

**Bring Math  
Alive...  
With a 3x5!!!!**

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*No instructor should enter a classroom ever without a stack of 3 x 5 cards.*

They provide us with the easiest and most (malleable) way of gaining all kinds of information from our students. They can become games, rewards, timelines of learning, or manipulatives.

There are many benefits to students creating their own manipulatives. And although you as the teacher can create sets of manipulatives there are many reasons for providing students the opportunity to “create” their own. It becomes a creative process empowering the students with the feelings of ownership, independence, and resourcefulness. It allows students to explore and discover mathematical concepts in an open-ended way before using them for a specific activity.

And of course all of these uses of cards actively engage students in the class, get them moving and thinking and doing. Finally, if you’re always checking on students; progress and attitudes about the class there are fewer surprises for both them and you at the end of the semester.

## **Classroom Management**

- 1. Reward Card** - Take a 4x6 card and have students write their name on the card. Then as students answer questions in class, have their supplies out on time, bring in classroom supplies or are caught doing a good act....stamp the card. Once there are enough stamps that cover the entire front and back of the card students turn in for extra credit, or class participation points.
- 2. Do, Check<sup>2</sup>, Discuss – DC<sup>2</sup>D** - This is a silly one....but has become an effective strategy in my class.

Students “**Do**” a problem from their homework.

The first “**Check**” is to check the answer in the back of the book; second check is with their partner. **The 3x5 card is used during the first check to hold the spot in the back of the book.** For some reason students think that looking in the back of the book is cheating, I need to train them to check their answers....and if they got the answer wrong to not immediately erase.

The “**Discuss**” is if the answers to the problems are different between the partners, or maybe from the book, the students then discuss their process used to solve the problem. One benefit to this is the mathematical discussions that occur and the academic language that is being used between the partners.

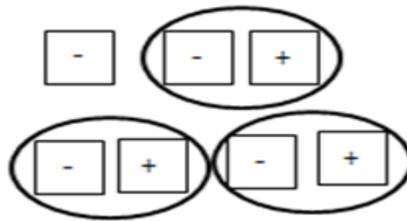
3. **Got a Minute** - This is a box I keep on my desk for those times where you need to fill a few minutes, I have used 5x8 cards for this one. I have gone through the chapters in my course book. On the blank side of the card I have put a problem, or a symbol, or a vocabulary word from a chapter in the course book...on the back of the card I write questions relating to the problem on the front anything I can think of to ask about that particular problem (and the answer). That way you don't about what to ask when you are pressured for time. Each of the chapters are colored coded, and clipped together. This could certainly be done by standards also.
4. **Word Wall** - Students write the vocabulary words large on the front of the index card, with the definition on the back. We put these up on the wall for future reference. I don't do this with every class. I teach a support class, so usually I have them be responsible for this. Some years I have kept these up for the year....Some years by chapter. When we are done with the chapter we put a metal ring into a hole on the cards and hang them around the room for students to reference.
5. **CST Scores** - I put every student's school ID number on the front of a 3x5 card. On the back I put their CST number score and their CST level. I also note their CELDT score. I then post the 3x5 cards in the room under the current CST level of that student. When we get closer to CST's, I take the 3x5 cards down and meet individually with each student where we discuss their current level and together we set a goal for the present CST. Then we write the goal on the back on the 3x5.

I tell my students that if they improve their CST level during the current school year I will invite them back for a CST relief party the next year during testing week. I use the same 3x5 cards the next year as their invitation ....with the goal set by them, and the improved level posted on the back of the card. I do this as reminder to encourage students to take the CST seriously and put forth their best effort when taking the test. .

## **Manipulatives**

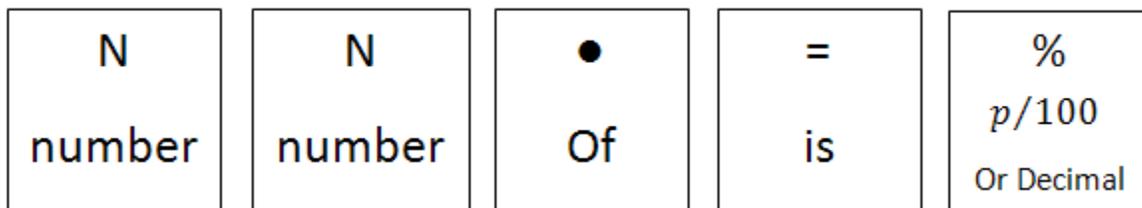
1. **Use to cover Division** – Students use a 3x5 card to cover numbers in the dividend so that they focus only on the needed numbers. This also helps them to remember that for every number in the dividend there should be a number in the quotient directly above it....even if it is just a zero at the beginning. (for struggling students.)

2. **Positive and Negative Integers** – This is just a cheap alternative to Algebra Tiles, Hands-On Equations, Chips, or Tile Spacers. Students can take 3x5 cards and cut them into 1/8ths. Put a green plus sign on one side and a red minus sign on the other. Students can now represent addition and subtraction of integers. For Example.  $-4 + 3 = -1$

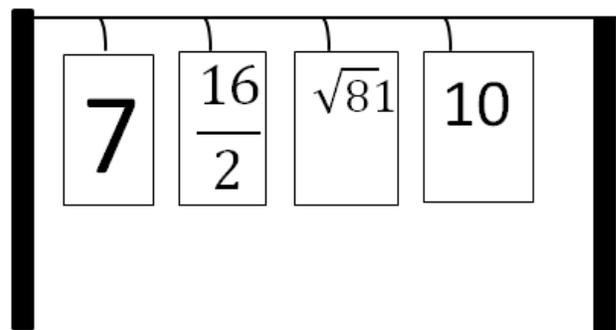


3. **Percent Cards** – These manipulatives are used to help students formulate the equations necessary to solving for the missing variable when finding a percent of a number or finding a number when the percent is known. While I know there are several ways to solve these types of problems....this is just another tool for your tool box. Often times students are seen pulling out their cards even when I do not ask them to. Or students seem to transition into “boxing” the parts of the equation to look like the cards....to help set-up the equation.

Each student receives 5 – ½ index cards. Students then write the following on each card.



4. **Number Line** – Have a string or a wire put up in your room. You can have students come up and put various numbers on the number line depending on the focus of study. For example, integers, fractions, square roots. You can leave it up in room for reference and review. Just use a paperclip to attach to number line.



**5. Dimensional Analysis** – Students develop rate cards with a rate involving measurements on one side and the reciprocal of that rate on the other side as a hands-on strategy for solving problems using dimensional analysis.

**Rate Cards for "Cost of gasoline for the trip"**

|        |        |       |       |        |        |
|--------|--------|-------|-------|--------|--------|
| 250 mi | 1 trip | 1 gal | 28 mi | \$1.65 | 1 gal  |
| 1 trip | 250 mi | 28 mi | 1 gal | 1 gal  | \$1.65 |
| Front  | Back   | Front | Back  | Front  | Back   |

Possible solution:

$$\begin{array}{|c|} \hline 250 \text{ mi} \\ \hline 1 \text{ trip} \\ \hline \end{array} \times \begin{array}{|c|} \hline 1 \text{ gal} \\ \hline 28 \text{ mi} \\ \hline \end{array} \times \begin{array}{|c|} \hline \$1.65 \\ \hline 1 \text{ gal} \\ \hline \end{array} = \begin{array}{|c|} \hline \$14.74 \\ \hline 1 \text{ trip} \\ \hline \end{array}$$

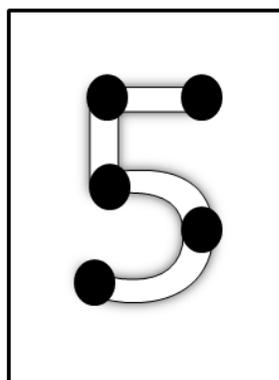
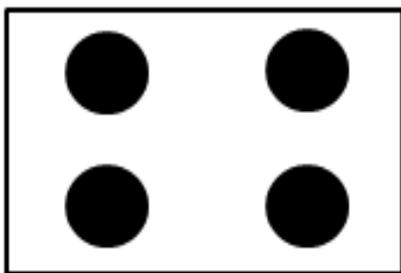
**Rate Cards for "Cost in dollars per person"**

|          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|
| 250 mi   | 3 adults | 1 gallon | 28 mi    | \$1.65   | 1 gallon |
| 3 adults | 250 mi   | 28 mi    | 1 gallon | 1 gallon | \$1.65   |
| Front    | Back     | Front    | Back     | Front    | Back     |

Possible solution:

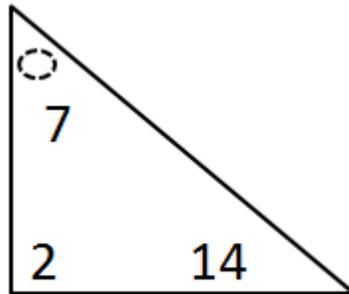
$$\begin{array}{|c|} \hline 250 \text{ mi} \\ \hline 3 \text{ adults} \\ \hline \end{array} \times \begin{array}{|c|} \hline 1 \text{ gallon} \\ \hline 28 \text{ mi} \\ \hline \end{array} \times \begin{array}{|c|} \hline \$1.65 \\ \hline 1 \text{ gallon} \\ \hline \end{array} = \begin{array}{|c|} \hline \$4.91 \\ \hline 1 \text{ adult} \\ \hline \end{array}$$

**6. Counting Mats** - Students use index cards for small counting mats. They use these cards when they are beginning to learn to count. The cards help them to place the correct amount of math counters on the card. The object is numeral identification and counting. Use index cards with color sticker dots and make your own set of counting cards. With the index cards I went up to 20 for the children that needed a challenge.



- Variations:
1. Put dots in the shape of touch points.
  2. When students are ready take two cards and make addition problems.

7. **Fact Families** – Take a 3x5 card and cut in half along the diagonal creating two right triangles. Write a fact family on each side of the card. Use a hole punch to put a hole at the top of the triangle and use a metal ring to clip together like-families. Students use their finger to cover one of the factors, and try to figure out the missing number.



### Formative Assessment

#### 1. Beginning

- a. **Muddy Waters** – Students write down one concept from the night before that they are still unclear about. They cannot just put number 7 from the homework. Try to have them use vocabulary from that section to rely their unclear idea.
- b. **Homework Quiz-** I pick one or two questions that I think they should know how to do. Or that I noticed after walking around looking at homework that many missed yet no one asked about. Or of course when hardly anyone did their homework. When taking the quiz the students may look at their homework assignment and simply copy. This is good for the students that completed the homework because it allows them the chance to look back at their work a second time and evaluate the process used and verify accuracy. For the students who chose not to do the previous night's homework....I at least got them to do two of the problems. (Buahahahah) and can now check for understanding.

#### 2. Middle

- a. At any time during class, either planned in advance or spontaneously, you can ask students to 1) write down a question about the material just covered; 2) answer a question; 3) in one or two sentences, describe an **application** of the point just made; 4) make a connection to a larger issue or previous lecture; 5) indicate whether and where they are confused; 6) solve an equation; 7) suggest an answer to a problem.
- b. **“Clickers”** - Students have 4 different colored cards with letters A, B, C, D on one side...and Yes, No, True, False on the other. Using these cards as “ghetto” clickers you can now get whole class feedback instantly from various types of questions. Use a library card envelope and attach to students desk for easy storage.

### 3. End

- a. At the end of class, you might ask students to write down what they thought was the most important point (or points) of the day. They may not copy that days objective!!!!

At the beginning of the next class you can say, for instance, "Most of you thought that x was the most important point. That's great. If you didn't see that, be sure to review or see me." Or "Many of you thought that x was the main point. I hadn't intended it to be, so let me review what I had intended." Or "Many of you expressed confusion about x, so let's go over it again."

- b. **Ticket out the Door** – Students work a question from the material covered during that days lesson. Teacher should use as formative assessment for the following day by sorting into piles...Got it/Don't Get it. Or minor error vs. conceptual errors.
- c. **Publishers** - Have students create their own question related to that day's objective ....and solve it. If the question is on topic and solved correctly, I may use it for the next day's warm-up....with the authors name next to the published question.
- d. **3-2-1** – Students write down 3 things they learned, 2 things they have a question about, and 1 thing they want the teacher to know. (Or for math...3 expressions that equal 3, 2 expressions that equal 2, and 1 expression that equals 1. Roll 3 dice to give students the digits to use in the expression.)

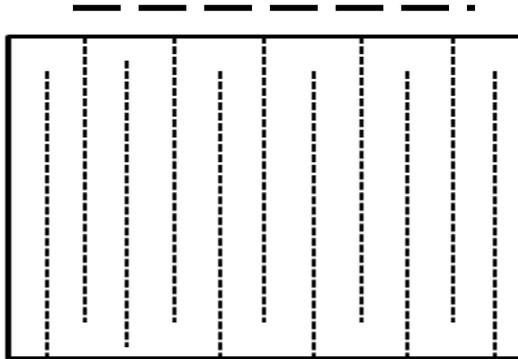
### Art

1. **Tessellations** - A *tessellation* is any pattern made of repeating shapes that covers a surface completely without overlapping or leaving any gaps. A checkerboard is a tessellation made of squares. The squares meet edge to edge with no gaps and no overlapping areas. The pattern of bricks on a wall is a tessellation made of rectangles. Over 2,200 years ago, ancient Greeks were decorating their homes with tessellations, making elaborate mosaics from tiny, square tiles. Early Persian and Islamic artists also created spectacular tessellating designs. More recently, the Dutch artist M. C. Escher used tessellation to create enchanting patterns of interlocking creatures, such as birds and fish. Making tessellations combines the creativity of an art project with the challenge of solving a puzzle. **See Appendix for instructions.**
2. **The Wheel of Theodorus Quilt** - The Wheel of Theodorus is a spiral formed by constructing a series of right triangles on the hypotenuses of preceding triangles. The outer edge of the spiral is formed by straight segments, but its path may be smoothed into a curve. The Wheel of Theodorus quilt is constructed from 36 right triangles. **See Appendix for instructions.**

## Group Building Activities

1. **Head through Card** – Can you cut a hole into a 3x5 card large enough to fit your body through? 1) Fold a lined - 3x5 card in half “hamburger” so that you can see the lines. Cut along the lines...close to the end but don't cut through. 2) Turn around and cut between the other cuts close to the end but don't cut through. 3) Carefully unfold but leave in a v-shape so that you can cut along the fold.....DONT CUT THE FIRST OR LAST FOLD. 4) Open and wa-la!

**Cut here...after unfold**



2. **Paper Scraper** – This is a “Minute to Win It” game. You need 30 index cards. 1) Set up the cards by bending 20 of them in half horizontally. 2) When the clocks starts, player may begin building a tower with each level consisting of two pre-bent index cards placed on their long side with one index card flat on top. 3) Player may not make additional creases in cards. 4) to complete the game, the player must build a 10-story structure within the 60-second time limit, and the structure must remain intact for 3 consecutive seconds.

## Games/Review

1. **Perfect Pair** – Have prepared cards for this activity. For example...Vocabulary/definition, problem/solution, graph/equation. As students walk in hand them each a card, students then need to find their partner and be ready to explain why. I usually try to put on or two that will end up with no partner. So many variations on this.
  - a. **Matching game** – at table students match stacks of the same types of cards
  - b. **Ordering** – almost like the number line...students each receive a number written in some form or another ie.; fraction form, exponential form, square roots, division problems, expressions....then students move around the room to put themselves in numerical order.

- 2. Stacked Deck** – This is a spin-off of a wonderful trick taught to me by the late MATHMAGICIAN Sam Dobler. He took one entire suite from a deck of cards (13 cards) and stacked them (that’s the magic part don’t let your friends know how you did it) in such a way that he would spell A-C-E and turn over the card and you would see the Ace. Then T-W-O and turn the two card over. As you say each letter you are taking the card from the top of the deck to the bottom of the deck.

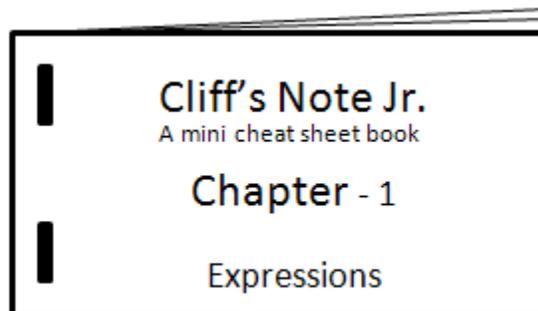
My variation in the class room is that students get 10-1/2 3x5 cards. Have them write the numbers 1-10 on the front. Students need to try and discover the order the cards must be in to be able to pull this magic trick off.

Deck of cards (spelling) - 3 , 8, 7, A, Q, 6, 4, 2, J, K, 10, 9, 5

3x5 cards (spelling numbers) – 4, 9, 10, 1, 3, 6, 8, 2, 5, 7

3x5 cards (counting numbers) – 9, 1, 8, 5, 2, 4, 7, 6, 3, 10

- 3. Cliff Notes, Jr.** – Students prepare a junior size “cheat sheet” that would be useful for having during a quiz over the days topic. Could organize by lessons and then publish as a book for that chapter.



- 4. Face-Off** – An Integer Card Game see appendix
- 5. Criss Cross** – Proportion review game see appendix

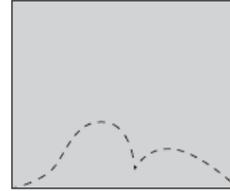
# Tessellations

## Materials:

- Index card 3" x 5"
- Pencil
- Ruler
- Transparent tape
- Scissors
- Colored pencils or pens
- Blank paper

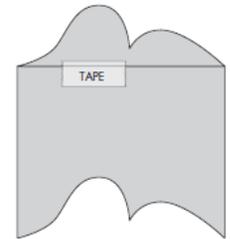
## Step 1

Cut a 3X5 card in half, creating a 2.5" x 3" rectangle.



## Step 2

Draw a line between two adjacent corners on one of the long sides of the rectangle. Your line can be squiggly or made up of straight segments. Whatever the shape, your line must connect two corners that share one side of the rectangle.

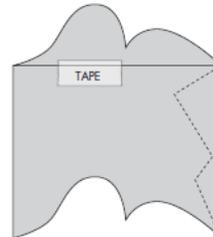


## Step 3

Cut along the line you drew. Take the piece you cut off and slide it straight across to the opposite long side of the rectangle. Line up the long, straight edges of the two pieces and tape them together.

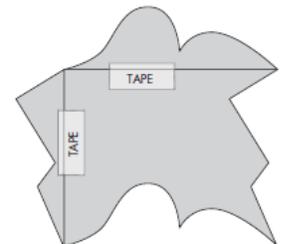
## Step 4

Now draw another line that connects two adjacent corners on one of the short sides of the shape.



## Step 5

Cut along this new line. Take the piece you cut off and slide it straight across to the opposite side of the shape. Line up the straight edges and tape them together.

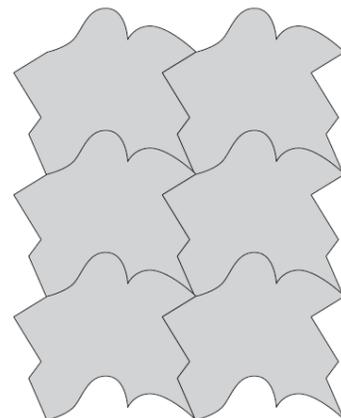


## Step 6

You have now created a shape that you can use as a pattern to make a tessellation.

## Step 7

On your paper, carefully trace around your pattern shape. Cover your whole sheet of paper by tracing the pattern, sliding it, then tracing it again leaving no overlaps and no gaps.



## Step 8

Look for a clever way to color in the resulting design on your sheet of paper. Does your shape look like a fish? A bird? An elephant?

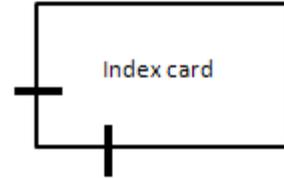
# The Wheel of Theodorus Quilt

## Materials:

- Index card 3" x 5"
- Pencil
- Ruler
- Transparent tape
- Scissors
- Colored pencils or pens
- Blank paper

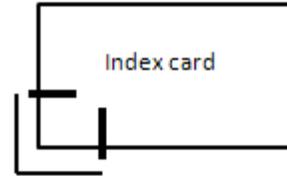
### Step 1

Choose one of the corners of the index card, and mark equal lengths on the adjacent sides of the corner. (I usually have students use 1 cm first, and then let them explore other lengths later)



### Step 2

Starting in the center of the paper, use the unit markings on the index card to trace the first right angle and to mark the lengths of the adjacent sides of the angle.



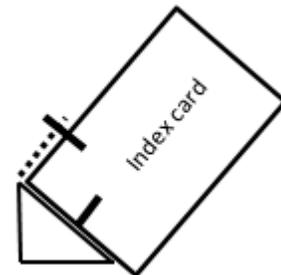
### Step 3

Use the straight edge straightedge to draw the hypotenuse of the first isosceles right triangle.



### Step 4

Place the index card so that one side of the right triangle lies on the hypotenuse of the first triangle, with the vertex of the right angle on the index card exactly aligned with the vertex of the hypotenuse and leg of the isosceles right triangle. Trace the segment for the unit leg of the second triangle.



\*side note: I usually have the students label one edge of the index card with the word hypotenuse and the other edge with the word leg. This seems to help them line the index card up better.

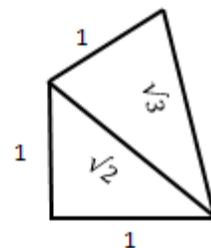
### Step 5

Use a straightedge to draw the hypotenuse of the second triangle.

### Step 6

Repeat steps 4 and 5. When you get to the sixteenth triangle, the triangles will overlap. Draw your hypotenuse toward the center of the spiral but DO NOT mark over the previous drawing.

Enlarged to show detail



Remember there are a total of 36 right triangles. Label all legs and hypotenuses with appropriate labels and lengths. Write your labels using radicals unless they can be simplified to rational numbers. For example you might label a hypotenuse  $\sqrt{9} = 3$ .

# Face-Off

**Materials:**

• 41 Index cards 3" x 5"

• Markers

• Scissors

**Step 1** - Cut 3x5 cards in half. Divide equally so both players have 41 cards.

**Step 2** - Quickly write integers from -20 through 20 on each set of cards (remember to use positive and negative numbers).

**Step 3** - Shuffle both decks.

**Step 4** - Now it's time to "face-off".

- a. Player 1 should lay down the top 2 cards from his deck face up.
- b. Player 1 adds the 2 cards, paying attention to positive and negative signs.
- c. Player 2 should do the same with her 2 cards.
- d. Compare answers.
- e. The player with the highest answer keeps all 4 cards (place in a separate pile).

**Step 5** - Continue playing until all integer cards are used. The player with the most cards wins!

**Tips:**

- Next time around, play "Face-Off" to practice subtraction of integers.
- Emphasize speed and accuracy when making and playing the game. The point is for addition and subtraction of integers to become automatic.

# Name that Number

**Materials:**

• 20 Index cards 3" x 5" cut in half

• Markers

• Scissors

**Step 1** - Cut 3x5 cards in half.

**Step 2** - Numbered index cards 1 to 20 (one set for each pair).

**Step 3** – Give each pair of students one set of cards.

**Step 4** - Lay down five cards face down and then turn them over.

**Step 5** - Select the highest number, which becomes their target number.

**Step 6** – Students make as many math expressions as they can that equals the target number.

**Step 7** – Students get one point for every number they use in the expression.

**Tip** : A variation would be to use only one operation at time, such as addition, subtraction, etc.

# Criss Cross

- |  |   |  |
|--|---|--|
| <ul style="list-style-type: none"><li>• Materials:</li><li>• 24 Index cards 3" x 5" cut in half</li><li>• One Game Board</li><li>•</li></ul> | <ul style="list-style-type: none"><li>• Markers</li><li>Binder Paper or Board Game Copy</li></ul> | <ul style="list-style-type: none"><li>• Scissors</li></ul> |
|--|---|--|

**Step 1** - Cut 3x5 cards in half.

**Step 2** - Copy the numbers below, one number onto each card.

1, 1, 1, 1, 2, 2, 2, 3, 3, 3, 4, 4, 4, 5, 5, 5, 6, 6, 6, 7, 7, 7, 8, 8, 8, 9, 9, 9  
10, 10, 11, 11, 12, 12, 13, 13, 14, 14, 15, 15, 16, 16, 18, 18, 20, 22, 24, 25,

**Step 3** – Deal 8 cards to each player. Place the rest face down in a pile.

**Step 4** - Lay down five cards face down and then turn them over.

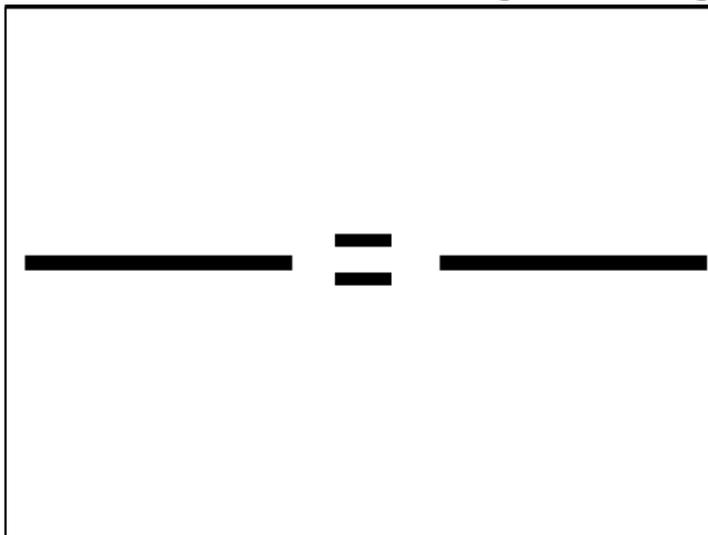
**Step 5** - The player to the dealer's right begins by trying to form a proportion using his or her cards. If a proportion is formed, the player says, "Criss cross!" and displays the cards on his or her game board.

**Step 6** – If the cross products of the proportion are equal, the player forming the proportion is awarded 4 points and those cards are placed in a discard pile. If not that player loses his or her turn.

**Step 7** – If a player cannot form a proportion, he or she draws a card from the first pile. If the player cannot use the card, play continues to the right.

**Step 8** - When there are no more cards in the original pile, shuffle the cards in the discard pile and use them. Who Wins? The first player to reach 20 points wins the game.

**Game Board should look like this....they can draw on binder paper....or just you could have a copy made of the game board and put in storage with game**



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