

Tidal Integers

Grade Levels

This activity is intended for grades 7 – 10.

Objectives and Topics

This lesson covers Integers, and will help students to understand adding and subtracting integers through an engaging tide activity.

Introduction

Begin by showing the following video of a time lapse demonstrating a dramatic tide change:

<http://www.youtube.com/watch?v=OP0cpXpw8yk&feature=related>

The students can also see a chart of local tides for the month at:

<http://www.hawaiiitides.com/OahuTides.asp>

Tides rise and fall each day, affected by the gravitational pull of the sun and moon. There is a certain base tide, which is considered to be the zero point. When tides rise above this point they are considered positive and when they drop below they are considered negative. Before beginning the actual tide activity, it is suggested to teach or review how to add and subtract integers. For a general lesson on adding and subtracting integers, see

<http://www.mathisfun.com/positive-negative-integers.html>,

or use your own textbook or methods for teaching addition/subtraction of integers.

Warm-Up Questions

1. $5 + -6 =$
2. $-4 = -2 =$
3. $-10 + 5 =$
4. $12 + -11 =$

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DEPARTMENT OF MATHEMATICS

Materials and Resources

- Clear Plastic Water Bottles
- Scissors
- Buckets
- Cups
- Markers
- Paper
- Pencils
- Dice
- Coin

Construction of Tide Models

1. After dividing the class into groups of 3 – 4, distribute the following materials to each group: 1 water bottle, 1 marker, 1 scissors.
2. Have each group cut the top off of the bottle so that they have a long clear cylindrical bottle.
3. With the marker, have the students draw a vertical line from top to bottom of the cylinder. Have them mark a line around the center and label it "0". Then have them mark about 10 lines above and below this initial mark at even intervals, labeling them with positive integers above and negative integers below.

Activity

1. Begin by having the students make a chart for the week with a column for each day. Each day should have a space to record the initial tide, the change of tide as a positive or negative integer, a space for calculation, and a space for the final tide.
2. Have the students fill their empty bottle by scooping water from a bucket using a cup. They should fill the bottle until the 0 point.
3. Roll the first dice and flight the coin. If the coin is heads up, then the students will add the number on the dice to 0 and fill the bottle until the correct point. They will record information on their papers. If the coin is tails up, then the students will add the negative of the number (or equivalently subtract the number) on the dice instead.
4. Continue this process, having the students make each change in tide based on the tide of the previous day. The tide carries over from day-to-day so that the ending tide of one day becomes the initial tide of the next. If necessary, adjust numbers to keep tides within the range of the bottles and to have enough variety of negative and positive.