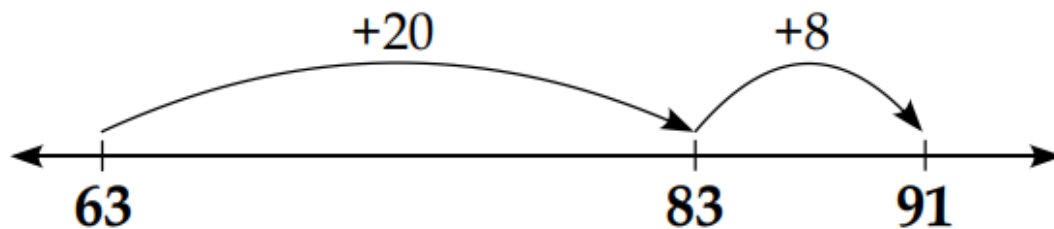
ADDITION STRATEGIES

Strategy 6: Breaking Down Numbers and Their Parts

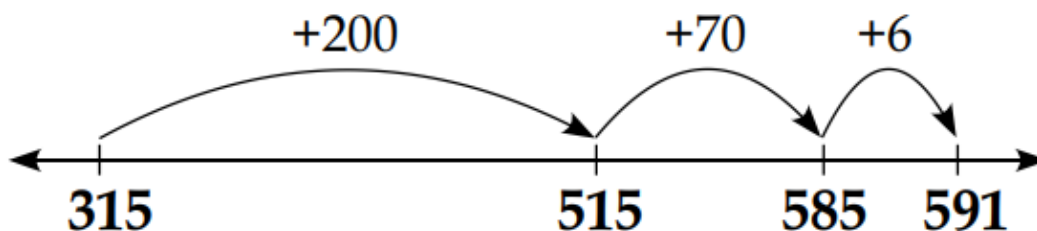
In this strategy, we first break down numbers into their hundreds, tens, ones, etc. After that, we simply add them in whatever way we think is best. For example, instead of trying to add 28 to a number, we first add 20 and then add 8.

Examples:

A) $63 + 28 =$



B) $315 + 276 =$



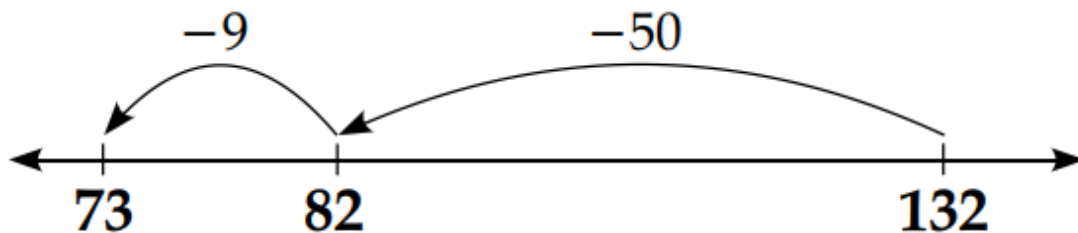
SUBTRACTION STRATEGIES

Strategy 7: Subtracting One Part at a Time

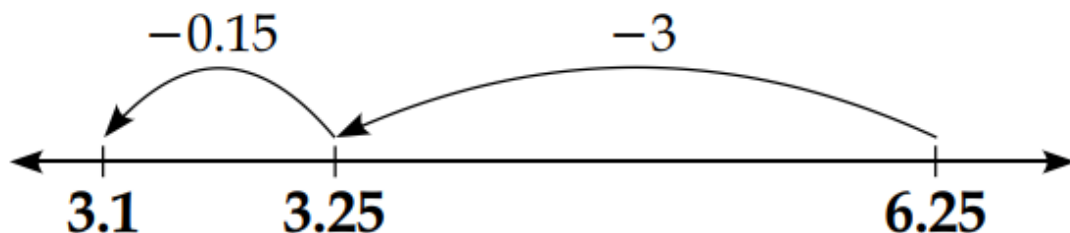
By breaking down numbers into their hundreds, tens, ones, etc. We can also simplify subtraction. For example, instead of subtracting 365, we first subtract 300, then 60, then 5. The order in which we subtract each place value doesn't matter at all.

Examples:

A) $132 - 59 =$



B) $6.25 - 3.15 =$



MULTIPLICATION STRATEGIES

Strategy 8: Associative Property (also use with addition)

When adding or multiplying many numbers together, we can order them in a way that makes them easier to work with.

Examples:

$$28 + 7 + 2 + 5 + 13 =$$

$$28 + 2 = 30$$

$$7 + 13 = 20$$

$$30 + 20 + 5 = \mathbf{55}$$

$$15 \times 7 \times 2 =$$

$$15 \times 7 \times 2 =$$

$$\mathbf{15 \times 2 \times 7 =}$$

$$\mathbf{30 \times 7 = 210}$$

MULTIPLICATION STRATEGIES

Strategy 9: Distributive Property (also use with division)

When working with complex numbers, breaking them down and multiplying one at a time can make them easier to work with.

Examples:

$$4 \times 235 =$$

$$4 \times 235 =$$

$$(4 \times 200) + (4 \times 30) + (4 \times 5)$$

$$800 + 120 + 20 = \mathbf{940}$$

$$7 \times 92.1 =$$

$$7 \times 92.1 =$$

$$(7 \times 90) + (7 \times 2) + (7 \times 0.1)$$

$$630 + 14 + 0.7 = \mathbf{644.7}$$

DIVISION STRATEGIES

Strategy 10: Using Multiplication to Divide

Thinking of division questions as multiplication questions, in other words, thinking of them backwards, can help make them easier to compute in our heads.

Examples:

$$63 \div 7 =$$

$$7 \times \underline{\quad? \quad} = 63$$

$$7 \times \underline{9} = 63$$

$$\text{So, } 63 \div 7 = 9$$

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

$$\frac{1}{2} \times \underline{\quad\quad} = 3$$

$$\frac{1}{2} \times \underline{6} = 3$$

$$\text{So, } 3 \div \frac{1}{2} = 6$$

MENTAL MATH GAMES

Closest to 100

Strategies Practiced: 1, 2, 5 and 6

Object of the Game: Get the lowest overall score by adding two 2-digit numbers to get as close to 100 as possible.

Materials: Deck of cards with 10 to King removed
(Ace = 1)

How to Play:

1. Deal out 6 cards per player.
2. Each player selects 4 cards from their hand to use to make **two** 2-digit numbers that add up to 100, or as close as they can get to it.
3. Players write down numbers and sum on score sheet. The score is how far away you are from 100. (In the example on the next page, since Tiffany's total was exactly 100, she gets a score of 0)
4. When both players are ready, they share their solutions and check each other's work.
5. Repeat for rounds 2-5.
6. At the end, add up all the points to get your *Total Score*. Lowest score wins!

Adaptations: Add a decimal between each number and aim for a total of TEN

Example:



Closest to 100 Score Sheet:

Closest to 100				Score
Score Sheet				
Round 1:	__ __	+	__ __ =	__
Round 2:	__ __	+	__ __ =	__
Round 3:	__ __	+	__ __ =	__
Round 4:	__ __	+	__ __ =	__
Round 5:	__ __	+	__ __ =	__
Total Score:				__

MENTAL MATH GAMES

Hit the Target

Strategies Practiced: All

Object of the Game: Use the numbers on your card and any operations to make a target number.

Materials: Deck of cards with face cards removed (Ace = 1)

How to Play:

1. Shuffle the deck and deal four cards face down to each player. Turn the next card face up in the center of the table. This is the target number.
2. At the count of three, all players turn their cards over at the same time. They will use their four numbers and any operation as well as brackets to create an equation that equals the target number. (All 4 numbers must be used!!)
3. The first player to equal the target number wins a point, and the player with the most points after 7 rounds wins the game.
4. If no one can equal the target number, turn over another card for a new target number.

Example:

- ***A player has been dealt a 2, 9, A, and 7.***
- ***The target card is a 5.***
- ***Their arrangement is $(9 - 7) \times 2 + 1$***

Hit The Target Score Sheet:

Target Number	Cards Dealt to You	Final Arrangement of Cards

MENTAL MATH GAMES

Game “42”

Strategies Practiced: 2, 5, 6

Object of the Game: Be the first to have your cards add up to exactly 42.

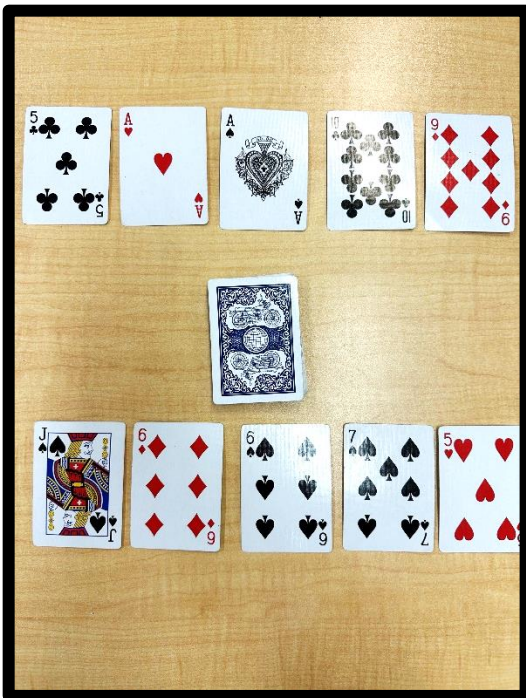
Materials: Deck of cards (Ace = 1, 2-10 = Face Value, Face cards = 10)

How to Play:

1. Deal out 5 cards per person. Leave the rest in a stack facing down as a draw pile. Players can leave their cards facing up. Players must have 5 cards, and 5 cards *only*, at all times. Each player looks at their cards and adds up the points in their hand.
2. The player to the left of the dealer starts. He takes one card from the top of the middle pile, and turns it over. He decides whether or not he wants to keep it. If he wants to keep it, he must swap it with and discard one of his other cards. If he does not want it, he can simply put it in the discard pile. Either way, he can only have 5 cards at one time.
3. The next player does the same thing, selecting from the stack of cards. Players may not take cards from the discard pile.
4. Once a player has 5 cards that add up to 42, they win.

Example:

- In this hand, I have $5 + 6 + 6 + 7 + 10 = 34$ points
- My opponent has $10 + 9 + 1 + 5 + 1 = 26$ points
- Since I want to increase my score to get closer to 42, I decide I want to keep the King I just picked, which is worth 10 points. I swap out my lowest card, 5, for the King. Net gain +5. Current total score = 39. I still need 3 more points to get to 42.



MENTAL MATH GAMES

Go Fish! Making 10s

(Variations can include using addition, subtraction, and negative numbers to make multiples of 10)

Steps to Play (Mental Math Practice Variation):

1. For Beginners, remove face cards.
2. As in traditional Go Fish, players take turns asking each other for their desired card. However, instead of seeking out pairs of the same card, players want pairs to make the sum (the total of two or more numbers by using addition) of 10.
3. If a player gets the card he asked for, he puts the pair down on the table and picks a new card from the deck. If he does not get the card he asked for, the player must "Go Fish" and pick a new card from the deck.
4. If the new card from the deck makes 10 with a card in the player's hand, he or she puts the pair of cards down, and passes the turn to the next player. If he still does not get the card he wanted, play passes to the next player.
5. If a player runs out of cards, they pick two new cards. A player's turn is over when they can no longer make 10.
6. The game is over when there are no more cards, or no more pairs can be made.
7. Variation includes increasing the sum required to 20 instead of 10, allowing for greater combinations of numbers and to include face cards.

Go Fish! Making 10s (Variations)

Variation – Subtraction

- Same goal as before, but students can now use the sum AND the difference between cards to make values of 10 or 20.
 - For example, a student can combine a “King” with a value of “3” and explain that the difference (subtracting) between the values is 10.

Variation – Negative numbers (Gr 7/8 Skill)

- Same goal as before, students can now use the sum and difference between cards to make values of 10 or 20.
- This version allows students to make values of -10 and -20
- This version assigns all RED CARDS with a negative value and all BLACK CARDS with a positive value.
 - Ex: six of diamonds (-6) + four of hearts (-4) = -10
 - Ex: Jack of diamonds (-11) + ace of clubs (+1) = -10
 - Ex: Queen of Clubs (+12) + two of diamonds = +10
 - Ex: Jack of Spades (+11) + Jack of Clubs (+11) + two of hearts (-2) = +20

MENTAL MATH GAMES

Faceoff!

(Variations can include addition, subtraction, multiplication, and integers)

Steps to Play (Addition Variation):

1. Using a deck of cards, players deal out the whole deck of cards equally to each player.
2. Players keep their deck of cards face down in front of them and at the same time, flip two cards over.
3. In the addition variation, players add up the amount on their cards and the highest score wins all the cards from both players (that would be a total of 4 cards – two from each player in a two-player game).
 - Note: A=1, J=11, Q=12, K=13
4. Players will FACEOFF when both players have the same total after their addition (example both players' cards add up to 11).
 - To faceoff, players put three cards face down on the table. A fourth card is placed on the table face up. The player with the higher faceup card wins ALL the cards from both players. (Example: if player A flips a 2 as their fourth card and player B flips a 9 as their faceup card, player B takes all the cards from both player A and B.)
5. Players continue flipping and adding cards, until one player has lost all their cards, at which point the other player wins!

Faceoff! (Variations)

Multiplication Variation:

Players multiply the cards instead of adding them.

Subtraction Variation:

Players subtract their cards (highest card subtract lowest card).

Integer Variation(s):

1. Players only flip one card over and identify which card is greater. Red cards are negative numbers and black cards are positive numbers. Negative numbers are less than positive numbers.
2. Players flip over two cards and add the positive (black cards) and negative (red cards) together. The player with the higher sum wins all the cards.

ONLINE GAMES & PUZZLES

Games and Puzzles List

For students looking to enhance their mental math skills in a fun and engaging way, several websites offer a variety of games and puzzles designed to make learning enjoyable.

1. ****KenKen Puzzle**** (www.kenkenpuzzle.com)

- Features daily math puzzles that challenge users to fill in grids with numbers while following arithmetic rules.

2. ****M@thsZone**** (<https://mathszone.co.uk/>)

- Offers hundreds of learning activities covering K to 12 math, including Ooodle

3. ****Logic Puzzles**** (www.logic-puzzles.org)

- Provides a variety of logic puzzles, including math-based puzzles that require mental calculation and reasoning.

4. ****Puzzlemix**** (www.puzzlemix.com)

- Hosts a collection of different puzzle types, including Sudoku, Kakuro, and KenKen, all of which incorporate math skills.

5. ****Nerdle**** (www.nerdlegame.com)

- If you liked Ooodle, then you will love the nerdverse. The core game nerdle is a math version of Wordle. After discovering this game, you can explore the nerdverse containing number-based math crosswords, anagrams, and so much more.

6. ****KrazyDad**** (www.krazydad.com)

- Offers a large selection of printable and online puzzles, such as Sudoku, Kakuro, and other math-related puzzles.

7. ****Conceptis Puzzles**** (www.conceptispuzzles.com)

- Provides a variety of interactive math puzzles, including Kakuro, Calcudoku, and other number-based challenges.

8. ****Puzzle Baron**** (www.puzzlebaron.com)

- Hosts a variety of puzzles, including math puzzles, logic grids, and number puzzles that require mental arithmetic.

9. ****Math Puzzle Games**** (www.mathsisfun.com/puzzles)

- Offers a collection of math puzzles and games designed to make learning math fun and challenging.

10. ****Daily SET Puzzle**** (www.setgame.com/set/puzzle)

- Presents a daily puzzle that involves pattern recognition and logical thinking, with an emphasis on mathematical concepts.

11. ****SolveMe Puzzles**** (solveme.edc.org)

- Use logic to solve visual, interactive mathematical puzzles. Good opening steps for algebra.

ONLINE RESOURCES

Websites for Teaching & Learning Math

For students seeking to deepen their understanding of math concepts and practice their skills, several educational websites provide comprehensive resources. These websites are valuable tools for reinforcing classroom learning and fostering a strong foundation in math.

Khan Academy

- **Website:** www.khanacademy.org
- **Description:** Offers comprehensive video tutorials, practice exercises, and a personalized learning dashboard across a wide range of math topics.

IXL

- **Website:** www.ixl.com
- **Description:** Provides an interactive learning platform with adaptive questions that cover over 4,500 math skills, along with detailed explanations and real-time feedback.

Math Antics

- **Website:** www.mathantics.com
- **Description:** Features engaging and easy-to-understand video tutorials covering fundamental math concepts, designed to make learning math fun and accessible for middle school students.

MathDrills.com

- **Website:** www.math-drills.com
- **Description:** Provides thousands of free math worksheets for practice in various topics, including basic operations, fractions, geometry, and more, to help reinforce math skills through repetition and practice.

U of Waterloo Center for Education in Mathematics and Computing

- **Website:** www.cemc.uwaterloo.ca
- **Description:** Provides access to a variety of math problems and detailed solutions, has instructional videos covering a wide range of mathematical concepts and techniques to support classroom learning and independent study