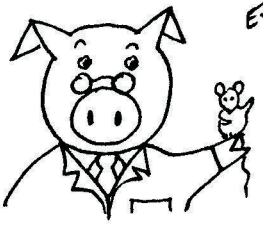
LESSON 4

CONTENTS:

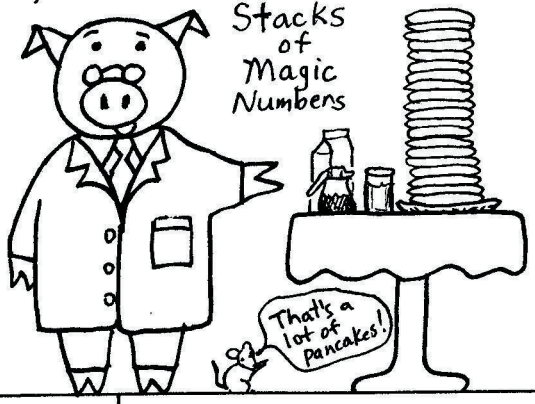
Prof. Pig

E-M



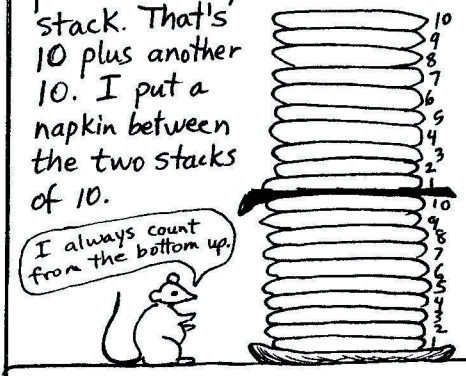
and Memory Mouse

I brought a large breakfast with me today to help illustrate our next topic:

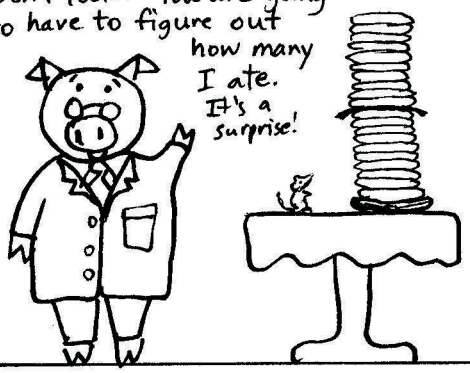


There are 20 pancakes in my stack. That's 10 plus another 10. I put a napkin between the two stacks of 10.

10+10=20



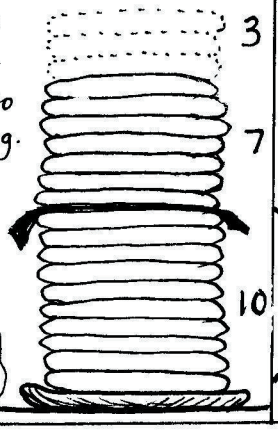
Now, I am going to eat a few pancakes off the top of the stack. Don't look! You are going to have to figure out how many I ate. It's a surprise!



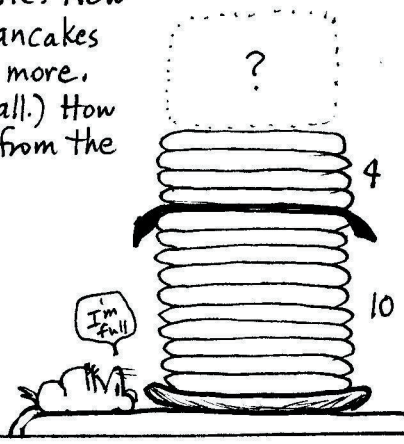
OKay, I'm full. Let's look at the stack now. I've still got my bottom 10, plus I still have 7 left from the top stack. That's 17 all together.

How many are missing? We had a stack of 10 on the top. Now there are only 7 left from that stack. I know that 7+3=10, so that means there are 3 missing.

17+3=20

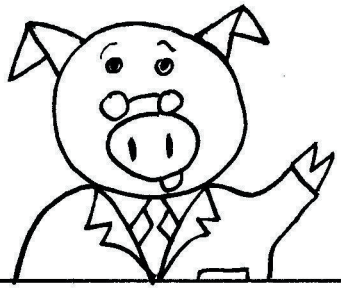


Let's try another one. Now there are only 14 pancakes left. I ate some more. (I am a pig, after all.) How many are missing from the original 20?

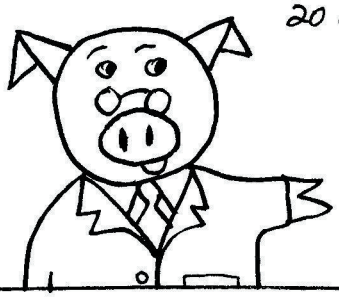


I know that 4+6 makes 10, so there must be 6 missing from the top stack.

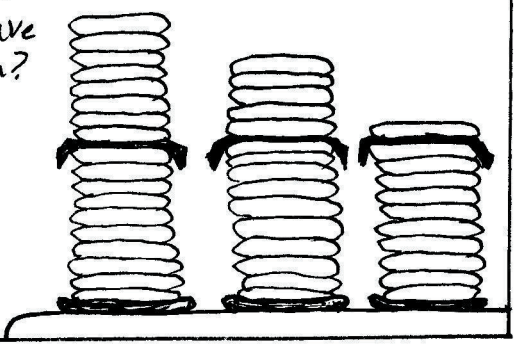
14+6=20



Here are some more stacks for you to try. How many pancakes would have to be added to each stack to make them have 20 again?

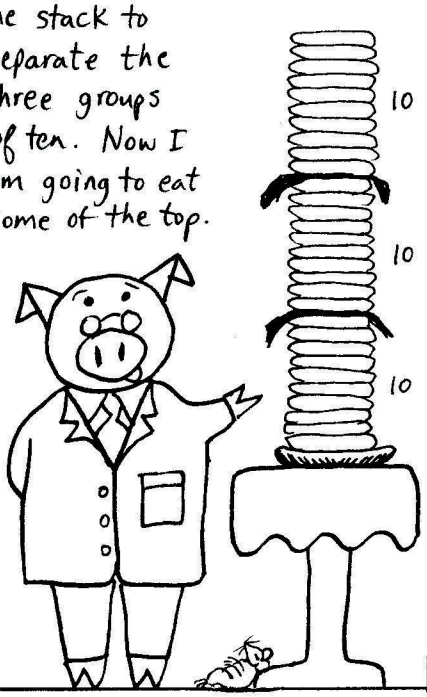


Remember, you don't have to count below the napkin. You know there are 10!

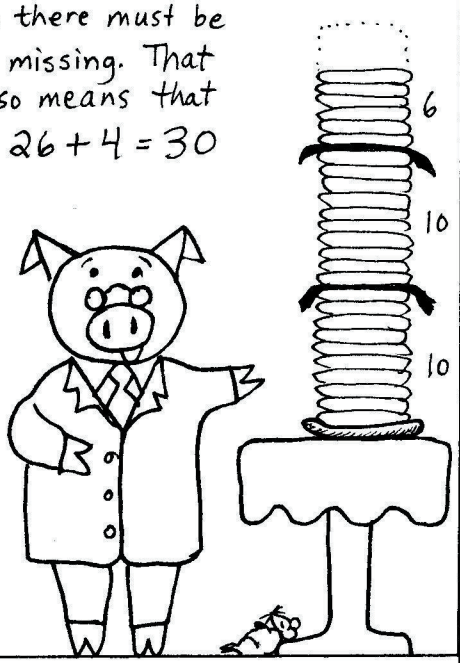


What if we had a really tall stack of pancakes? Here is a stack of 30 pancakes.

I put napkins in the stack to separate the three groups of ten. Now I am going to eat some of the top.



How many are gone? Well, there used to be a stack of 10 on top and now there are only 6 left from that stack. I know that $6+4=10$, so there must be 4 missing. That also means that $26+4=30$



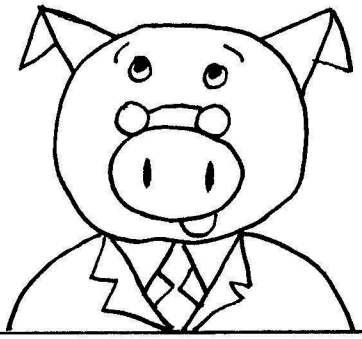
Let's take a close-up look at these two numbers.

30

↑ 3 stacks of 10 pancakes ↑ 0 extra on top

26

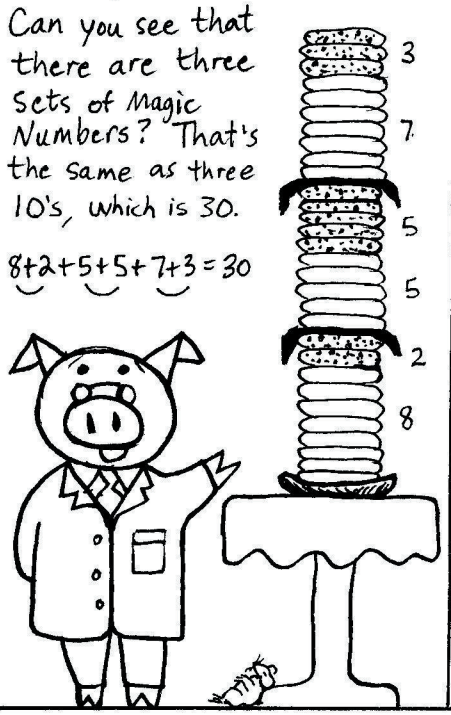
↑ 2 stacks of 10 pancakes ↑ 6 extras on top



But what if I stick some blueberry pancakes into the stack? Out of each set of 10, some are regular and some are blueberry. (Which do you like better?) They are still easy to count if you know the Magic Numbers.

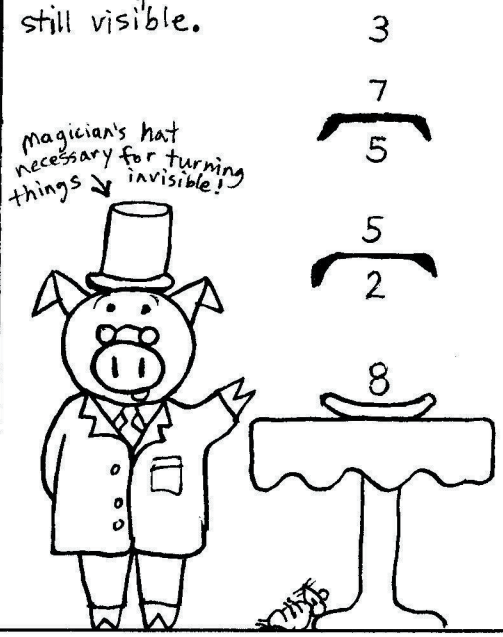
Can you see that there are three sets of Magic Numbers? That's the same as three 10's, which is 30.

$8+2+5+5+7+3=30$



Now, can we switch to invisible pancakes? (They still taste good, just a little less filling.) Since you can't see the pancakes, I've written the number of regular and the number of blueberry in each stack of 10.

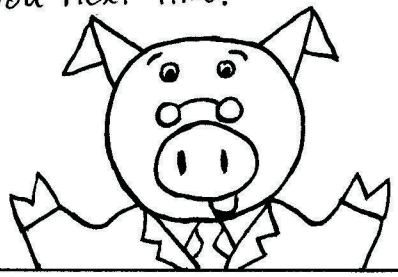
The napkins are still visible.



Here are a few more stacks of invisible pancakes for you to practice with. How many are in each stack?

3 / 5	1 / 9	3 / 4
5 / 9	1 / 6	6 / 2
1	4 / 7	8 / 5
	3	5

Looks like we are out of space for this lesson. See you next time!



FOR LESSON 4

The Dime Game

You will need:

- 12 dimes

Here is yet another variation of the old "Ten Penny Game." This time you will be counting by tens, using dimes. Do not let the student tell you the number of coins-- he or she must tell you the amount: ten, twenty, thirty, etc. If you have three dimes hidden in your hand, the answer must be "thirty" not "three." Start with ten dimes then increase to eleven, then to twelve.

"Complements"

If you spell this word with an "i" in the middle (compliments) if means saying nice things about someone or something. Spelled this way, it has a mathematical meaning. A complement is the number required to make something complete. If we are talking about the number 10, we could say that 3 was the complement to 7, because they go together to make the complete number 10. All the magic numbers are complementary with respect to 10.

In this game, we will be doing complements to 20. If you have two players, they simple take turns, with no time pressure. One player says a number between 0 and 20 and the other player must say the complement of that number-- the number that must be added to it to make 20. For instance, if the first player says 5, the second player says 15. If you have three or more players, you might want to make it competitive by having one person say a number and the others race to see who can think of the complement first. (However, if competition brings bad feeling or tears, drop it immediately!)

After you play to 20, play to 12, as a review, or to 30 as a challenge round.

The 49 Game

Each player will need:

- 4 pennies, 1 nickel, 4 dimes
- a copy of the small game board (You will note that copying the pattern page just once will give you 4 copies of the game board.)

This game is a simple introduction to the abacus. The players will not really have to add numbers, just slide them around on the board. Following the correct rules for placement of the coins will automatically give them the right answer!

The object of this game is to get 49 cents in coins on your board. Make sure that your players know the values of the coins and that they understand that 4 dimes, 1 nickel and 4 pennies add up to 49 cents. For this game use either the tetrahedron die or the cubic die that you made in lesson 2. The cubic die will give you a slightly faster game by allowing higher numbers.

Before playing, practice placing the coins on the board. You put down one penny at a time until all 4

are on the board. When you put the nickel down, you must at the same time sweep all the pennies off. Then you can add four more pennies. When you get to 10 cents, you put down the dime then sweep the nickel and four pennies off the board. Tell them it is one move: "place and sweep." Make sure the players understand that every time they put down a nickel they must sweep off all the pennies, and every time they put down a dime they must sweep off all nickels and pennies.

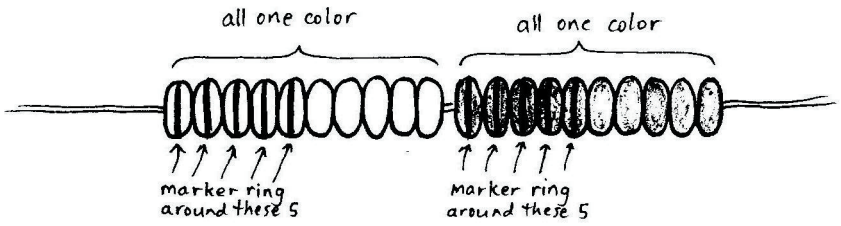
The game is incredibly straightforward. Just roll the die and they earn that many cents for their board. The first player to get 49 cents wins.

The World's Simplest Calculator

You will need:

- one piece of thin elastic
- 20 beads, 10 each of 2 different colors
- a permanent marker

String the beads onto the elastic with all 10 of each color in a row. Use the marker to make a black ring around 5 beads in each set of 10.



The black rings are to help the student's eye quickly and easily identify a group of beads.

Tie the elastic band at the back. Find a book or binder or some object around which the elastic will fit nicely, not too tight, not too lose. The beads should be easily manipulated but stay tight against the backing board.

Proceed with the following list of activities:

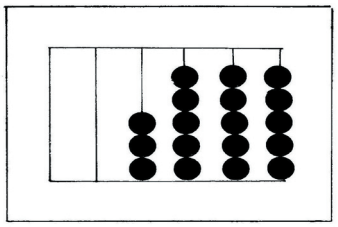
1) Have the student do the very simple task of counting to 20 using the beads. Have the student notice how beads 1-5 are marked with a ring, as well as beads 11-15. Also note how the color changes as you go past 10.

2) Cover any number of beads on the top of the stack and have the student tell you how many are behind your hand. You can slide the hidden beads up to the top of the elastic as long as they stay hidden. The student should be using the information they just learned in this lesson. Strongly encourage your student to talk out loud as they think, so that you can tell what is going on inside their head. It's important to know how they are coming up with their final answer. The thought process is most important here, more than the answer.

3) Give the student simple problems to solve using the abacus. The beads can start up high and be brought down as the problem is solved. For example, for the problem "7+6" the student can start with the beads up high and bring down 7 of them, (5 ringed and 2 non-ringed) then bring down 6 more (3 non-ringed and 3 of a different color). To say the answer, they should NOT count the total number of beads. (Counting beads the total number is forbidden!) Rather, they should look at the color scheme and see 10 of the same color with 3 of the other color on top. Thus, 7+6 turns out to be as easy as 10+3. Simply looking at the beads will give the obvious 10+3 answer. (It's just too easy!)

Instructions for flash cards

Copy the flashcard pattern page and cut apart the cards.

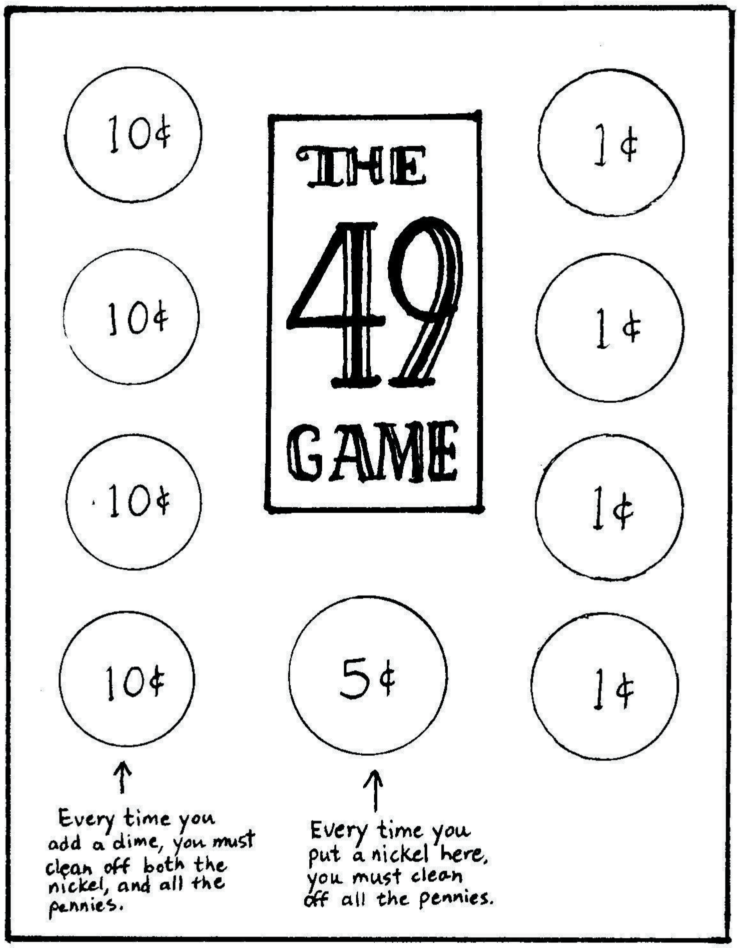


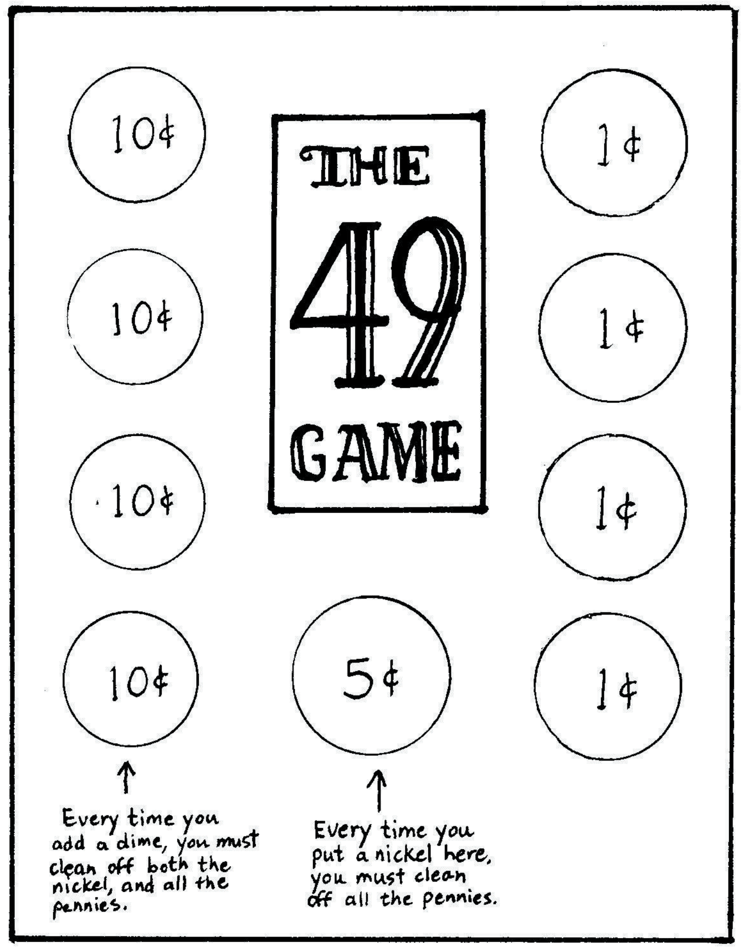
The correct orientation of the cards is like this.

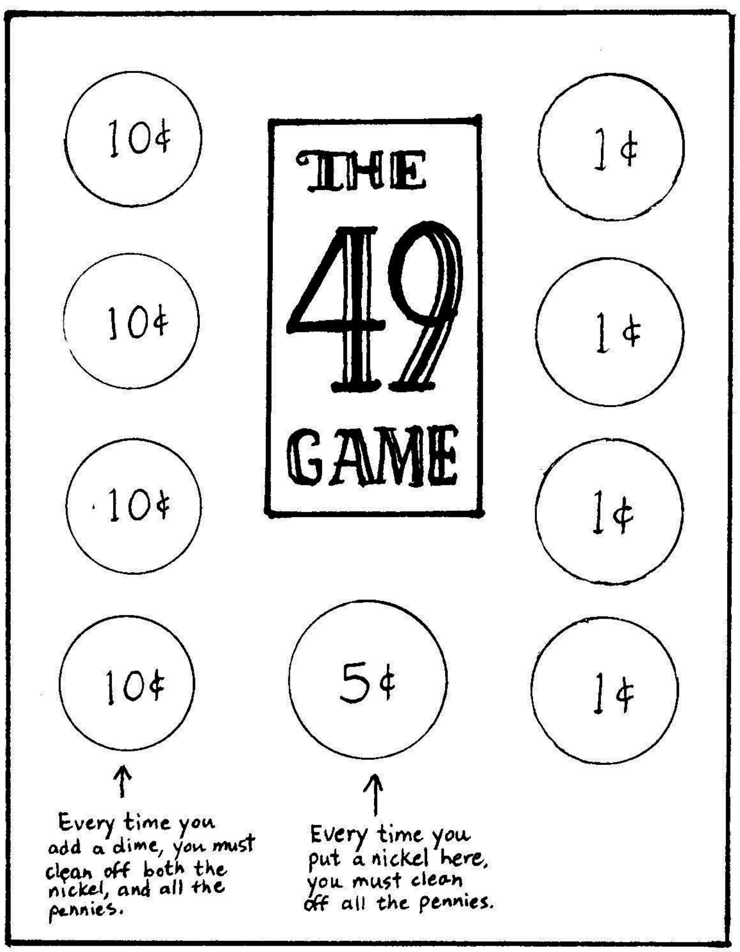
The object of this game is to force students to count quickly by using groups of 5. 17 beads should be seen as 3 groups of 5 plus 2 left over.

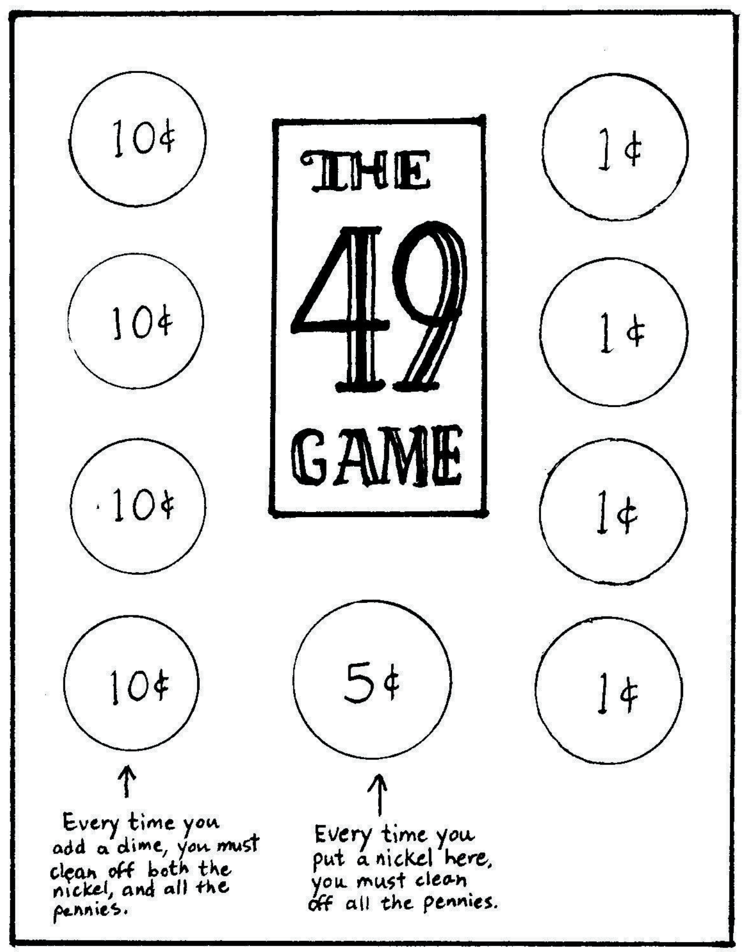
Let the student examine one of the cards to see that a full stack contains exactly beads. The students may want to count the beads on some of the cards. You also may want to review counting by ‘s up to 30.

Start the game by giving the student at least 5 seconds to study a card before hiding it. The student must say from memory how many beads were on the abacus. After a successful round at 5 seconds, reduce the time to 3 seconds.

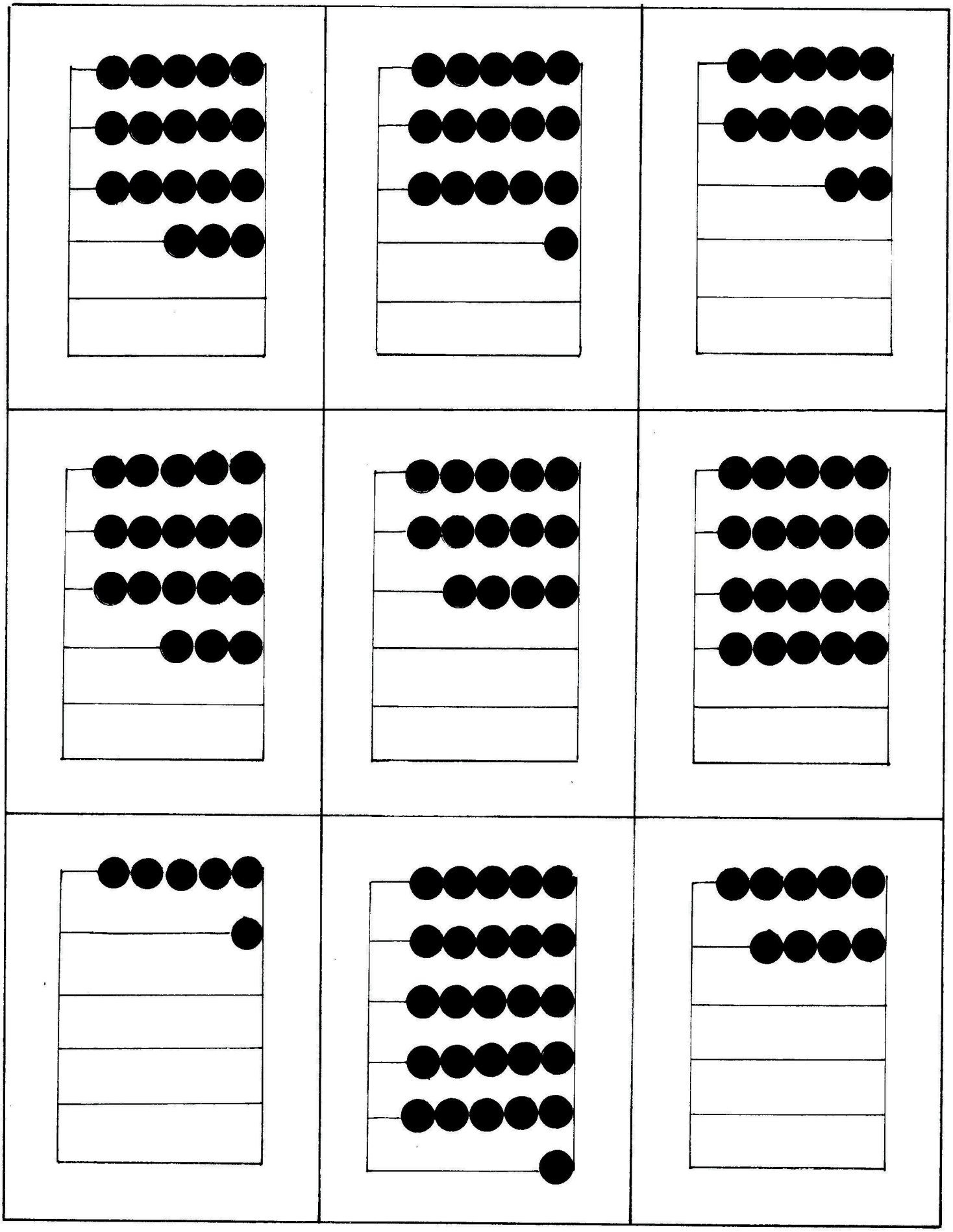








Copy onto card stock and cut apart. Each player needs only one



MEMORY MOUSE'S MENTAL MATH

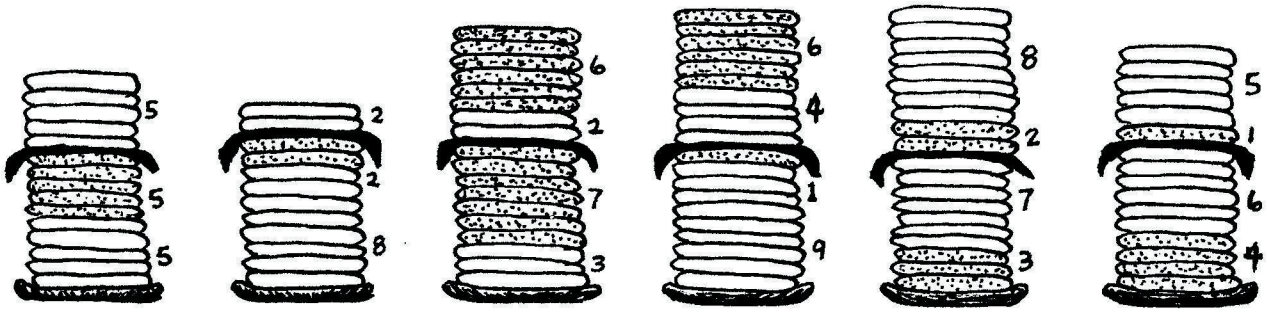
1) A group of 20 kids went to an amusement park. Only 5 of them had the nerve to ride the roller coaster that went upside down. How many didn't ride it? *(15)*
2) That same group of 20 kids all got on the Ferris wheel at the same time. Half of the kids had to close their eyes when they got to the top. How many kept their eyes open? *(10)*
3) Of this group of 20 kids, 11 were girls. How many were boys? *(9)*
4) When this group of 20 went to get a snack, 8 of them wanted ice cream. How many wanted hot dogs? *(not enough information)*
5) This same group of kids went to ride the carousel. Unfortunately, the carousel only had 16 horses on it. How many kids would have to wait to get a horse? *(4)*
6) One of the kids found 3 dimes on the sidewalk in front of the bumper cars. Another kid found 2 dimes lying on the floor in the arcade. Between the two of them, would they have enough money to buy a 50-cent drink? *(yes)*
7) One of the rides in the park was very popular. The line was very long and the attendant said that the average wait was 30 minutes. The kids had been waiting in line for only 7 minutes. How many more minutes can they expect to wait? *(23)*
8) The park had a small petting zoo. They had 3 rabbits, 2 guinea pigs and 2 chinchillas. How many turtles did they have? *(not enough information)*
9) The park has a dozen paddle boats. However, 3 of them have sprung leaks. How many good paddle boats were left? *(9)*
10) The train went around the tracks 10 times every hour. After an 8-hour day, how many times has the train gone around its loop? *(80)*

11) One of the kids played mini-golf 4 times. If each time cost him dollars, how much money did he spend on mini-golf? *(20 dollars)*
12) People who work at the amusement park earn 6 dollars per hour. If they work 2 hours, how much money do they make? *(12 dollars)*
13) If the Tilt-n-Whirl ride lasts 4 minutes, the Scrambler lasts 6 minutes and the roller coast lasts 5 minutes, how much time will you have spent on rides if you ride all three of them? *(15 minutes)*
14) There were a total of 23 rides in the park; 10 of these rides require you to be over 4 feet tall. If you are less than 4 feet tall, how many rides can you go on? *(13)*
15) Two of the kids got sick from riding too much and sat on a bench for a while. They got bored so they decided to play a number game. One of them asked the other one to add up these numbers: 2, 4, 6, 8. The other kid came up with the answer very quickly by putting the numbers in pairs. What was his answer and which numbers did he pair together? *(20. Put the 2 with the 8 and the 4 with the 6.)*

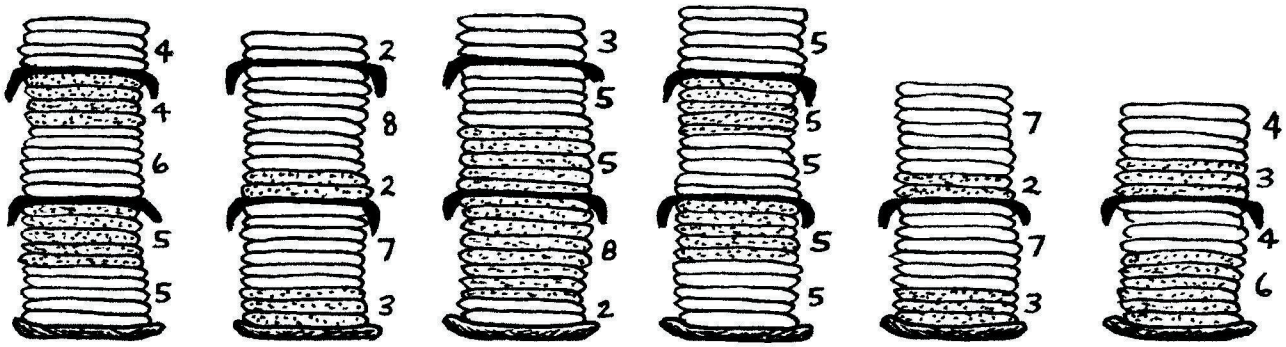
CHALLENGE QUESTIONS:
1) At the concession stand, drinks are 1 dollar, hot dogs are 2 dollars, French fries are 3 dollars. If you order one of each for yourself, plus one of each for a friend, how much money will you spend? *(12 dollars)*
2) The group of 20 kids split up three ways and went to three different rides. 8 of the kids went to the bumper cars and 4 of them went to the roller coaster again. How many were in the third group that went to the haunted house? *(8)*
3) If each of the 20 kids bought a post card for 50 cents, how much money did the souvenir stand get for all those postcards? *(10 dollars)*

LESSON 4 WORKSHEET (you may photocopy, or you may want to insert it into a plastic sheet and use dry erase markder or wipe-able crayons)

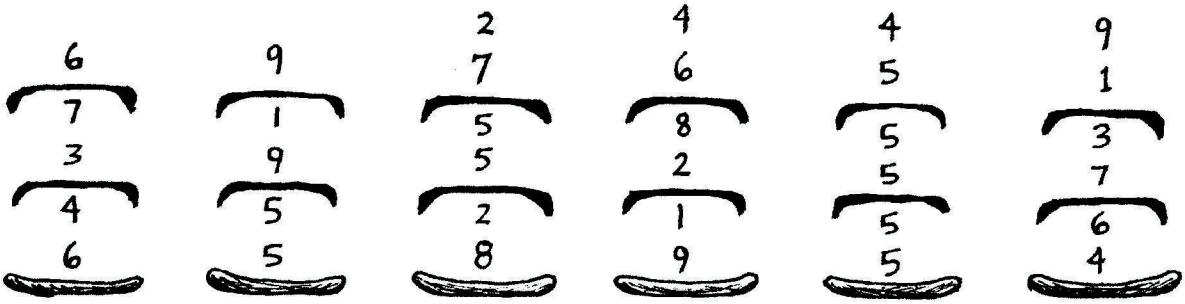
1) Write the number of pancakes in each stack. Put the answer underneath the plate.



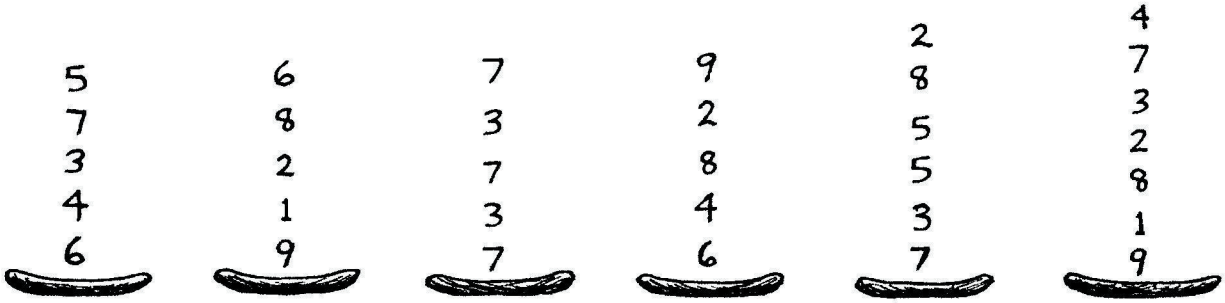
2) Here are some more pancakes to add. Remember to look for sets of 10.



3) Here are some invisible pancakes to add. We've left the napkins in, between the groups of 10.



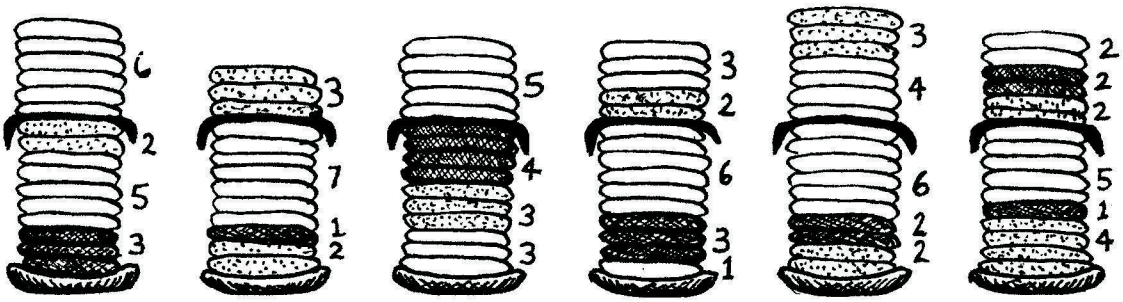
4) Add these invisible pancakes. Someone took out the napkins. Oops! That's okay, you can still add them easily. Just look for magic number pairs that make 10!



5) Now we have even taken away the plate and just drawn a line to represent the plate. So you've got invisible pancakes with no napkins and no plate. But you can still do it, yes you can!

		3	2	8	6
			4	1	8
7	9	7	6	9	2
1	6	5	3	5	5
9	4	5	7	5	5
8	5	2	9	5	7
2	5	8	1	5	3

6) Here's something new-- chocolate pancakes as well as plain and blueberry. The bottom stack of ten is divided into three types, instead of just two. Just add any two of those numbers together and you'll see a magic pair appear! Then add the ones on top.



7) Now here are some invisible pancakes that are chocolate, plain, and blueberry. We've counted them out for you so you know how many there are even though you can't see them. We left the napkins in, between the groups of ten this time.

4	1	1	2	2	3
3	1	6	3	5	1
3	8	2	2	2	9
1	3	2	4	5	3
7	1	3	4	3	3
2	6	3	6	4	4
		4	3	1	4
		3	1	5	4
		3	1	1	2
					4

8) Now for the grand finale. Here are invisible pancakes with no napkins or plates, AND they are mixed up this time! The magic number pairs are not right next to each other. You will have to pair them up yourself. Good luck!

	4			1		5			
9	8	5	7	3	5	1	8	5	9
8	6	3	4	2	3	5	7	8	8
3	5	9	3	7	4	9	7	9	5
2	2	5	6	9	5	5	3	5	2
7	5	1	4	8	6	5	3	2	1