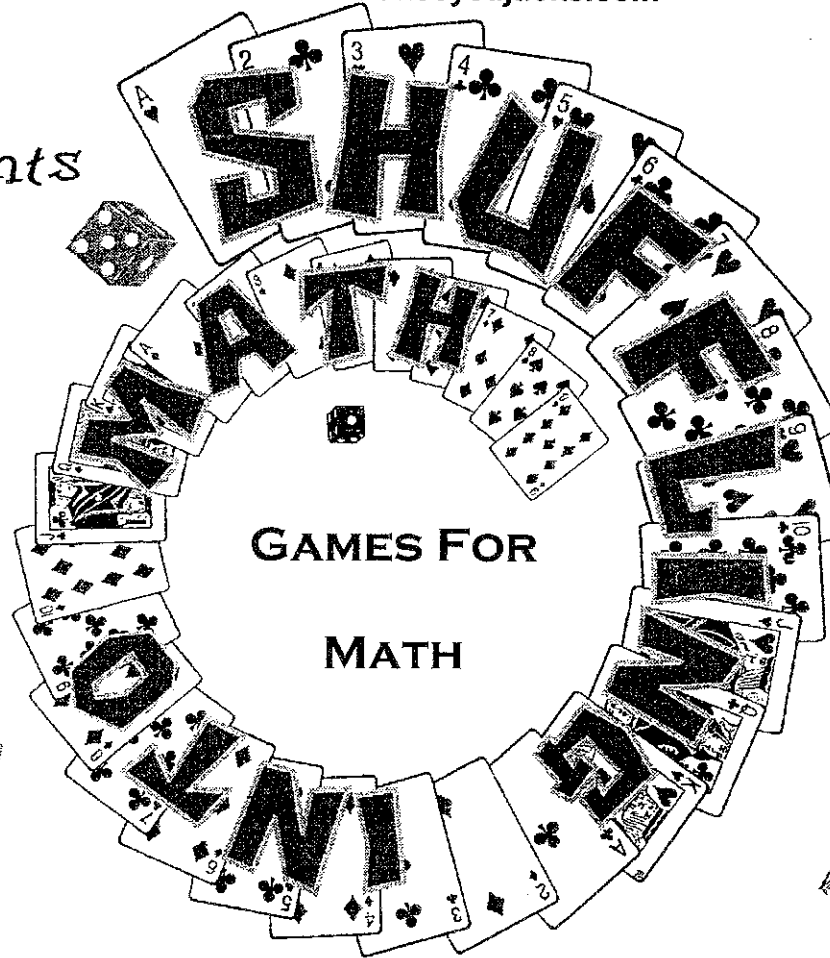


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Presents



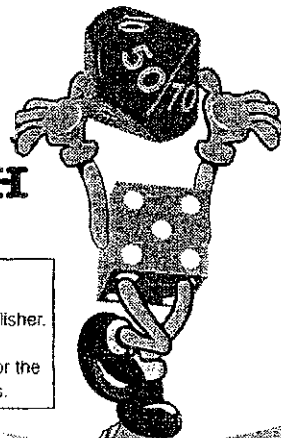
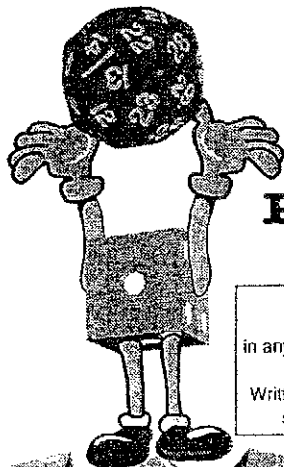
Presented by John Felling
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DOUBLES + PATTERNS

DOUBLE



$1 + 1 = 2$

$2 + 2 = 4$

$3 + 3 = 6$

$4 + 4 = 8$

$5 + 5 = 10$

$6 + 6 = 12$

$7 + 7 = 14$

$8 + 8 = 16$

$9 + 9 = 18$

DOUBLE + 1



$1 + 2 = 3$

$2 + 3 = 5$

$3 + 4 = 7$

$4 + 5 = 9$

$5 + 6 = 11$

$6 + 7 = 13$

$7 + 8 = 15$

$8 + 9 = 17$

$9 + 10 = 19$

NICKNAME

Goal Post

Rabbit, Kangaroo, Caribou

Dental

Spider, Octopus

Ten Tickly Fingers

“Box Cars”, Egg Carton, Farmers

Valentines Day

Sweetheart

Adult Double

-
- Learn doubles – cards 1-6 or 1-9, regular dice, 10 sided 0-9 dice
 - +1 Trick counting on
 - Doubles + 1 → Then transfer to symbolic work
-

PATTERNS FOR DICE PLAY

1	2	6
2	4	7
3	6	8
<u>+4</u>	<u>+8</u>	<u>+9</u>
10	20	30

SIMPLE SIXES

SUCCESSFUL SEVENS

EASY EIGHTS

NIFTY NINES

TERRIFIC TENS

ENORMOUS ELEVENS

TREMENDOUS TWELVES

HORSE RACE

4 LEVELS
OF
PLAY

2 DICERS
2 PLAY



This is a game for two Dicers to play at one time. Players use one tray divided so that each player uses only their half.

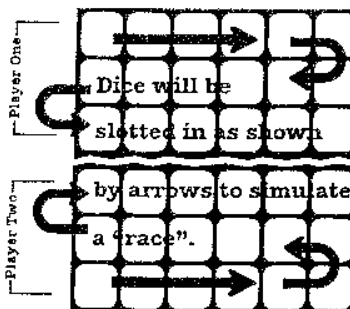
TO BEGIN

Each Dicer chooses eighteen dice of their own colour and these are removed from the tray.

THE GOAL

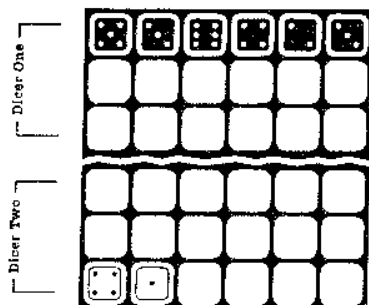
The goal of the game is to have the most dice in your side of the "horse race track" after all dice have been rolled out for the round. Dicers roll two dice at one time.

Dicers add their two dice and compare their sums. The Dicer with the greatest sum places them into their side of the "horse race track". Their opponent places their two dice into the lid (losing side). Dicers pick up two new dice, roll, add and compare their sums. The Dicer with the greatest sum places them into their side of the "horse race track" and their opponent places them into the lid. In the event of a tie sum, both Dicers place their dice into their own side of the "horse race track". Dicers roll out all remaining dice. The Dicer with the most dice on their side of the "horse race track" after nine tosses, is the winner.



The tray is divided between the two players as shown.

EXAMPLE



Play After 3 of 9 Rounds.

Toss 1

Dicer One + = 8 → WINS and places dice in tray

Dicer Two + = 5 → Tosses dice into lid

Toss 2

Dicer One + = 10 → WINS and places dice in tray

Dicer Two + = 3 → Tosses dice into lid

Toss 3

Dicer One + = 5 → TIE both players place dice in tray

Dicer Two + = 5

LEVEL 1

Play is outlined above, Dicers roll two dice and add.

LEVEL 2

Play as described in above rules, but now Dicers roll three dice and add for the greatest sum. The Dicer with the greatest sum (answer) places them into their side of the "horse race track".

$$\begin{matrix} \blacksquare & \blacksquare & \blacksquare \\ + & + & + \\ \hline \blacksquare & \blacksquare & \blacksquare \end{matrix} = 9$$

LEVEL 3

Play as described in above rules, but now Dicers roll two dice and multiply $\blacksquare \times \blacksquare = 20$ for the greatest product. The Dicer with the greatest product (answer) places them into their side of the "horse race track".

LEVEL 4

Play as described in above rules, but now Dicers roll three dice, add two, and multiply by the third for the greatest product. See example.

The Dicer with the greatest product places them into their side of the "horse race track".

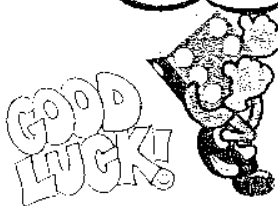


$$(5 + 3) \times 6 = 48 \rightarrow \text{Best Choice}$$

$$(6 + 3) \times 5 = 45$$

$$(6 + 5) \times 3 = 33$$

You will have to do some thinking here to create the best possible answer for your roll. Will there always be 3 possible answers?



one

two

three

four

five

six

seven

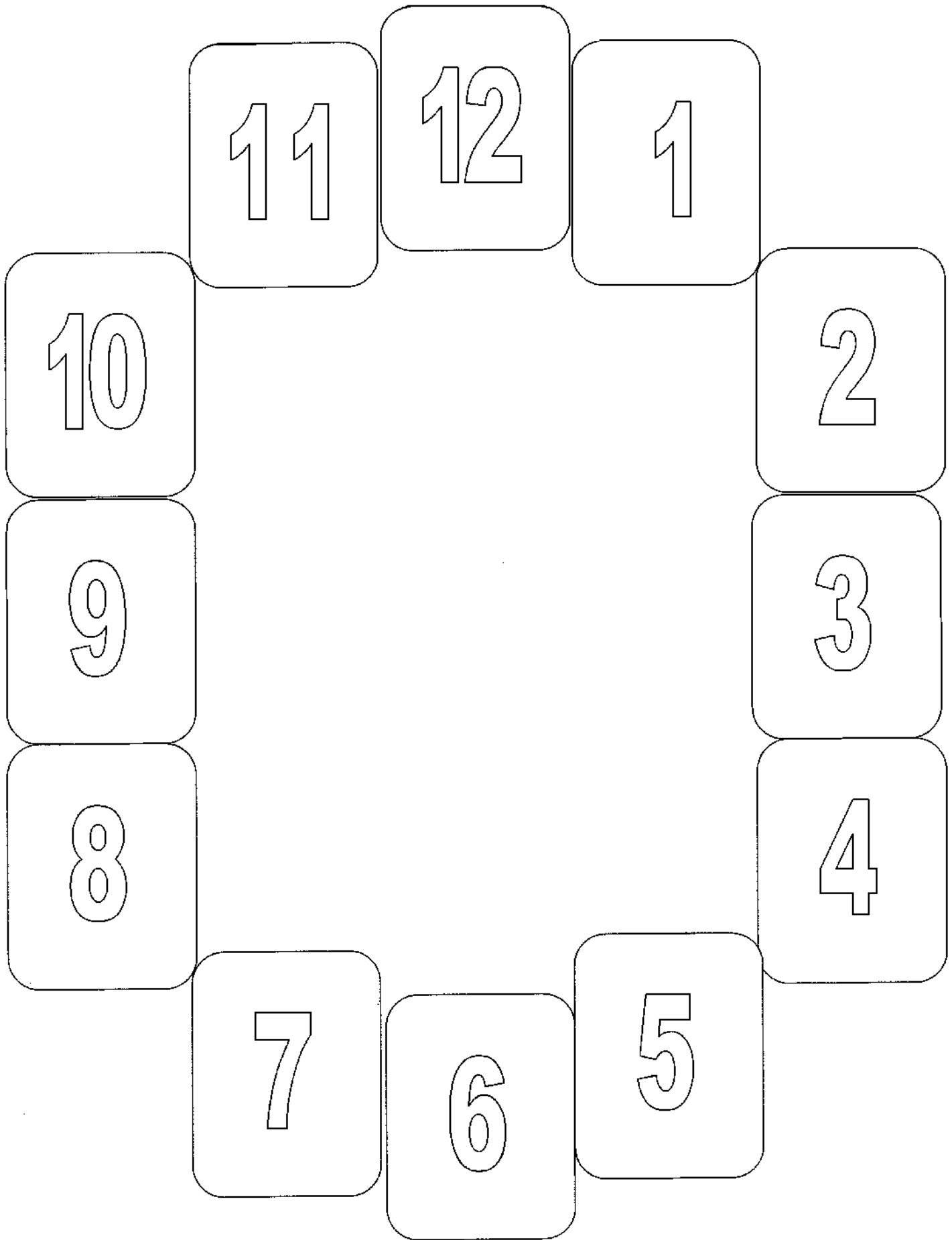
eight

nine

ten

eleven

twelve



HUNDRED BOARD TIC TAC TOE

LEVEL: Grade 1 and up
SKILLS: Identification of place value 1 - 100
PLAYERS: 2
EQUIPMENT: Hundred Board, two 10-sided dice or cards (Ace=1)-9, bingo chips (1 colour per player)

GETTING STARTED: Players select a colour of marker. The goal of the game is for players to get three bingo chips of their own colour in a row, either horizontally, vertically or diagonally. Player one rolls the dice and makes a two-digit number (ie., roll 4 and 7 and verbalizes "4 tens, 7 ones, : forty-seven", OR "7 tens, 4 ones, : seventy-four"). Player then covers the two corresponding spaces on the Hundred Board. Player two then takes their turn, rolling the dice and covering both of their numbers, remembering to verbalize the tens and ones place value to their opponent. Players continue to alternate turns trying to get TIC TAC TOE - THREE IN A ROW. When this happens the player removes their markers and counts 2 points for each marker (6 points for three in a row).

CAPTURING AN OPPONENT'S SPACE: If a player rolls a two-digit number that is occupied by their opponent then that player removes their opponent's marker and replaces it with one of their own. Each captured marker is worth 5 points.

ROLLING YOUR OWN SPACE: If a player rolls a one or two-digit number that they already occupy, they may roll again to get a new number.

Players continue to alternate turns for a set period of time. At the end of play, the player with the most points is the winner.

Grade 4-9 Variation: 100 Board Wipe Out

Roll 5 dice, then using $+$ $-$ \times \div (and exponents if you wish) make a math sentence that = one of the numbers on the 100 board. Using the same roll, make a new math sentence to = another number on the 100 board. Keep going until you can no longer make any more math sentences to = any other number on the 100 board. Roll the 5 dice again and continue. How many rolls will it take for you to clear the board?

Hundred Board

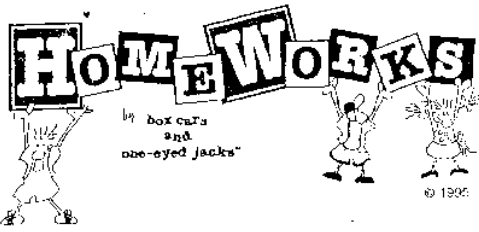
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Addition Tic Tac Toe

	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

0 1 2 3 4 5 6 7 8 9

0									
1									
2									
3									
4									
5									
6									
7									
8									
9									



MULTIPLICATION TIC TAC TOE

LEVEL: Grade 2 - 3
SKILLS: Beginning multiplication - products to 25
PLAYERS: 2
EQUIPMENT: 2 0-5 dice, one gameboard, 2 different coloured markers

GETTING STARTED: Players select a colour of marker. The goal of the game is for players to get three bingo chips of their own colour in a row, either horizontally, vertically, or diagonally. Player one rolls the dice and multiplies them, verbalizing the product to their opponent i.e., Player rolls 2 and 4, verbalizes $2 \times 4 = 8$ and $4 \times 2 = 8$ and covers the two corresponding spaces on the gameboard. Player two now rolls and covers their corresponding spaces on the gameboard. Players continue to alternate turns trying to get TIC-TAC-TOE - THREE IN A ROW.

When this happens the player removes their markers and counts two points for each marker (six points for three in a row, eight points for four in a row, etc.)

Capturing an Opponent's Space: If a player rolls a product that is occupied by their opponent then that player removes their opponent's marker and replaces it with one of their own. Each captured marker is worth five points.

Rolling Your Own Space: If a player rolls a product that they already occupy, they may roll again to get a new product. Players continue to alternate turns for a set period of time. At the end of play, the player with the most points wins.

	0	1	2	3	4	5
0	0	0	0	0	0	0
1	0	1	2	3	4	5
2	0	2	4	6	8	10
3	0	3	6	9	12	15
4	0	4	8	12	16	20
5	0	5	10	15	20	25



Multiplication Board

	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

Blank Multiplication Board

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

100 Board Wipe Out

Roll 1
Roll 2
Roll 3

Roll 4
Roll 5
Roll 6

= 1
= 2
= 3
= 4
= 5
= 6
= 7
= 8
= 9
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= 98
= 99
= 100

Roll 3 to 5 dice, record numbers, create math sentence, mark on 100 Brd at answer or on answer sheet, keep making math sentences with same roll until no longer possible, then re-roll, **RECORD IN WRITING ALL MATH SENTENCES**

MULTIPLICATION SCRAMBLE

0 - 9	_____	0 - 9	_____
10 - 19	_____	10 - 19	_____
20 - 29	_____	20 - 29	_____
30 - 39	_____	30 - 39	_____
40 - 49	_____	40 - 49	_____
50 - 59	_____	50 - 59	_____
60 - 69	_____	60 - 69	_____
70 - 79	_____	70 - 79	_____
80 - 89	_____	80 - 89	_____
90 - 99	_____	90 - 99	_____
100 - 109	_____	100 - 109	_____
110 - 119	_____	110 - 119	_____
120 - 129	_____	120 - 129	_____
130 - 139	_____	130 - 139	_____
140 - 149	_____	140 - 149	_____

THE BIG ROUND UP

10 20 30 40 50 60 70 80 90 100 110 120 130 140

10 20 30 40 50 60 70 80 90 100 110 120 130 140

TANGLE WITH TWENTY

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
X X X

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
X X X

MYSTERY ROLL

You will need to play either 50 or 100 rounds. Play in groups of 3. Every round record L, E and G plus figure out the RANGE between G and L. Use a calculator if you wish. When you are playing you should use your highlight pen to mark any unusual rolls - for example, tie rolls, sequences, unusual winning rolls, etc. Circle the points you score.

Round #	Least	Between	Greatest	Range	Analyze
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Once you have completed either 50 or 100 rolls
answer the following questions.

Work Together!

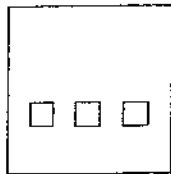
1. What is the average range of the rolls?
2. What percentage of the time does a tie roll happen?
3. What percentage of the time did you score a point? If you kept track of all winners, what percentage of the time did all 3 players score a point?
4. Describe your most unusual round. Try to interpret the probability of that event happening. Remember $1/30$ chance of rolling any number.
5. Write one question for the rest of the group to use with their data.

BETWEENERS

USING THREE IN A CUBE DICE

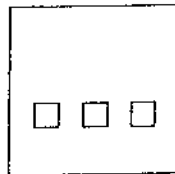
READ AND CHUNK PLACE VALUE

ROLL 1

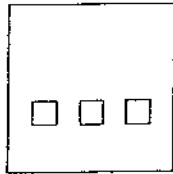


Hundreds
Tens
Ones

ROLL 2

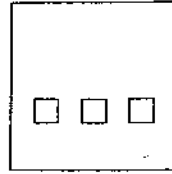


Hundred Thousands
Ten Thousands
Thousands

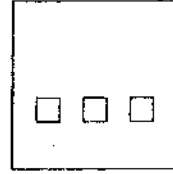


Hundreds
Tens
Ones

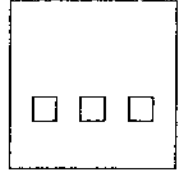
ROLL 3



Hundred Millions
Ten Millions
Millions



Hundred Thousands
Ten Thousands
Thousands



Hundreds
Tens
Ones

WARM UP:

ROLL THREE IN A CUBE TO BUILD THE GREATEST NUMBER POSSIBLE

ROLL THREE IN A CUBE TO BUILD THE LEAST NUMBER POSSIBLE

ASSIGN RED/WHITE/BLUE AS HUNDREDS/TENS/ONES (UNITS)

TO PLAY

ROLL AND HIDE CUBE

BUILD THE BEST "BETWEEN" NUMBER. WRITE NUMBER DOWN

COMPARE AND SCORE. BETWEEN NUMBER WINS 1 POINT

EXAMPLE

246
351
556



Name _____

Order In The Court

Date _____

Reject Rolls

Reject Rolls

Reject Rolls

Reject Rolls

Reject Rolls

Reject Rolls

Use Double Sided Dice; 6-Sided Dice; or 1-12 Dice

Goal: To get as many fractions in a row as possible

- Roll one die at a time (Variation: You may roll all the dice at once and race your partner to line them up)
- Write the fraction into the chain or put into the reject boxes
- Points are awarded at the end of 7 rolls. 1 point for each fraction in the chain.
- Use Fraction Circles or Fraction Bars to check accuracy

Fractions, Decimals, Percents

1 Whole Number											
1/1	1.0	100%									
2/2											
3/3											
One Third 1/3 .333 33.3%			2/3			3/4			4/4		
One Fourth 1/4 .25 25%			2/4			3/5			4/5		
One Fifth 1/5 .2 20%			2/5			3/6			4/6		
One Sixth 1/6 .166 16.6%			2/6			3/7			4/7		
One Seventh 1/7 .142 14.2%			2/7			3/8			4/8		
One Eighth 1/8 .125 12.5%			2/8			3/9			4/9		
One Ninth 1/9 .111 11.1%			2/9			3/10			4/10		
One Tenth 1/10 .1 10%			2/10			3/11			4/11		
One Eleventh 1/11 .0909 9%			2/11			3/12			4/12		
One Twelfth 1/12 .083 8.3%			2/12			3/13			4/13		
5/5			6/6			7/7			8/8		
9/9			10/10			11/11			12/12		

Batters Up!

Skills: Place Value to 100 000s, Addition with Expanded Notation

Equipment: Cards 0-9, Place Value System die, paper/pencil

Goal: Greatest total sum after ten rounds wins

Getting Started:

Each player builds a number in the 100 000s with their cards

Build in order from 100 000s place to 1s place (Example 230 516)

Each player reads their number to the other players.

One player rolls the PV System die and calls out the place value

Players identify the value at that place value in their number (this is their score for the round) and record their score for that round. Example: **ten thousands** is rolled, 3 is in the 10 000s place, score for that round is 30 000

Play 10 rounds, (rotate roller) then total your score.

BATTERS UP!

Round	Number	Roll	Value/Points/Score
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Total Score =

ROLL'N ON PLACE VALUE



TO BEGIN

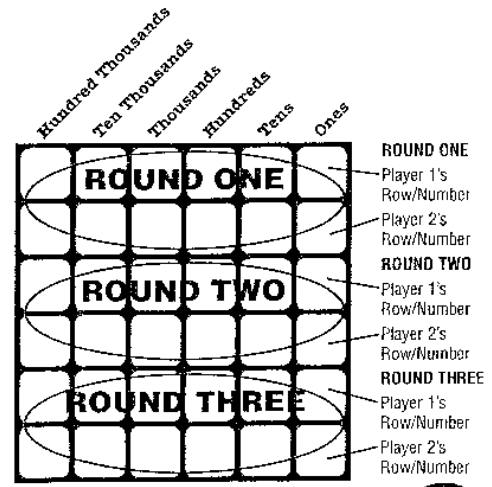
Dicers select their own colour of dice. The dice will be rolled alternately one at a time by the players throughout the game. A total of three rounds will be played (see example 7).

THE GOAL

The goal of the game is to be the player who creates the largest six-digit number in each round.

TO WIN

A Dicer must be the first one to win two out of three rounds. To start the first round player number one rolls a die and selects the best place value position in their row. For example, if player one rolls a two, the "tens" position might be selected. Player two now might roll a five and place it in the "ten thousands" position of their row. Once a die is placed in any place value position it cannot be moved. Remember, this is a game of chance. It depends on chance whether you throw the number you want on the die. Be a risk-taker and make a calculated guess. The more you play, the better you'll play. Players alternate taking their remaining five rolls, each building their own hundred thousands number - keeping in mind the goal of the game is to create the largest number possible.

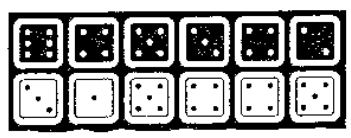


Example 7



ROLL'N ON PLACE VALUE (CONTINUED)

Player 1 rolls a 5
 Player 2 rolls a 4
 Player 1 rolls a 3
 Player 2 rolls a 4
 Player 1 rolls a 6
 Player 2 rolls a 5
 Player 1 rolls a 4
 Player 2 rolls a 5
 Player 1 rolls a 2
 Player 2 rolls a 1
 Player 1 rolls a 4
 Player 2 rolls a 3



Example 8

Once all dice have been placed, players say their numbers out loud and compare them to determine which player has made the greatest hundred thousands number. This Dicer wins that round. In example 8, player one wins round one. Play continues into round two and if necessary a third round is played to determine the overall winner.

VARIATION I

To decrease the level of difficulty players may roll less dice ie., only four dice per player to build a thousands number or three dice each to build a hundreds number.

VARIATION II

Dicers can agree to change the goal of the game and now attempt to build the smallest six-digit number in each round. A roll of 1 or 2 is now considered a "nice dice" roll! The lowest number you could possibly roll would be 111,111. What would the probability of that be?

Player one's number is 645,342 which beats player two's number 315,445.

Flippin' Out



Tens

Ones

Tens

Ones

Player One

Player Two

Flippin' Out Variation

000	100	200	300	400	500	600	700	800	900	1000
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------

Hundreds	Tens	Ones	Hundreds	Tens	Ones
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

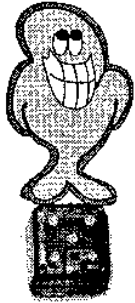
Player Two

Player One



REGULAR DOUBLE DICE WARM-UPS

2
Double Dicers
to Play



1. DUELLING DICE +

Each player rolls their own die, adds the inside and outside numbers, and verbalizes their sum out loud. Players compare sums. The player with the greatest sum scores 1 point. You'll practice adding to 12 this way.

$$\begin{array}{|c|} \hline 4 \\ \hline 2 \\ \hline \end{array} = 6$$



Each player rolls 2 dice, adds all 4 numbers and compares for the greatest sum. You'll practice adding to 24 this way.

$$\begin{array}{|c|} \hline 5 \\ \hline 3 \\ \hline \end{array} + \begin{array}{|c|} \hline 6 \\ \hline 1 \\ \hline \end{array} = 15$$



Each player rolls 1 die, adds inside and outside numbers, then doubles it. Greatest sum scores 1 point.

$$\begin{array}{|c|} \hline 6 \\ \hline 2 \\ \hline \end{array} = 8 \text{ doubled} = 16$$

2. DUELLING DICE -

Each player rolls their own die and subtracts for the LEAST difference. The player with the least difference (answer) scores 1 point. You'll practice subtracting from 6 this way.

$$\begin{array}{|c|} \hline 5 \\ \hline 3 \\ \hline \end{array} 5 - 3 = 2$$

3. DUELLING DICE X

Each player rolls one die and multiplies the numbers. The player with the greatest product (answer) scores 1 point. You'll practice multiplying to 36 this way.

$$\begin{array}{|c|} \hline 5 \\ \hline 3 \\ \hline \end{array} 5 \times 3 = 15$$



Each player rolls two dice and adds the sum of each die, then multiplies. The player with the greatest product scores 1 point. You'll practice multiplying to 144 this way.

$$\begin{array}{|c|} \hline 6 \\ \hline 2 \\ \hline \end{array} = 8 \quad \begin{array}{|c|} \hline 5 \\ \hline 4 \\ \hline \end{array} = 9 \quad 8 \times 9 = 72$$

You will be very LUCKY to hit 144 - what roll will do it?

TIES In the event of a tie, in all games, both players score 1 point.

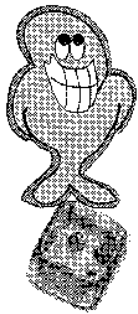
4. DOUBLE DICE SNAPS

Players can try all of the above games for speed. DOUBLE DICERS roll only one die between them (or set of dice if needed). The first player to call out the correct answer scores 1 point.



THREE-IN-A-CUBE WARM-UPS

2
Double Dicers
to Play



1. DUELLING DICE



Each player rolls their own die and adds all three numbers and verbalizes their sum out loud. Players compare their sums. The player with the greatest sum scores 1 point. You'll add to 18 this way.

ROLL

3	2	5
---	---	---

 = 10



Play for speed. Players roll one die between them. The first player to give the correct sum out loud scores 1 point. $4 + 4 + 3 = 11$

Use patterns such as doubles, doubles +1, making 10's to help you add quicker.

$4 + 4 + 3 = \text{doubles } (8) + 3 = 11$ $3 + 4 + 6 = \text{making } 10\text{'s}$ $3 + (10) = 13$

The best possible score is 0!
What rolls will make it?

2. DUELLING DICE



Each player rolls their own die and may add any two numbers. They then subtract the third. Players are trying to create the least difference possible. Players will have to analyze the various combinations to find the least difference for their final answer.

Each number may only be used once.

ROLL

3	3	1
---	---	---

 $(3 + 1) = 4$ $4 - 3 = 1$

3. DUELLING DICE



Each player rolls their own die and adds two numbers and multiplies this sum by the remaining third number. Players will need to analyze the various combinations to build the greatest product. The player with the greatest product scores 1 point.

ROLL

6	2	3
---	---	---

 $6 + 2 = 8$ or $3 + 2 = 5$
 $8 \times 3 = 24$ $5 \times 6 = 30$

4. DUELLING DICE PLACE VALUE

Each player rolls their own die and builds the greatest hundreds number. ROLL

4	5	1
---	---	---

 = 541 (when rearranged) to make "Five hundred forty-one". The player with the greatest number scores 1 point.



You can also play that the least number scores 1 point. CHECK OUT CUBIC MYSTERY on p. 16-18 for a great game that uses the dice this way.

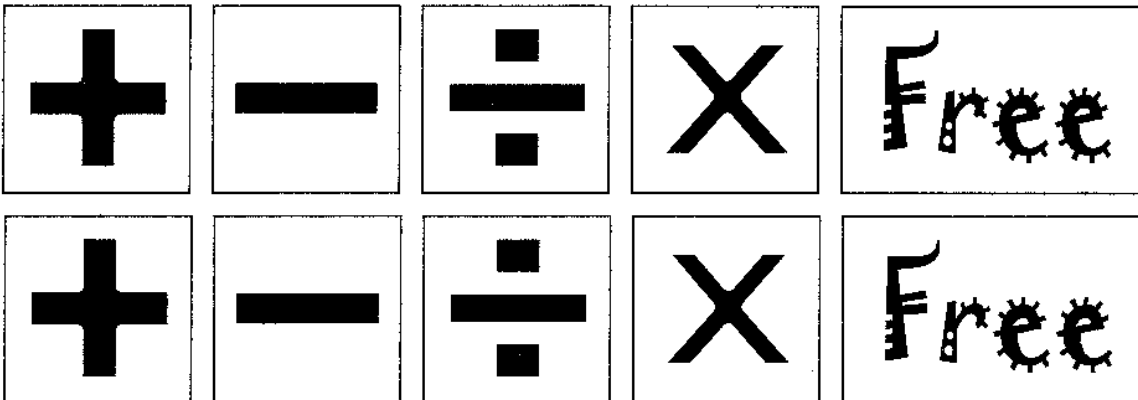
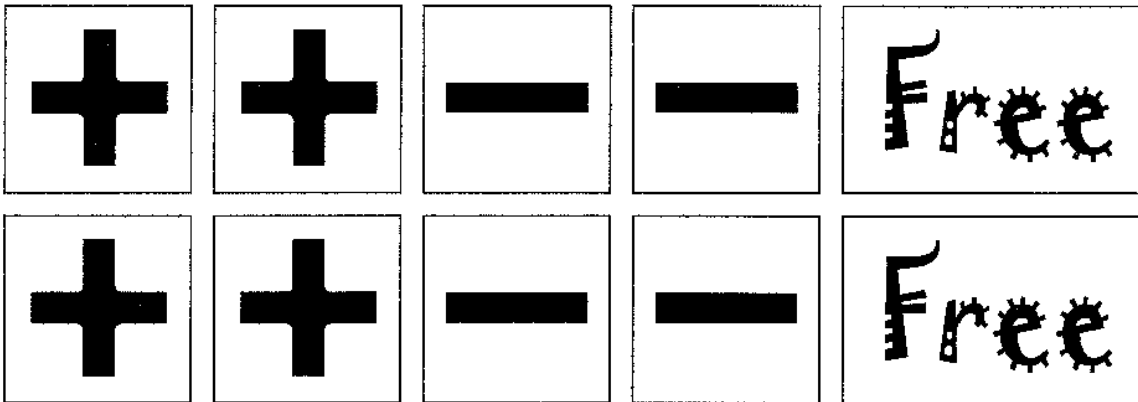


Players can build a decimal number. ROLL

6	1	1
---	---	---

 = .116 (when rearranged) to make "one hundred sixteen thousandths". The player with the least number scores 1 point.

Double Dice Decisions



GOAL: The greatest accumulated sum wins

- 1) Roll the double dice
- 2) Decide which operation to use and record the math sentence
- 3) Bank your points and cover up that operation. That operation cannot be used again except as a free choice
- 4) Division sentences must have a remainder of zero in order to score

EXAMPLE:

ROLL

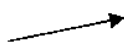
ACCUMULATED POINTS

- 1) $6 - 2 = 4$
- 2) $3 + 1 = 3$
- 3) $4 + 3 = 7$
- 4) $4 \times 2 = 8$
- 5) $6 \times 3 = 18$

4
+3 7
+7 14
+8 22
+18

40 Total Points

Chooses free



BIG SUMS



SKILLS: Problem solving, gathering data, recording data, interpreting data

PLAYERS: Students work in groups of 2, 3 or 4

EQUIPMENT: 36 regular dice per group, paper and pencil, chart

ACTIVITY I: The goal of the activity is to find the sum of 36 dice after they have been rolled.

TEACHING TIP: Allow students several rounds to develop their own method of adding the dice. Use **Chart I** to record the methods. Teach the patterns below and show the students how to group the dice.

1	2	6
2	4	7
3	6	8
<u>+4</u>	<u>+8</u>	<u>+9</u>
10	20	30

THOUGHT PROVOKERS:

1. What is the most efficient pattern to start with? Why?
2. In which order should we use the patterns to be most efficient? Why?
3. What is the largest sum we could have? What is the smallest?

ACTIVITY II: The goal is the same but we are trying to determine the range of possible sums. Use **Chart II** to record the sums that are used.

THOUGHT PROVOKERS:

1. What is the estimate for the mean value of the sums?
2. Can anyone give an explanation for the mean?
3. (Challenger) What is the mean sum of 48 dice?

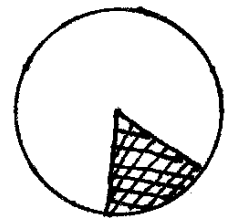
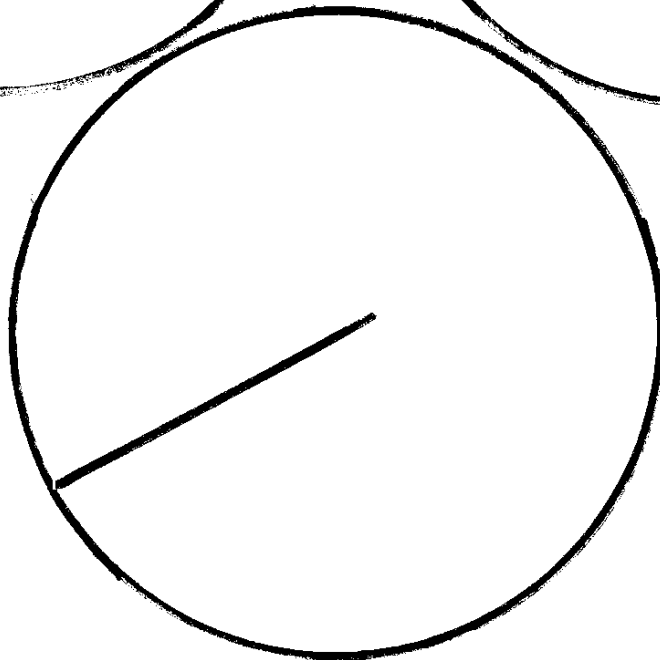
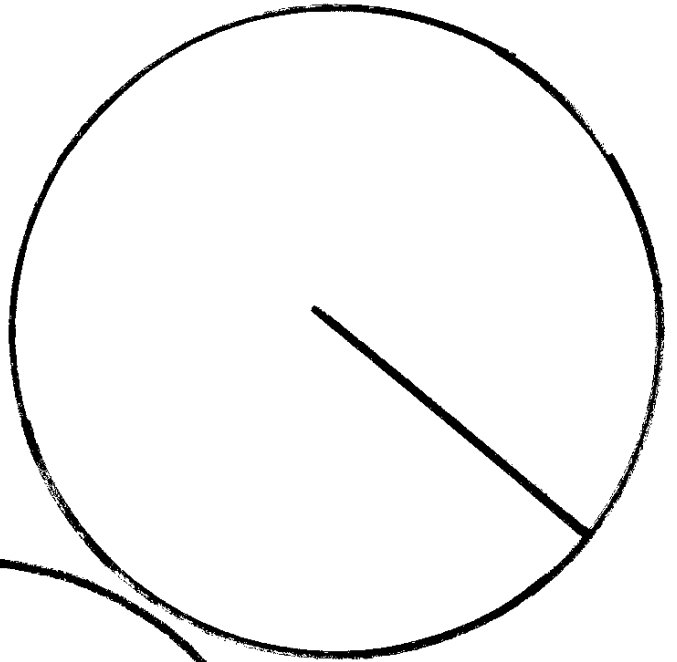
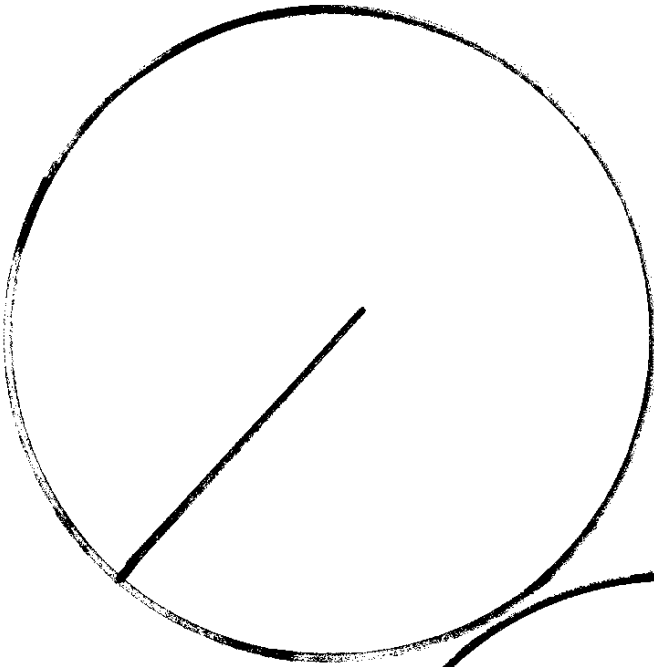
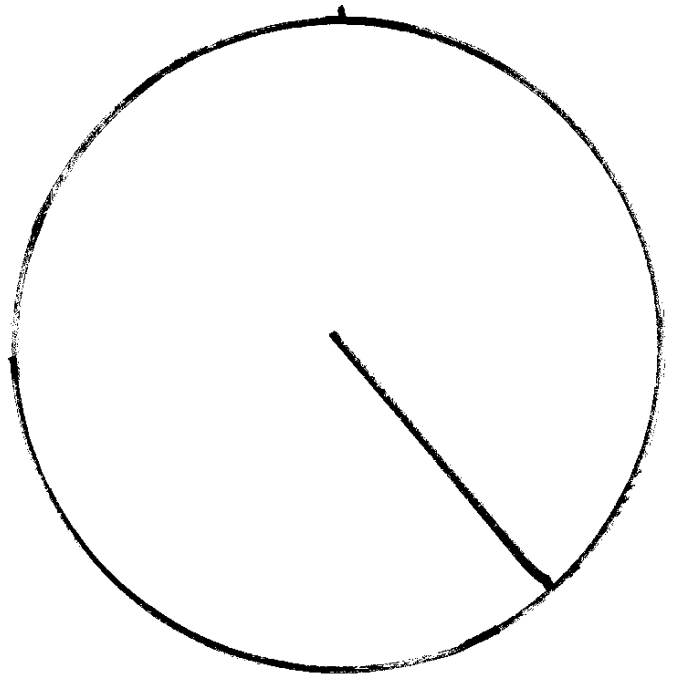
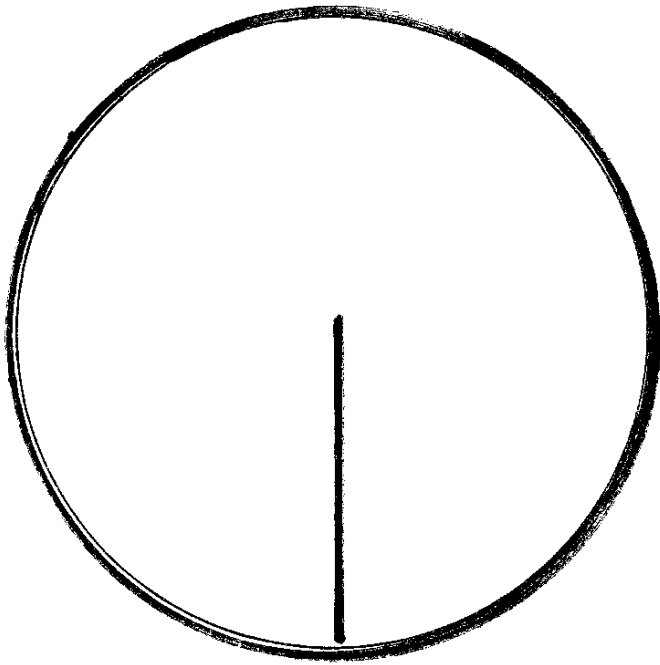
CHART I:

	Prediction	Method Used	Actual Sum	+ / - Difference
1.				
2.				
3.				
4.				
5.				

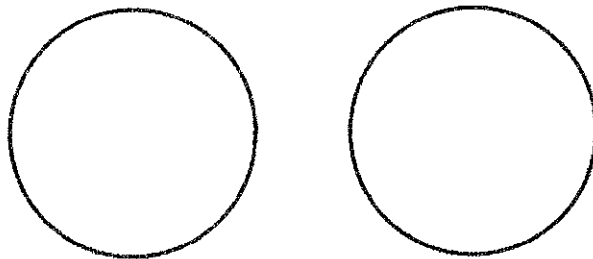
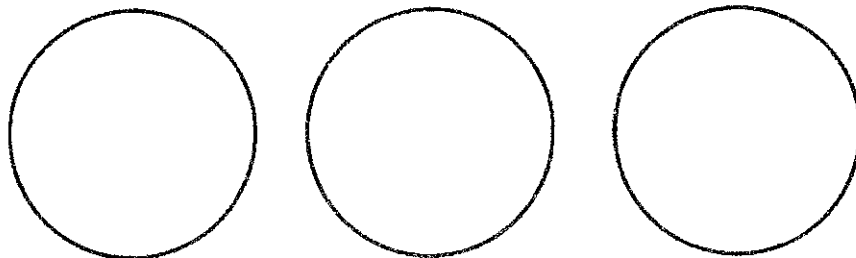
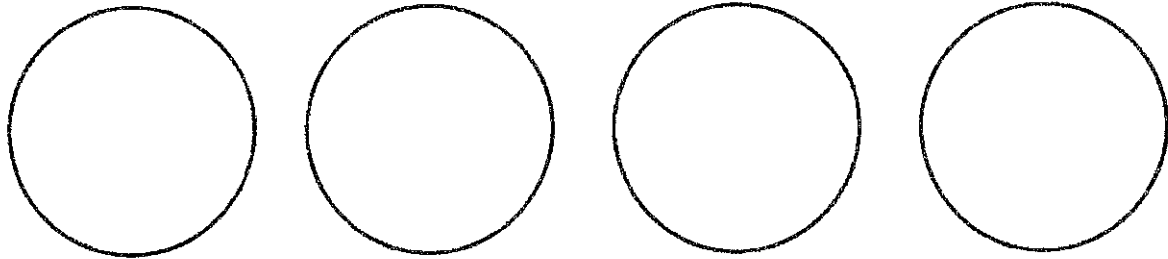
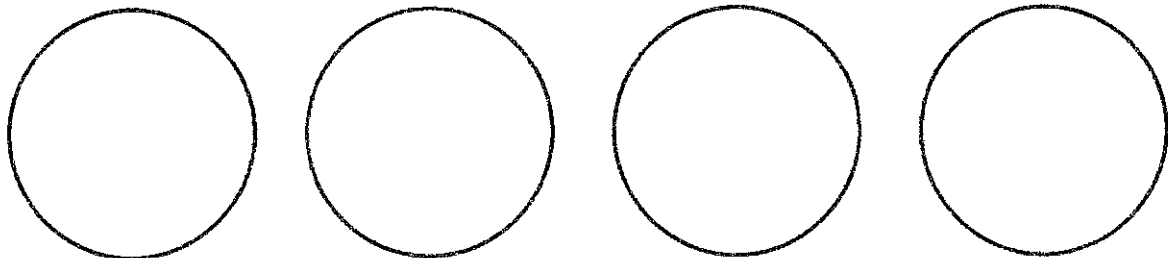
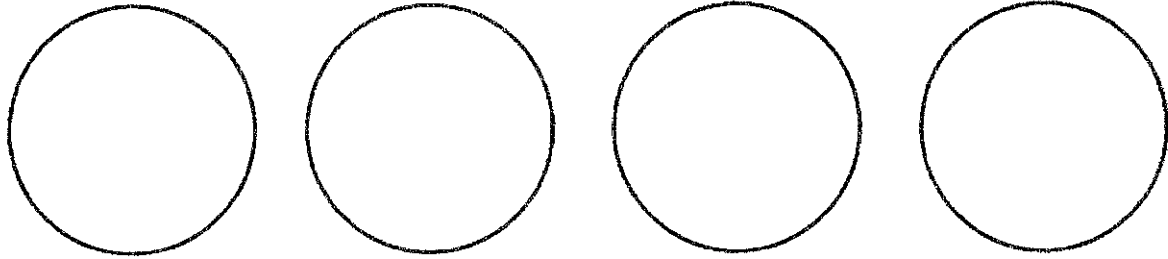
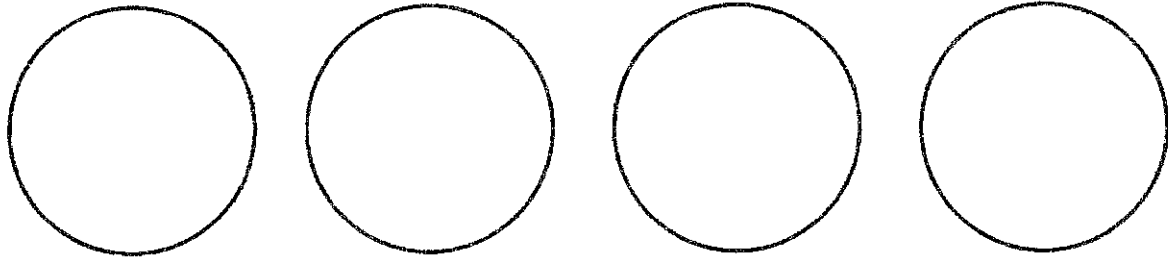
CHART II:

150+	141-150	131-140	121-130	111-120	101-110	90-100

**box cars
and
one-eyed jacks®**



The Solution



Fractions Used