

**Data Management**  
**Unit 1 Line Master 9****Heights of Grade 9 Students Activity**

Write “Heights of Grade 9 Students” on the board and display **Slide 1** as students enter the classroom. As they enter, hand each student a sticky note and a marker. Ask them to write their height (in centimetres) on the sticky note, then place it under the title on the board. The slide includes a conversion chart to help students convert from feet and inches. Provide a metre stick, if needed, for students who do not know their height.

Once all sticky notes are on the board, take this opportunity to review unit concepts learned so far. Ask:

- According to the title on the board, what is the population we are considering? (Grade 9 students)
- Who was included in the sample? (Students in our class)
- What kind of sample is this? (A convenience sample)
- What are some possible sources of bias caused by using this sampling technique? (Students reporting incorrect heights, measuring errors, privacy, heights of Grade 9 students in our region might not be representative of heights of students around the country or in different countries)

Re-focus on the data themselves. Solicit student reflection, recording observations on a separate space on the board. Ask:

- What do you notice?
- Which measure is the shortest? The tallest? What is the difference between these values? Remind students that this is the *range* of the data.
- Are there any heights that you think are outliers? Explain.
- Are there other ways to organize the sticky notes that might help us see patterns, trends, or other important information?

Have a couple of students arrange the data in ascending order, along a labeled horizontal axis. This is an opportunity to review the *median* and to reinforce that approximately half of all the data points lie on each side of the median. Also, if there is a *mode*, it should be apparent when the data are arranged.

Now that the range, median, and mode have been identified, *mean* is the only measure of central tendency missing. Review how to find the mean and have two pairs of students (with their calculators) come up to the board to calculate the mean. While these students are determining the mean, ask the remaining students to brainstorm other ways that the data could be displayed.

Once the mean has been calculated, record it on the board, along with the range, median, and mode.

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**Unit 1 Line Master 9****Heights of Grade 9 Students Activity (cont'd)**

Ask how else the data could be displayed and follow through on one suggestion with a rough graph or chart. If you decide to display the data in a bar graph, then you will need to calculate the heights of the bars. If you decide to use a circle graph, then you will need to calculate the percent for each sector. Some students might suggest a histogram, where intervals for the horizontal axis are determined, and the vertical axis represents the frequency of data in each interval.

Ask: “Based on the data display created, can we locate the mean, median, and mode? Does the display help us to understand the data in a better way?”

**Part A: Histograms**

If required by your curriculum, display **Slide 2** and introduce the **histogram**. Compare and contrast a histogram with a bar graph, noting that a histogram looks a lot like a bar graph but differs in that the horizontal axis is split into *intervals*, where a bar graph has a horizontal axis split into *categories*.

Use the sticky-note data to create a histogram on the board. The uniform size of the sticky notes lends itself to stacking them to create the columns (bars). Note that the tallest bar is the interval that contains the mode (but we are not necessarily able to say exactly what the mode is). The median can be estimated by splitting the data in half.

Display **Slide 3** and ask students to create a histogram to display the given data set, using the same intervals (bins) as the class-made histogram. When comparing the data sets, you might ask students to identify whether either data set is skewed. The word *skew* may be used to describe a histogram that is heavy to one side or the other. For example, in this context, if one of the Grade 9 classes had a lot of shorter students, it would skew left.

**Part B: Box Plots**

If required by your curriculum, display **Slide 4** and introduce the box plot as a useful tool for comparing two data sets and extracting useful information. Introduce the concept of quartiles, which divide the data into quarters. Walk students through the steps for determining the quartiles and creating a box plot (**Slide 5**).

As a class, create a box plot for the class data. Reinforce, with the use of the sticky notes, the percent of data that falls in the interquartile range (~50%), below the first quartile (~25%) and above the third quartile (~25%).

Display **Slide 6** and have pairs of students create a box plot with the second set of data, using the same horizontal scale as the class-created plot.

**Heights of Grade 9 Students Activity (cont'd)****Part C: Comparing Data Using Known Displays**

With their table partner, ask students to determine the range, mean, median, and mode for the second set of data. Then have them compare their responses to those for the class's data set. Ask:

- How are the heights of the students similar/different? How do you know?
- What questions do you have? What information is missing?

Record student observations on the board.

As a class, brainstorm a list of other ways to display the data that would be helpful for making comparisons. You may need to prompt students to recall the different charts and graphs they have previously worked with.

With a partner, have students select one type of chart or graph, and create one data display for the class's data, and another for the given data. This can be done on a vertical non-permanent surface, or on paper.