

4th Grade Math Lesson

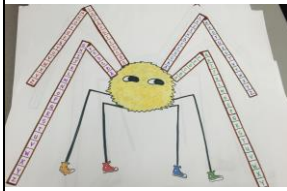
Lesson Title: Spider Leg Game

Grade: 4 "What are strategies that we use to divide?"

Content Standard: Content Standard: Number and Operations in Base Ten 4.NBT.B.6

Find whole number quotients and remainders, with up to 4-digit dividends and one digit divisors, using strategies based on place value, the properties of operations, and or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and or area models

Materials: Game board, hundreds chart, linking cubes, letter cards, grouping mats, secret recording card, score sheet, white boards and/or paper.



Shared Experience and procedure details:

Number of Players: Two to four players

Object: To be the first player or team to remove equal-sized groups that will get the player closest to the winning space on each game board.

Set-up: Each team will need a game board that included rows of squares that have 26 spaces that would fit the size of a single linking cube. Each player will need a set of linking cubes. A capital letter of the alphabet will be labeled on each space on the game board. Each team will be given a set of letter cards.

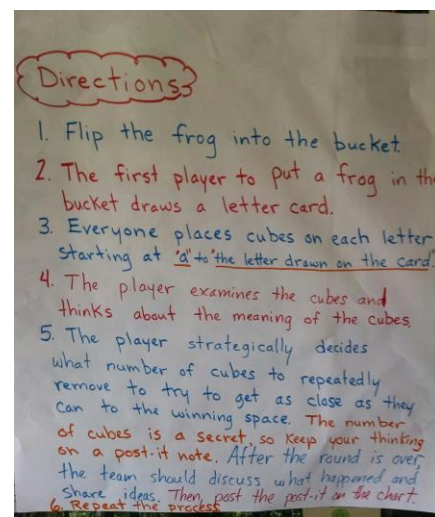
Demonstrate 3rd grade game & discuss

Review 4th grade game, discuss rules, have rules posted on the board.

Play:

Each player completes a fun challenge task (eg. Trying to get a jumping toy frog into a bucket, or a race) Practice shooting frogs into bucket. To set player order (1st player to get frog in the bucket is player 1, 2nd person to get frog in the bucket is player 2, etc.) Optional: may have student flip frogs every time to set order of drawing the card.

- Player 1 draws a letter card. The letter cards in the stack will be the following letters: F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z. Each player looks at the letter on the card and finds the corresponding letter on the game board & fills in the Data & Score sheet
- The players fill in the row of squares on the game board covering all the letters before the letter on the card including the letter on the card. The total cubes represents the amount to be divided.
- The players examine the cubes on the path and decides the number of equal groups of cubes that they can remove and how many groups they need for each equal group to get closest to



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the winning space. The players may land exactly on the winning space or as close to the winning space with some cubes leftover. The player cannot remove all the cubes at one time.

- The player selects a number of cubes they want to remove repeatedly. The players will be given a set time limit of a minute or less to decide the number of cubes they will be repeatedly remove. After each player has made a decision, the player begins to remove the selected number and place those cubes on a grouping mat (spider web). Then, the player repeatedly removes that number until they can't take any more equal-sized groups. The player who is closest to the winning space earns a point. In the case of a tie, both players earn a point. The game continues until the instruction period for the game ends. The player with the most number of points wins. Students have a discussion and complete the data and score sheet.



Questions: Why is it important to know how many cubes you have? How close can you get to the winning space? What are ways a player could approach this round? How do you know how many cubes can be made?

Note: The grouping model of division by dividing by the number of cubes in each group to find the total number of equal groups is represented. The sharing model of division by having the student place the webs or groups and how many cubes fit in each group. The divisor and quotient are interchangeable in the sharing and grouping model. The dividend will always be represented by the total amount of cubes.

Differentiated instruction: Students who know their multiplication facts 2 to 9 should be able to divide mentally when working with division problems with remainders. Students who struggle with multiplication concepts may need to work with numbers that divide evenly and be provided a number chart to use as a tool for understanding patterns and counting.

Possible Picture:

Students draw a picture to show their thinking or what they did.

Possible People Talk:

Students may use non-math and math terms to describe the game, explain the process, or the strategy used to play the game.

Have students share picture and writing with their group

Feature Talk: (Ingredients, important ideas)

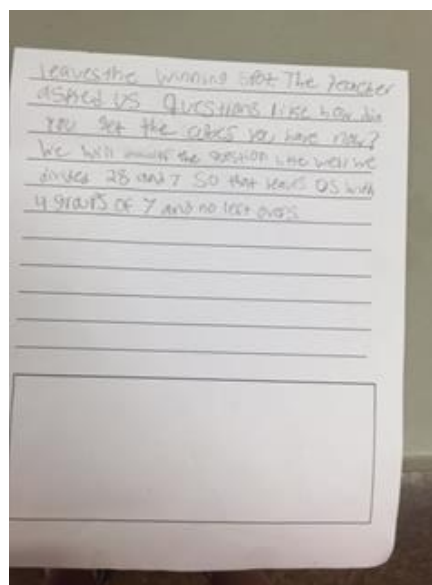
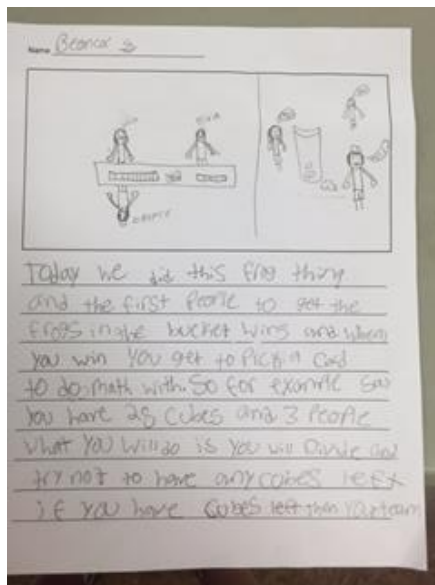
Questions: How does taking the same number over and over help you get as close to the winning space? Why did you select the number to remove? How can you use your of what cube(s) might be leftover to help you? Who do you think picked the best number and why? Explain why players had different strategies? Can you explain your thinking?

Total/amount/dividend

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sharing, equal groups/grouping/ sets of a group
divide/division, repeated subtraction
multiply/multiple/multiplication
leftover/extra/remaining/remainder/sum/subtraction
equal/equality

- Students discover that they need to know the total amount to be divided before doing any grouping or sharing.
- Students learn that when you share equally, you are actually dividing into equal groups and then count number of items in each group.
- Students learn that when you group you divide the number of items in each group to find the number of equal groups.
- Students may use words or express that there is an equation or a number sentence that describes the solution they tried in each round of the game.
- Students understand that the product and the dividend are always the same and has a relationship when thinking of the inverse operations.
- Students may understand that there can be remainders when dividing to make equal groups or when dividing to share equally.
- Students understand that the unit or divisor is critical and must be understood in giving the remainder.
- Students understand the process that repeated subtraction is a strategy of division

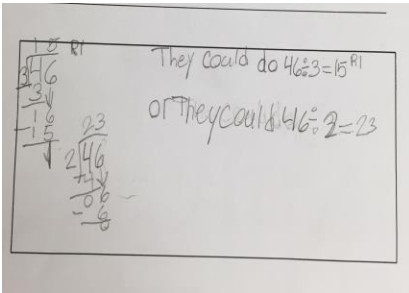


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Possible Symbolic Representation:

You could pose the question: If you pull a "Y card", and your secret number is 5, what would happen?
Have students agree that $Y=25$ cubes

- Students may illustrate how repeated subtraction is a strategy to divide.
- Students may illustrate the relationship between multiplication and division.
- Students illustrate the difference of sharing by dividing equally and dividing by grouping.
- Students may illustrate the situations when dividing and using either sharing and groupings may include a remainder.



Extensions/Reteaching/What To Do Next:

One of the objectives of the game is to lean the strategy of repeated subtraction as a beginning step to the standard algorithm of division. Adding the rule that the player with the largest number of items in each group wins the point in the event of a tie.

Increase the number of possible number of dividends (add on to the game board AA, BB, CC, ... ZZ). To assist students in making sense of the letter and corresponding number, students could be given a chart to record the meaning of the letters (ex: BB=28) *chart attached

Teacher Reflection:

Prior to beginning the game, students should experience one round of how the game is played. This will support students in understanding the importance of making sense of the numbers and corresponding letters, and the importance of removing equal groups of cubes.

Written By: Math Camp Participants 2015

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Variable Chart

A	B	C	D	E	F	G	H
I	J	K	L	M	N	O	P
Q	R	S	T	U	V	W	X
Y	Z	AA	BB	CC	DD	EE	FF
GG	HH	II	JJ	KK	LL	MM	NN
OO	PP	QQ	RR	SS	TT	UU	VV
WW	XX	YY	ZZ				