

Vertical Alignment of Scientific and Engineering Practice: Analyzing Data

TEKS in Focus highlights key concepts and student expectations to assist educators in implementing the Texas Essential Knowledge and Skills (TEKS) in science. The vertical progression of a concept within the science TEKS is presented, along with detailed explanations from the TEKS Guide. The scientific and engineering practices are the first strand of the science TEKS. To create a cohesive learning experience, educators should integrate scientific and engineering practices with content. Embedding these practices in the content provides students with the context to ask questions, develop models, and analyze data. This approach ensures that students develop critical thinking and problem-solving skills by applying scientific and engineering practices to real-world scenarios as they learn the content.

Detailed explanations are provided for the underlined terms and phrases in each student expectation. Detailed explanations call out a specific word or phrase in a student expectation to clarify what students should know and be able to do in reference to that word or phrase. Detailed explanations may include an instructional boundary that specifies Tier 1 (baseline) instructional expectations for all students.

Scientific and Engineering Practice 2B

Science TEKS	Term or Phrase	Detailed Explanations from TEKS Guide
K.2.B; 1.2.B; 2.2.B <i>analyze data by identifying significant features and patterns;</i>	significant features and patterns	Students should understand that identifying significant features of data uses language such as "more than," "less than," or "the same as." For example, a student might observe that there are "three more smooth rocks than rough rocks," or they might observe that there are "equal numbers of smooth and rough rocks."
3.2.B; 4.2.B; 5.2.B <i>analyze data by identifying any significant features, patterns, or sources of error;</i>	sources of error	Students in grades 3–5 should be aware that errors may occur while collecting data, and they should consider the sources of error, such as during the collection of measurements, design, or calculations, and what impact the error may have on the interpretation of the data. Students should also consider which data, such as outliers, may be in error.

TEKS In Focus highlights concepts or student expectations to strengthen TEKS alignment, rigor, and shared understanding. It doesn't specify a particular order or timing but helps clarify TEKS expectations and serves as a guide for classroom instruction when relevant.

Science TEKS	Term or Phrase	Detailed Explanations from TEKS Guide
6.2.B; 7.2.B; 8.2.B; BIO.2.B; CHEM.2.B; IPC.2.B; PHYS.2.B <i>analyze data by identifying any significant descriptive statistical features, patterns, sources of error, or limitations;</i>	sources of error	Grades 6–12: Students should consider where sources of errors might occur, such as during the collection of measurements, design, or calculations, and what impact the error may have on the interpretation of the data. Students should also consider which data, such as outliers, may be in error.
6.2.B; 7.2.B; 8.2.B; BIO.2.B; CHEM.2.B; IPC.2.B; PHYS.2.B <i>analyze data by identifying any significant descriptive statistical features, patterns, sources of error, or limitations;</i>	significant descriptive statistical features	Grade 6: By the end of grade 6, students should describe the shape, spread, and center of data, including the mean, median, mode, range, quartiles, and descriptions of clustering. Grades 7–8: Significant descriptive statistical features students should use to analyze data include describing the shape, spread, and center of data, using mean, median, mode, range, quartiles, and descriptions of clustering. Biology, Chemistry, IPC, Physics: Students should describe the shape, spread, and center of data, including the mean, median, mode, range, quartiles, and descriptions of clustering. Statistics include inferential statistics, which help determine whether data confirms or refutes a hypothesis and whether it is generalizable to a larger population.

TEKS Guide Glossary Terms (found in one or more student expectations of this vertical alignment):

Glossary terms and definitions in the TEKS Guide are consistent from kindergarten through high school. The definitions provide educators with a common understanding of the terms, regardless of the grade level they teach. Glossary definitions are not intended for use with students.

data: factual information (such as observations, measurements, or statistics) used as a basis for reasoning, discussion, or calculation; often includes both useful and irrelevant or redundant information and must be processed to be meaningful

patterns: regular sequences that can be found throughout nature

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TEKS Guide Further Explanation:

The further explanation section is intended to serve as a resource to help educators better understand the topic their students are studying. Further explanations may be written at a level more complex than what is expected for students at that grade level.

The following further explanation appears in kindergarten through grade 2:

Patterns in science:

Scientific questions can be generated when scientists observe a pattern of events or when something does not match an established pattern. Scientists can use patterns to classify phenomena. For example, day and night, moon phases, and life cycles are patterns that are used for classification.

Patterns in engineering:

Engineers use scientific knowledge to develop or improve objects, systems, or processes. Engineers use patterns found in scientific data to make data-informed decisions during the engineering design process. Engineers may diagnose failure patterns in a designed system and improve the design, and analyze patterns such as daily and seasonal power use to design a system that can meet fluctuating needs.

The following further explanation appears in grades 6 through 8 and high school:

Sources of error in data could include human errors, such as failing to follow instructions accurately, not following investigation procedures, or misreading a measurement, and experimental errors, such as neglecting external environmental factors (e.g., friction), equipment calibration issues, contamination, or insufficient quantity or range of data.

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