Ms Math Presents FUN WITH CARDS

Dealing Out Number Sense

Teaching with Card Games!

Topics involved: addition, integers, inequalities, using the language of mathematics.
Grades: kindergarten and up
Type of Activity: 2-person game
Materials: one standard deck of cards with the face cards removed.
Relation to NCTM Standards: Promotes students' abilities to relate their everyday language to mathematical language and symbols; develops number sense.

Numbered cards are wonderful math tools, whether using a traditional deck, or a handmade set constructed from card stock and decorated with circles, squares, triangles and rectangles. In this issue, we are featuring a series of games developed by our own Rachel McAnallen. She suggests demonstrating the games to kids around a table or on the floor with a deck of giant cards.

"The first thing you do with any of these card games is take out the face cards and the joker," Rachel instructs. "Not only that, the ace has a value of ONE. Not 11 or 13."

"I don't waste time with kids dealing cards out," she says. "So I do a thing called split and pick. Split and pick comes from when there was only one piece of pie or cake left at home and there were two of us. Mother would lay the knife down and say, 'One of you cut and the other person gets to pick the piece they want.' Of course," Rachel laughs, "if you are the cutter, you want to get the pieces very even, because you don't get to pick!"

The first game is based on the card game that most people know as "War."

"I don't like to call it that," explains Rachel, "So I call it 'High Number/Low Number,' or 'Greater Than/Lesser Than.'"

High Number

Each player lays down a card, and the player with the highest number wins the other player's card.

For example:
Player One lays down a 5.
Player Two lays down a 3.
Player One has the higher card, however, to win both cards, she must say the correct mathematical sentence. "Five is greater than three," or "Five is more than three."

"Make sure they don't say, 'Five is better than three,'" warns Rachel. "Think of hornets. Five hornets chasing you is NOT better than three hornets chasing you."

(Continued on page 4)

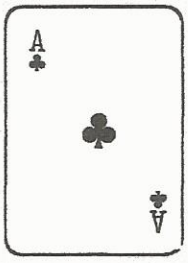
"Cool Things" About Cards!

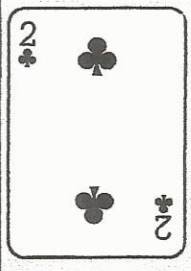
From Go Fish and Crazy Eights to Cribbage and Canasta, almost everyone has played family card games growing up. But how many of us have ever *really* examined a deck of cards?

If you think it's all just a jumble of hearts, diamonds, clubs or spades, then it's time to grab that not-so-familiar deck and take another look—with a little help from Ms. Math herself.

In the following lesson, Rachel McAnallen uses the patterns on numbered cards to teach math facts. Or as Rachel phrases it, she shows us "some of the cool things about cards."

"Remove the jokers and face cards before you begin," instructs Rachel. Lay out an ace. Look at the picture. Don't look at the small design under the A, just look at the large design." She points to the large club in the center of the card. "There is the one."





"Then I put a two beside it." She lays the two next the the ace. "Notice where the two shapes are placed on the card."

(Continued on page 3)

"Cool Things" about Cards

(Continued from page 1) Rachel lays down the three of clubs. "Then you lay a three down over the two and the top and bottom shapes match, with the one in the center." She points to the corresponding patterns. "One plus Two equals Three. *(see fig. 3a)* That's what is nice about transparencies, or cards for the overhead projector—you can show it."

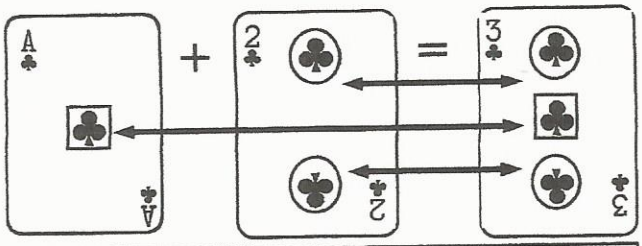


Figure 3a: 1 + 2 = 3

Rachel lays down the next card. "Here is the four." She points again to the corresponding patterns. "You can see the two two's, moved to either the left or right, so that the design is placed in the four vertices *(see fig. 3b)*. You will always see those four vertices in the cards next six cards." *(see fig. 3c)*

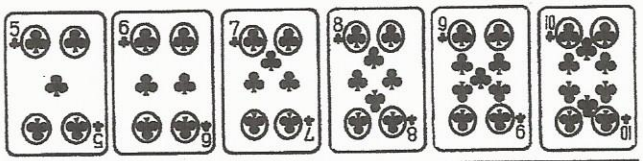


Figure 3c: the four vertices

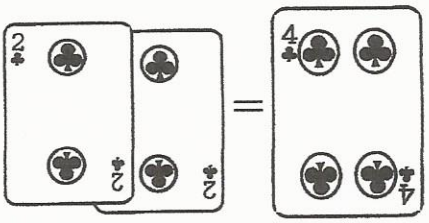


Figure 3b: 2 + 2 = 4

"Now," she says, flipping over the five, "look how nice the five is! Here is the four," she points to the vertices, "plus one in the center *(see fig.3d)*. It is the same with the dice.

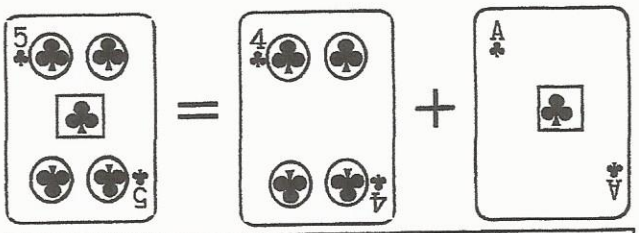


Figure 3d: 5 = 4 + 1

"Now, the six." Rachel lays down the six. "Three and three," she says, pointing to two sets of off-center threes *(see fig.3e)*. "But, also there are the four and two," she adds, touching the vertices.

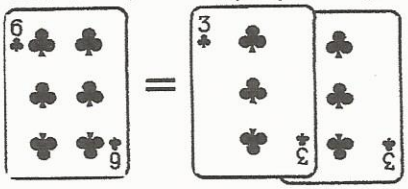


Figure 3e: 6 = 3 + 3

"Take a guess, what do you think a seven is like?" Rachel covers the seven. " I've done this workshop hundreds of times with adults, and as much as we've played cards, we don't notice that. Almost everybody will guess the seven design is six with one in the middle." She reveals the seven card. "It's in the center, but up. What's nice about it is that you can see five plus two *(see fig. 3f)*. The cards are based on fives, really. There is that beautiful picture of five: four and one in the center. But if I cover this up," she puts her hand over the three center clubs, "those four are always going to sit in

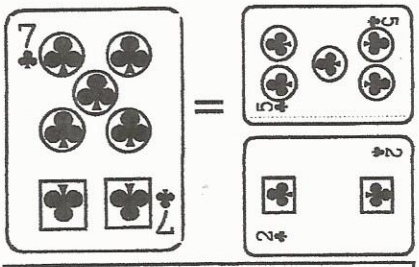


Figure 3f: 7 = 5 + 2

there."

"The eight has the five and three. You also have the four vertices and another circle of four in the center. And also six and two *(see fig. 3g)*."

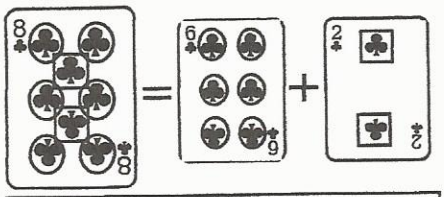


Figure 3g: 8 = 6 + 2

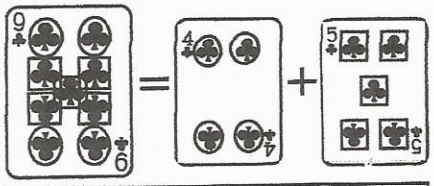


Figure 3h: 8 = 6 + 2

Rachel lays down a nine. "There are the four vertices, and a five in the center *(see fig. 3h)* ."

"And finally, here is ten, with those two fives sitting at the top and bottom *(see fig. 3i)*. Cards are great for teaching number facts: ten is five and five."

Once, a first grader said to me, 'Look at the circle." I had never noticed, but if you cover up the four vertices on the ten, you get a circle." The pattern of cards is just absolutely beautiful."

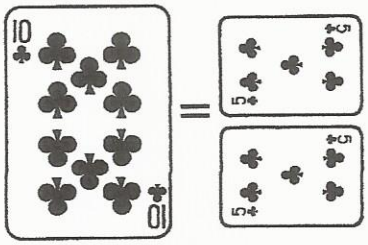


Figure 3i: 10 = 5 + 5

Teaching with Card Games

(Continued from page 1)

After saying the math sentence, Player One may pick up the cards and slide them underneath the deck in her hand. As the game continues, players will eventually lay down cards of equal value:
Player One flips over a 3.
Player Two flips over a 3.
Both players must say, "Three is equal to three."

"Now," Rachel says, "Each player lays three cards down. On the first one we lay down we say 'I,' on the second card we say, 'Declare,' and on the third card, we say, 'Peace.' Now we flip over a fourth card and whoever has the higher one wins the whole kit and kaboodle."

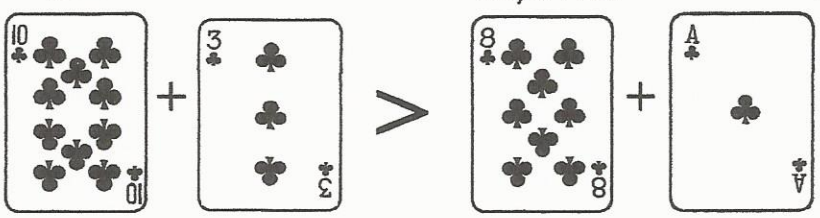
"You're forcing the kids to talk," Rachel emphasizes. "When I put kids together to play, I put the two kids who are very verbal together, so they drive each other crazy," she laughs. "And I put two kids who are not very verbal together so that they will each have to talk. If you put the verbal kid with the kid who doesn't talk, the verbal kid will do all the talking. They'll say, "You won, because..." and the kid who doesn't talk will allow them to do that."

Rachel enforces a very effective rule to remind students use the math sentences. She warns the class that if she sees a player pick up the two cards because they've won, and they don't say the words, she will take away half the cards in that person's hand and give them to the other player. "And I always catch it once!" she says. "You ought to hear the room after that—they all make sure I hear them!"

The person who wins the game is the person who gets all the cards. If a pair of players have finished a game, they often will ask Rachel what they should do. Her reply is, "What do you think you should do?" They will almost always say, "Play again," which is exactly what Rachel wants to hear. "I just want them to play," she says.

High Total

Player One: Player Two:



Player One: "Thirteen is greater than nine." or "Thirteen is greater than nine by four." or "Ten is greater than eight by two, three is greater than one by two."

Low Number

Once everyone has played at least one "Greater Than" game, Rachel will tell them it's time to play "Low Number." Suddenly the tables are turned!
Player One lays down a 5.
Player Two lays down a 3.
Player Two says, "Three is less than five," and picks up the cards.

"After they've played that a while, I'll yell out, "High Number!" says Rachel, "and they'll switch again. From then on, I will continue to call out high number, low number. I play this in classrooms from kindergarten to 6th or 7th grade."

What's the Difference?

Another way to play High Number/Low number is to have students say the amount they have won by. So instead of saying "Five is greater than three," a player would say, "Five is greater than three by two."

High Total

The next game Rachel calls, "High Total."
"What you're doing is playing for the highest *total*," she stresses, "Not separate cards. That's really important."

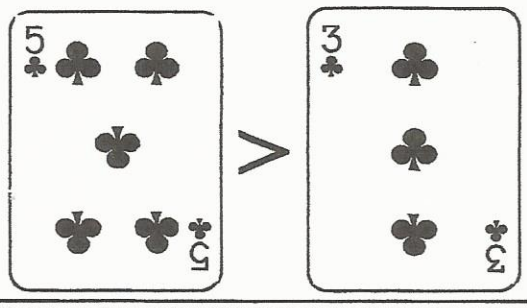
Each player lays down two cards instead of one card.
For instance:
Player One lays down a 3 and a 10, for a total of 13.
Player Two lays down a 1 and an 8, for a total of 9.
As in the first game, Player One must say, "Thirteen is greater than nine," before picking up the cards.

If students are not adding their cards together when they play, they should include the difference of the cards in their sentence. So Player One would say, "Three is greater than one by two, and ten

(Continued on page 5)

High Number

Player One: Player Two:



Player One: "Five is greater than three." or "Five is greater than three by two."

is greater than eight by two."

Students will find their own way to compare differences in their cards when they speak their math sentences. For example:

Player One lays down a 9 and a 5. (Total of 14)
Player Two lays down a 6 and a 7. (Total of 13)
Player One says, "My nine is greater than your six by three. Your seven is greater than my five by 2. So my total is one more."

"I was playing this with a five year old," recalls Rachel, "I laid down a 3 and an 8, and she laid down a 9 and a 6."
"I won," said the kindergartner.
"Of course I knew she had won, but I asked her, 'How'd you get that?'"
"My nine beat your three by a lot," she explained to Rachel. "And your eight beat my six by a little. My a lot beats your little."
"Now that is number sense! You have no idea where it comes from in a five year old, but it's there."

As the High Total Game continues, Rachel will call out, "Now play with three cards!"

Player One lays out 9, 2, and 4
Player Two lays out 6, 7 and 3
(Rachel recommends looking for common totals to "tie out.")
Player One's 9 and 4 total 13.
Player Two's 6 and 7 total 13.
The two 13s tie out, and leave Player Two with 3, and Player One with 2.
Player Two wins by one.

"The kids have to justify their answer before they take it. They can justify it any way they want," says Rachel.

Big Card Challenge

Rachel continues to increase the number of cards as they play, until they are playing with 8, 9 and finally 10 cards. She calls this the "Big Card Challenge."

"Now kids start estimating," says Rachel. "We can also look at each others cards, and ask each other things," says Rachel. "Look for cards of equal value to tie out. Look for tens. Make a ten with as many cards as you want."
Player One plays 4, 6, 9, and 2
Player Two plays 7, 3, 4 and 8
Player One: "Four and six is ten." She asks Player Two, "Do you have a ten?"
Player Two: "Seven and three is ten"
Player Two: Those tens tie out. I have 12 left over.
Player One: I have 11.
Player Two: "12 is greater than 11 by one."

Any Number Challenge

Once students have played up to ten cards, Rachel will call out for them choose how many cards they want to play with. If one player has very few cards left in their hand, their opponent can use a little strategy. For instance:
Player One: "How many cards do you have left your hand?"
Player Two: "Eight."
Player One: Let's play eight cards. If Player One's eight cards make a higher total than Player Two's, she will win the hand and the game.

Positive/Negative Challenge:

This is a great challenge for practicing integers. In this game, the red cards represent negative numbers, and black cards represent positive numbers.
Rachel plays this game to fourth grade and up. She introduces the idea this way: "A black 3 represents three dollars that I have. Those are Positive Numbers. A red 5 represents five dollars I owe, or a negative five."
"I teach kids that when you have money, that's being very positive," she says. " When you owe money that's negative. I don't do plus and minuses."

Each player begins by flipping over just one card:
Player One: Black 7
Player Two: Red 3
Player One: "Positive seven is greater than negative three."

(Continued on page 6)

(Continued from page 5)

Player One: Red 9
Player Two: Red 4
Player Two: Negative four is greater than negative nine."
"You'd rather owe six dollars than owe nine dollars," says Rachel.

Have students practice with one card, then increase it to two, three, and so on, until students are playing the Any Number Challenge.

Player One: Red 4, Red 8, Black 1
Player Two: Black 8, Black 5, Black 3

"Right off the bat you can see that Player Two has won big time!" says Rachel. "Kids pick this up really easily."

Player One: Black 7, Red 1, Black 3
Player Two: Red 7, Black 2, Red 4

"If Player One has a black seven and Player Two has a red seven, some teachers will be tempted to zero those out," says Rachel, "But remember, the black seven is Player One's money, the red is Player Two's money. If Player One lays down both a red and a black seven, then those will cancel each other out."

"All we're doing is adding," says Rachel. "We're just adding positive and negative numbers.

Teach A Grown-Up

Perhaps Rachel's favorite rule for all her games is the one she reveals at the end of the lesson: "I tell students to go home and teach someone else how to play!"

Resources for Materials:

If standard playing cards are not available in your classroom, you can always make them yourself from card stock. Or, even better, introduce your students to the patterns in cards by having them construct their own deck, using squares, triangles, circles, and rectangles as the designs.