The purpose of this write up is to correlate the steps of the Mars Rover Program and Competition with the national education standards for K-8th grade science and with the Texas Essential Knowledge and Skills for 3rd-8th grade science, math and language arts. The attempt was to include the national standards on a broad scale, while including any TEKS that related in any way. While it is possible to break the program/competition steps down further, this paper groups them into three main areas: Research, Rover Design and Group Presentation. The program/competition steps can be found in detail in the paper “Mars Rover Models - - A Program to Enrich Teaching Space Science, Planetary Exploration and Robotics in Elementary and Middle School” by Edgar A. Bering III, John Ramsey, Brenda Boyko, Holly Smith, Sandy Peck and William H. Arceneaux.

The national standards are indeed quite broad. This paper covers the standards that fit the project/competition as a whole.

National Standards K-4
Standard A - Science as Inquiry
As a result of activities in grades K-4, all students should develop the abilities necessary to do scientific inquiry to:

- Ask questions about objects, organisms, and events in the environment
- Plan and conduct a simple investigation
- Employ simple equipment and tools to gather Data and extend the senses
- Use data to construct a reasonable explanation
- Communicate investigations and explanations

As a result of activities in grades K-4, all students should develop an understanding of scientific inquiry:

- Scientific investigations involve asking and answering a question and comparing the answer with what scientists already know about the world.
- Scientists use different kinds of investigations depending on the questions they are trying to answer. Types of investigations include describing objects, events, and organisms; classifying them; and doing a fair test (experimenting).
- Simple instruments, such as magnifiers, thermometers, and rulers, provide more information than scientists obtain using only their senses.
- Scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge). Good explanations are based on evidence from investigations.
- Scientists make the results of their investigations public; they describe the investigations in ways that
enable others to repeat the investigations.
- Scientists review and ask questions about the results of other scientists’ work.

**Standard E – Science and Technology**

As a result of activities in grades K-4, all students should develop abilities of technological design:
- Identify a simple problem
- Propose a solution
- Implementing proposed solutions
- Evaluate a product or design
- Communicate a problem, design, and solution

As a result of activities in grades K-4, all students should develop an understanding about science and technology:
- People have always had questions about their world. Science is on way of answering questions and explaining the natural world.
- People have always had problems and invented tools and techniques (ways of doing something) to solve problems. Trying to determine the effects of solutions helps people avoid some new problems.
- Scientists and engineers often work in teams with different individuals doing different things that contribute to the results. This understanding focuses primarily on teams working together and secondarily, on the combination of scientist and engineer teams.
- Women and men of all ages, backgrounds, and groups engage in a variety of scientific and technological work.
- Tools help scientists make better observations, measurements, and equipment for investigations. They help scientists see, measure, and do things that they could not otherwise see, measure, and do.

As a result of activities in grades K-4, all students should develop abilities to distinguish between natural objects and objects made by humans:
- Some objects occur in nature; others have been designed and made by people to solve human problems and enhance the quality of life.
- Objects can be categorized into two groups, natural and designed.

**Standard G – History and Nature of Science**

As a result of activities in grades K-4, all students should develop understanding of science as a human endeavor:
- Science and technology have been practiced by people for a long time.
- Men and women have made a variety of contributions throughout the history of science and technology.
- Although men and women using scientific inquiry have learned much about the objects, events, and phenomena in nature, much more remains to be understood. Science will never be finished.
- Many people choose science as a career and devote their entire lives to studying it. Many people derive great pleasure from doing science.

**National Standards 5-8**

**Standard A – Science as Inquiry**

As a result of activities in grades 5-8, all students should develop the abilities necessary to do scientific inquiry:
- Identify questions that can be answered through scientific investigations
- Design and conduct a scientific investigation
- Use appropriate tools and techniques to gather, analyze, and interpret data
- Develop descriptions, explanations, predictions, and models using evidence
- Think critically and logically to make the relationships between evidence and explanations
- Recognize and analyze alternative explanations and predictions
- Communicate scientific procedures and explanations
- Use mathematics in all aspects of scientific inquiry

As a result of activities in grades 5-8, all students should develop understandings about scientific inquiry:
- Different kinds of questions suggest different kinds of scientific investigations. Some investigations involve observing and describing objects, organisms, or events; some involve collecting specimens; some involve experiments; some involve seeking more information; some involve discovery of new objects and phenomena; and some involve making models.
- Current scientific knowledge and understanding guide scientific investigations. Different scientific domains employ different methods, core theories, and standards to advance scientific knowledge and understanding.
- Mathematics is important in all aspects of scientific inquiry.
- Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.
- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models, and theories. The scientific community accepts and uses such explanations until displaced by better scientific ones. When such displacement occurs, science advances.
- Science advances through legitimate skepticism. Asking questions and querying other scientists’ explanations is part of scientific inquiry. Scientists evaluate the explanations proposed by other scientists by examining evidence, comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations.
- Scientific investigations sometimes result in new ideas and phenomena for study, generate new methods or procedures for an investigation, or develop new technologies to improve the collection of data. All of these results can lead to new investigations.

**Standard E – Science and Technology**

As a result of activities in grades 5-8, all students should develop the abilities of technological design:
- Identify appropriate problems for technological design
- Implement a proposed design
- Evaluate completed technological designs or products
- Communicate the process of technological design

As a result of activities in grades 5-8, all students should develop understandings about science and technology:
- Scientific inquiry and technological design have similarities and differences. Scientists propose explanations for questions about the natural world, and engineers propose solutions relating to human problems, needs, and aspirations. Technological solutions are temporary; technologies exist within nature and so they cannot contravene physical or biological principles; technological solutions have side effects; and technologies cost, carry risks, and provide benefits.
- Many different people in different cultures have made and continue to make contributions to science and technology.
- Science and technology are reciprocal. Science helps drive technology as it addresses questions that demand more sophisticated instruments and provides principles for better instrumentation and technique. Technology is essential to science, because it provides instruments and techniques that enable observations of objects and phenomena that are otherwise unobservable due to factors such a quantity, distance, location, size, and speed. Technology also provides tools for investigations, inquiry, and analysis.
Perfectly designed solutions do not exist. All technological solutions have trade-offs, such as safety, cost, efficiency, and appearance. Engineers often build in back-up systems to provide safety. Risk is part of living in a highly technological world. Reducing risk often results in new technology.

- Technological designs have constraints. Some constraints are unavoidable, for example, properties of materials, or effects of weather and friction; other constraints limit choices in the design, for example, environmental protection, human safety, and aesthetics.
- Technological solutions have intended benefits and unintended consequences. Some consequences can be predicted, others cannot.

**Standard F – Science in personal and Social Perspectives**

As a result of activities in grades 5-8, all students should develop understanding of science and technology in society:

- Science influences society through its knowledge and world view. Scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment. The effect of science on society is neither entirely beneficial nor entirely detrimental.
- Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities through the availability of funding for research.
- Technology influences society through its products and processes. Technology influences the quality of life and the ways people act and interact. Technological changes are often accompanied by social, political, and economic changes that can be beneficial or detrimental to individuals and to society. Social needs, attitudes, and values influence the direction of technological development.
- Science and technology have advanced through contributions of many different people, in different cultures, at different times in history. Science and technology have contributed enormously to economic growth and productivity among societies and groups within societies.
- Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.
- Scientists and engineers have ethical codes requiring that human subjects involved with research be fully informed about risks and benefits associated with the research before the individuals choose to participate. Their ethic extends to potential risks to communities and property. In short, prior knowledge and consent are required for research involving human subjects or potential damage to property.
- Science cannot answer all questions and technology cannot solve all human problems or meet all human needs. Students should understand the difference between scientific and other questions. They should appreciate what science and technology can reasonably contribute to society and what they cannot do. For example, new technologies often will decrease some risks and increase others.

**Standard G – History and Nature of Science**

As a result of activities in grades 5-8, all students should develop understanding of science as human endeavor:

- Women and men of various social and ethnic backgrounds – and with diverse interests, talents, qualities, and motivations – engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams, and some work alone, but all communicate extensively with others.
- Science requires different abilities, depending on such factors as the field of study and type of inquiry. Science is very much a human endeavor, and the work of science relies on basic human qualities, such as reasoning, insight, energy, skill, and creativity – as well as on scientific habits of mind, such as intellectual honest, tolerance of ambiguity, skepticism, and openness to new ideas,
As a result of activities in grades 5-8, all students should develop understanding of the nature of science:

- Scientists formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models. Although all scientific ideas are tentative and subject to change and improvement in principle, for most major ideas in science, there is much experimental and observational confirmation. Those ideas are not likely to change greatly in the future. Scientists do and have changed their ideas about nature when they encounter new experimental evidence that does not match their existing explanations.

- In areas where active research is being pursued and in which there is not a great deal of experimental or observational evidence and understanding, it is normal for scientists to differ with one another about the interpretation of the evidence or theory being considered.

- Different scientists might publish conflicting experimental results or might draw different conclusion from the same data. Ideally, scientists acknowledge such conflict and work towards finding evidence that will resolve their disagreement.

- It is part of scientific inquiry to evaluate the results of scientific investigations, experiments, observations, theoretical models, and the explanations proposed by other scientists. Evaluation includes reviewing the experimental procedures, examining the evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Although scientists may disagree about explanations of phenomena, about interpretations of data, or about the value of rival theories, they do agree that questioning, response to criticism, and open communication are integral to the process of science. As scientific knowledge evolves, major disagreements are eventually resolved through such interactions between scientists.

As a result of activities in grades 5-8, all students should develop an understanding of the history of science:

- Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.

- In historical perspective, science has been practiced by different individuals in different cultures. In looking at the history of many peoples, one finds that scientists and engineers of high achievement are considered to be among the most valued contributors to their culture.

- Tracing the history of science can show how difficult it was for scientific innovators to break through the accepted ideas of their time to reach the conclusions that we currently take for granted.

**Step One: Research**

The areas of research are: the characteristics of Mars, the characteristics of space travel, the features and uses of space probes in general and Mars probes in particular, and the requirements of various missions. Students will utilize the Internet, videos, CD-ROMS, books and NASA material. They will need the abilities to identify research objectives, collect and organize data, and collectively decide how to best use the information gathered.

**Texas Essential Knowledge and Skills**

3rd Grade Language Arts

12(A) The student is expected to identify relevant questions for inquiry

12 (C) The student is expected to recognize and use parts of a book to locate information, including table of contents, chapter titles, guide words, and indices
12(D) The student is expected to use multiple sources, including print such as an encyclopedia, technology, and experts, to locate information that addresses questions.

12(E) The student is expected to interpret and use graphic sources of information, including maps, charts, graphs, and diagrams.

12(F) The student is expected to locate and use important areas of the library media center.

12(G) The student is expected to organize information in systematic ways, including notes, charts, and labels.

12(I) The student is expected to use compiled information and knowledge to raise additional, unanswered questions.

12(J) The student is expected to draw conclusions from information gathered.

20(A) The student is expected to write or dictate questions for investigating.

20(B) The student is expected to record his/her own knowledge of a topic in a variety of ways such as by drawing pictures, making lists, and showing connections among ideas.

20(C) The student is expected to take simple notes from relevant sources such as classroom quests, books, and media sources.

3rd Grade Math
14(A) The student is expected to collect, organize, record, and display data in pictographs and bar graphs where each picture or cell might represent more than one piece of data.

14(B) The student is expected to interpret information from pictographs and bar graphs.

16(A) The student is expected to explain and record observations using objects, words, pictures, numbers, and technology.

16(B) The student is expected to relate informal language to mathematical language and symbols.

3rd Grade Science
3(A) The student is expected to analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.

3(D) The student is expected to evaluate the impact of research on scientific thought, society, and the environment.

3(E) The student is expected to connect Grade 3 science concepts with the history of science and contributions of scientists.

4(A) The student is expected to collect and analyze information using tools including calculators, microscopes, cameras, safety goggles, sound recorders, clocks, computers, thermometers, hand lenses, meter sticks, rulers, balances, magnets, and compasses.

11(C) The student is expected to identify the planets in our solar system and their position in relation to the sun.
These next two TEKS relate specifically to the Earth, but can easily translate into use for Mars research.

6(A) The student is expected to gather information including temperature, magnetism, hardness, and mass using appropriate tools to identify physical properties of matter

11(A) The student is expected to identify and describe the importance of earth materials including rocks, soil, water, and gases of the atmosphere in the local area and classify them as renewable, nonrenewable, or inexhaustible resources

4th Grade Language Arts

9(C) The student is expected to use multiple reference aids, indulging a thesaurus, a synonym finder, a dictionary, and software, to clarify meanings and usage

10(G) The student is expected to paraphrase and summarize text to recall, inform, and organize ideas

10(H) The student is expected to draw inferences such as conclusions or generalizations and support them with text evidence and experience

10(L) The student is expected to represent text information in different ways such as in outline, timeline, or graphic organizer

11(A) The student is expected to offer observations, make connections, react, speculate, interpret, and raise questions in response to texts

11(B) The student is expected to interpret text ideas through such varied means as journal writing, discussion, enactment, and media

11(D) The student is expected to connect, compare, and contrast ideas, themes, and issues across text

13(A) The student is expected to form and revise questions for investigations, including questions arising from interests and unit of study

13(B) The student is expected to use text organizers, including headings, graphic features, and tables of contents, to locate and organize information

13(C) The student is expected to use multiples sources, including electronic texts, experts, and print resources, to locate information relevant to research questions

13(D) The student is expected to interpret and use graphic sources of information such as maps, graphs, timelines, tables, and diagrams to address research questions

13(E) The student is expected to summarize and organize information from multiple sources by taking motes, outlining ideas, or making charts

13(F) The student is expected to produce research projects and reports in effective formats using visuals to support meaning, as appropriate

13(G) The student is expected to draw conclusions from information gathered from multiple sources
13(H) The student is expected to use compiled information and knowledge to raise additional, unanswered questions

21(A) The student is expected to frame questions to direct research

21(B) The student is expected to organize prior knowledge about a topic in a variety of ways such as by producing a graphic organizer

21(C) The student is expected to take notes from relevant and authoritative sources such as guest speakers, periodicals, and on-line searches

21(D) The student is expected to summarize and organize ideas gained from multiple sources in useful ways such as outlines, conceptual maps, learning logs, and timelines

21(F) The student is expected to evaluate his/her own research and raise new questions for further investigation

**4th Grade Math**

14(A) The student is expected to identify the mathematics in everyday situations

15(A) The student is expected to explain and record observations using objects, words, pictures, numbers, and technology

15(B) The student is expected to relate informal language to mathematical language and symbols

**4th Grade Science**

2(A) The student is expected to plan and implement descriptive investigations including asking well-defined questions, formulating testable hypotheses, and selecting and using equipment and technology

2(B) The student is expected to collect information by observing and measuring

2(C) The student is expected to communicate valid conclusions

2(D) The student is expected to construct simple graphs, tables, maps, and charts to organize, examine, and evaluate information

3(A) The student is expected to analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information

3(C) The student is expected to represent the natural world using models and identify their limitations

3(D) The student is expected to evaluate the impact of research on scientific thought, society, and the environment

3(E) The student is expected to connect Grade 4 science concepts with the history of science and contributions of scientists

4(A) The student is expected to collect and analyze information using tools including calculators, safety goggles, microscopes, cameras, sound recorders, computers, hand lenses, rulers, thermometers, meter sticks, timing devices, balances, and compasses
5th Grade Language Arts

9(C) The student is expected to use multiple reference aids, including a thesaurus, a synonym finder, a dictionary and software to clarify meanings and usage

10(G) The student is expected to paraphrase and summarize text to recall, inform, or organize ideas

10(H) The student is expected to draw inferences such as conclusions or generalizations and support them with text evidence and experience

10(L) The student is expected to represent text information in different ways such as in outline, timeline, or graphic organizer

11(A) The student is expected to offer observations, make connections, react, speculate, interpret, and raise questions in response to texts

11(B) The student is expected to interpret text ideas through such varied means as journal writing, discussion, enactment, and media

11(D) The student is expected to connect, compare, and contrast ideas, themes, and issues across text

13(A) The student is expected to form and revise questions for investigations, including questions arising from interests and unit of study

13(B) The student is expected to use text organizers, including headings, graphic features, and tables of contents, to locate and organize information

13(C) The student is expected to use multiples sources, including electronic texts, experts, and print resources, to locate information relevant to research questions

13(D) The student is expected to interpret and use graphic sources of information such as maps, graphs, timelines, tables, and diagrams to address research questions

13(E) The student is expected to summarize and organize information from multiple sources by taking motes, outlining ideas, or making charts

13(F) The student is expected to produce research projects and reports in effective formats using visuals to support meaning, as appropriate

13(G) The student is expected to draw conclusions from information gathered from multiple sources

13(H) The student is expected to use compiled information and knowledge to raise additional, unanswered questions

21(A) The student is expected to frame questions to direct research

21(B) The student is expected to organize prior knowledge about a topic in a variety of ways such as by producing a graphic organizer

21(C) The student is expected to take notes from relevant and authoritative sources such as guest speakers,
periodicals, and on-line searches

21 (D) The student is expected to summarize and organize ideas gained from multiple sources in useful ways such as outlines, conceptual maps, learning logs, and timelines

21(F) The student is expected to evaluate his/her own research and raise new questions for further investigation

5th Grade Math
14(A) The student is expected to identify the mathematics in everyday situations

15(A) The student is expected to explain and record observations using objects, words, pictures, numbers, and technology

15(B) The student is expected to relate informal language to mathematical language and symbols

5th Grade Science
2(A) The student is expected to plan and implement descriptive and simple experimental investigations including asking well-defined questions, formulating testable hypotheses, and selecting and using equipment and technology

2(B) The student is expected to collect information by observing and measuring

2(C) The student is expected to analyze and interpret information to construct reasonable explanations from direct and indirect evidence

2(D) The student is expected to communicate valid conclusions

2(E) The student is expected to construct simple graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate information

3(A) The student is expected to analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information

3(C) The student is expected to represent the natural world using models and identify their limitations

3(D) The student is expected to evaluate the impact of research on scientific thought, society, and the environment

3(E) The student is expected to connect Grade 5 science concepts with the history of science and contributions of scientists

4(A) The student is expected to collect and analyze information using tools including calculators, microscopes, cameras, sound recorders, computers, hand lenses, rulers, thermometers, compasses, balances, hot plates, meter sticks, timing devices, magnets, collecting nets, and safety goggles

6th Grade Language Arts
9(C) The student is expected to use multiple reference aids, including a thesaurus, a synonym finder, a dictionary and software to clarify meanings and usage

10(G) The student is expected to paraphrase and summarize text to recall, inform, or organize ideas
10(H) The student is expected to draw inferences such as conclusions or generalizations and support them with text evidence and experience.

10(L) The student is expected to represent text information in different ways such as in outline, timeline, or graphic organizer.

11(A) The student is expected to offer observations, make connections, react, speculate, interpret, and raise questions in response to texts.

11(B) The student is expected to interpret text ideas through such varied means as journal writing, discussion, enactment, and media.

11(D) The student is expected to connect, compare, and contrast ideas, themes, and issues across text.

13(A) The student is expected to form and revise questions for investigations, including questions arising from interests and unit of study.

13(B) The student is expected to use text organizers, including headings, graphic features, and tables of contents, to locate and organize information.

13(C) The student is expected to use multiple sources, including electronic texts, experts, and print resources, to locate information relevant to research questions.

13(D) The student is expected to interpret and use graphic sources of information such as maps, graphs, timelines, tables, and diagrams to address research questions.

13(E) The student is expected to summarize and organize information from multiple sources by taking notes, outlining ideas, or making charts.

13(F) The student is expected to produce research projects and reports in effective formats for various audiences.

13(G) The student is expected to draw conclusions from information gathered from multiple sources.

13(H) The student is expected to use compiled information and knowledge to raise additional, unanswered questions.

20(A) The student is expected to frame questions to direct research.

20(B) The student is expected to organize prior knowledge about a topic in a variety of ways such as by producing a graphic organizer.

20(C) The student is expected to take notes from relevant and authoritative sources such as guest speakers, periodicals, and on-line searches.

20(D) The student is expected to summarize and organize ideas gained from multiple sources in useful ways such as outlines, conceptual maps, learning logs, and timelines.

20(F) The student is expected to evaluate his/her own research and raise new questions for further investigation.
20(G) The student is expected to follow accepted formats for writing research, including documenting sources

6th Grade Math
There are not obvious TEKS covering research for the 6th grade.

6th Grade Science
1(A) The student is expected to demonstrate safe practices during field and laboratory investigations

1(B) The student is expected to make wise choices in the use and conservation of resources and the disposal or recycling of materials

2(A) The student is expected to plan and implement descriptive and simple experimental investigations including asking well-defined questions, formulating testable hypotheses, and selecting and using equipment and technology

2(B) The student is expected to collect information by observing and measuring

2(C) The student is expected to analyze and interpret information to construct reasonable explanations from direct and indirect evidence

2(D) The student is expected to communicate valid conclusions

2(E) The student is expected to construct simple graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate information

3(A) The student is expected to analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information

3(C) The student is expected to represent the natural world using models and identify their limitations

3(D) The student is expected to evaluate the impact of research on scientific thought, society, and the environment

3(E) The student is expected to connect Grade 6 science concepts with the history of science and contributions of scientists

4(A) The student is expected to collect and analyze information using tools including beakers, petri dishes, meter sticks, graduated cylinders, weather instruments, timing devices, hot plates, test tubes, safety goggles, spring scales, magnets, balances, microscopes, telescopes, thermometers, calculators, field equipment, compasses, computers, and computer probes

7th Grade Language Arts
9(C) The student is expected to use multiple reference aids, including a thesaurus, a synonym finder, a dictionary and software to clarify meanings and usage

10(G) The student is expected to paraphrase and summarize text to recall, inform, or organize ideas

10(H) The student is expected to draw inferences such as conclusions or generalizations and support them with text evidence and experience
10(L) The student is expected to represent text information in different ways such as in outline, timeline, or graphic organizer

11(A) The student is expected to offer observations, make connections, react, speculate, interpret, and raise questions in response to texts

11(B) The student is expected to interpret text ideas through such varied means as journal writing, discussion, enactment, and media

11(D) The student is expected to connect, compare, and contrast ideas, themes, and issues across text

13(A) The student is expected to form and revise questions for investigations, including questions arising from interests and unit of study

13(B) The student is expected to use text organizers, including headings, graphic features, and tables of contents, to locate and organize information

13(C) The student is expected to use multiple sources, including electronic texts, experts, and print resources, to locate information relevant to research questions

13(D) The student is expected to interpret and use graphic sources of information such as maps, graphs, timelines, tables, and diagrams to address research questions

13(E) The student is expected to summarize and organize information from multiple sources by taking notes, outlining ideas, or making charts

13(F) The student is expected to produce research projects and reports in effective formats for various audiences

13(G) The student is expected to draw conclusions from information gathered from multiple sources

13(H) The student is expected to use compiled information and knowledge to raise additional, unanswered questions

20(A) The student is expected to frame questions to direct research

20(B) The student is expected to organize prior knowledge about a topic in a variety of ways such as by producing a graphic organizer

20(C) The student is expected to take notes from relevant and authoritative sources such as guest speakers, periodicals, and on-line searches

20(D) The student is expected to summarize and organize ideas gained from multiple sources in useful ways such as outlines, conceptual maps, learning logs, and timelines

20(F) The student is expected to evaluate his/her own research and raise new questions for further investigation

20(G) The student is expected to follow accepted formats for writing research, including documenting sources

7th Grade Math
There are not obvious TEKS covering research for the 7th grade.
7th Grade Science
1(A) The student is expected to demonstrate safe practices during field and laboratory investigations

1(B) The student is expected to make wise choices in the use and conservation of resources and the disposal or recycling of materials

2(A) The student is expected to plan and implement descriptive and simple experimental investigations including asking questions, formulating testable hypotheses, and selecting and using equipment and technology

2(B) The student is expected to collect information by observing and measuring

2(C) The student is expected to organize, analyze, make inferences, and predict trends from direct and indirect evidence

2(D) The student is expected to communicate valid conclusions

2(E) The student is expected to construct graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate data

3(A) The student is expected to analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information

3(C) The student is expected to represent the natural world using models and identify their limitations

3(D) The student is expected to evaluate the impact of research on scientific thought, society, and the environment

3(E) The student is expected to connect Grade 6 science concepts with the history of science and contributions of scientists

4(A) The student is expected to collect, analyze, and record information to explain a phenomenon using tools including beakers, petri dishes, meter sticks, graduated cylinders, weather instruments, hot plates, dissecting equipment, test tubes, safety goggles, spring scales, balances, microscopes, telescopes, thermometers, calculators, field equipment, computers, computer probes, timing devices, magnets, and compasses

8th Grade Language Arts
9(C) The student is expected to use multiple reference aids, including a thesaurus, a synonym finder, a dictionary and software to clarify meanings and usage

10(G) The student is expected to paraphrase and summarize text to recall, inform, or organize ideas

10(H) The student is expected to draw inferences such as conclusions or generalizations and support them with text evidence and experience

10(L) The student is expected to represent text information in different ways such as in outline, timeline, or graphic organizer

11(A) The student is expected to offer observations, make connections, react, speculate, interpret, and raise questions in response to texts
11(B) The student is expected to interpret text ideas through such varied means as journal writing, discussion, enactment, and media.

11(D) The student is expected to connect, compare, and contrast ideas, themes, and issues across text.

13(A) The student is expected to form and revise questions for investigations, including questions arising from interests and unit of study.

13(B) The student is expected to use text organizers, including headings, graphic features, and tables of contents, to locate and organize information.

13(C) The student is expected to use multiple sources, including electronic texts, experts, and print resources, to locate information relevant to research questions.

13(D) The student is expected to interpret and use graphic sources of information such as maps, graphs, timelines, tables, and diagrams to address research questions.

13(E) The student is expected to summarize and organize information from multiple sources by taking notes, outlining ideas, or making charts.

13(F) The student is expected to produce research projects and reports in effective formats for various audiences.

13(G) The student is expected to draw conclusions from information gathered from multiple sources.

13(H) The student is expected to use compiled information and knowledge to raise additional, unanswered questions.

20(A) The student is expected to frame questions to direct research.

20(B) The student is expected to organize prior knowledge about a topic in a variety of ways such as by producing a graphic organizer.

20(C) The student is expected to take notes from relevant and authoritative sources such as guest speakers, periodicals, and on-line searches.

20(D) The student is expected to summarize and organize ideas gained from multiple sources in useful ways such as outlines, conceptual maps, learning logs, and timelines.

20(F) The student is expected to evaluate his/her own research and raise new questions for further investigation.

20(G) The student is expected to follow accepted formats for writing research, including documenting sources.

**8th Grade Math**

There are not obvious TEKS covering research for the 8th grade.

**8th Grade Science**

1(A) The student is expected to demonstrate safe practices during field and laboratory investigations.

1(B) The student is expected to make wise choices in the use and conservation of resources and the disposal or
recycling of materials

2(A) The student is expected to plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting and using equipment and technology

2(B) The student is expected to collect information by observing and measuring

2(C) The student is expected to organize, analyze, make inferences, and predict trends from direct and indirect evidence

2(D) The student is expected to communicate valid conclusions

2(E) The student is expected to construct graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate data

3(A) The student is expected to analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information

3(C) The student is expected to represent the natural world using models and identify their limitations

3(D) The student is expected to evaluate the impact of research on scientific thought, society, and the environment

3(E) The student is expected to connect Grade 8 science concepts with the history of science and contributions of scientists

4(A) The student is expected to collect, analyze, and record information to explain a phenomenon using tools including beakers, petri dishes, meter sticks, graduated cylinders, weather instruments, hot plates, dissecting equipment, test tubes, safety goggles, spring scales, balances, microscopes, telescopes, thermometers, calculators, field equipment, computers, computer probes, timing devices, magnets, and compasses

Step Two: Design
The design portion of the program/competition covers the selection of a mission, the planning of needed equipment/features and the design of the rover itself.

Texas Essential Knowledge and Skills
3rd Grade Language Arts
There are no obvious TEKS for design in the 3rd grade

3rd Grade Math
3(A&B) Number, operation, and quantitative reasoning. The student adds and subtracts to solve meaningful problems involving whole numbers.

4(A&B&C) Number, operation, and quantitative reasoning. The student recognizes and solves problems in multiplication and division situations.

5(A&B) Number, operation, and quantitative reasoning. The student estimates to determine reasonable results.
6(A&B&C) Patterns, relationships and algebraic thinking. The student uses patterns to solve problems.

8 Geometry and spatial reasoning. The student uses formal geometric vocabulary. The student is expected to name, describe, and compare shapes and solids using formal geometric vocabulary.

9(A&B&C) Geometry and spatial reasoning. The student recognizes congruence and symmetry.

10 Geometry and spatial reasoning. The student recognizes that numbers can be represented by points on a line. The student is expected to locate and name points on a line using whole numbers and fractions such as halves.

11 (A&B&C) Measurement. The student selects and uses appropriate units and procedures to measure length and area.

13 Measurement. The student applies measurement concepts. The student is expected to measure to solve problems involving length, area, temperature and time.

15(A) The student is expected to identify the mathematics in everyday situations

15(B) The student is expected to use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness

15(C) The student is expected to select or develop an appropriate problem-solving strategy, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem

15(D) The student is expected to use tools such as real objects, manipulatives, and technology to solve problems

17(A&B) Underlying process and mathematical tools. The student uses logical reasoning to make sense of his or her world.

**3rd Grade Science**

2(A) The student is expected to plan and implement descriptive investigations including asking well-defined questions, formulating testable hypotheses, and selecting and using equipment and technology

2(E) The student is expected to construct simple graphs, tables, maps, and charts to organize, examine and evaluate information

**4th Grade Language Arts**

There are no obvious TEKS for design in the 4th grade

**4th Grade Math**

3(A&B) Number, operation, and quantitative reasoning. The student adds and subtracts to solve meaningful problems involving whole numbers and decimals

4(A-E) Number, operation, and quantitative reasoning. The student multiplies and divides to solve meaningful problems involving whole numbers.

5(A&B) Number, operation, and quantitative reasoning. The student estimates to determine reasonable results

8(A&B&C) Geometry and spatial reasoning. The student identifies and describes lines, shapes, and solids using
formal geometric language

9(A&B&C) Geometry and spatial reasoning. The student connects transformations to congruence and symmetry

10 Geometry and spatial reasoning. The student recognizes the connection between numbers and points on a number line. The student is expected to locate and name points on a number line using whole numbers, fractions such as halves and fourths, and decimals such as tenths.

12 Measurement. The student applies measurement concepts. The student is expected to measure to solve problems involving length, including perimeter, time, temperature, and area.

14(A) The student is expected to identify the mathematics in everyday situations.

14(B) The student is expected to use a problem-solving model that incorporates understanding the problem, making a plan, carry out the plan, and evaluating the solution for reasonableness.

14(C) The student is expected to select or develop an appropriate problem-solving strategy, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem.

14(D) The student is expected to use tools such as real objects, manipulatives, and technology to solve problems.

16(A) The student is expected to make generalizations from patterns or sets of examples and nonexamples.

16(B) The student is expected to justify why an answer is reasonable and explain the solution process.

4th Grade Science
2(A) The student is expected to plan and implement descriptive investigations including asking well-defined questions, formulating testable hypotheses, and selecting and using equipment and technology.

2(E) The student is expected to construct simple graphs, tables, maps, and charts to organize, examine and evaluate information.

5th Grade Language Arts
There are no obvious TEKS for design in the 5th grade.

5th Grade Math
3(A-E) Number, operation, and quantitative reasoning. The student adds, subtracts, multiplies, and divides to solve meaningful problems.

4(A&B) Number, operation, and quantitative reasoning. The student estimates to determine reasonable results.

8(A) The student is expected to sketch the results of translations, rotations, and reflections.

8(B) The student is expected to describe the transformation that generates one figure from the other when given two congruent figures.

10(A&B) Measurement. The student selects and uses appropriate units and procedures to measure volume.

11(A&B) Measurement. The student applies measurement concepts.
14(A) The student is expected to identify the mathematics in everyday situations

14(B) The student is expected to use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness

14(C) The student is expected to select or develop an appropriate problem-solving strategy, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem

14(D) The student is expected to use tools such as real objects, manipulatives, and technology to solve problems

5th Grade Science
2(A) The student is expected to plan and implement descriptive investigations including asking well-defined questions, formulating testable hypotheses, and selecting and using equipment and technology

2(E) The student is expected to construct simple graphs, tables, maps, and charts to organize, examine and evaluate information

6th Grade Language Arts
There are no obvious TEKS for design in the 6th grade

6th Grade Math
2(A-D) Number, operation, and quantitative reasoning. The student adds, subtracts, multiplies, and divides to solve problems and justify solutions

3(A-C) Patterns, relationships, and algebraic thinking. The student solves problems involving proportional relationships

6(A-C) Geometry and spatial reasoning. The student uses geometric vocabulary to describe angles, polygons, and circles

7 Geometry and spatial reasoning. The student uses coordinate geometry to identify location in two dimensions. The student is expected to locate and name points on a coordinate plane using ordered pairs of non-negative rational numbers

8(A-D) Measurement. The student solves application problems involving estimation and measurement of length, area, time, temperature, capacity, weight, and angles

11(A) The student is expected to identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and with other mathematical topics

11(B) The student is expected to use a problem-solving model that incorporates understanding the problem, making a plan carrying out the plan, and evaluating the solution for reasonableness

11(C) The student is expected to select or develop an appropriate problem-solving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out making table, working a simper problem, or working backwards to solve a problem

11(D) The student is expected to select tools such as real objects, manipulatives, paper/pencil, and technology
or techniques such as mental math, estimation, and number sense to solve problems

**6th Grade Science**
2(A) The student is expected to plan and implement descriptive investigations including asking well-defined questions, formulating testable hypotheses, and selecting and using equipment and technology

2(E) The student is expected to construct simple graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate data

9(B) The student is expected to compare methods used for transforming energy in devices such as water heaters, cooling systems, or hydroelectric and wind power plants

9(C) The student is expected to research and describe energy types from their source to their use and determine if the type is renewable, non-renewable, or inexhaustible

13(B) The student is expected to describe types of equipment and transportation needed for space travel

**7th Grade Language Arts**
There are no obvious TEKS for design in the 7th grade

**7th Grade Math**
2(A-G) Number, operation, and quantitative reasoning. The student adds, subtracts, multiples, or divides to solve problems and justify solutions

3(A&B) Patterns, relationships, and algebraic thinking. The student solves problems involving proportional relationships

6(A-D) Geometry and spatial reasoning. The student compares and classifies shapes and solids using geometric vocabulary and properties

8(A-C) Geometry and spatial reasoning. The student uses geometry to model and describe the physical world

9 Measurement. The student solves application problems involving estimation and measurement. The student is expected to estimate measurements and solve application problems involving length (including perimeter and circumference), area, and volume

10(A&B) Probability and statistics. The student recognizes that a physical or mathematical model can be used to describe the probability of real-life events

**7th Grade Science**
2(A) The student is expected to plan and implement descriptive investigations including asking well-defined questions, formulating testable hypotheses, and selecting and using equipment and technology

2(E) The student is expected to construct simple graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate data

6 Science concepts. The student knows that there is a relationship between force and motion

**8th Grade Language Arts**
There are no obvious TEKS for design in the 8th grade
8th Grade Math
1(A-D) Number, operation, and quantitative reasoning. The student understands that different forms of numbers are appropriate for different situations

2(A-D) Number, operation, and quantitative reasoning. The student selects and uses appropriate operations to solve problems and justify solutions

3(A&B) Patterns, relationships, and algebraic thinking. The student identifies proportional relationships in problem situations and solves problems

10(A&B) Measurement. The student describes how changes in dimensions affect linear, area, and volume measures
14(A) The student is expected to identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and with other mathematical topics
14(B) The student is expected to use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness
14(C) The student is expected to select or develop an appropriate problem-solving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem
14(D) The student is expected to select tools such as real objects, manipulatives, paper/pencil, and technology or techniques such as mental math, estimation, and number sense to solve problems

8th Grade Science
2(A) The student is expected to plan and implement descriptive investigations including asking well-defined questions, formulating testable hypotheses, and selecting and using equipment and technology
2(E) The student is expected to construct simple graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate date
5(A) The student is expected to identify a design problem and propose a solution
5(B) The student is expected to design and test a model to solve the problem
5(C) The student is expected to evaluate the model and make recommendations for improving the model
7(A) The student is expected to demonstrate how unbalanced forces cause changes in the speed or direction of an object’s motion

Step Three: Presentation
This stage includes the presentation of the model and the skit.
Note: There are no obvious TEKS for presentation in any of the grades for Math & Science.

3rd Grade Language Arts
3(A) The student is expected to choose and adapt spoken language appropriate to the audience, purpose, and the occasion, including use of appropriate volume and rate
3(C) The student is expected to ask and answer relevant questions and make contributions in small or large group discussions

3(D) The student is expected to present dramatic interpretations of experiences, stories, poems, or plays

3(E) The student is expected to gain increasing control of grammar when speaking such as using subject-verb agreement, complete sentences, and correct tense

4(A) The student is expected to use vocabulary to describe clearly ideas, feelings, and experiences

4(B) The student is expected to clarify and support spoken messages using appropriate props, including objects, pictures, and charts

12(H) The student is expected to demonstrate learning through productions and displays such as oral and written reports, murals, and dramatizations

20(D) The student is expected to compile notes into outlines, reports, summaries, or other written efforts using available technology

4th to 8th Grade Language Arts
Note: TEKS begin repeating at this point. The grade(s) the TEKS applies to is given at the end in parenthesis.

5(A) The student is expected to adapt spoken language such as word choice, diction, and usage to the audience, purpose, and occasion. (4-8)

5(C) The student is expected to present dramatic interpretations of experiences, stories, poems, or plays to communicate. (4-8)

5(F) The student is expected to clarify and support spoken ideas with evidence, elaborations, and examples. (4-8)

15(C) The student is expected to write to inform such as to explain, describe, report, and narrate. (4-8)

15(D) The student is expected to write to entertain such as to compose humorous poems or short stories. (4-8)

19(A-I) Writing/writing processes. The student selects and uses writing processes for self-initiated and assigned writing. (4-8)

21(E) The student is expected to present information in various forms using available technology. (4-8)

25(A) The student is expected to select, organize, or produce visuals to complement and extend meanings. (4-8)

25(B) The student is expected to produce communications using technology or appropriate media such as developing a class newspaper, multimedia reports, or video reports. (4-8)