Tennessee Science

Scientific Research

Links Among Engineering, Technology, Science, and Society SCRE.ETS2

1. **Explore the impact of technology on social, political, or economic systems.** SCRE.ETS2.1
2. **Describe the dynamic interplay among engineering, technology, and applied science.** SCRE.ETS2.2
3. **Identify the most appropriate scientific instruments and/or computer programs for different experiments and research, and learn to use, care for, and maintain them, gather data, and analyze results.** SCRE.ETS2.3
4. **Engage in evidence-based arguments through the scientific method of investigation to understand the effective role that scientific discoveries played in the progression of humankind.** SCRE.ETS2.4

Applications of Science SCRE.ETS3

1. **Research and present information about the history of the development of a scientific theory. Articulate reasons for refinements and/or replacement of this theory over time.** SCRE.ETS3.1
2. **Engage in argument from evidence supporting the statement that science is tentative.** SCRE.ETS3.2
3. **Generate questions and engage in discussion regarding the role of ethics in scientific research and in decision making based on scientific information.** SCRE.ETS3.3
4. **Make observations and ask questions about the natural world. Refine the questions such that they can be answered by way of scientific investigation.** SCRE.ETS3.4
5. **Use online search engines to find sources of scientific information. Develop, share, and revise criteria for evaluating reliability of sources.** SCRE.ETS3.5
6. **Obtain and communicate information regarding ethical research practices pertaining to humans and animals as well as information regarding proper permitting agencies and procedures.** SCRE.ETS3.6
7. **Obtain and present information on research protocols including citation formats (APA, MLA, etc.), plagiarism, and copyright and patent laws.** SCRE.ETS3.7
8. **Engage in the peer review process by giving and receiving detailed feedback throughout the process of planning and carrying out investigations.** SCRE.ETS3.8

9 **Develop a research proposal including the following: a problem statement; purpose of research; significance of research; objectives; literature review (including both primary and secondary sources); materials and methods; detailed budget; data analysis procedures; and, references. Include a list of potential risks associated with the study and a detailed safety plan as appropriate for materials and methods. Revise the proposal based on feedback from teacher and peers.** SCRE.ETS3.9

10 **Create a scientific journal and/or lab notebook for recording qualitative and quantitative data.** SCRE.ETS3.10

11 **Carry out an original scientific investigation (experiment or study) after having received approval of a revised research proposal.** SCRE.ETS3.11

12 **Select and use appropriate statistical procedures (descriptive statistics, t-tests, regression and correlation, chi-square, etc.) to analyze data. Use available calculators, spreadsheets, and statistical software programs.** SCRE.ETS3.12

13 **Select and use appropriate data tables, graphs, and diagrams to represent data. Use mathematics and computational thinking to look for patterns in data.** SCRE.ETS3.13

14 **Develop a conclusion based on data analysis and cite evidence to support the conclusion.** SCRE.ETS3.14

15 **Use data to develop a model. Evaluate the effectiveness of the model by making and testing predictions.** SCRE.ETS3.15

16 **Evaluate experimental results and identify possible sources of error or bias in scientific investigations (published research, original research, and research of peers).** SCRE.ETS3.16

17 **Write a scientific paper based on original scientific research including the following or equivalent sections: abstract, introduction, literature review, materials and methods, results, conclusions, and literature cited.** SCRE.ETS3.17

18 **Prepare and give a presentation based on original scientific research.** SCRE.ETS3.18

19 **Prepare a poster based on original scientific research and participate in a poster session.** SCRE.ETS3.19

20 **Submit research to scientific agencies as appropriate.** SCRE.ETS3.20