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Domino Multiple Game

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Using manipulatives, activities or games to demonstrate and reinforce various mathematical concepts often results in lessening math anxiety and improving retention of the related concepts (Briscoe & Stout, 2001; Ratheal, 2007). The activity detailed in this article is designed to increase students' knowledge of *multiples* while providing a fun and engaging way to promote retention through *competitive play*. The game described below, when played with a double six domino set, is suitable for 2-4 players.

Dominoes

Domino Sets

There are five commonly sold sets of dominoes: double six; double nine; double twelve; double fifteen; and double eighteen. Domino sets can also be made using templates and laminated card stock or cardboard. Individual dominoes are typically called tiles and are rectangular in shape with a line through the center dividing the rectangle into two same-sized squares. Figure 1 depicts tiles from a double six set of dominoes.

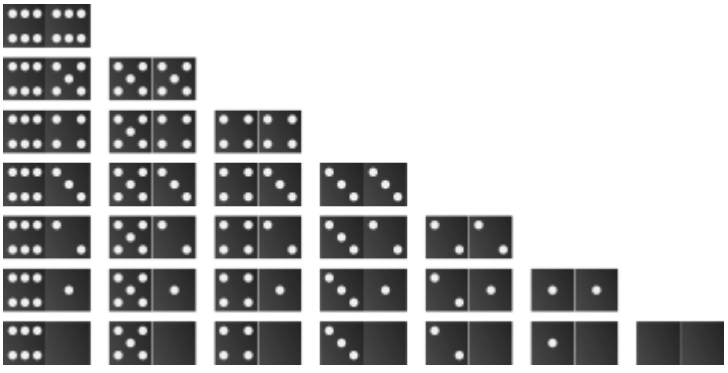

Figure 1. Illustration of a Double Six Set of Dominoes.

The “spots” on the tiles are called pips. In this article, the following notation will be used to identify specific tiles: 6-6 for the double-six tile, 6-5 or 5-6 for the tile with six pips on one half and five pips on the other half, etc. Double six domino sets have 28 tiles with 168 pips; double nine sets have 55 tiles with 495 pips; double twelve sets have 91 tiles with 1092 pips; double fifteen have 136 tiles with 2040 pips; and double eighteen have 190 tiles with 3420 pips.

The All Fives Domino Game

One type of domino game, the *All Fives Domino Game*, uses multiples of five to score points. For each multiple of five resulting from play, the player receives one point. The first player to reach a designated number of points wins the game. This game is generally played with a double six set of dominoes, which will be used to describe the rules of the game.

Beginning the game. First, all the tiles are placed face down and shuffled. Each player draws one domino, and the player with the largest number of pips on his or her domino starts the game. Once the starting player is selected, all dominoes are returned to the facedown position and reshuffled. All players then draw equal numbers of tiles, and conceal their tiles from the view of other players. Any leftover or extra dominoes are placed to the side, in the “heap.” Dominoes in the heap are used if a player, during his or her turn, does not have a domino that matches any of the domino “ends” that have been played on the table.

Playing the game. The starting player can play any domino from his or her hand, whether or not it scores points. Players will play in a clockwise sequence. A player takes a turn by matching one of his or her dominoes to an open end of the trains of dominoes that have been played. A matching tile has a square with the same number of pips as the square of the tile at an open end of the train. Figure 2 (Liko81, 2008) illustrates matching tiles. For example, if the 6-4 was led, the second player must play a domino with one of its squares containing either a 6 or a 4. If the player does not have a domino that matches, the player must draw from the tile heap until a tile is drawn that can be played, or until there are no more tiles to draw, at which time, that player’s turn is forfeited.

Figure 2 also illustrates how the trains of tiles are allowed to grow. There will be at most four trains (rows of tiles) extending from the four sides of the “spinner,” which is the term used for the first double-tile played. In Figure 2, the spinner is the 3-3 tile.

Trains of tiles must grow from the long ends of the spinner tile before players can play off the spinner's narrow sides. Another rule depicted in Figure 2 is that *doubles* are placed perpendicular to *non-double* tiles.

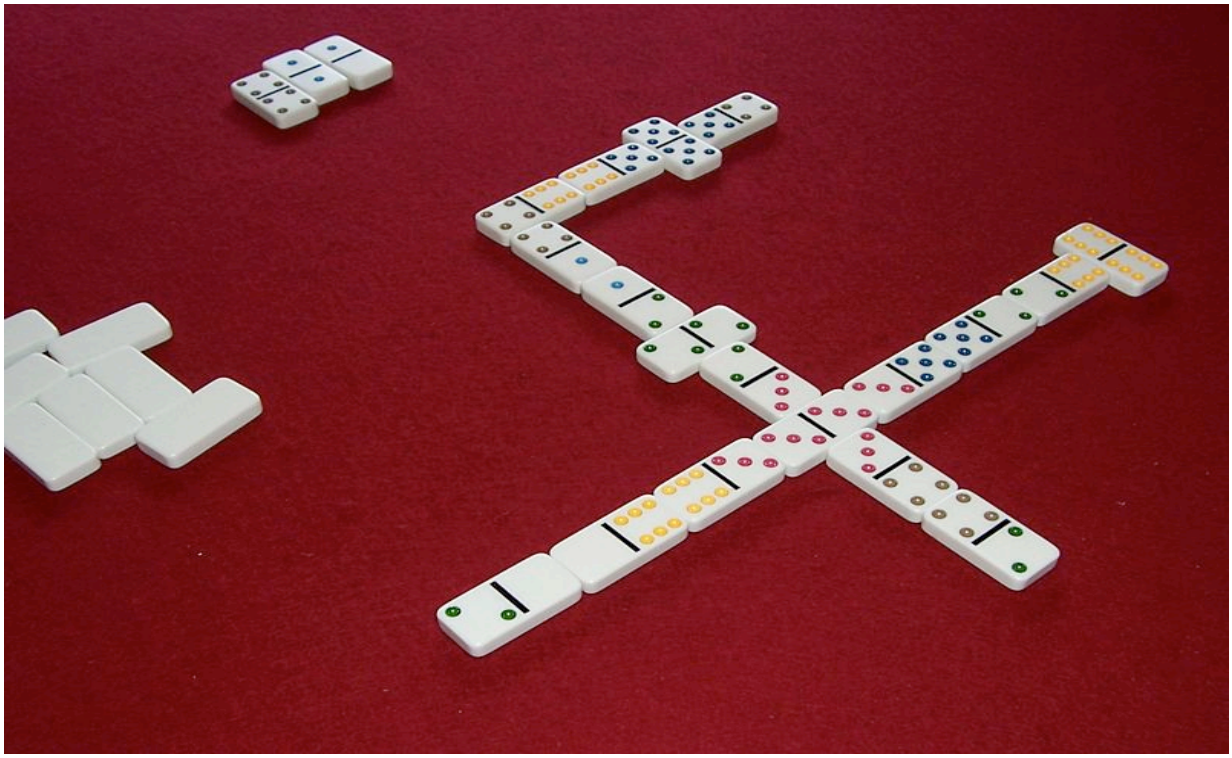

Figure 2. Illustration of Matching Tiles.

Finally, a train is allowed to turn so it doesn't extend off the table. This is shown in the top-center of Figure 2, where the 4-6 tile has been added to the end of the 1-4 domino.

Scoring points. The goal of the *All Fives Domino* game is to score points by adding to the domino trains, so the ends of all the trains add up to be a multiple of five. For each multiple of five, the player receives one point. After each tile is played, the number of pips on the ending squares of the trains are added together, to determine if the sum is a multiple of five. So in Figure 2, the following addition problem would be computed: 2 + 2 + 4 + 12 = 20. Since the sum is a multiple of five, the player would receive four points, since 20/5 is 4. When a double tile is played on one of the ends, the total number of pips on both squares of the double is used to determine the sum of the ends, as in the case with the 6-6 tile in the example just described.

Since points are earned regardless of how long or short the train is, the following tiles result in the starting player scoring points for the first domino played:

6-4 tile has 10 pips so would result in 2 points;
5-5 tile has 10 pips so would result in 2 points;
5-0 tile has 5 pips so would result in 1 point;
4-1 tile has 5 pips so would result in 1 point; and,
3-2 tile has 5 pips would result in 1 point.

Ending each round of play. The player who plays all of his or her tiles first ends the round, and receives additional points equal to the total number of pips remaining in each of the players' hands, first rounded off to the nearest multiple of five, and then divided by five. For example, if the sum of the pips is 27, the player going out would receive five points. Then a new round is initiated. The first player to reach the designated number of points wins the overall game.

The Domino Multiple Game

The *All Fives Domino Game* can be the basis for the *Domino Multiple Game*, designed to develop conceptual understanding for multiples of numbers in addition to five, and to provide opportunities to reinforce learning objectives in a fun and competitive manner. The following manipulatives will be needed for playing or demonstrating the *Domino Multiple Game*: a set of double six, double nine, double twelve, double fifteen, or double eighteen dominoes and dice for each group of players.

For the *Domino Multiple Game*, the rules for *All Fives* are followed, with the exception of those for point scoring. Instead of restricting the train-end sums to multiples of five, the multiple used for scoring points is determined by the roll of a die or dice. If playing with a double six set of dominoes, use one die. If using a set of double nine dominoes, players should only consider dice rolls that equal nine or less; rolls of twelve or below for a set of double twelve, and similarly for sets of double fifteen or double eighteen. The starting player rolls a die or dice to determine the number that will be the multiple for scoring points during that round. If the player rolls a four, then all points scored are based on multiples of four. So in Figure 2, the following addition problem would be computed: 2 + 2 + 4 + 12 = 20. Since the sum is a multiple of four, the player would receive five points, since 20/4 is 5.

As before, the player who plays all of his or her tiles first ends the round, and receives points based on the total number of pips remaining in each player's hand (rounded off to the nearest multiple of four and divided by four). For example, if the sum

of the pips is 27, the player going out would receive seven points. The first player to reach the designated number of points wins the game.

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