## Close To 100

#### Materials

One deck of Numeral Cards Close to 100 Score Sheet for each player Players: 1, 2, or 3

### How to Play

- 1. Deal out six Numeral Cards to each player.
- 2. Use any four of your cards to make two numbers. For example, a 6 and a 5 could make either 56 or 65. Wild Cards can be used as any numeral. Try to make numbers that, when added, give you a total that is close to 100.
- 3. Write these two numbers and their total on the Close to 100 Score Sheet. For example: 42 + 56 = 98.
- 4. Find your score. Your score is the difference between your total and 100. For example, if your total is 98, your score is 2. If your total is 105, your score is 5.
- 5. Put the cards you used in a discard pile. Keep the two cards you didn't use for the next round.
- 6. For the next round, deal four new cards to each player. Make more numbers that come close to 100. When you run out of cards, mix up the discard pile and use them again.
- 7. Five rounds make one game. Total your scores for the five rounds. LOWEST score wins!

### **Scoring Variation**

Write the score with plus and minus signs to show the direction of your total away from 100. For example: If your total is 98, your score is -2. If your total is 105, your score is +5. The total of these two scores would be +3. Your goal is to get a total score for five rounds that is close to 0.

Game				Score
Round 1	 +	 =		
Round 2	 +	 =		
Round 3	 +	 =		
Round 4	 +	 =		
Round 5	 +	 =		
			Total Score	

### Score Sheet for CLOSE TO 100

### Score Sheet for CLOSE TO 100

Game		Score
Round 1	+ =	
Round 2	+ =	
Round 3	+ =	
Round 4	+ =	
Round 5	+ =	
		Total Score

## Close To 1000

### Materials

One deck of Numeral Cards Close to 1000 Score Sheet for each player Players: 1., 2, or 3

### How to Play

- 1. Deal out eight Numeral Cards to each player.
- 2. Use any six cards to make two numbers. For example, a 6, a 5, and a 2 could make 652, 625, 526, 562, 256, or 265. Wild Cards can be used as any numeral. Try to make two numbers that, when added, give you a total that is close to 1000.
- 3. Write these numbers and their total on the Close to 1000 Score Sheet. For example: 652 + 347 = 999.
- 4. Find your score. Your score is the difference between your total and 1000.
- 5. Put the cards you used in a discard pile. Keep the two cards you didn't use for the next round.
- 6. For the next round, deal six new cards to each player. Make more numbers that come close to 1000. When you run out of cards, mix up the discard pile and use them again.
- 7. After five rounds, total your scores. Lowest score wins!

### **Scoring Variation**

Write the score with plus and minus signs to show the direction of your total away from 1000. For example: If your total is 999, your score is -1. If your total is 1005, your score is +5. The total of these two scores would be +4. Your goal is to get a total score for five rounds that is close to 0.

Game		Score
Round 1	+ =	
Round 2	+ =	
Round 3	+ =	
Round 4	+ =	
Round 5	+ =	
	Total Score	

### Score Sheet for Close To 1000

### Score Sheet for Close To 1000

Game			Score
Round 1	+ =		
Round 2	+ =		
Round 3	+ =		
Round 4	+ =		
Round 5	+ =		
		Total Score	

## Close to Zero

### From Mathematical Thinking in 5th Grade

Investigations in Number, Data, and Space © 2000 TERC

This is a game that has many variations in the Investigations curriculum.

Math content: place value, mental math, estimation

Materials: a deck of number cards or playing cards with 10s, Queens and Kings removed.

Players: 2 to however many the deck supports.

**Gameplay:** Deal out 6 cards to each player. The goal is to arrange the cards as two 3 digit numbers whose difference is as close to zero as possible. Arrange the 3 digit numbers for larger – smaller. After doing this five times, the sum of the differences is taken, and the lowest score wins. All cards go to the discard pile. When out of cards, shuffle up the discard pile to deal more cards.

### Variations:

- 2 players. Deal three cards to each player. Players take turns going first, making a three digit number. The other player makes the 2<sup>nd</sup> number and scores the difference. Note that there is perhaps a lesser amount of problem solving here, but the game feels more competitive.
- 2) Deal 4 cards to each player and make two 2 digit numbers. (Good variation for late second or third grade.)
- 3) Deal an extra card so that players use all but one card to make their numbers. Makes scores much lower.
- 4) The game can be adapted to addition. For example: Deal 4 cards, and make two 2 digit numbers whose sum is as close to 100 as possible. Scoring can be: a) the difference between the sum and 100, taken as a positive number. (i.e. 112-100 or 100-87). Play 5 times, add the distances from 100 and the lowest score wins. Or, b) you only score if under 100. Over 100 means zero points. Play 5 times, highest score wins. Note that some deals of four cards have no sum under 100, so the five card variation can be used if you are scoring this way.

5) Calculators can be used at some, all or no points in this game to change the pedagogical focus. Sample Score sheet:

 	 =	 	
 	 =	 	
	Total:	 	

## **Calculator Get Down**

I first and last saw this game in a "calculator fun book" about 30 years ago, but long ago lost track of the book and author. (Yes, there were calculators then. They could add, subtract, multiply and divide, and got hot if you left them on too long.)

Math content: mental math, operations, divisibility rules.

Materials: 1 calculator

Players: 1

**Gameplay:** Enter a random 6 digit number with no repeats. Using only +, -, \* and / perform operations on this number to get to zero - using only 2 digit operands, and 6 or less steps! Ask students to keep a record.

Example: 342987. (1) -37. (2)/50. (3) -59. (4) /40. (5) -85. (6) -85.

Variations: Don't even get me started.

## Make It, Take It

a money game for 2 players or teams

Materials: Play coins or coin pictures or cards, amount cards. Record sheet if desired.

**Play**: Put the coins in the center. Shuffle the amount cards and make a stack. Players each turn over an amount card, and the player with the larger amount goes first. On a player's turn they turn over a card, and see if they can make that amount with the coins. If they can, they take the coins. If they can not, it's the other player's turn. Play until all coins are gone, or both players in a row can't make their amounts. The winner is the player with the biggest value of coins they collected.

**Variations:** recommended starting amounts – 4 quarters, 6 dimes, 8 nickels, 10 pennies. Other amounts can be used. Teachers can add amount cards for more complicated amounts. Or players can roll two dice to determine the amount. (Note the dice variation requires more pennies.) Advanced play allows people to make change with the coins they've collected. For example, trading a dime from the center with two nickels they have taken before. Players can use dollar value charts to keep a running total.

### Example:

Bill and Keenya have been playing for a few turns.Bill turns over 12 cents and takes two nickels and two pennies.Keenya turns over 25 cents, but there are no quarters left. She takes five nickels.Bill turns over 50 cents and can not make it.Keenya turns over 6 cents and takes a nickel and a penny.

Math Games			p.18
25	10	5	1 cent
cents	cents	cents	
50	35	30	26
cents	cents	cents	cents
20	15	11	10
cents	cents	cents	cents
6	2	27	12
cents	cents	cents	cents
7	25	10	45
cents	cents	cents	cents

## Score Sheet



Amount Card	Coins Taken

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

## Change for the Better

**Materials:** Real coins or play money. Enough so that each player can have 1 quarter, 2 dimes, 3 nickels and 4 pennies.

Math content: Low double digit subtraction.

Gameplay: Randomly determine who goes first. That player puts a coin in the middle. Play

	T		goes clockwise (to the left). Each
Paid	Change	Cost	player puts in a coin, and is
			allowed to take out as much
			change for that coin as they can,
			for any amount less than the value
			they put in. For example, if you
			put in a dime, you could take out
			— up to nine cents. The winner is
			the last person to have money.
			As a tutoring activity, it is
			recommended that students keep
			track of their change.
			Variations:
			1) Allow 1 dollar coin, 2 fifty
			cent, 3 quarters, 4 dimes, 5
			nickels and 6 pennies.
			2) Have students keep track
			of how much money they
			have total.
			Adapted from the game Fight ©
			James Earnest





## **One Dollar Race**



**Goal**: fill up your dollar first. You have to fill your dollar grid exactly. **How to play**: On your turn, roll a die. Take the coins for that number, if you can put them on your dollar. If there's room, you have to use them.



p.21







## The Product Game

1		2	3		4	5		6
7		8	9		10	12	)	14
15		16	18	3	20	21		24
25	)	27	28	28 3		32		35
36	<b>)</b>	40	42	2	45	48	<b>}</b>	49
54	ŀ	56	63	3	64	72	2	81
1	2	3	4	5	6	7	8	9
1	2	3	4	5	6	7	8	9

Play begins with each player covering a factor from 1 to 9 at the bottom. The 2<sup>nd</sup> player then covers the product of those two numbers on the game board. The 1<sup>st</sup> player can then move either one of the factor numbers and covers the new product. Play continues until a player can cover four products in a row, horizontally, vertically or diagonally.

(From CMP)

## Prime Time

Free	50	10	6	18
15	9	27	30	105
4	70	49	35	20
8	25	14	28	42
147	21	75	175	63
45	98	12	125	Free

**Factor List** 

2	3	5	7
2	3	5	7
2	3	5	7

## Rules

Player A covers a factor and then Player B covers a factor and the product. Players then take turns either changing one factor or adding or removing a factor chip. Play continues until one player has covered four in row (horizontally, vertically or diagonally) or neither player will be able to. (From CMP)

Math Games	$\bigcirc$		Score	Factor		6	p.27		
		1	Game	Board					
1	2	3	4	5	6	7	8		
9	10	11	12	13	14	15	16		
17	18	19	20	21	22	23	24		
25	26	27	28	29	30	31	32		
33	34	35	36	37	38	39	40		

Player A chooses a number on the game board and covers (or circles) it. Using a different color, player B covers all of the proper factors. Player B then circles a new number, and Player A covers all of the uncovered, proper factors of that number. If a player circles a number with no uncovered factors, that player scores no points and loses that turn. The game ends when there are no numbers left that have an uncovered proper factor. Each player scores points equal to the total of the numbers they covered.

© Connected Mathematics Project, Prime Time

Players take turns adding a letter to a word. The first player to be forced to spell a word (at least three letters) loses. A player can challenge the previous turn if they think there is no such word. If there is such a word, the challenger is out. If there is not, the challenged player is out.



## Number Strings

Players take turns breaking down a number by multiplication. The first player starts with a whole number. The next player makes a string of two numbers that multiply to give the first. The next player then can break down one of the two numbers, making a three number string. The last player who can break it down is the loser of the game. Numbers chosen must be able to be broken down more than once.

Game One



Players may not reuse starting numbers. 1 may not be used in the breakdown.

Flip – a free game by James Ernest

Players: 2

Playing Time: 5 minutes

Equipment: Ten 6-sided dice

To Begin: Each player rolls five 6-sided dice. The player who rolls the lowest total goes first.

**On Each Turn:** You may do one of two things. You may either flip over one of your own dice, or you may instruct your opponent to play one of his dice into the middle of the table.

**Playing:** When you make your opponent put a die in the middle, you choose the die. Your opponent puts it into the middle. He may then withdraw any combination of dice from the middle which totals less than the value of the die he put in. So, for example, if he plays a 5 into the middle, he could take out up to 4 points worth of dice in any combination.

**Winning:** To win the round, you must be the last player with any dice left. To keep score over several rounds, record the sum total of the dice you keep. In that case, play to 50 points.

Stalemate: To avoid stalemate, it is illegal to flip the same die twice without first making your opponent play.

**Note:** This game requires some modeling, as the reverse nature of the decisions makes it difficult for students to get the hang of it.

# Fill the Bar

**Game**: Each team/player rolls a die. Put an X over the number you rolled. The first team to mark each number wins. Teams can tie if they both fill up at the same roll.

	G	fame	e Or	ne			G	ame	e Tw	'O			G	ame	Thr	ee	
1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6

After game three or when time is up, count up how many of each number you rolled.

1	2	3	4	5	6





## Materials:

Γ

Using the fraction cards, remove the tenths. Think about how to represent 1/2, 1/3, 1/4, 1/6, 1/8, 1/12 when the unit is four hexagons.

## Game Play:

Deal out the cards out to all players. All players turn over a card and determine who has the largest, next largest, etc. Each player scores the difference between their fraction and the next highest fraction; the lowest fraction player scores 0. Place blocks representing that amount on the unit above. Announce your total score. The winner is the first to reach one; if two or more players reach one on the same turn, the player with the largest total wins. In case of ties,both players score the difference between their score and the next highest.

## SCORING:

Difference		Score	Total Score
	=		
	=		
	=		
	=		
	=		
	=		
	Ξ		
	Ξ		
	=		
	=		
	=		
	=		

p.30

Math Games	p.31

Μ	lath Games			p.32
	ROLL TO TEN	<b>Game rules</b> : Each group of players gets three Players roll to see who goes first and the higher same color dice first, and make the biggest two make a 46 or 64. Then the third die is rolled to tenths, 46 hundredths or 46 thousandths. Play if their total goes over 10. The winner is the la <b>Unit Roll</b> :	dice – two with t st untied die roll p digit number the determine the un ers build that amo st player remainin	he same color and one that is different. blays first. On a player's turn, they roll the two y can from it. For example, a 4 and a 6 could hits: tenths, hundreds or thousandths: is it 46 bunt, then add it to their total. A player is out Ig in. Low score wins!
	1	Tenths	Hundredths	Thousandths

Score Card:	
D 11	

Roll		Unit		Ones (Blocks)	Tenths (Flats)	Hundredths (Sticks)	Thousandths (cubes)		Total
	.1	.01	.001					+	0
	.1	.01	.001					+	
	.1	.01	.001					+	
	.1	.01	.001					+	
	.1	.01	.001					+	
	.1	.01	.001					+	
	.1	.01	.001					+	
	.1	.01	.001					+	
	.1	.01	.001					+	
	.1	.01	.001					+	
	.1	.01	.001					+	
	.1	.01	.001					+	
	.1	.01	.001					+	
	.1	.01	.001					+	
	.1	.01	.001					+	
	.1	.01	.001					+	
	.1	.01	.001					+	
	.1	.01	.001					+	



Game 1

Three players. Each takes a vertex. Roll dice to determine who goes first. Play proceeds counter-clockwise. First player circles their vertex, rolls, and moves halfway towards the indicated point. Subsequent players roll a die, and move the point halfway towards the vertex rolled. Continue until each player has rolled twice. The winner is the player whose vertex is closest to the point at the end of the game. Players should play new games on the same board.

## Game 2

Any number of players and a referee. Referee chooses a vertex (A, B or C) as a starting point and a target white triangle. Players write down a sequence of vertex moves. Closest player to the target triangle after their sequence of moves wins and is the next referee.  $\land$ 

Triangle Size (edges)	8	4	2	1	1 edge
Sequence Length	3	4	5	6	triangle

## Racin<sup>°</sup> Robots

2-3 players

Materials: Board, cards (printed two-sided or on colored paper), robot piece for each.

Goal: get your robot to his delivery spot to finish his job of transporting widgets.

**Gameplay:** Randomly determine who goes first. Each player draws four cards, and lays down 2 cards to program their robot. Their robot may be placed in any direction in the home square. Note that a flipped robot has the reverse orientation of an unflipped robot. On a player's turn, they:

- 1) Lay down a third program card for their robot.
- 2) Turn over the front program card and make the robot do that movement. The card then goes to the discard pile.
- 3) Draw back up to four cards in hand.

All directions are given from the robot's perspective. Example: forward means the direction the robot is facing. Left is the robot's left, etc.

If a robot moves onto another robot's square it pushes that robot back one spot in the direction the moving robot is heading.

If a robot lands on a square with text, follow those directions.

If there are no more cards to draw, shuffle the discard pile and put it into the deck.

If the robot would be put off the board, it relocates to start.

If you play a push card on an opponent, play an additional program card on your own robot.

Turns are around the center point.

Variation: Play so that if you go off an edge you come onto the opposite side. (Less frustration this way.)

### Math:

As you play, think about how the different motions combine.

How would the game be different if the motions were to some standard system instead of relative to the robot?

What new motion cards could you make?

Which motion cards were more difficult to use?

What's the difference between a vertical flip and a 180° turn?

Inspired by the game RoboRally, designed by Richard Garfield.

Math Games				p.35
Run	Run	Run	Run	Run
ROBOT	ROBOT	ROBOT	ROBOT	ROBOT
Run	Run	Run	Run	Run
Run	Run	Run	Run	Run
ROBOT	ROBOT	ROBOT	ROBOT	ROBOT
Run	Run	Run	Run	Run
Run	Run	Run	Run	Run
ROBOT	ROBOT	ROBOT	ROBOT	ROBOT
Run	Run	Run	Run	Run
Run	Run	Run	Run	Run
ROBOT	ROBOT	ROBOT	ROBOT	ROBOT
Run	Run	Run	Run	Run
Run	Run	Run	Run	Run
ROBOT	ROBOT	ROBOT	ROBOT	ROBOT
Run	Run	Run	Run	Run
Run	Run	Run	Run	Run
ROBOT	ROBOT	ROBOT	ROBOT	ROBOT
Run	Run	Run	Run	Run
Run	Run	Run	Run	Run
ROBOT	ROBOT	ROBOT	ROBOT	ROBOT
Run	Run	Run	Run	Run
Run	Run	Run	Run	Run
ROBOT	ROBOT	ROBOT	ROBOT	ROBOT
Run	Run	Run	Run	Run

Math Games				p.36
Move forward one	Move forward one	Move forward one	Flip over right hand edge	Flip over right hand edge
Move left one	Move left one	Move left one	Flip over left hand edge	Flip over dotted line
Move right one	Move right one	Move right one	Flip over left hand edge	Flip over dotted line
Move back one	Move back one	Move back one	Turn 90º right	Push forward one (this card may be swapped with an opponents program)
Move forward two	Move forward two	Move forward two	Turn 90º right	Push backward one (this card may be swapped with an opponents program)
Move forward three	Move forward three	Move forward three	Turn 90º right	Flip over horizontal center line
Move back two	Move back two	Move back two	Turn 90º left	Flip over vertical center line
Turn 180º	Turn 180º	Turn 90º left	Turn 90º left	Turn 90° in a direction of your choice.

Math Games						p.37
		I	Race Boar	:d		
ROBOT 2 Start					ROBOT 1 FINISH	
			Rotate 90° right around center			
	Move Forward 2 spaces					
					Move Left 2	
					spaces	
		Rotate 90º left around center			ROBOT 2	
ROBOT 1 Start					PIN	1011
R	H H H H H H H H H H H H H H H H H H H	Cut out Robots in edge to get	nto two strips, fold a robot with a fror	l along right hand nt and back.		

## Polygon Capture – Game Rules

## **Preparation:**

Each pair of players needs a set of property cards and a set of polygon cards. The polygons go into the center of the playing area and the side and angle property cards are separated into two piles.

## Goal:

Capture the most polygons.

## Play:

1. Randomly choose who goes first.

2. Player 1 flips over an angle card and a side card. She captures any card which satisfies **both** these properties. When finished she says: "Done"

3. Player 2 may capture any polygons which player 1 missed.

4. Player 2 takes a turn, turning over two new property cards and capturing the appropriate polygons.

5. Play continues in this manner until two or fewer polygons remain.

## Notes:

If you run out of angle or side property cards, reshuffle that pile and continue.

If the active player believes no polygons can be captured, the other player gets a chance to capture any matches. If there is a match, the turn is done. If not, the active player can choose to turn over one more property card, choosing either angle or side. If they believe still no polygons can be captured, they must say, "Done" and end their turn.

Any player can **challenge** the capture of a polygon. If a player chose a polygon incorrectly, it goes back into the center pile and their turn is done.

If the **Wild Card** comes up, the player may choose any side property. For example, if the angle card is "All angles are right angles", she may choose "All opposite sides are equal" and capture all rectangles.

If the **Steal Card** comes up, the player picks one side property and one angle property, and steals all of the polygons the other player has captured which satisfies those properties. Ignore the other card.

## Example:

Player 1 turns up "All angles have the same measure" and "It is a quadrilateral". She then captures the square, the short rectangle and the right trapezoid and says "Done." Player 2 may then capture the long rectangle. Then he begins his turn.

Source: Carroll, William M., Polygon Capture: a Geometry Game, Mathematics Teaching in the Middle School, Oct 1998. Vol. 4, Iss. 2; p. 90



Math Games		p.40	
All angles are right angles	At least one angle is obtuse	No angle is a right angle	At least one angle is less than 90°
At least one angle is a right angle	At least two angles are acute	All angles have the same measure	<b>STEAL CARD</b> Select a <i>pair</i> of properties. Steal all these polygons from your opponent.
No pairs of sides are parallel	All sides are of equal length	Exactly one pair of sides is parallel	At least one pair of sides is perpendicular
All pairs of opposite sides are parallel	It is a quadrilateral	All pairs of opposite sides have equal length	<b>WILD CARD</b> Pick your own side property