

# NCLB Math Institute Summer 2011

Faculty Name: Kensell Batty

School: Vicksburg Jr. High

Grade Level: 7<sup>th</sup> Grade



## 1 Teaching objective(s):

- 5b. Determine how outliers affect mean, median, mode, or range. (DOK 2)
- 5c. Construct and interpret line graphs, frequency tables, circle graphs, box-and whisker plots, and scatter plots to generalize trends from given data. (DOK 2)

## 2 Instructional Activities

- **Anticipatory Set: TTW-** Begin the investigation by encouraging students to give an example of something that they do once a day such as eat breakfast, listen to school announcements, or play with a friend. TTW-ask them to name something they do about ten times each day, which might include saying hello in the hall, changing the television channel, or writing their names on papers. Finally I will ask students to name something that they do at least one hundred times a day. A narrow range of responses often includes blinking and breathing. If not, take a deep breath and ask, "What about breathing?"

Ask students, "Do you take more than 100 breaths in a day? More than 100 or 1000 breaths in an hour?"

- **Modeling:** After a brief discussion, TTW-distribute the Every Breath You Take activity sheet and ask each student to estimate the number of breaths a person takes each hour. Then each student writes down an estimate. Students should work with a partner to answer questions 3 and 4. Each pair will share its response with another pair. As the class, discuss similarities and differences in data interpretation that surfaced when sharing observations.

To explore the data further, each student will use his or her estimate from question 1 and line up in order. Each student will determine his or her place in line without assistance.

The student with the lowest estimate should start by reading the estimate to the class. Determine the range by identifying the lowest and highest estimates, noting how much easier they are to find when the data points are so displayed. Ask students whether it is more obvious that some estimates appear to "bunch" or "cluster" around certain values or whether the estimates appear to be evenly distributed when students are lined up than when the numbers are listed on paper.

- **Guided Practice:** TSW- construct a graph of the class data using graph paper. Discuss an appropriate scale and label for the graph's vertical axis with your group. Students will also need to construct plot a scatter graph, line graph or a bar graph, determine which graph will be a better representation of this data. Note that student estimates may vary widely, so you made need to use ranges of data for each of the bars in a bar graph. For example, you may have 0-60, 61-120, 121-180, and so on for the number of breaths estimated. To take this further each bar in the bar graph needs to measure  $1\frac{1}{2}$  cm.

Explore the data in terms of, for example, an approximate mean, the median, mode and the outliers.

Discuss what makes a good estimate and more than one estimate may be good.

- **Independent Practice:** TSW- explore how they might use their estimates of the number of breaths taken in one hour to estimate the number taken in a day. Students might suggest multiplying their estimates by 24, whereas other children might use a repeated-addition process on their calculators.

Discuss why this estimate might be considerably different from the actual number of breaths taken in a day.

To judge the reasonableness of student's estimates, ask, "How could you find out how many breaths a person actually takes in a day?" Allow students to brainstorm solving the problem. They might work with a partner and count the number of breaths in a given period of time—for instance, one minute—or determine the time it takes to breathe a given number of times, say, one hundred.

### 3 Materials

- a) Graph paper
- b) Worksheet
- c) Rulers
- d) Protractors
- e) Timer
- f) Calculators

#### 4 Resources

Illuminations NCTM Resources for teaching math.

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<http://illuminations.nctms.org>

Macmillan/Mcgraw-Hill Glencoe

© 2006 Mathematics Applications & Concepts

#### 5 Assessment

Students will be assessed through teacher observation of the groups.

# Every Breath You Take

Name \_\_\_\_\_

1. In the box below, write your guess for the number of breaths you take each hour.



2. In the boxes below, record each classmate's guess (one per box.)


3. What is the highest estimate in the class? \_\_\_\_\_ The lowest? \_\_\_\_\_

4. How would you describe the guesses made by you and your classmates?

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5. On the back of this sheet or on graph paper, draw a line graph, bar graph (the bars in the bar graph must measure  $1\frac{1}{2}$  cm), and some other type of graph that displays the data.

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6. Determine how many times you breathe in one hour. \_\_\_\_\_

Determine how many times you breathe in one day. \_\_\_\_\_

Explain the method you used to get your answers. \_\_\_\_\_

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