**Data Literacy in CCSS & NGSS**

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|  | Common Core Mathematics Standard (CCMS) | Next Generation Science Standard (NGSS) |
| Grade 3 -  Visualize & describe data | * Draw a **scaled** **picture graph** and a **scaled bar graph** to represent a data set with several categories. * **Generate measurement data**, show data in line plot (**dot plot**); **scale a single axis** with ¼ tic marks. | **Practice #4**: **Analyze and interpret data**  - *Represent data in tables, pictographs, bar graphs, pie charts*  - *Interpret/make sense of data*  - *Discuss similarities/differences between data collected by different groups.*    **Practice #5: Apply mathematical concepts**  - *Quantitative vs. qualitative data*  - *Organize simple data sets to reveal patterns/relationships*  - *Describe, measure, estimate, and/or graph quantities*  - *Create and/or use graphs and charts*    **Practice #6 Constructing Explanations**  *- Construct* ***explanations****; use* ***evidence*** |
| Grade 4 -  Visualize & describe data | * Display data in a line plot (**dot plot**) with tic marks at 1/8. * Interpret differences between min & max values from a bar graph & line plot (dot plot). (**Range**) * Use and interpret **units** of measurement; relate units to each other (1 ft. = 12 inches) |
| Grade 5 - Visualize & describe data | * Find **average** (measure of center) |
| Grade 6 - Anticipate variability | * Recognize a statistical question as one that anticipates **variability** in the data related to the question and accounts for it in the answers (**CCMS 6 SP-1**). | **Practice #4**: **Analyze and interpret data**  Use spreadsheets, databases, tables, charts, graphs, statistics, mathematics, and information technology to collate, summarize, and display data and to explore relationships between variables.  Construct, analyze, interpret graphical displays of data &/or large data sets to identify relationships  Analyze & interpret data to provide evidence for phenomena  Apply concepts of statistics to analyze and characterize data, using digital tools when feasible  Analyze and interpret data to determine similarities and differences in findings  **Practice #5: Apply mathematical concepts**  - *Quantitative vs. qualitative data*  - *Organize simple data sets to reveal patterns/relationships*  - *Describe, measure, estimate, and/or graph quantities*  - *Create and/or use graphs and charts* |
| Show & describe variability | * Understand that a set of data collected to answer a statistical question has a **distribution**, which can be described by its **center**, **spread**, & overall **shape**. (**CCM 6 SP-2**) * *Display numerical data in plots on a number line, including* ***dot plots****,* ***histograms****, and* ***box******plots****. (****CCMS 6 SP-4****)* * ***Summarize*** *numerical data sets in relation to their context. (****CCMS 6 SP-5****)* |
| Grade 7 - Compare groups | * Informally assess the degree of visual overlap of **two numerical data distributions** with similar variability, measuring the difference between the centers by expressing it as a multiple of a measure of variability. (**CCMS 7 SP-I3**) |
| Grade 8 -  Show correlation  Show change through time  Show proportions | * Construct & interpret **scatter plots** for bi-variate measurement data to investigate patterns of association between two quantities. (**CCMS 8 SP-1**) * *Informally* ***fit a straight line****; informally assess the model fit by judging the closeness of the data points to the line. (****CCMS 8 SP-3****)* * Use ratio and rate reasoning to solve real-world and mathematical problems. **(CCMS 6RP-3**) |
| Grade 9-12 | * **Data are gathered, displayed, summarized, examined, and interpreted** to discover patterns and deviations from patterns. Quantitative data can be described in terms of key characteristics: measures of shape, center, and spread. | **By grade 12, students should be able to:**  **Formulate questions that can be investigated** within the scope of the classroom, school laboratory, or field with available resources and, when appropriate, **frame a hypothesis for an expected outcome** based on a **model** or **theory**.  **Decide** what data are to be gathered, what tools are needed to do the gathering, and how measurements will be recorded.  **Decide how much data are needed** to produce reliable measurements and **consider any limitations** on the precision of the data.  Plan experimental or field-research procedures, identifying relevant independent and dependent variables and, when appropriate, the need for controls.  **Consider possible confounding variables** or effects and ensure that the investigation’s design has controlled for them. |
|  | * A statistically significant outcome is one that is unlikely to be due to chance alone, and this can be evaluated only under the condition of randomness. It is important to **consider the study design, how the data were gathered, and the analyses employed** as well as the data summaries and the conclusions drawn. |
|  | * **Technology** plays an important role in statistics and probability by making it possible to generate plots, regression functions, and correlation coefficients, and to simulate many possible outcomes **in a short amount of time**. |
|  | * Functions may be used to describe data; if the data suggest a linear relationship, the **relationship can be modeled** with a regression line, and its strength and direction can be expressed through a correlation coefficient. |
| Tell a data story |  | A data story includes a question, evidence, claim, reasoning  NGSS Practice #6: Construct explanations  - *Construct explanations based on valid and reliable evidence…*  - *Apply scientific reasoning to show why data or evidence is adequate for the explanation*  **NGSS Practice #7**: **Engage in argument from evidence**  - *Construct, use, &/or present an oral & written argument supported by empirical evidence & scientific reasoning to support or refute an explanation…*  NGSS Practice #8: Communicate scientific ideas using tables, graphs and diagrams  - *Communicate scientific information using tables, diagrams, graphs…in writing and/or through oral presentations.* |