

Analyzing and Interpreting Data - Learning Progressions

Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
Analyzing data in K-2 builds on prior experiences and progresses to collecting, recording, and sharing observations.	Analyzing data in 3-5 builds on K-2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible digital tools should be used.	Analyzing data in 6-8 builds on K-5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.	Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.
Record information (thoughts, observations, and ideas). Use and share pictures, drawings, and/or writing of observations.	Represent data in tables and/or various graphical displays (bar graphs, pictographs, pie charts) to reveal patterns that indicate relationships. (3.ESS2.1 , 5.ESS1.2)	Construct, analyze, and/or interpret graphical displays of data and/or large data sets to identify linear and nonlinear relationships. (7.PS3.1) Use graphical displays (e.g., maps, charts, graphs, tables) of large data sets to identify temporal and spatial relationships. Distinguish between causal and correlational relationships in data. Analyze and interpret data to provide evidence for phenomena. (3.LS3.1 , 3.LS4.1 , 4.ESS2.2 , 6.ESS3.2 , 7.LS2.1)	Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution. (PS.PS2.1 , PH.PS2.1 , ES.ESS2.2 , ES.ESS2.4 , EN.ESS2.2 , EN.ESS2.4)
Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in	Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or	Analyze concepts of statistics and probability (including mean, median, mode, and variability) to analyze and characterize data,	Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation

order to answer scientific questions and solve problems (K.LS1.1 , K.ESS2.1 , 1.ESS1.1)	computation.	using digital tools when feasible. Consider limitations of data analysis (e.g., measurement error, sample selection) and/or seek to improve precision and accuracy of data with better technological tools and methods (e.g., multiple trials).	coefficient to linear fits) to scientific and engineering questions and problems, using digital tools when feasible. (B.LS3.3 , B.LS4.3) Consider limitations of data analysis (e.g., measurement error, sample selection) when analyzing and interpreting data.
Compare predictions (based on prior experiences) to what occurred (observable events).	Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.	Analyze and interpret data to determine similarities and differences in findings. (6.ESS2.3 , 7.PS1.2 , 8.LS4.1 , 8.LS4.3 , 8.ESS1.3)	Compare and contrast various types of data sets (e.g., self-generated, archival) to examine consistency of measurements and observations.
Analyze data from tests of an object or tool to determine if it works as intended. (K.PS2.2 , 2.PS1.2)	Analyze data to refine a problem statement or the design of a proposed object, tool, or process. Use data to evaluate and refine design solutions.	Analyze data to define an optimal operational range for a proposed object, tool, process, or system that best meets criteria for success.	Evaluate the impact of new data on a working explanation and/or model of a proposed process or system. Analyze data to identify design features or characteristics of the components of a proposed process or system to optimize it relative to criteria for success.