GAMES AND TRICKS
TO PUT THE F-WORD BACK IN TEACHING –
FUN!

Gary Tsuruda
(garytsuruda@yahoo.com)
ASILOMAR 2007

I. WHY GAMES?

II. 5-MINUTES OR LESS
Code Words; Six Guesses; Pico, Ferme, Bagel

III. 10-20 MINUTES
Staircase; Monster; Concentration; Nim

IV. 23-47 MINUTES
Pig; Road Race; Carmel; Four Nines

V. MAGIC TRICKS
Memory cards; Mathematical mind reading; Magic smoke; Addition contest; ESP

VI. JUST FOR FUN
Hidden messages and teaching quadratic equations in five minutes or less

WHY GAMES?

- ✦ To enhance learning
- ✦ To actively involve students
- ✦ To fill small chunks of time
- ✦ To motivate and invigorate …

GAMES ARE FUN!

USE GAMES TO:

INTRODUCE
new ideas

REINFORCE
concepts and skills

SUMMARIZE
units of study

CODE WORDS

- The object of this game is to figure out the category for a series of code word clues.
- I display the clues on an electronic moving message board that I purchased at Costco for about $200, but a chalkboard would work just as well.
- I usually put up one new clue per day until someone solves the puzzle by guessing the category.
- For each puzzle, either the category or one of the word clues has something to do with mathematics.
- A student may guess only once in a given category. This is to encourage thinking and discourage wild guessing.

PICO, FERME, BAGEL

- This game has been around forever. The object is for students to determine the two-digit number you have chosen.
- Pick a two-digit number and allow students to make guesses.
- Give clues as follows: PICO means that at least one of the digits is correct and in the right place. FERME means that at least one of the digits is correct but in the wrong place. BAGEL means that both digits are incorrect.
- Students continue to guess as I record the clues on the overhead projector. When a student thinks he/she knows the number, he/she can stand up and make a guess. If the guess is correct, he/she wins the game; if it is incorrect, he/she is out of the game for the rest of the day. This is to encourage thinking and discourage wild guessing.

CODE WORDS

1. CATEGORY: THINGS AT A BASEBALL GAME
    a) Sphere
    b) Chalk
    c) Slide
    d) Parabolic trajectory
    e) Safe
    f) Error

2. CATEGORY: THINGS WITH COLONS
    a) Digital clock
    b) Business letter
    c) Ratio
    d) Large intestine

3. CATEGORY: THINGS WITH AN "X"
    a) Alphabet soup
    b) Mexican beer
    c) Algebraic expression
    d) Pirate flag

4. THINGS WITH POWER
    a) Dictator
    b) Electric company
    c) Albert Pujols
    d) Exponential expression

5. THINGS WITH RADICALS
    a) U.C. Berkeley in the 1960's
    b) Molecules
    c) Square roots
    d) Algebraic expressions with fractional exponents

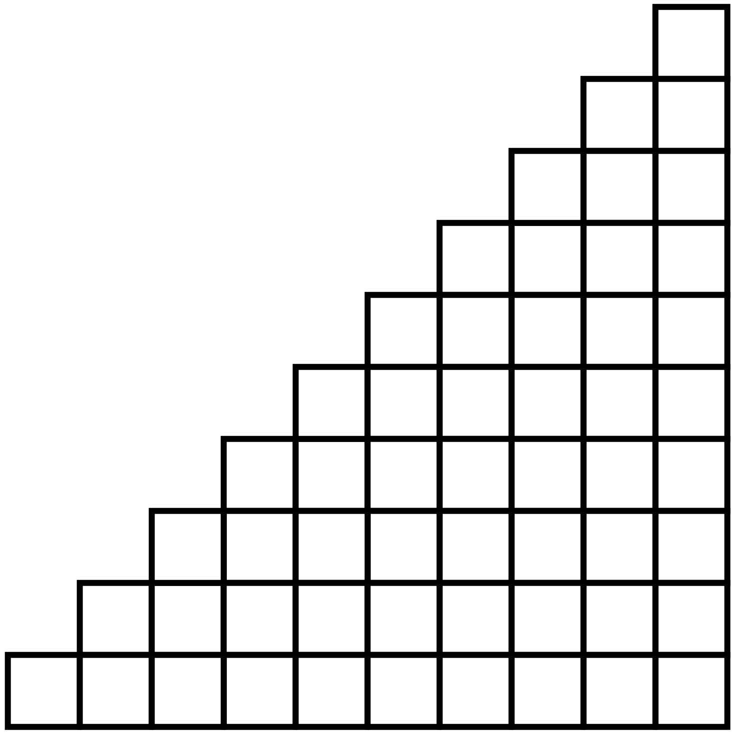
STAIRCASE

- The object of this game is to get the highest sum after placing digits in the 10 steps of the staircase.
- I roll a ten-faced die to generate the random digits 0 – 9. A spinner would work just as well.
- Be sure that students write down each digit as it is rolled rather than waiting to see what comes up next. Have students watch each other to make sure that this rule is followed.
- I have students place a star or asterisk next to any step in which they produce the largest possible number.
- When all numbers have been rolled, have the students add the numbers together. I don't allow calculators.
- Students must be able to read the name of their large sum in order to win the game.

MONSTER

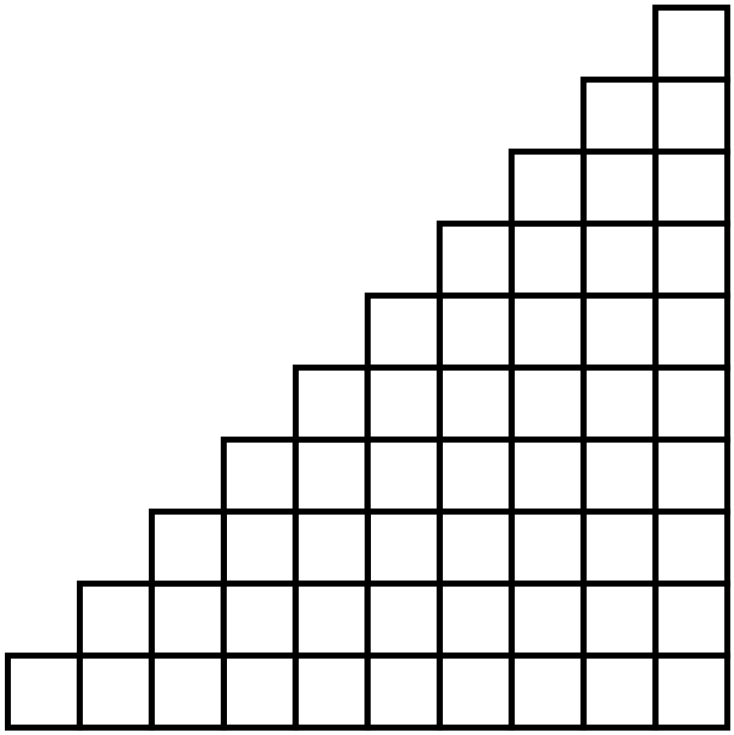
- The object of this game is for a student to get the highest score possible against the monster.
- The student may choose any number from the board but for any number taken, the monster gets <u>all</u> the factors of that number. The monster <u>must</u> get something every time, so the student is forced to choose numbers that have factors left on the board.
- As numbers are taken, cross them off or cover them up. A number can only be used once.
- When the student can no longer take a number that would give the monster a factor, the student and the monster take turns choosing the leftovers.
- The student's score is the sum of all the numbers he/she has chosen. The maximum score (world record) is 224. Advanced students can prove that this is the highest possible score.

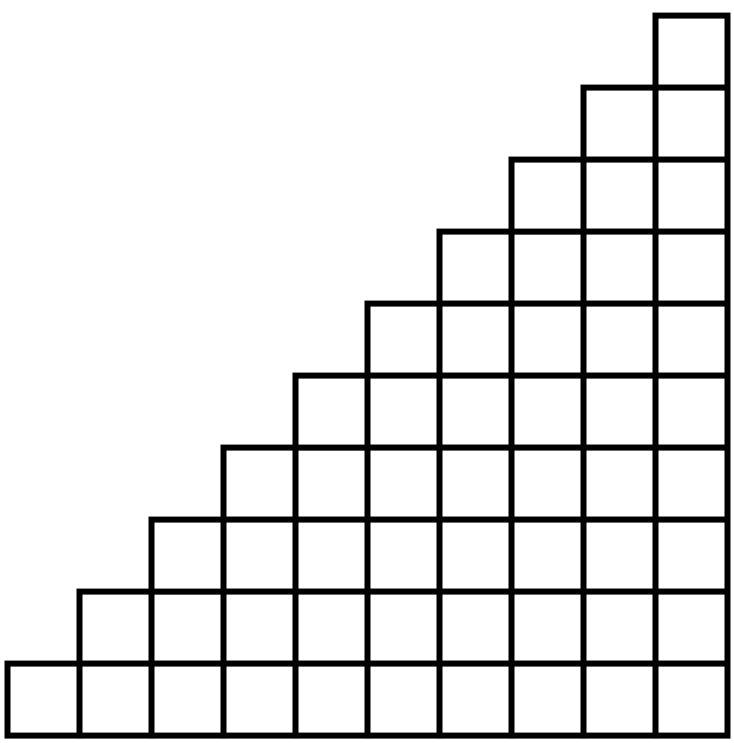
STAIRCASE



- The object of this game is to get the highest sum after placing digits in the 10 steps of the staircase.
- I roll a ten-faced die to generate the random digits 0 – 9. A spinner would work just as well.
- Be sure that students write down each digit as it is rolled rather than waiting to see what comes up next. Have students watch each other to make sure that this rule is followed.
- I have students place a star or asterisk next to any step in which they produce the largest possible number.
- When all numbers have been rolled, have the students add the numbers together. I don't allow calculators.
- Students must be able to read the name of their large sum in order to win the game.
- The WORLD RECORD for 10-step Staircase is 11,096,887,912. This record was set on October 11, 2007 in Loomis, CA.

STAIRCASE





MONSTER

2	3	4	5
6	7	8	9
10	11	12	13
14	15	16	17
18	19	20	21
22	23	24	25

CONCENTRATION

	A	B	C	D	E
1					
2					
3					
4					
5					
6					

FRACTION-DECIMAL-PERCENT

CONCENTRATION

	A	B	C	D	E
1	$\frac{2}{3}$	30%	.7	$\frac{1}{8}$	.75
2	.375	$\frac{1}{2}$	40%	$.\overline{9}$	$.1\overline{6}$
3	70%	.625	.875	WILD CAR	.125
4	$.8\overline{3}$	$\frac{3}{8}$	$\frac{5}{8}$	$.\overline{6}$	$\frac{5}{6}$
5	1	$\frac{3}{4}$	$.\overline{3}$	.6	50%
6	$\frac{3}{5}$	.3	$\frac{7}{8}$	WILD CARD	$\frac{2}{5}$

UNIT CONVERSION
CONCENTRATION

	A	B	C	D	E
1	47 hrs.	188 cups	276"	6 gal.	7 qt.
2	1380 min.	252"	wild card	2880 min.	96 oz.
3	47 qt.	730 days	2'	24"	2820 min.
4	14 pints	2 days	6 lbs.	8 pints	47'
5	½ gal.	7 yds.	2 miles	2 years	wild card
6	564"	23 hrs.	24 qt.	3520 yds.	23'

FRACTION-DECIMAL-PERCENT
CONCENTRATION

	A	B	C	D	E
1	$\frac{2}{3}$	30%	.7	$\frac{1}{8}$	.75
2	.375	$\frac{1}{2}$	40%	$.\overline{9}$	$.1\overline{6}$
3	70%	.625	.875	WILD CARD	.125
4	$.8\overline{3}$	$\frac{3}{8}$	$\frac{5}{8}$	$.\overline{6}$	$\frac{5}{6}$
5	1	$\frac{3}{4}$	$.\overline{3}$	.6	50%
6	$\frac{3}{5}$	.3	$\frac{7}{8}$	WILD CARD	$\frac{2}{5}$

FRACTIONAL FORMS

CONCENTRATION

	A	B	C	D	E
1	$\frac{6}{8}$	$\frac{1}{4}$	$\frac{4}{5}$	$\frac{9}{18}$	$\frac{1}{3}$
2	$\frac{14}{21}$	$\frac{15}{25}$	$\frac{3}{4}$	$\frac{8}{10}$	wild card
3	$\frac{18}{45}$	$\frac{5}{20}$	$\frac{3}{18}$	wild card	$\frac{1}{5}$
4	$\frac{2}{10}$	$\frac{7}{12}$	$\frac{14}{24}$	$\frac{2}{3}$	$\frac{2}{5}$
5	$\frac{8}{24}$	wild card	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{3}{5}$

MIXED NUMBER
CONCENTRATION

	A	B	C	D	E
1	$1\frac{1}{2}$	$\frac{9}{8}$	$\frac{8}{5}$	$\frac{5}{3}$	$\frac{13}{6}$
2	wild card	$2\frac{1}{5}$	$\frac{12}{5}$	$1\frac{1}{4}$	$\frac{11}{4}$
3	$2\frac{2}{5}$	$2\frac{5}{6}$	$\frac{3}{2}$	$1\frac{2}{3}$	$\frac{9}{5}$
4	$\frac{5}{4}$	$1\frac{1}{8}$	$1\frac{1}{3}$	$2\frac{3}{4}$	$1\frac{3}{5}$
5	$1\frac{4}{5}$	$\frac{4}{3}$	$2\frac{1}{6}$	$\frac{11}{5}$	$\frac{17}{6}$

FRACTION-DECIMAL-PERCENT
CONCENTRATION

	A	B	C	D	E	F
1	50%	$\frac{1}{4}$	0.7	47%	$\frac{1}{3}$	0.3
2	0.4	10%	$\frac{3}{4}$	15%	.23	$\frac{2}{3}$
3	.15	wild card	20%	.25	$\frac{1}{5}$	32%
4	$\frac{3}{10}$	70%	80%	$0.\overline{9}$	0.9	$\frac{1}{10}$
5	$\frac{9}{10}$	75%	0.8	$\frac{1}{2}$	40%	wild card
6	1	$\frac{23}{100}$	$\frac{32}{100}$	$0.\overline{3}$	$0.\overline{6}$	.47

NIM GAMES

GAME #1: **Circle 1, 2, or 3 symbols. You lose if you take the last one.**

✪✪✪✪✪ ✪✪✪✪✪ ✪✪✪✪✪ ✪✪✪✪✪

GAME #2: **Circle 1, 2, or 3 symbols. You WIN if you take the last one.**

⭘ ⭘ ⭘ ⭘ ⭘ ⭘ ⭘ ⭘ ⭘ ⭘ ⭘ ⭘ ⭘ ⭘ ⭘ ⭘ ⭘ ⭘ ⭘ ⭘

GAME #3: **Circle 1, 2, 3, or 4 symbols. You lose if you take the last one.**

♥ ♥ ♥ ♥ ♥ ♥ ♥ ♥ ♥ ♥ ♥ ♥ ♥ ♥ ♥ ♥ ♥ ♥ ♥ ♥

GAME #4: **Circle 1, 2, 3, or 4 symbols. You WIN if you take the last one.**

✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦

GAME #5: **Circle 1, 2, 3, or 4 symbols. You lose if you take the last one.**

◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈

◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈

◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈ ◈

THE GAME OF PIG
(whole class version)

1) The object of this game is to get the highest total score in the class.
2) Everyone stands up at the beginning of each round.
3) Roll two regular dice. I use two large foam dice so that everyone can see the results as they are rolled.
4) Add the numbers that come up on the two dice. However, if the two numbers are the same, multiply them.
5) Continue to roll the dice and add the numbers to the sum for that round.
6) Anyone may record his/her score for the round by sitting down and writing the current sum in the "Score" column of the score sheet.
7) If a ONE comes up on either die, any students still standing must record a score of ZERO for that round. However, if a ONE comes up on the first roll, I roll that die again to get a non-zero score for the round.
8) Students keep a running total of their score in the "Total" column of the score sheet.
9) If a ONE comes up on BOTH dice, any students still standing must record a TOTAL of zero for the game. In other words, they lose all the points they've accumulated to that point in the game.
10) A round ends when a one is rolled or all students have chosen to sit down.
11) After Round 5, as long as <u>all</u> students are still standing, when a one comes up, I roll again.
12) The winner is the student with the highest total score after the final round.

PIG

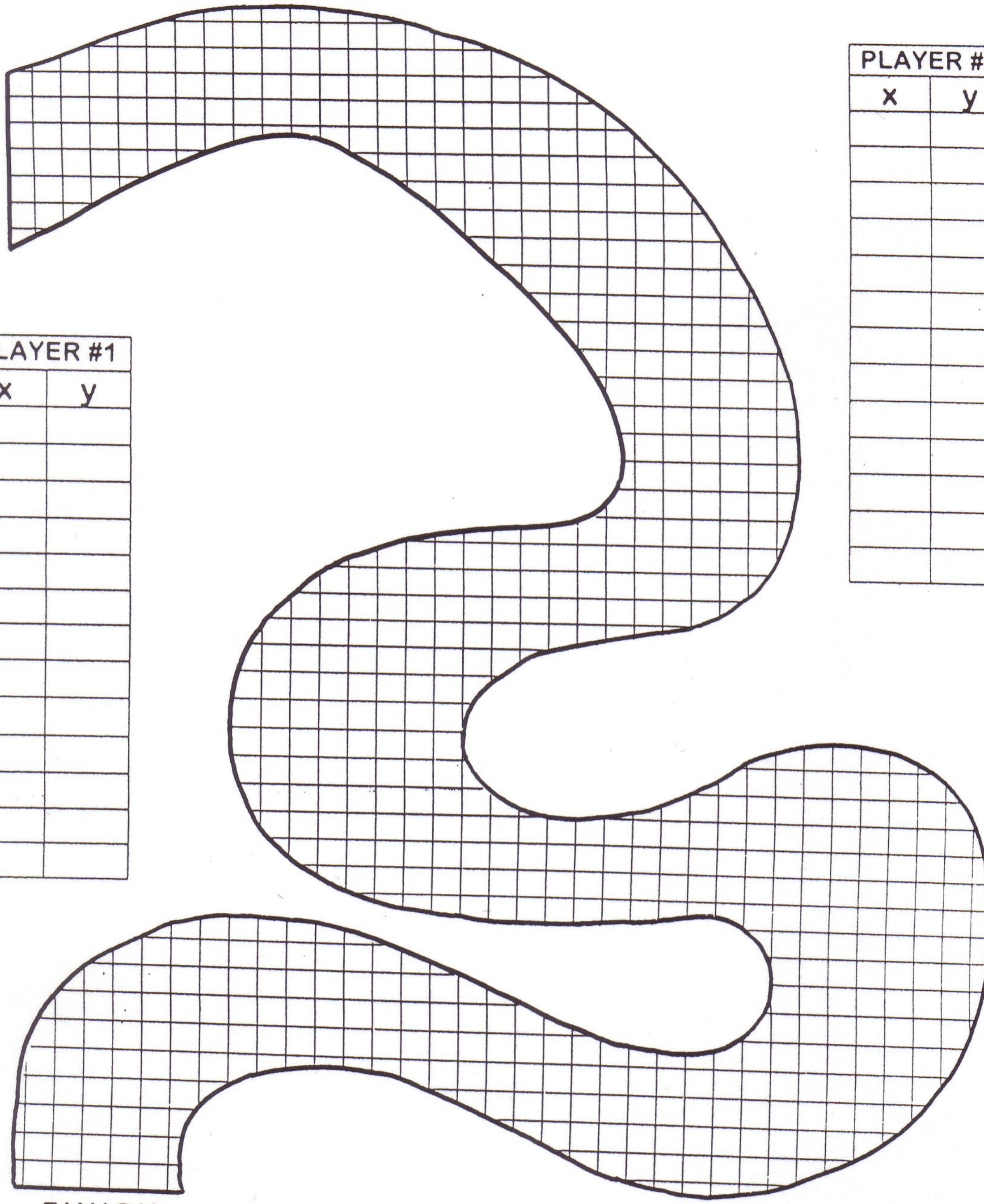
ROUND	SCORE	TOTAL
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

DIRECTIONS FOR ROAD RACE

- This game simulates the driving of a race car. The object of this game is to get your car to the finish line before your opponent.
- Students can start their cars at any one of the points on the starting line. Flip a coin to decide who goes first. It is easier to keep track of the race if the competitors use different colors to mark the progress of their cars.
- The position of a car in the race represents the origin of the Cartesian coordinate plane.
- The speed and direction (vector) of a race car can only be changed by ±1 for each coordinate on any given turn.
- Students record their moves throughout the race.
- A car cannot occupy the same space (coordinate) as another car during the race.
- A car that strikes the wall has crashed and loses the race.
- Road Race tournaments are a big hit, especially when students begin to make up their own race tracks.

ROAD RACE

START



FINISH

PLAYER #1	
x	y

PLAYER #2	
x	y

DIRECTIONS FOR CARMEL

- The object of this game is for a team of students to get more points than any other team.
- Carmel may be played by two or more teams. I have found that three teams works best in a classroom situation.
- You'll need a scorekeeper and someone to write the numbers on the board. The same person could do both jobs.
- Have each team select a spokesperson.
- Place the Carmel transparency on the overhead projector. Cover a few numbers at random with 2-cm cubes or plastic counters.
- Roll three regular dice and announce the numbers.
- The recorder writes these numbers on the board for everyone to see.
- Each team tries to use all three numbers to produce an answer that equals one of the uncovered numbers on the board. They have 30 seconds to come up with an answer.
- The team spokesperson must announce the answer and tell how they got it.
- Points are scored for coming up with an answer that isn't yet covered and for each covered number touching the answer.
- Teams may earn points even when it isn't their turn if they can find a way to use the same numbers and score more points. They get the difference between their score and the score of the team whose turn it was.

CARMEL

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	49	50	54
55	60	64	66	72	75	80	90
100	108	120	125	144	150	180	216

FOUR NINES CONTEST

- **This seemingly dry number game can become as exciting as any sporting event if staged well. The object of this game is to find equations using four nines that equal every number from 1 to 100.**

- **I usually have two or more classes competing against each other to see who can come up with the most numbers in a given amount of time, usually about a week.**

- **This is a great opportunity to introduce order of operations, parenthesis, exponents, square roots, factorial, and even repeating decimals.**

- **Using these operations, all numbers from 1-100 are possible.**

- **As students come up with equations, I check off the numbers on a large wall chart. You could do this on the overhead projector as well, but I like to have the chart visible at all times throughout the week.**

- **I add a requirement that each student in the class must come up with at least one equation. It's amazing how this encourages collaboration.**

FOUR NINES CONTEST SOLUTIONS

$1 = \frac{99}{99}$

$2 = \frac{9}{9} + \frac{9}{9}$

$3 = \sqrt{9} \times \frac{9}{\sqrt{9} \cdot \sqrt{9}}$

$4 = \sqrt{9} + \frac{9}{\sqrt{9} \cdot \sqrt{9}}$

$5 = 9 - \sqrt{9} - \frac{9}{9}$

$6 = 9 - \sqrt{9} \cdot \frac{9}{9}$

$7 = 9 - \sqrt{9} + \frac{9}{9}$

$8 = 9 - \frac{9}{\sqrt{9} \cdot \sqrt{9}}$

$9 = 9 \times \frac{9}{\sqrt{9} \cdot \sqrt{9}}$

$10 = 9 + \frac{9}{\sqrt{9} \cdot \sqrt{9}}$

$11 = 9 + \sqrt{9} - \frac{9}{9}$

$12 = 9 + \sqrt{9} \cdot \frac{9}{9}$

$13 = 9 + \sqrt{9} + \frac{9}{9}$

$14 = 9 + \sqrt{9} + \sqrt{9} - .\overline{9}$

$15 = \sqrt{9} \times \sqrt{9} + \sqrt{9} + \sqrt{9}$

$16 = 9 + 9 - \sqrt{9} + .\overline{9}$

$17 = 9 + 9 - \frac{9}{9}$

$18 = 9 + 9 \cdot \frac{9}{9}$

$19 = 9 + 9 + \frac{9}{9}$

$20 = 9 + 9 + \sqrt{9} - .\overline{9}$

$21 = 9 + 9 + \frac{9}{\sqrt{9}}$

$22 = 9 + 9 + \sqrt{9} + .\overline{9}$

$23 = \sqrt{9}^{\sqrt{9}} - .\overline{9} - \sqrt{9}$

$24 = \sqrt{9}^{\sqrt{9}} - \frac{9}{\sqrt{9}}$

$25 = \sqrt{9}^{\sqrt{9}} - \sqrt{9} + .\overline{9}$

$26 = \sqrt{9}^{\sqrt{9}} - \frac{9}{9}$

$27 = \sqrt{9}^{\sqrt{9}} \cdot \frac{9}{9}$

$28 = \sqrt{9}^{\sqrt{9}} + \frac{9}{9}$

$29 = \sqrt{9}^{\sqrt{9}} + \sqrt{9} - .\overline{9}$

$30 = \sqrt{9}^{\sqrt{9}} + \frac{9}{\sqrt{9}}$

$31 = \sqrt{9}^{\sqrt{9}} + \sqrt{9} + .\overline{9}$

$32 = (9 - .\overline{9})(\sqrt{9} + .\overline{9})$

$33 = 9 \cdot \sqrt{9} + 9 - \sqrt{9}$

$34 = \dfrac{99 + \sqrt{9}}{\sqrt{9}}$

$35 = 9 \cdot \sqrt{9} + 9 - .\overline{9}$

$36 = 9 \cdot \sqrt{9} + 9 \cdot .\overline{9}$

$37 = 9 \cdot \sqrt{9} + 9 + .\overline{9}$

$38 = (\sqrt{9})!(\sqrt{9})! + \sqrt{9} - .\overline{9}$

$39 = 9 \cdot \sqrt{9} + 9 + \sqrt{9}$

$40 = (9 + .\overline{9})(\sqrt{9} + .\overline{9})$

$41 = (\sqrt{9})!\,[(\sqrt{9})! + .\overline{9}] - .\overline{9}$

$42 = (\sqrt{9})!\,[(\sqrt{9})! + .\overline{9}]\,(.\overline{9})$

$43 = (\sqrt{9})!\,[(\sqrt{9})! + .\overline{9}] + .\overline{9}$

$44 = 9[(\sqrt{9})! - .\overline{9}] - .\overline{9}$

$45 = [(\sqrt{9})! - .\overline{9}]\,[\sqrt{9} \cdot \sqrt{9}]$

$46 = 9[(\sqrt{9})! - .\overline{9}] + .\overline{9}$

$47 = (\sqrt{9})!(9 - .\overline{9}) - .\overline{9}$

$48 = (9 + \sqrt{9})(\sqrt{9} + .\overline{9})$

$49 = [(\sqrt{9})! + .\overline{9}][(\sqrt{9})! + .\overline{9}]$

$50 = [(\sqrt{9})! - .\overline{9}][9 + .\overline{9}]$

$51 = (\sqrt{9})!(9 - .\overline{9}) + \sqrt{9}$

$52 = 9(\sqrt{9})! - .\overline{9} - .\overline{9}$

$53 = 9(\sqrt{9} + \sqrt{9}) - .\overline{9}$

$54 = (\sqrt{9} + \sqrt{9})(\sqrt{9} \cdot \sqrt{9})$

$55 = 9(\sqrt{9} + \sqrt{9}) + .\overline{9}$

$56 = 9(\sqrt{9})! + .\overline{9} + .\overline{9}$

$57 = (\sqrt{9})!(9 + .\overline{9}) - \sqrt{9}$

$58 = 9(\sqrt{9})! + \sqrt{9} + .\overline{9}$

$59 = (\sqrt{9})!(9 + .\overline{9}) - .\overline{9}$

$60 = (\sqrt{9} + \sqrt{9})(9 + .\overline{9})$

$61 = (\sqrt{9})!(9 + .\overline{9}) + .\overline{9}$

$62 = 9[(\sqrt{9})! + .\overline{9}] - .\overline{9}$

$63 = (\sqrt{9})(\sqrt{9})[(\sqrt{9})! + .\overline{9}]$

$64 = 9[(\sqrt{9})! + .\overline{9}] + .\overline{9}$

$65 = (\sqrt{9} + .\overline{9})^{\sqrt{9}} + .\overline{9}$

$66 = (\sqrt{9})!\left(\dfrac{99}{9}\right)$

$67 = (\sqrt{9} + .\overline{9})^{\sqrt{9}} + \sqrt{9}$

$68 = \dfrac{(\sqrt{9})!!}{9} - 9 - \sqrt{9}$

$69 = 9 \cdot 9 - (\sqrt{9})! - (\sqrt{9})!$

$70 = [(\sqrt{9})! + .\overline{9}]\,[9 + .\overline{9}]$

$71 = 9(9 - .\overline{9}) - .\overline{9}$

$72 = (\sqrt{9})(\sqrt{9})(9 - .\overline{9})$

$73 = 9 \cdot 9 - 9 + .\overline{9}$

$74 = 9 \cdot 9 - [(\sqrt{9})! + .\overline{9}]$

$75 = 9 \cdot 9 - \sqrt{9} - \sqrt{9}$

$76 = 9 \cdot 9 - (\sqrt{9})! + .\overline{9}$

$77 = 9 \cdot 9 - \sqrt{9} - .\overline{9}$

$78 = 9 \cdot 9 - \sqrt{9} \cdot .\overline{9}$

$79 = 9 \cdot 9 - \sqrt{9} + .\overline{9}$

$80 = 9 \cdot 9 - \dfrac{9}{9}$

$81 = \sqrt{9} \cdot \sqrt{9} \cdot \sqrt{9} \cdot \sqrt{9}$

$82 = 9 \cdot 9 + \dfrac{9}{9}$

$83 = 9 \cdot 9 + \sqrt{9} - .\overline{9}$

$84 = 9 \cdot 9 + \sqrt{9} \cdot .\overline{9}$

$85 = 9 \cdot 9 + \sqrt{9} + .\overline{9}$

$86 = 9 \cdot 9 + (\sqrt{9})! - .\overline{9}$

$87 = 9 \cdot 9 + \sqrt{9} + \sqrt{9}$

$88 = 9 \cdot 9 + (\sqrt{9})! + .\overline{9}$

$89 = 9 \cdot 9 + 9 - .\overline{9}$

$$90 = 9 \cdot 9 + 9 \cdot .\overline{9}$$

$$91 = 9 \cdot 9 + 9 + .\overline{9}$$

$$92 = 99 - \left(\sqrt{9}\right)! - .\overline{9}$$

$$93 = 9 \cdot 9 + 9 + \sqrt{9}$$

$$94 = 99 - \left(\sqrt{9}\right)! + .\overline{9}$$

$$95 = 99 - \sqrt{9} - .\overline{9}$$

$$96 = 99 - \sqrt{9} \cdot .\overline{9}$$

$$97 = 99 - .\overline{9} - .\overline{9}$$

$$98 = 99 - \frac{9}{9}$$

$$99 = 99 \cdot \frac{9}{9}$$

$$100 = 99 + \frac{9}{9}$$

MEMORY CARDS

Show the class a set of cards with a two-digit number in the top left corner and a four-digit number in the middle of the card. Tell them that you have spent many hours of study and have finally memorized the pairs of numbers on the entire deck of cards. Pass out the cards and have them test your memory by giving you either the two-digit number or the four-digit number so that you can give them the matching pair.

HOW IT WORKS

The two-digit numbers should range from 1 to 83. The first two digits of the four-digit number are determined by adding 16 to the two-digit number. The third digit is the sum of the first and second digits, truncating any sums that are more than nine. The last digit is the sum of the second and third digits, again truncating any sums that are more than nine.

For example, the corresponding four-digit number for 47 is 6392. (47 + 16 = 63, 6 + 3 = 9, and 3 + 9 = 2)

Practice this ahead of time and mask any delays in addition by saying that this particular combination was a tough one to memorize. Be careful when students give you the four-digit number. You can simply subtract 16 from the first two digits to get the smaller number, but first make sure that the four-digit number they gave you is valid. I've had students make up four-digit numbers to trick me.

MATHEMATICAL MIND READING

Announce to the class that you have mastered a mathematical mind-reading technique invented by the famed 13th Century Portuguese mathematician, Peter Ribadeneira. (Peter is actually the teacher who taught me this trick.)

Have each student select a four-digit number. Any non-zero digits in any order will work. Have them add the digits and subtract this sum from the original number, crossing out any zeros in the answer. Have each student circle any digit and tell you the remaining digits in any order. You can then determine the circled digit simply by staring into their eyes for three seconds.

The number they get will always be a multiple of nine. Therefore, the sum of its digits will always be a multiple of nine. You can determine the circled digit by subtracting the sum of the other digits from the next highest multiple of nine. For example if 4723 was the original number, 5347 - 19 = 5328. If the student circled the 2, you would add 5 + 3 + 8 = 16. 18 (the next highest multiple of 9) – 16 = 2.

THE WIZARD

Tell the class that you know of a man known as "The Wizard." This man, it is said, can read a person's mind over the telephone. Tell them that you've actually seen it done, and although you don't know The Wizard, you have his phone number.

Select a student volunteer. Shuffle a deck of cards and have the volunteer select a card, any card. Have her show the card to the class so that everyone can see it. Then call The Wizard, put the student volunteer on the line, and watch the expression on her face as The Wizard correctly identifies the card.

This trick obviously requires the assistance of an accomplice. Make sure "The Wizard" is expecting your call or is at least ready to react immediately when you ask to speak to The Wizard. As soon as you say, "May I please speak with The Wizard?" he begins by saying, "Spade ... heart ... diamond ... club." When you hear the correct suit of the card, say, "Yes, I'm trying to reach The Wizard. Is he there?" The Wizard will then confirm by repeating the suit to make sure: "It's a diamond, right?" You respond "Yes, that's right, The Wizard, please." The Wizard will then say, "Ace ... deuce ... three ... four ... five ... etc." You stop him when the correct card is reached, he confirms it, and then you say, "Hello, is this The Wizard? I have a student here who would like you to read her mind." Then had the phone to the student. The Wizard can play it up, saying things like "I'm seeing red ... and the shape is pointed on top...is it a diamond? Okay, I see a rounded number ... it looks like a snowman ... it's an 8, an 8 of diamonds!" He then abruptly hangs up, leaving the student totally incredulous.

MAGIC SMOKE

Select a responsible student volunteer for this trick. Have him/her make up any three-digit number for which the hundreds digit and the ones digit are not consecutive. Have the assistant reverse the digits to produce a new three-digit number and subtract the two numbers (larger minus smaller). Then have him/her reverse the digits of this new number and add. After showing the answer to several other students, the assistant is to crumple the paper so that the answer is on the inside. Take the paper and light it on fire in a pie tin. As it burns, hold you arm over the "magic" smoke. When you rub the ashes on your arm, the answer, 1089, will appear on your arm.

You can verify that the answer will always be 1089. To make it appear on your arm, write the number 1089 on your arm with soap before class. You can do this several hours in advance. The soap is virtually invisible.

ADDITION TRICK

Challenge students to an addition contest. Use three- or four-digit numbers to make it interesting (and to make the secret of the trick less obvious). Have students give the first three numbers and then make up the last two numbers yourself. You can announce the sum immediately and have them verify that you're correct.

Make sure that the sum of each of your digits and each of theirs adds up to 9. This will produce two sums of 999 and one remaining number. The answer will be that remaining number plus 1998, which is simply 2000 more than the number less 2.

247
831
596
} **numbers given by the students**

168
403
} **numbers you added**

999 (831 + 168)
999 (596 + 403)

2245 *(2000 + 247 – 2)*

BURNING OVERHEAD

Hand a new book of matches to a student volunteer. Ask him/her to remove 1 – 10 matches from the book and count the number of matches left. Tell the assistant that if the number of matches left in the book is a two-digit number (it will always be), then he/she is to add the two digits together and remove that many more matches from the book. Have the assistant remove one more match from the book and hand it to you.

Ask the assistant to count the remaining matches in the book and show the number to the rest of the class. Ask the class to concentrate on the number while you set the overhead projector on fire. As they stare at the screen in amazement, the answer will appear as the overhead burns.

Since a book of matches contains 20 matches, the result will always be 8. Prepare a stencil of the number 8 in advance and cover it with flash paper. As the overhead "burns", the flash paper burns away to reveal the 8.

MAGIC CUBES

Distribute 5 cubes to students in various parts of the classroom. The cubes have 3-digit numbers written on each of their faces. Have each student roll his/her die and report the result. List the five numbers on the board or overhead and have everyone add them together (like the Addition Contest). You'll be able to give the answer almost immediately.

Prepare the five cubes using the following numbers:

A: 872, 278, 971, 179, 773, 377
B: 558, 855, 459, 954, 657, 756
C: 147, 741, 642, 543, 345, 840
D: 681, 186, 483, 384, 285, 780
E: 168, 366, 663, 762, 564, 960

The answer is always given by this rule: the tens and ones places are the sum of the ones digits of the five numbers, and the thousands and hundreds places are the complement of this sum with respect to 50.

For example, if the numbers rolled were the first number listed for each die above (872, 558, 147, 681, and 168), the last two digits of their sum would be 26 (2+8+7+1+8) and the first two digits would be 24 (50-26). So the sum of the five numbers is 2426.