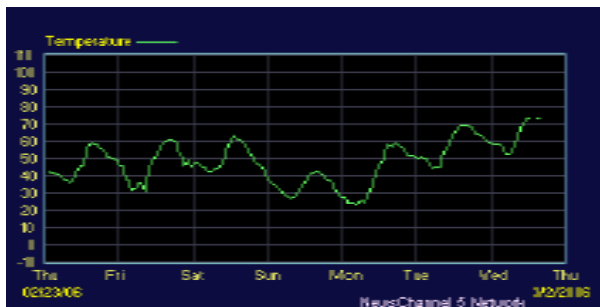


Tips for Helping at Home

Questions to ask:

- What is it that you don't understand (have the student be specific)?
 - What about putting things in order?
 - Could you try it with simpler numbers?
 - Can you guess and check?
 - Does this make sense?
 - What can you do to explain your answer to show others what you are thinking?
 - Does your answer seem reasonable?
-
- Look at graphs from newspapers or other sources that show things that change over time, such as temperatures, heights, or population. If you can, please help your child find one or two graphs to bring to school.



Websites

<http://www.dreamsbeginhere.org/static/aboutdcps/departments/acadprog/mathematics/index.asp>

Line Jumper

<http://www.funbrain.com/linejump/index.html>

Create a Graph

<http://nces.ed.gov/nceskids/graphing/>

Mathematical Emphasis

Investigation 1—Net Change

- Developing strategies for computing net change and for using net change to find a missing end point or start point
- Constructing different sequences of positive and negative numbers to produce the same net change

Investigation 2—Representing Elevator Trips

- Representing numbers graphically
- Understanding how the passage of time is represented on graphs showing change over time.

Investigation 3—Inventing Board Games

- Relating the direction of movement (left or right, up or down) to positive and negative numbers
- Using net change to determine an end point



Tierney, C. Investigations in Number, Data, and Space: Up and Down the Number Line. Dale Seymour Publications, 1998.

Investigations in Number, Data, and Space



Up and Down the Number Line Grade 3 Changes

Unit Goals:

- Students investigate ideas about addition and subtraction as they play games and do activities that involve changing the position of a chip on a vertical number line.
- Students use numbers with negative signs from the beginning of the unit.
- Students play games on boards set up as a horizontal number line.
- Students develop knowledge about numbers below zero, net change, the opposite effects of addition and subtraction, and many ways to use addition and subtraction to reach a given answer.

Proposed Time Frame:

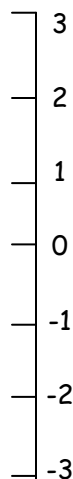
4 weeks

Vocabulary

Net change—how far and in which direction (positive or negative) an object has moved in all after a series of moves in each direction.

Using numbers to describe how something changes is a very important part of mathematics.

One use for negative numbers is to show location on the number line. Vertical number lines are marked with positive numbers above zero, and negative numbers below zero.



Thinking about ups and downs helps children learn how to describe mathematical changes. In the future, they'll use these skills in both science and math as they describe and graph how things change.

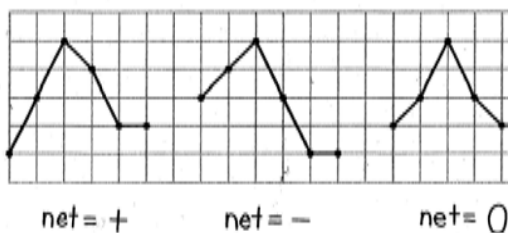
Glossary

<http://www.amathsdictionaryforkids.com/>

Graphs of Plus and Minus Sequences

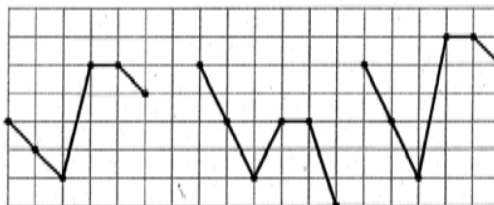
Working with a plus and minus sequence leads to the reading of a graph as a sequence of increases and decreases. The only aspect that gets specified is whether the graph goes up, goes down, or stays the same. Many different graphs can be made for $++--0$; but for all of them, the overall shape goes up twice, then down twice, and then stays the same.

$++--0$



Similarly, a $--+0-$ graph, no matter what the exact numbers are, would go down twice, then up, then stay in the same place before coming down again.

$--+0-$



One of the most important aspects of graphs to learn is the shape of the graph—how it increases, decreases, or remains the same. The up/down/horizontal distinction provides information that is independent of height or steepness. For example, we may know when we reach the highest or the lowest floor just from the sequence of signs.

Game

Fifteen Number Cross-Out

You need: A partner and two dice or number cubes
Rules:

1. Each player makes a list of fifteen numbers. Five numbers must be 5's; the other ten numbers can be any numbers from 1 to 9. You may repeat any of these numbers as many times as you like, and you do not have to include every number from 1 to 9.
2. Player 1 rolls the two dice; both players add the numbers and agree on the sum.
3. On his or her list, each player crosses out either the sum or a combination of numbers that makes that sum.

For example, if the sum of the dice is seven, a player might cross out a 7, or a 3 and a 4, or a 5 and a 2, or a 3 and two 2's. For each roll of the dice, a player can make the sum only one way.

4. Player 2 rolls the dice and, again, both players add the numbers, agree on the sum, and cross out numbers on their lists.
5. If a player cannot make the sum that comes up with any numbers on his or her list, that player waits for the next roll of the dice to try again.
6. The game continues as long as one player is able to cross out numbers for the roll of the dice.
7. The game ends in one of two ways. If one player crosses out all of the numbers on his or her list, the game is over and that player is the winner. Or, if both players are unable to make a play, the game is over and the winner is the player with the fewest numbers left on his or her list.

Mathematics Education Collaborative (MEC) Building Support for School Mathematics: Working with Parents and the Public