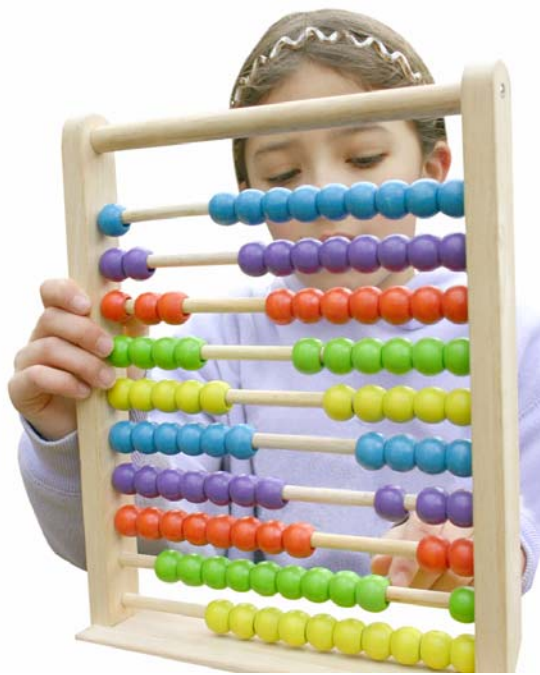


NAPLAN NUMERACY GUIDE FOR PARENTS



BEAUTY POINT PUBLIC SCHOOL

THE IMPORTANCE OF LANGUAGE IN MATHEMATICS

Many people think that it is just numbers that are important when learning mathematics, however an important part of applying maths is understanding the language associated with it. Many students can understand how to complete a number sentence or algorithm but can struggle in deciphering what to do when a question is written in words. The following information is provided to help you understand where your student may be experiencing difficulty.

Where do we see language in mathematics?

- Wording of mathematical problems and questions. e.g. I bought ten apples for \$2.00. How much did each apple cost?
- Explanation of mathematical concepts.
- Communication by students of their understanding of ideas and concepts using appropriate language.

Words in Mathematics can be classified into three different groups

1. Words that mean the **same** as they do in ordinary language e.g: equal, more
2. Words that are **only** used in mathematics e.g numeral, equilateral
3. Words that have a **different** meaning than they do in ordinary language e.g. face, pie, net

Through understanding the words being used in mathematics students can then determine the appropriate strategy to help them solve the problem.

Reasons for Difficulty in the Mastery of Mathematical Literacy

- Some words have different meaning than the general usage
-difference, area, volume, degree, product
- Some words have more than one mathematical context
-draw a 'square'. 'square' 4
- There is no consistent left to right processing of meaning
-divide 3 into 6, divide 3 into 6 equal parts
- The order in which information is presented is often different from how it needs to be processed
-the number 5 is 2 less than what number? $-2 = 5$
-take 6 from 12 $12-6=$
- Comparatives used in mathematics are used precisely
-Jo is taller than Sam, Sam is taller than John
- Nouns used in mathematics often represent concepts rather than things.
-width, volume, area, distance
- The order of words can create different meanings
-4 is half of what number?
-what number is half of 4?
- Insignificant words are important
-increase by 3
-increase to 3
-increase from 3
- A key word approach can be counter productive
-what number is 3 more than 5? $5 + 3=$
-5 is how many more than 3? $3 + ? = 5$
-5 is more than 3 $5 > 3$

HOW TO HELP YOUR STUDENT SOLVE WORD PROBLEMS.

Anne Newman's research tells us about the hurdles students have to navigate in problem solving tasks.

Newman identified that students may have difficulty in:

1. **READING** the words
2. **UNDERSTANDING** what they have read
3. **TRANSFORMING** what they have read so as to be able to form a course of action
4. **FOLLOW THROUGH** on procedures
5. **ENCODING** the result of a procedure to answer the question

The 5 Questions

Newman designed 5 questions to identify at which point in solving a word number problem were students having difficulty in

1. Read the question to me.
2. What is the question asking you to find out?
3. What method did (could) you use?
4. Try doing it, and as you are doing it tell me what you are thinking.
5. Now write your answer.

Natalie paddled 402 km of the Murray River in her canoe over 6 days. She paddled the same distance each day. How far did Natalie paddle each day?

What can a supervisor do in the mathematics classroom with a student who has difficulty with reading mathematics problems?

The task for the supervisor in the mathematics classroom is to teach the student to read the particular text under consideration.

Provide an orientation

Students who have difficulty with reading find it hard to establish a context for a particular text, predict its grammatical structure, predict the meaning of the text and anticipate words that are likely to occur within it. To assist these students, the supervisors can provide an orientation to the text before they read the problem. The aim of the orientation is to make the students aware of:

1. the story in which the problem is embedded,
2. the context of the problem,
3. unusual language, likely to cause difficulties for the students,
4. mathematical words in the text of the problem.

'This is a problem about a girl who goes on a canoe trip on the Murray River' is a possible orientation to this problem, providing a context to it and enabling students to access unusual words that might be a stumbling block.

It is important that supervisor do not read out the problem for the students, that they do not simplify the language of the problem or present an orientation that provides too much guidance to solve the problem.

What can a supervisor do in the mathematics classroom with a student who has difficulty with comprehending mathematics problems?

Focus on language features

Students need to be familiar with a range of mathematical texts and understand the language, features and grammar of these texts. For example, knowing that what needs to be worked out often appears as a question at the end of the problem may assist students to read and understand the problem

Strategies:

1. Cut problem up into pieces of information. e.g. "Natalie" and "paddled 402 km up the Murray River" and discuss what each piece means
2. Remove 1-2 words at a time and see how it affects meaning.

What can a supervisor do in the mathematics classroom with a student who has difficulty with transforming mathematics problems?

Focus on solving problems

Supervisors can build the ability of students to transform mathematical texts into mathematical processes by creating classrooms where learning to read mathematics problems occurs frequently and where solving problems is the focus of mathematics


Strategies

1. **Teach students to represent problems e.g.** draw a picture, act it out, draw a table
2. **Teach students to write problems e.g** Having worked in this way to solve the focus problem, students could be asked to write a problem about a bike trek, the solution for which can be obtained by dividing 402 by 6. This provides students with an opportunity to transfer their understanding to a very similar context

Number	Patterns & Algebra	Data	Measurement	Space & Geometry
<ul style="list-style-type: none"> •addition •subtraction •multiplication •division •place value •money •fractions •decimals •chance 	<ul style="list-style-type: none"> •number patterns •geometric (shape) patterns 	<ul style="list-style-type: none"> •Graphs- Picture graphs -Column graphs -bar graphs •tables •scale 	<ul style="list-style-type: none"> •Length •Area •Volume and Capacity •Mass •Time 	<ul style="list-style-type: none"> •3D space •2D space •Angles •Position •Maps, plans and directions

The above are the various strands that students may be tested on in the NAPLAN. Included on the resource CD is activities that your student can practise if you find they are finding it difficult.

Remember to refer to the *Parents Count Too* leaflets on the Resource CD as well. These leaflets provide you with various ideas to practice mathematical concepts in everyday life.



Parents Count Too

Helping your child with – Mental calculations

Most calculations that we carry out each day, we do in our heads. With some calculations we feel the need to reach for paper and pencil or a calculator. Yet when we play a game of darts or cards or even watch a league game, we rely on carrying out lots of mental calculations. How many points are needed to win, how many converted tries will put us in front and is there enough time?

Travelling, sharing a bill, shopping, playing or watching a sport and preparing a meal all involve mental calculations. The methods that we use when we work things out in our heads are often not the same methods that we use when we write down a sum.

The processes involved in mental calculations have remained a mystery for many children and even for many adults. Working out 998×3 is a difficult task, even when using pen and paper, if you do not realise that you can find the answer mentally by subtracting 6 from 3000.

So how do children learn to do mental calculations?

Children begin by counting things that they can see, and using objects to add and subtract. Through practice, children will begin to think of ways to add and subtract without having to use objects. One of the early ways in which children learn to add two numbers mentally is to start with the larger number and count on by ones to add the second number. This is an effective way when adding on small numbers. As children begin to deal with larger numbers, they develop a range of ways other than counting by ones.

For example, to find the answer to $25 + 89$, children could:

- Make the 89 up to 90, then add 10 and then 14
- Add 20 and 80 to make 100, then add 9 and 5, then add 100 and 14
- Add 10 twice to 89 and then add 5 more.

One of the interesting things about mental calculations is that we do not all think the same way.

What can you do at home?

- Ask your child how he or she mentally worked out the answer to a question. Explain how you would mentally work out the answer. If your child can not work out the answer mentally, give him or her objects to use for counting.

- Ask your child to work out how much change he or she will get when paying for an item at the shops.
- If your child is saving to buy an item, ask how much more money he or she will need to save before being able to buy it.
- Encourage your child to estimate the cost of two items when shopping.
- When playing games that use two dice, replace dot dice with ones that have numbers on them.
- If watching a game involving two teams, ask your child to work out mentally the difference in the scores.
- Involve your child in working out costs associated with holiday travel. For example, *We will stay five nights and the cost per night is \$70.*





Parents Count Too

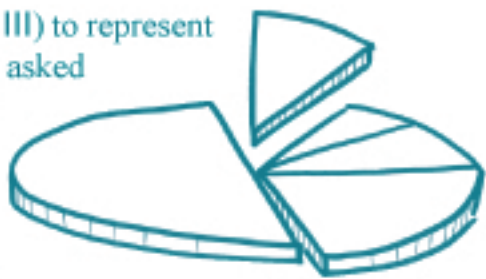
Helping your child with – representing and interpreting graphs and tables

In our daily lives we are called upon to understand information that is presented in graphs and tables. We see this type of information in newspapers and pamphlets, on bills and on television. Graphs can make it easy to record and interpret information as well as help us to make predictions such as predicting the weather, interest rates and the future cost of our home electricity usage. Children will learn to read and interpret graphs and tables not only during Mathematics lessons but also during Science, Health and other lessons.

How do children learn to make and interpret graphs and tables?

Initially children learn to construct graphs by collecting information in tables and then using objects or pictures to represent this information as a graph. Typically in the early years, children will be asked by their teacher to collect and record information about themselves, such as the pets they own, or about their environment, such as the colour of the cars in the car park. In early graphs, one picture stands for one object.

Later, children will learn to use tally marks (e.g. IIII III) to represent the results of surveys. They may, for example be asked to use tally marks to record the number of cars that pass by the school during a given period of time. They will also be introduced to different types of graphs including column graphs, line graphs and sector (pie) graphs. It is important that children know how to interpret graphs and be able to identify how graphs could misrepresent information.



What can you do at home?

- Measure the height or weight of your child and track the changes over time on a graph.
- The next time you come across a graph in a newspaper on a topic that would be interesting to your child, sit down together to try to interpret it. Work together to answer questions such as: *What is this graph telling us? How do we know whether the information is true? Is there a different way of representing this*



Card games



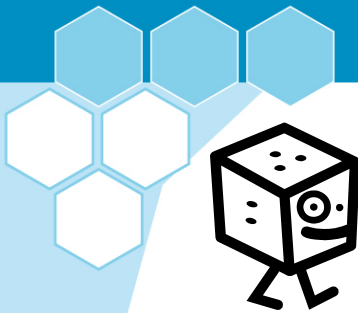
These card games use the cards 1 (Ace) to 10

Stage	Why play this game?	Game
Kinder Year1 - 2	Recognising numbers. Numbers before and after a given number. Combinations to 10	<p>Snap</p> <p>Divide the cards amongst the players. Snap the cards that are the same. Snap the cards that come after the one played. Snap the cards that come before the one played. Snap the cards that add up to 10.</p>
Kinder Year 1 - 2	Recognising numbers	<p>Fish</p> <p>Deal out seven cards to each player. Each player finds pairs of numbers from their hand and places them down in front of them. The game begins when player 1 asks the player sitting to their left if they have a card that matches one of theirs so that they can make a pair. If they do have the card, they give it to player 1. If they do not have the card they say "fish" and player 1 picks a card from the pack. Play continues in this way. After all the deck has been used, players count the number of pairs they made. The winner is the one with the most number of pairs.</p> <p>Variation</p> <ul style="list-style-type: none"> • Players collect cards that add to 10 instead of pairs
Year 1 - 4	Addition and subtraction using mental strategies	<p>24</p> <p>Deal out all the cards, an equal number to each player. The person to the dealer's left goes first and the game continues clockwise. The first person turns over a card and places it face up in the centre of the play area. The next player turns over a card and adds it to the card already played, says the sum out loud, and places the card on top of the previously played card. The next player turns over a card and adds the card to the sum of the first two cards. Play continues in this way until someone adds a card that makes 24 or more. If the sum is exactly 24 that player wins. If the sum is over 24 the value of the card is taken away from the previous total. Play continues until someone gets a total of exactly 24.</p>
Year 4 - 6	Numeral recognition	<p>Make the largest number</p> <p>Short deck, cards 1-9 Players take turns drawing one card at a time until they have 5 cards. Each player makes the largest number they can and says the number. The person with the largest number receives a point. Play continues in this way. After using all the cards in the pack, the player with the most points is the winner.</p>

Stage	Why play this game?	Game
Year 2-8 and adults can have fun with this.	Addition and subtraction Multiplication and division	<p align="center">Salute</p> <p>Short deck, cards 2-10 (3 players) Deal one card each, face down. When the dealer says "salute", each player raises the card to his or her forehead. The dealer states the total of the cards. Each player has to determine the value of the card being held to his or her forehead by looking at the other person's card and subtracting this amount from the total. This can also be played with multiplication Variation The dealer looks at the colour of the cards. If the colours are the same the dealer adds and if the colours are different, the dealer multiplies. This time, the player has to state both the colour and the value of the card being held.</p>
Year 2 - 8	Addition and subtraction	<p align="center">Flip 4 and add</p> <p>The first player flips 4 cards to make two 2-digit numbers and adds these together. The next player also flips 4 cards and adds the two 2-digit numbers together. The player with the largest number gets a point. The player with the most points wins. Variations</p> <ul style="list-style-type: none"> • Flip 6 cards and make two 3-digit numbers to add together. • Begin with 50 and flip 2 cards to make a 2-digit number. Subtract the number from 50. The next player flips 2 cards and subtracts their 2-digit number. Play continues by subtracting a number when it is your turn. The person closest to zero is the winner.
Year 4 - 8	Addition, subtraction, multiplication and division.	<p align="center">Make 20</p> <p>Players are given 4 cards each. Using any of the four operations, (\div, \times, $+$, $-$) the player tries to make a total of 20. If the player makes exactly 20, they score 10 bonus points for making 20 plus their score of 20 (30 altogether). The next player has his or her turn. If they are unable to make 20, their score is the number they have made that is less than 20. Play continues with players trying to make 20 with another four cards. After each turn the scores are added to the player's total. The first player to reach 200 is the winner Variation</p> <ul style="list-style-type: none"> • Select another number to begin the game
Year 2 - 6	Addition and subtraction	<p align="center">Add or subtract</p> <p>Start with a selected two digit number such as 35. Players take turns to turn over a card. If the card is black it is added to the number (35). If the card is red, the number of the card is subtracted from the number. Play continues by adding or subtracting the card turned over from your total. The player with the highest number at the end of the game is the winner.</p>

Stage	Why play this game?	Game
Kinder Year 1 - 2	Numeral recognition Numbers before and numbers after a given number	<p style="text-align: center;">Place in order</p> Place all the cards 1(ace) -10 face down in rows of ten so that there are four rows with ten cards in each row. The aim of the game is to have the cards in order in each row. (cards places 1 – 10) The game begins when player 1 turns over the first card and tries to work out where it should be in the row and places the card down. The next player picks up the card where player 1 placed their card and then works out where to put that card. Play continues in this way until all the rows are from 1 – 10.
Year 1 - 3	Addition of number facts	<p style="text-align: center;">Addition snap</p> Cards 1(ace) – 9. two players Players divide the cards evenly between themselves. At the same time each player turns over one card. Players add the two numbers together as quickly as possible and say the answer aloud. The player who says the correct answer first, keeps the two cards. Play continues until one player collects all the cards.
Year 1 - 6	Addition and subtraction facts	<p style="text-align: center;">Addition and subtraction</p> Cards 1 (ace) – 10 Players divide the cards evenly between themselves and place one card face up in the middle. The first player places their card next to the card in the middle. If it is a black card the cards are added together. If it is a red card subtract the number from the previous total.
All ages	Sequencing in ascending or descending order.	<p style="text-align: center;">Up and Down</p> A deck of cards 1 -10 Each player is dealt four cards face up. The remaining cards are placed in a pack in the centre. The aim of the game is to be the first player to arrange the cards in ascending or descending order. Starting with play to the dealer's left, each player takes turns to exchange cards from the pack or discard pile to arrange their four cards in order. The first player to arrange his/her cards in order is the winner of that round and receives a point. The first player to accumulate five points is the winner of the game.

Stage	Why play this game?	Game
K - 2	Addition	<p>Make 10</p> <p>A pack of cards 1-10 One player deals out ten cards and places them face up in a row. The first player then looks across the row of cards for combinations that add up to 10 (any number of cards is fine). Only one combination can be removed.</p> <p>The aim of the game is to collect as many cards as possible, so combinations that require more cards are favoured.</p> <p>Once a combination of cards has been removed the cards are replaced with new ones from the pack.</p> <p>Play continues until there are no more cards or combinations to 10. The winner is the player with the most cards.</p> <p>Variation</p> <ul style="list-style-type: none"> Choose a different target number for the combinations.
Year 2 -10	Multiplication Number facts	<p>Fast Facts</p> <p>A pack of cards 1 – 10. A game for two players. Deal out half the cards to each player. Both players lay out a card face up. The first to multiply the two numbers together wins the cards. Play continues and the winner is the one with the most cards at the end.</p> <p>Variation</p> <ul style="list-style-type: none"> Remove cards which are beyond children's ability, e.g. 8, 9 Use addition or subtraction
All ages	Addition Subtraction Multiplication Division	<p>Card Calculations</p> <p>A pack of cards 1 - 9 Each player is dealt 4 cards face up. Each player then tries to make a number sentence which gives a single digit answer using their four cards. The answer becomes the score for that player. e.g. If the four cards were 2, 6, 3 and 7 Answers could be: $7 + 3 + 2 - 6 = 6$ 6 points $6 + 7 - 3 - 2 = 8$ 8 points $36 - 27 = 9$ 9 points The winner is the player with the largest score after five rounds.</p> <p>Variations</p> <ul style="list-style-type: none"> Aim to produce the lowest score Deal out more or less cards






Dice games



Stage	Why play this game?	Game
Kindergarten	Recognising numbers and counting	<p>Collect 10</p> <p>A game for pairs of students, with each student having a regular dice (the dice used for this game can be varied according to the needs of the students). Counters are also required. The players roll the dice and the player with the higher number showing scores a counter; if both throw the same number they both score a counter. The first player to collect 10 counters is the winner.</p> <p>Variations</p> <ul style="list-style-type: none"> • The player with the lower number scores the counter each time. • Start with ten counters and the player with the higher number on the roll of the dice takes away this number of counters. The first player to have no counters is the winner.
Kindergarten Year 1	Addition	Same as Collect 10 above, but each student has 2 regular dice and the total is obtained by adding the numbers rolled.
Year 1 - 2	Addition	<p>Same as Collect 10 above, but the total is obtained by adding three regular dice.</p> <p>Note: Encourage the students to find quicker ways of adding the numbers.</p> <ol style="list-style-type: none"> 1. Doubles, eg $4 + 4$ 2. Doubles plus one, eg $4 + 5$ ($4 + 4 + 1$) 3. Doubles less one, eg $4 + 3$ ($4 + 4 - 1$) 4. Combinations to 5, eg $1 + 4$ 5. Combinations to 10, eg $6 + 4$

Stage	Why play this game?	Game																														
Year 1 - 2	Addition	<p>Cross out</p> <p>Cross out is an activity for two students. Each student writes the numbers 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12 on a piece of paper. They take turns to roll two regular dice, add both numbers rolled and cross out the total on their piece of paper. The first player to cross out all the numbers is the winner.</p>																														
Year 2 - 6	Subtraction	<p>Take 100</p> <p>Each student begins with 100 points. In turn, students roll a regular dice and subtract the number from their 100 points. The first player to reach zero is the winner.</p> <p>Variations</p> <ul style="list-style-type: none"> • Change the number of points to begin. • The students may roll two regular dice and either add or multiply the numbers together before subtracting from the total. 																														
Year 2 - 4	Addition	<p>Make 24</p> <p>This game for individuals requires only 1 dice. The player throws the dice repeatedly, listing the numbers thrown in columns as follows.</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td colspan="6"><hr/></td> </tr> <tr> <td>1</td> <td>2</td> <td></td> <td>4</td> <td></td> <td>6</td> </tr> <tr> <td></td> <td>2</td> <td></td> <td>4</td> <td></td> <td></td> </tr> <tr> <td></td> <td>2</td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p>The player has to keep a running total of each column in their head and stop when one of the columns reaches exactly 24 (The fifth column will never reach 24). Players play the game several times and compare their findings.</p>	1	2	3	4	5	6	<hr/>						1	2		4		6		2		4				2				
1	2	3	4	5	6																											
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Year 4 - 8	Addition Subtraction	<p>Make 100</p> <p>An activity for two players.</p> <p>Equipment: two regular dice, paper and pencil</p>																														

Stage	Why play this game?	Game																								
	Multiplication Division	<p>The aim is to make a total of 100 or as close to 100 as possible. Players take turns to roll the two dice and combine the numbers with any operation to produce a score. The player who reaches 100 or is closest to 100 is the winner. Encourage players to record their choices and calculations. For example:</p> <table border="1"> <thead> <tr> <th>Dice throw</th> <th>Calculation</th> <th>Running total</th> </tr> </thead> <tbody> <tr> <td>4 and 6</td> <td>$4 \times 6 = 24$</td> <td>24</td> </tr> <tr> <td>1 and 4</td> <td>$1 + 4 = 5$</td> <td>29</td> </tr> <tr> <td>2 and 5</td> <td>$2 \times 5 = 10$</td> <td>39</td> </tr> <tr> <td>6 and 6</td> <td>$6 \times 6 = 36$</td> <td>75</td> </tr> <tr> <td>5 and 3</td> <td>$5 \times 3 = 15$</td> <td>90</td> </tr> <tr> <td>2 and 3</td> <td>$2 + 3 = 5$</td> <td>95</td> </tr> <tr> <td>6 and 1</td> <td>$6 - 1 = 5$</td> <td>100</td> </tr> </tbody> </table>	Dice throw	Calculation	Running total	4 and 6	$4 \times 6 = 24$	24	1 and 4	$1 + 4 = 5$	29	2 and 5	$2 \times 5 = 10$	39	6 and 6	$6 \times 6 = 36$	75	5 and 3	$5 \times 3 = 15$	90	2 and 3	$2 + 3 = 5$	95	6 and 1	$6 - 1 = 5$	100
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Year 4 - 8	Multiplication Division	<p style="text-align: center;">Double, halve or stay</p> <p>An activity for two to four players</p> <p>Equipment: two different coloured regular dice</p> <p>Decide on one coloured dice to represent the tens and the other to represent the ones. Choose a target number between 5 and 122. Players take turns to roll the dice. Once the dice are rolled a number is formed. The player then makes a decision to produce a number that is as close as possible to the target number. They can choose to:</p> <ul style="list-style-type: none"> • double their number • halve their number • keep the number as is <p>The player closest to the target is the winner.</p>																								
Year 4 - 8	Addition Subtraction Multiplication	<p style="text-align: center;">Total three</p> <p>An activity for two players.</p> <p>Equipment: two regular dice, paper and pencil</p> <p>Players take turns to roll the two dice and complete the following calculations on each roll:</p>																								

Stage	Why play this game?	Game
		<ul style="list-style-type: none"> • add the two numbers shown on the dice • find the difference between the two numbers • multiply the two numbers • add the three numbers to produce the score for that round <p>For example</p> <div style="display: flex; align-items: center;">  <div> $6 + 3 = 9$ $6 - 3 = 3$ $6 \times 3 = 18$ Score = $9 + 3 + 18$ = 30 </div> </div> <p>After 10 rounds the player with the highest total is the winner. To make the activity more challenging change the type of dice used to 8, 10, 12 or 20 sided.</p> 
Year 2 - 6	Addition Strategy	<p style="text-align: center;">Cross out 9</p> <p>An activity for two to four players. Equipment: two regular dice, paper and pencil Each player writes the numbers 1 to 9 on a piece of paper. The first player rolls the two dice then crosses out the numbers shown on the dice or the sum of the two numbers.</p> <div style="display: flex; align-items: center;">  <div> <p>For example On this roll, the player may cross out 2, 3 or 5 (2 + 3).</p> </div> </div> <p>When six numbers or less are left only a single dice is used. The player's turn continues until they cannot cross off any more numbers. The remaining numbers are totaled and this is the score for that round. After five rounds the player with the smallest total wins.</p>