Math Magic: A trick and a challenge activity

A SIMPLE TRICK WITH A DIE FOR
ANYONE WHO CAN ADD, SUBTRACT OR COUNT

I tried the following trick with our six-year-old granddaughter, Lois. She got it and was delighted to try it on her parents. Here's how it goes.

Have a child roll a die and identify the number on top. Without looking you can predict the number on the bottom by mentally subtracting it from 7. (Many people do not know that opposite sides of a die add up to seven.) Do this several times and see if the child can discover the secret. If not, have him/her takes notes on the top number and the bottom result to see if there's a pattern.

When doing any of these tricks, try to give hints so the child or student can discover by her/himself what is happening. Allowing children to have their ah-ha-moment builds confidence in their own problem solving ability versus just being given the answer. Resist the temptation to "give the answers."

Once the secret is discovered let the child practice trying this trick on you in preparation for trying it on another.   This trick is a great way to teach problem solving by taking notes and looking for patterns. It provides an opportunity to practice simple addition or subtraction.

top+ bottom
4 + 3 =
5 + 2 =
2 + 5 =
1 + 6 =

With older children or adults, I change the directions to: "Without telling me the top or bottom number take the number on the bottom and subtract it from nine, and tell me the result."   If they tell you the answer is 4, you have to mentally subtract 4 from 9 to get 5, and then subtract 5 from 7 to determine the top number which is 2. For the algebra student: 7 - (9 - n) = n - 2 where respondent's answer is lessened by 2.

MAKING MANY NUMBERS USING $1, 4, 9, 2$

This is one of those challenges I used to throw out to my students who were learning *the order of operations* when adding, subtracting, multiplying, or dividing numbers. Most 7-8th graders are familiar with this order which tells which is done first. PEMDAS is the acronym to help them remember that numbers within Parentheses are computed first, Exponents are done next, then Multiplication, Division, Addition and Subtraction in that order.

So in the expression $3 + 5 \times 4 - 2$ multiplication gets done first $3 + (5 \times 4) - 2 = 3 + 20 - 2 = 21$.

The challenge to the class is to create the numbers 1-100 using the digits 1,4,9,2 once and only once in a math expression following *the order of operations*. I have all the numbers 1-50 listed around the classroom on butcher paper. When someone gets a result it's verified on the board for all to confirm, that person enters the equation and his/her name on the chart. Students also keep their own individual charts. (Get your chart here.)   Here are some examples below:

$1 + 4 + 9 + 2 = 16$, so 16 is posted by Kenny G. on the chart next to 16.

$4/2 + 9+1 = 12$, and so 12 is also posted by Suzy Q.

$(9+1) = 10/2 = 5$, and it is also posted by Columbus. $4/2$

When students exhaust simple combinations, I introduce $\sqrt{4} = 2$, $\sqrt{9} = 3$, and $3! = 3 \times 2 \times 1 = 6$ or exponents.

For completing this page the participant is eligible for a certificate of achievement. An Index of All Math Magic Activities