Vermont Comprehensive Assessment Program (VTCAP)

VERMONT AGENCY OF EDUCATION

Practice Test Alignment Document

Science | Grade 5

Sequence Number	Standard	Learning Target
Session 1		
1	**SEP**: Constructing Explanations and Designing Solutions, **DCI**: LS4.B Natural Selection, **CCC**: Cause and Effect, **PE: 3-LS4-2**: Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.	Support a claim using results of an investigation that plants with certain characteristics are more likely to survive.
2	**SEP**: Asking Questions and Defining Problems, **DCI**: PS3.B Conservation of Energy and Energy Transfer, **CCC**: Energy and Matter, **PE: 4-PS3-3**: Ask questions and predict outcomes about the changes in energy that occur when objects collide.	Identify a question to investigate changes in energy during a collision and identify the types of energy produced in the collision.
3	**SEP**: Developing and Using Models, **DCI**: PS4.A Wave Properties, **CCC**: Patterns, **PE: 4-PS4-1**: Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.	Develop a model to show the motion of water waves.
4*	**SEP**: Developing and Using Models, **DCI**: LS1.B Growth and Development of Organisms, **CCC**: Patterns, **PE: 3-LS1-1**: Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.	Describe how life cycles of two organisms are alike and different.
5	**SEP**: Planning and Carrying Out Investigations, **DCI**: PS1.A Structure and Properties of Matter, **CCC**: Scale, Proportion, and Quantity, **PE: 5-PS1-3**: Make observations and measurements to identify materials based on their properties.	Describe a claim about an investigation to identify materials based on their properties.
6	**SEP**: Planning and Carrying Out Investigations, **DCI**: PS1.A Structure and Properties of Matter, **PE: 5-PS1-3**: Make observations and measurements to identify materials based on their properties.	Identify an unknown substance based on observations and properties in a data table.
7	**DCI**: PS1.B Chemical Reactions, **CCC**: Cause and Effect, **PE: 5-PS1-4**: Conduct an investigation to determine whether the mixing of two or more substances results in new substances.	Identify evidence that supports the claim that mixing two substances produces a new substance.

*This is a hand-scored question. The rubric can be found at the end of this document for reference.
Science and Engineering Practices (**SEP**), Disciplinary Core Ideas (**DCI**), Cross-Cutting Concepts (**CCC**)

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Sequence Number	Standard	Learning Target
8	**DCI**: PS1.B Chemical Reactions, **CCC**: Cause and Effect, **PE: 5-PS1-4**: Conduct an investigation to determine whether the mixing of two or more substances results in new substances.	Describe an observation that supports a claim that mixing two substances produces a new substance.
9	**SEP**: Planning and Carrying Out Investigations, **DCI**: ESS2.A Earth Materials and Systems, **CCC**: Cause and Effect, **PE: 4-ESS2-1**: Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.	Identify the type of data that is most useful to collect in an investigation about the effects of rainwater on volcanic slopes.
10	**SEP**: Planning and Carrying Out Investigations, **DCI**: ESS2.A Earth Materials and Systems, **CCC**: Cause and Effect, **PE: 4-ESS2-1**: Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.	Support a hypothesis about the differences in observed erosion on two different sides of a volcano.
11	**SEP**: Analyzing and Interpreting Data, **DCI**: ESS2.B Plate Tectonics and Large-Scale System Interactions, **CCC**: Patterns, **PE: 4-ESS2-2**: Analyze and interpret data from maps to describe patterns of Earth's features.	Use a map to compare two different volcanoes.
12	**SEP**: Analyzing and Interpreting Data, **DCI**: ESS2.B Plate Tectonics and Large-Scale System Interactions, **CCC**: Patterns, **PE: 4-ESS2-2**: Analyze and interpret data from maps to describe patterns of Earth's features.	Use a map to identify the volcano with the steepest slope and explain my reasoning.
Session 2		
1	**SEP**: Obtaining, Evaluating, and Communicating Information, **DCI**: ESS2.D Weather and Climate, **CCC**: Patterns, **PE: 3-ESS2-2**: Obtain and combine information to describe climates in different regions of the world.	Use graphs and data tables to describe typical weather patterns and climate for an area.
2	**SEP**: Developing and Using Models, **DCI**: LS1.D Information Processing, **CCC**: Systems and System Models, **PE: 4-LS1-2**: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.	Use a model to describe how the nervous system allows an organism to react to the environment.
3*****	**SEP**: Engaging in Argument from Evidence, **DCI**: ESS3.B Natural Hazards, **CCC**: Cause and Effect, **PE: 3-ESS3-1**: Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.	Explain what a score value means about a design, describe what will likely happen if a strong wave hits the wood fence design, and identify the design that best meets the criteria.

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Science and Engineering Practices (**SEP**), Disciplinary Core Ideas (**DCI**), Cross-Cutting Concepts (**CCC**)

Sequence Number	Standard	Learning Target
4	**SEP**: Engaging in Argument from Evidence, **DCI**: LS4.C Adaptation, **CCC**: Cause and Effect, **PE: 3-LS4-3**: Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.	Support a claim using the results of an investigation that some organisms can survive in a particular habitat.
5	**SEP**: Engaging in Argument from Evidence, **DCI**: LS2.C Ecosystem Dynamics, Functioning, and Resilience, **CCC**: System and System Models, **PE: 3-LS4-4**: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.	Support a claim about a solution to a problem in a garden caused by drought conditions.
6	**SEP**: Engaging in Argument from Evidence, **DCI**: LS4.C Adaptation, **PE: 3-LS4-3**: Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.	Support a claim using data from an investigation about the best plant choices during drought conditions.
7	**DCI**: LS2.C Ecosystem Dynamics, Functioning, and Resilience, **CCC**: System and System Models, **PE: 3-LS4-4**: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.	Support a claim using evidence about an environmental change and how plants and animals are affected.
8	**SEP**: Constructing Explanations and Designing Solutions, **DCI**: ETS1.A Defining and Delimiting an Engineering Problem, ***Connections to Nature of Science***: Science is a Human Endeavor, **PE: 4-PS3-4**: Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.	Describe how a model converts energy from one form to another and how to improve the model.
9	**SEP**: Planning and Carrying Out Investigations, **DCI**: PS3.B Conservation of Energy and Energy Transfer, **CCC**: Energy and Matter, **PE: 4-PS3-2**: Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.	Identify an observation that provides evidence of an energy transformation.
10	**SEP**: Constructing Explanations and Designing Solutions, **DCI**: ETS1.A Defining and Delimiting an Engineering Problem, **PE: 4-PS3-4**: Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.	Describe how a model is designed to convert energy from one form to another and how to improve the model.
11	**SEP**: Constructing Explanations and Designing Solutions, **DCI**: ETS1.A Defining and Delimiting an Engineering Problem, ***Connections to Nature of Science***: Science is a Human Endeavor, **PE: 4-PS3-4**: Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.	Describe the effect of a change to a model on energy conversion.

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Science and Engineering Practices (**SEP**), Disciplinary Core Ideas (**DCI**), Cross-Cutting Concepts (**CCC**)

Sequence Number	Standard	Learning Target
Session 3		
1	**SEP**: Planning and Carrying Out Investigations, **DCI**: PS2.A Forces and Motion, **CCC**: Cause and Effect, **PE: 3-PS2-1**: Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.	Describe the effect of balanced and unbalanced forces on the motion of an object.
2	**DCI**: ESS3.B Natural Hazards, **CCC**: Cause and Effect, **PE: 4-ESS3-2**: Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.	Describe how a tiltmeter could help save the lives of people who live near a volcano.
3	**SEP**: Planning and Carrying Out Investigations, **DCI**: PS1.B Chemical Reactions, **CCC**: Cause and Effect, **PE: 5-PS1-4** Conduct an investigation to determine whether the mixing of two or more substances results in new substances.	Identify a measurement to test water and identify variables to keep the same during an investigation.
4*****	**SEP**: Developing and Using Models, **DCI**: PS4.B Electromagnetic Radiation, **CCC**: Cause and Effect, **PE: 4-PS4-2**: Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.	Draw a model that shows how light reflects from objects and enters the eye allowing objects to be seen and predict how thick fog will affect vision.
5	**SEP**: Analyzing and Interpreting Data, **DCI**: ESS1.B Earth and the Solar System, **CCC**: Patterns, **PE: 5-ESS1-2**: Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.	Describe how the direction of a stick's shadow changes and the Earth's motion that causes such a change.
6	**SEP**: Analyzing and Interpreting Data, **DCI**: ESS1.B Earth and the Solar System, **CCC**: Patterns, **PE: 5-ESS1-2**: Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.	Place diagrams showing a stick's shadow in order from shortest to longest throughout a day.
7	**SEP**: Analyzing and Interpreting Data, **DCI**: ESS1.B Earth and the Solar System, **CCC**: Patterns, **PE: 5-ESS1-2**: Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.	Complete a table to show the time of day each shadow was observed.
8	**SEP**: Analyzing and Interpreting Data, **DCI**: ESS1.B Earth and the Solar System, **CCC**: Patterns, **PE: 5-ESS1-2**: Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.	Support a claim about the length of a shadow observed during the winter, as compared to summer.

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Science and Engineering Practices (**SEP**), Disciplinary Core Ideas (**DCI**), Cross-Cutting Concepts (**CCC**)

Sequence Number	Standard	Learning Target
9	**DCI**: LS2.B Cycles of Matter and Energy Transfer in Ecosystems, **CCC**: Systems and System Models, **PE: 5-LS2-1**: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.	Describe how soil helps plants grow.
10	**SEP**: Developing and Using Models, **DCI**: LS2.B Cycles of Matter and Energy Transfer in Ecosystems, **CCC**: Systems and System Models, **PE: 5-LS2-1**: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.	Describe types of matter that organisms need to live using a model.
11	**SEP**: Engaging in Argument from Evidence, **DCI**: LS1.C Organization for Matter and Energy Flow in Organisms, **CCC**: Energy and Matter, **PE: 5-LS1-1**: Support an argument that plants get the materials they need for growth chiefly from air and water.	Describe a reason that a plant will not grow due to not receiving materials needed for growth.
12	**SEP**: Engaging in Argument from Evidence, **DCI**: LS1.C Organization for Matter and Energy Flow in Organisms, **CCC**: Energy and Matter, **PE: 5-LS1-1**: Support an argument that plants get the materials they need for growth chiefly from air and water.	Support a claim about an investigation and describe changes to make a plant grow faster.

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Science and Engineering Practices (**SEP**), Disciplinary Core Ideas (**DCI**), Cross-Cutting Concepts (**CCC**)

Scoring Rubrics

Session 1

Question 4

Scoring Rubric

Score	Description
4	The response demonstrates thorough use of the three dimensions to make sense of scientific phenomena and/or to design solutions to problems. The response uses the models to describe one way the butterfly and clownfish life cycles are alike and one way they are different. The response also identifies which of the two life cycle models is most similar to the parrot's life cycle and describes one way that an animal's life cycle and the parrot's life cycle are alike and one way that an animal's life cycle and the parrot's life cycle are different. The response • clearly applies science and engineering practices to provide an explanation or solution; • provides a coherent and accurate explanation or solution based on disciplinary core ideas; • reflects thorough understanding of complex ideas and crosscutting concepts; and • effectively applies and demonstrates complete understanding of the three dimensions.
3	The response demonstrates sufficient use of the three dimensions to make sense of scientific phenomena and/or to design solutions to problems. The response may lack some detail or information, or the response may contain minor errors in applying and demonstrating understanding of science and engineering practices, disciplinary core ideas, and crosscutting concepts.
2	The response demonstrates limited use of the three dimensions to make sense of scientific phenomena and/or to design solutions to problems. The response may lack multiple details or information, or the response may contain major error(s) in applying and demonstrating understanding of science and engineering practices, disciplinary core ideas, and crosscutting concepts.
1	The response demonstrates minimal use of the three dimensions to make sense of scientific phenomena and/or to design solutions to problems.
0	The response is inaccurate, is irrelevant, or contains no evidence of use of the three dimensions to make sense of scientific phenomena and/or to design solutions to problems.
Blank	No response.

Sample Student Response:

a. The two life cycles are alike because both animals begin as eggs. Then they get bigger. They both grow up and become adults. Both the butterfly and the clownfish babies are called something different from their grown-up names. The baby butterflies are called caterpillars and the baby clownfish are called larvae. The two life cycles are different because when a butterfly is young it looks very different from its parents. The baby clownfish looks similar to a clownfish (both have tails) when it is born. It is just smaller and has no fins. It takes years for a clownfish to grow, but it lives a long time. A butterfly takes only weeks to grow and only lives for four weeks.

Note: Responses need only one of the many similarities and one of the many differences.

Scoring Rubrics

b. The parrot's life cycle is more like the clownfish. Both animals begin as eggs. After birth, both animals look similar to but smaller than parents. They both get larger. The cycles are different because the parrot takes a longer time to grow up than the lion. Clownfish start out without stripes and grow stripes while parrots do not.

Notes:

- *A student may use a drawing of the parrot's life cycle in his or her description of similarities and differences. If so, it should look similar to that of the clownfish and there must be a description or label of what the student intends to be similar and different. The drawings of the parrot do not have to look like parrots. Responses without drawings are also acceptable if a detailed description is provided.*
- *Students are not required to know anything about feather colors and how they change on parrots, so reasonable statements about color/pattern changes in feathers can be accepted.*

Students are not required to use the scientific understanding of metamorphosis and chrysalises, etc. in descriptions of butterfly life cycles.

Scoring Rubrics

Session 2

Question 3

Scoring Rubric

Score	Description
4	The response demonstrates thorough use of the three dimensions to make sense of scientific phenomena and/or to design solutions to problems. The response explains what a score of 85 for the concrete pod design means, describes what will likely happen if a strong wave hits the wood fence design, and explains which design best meets Sid's criteria. The response • clearly applies science and engineering practices to provide an explanation or solution; • provides a coherent and accurate explanation or solution based on disciplinary core ideas; • reflects thorough understanding of complex ideas and crosscutting concepts; and • effectively applies and demonstrates complete understanding of the three dimensions.
3	The response demonstrates sufficient use of the three dimensions to make sense of scientific phenomena and/or to design solutions to problems. The response may lack some detail or information, or the response may contain minor errors in applying and demonstrating understanding of science and engineering practices, disciplinary core ideas, and crosscutting concepts.
2	The response demonstrates limited use of the three dimensions to make sense of scientific phenomena and/or to design solutions to problems. The response may lack multiple details or information, or the response may contain major error(s) in applying and demonstrating understanding of science and engineering practices, disciplinary core ideas, and crosscutting concepts.
1	The response demonstrates minimal use of the three dimensions to make sense of scientific phenomena and/or to design solutions to problems.
0	The response is inaccurate, is irrelevant, or contains no evidence of use of the three dimensions to make sense of scientific phenomena and/or to design solutions to problems.
Blank	No response.

Sample Student Response:

a. A score of 85 means that the design can reduce a great deal of flood damage but cannot prevent some damage from occurring.

b. The waves will probably wash away the fence.

c. The best design for Sid is the concrete column design. Because the house is on stilts, the water will flow under the house. And because the columns are made of concrete, the columns can standup to the powerful waves.

Note: Award credit for other designs if the selection is well explained.

Scoring Rubrics

Session 3

Question 4

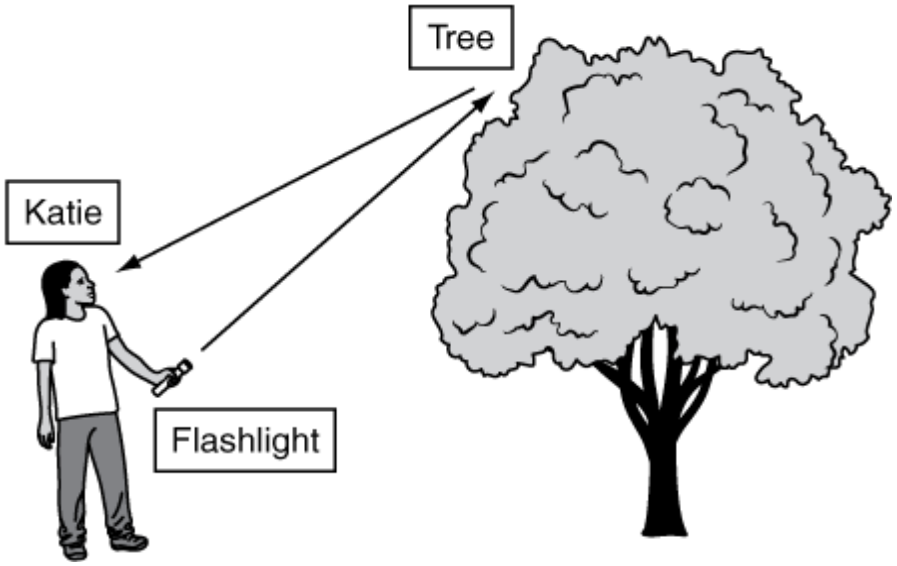
Scoring Rubric

Score	Description
4	The response demonstrates thorough use of the three dimensions to make sense of scientific phenomena and/or to design solutions to problems. The response uses the objects and arrows showing the path of light to draw a model that shows how Katie is able to see the tree and uses the model to describe how Katie is able to see the tree. The response also predicts how well Katie will be able to see the tree if there is thick fog in the woods. The response • clearly applies science and engineering practices to provide an explanation or solution; • provides a coherent and accurate explanation or solution based on disciplinary core ideas; • reflects thorough understanding of complex ideas and crosscutting concepts; and • effectively applies and demonstrates complete understanding of the three dimensions.
3	The response demonstrates sufficient use of the three dimensions to make sense of scientific phenomena and/or to design solutions to problems. The response may lack some detail or information, or the response may contain minor errors in applying and demonstrating understanding of science and engineering practices, disciplinary core ideas, and crosscutting concepts.
2	The response demonstrates limited use of the three dimensions to make sense of scientific phenomena and/or to design solutions to problems. The response may lack multiple details or information, or the response may contain major error(s) in applying and demonstrating understanding of science and engineering practices, disciplinary core ideas, and crosscutting concepts.
1	The response demonstrates minimal use of the three dimensions to make sense of scientific phenomena and/or to design solutions to problems.
0	The response is inaccurate, is irrelevant, or contains no evidence of use of the three dimensions to make sense of scientific phenomena and/or to design solutions to problems.
Blank	No response.

Sample Student Response:

a. The model should look similar to the following: one arrow pointing from the flashlight toward the tree and one arrow pointing from the tree toward the person's head. Angles of incidence and reflection do not have to be equal. The arrows do not have to begin on the objects. The arrows do not have to meet at the same place on the tree. Students do not have to include objects in the drawing.

Scoring Rubrics



b. For Katie to see the tree, light must travel from a light source to the tree and then reflect off the tree and travel to Katie's eyes.

c. In thick fog, Katie will not be able to see the tree as well. The model shows that light must travel from the flashlight to the tree and then reflect off the tree to Katie's eyes. Thick fog would block some of the light from traveling this path. Less light from the flashlight will reach the tree, thus less light from the tree will reach Katie's eyes. The tree will be less bright, more blurry. Light scattered away from the direct path will make the fog bright, which will make the tree harder to see.

Note: Students do not need to refer back to the model for part c.