**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)
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| Grade 5 - Visualize & describe data | * Find **average** (measure of center)

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| 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 relationshipsAnalyze & interpret data to provide evidence for phenomenaApply concepts of statistics to analyze and characterize data, using digital tools when feasibleAnalyze 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****)*
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| 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**)
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| Grade 8 -Show correlationShow change through timeShow 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**)
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| 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.
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|   | * **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**.
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|   | * 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.
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| Tell a data story |  | A data story includes a question, evidence, claim, reasoningNGSS 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.* |