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| **Asking questions (for science) and defining problems (for engineering)**  A basic practice of the *scientist* is the ability to  formulate empirically answerable questions about  phenomena to establish what is already know, and  to determine what questions have yet to be  satisfactorily answered.  *Engineering* begins with a problem that needs to be  solved, such as “How can we reduce the nation’s  dependence on fossil fuels?” or “What can be done  to reduce a particular disease?” or “How can we  improve the fuel efficiency of automobiles?” | **Developing and using models**  *Science* often involves the construction and use of  models and simulations to help develop  explanations about natural phenomena.  *Engineering* makes use of models and simulations  to analyze systems to identify flaws that might occur  or to test possible solutions to a new problem. |
| **Planning and carrying out investigations**  A major practice of *scientists* is planning and  carrying out systematic scientific investigations that require identifying variables and clarifying what counts as data.  *Engineering* investigations are conducted to gain  data essential for specifying criteria or parameters  and to test proposed designs. | **Analyzing and interpreting data**  Scientific investigations produce data that must be  analyzed to derive meaning. *Scientists* use a range  of tools to identify significant features and patterns in the data.  *Engineering* investigations include analyses of data  collected in the tests of designs. This allows  comparison of different solutions and determines  how well each meets specific design criteria. |
| **Using mathematics and computational thinking**  In *science*, mathematics and computation are  fundamental tools for representing physical variables and their relationships.  In *engineering*, mathematical and computational  representations of established relationships and  principles are an integral part of the design  process. | **Constructing explanations (for science) and designing solutions (for engineering)**  The goal of *science* is the construction of theories  that provide explanatory accounts of the material  world.  The goal of *engineering* design is a systematic  approach to solving engineering problems that is  based on scientific knowledge and models of the  material world. |
| **Engaging in argument from evidence**  In *science*, reasoning and argument are essential for  clarifying strengths and weaknesses of a line of  evidence and for identifying the best explanation for a natural phenomenon.  In *engineering*, reasoning and arguments are  essential for finding the best solution to a problem.  Engineers collaborate with their peers throughout  the design process. | **Obtaining, evaluating, and communicating information**  *Science* cannot advance if scientists are unstable to  communicate their findings clearly and persuasively or learn about the findings of others.  *Engineering* cannot produce new or improved  technologies if the advantages of their designs are  not communicated clearly and persuasively. |