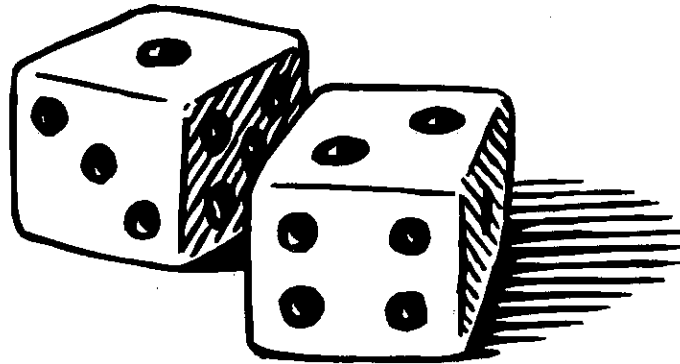




KENTUCKY CENTER FOR  
MATHEMATICS

# A Collection of Mathematical Games and Puzzles



504 John's Hill Road  
Highland Heights, KY 41099  
[www.kymathematics.org](http://www.kymathematics.org)

**Activity 1:**

Each player will need paper and a pencil for this activity. You can work at the board. To explain the game, write the following on the chalkboard.

<u>Numbers</u>	<u>Answer</u>
4, 8, 32	16

Ask the students what they can do with these three numbers to get 16. Tell them that they might try adding and/or subtracting.

After trying two or three problems individually, separate the class into teams. Write on the board a set of numbers and an answer. Have each team try to use the three numbers to get the answer working individually or together. The first team to give a correct method scores a point. The first team to get five points wins the game.

Here are some numbers and answers to get you started.

<u>Numbers</u>	<u>Answer</u>	<u>Numbers</u>	<u>Answer</u>
5, 7, 35	0	3, 6, 30	15
5, 7, 35	1	7, 10, 14	20
4, 6, 48	24	8, 48, 56	55
4, 6, 48	2	3, 5, 45	3
2, 5, 9	63	9, 27, 81	6
7, 21, 84	9	0, 4, 10	4
38, 43, 58	53	6, 9, 64	18
3, 9, 18	12	8, 16, 64	8
5, 28, 63	7	8, 5, 25	5
3, 6, 30	12	6, 24, 15	54

**Activity 2:**

Palindromic numbers are numbers that form a pattern so that you can read them forward or backward and they say the same thing as in: 323, 5115, 64346, etc. To find palindromes you add numbers like this:

$$\begin{array}{r} 67 \\ +76 \\ \hline 143 \\ +341 \\ \hline 484 \end{array}$$

This is not a palindrome, so we can reverse the numbers again and add.

Now we have a palindromic number. It took two steps.

Make a chart and list numbers that you add. Tell how many steps it takes to make a palindrome. Are all numbers eventually palindrome numbers?

Number	Steps	Palindromic Number
67	2	484
12		

**Activity 3:**

Here is an activity that can be for an individual or small group. Afterwards the whole class can discuss the number patterns that evolved.

Use sums of 2 or more consecutive numbers to represent as many numbers as possible from 1 to 100. (A hand calculator could be used.)

For example,

$$1 = \text{none}$$

$$2 = \text{none}$$

$$3 = 1 + 2$$

$$4 =$$

$$5 =$$

$$6 =$$

$$7 =$$

$$8 =$$

$$9 = 4 + 5 \text{ or } 2 + 3 + 4$$

$$10 = 1 + 2 + 3 + 4$$

$$11 =$$

$$12 =$$

etc

Questions to consider are: Is there a pattern for the numbers that cannot be represented? The odd numbers may be easier than the even ones, why? Is there any type of pattern, if so what is it?

**Activity 4:**

Joe has one minute to decide which of these allowances he would like to receive.

(1) \$1.00 per week

or

(2) Each week get 1¢ the first day, 2¢ the second day, 4¢ the third day, and so on for 7 days.

Which would you take? Give yourself one minute to decide and then figure it out mathematically.

# ADD THEM UP

Topic: Addition

Grade Level: 3 - up

Time: 20 - 30 minutes

Number of players: 1

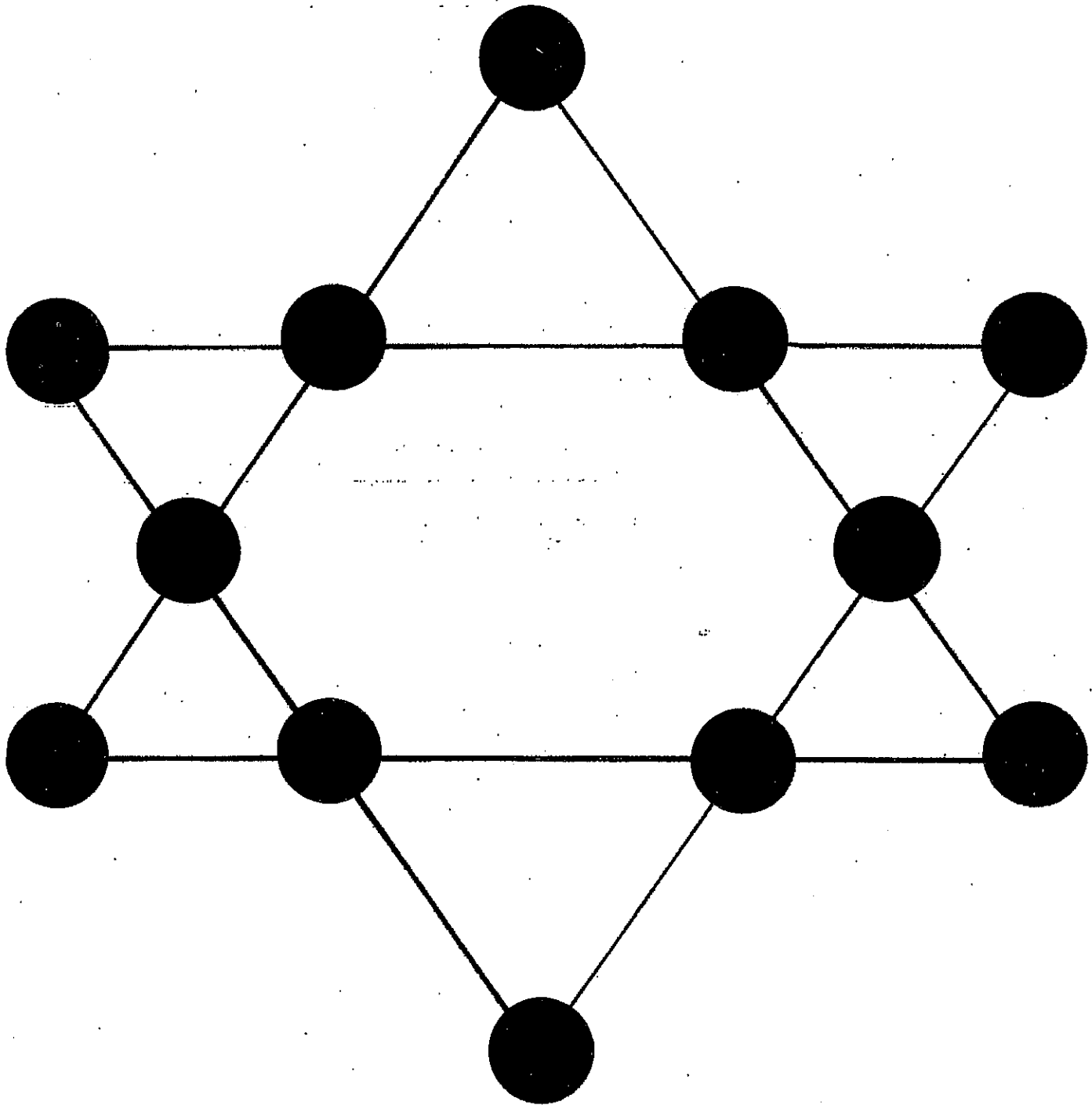
Materials needed: Gameboard  
Tiles numbered 1 through 12

Object: To make each side add up to 26

Rules:

1. Place the tiles on the circles so that each of the six sets of 4 tiles in a straight line total 26.
2. Try to make the 6 points also add up to 26.

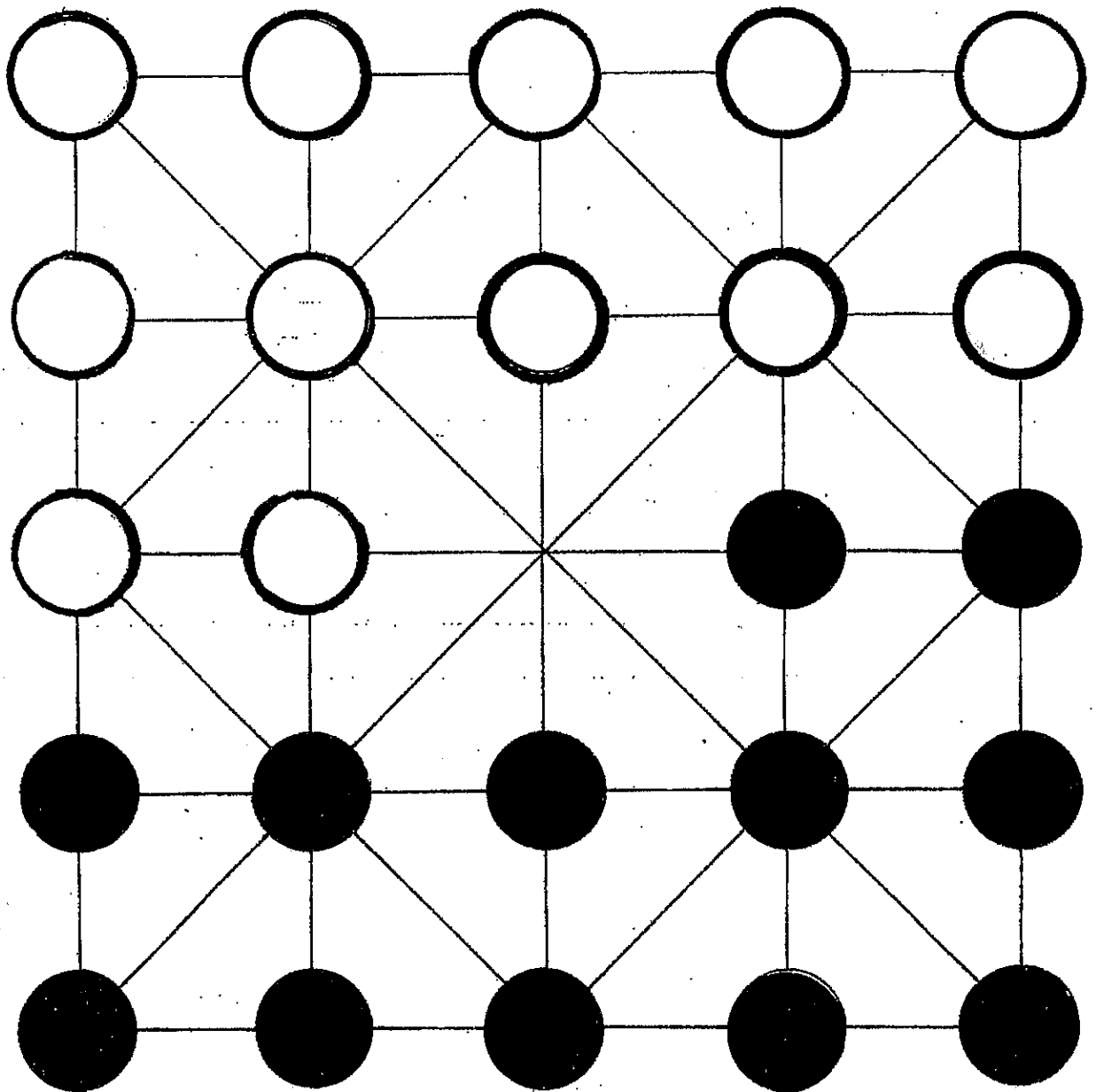
# Add Them Up



# ALBUQUERQUE

- Topic: Strategic thinking
- Grade level: 1 - up
- Time: 20 minutes
- Number of players: 2
- Materials: Game board  
24 markers, 12 of each color
- Object: To capture all of the opponent's markers by jumping over his covered positions.
- Directions.
1. Arrange the playing pieces as indicated on the board.
  2. Players alternate turns an move along any line to an adjacent cell. If a cell is occupied by the opponent but the next cell along the line is vacant, player may jump his opponent's piece. The captured piece is removed from the board.
  3. Successive jumps may be made in the same turn and need not be made in a straight line.
  4. It is compulsory to jump but the player making the move may select which jump to make if more than one exists.
  5. The player who captures all of his opponent's playing pieces is the winner. A game is tied if neither player is able to capture all of the opponent's pieces.

# Albuquerque

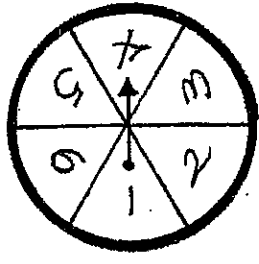
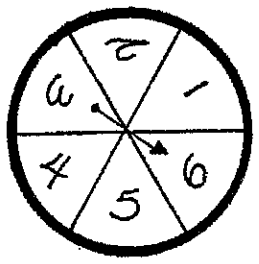
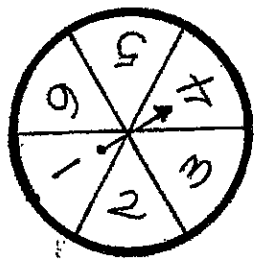


# BLOCK IT K

- Topic: Whole Number Combinations
- Grade Level: 5 - 9
- Time: 30 - 45 minutes
- Number of players: 2 - 4
- Materials needed: Gameboard  
3 Spinners or 3 Dice  
10 or 12 colored Markers for each player
- Object: To get 4 in a row..horizontally, vertically or diagonally while trying to block opponents from getting 4 in a row
- Rules:
1. Each player spins one spinner; highest spin goes first.
  2. Each play consists of spinning all 3 spinners (or rolling all 3 dice). The player combines his 3 numbers using any operation to arrive at a number.
  3. The player then places his marker on that square to cover that number.
  4. Each player takes turns spinning and combining 3 numbers to cover numbers on the board.
  5. Player tries to get 4 of his markers in a row, while trying to block his opponent. If questioned, players must justify their number.
- Variations: The use of powers may be used in addition to the four basic operations. Perhaps some students will be more challenged by trying to get 5 markers in a row.

# Block It

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
41	42	44	45	48	50	54	55
60	64	66	72	75	80	90	96
100	108	120	125	144	150	180	216



# CASINO

- Topic: Addition, Probability, Strategic Thinking
- Grade Level: 1st - adult
- Time: 10 - 30 minutes
- Number of players: 2 - 4
- Materials needed: Gameboard  
Pair of dice  
Markers to cover numbers
- Object: Players aim to cover as many of the numbers as possible, in accordance with the throws of the dice. The score for a round is the sum of uncovered numbers. Player with the lowest total wins.
- Rules:
1. Play begins after a preliminary round has decided the first shooter. Each player in turn throws the two dice. He then adds the spot values of the two dice and decides which box numbers he will cover. For example: a throw totaling 10 would allow him to cover 6 and 4; 7 and 3; 8 and 2; 9 and 1, 1, 2, and 7; 1, 2, 3, and 4; etc.
  2. Once the player has covered his chosen numbers, he throws again and makes a further choice. But he cannot make use of numbers he has already covered. He must also use up his entire score with uncovered numbers.
  3. Player continues throwing until he can no longer find combinations in his latest throw to match the numbers still uncovered. His turn is then complete and the uncovered numbers remaining are totaled and constitute his score for the round.
  4. Player with the lowest total after 10 rounds is the winner.

1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	----	----	----

Player A

# CASINO

1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	----	----	----

Player B

# CASINO ROYALE

- Topic: Computation, Strategic Thinking
- Grade Level: 3 - up
- Time: 10 - 30 minutes
- Number of players: 2 - 4
- Materials needed: Gameboard  
Pair of dice  
Markers to cover numbers.
- Object: Players aim to cover as many of the numbers as possible, in accordance with the throws of the dice. The score for a round is the sum of uncovered numbers. Player with the lowest total wins.
- Rules:
1. Play begins after a preliminary round has decided the first shooter. Each player in turn throws the two dice. He then can add, subtract, multiply, or divide the spot values of the dice and decide which numbers he will cover.  
For example: If a player rolled a 2 and a 6, he could either use the sum of 8, difference of 4, product of 12, or divided 3.
  2. Once the player has covered his chosen numbers, he throws again and makes a further choice. But he cannot make use of numbers he has already covered. He must also use up his entire score with uncovered numbers.
  3. Player continues throwing until he can no longer find combinations in his latest throw to match the numbers still uncovered. His turn is then complete and the uncovered numbers remaining are totaled and constitute his score for the round.
  4. Player with the lowest total after 10 rounds is the winner.

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

+ Casino Royale ×

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

# COVER - UP<sup>P</sup>

Topic:	Simple Addition Facts
Grade Level:	1 - up
Time:	15 minutes
Number of players:	2
Materials needed:	3 Dice 25 Markers for each player
Object:	To cover all sums on the board
Rules:	<ol style="list-style-type: none"><li>1. Each player chooses a grid on the gameboard.</li><li>2. Play alternates as players roll dice and cover their sum with a marker.</li><li>3. Winner is the first player to cover all sums on his grid.</li></ol>
Variations:	Cover a row vertically, horizontally or diagonally.

cover up

7	9	4	12	3
2	8	6	5	11
10	7	3	6	10
9	11	8	4	2
12	9	5	7	8

7	9	4	12	3
2	8	6	5	11
10	7	3	6	10
9	11	8	4	2
12	9	5	7	8

# DOMINO FACTOR

Topic: Multiplication, factors

Grade Level: 3 - 6

Time: 10 - 15 minutes

Number of players: 2 - 4

Materials needed: Set of 9 x 9 dominoes  
Game cards  
Covers

Object: To be the first player to have 5 in a vertical, horizontal or diagonal row.

- Rules:
1. A set of 9 x 9 dominoes should be turned over and mixed.
  2. Players take turns taking a domino from the array and reading both the factors and the product.

Example: The domino would  
be read 3, 6, product 18.

3. Players with an 18 on game card covers.
4. First player with 5 in a vertical, horizontal, or diagonal row is the winner.

# Domino Factors

12	35	4	36	9
24	8	6	2	16
42	16	18	0	32
9	24	12	4	18
0	36	8	6	81

This is a sample bingo card. There should be different cards for playing.

# ELEVEN MEN'S MORRIS

Topic: Strategic thinking

Grade level: 2 - up

Time: 20 minutes

Number of players: 2

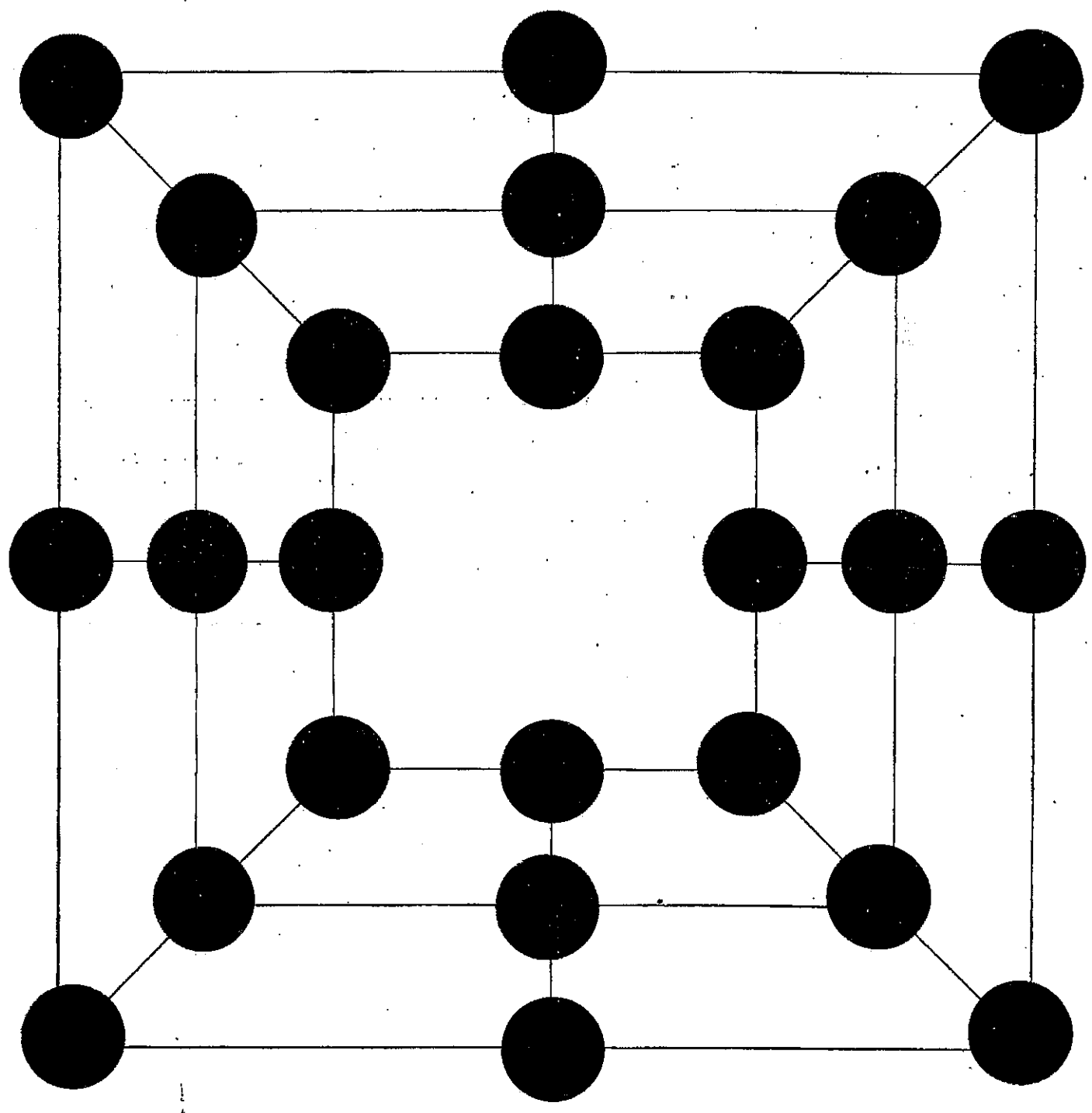
Materials: Game board  
22 markers, 11 of each color.

Object: To capture all of the opponent's markers or to block them so he has no more moves.

- Directions.
1. Start with the board empty. Each player takes turns placing his markers until all markers are on the board. There will be some empty holes.
  2. If a player places his markers such that he has three in a row, vertically, horizontally, or diagonally, it forms a mill and he may at that time remove one of his opponent's pieces from the board. You are not allowed to remove a marker from a mill of your opponent. A good trick is to move a peg out of a complete mill on one turn, and back in on the next. This counts as a new mill.
  3. To win player must capture all of his opponent's markers or block him so that he has no more moves.

Variation: Nine Men's Morris. Each player places 9 men on the board instead of 11. Rules are the same. This is a faster game.

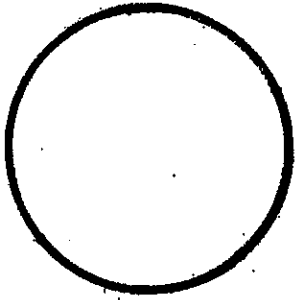
# Eleven Men's Morris



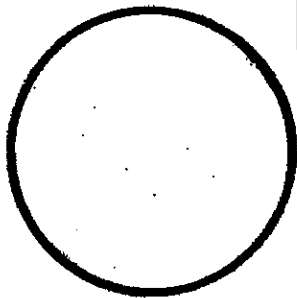
# KALAH

- Topic: Strategic Thinking, Quantitative Judgment Skills, Intuitive Decision Making
- Grade Level: K - adult
- Time: 15 minutes
- Number of players: 2
- Materials needed: Game board and stones (36)
- Object: To have the most stones in your kalah at the end of the game.
- Rules:
1. Each player sits in front of his row of 6 pits.
  2. Each pit contains 3 (for beginners) or 6 (for experts) stones.
  3. Players try to accumulate as many counters as possible in their own kalah. (This is the large pit on players right.)
  4. A player in turn picks up all the counters from any one of his own 6 pits and drops them, one by one, into each pit around the board to the right, including, if there are enough, his own kalah, and on to his opponents pits (but not his opponent's kalah).  
If the player's last counter lands in his own kalah, he gets another turn.
  5. If the player's last counter lands in an empty pit on his own side, he captures all his opponent's counters in the opposite pit and puts them in his kalah.
  6. Game is over when all six pits on one side or another are empty.
  7. Remaining stones are kept by the player whose side they are on.

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



*Kafan*

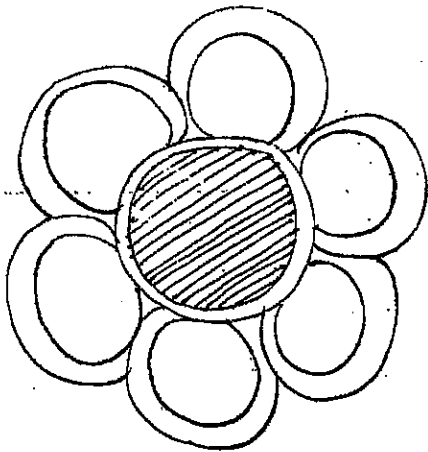


--	--	--	--	--	--

# MARTINETTI

Topic:	Addition
Grade level:	1 - adult
Time:	15 minutes
Number of players:	2 - 4
Materials needed:	Game board 3 dice Game piece for each player
Object:	Each player tries to be the first to move his counter, in accordance with the rolls of the dice, from 1 to 12 and back again.
Rules	<ol style="list-style-type: none"><li>1. High roller goes first. Each player, in turn, rolls the three dice once. Player's throw must contain a "1" before he can put his marker in the box so numbered.</li><li>2. After his throw, the dice are passed to the next player, and so on.</li><li>3. Once a player has thrown a "1", he must try for a "2". He can make a "2" by throwing either a "2" or two "1s". He continues to move his marker in this way from box to box.</li><li>4. Some throws may enable him to move through more than one box on a single throw. For example, a throw of 1, 2, and 3 would not only take him through the first three boxes, but on through the fourth (<math>1 + 3 = 4</math>), the fifth (<math>2 + 3 = 5</math>), and the sixth (<math>1 + 2 + 3 = 6</math>).</li><li>5. Players should watch the throws of their opponents. If a player throws a number he needs, but overlooks and does not use that number, the opponent should wait until the dice are passed, explain the move, and can then move his own marker one space forward.</li></ol>
Variation:	Use the face value of the dice, but permit any combination of operations, multiplication, division, addition, or subtraction to make the numbers.

M  
a  
r  
t  
i  
n  
e  
t  
t  
i



1
2
3
4
5
6
7
8
9
10
11
12

# NAUGHTS AND CROSSES

Topic: Strategy

Grade Level: Kindergarten - up

Time: 5 minutes

Number of players: 2

Materials needed: Gameboard with 25 squares  
13 Markers one color  
13 Markers another color

Object: To get the highest score

Rules:

1. Players take turns placing markers on board until all squares are filled in on board.
2. Player with highest score wins.

Scoring:

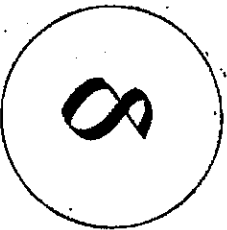
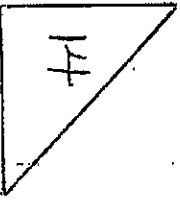
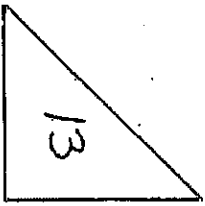
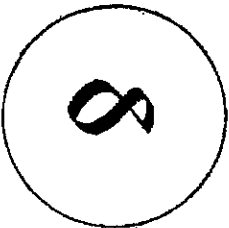
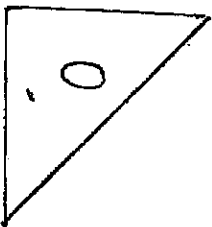
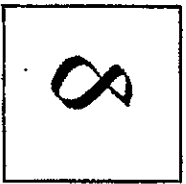
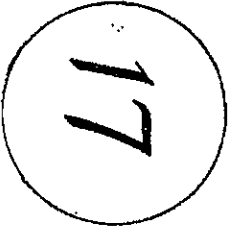
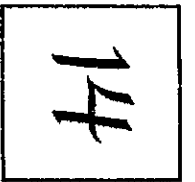
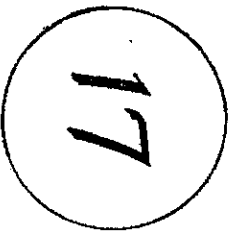
- 1 point - 3 in a row
- 2 points 4 in a row
- 3 points 5 in a row

# Naughts and Crosses


# 100

- Topic: Adding to 100
- Grade Level: 3 - 4
- Time: 20 minutes
- Number of players: 2
- Materials needed: 2 Different Markers  
Scratch paper and pencil
- Object: To reach the sum of 100
- Rules:
1. Players take turns placing their markers on any uncovered number and then add that number to their total.
  2. If a player reaches 100 exactly, he gets 3 points. If a player goes over 100, he gets 1 point.
  3. Play continues until both players total 100 or more for each game.
  4. The first player to score 15 points is the winner.

# 100



# PAIR-U<sup>P</sup>

- Topic: Addition and Subtraction (Sums 11 - 17)
- Grade Level: Primary
- Time: 15 minutes
- Number of players: 2
- Materials needed: Gameboard with numbers 11-17 in a row  
Deck of 38 cards with numbers from 2-9  
(Make one 2, two 3's, three 4's, four 5's, six 6's, seven 7's, eight 8's and seven 9's.)
- Object: To have the most pairs
- Rules:
1. 5 cards are dealt to each player. Remainder of deck is placed face down on gameboard.
  2. First player lays a card under one number on playing board. Player then draws another card from deck.
  3. If it is possible, the second player lays a card under first player's card and makes a "pair" (sum of numbers on cards must equal number on gameboard). He then draws a card from the deck.
  4. If a player is unable to make a pair, he lays a card under another number.
  5. Player draws a card from deck after every play. At all times, players must have 5 cards in their hands.
  6. Everytime a pair is made, the player collects the "pair" and plays another card (after drawing from the deck). One player can make as many pairs as possible.
  7. Players continue taking turns trying to make pairs until all cards are used.
  8. The player with the most pairs wins.

# PAIR - UP

11

12

13

14

15

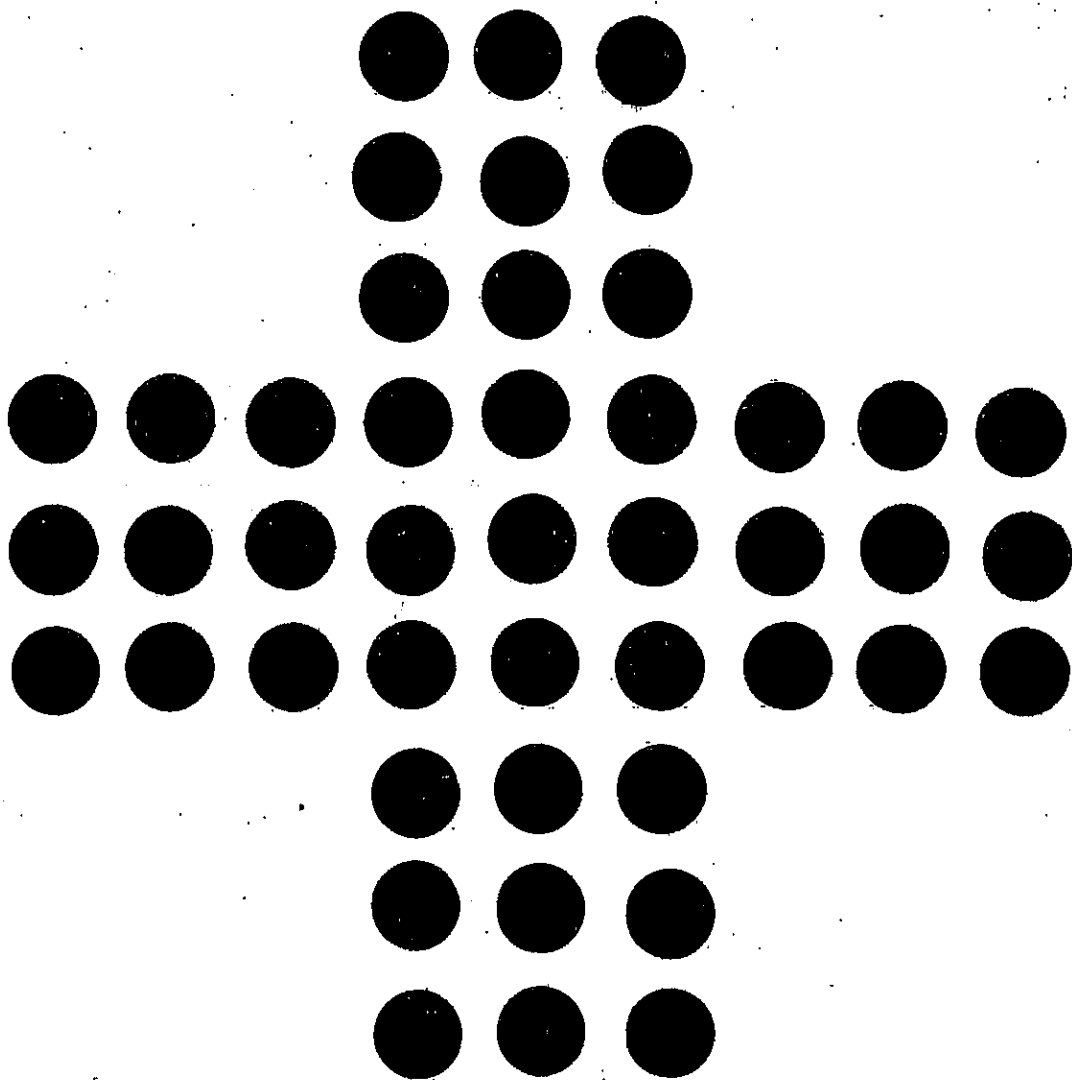
16

17

# PATIENCE

- Topic: Strategic thinking
- Grade Level: 2 - up
- Time: 5 minutes
- Number of players: 1
- Materials needed: Gameboard  
44 Markers
- Object: To remove as many markers as possible..
- Rules:
1. Place a marker on each circle except one.
  2. Jump one marker to an empty space.
  3. Remove the marker that was jumped.
  4. Player may jump in any direction, but only over one marker into an empty space. It is possible to be left with only one marker.
  5. The winner is the one to remove the most markers.

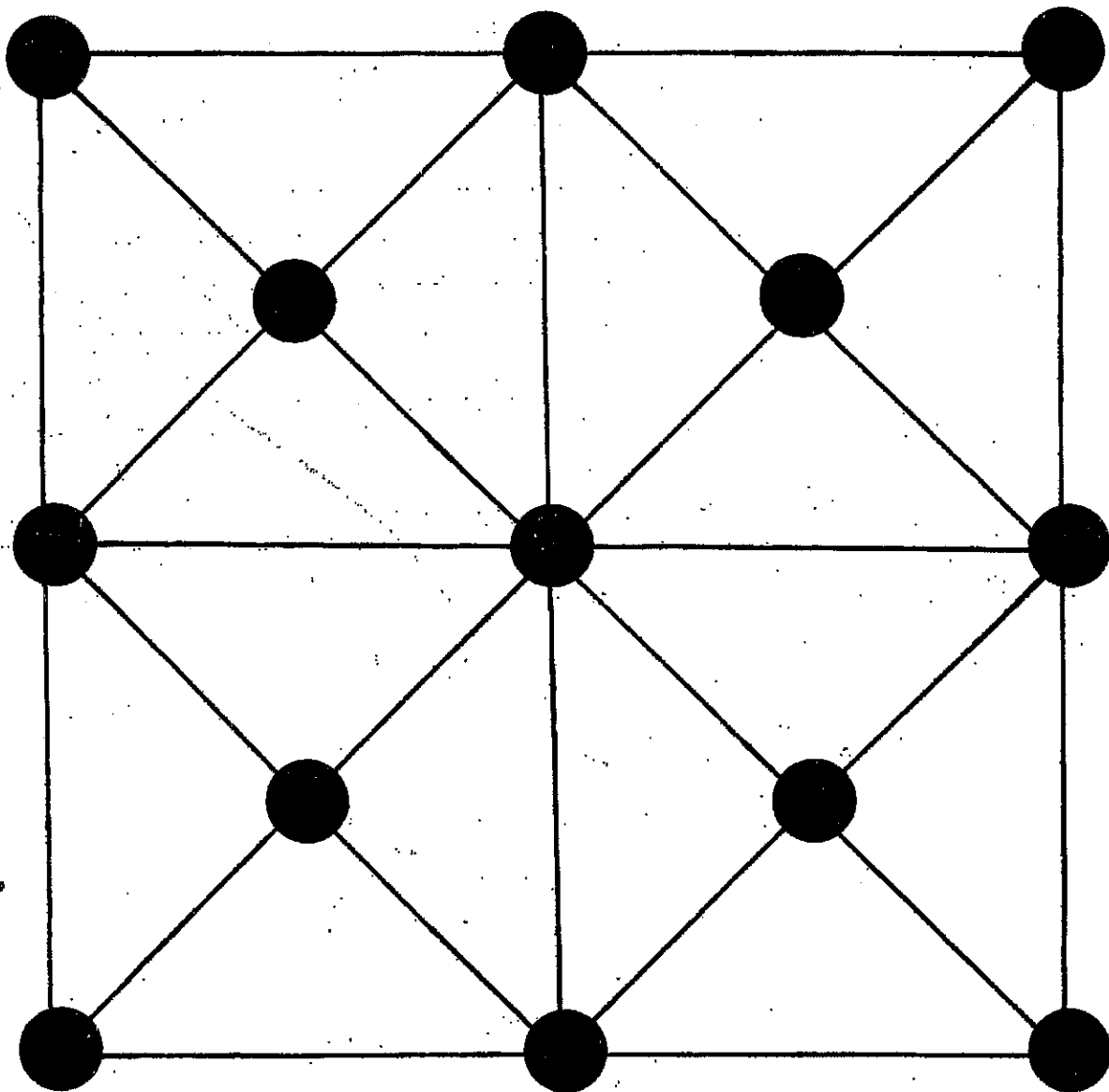
# *Patience*



# PICARIA

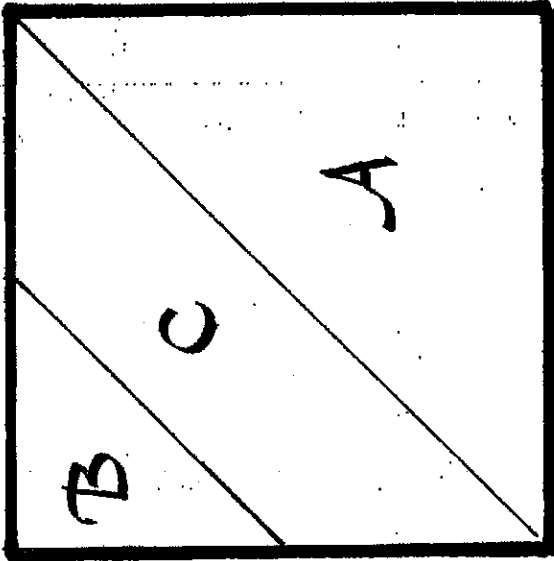
- Topic: Strategic Thinking
- Grade Level: 1st - adult
- Time: 5 - 15 minutes
- Number of players: 2
- Materials needed: Gameboard  
Markers (3 each of 2 colors)
- Object: To have your three playing pieces in a row  
(horizontal, vertical, or diagonal)
- Rules:
1. Each player has three playing pieces which are alternately placed on any line intersection.
  2. The center may not be used until all playing pieces are placed.
  3. After all playing pieces have been placed, the turns continue by moving a playing piece one position along a line to a vacant cell.
  4. The winner of the game is the first player to have three playing pieces in a row.  
(horizontally, vertically, or diagonally)
- Suggestion: Different types of beans or macaroni work well as markers.

# PICARIA

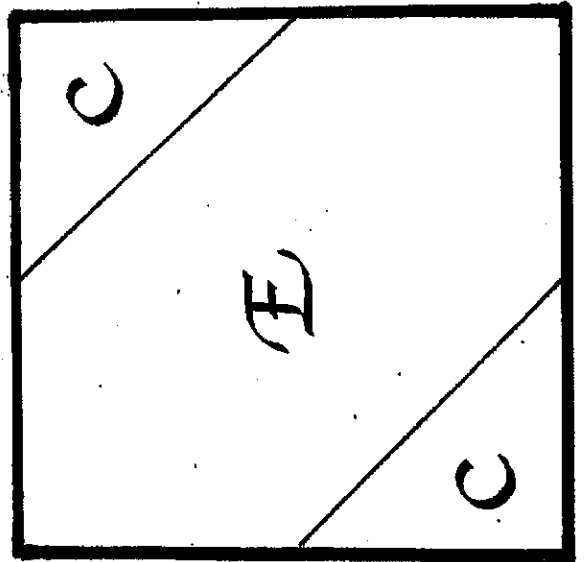
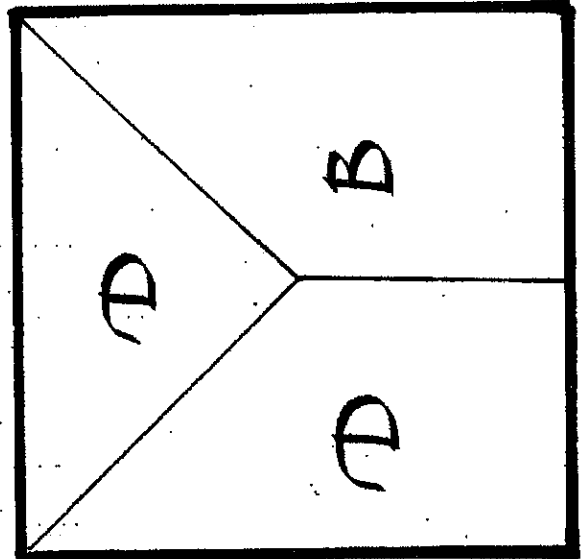
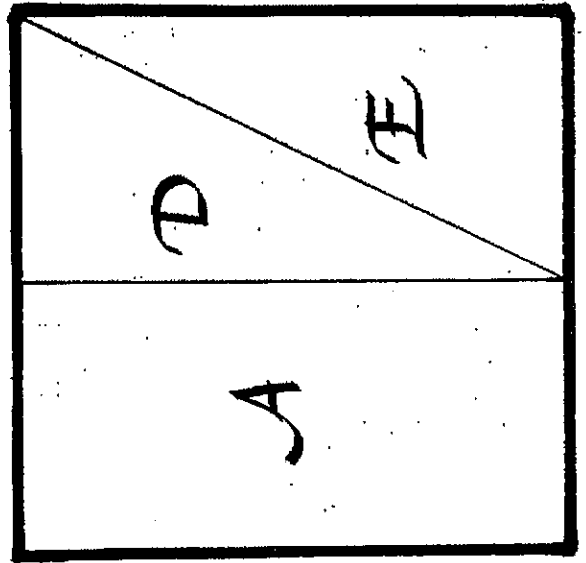
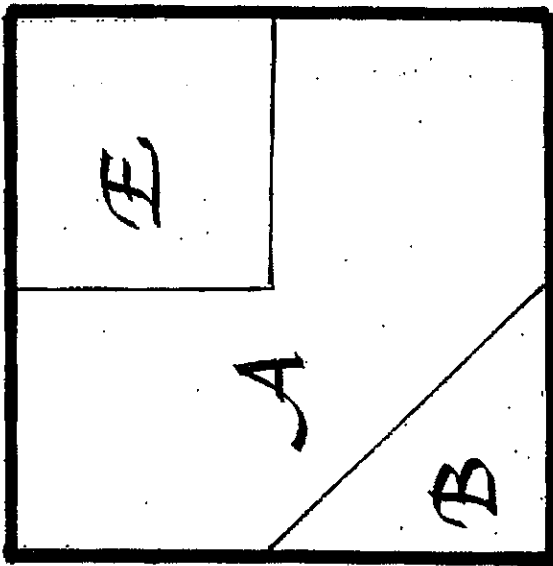


# PUZZLE TRUST

- Topic: Problem Solving and Communication
- Grade Level: Kindergarten - 12
- Time: 10 - 30 minutes
- Number of players: 5
- Materials needed: 5 Pieces of Tag Board with a square drawn on each piece  
5 Envelopes - A, B, C, D, E  
(Put all A pieces in envelope A, all B pieces in envelope B, etc.)  
5 Puzzles cut as shown
- Object: To completely cover all 5 squares using the pieces in the envelopes.
- Rules:
1. The 5 puzzles should be mixed up and random pieces placed in each envelope.
  2. Each player is given an envelope.
  3. Each person must try to complete his square puzzle without talking, gesturing, or signaling during the game. He may give away pieces.
  4. This is a game of cooperation. There is no winner.



JUST  
PUNNIE



# ROTATION

Topic: Addition

Grade level: 3 - up

Time required: 10 minutes

Number of players: 2

Materials  
Game board  
2 markers  
Pair of dice

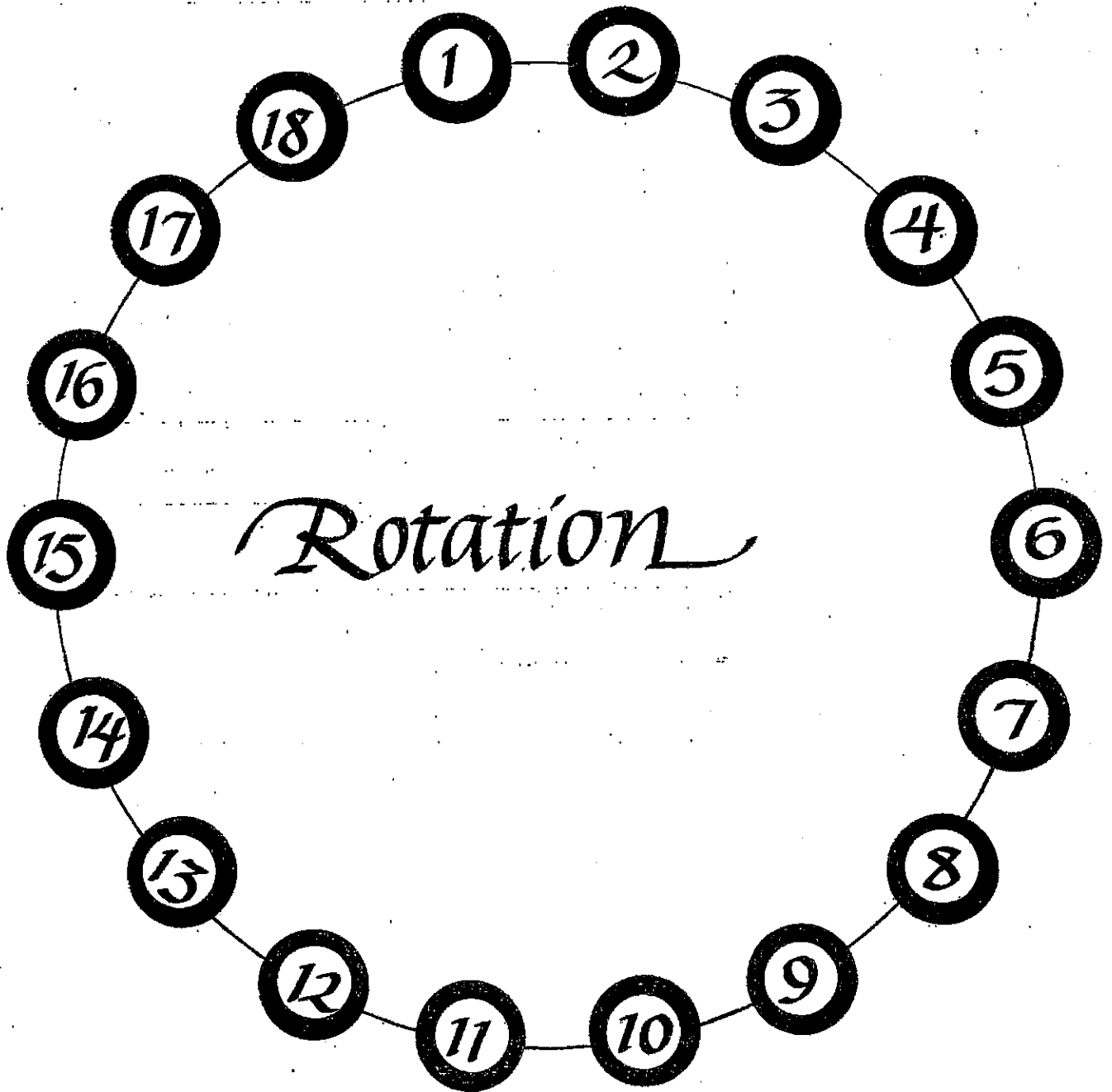
Object: To obtain the highest score

Directions:

1. Players may begin by placing markers on number they choose.
2. First player rolls the dice and may move either clockwise or counter-clockwise the number shown on the dice.
3. Each player records the number he lands on.
4. Play five rounds. Players add their five numbers and the highest score wins.

Variations:

1. Permit players to move only clockwise or counter-clockwise.
2. Lowest score wins.
3. Multiply the number on the dice times the number under marker.



# SHUFFLEBOARD SUMS

- Topic: Addition and Subtraction
- Grade Level: 2 - 5
- Time: 20 minutes
- Number of players: 1 or 2
- Materials needed: Gameboard  
1 Marker
- Object: To get 100 points
- Rules:
1. Put a marker in the "Start" box and flick it.
  2. Add the number or numbers of any box touched to get your score. (If the marker lands where two lines cross, four numbers can be added.)
  3. If a marker lands in one of the border areas, follow the directions and subtract from your total.
  4. Players take turns and continue adding to their previous score until one reaches 100 and wins.

# Shuffleboard Sums

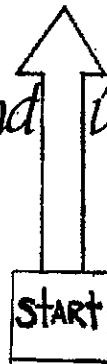
Subtract 10 points

Subtract 5 points

16	15	14	13
12	11	10	9
8	7	6	5
4	3	2	1

Subtract 5 points

If you land in this space,  
take  
another  
turn.



## Links to Games Offered Online for Download/Classroom Use

Center for Hands-on Learning

[www.handsonlearning.com](http://www.handsonlearning.com)

Connected Mathematics

<http://www.math.msu.edu/cmp/>

Everyday Math

<http://everydaymath.uchicago.edu/>

Fraction Four-Shodor Education Foundation

<http://www.shodor.org/interactivate/activities/FractionFour/>

Illuminations

E-Examples

<http://standards.nctm.org/document/eexamples/index.htm#Pre-K-2>

Texas Instruments

<http://education.ti.com/educationportal/sites/US/homePage/index.html>

The SET Game

<http://www.setgame.com/>

The 24 Game

<http://www.firstinmath.com/samplegame.asp>

Utah State Interactive Math

National Library of virtual manipulatives, base ten, algebra tiles, etc.

[www.matti.usu.edu/nlvm/nav](http://www.matti.usu.edu/nlvm/nav)

## References

Wilderman, A.M., Ed.D. *Mathematics ideas at your finger tips*. Hockessin, DE: K and W Publishing Co.

Winner, C. (Chairperson of Make It-Take It Committee). (1978). *Make it take it math games*. Presented at *The NCTM National Conference*. San Diego, CA.