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| LessonTitle: Comparing Pulse Rates | Alg Stats 2.1a |
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| Utah State Core Standard and Indicators Algebra Content 1, 5 Process Standards 3-5 |
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Summary

In this lesson, students collect data for resting, exercising and recovery pulse rates. They organize the data into stem and leaf plots, create histograms and box plots on the calculator, sketch the graphs and record and analyze the statistics. They explain what the graphs show and compare themselves to the rest of the class in each category.

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| Enduring Understanding | Essential Questions |
| We represent and organize data numerically, graphically and symbolically in order to draw conclusions about ourselves and our world. | What kind of data is helpful to you in finding out about your own fitness? How do you collect, organize and interpret the data? |

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| Skill Focus | Vocabulary Focus |
| Collecting, organizing, representing, and interpreting data with and without calculators via stem and leaf plots, histograms, and box plots. | |

Assessment ideas:
The Comparing Pulse Rate Assessment below duplicates the tasks found in the activity. Evaluate this using problem solving and/or correct answer rubrics found under assessment on the Teacher Info link.

Students might also be asked to respond in writing to the following essential questions. Evaluate using understanding and communication rubrics found under assessment on the Teacher Info link.

- What conclusions might you draw about yourself as related to other students your age with regard to fitness?
- What are measures of central tendency and why do we use them?
- How are different kinds of plots helpful for examining data?

Materials: TI-73 Graphing Calculators

Launch

Explore

Summarize

Apply

Directions:
Discuss how fitness trainers help people measure their fitness. They measure resting, exercising, and recovery pulse rates along with flexibility, strength, and body fat percentage. The average resting heart rate is between 60 and 80 beats per minute. Young people often have a heart rate higher than 80 BPM because they may have a smaller heart and unfit people with low

pulse rates probably have larger hearts. However there are exceptions. As people become more fit, their resting heart rates decrease. That is one very good measure of improved fitness. After exercise, a fast resting recovery rate indicates a high level of fitness. Students could research more information on the internet and from the American College of Sports Medicine.

Pulse Rate Directions

- 1) Students find their pulses and then begin timing. Time for 10 seconds and multiply by 6.
- 2) Record names and pulses on the overhead while students record the data into the calculator under list 1.
- 3) Teach students how to create a stem and leaf plot from the pulse rate data. Record the plot on the student worksheet. Find mean, median and mode from the stem and leaf plot.
- 4) Teach students how to find or check the mean, median and mode on their graphing calculator using the Statistics-Math command or Statistics-Calculate-1Var Stats
- 5) Using list 1 (pulse rate) teach students how to create a histogram and then a box plot on their calculator. Have the students record the histogram and plot on the student worksheet, along with three labels obtained by tracing the plot. The teacher can demonstrate using the overhead viewscreen and calculator.
- 6) Students run in place to a beat (to maintain a semi consistent comparison). They should do this for 3 to 5 minutes. To be most consistent you could do a 3 minute step test using a 1 foot step and a metronome set at 96 beats per minute. Students step up, up, down, down to the beat of the metronome. When students are getting a little out of breath, can still talk but cannot sing, they are arriving at a level of exercise when an exercise pulse can be taken. Take the pulse while they are still exercising.
- 7) For the recovery pulse, measure the pulse for a full minute immediately after stopping exercise because the pulse rate will rapidly decline.
- 8) Students repeat steps 3 to 5 above for exercise pulse and recovery pulse.

Alg Stats 2.1a

Comparing Pulse Rates

Pulse Rate Statistics for _____ (your name)

1) What is your resting pulse? _____ Record your classmates' pulses in L1 on your calculator.

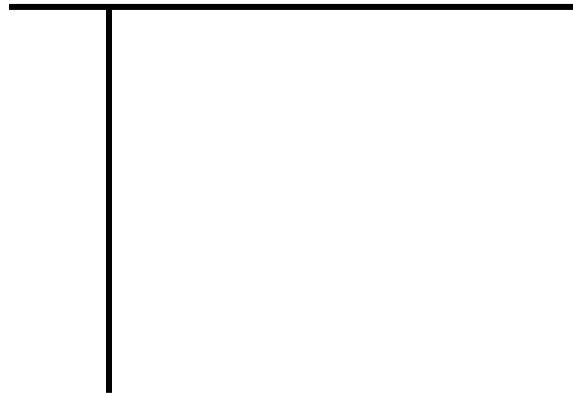
2) Create a stem and leaf plot for the pulse rate data.

3) Find the following data using the stem and leaf plot:

Minimum _____ Maximum _____

Range _____ Mean _____

Median _____ Upper Quartile _____ Lower Quartile _____ Mode _____



Check your statistics using the Statistics-Math command on the calculator. Have your partner sign to verify you did this on the calculator. _____

- 4) a) Create a histogram for the class resting pulse rates using the graphing calculator. Based on the data, decide on the window; the x min and max, the y min and max, and the scales. Sketch the graph below.
- b) Now create a box plot for the resting pulse rates. Sketch the box plot in the space at the right below. Trace the plot. Sketch the plot below and record the statistics on the plot (the quartiles, median etc.)
- c) Locate yourself on the graph. Label it "ME". Describe where you fit in the range of class resting pulse data.



- 5) Run in place (or use a 3 minute step test) for 3 to 5 minutes and take your pulse toward the end of the time you are exercising (while you are still exercising). Thirty seconds after you stop exercising, take your recovery pulse by timing your heart rate for a full minute.

Your exercise pulse rate _____ Your recovery pulse rate _____

- 6) Record the exercise pulses and recovery pulses in L2 and L3. Create the histograms and the box plots and sketch below. Use trace to find the statistics. Locate and label yourself on the graphs. Label "ME".

Exercise pulse rates



Minimum _____ Maximum _____ Range _____ Median _____

Upper Quartile _____ Lower Quartile _____ Mode _____ Mean _____

Recovery pulse rates



Minimum _____ Maximum _____ Range _____ Median _____

Upper Quartile _____ Lower Quartile _____ Mode _____ Mean _____

7) Explain what the graphs show. Then compare yourself to the rest of the class for resting, exercise, and recovery pulse rates.

8) Calculate your ideal target exercise heart rate. Use the following formulas:

Standard formula:

Target heart rate = $(70\%)(220 - \text{your age})$

9) What are your observations about your heart rate? What do you think you should do to become more fit?

Comparing Pulse Rate Assessment

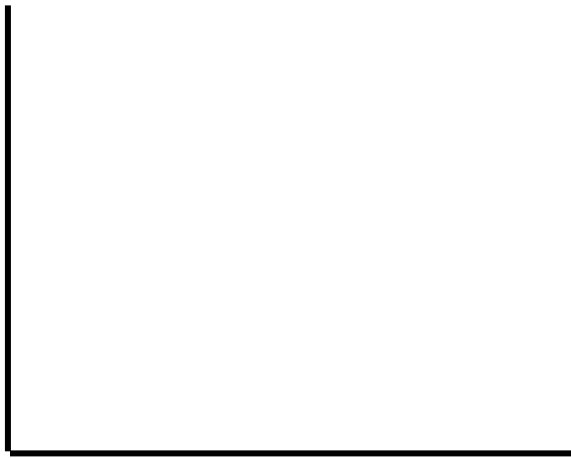
Name _____

Stem & Leaf, Box plots, and Measures of Central Tendency

- 1) Make a stem and leaf plot from the following heights measured in centimeters.
180, 172, 179, 176, 183, 154, 150, 148, 159, 158, 165, 168, 166, 163, 162



- 2) Record the heights into a list on the graphing calculator. Make a histogram and a box plot using the calculator. Sketch below, label and record the statistics.



Minimum _____ Maximum _____ Range _____ Median _____

Upper Quartile _____ Lower Quartile _____ Mode _____ Mean _____

Signature of partner or teacher for verification of completion of task on the calculator

Extra Credit: Think of some examples for using a stem and leaf, histogram and box plot.