VSC - Science

Print pages on legal paper, landscape mode.

Grade PK	Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
Standard 1.0 Skills and Processes: Students will demonstrate the thinking and acting inherent in the practice of science.	**Standard 1.0** Skills and Processes: Students will demonstrate the thinking and acting inherent in the practice of science.	**Standard 1.0** Skills and Processes: Students will demonstrate the thinking and acting inherent in the practice of science.	**Standard 1.0** Skills and Processes: Students will demonstrate the thinking and acting inherent in the practice of science.	**Standard 1.0** Skills and Processes: Students will demonstrate the thinking and acting inherent in the practice of science.	**Standard 1.0** Skills and Processes: Students will demonstrate the thinking and acting inherent in the practice of science.	**Standard 1.0** Skills and Processes: Students will demonstrate the thinking and acting inherent in the practice of science.	**Standard 1.0** Skills and Processes: Students will demonstrate the thinking and acting inherent in the practice of science.	**Standard 1.0** Skills and Processes: Students will demonstrate the thinking and acting inherent in the practice of science.	**Standard 1.0** Skills and Processes: Students will demonstrate the thinking and acting inherent in the practice of science.
A. Constructing Knowledge	**A**. Constructing Knowledge	**A**. Constructing Knowledge	**A**. Constructing Knowledge	**A**. Constructing Knowledge	**A**. Constructing Knowledge	**A**. Constructing Knowledge	**A**. Constructing Knowledge	**A**. Constructing Knowledge	**A**. Constructing Knowledge
1. Raise questions about the world around them and be willing to seek answers to some of them by making careful observations and trying things out.	**1.** Raise questions about the world around them and be willing to seek answers to some of them by making careful observations and trying things out.	**1.** Raise questions about the world around them and be willing to seek answers to some of them by making careful observations and trying things out.	**1.** Raise questions about the world around them and be willing to seek answers to some of them by making careful observations and trying things out.	**1.** Gather and question data from many different forms of scientific investigations which include reviewing appropriate print resources, observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.	**1.** Gather and question data from many different forms of scientific investigations which include reviewing appropriate print resources, observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.	**1.** Gather and question data from many different forms of scientific investigations which include reviewing appropriate print resources, observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.	**1.** Design, analyze, or carry out simple investigations and formulate appropriate conclusions based on data obtained or provided.	**1.** Design, analyze, or carry out simple investigations and formulate appropriate conclusions based on data obtained or provided.	**1.** Design, analyze, or carry out simple investigations and formulate appropriate conclusions based on data obtained or provided.
a. Describe what can be learned about things by just observing those things carefully and adding information by sometimes doing something to the things and noting what happens.	**a.** Describe what can be learned about things by just observing those things carefully and adding information by sometimes doing something to the things and noting what happens. ***41. How Plants Grow***	**a.** Describe what can be learned about things by just observing those things carefully and adding information by sometimes doing something to the things and noting what happens. ***24. Nature's***	**a.** Describe what can be learned about things by just observing those things carefully and adding information by sometimes doing something to the things and noting what happens. ***24. Nature's***	**a.** Support investigative findings with data found in books, articles, and databases, and identify the sources used and expect others to do the same.	**a.** Support investigative findings with data found in books, articles, and databases, and identify the sources used and expect others to do the same. ***67. How Big is Your Tree?*** ***67. How Big is Your Tree?- Enrichment*** ***70. Soil Stories***	**a.** Support investigative findings with data found in books, articles, and databases, and identify the sources used and expect others to do the same. ***67. How Big is Your Tree?*** ***67. How Big is Your Tree?- Enrichment*** ***76. Tree Cookies,***	**a.** Explain that scientists differ greatly in what phenomena they study and how they go about their work.	**a.** Explain that scientists differ greatly in what phenomena they study and how they go about their work.	**a.** Explain that scientists differ greatly in what phenomena they study and how they go about their work.

		Recyclers ***24. Nature's Recyclers-variation*** ***41. How Plants Grow***	***Recyclers*** ***24. Nature's Recyclers-variation*** ***41. How Plants Grow***	***67. How Big is Your Tree? - Enrichment*** ***70. Soil Stories***	***77. Trees in Trouble, Part B***	***Part A*** ***77. Trees in Trouble, Part B***			
b. Seek information through reading, observation, exploration, and investigations. ***1. The Shape of Things, Part A*** ***2. Get in Touch with Trees, Parts A, B, and variation*** ***3. Peppermint Beetle*** ***21. adopt a Tree, Part A*** ***22. Trees as Habitats, Part A*** ***43. Have Seeds, Will Travel*** ***46. School Yard Safari*** ***65. Bursting Buds*** ***65. Bursting Buds, Enrichment*** ***67. How Big is Your Tree? – Variation, Enrichment***	**b.** Seek information through reading, observation, exploration, and investigations. ***1. The Shape of Things, Parts A, B*** ***2. Get in Touch with Trees, Parts A, B, and variation*** ***3.Peppermint Beetle*** ***21. Adopt a Tree, Part A*** ***22. Trees as Habitats, Part A*** ***41. How Plants Grow*** ***43. Have Seeds, Will Travel*** ***46. Schoolyard Safari*** ***61. The Closer You Look*** ***65. Bursting Buds*** ***65. Bursting Buds, Enrichment*** ***67. How Big is Your Tree? - Variation & Enrichment*** ***70. Soil Stories, Part A***	**b.** Seek information through reading, observation, exploration, and investigations. ***1. The Shape of Things, Part, B*** ***2. Get in Touch with Trees, Parts A, B, and variation*** ***3.Peppermint Beetle*** ***21. Adopt a Tree, Part A*** ***22. Trees as Habitats, Part A*** ***24. Nature's Recyclers*** ***24. Nature's Recyclers, Variation*** ***41. How Plants Grow*** ***43. Have Seeds, Will Travel*** ***46. Schoolyard Safari*** ***61. The Closer You Look*** ***65. Bursting Buds*** ***65. Bursting Buds, Enrichment*** ***67. How Big is***	**b.** Seek information through reading, observation, exploration, and investigations. ***1. The Shape of Things, Part, B*** ***2. Get in Touch with Trees, Parts A, B, and variation*** ***3.Peppermint Beetle***	**b.** Select and use appropriate tools hand lens or microscope (magnifiers), centimeter ruler (length), spring scale (weight), balance (mass), Celsius thermometer (temperature), graduated cylinder (liquid volume), and stopwatch (elapsed time) to augment observations of objects, events, and processes.	**b.** Select and use appropriate tools hand lens or microscope (magnifiers), centimeter ruler (length), spring scale (weight), balance (mass), Celsius thermometer (temperature), graduated cylinder (liquid volume), and stopwatch (elapsed time) to augment observations of objects, events, and processes.	**b.** Select and use appropriate tools hand lens or microscope (magnifiers), centimeter ruler (length), spring scale (weight), balance (mass), Celsius thermometer (temperature), graduated cylinder (liquid volume), and stopwatch (elapsed time) to augment observations of objects, events, and processes.	**b.** Develop the ability to clarify questions and direct them toward objects and phenomena that can be described, explained, or predicted by scientific investigations.	**b.** Develop the ability to clarify questions and direct them toward objects and phenomena that can be described, explained, or predicted by scientific investigations.	**b.** Develop the ability to clarify questions and direct them toward objects and phenomena that can be described, explained, or predicted by scientific investigations.

	78. Signs of Fall, Part A	***Your Tree? - Variation & Enrichment 70. Soil Stories, Part A 70. Soil Stories, Enrichment 77. Trees in Trouble, Enrichment 78. Signs of Fall, Part A***							
c. Use tools such as thermometers, magnifiers, rulers, or balances to extend their senses and gather data.	**c.** Use tools such as thermometers, magnifiers, rulers, or balances to extend their senses and gather data.	**c.** Use tools such as thermometers, magnifiers, rulers, or balances to extend their senses and gather data.	**c.** Use tools such as thermometers, magnifiers, rulers, or balances to extend their senses and gather data.	**c.** Explain that comparisons of data might not be fair because some conditions are not kept the same.	**c.** Explain that comparisons of data might not be fair because some conditions are not kept the same.	**c.** Explain that comparisons of data might not be fair because some conditions are not kept the same.	**c.** Explain and provide examples that all hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations.	**c.** Explain and provide examples that all hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations.	**c.** Explain and provide examples that all hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations.
d. Explain that when a science investigation is done the way it was done before, we expect to get a very similar result.	**d.** Explain that when a science investigation is done the way it was done before, we expect to get a very similar result.	**d.** Explain that when a science investigation is done the way it was done before, we expect to get a very similar result.	**d.** Explain that when a science investigation is done the way it was done before, we expect to get a very similar result.	**d.** Recognize that the results of scientific investigations are seldom exactly the same, and when the differences are large, it is important to try to figure out why.	**d.** Recognize that the results of scientific investigations are seldom exactly the same, and when the differences are large, it is important to try to figure out why.	**d.** Recognize that the results of scientific investigations are seldom exactly the same, and when the differences are large, it is important to try to figure out why.	**d.** Locate information in reference books, back issues of newspapers, magazines and compact disks, and computer databases.	**d.** Locate information in reference books, back issues of newspapers, magazines and compact disks, and computer databases.	**d.** Locate information in reference books, back issues of newspapers, magazines and compact disks, and computer databases.
e. Participate in multiple experiences to verify that science investigations generally work the same way in different places.	**e.** Participate in multiple experiences to verify that science investigations generally work the same way in different places.	**e.** Participate in multiple experiences to verify that science investigations generally work the same way in different places.	**e.** Participate in multiple experiences to verify that science investigations generally work the same way in different places.	**e.** Follow directions carefully and keep accurate records of one's work in order to compare data gathered.	**e.** Follow directions carefully and keep accurate records of one's work in order to compare data gathered.	**e.** Follow directions carefully and keep accurate records of one's work in order to compare data gathered.	**e.** Explain that if more than one variable changes at the same time in an investigation, the outcome of the investigation may not be clearly attributable to any one of the variables.	**e.** Explain that if more than one variable changes at the same time in an investigation, the outcome of the investigation may not be clearly attributable to any one of the variables.	**e.** Explain that if more than one variable changes at the same time in an investigation, the outcome of the investigation may not be clearly attributable to any one of the variables.
f. Suggest things that you	**f.** Suggest things that you	**f.** Suggest things that you	**f.** Suggest things that you	**f.** Identify possible reasons for	**f.** Identify possible reasons for	**f.** Identify possible reasons for	**f.** Give examples of when further	**f.** Give examples of when further	**f.** Give examples of when further

could do to find answers to questions raised by observing objects and/or phenomena (events such as, water disappearing from the classroom aquarium or a pet's water bowl).	could do to find answers to questions raised by observing objects and/or phenomena (events such as, water disappearing from the classroom aquarium or a pet's water bowl).	could do to find answers to questions raised by observing objects and/or phenomena (events such as, water disappearing from the classroom aquarium or a pet's water bowl).	could do to find answers to questions raised by observing objects and/or phenomena (events such as, water disappearing from the classroom aquarium or a pet's water bowl).	differences in results from investigations including unexpected differences in the methods used or in the circumstances in which the investigation is carried out, and sometimes just because of uncertainties in observations.	differences in results from investigations including unexpected differences in the methods used or in the circumstances in which the investigation is carried out, and sometimes just because of uncertainties in observations.	differences in results from investigations including unexpected differences in the methods used or in the circumstances in which the investigation is carried out, and sometimes just because of uncertainties in observations.	studies of the question being investigated may be necessary.	studies of the question being investigated may be necessary.	studies of the question being investigated may be necessary.
g. Use whole numbers and simple, everyday fractions in ordering, counting, identifying, measuring, and describing things and experiences.	**g.** Use whole numbers and simple, everyday fractions in ordering, counting, identifying, measuring, and describing things and experiences.	**g.** Use whole numbers and simple, everyday fractions in ordering, counting, identifying, measuring, and describing things and experiences.	**g.** Use whole numbers and simple, everyday fractions in ordering, counting, identifying, measuring, and describing things and experiences.	**g.** Judge whether measurements and computations of quantities are reasonable in a familiar context by comparing them to typical values when measured to the nearest: • Millimeter - length • Square centimeter - area • Milliliter - volume • Newton - weight • Gram - mass • Second - time • Degree ° - temperature	**g.** Judge whether measurements and computations of quantities are reasonable in a familiar context by comparing them to typical values when measured to the nearest: • Millimeter - length • Square centimeter - area • Milliliter - volume • Newton - weight • Gram - mass • Second - time • Degree C° - temperature	**g.** Judge whether measurements and computations of quantities are reasonable in a familiar context by comparing them to typical values when measured to the nearest: • Millimeter - length • Square centimeter - area • Milliliter - volume • Newton - weight • Gram - mass • Second - time • Degree ° - temperature	**g.** Give reasons for the importance of waiting until an investigation has been repeated many times before accepting the results as correct.	**g.** Give reasons for the importance of waiting until an investigation has been repeated many times before accepting the results as correct.	**g.** Give reasons for the importance of waiting until an investigation has been repeated many times before accepting the results as correct.
							h. Use mathematics to interpret and communicate data.	**h.** Use mathematics to interpret and communicate data.	**h.** Use mathematics to interpret and communicate data.

							i. Explain why accurate recordkeeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society.	**i.** Explain why accurate recordkeeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society.	**i.** Explain why accurate recordkeeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society.
B. Applying Evidence and Reasoning	**B**. Applying Evidence and Reasoning	**B**. Applying Evidence and Reasoning	**B**. Applying Evidence and Reasoning	**B**. Applying Evidence and Reasoning	**B**. Applying Evidence and Reasoning	**B**. Applying Evidence and Reasoning	**B**. Applying Evidence and Reasoning	**B**. Applying Evidence and Reasoning	**B**. Applying Evidence and Reasoning
1. People are more likely to believe your ideas if you can give good reasons for them.	**1.** People are more likely to believe your ideas if you can give good reasons for them.	**1.** People are more likely to believe your ideas if you can give good reasons for them.	**1.** People are more likely to believe your ideas if you can give good reasons for them.	**1.** Seek better reasons for believing something than "Everybody knows that..." or "I just know" and discount such reasons when given by others.	**1.** Seek better reasons for believing something than "Everybody knows that..." or "I just know" and discount such reasons when given by others.	**1.** Seek better reasons for believing something than "Everybody knows that..." or "I just know" and discount such reasons when given by others.	**1.** Review data from a simple experiment, summarize the data, and construct a logical argument about the cause-and-effect relationships in the experiment.	**1.** Review data from a simple experiment, summarize the data, and construct a logical argument about the cause-and-effect relationships in the experiment.	**1.** Review data from a simple experiment, summarize the data, and construct a logical argument about the cause-and-effect relationships in the experiment.
a. Provide reasons for accepting or rejecting ideas examined.	**a.** Provide reasons for accepting or rejecting ideas examined.	**a.** Provide reasons for accepting or rejecting ideas examined.	**a.** Provide reasons for accepting or rejecting ideas examined.	**a.** Develop explanations using knowledge possessed and evidence from observations, reliable print resources, and investigations.	**a.** Develop explanations using knowledge possessed and evidence from observations, reliable print resources, and investigations.	**a.** Develop explanations using knowledge possessed and evidence from observations, reliable print resources, and investigations.	**a.** Verify the idea that there is no fixed set of steps all scientists follow, scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence.	**a.** Verify the idea that there is no fixed set of steps all scientists follow, scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence.	**a.** Verify the idea that there is no fixed set of steps all scientists follow, scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence.
b. Develop reasonable explanations for observations made, investigations completed, and	**b.** Develop reasonable explanations for observations made, investigations completed, and	**b.** Develop reasonable explanations for observations made, investigations completed, and	**b.** Develop reasonable explanations for observations made, investigations completed, and	**b.** Offer reasons for their findings and consider reasons suggested by others.	**b.** Offer reasons for their findings and consider reasons suggested by others.	**b.** Offer reasons for their findings and consider reasons suggested by others.	**b.** Explain that what people expect to observe often affects what they actually do observe and that scientists know about this	**b.** Explain that what people expect to observe often affects what they actually do observe and that scientists know about this	**b.** Explain that what people expect to observe often affects what they actually do observe and that scientists know about this

information gained by sharing ideas and listening to others' ideas.	information gained by sharing ideas and listening to others' ideas.	information gained by sharing ideas and listening to others' ideas.	information gained by sharing ideas and listening to others' ideas.				danger to objectivity and take steps to try to avoid it when designing investigations and examining data.	danger to objectivity and take steps to try to avoid it when designing investigations and examining data.	danger to objectivity and take steps to try to avoid it when designing investigations and examining data.
c. Explain why it is important to make some fresh observations when people give different descriptions of the same thing.	**c.** Explain why it is important to make some fresh observations when people give different descriptions of the same thing.	**c.** Explain why it is important to make some fresh observations when people give different descriptions of the same thing.	**c.** Explain why it is important to make some fresh observations when people give different descriptions of the same thing.	**c.** Review different explanations for the same set of observations and make more observations to resolve the differences.	**c.** Review different explanations for the same set of observations and make more observations to resolve the differences.	**c.** Review different explanations for the same set of observations and make more observations to resolve the differences.	**c.** Explain that even though different explanations are given for the same evidence, it is not always possible to tell which one is correct.	**c.** Explain that even though different explanations are given for the same evidence, it is not always possible to tell which one is correct.	**c.** Explain that even though different explanations are given for the same evidence, it is not always possible to tell which one is correct.
				d. Keep a notebook that describes observations made, carefully distinguishes actual observations from ideas and speculations about what was observed, and is understandable weeks or months later.	**d.** Keep a notebook that describes observations made, carefully distinguishes actual observations from ideas and speculations about what was observed, and is understandable weeks or months later.	**d.** Keep a notebook that describes observations made, carefully distinguishes actual observations from ideas and speculations about what was observed, and is understandable weeks or months later.	**d.** Describe the reasoning that lead to the interpretation of data and conclusions drawn.	**d.** Describe the reasoning that lead to the interpretation of data and conclusions drawn.	**d.** Describe the reasoning that lead to the interpretation of data and conclusions drawn.
							e. Question claims based on vague statements or on statements made by people outside their area of expertise.	**e.** Question claims based on vague statements or on statements made by people outside their area of expertise.	**e.** Question claims based on vague statements or on statements made by people outside their area of expertise.
C. Communicating Scientific Information	**C**. Communicating Scientific Information	**C**. Communicating Scientific Information	**C**. Communicating Scientific Information	**C**. Communicating Scientific Information	**C**. Communicating Scientific Information	**C**. Communicating Scientific Information	**C**. Communicating Scientific Information	**C**. Communicating Scientific Information	**C**. Communicating Scientific Information
1. Ask, "How do you know?" in appropriate situations and	**1.** Ask, "How do you know?" in appropriate situations and	**1.** Ask, "How do you know?" in appropriate situations and	**1.** Ask, "How do you know?" in appropriate situations and	**1.** Recognize that clear communication is an essential part	**1.** Recognize that clear communication is an essential part of doing science	**1.** Recognize that clear communication is an essential part of doing science	**1.** Develop explanations that explicitly link data from investigations	**1.** Develop explanations that explicitly link data from investigations	**1.** Develop explanations that explicitly link data from investigations

attempt reasonable answers when others ask them the same question.	attempt reasonable answers when others ask them the same question.	attempt reasonable answers when others ask them the same question.	attempt reasonable answers when others ask them the same question.	of doing science because it enables scientists to inform others about their work, expose their ideas to criticism by other scientists, and stay informed about scientific discoveries around the world.	because it enables scientists to inform others about their work, expose their ideas to criticism by other scientists, and stay informed about scientific discoveries around the world.	because it enables scientists to inform others about their work, expose their ideas to criticism by other scientists, and stay informed about scientific discoveries around the world.	conducted, selected readings and, when appropriate, contributions from historical discoveries.	conducted, selected readings and, when appropriate, contributions from historical discoveries.	conducted, selected readings and, when appropriate, contributions from historical discoveries.
a. Describe things as accurately as possible and compare observations with those of others.	**a.** Describe things as accurately as possible and compare observations with those of others.	**a.** Describe things as accurately as possible and compare observations with those of others.	**a.** Describe things as accurately as possible and compare observations with those of others.	**a.** Make use of and analyze models, such as tables and graphs to summarize and interpret data.	**a.** Make use of and analyze models, such as tables and graphs to summarize and interpret data.	**a.** Make use of and analyze models, such as tables and graphs to summarize and interpret data.	**a.** Organize and present data in tables and graphs and identify relationships they reveal.	**a.** Organize and present data in tables and graphs and identify relationships they reveal.	**a.** Organize and present data in tables and graphs and identify relationships they reveal.
b. Describe and compare things in terms of number, shape, texture, size, weight, color, and motion.	**b.** Describe and compare things in terms of number, shape, texture, size, weight, color, and motion.	**b.** Describe and compare things in terms of number, shape, texture, size, weight, color, and motion.	**b.** Describe and compare things in terms of number, shape, texture, size, weight, color, and motion.	**b.** Avoid choosing and reporting only the data that show what is expected by the person doing the choosing.	**b.** Avoid choosing and reporting only the data that show what is expected by the person doing the choosing.	**b.** Avoid choosing and reporting only the data that show what is expected by the person doing the choosing.	**b.** Interpret tables and graphs produced by others and describe in words the relationships they show.	**b.** Interpret tables and graphs produced by others and describe in words the relationships they show.	**b.** Interpret tables and graphs produced by others and describe in words the relationships they show.
c. Draw pictures that correctly portray at least some features of the thing being described and sequence events (seasons, seed growth).	**c.** Draw pictures that correctly portray at least some features of the thing being described and sequence events (seasons, seed growth).	**c.** Draw pictures that correctly portray at least some features of the thing being described and sequence events (seasons, seed growth).	**c.** Draw pictures that correctly portray at least some features of the thing being described and sequence events (seasons, seed growth).	**c.** Submit work to the critique of others which involves discussing findings, posing questions, and challenging statements to clarify ideas.	**c.** Submit work to the critique of others which involves discussing findings, posing questions, and challenging statements to clarify ideas.	**c.** Submit work to the critique of others which involves discussing findings, posing questions, and challenging statements to clarify ideas.	**c.** Give examples of how scientific knowledge is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way.	**c.** Give examples of how scientific knowledge is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way.	**c.** Give examples of how scientific knowledge is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way.
d. Have opportunities to work with a team, share findings with others, and recognize that	**d.** Have opportunities to work with a team, share findings with others, and recognize that	**d.** Have opportunities to work with a team, share findings with others, and recognize that	**d.** Have opportunities to work with a team, share findings with others, and recognize that	**d.** Construct and share reasonable explanations for questions asked.	**d.** Construct and share reasonable explanations for questions asked.	**d.** Construct and share reasonable explanations for questions asked.	**d.** Criticize the reasoning in arguments in which • Fact and opinion are	**d.** Criticize the reasoning in arguments in which • Fact and opinion are	**d.** Criticize the reasoning in arguments in which • Fact and opinion are

all team members should reach their own conclusions about what the findings mean.	all team members should reach their own conclusions about what the findings mean.	all team members should reach their own conclusions about what the findings mean.	all team members should reach their own conclusions about what the findings mean.				intermingled • Conclusions do not follow logically from the evidence given. • Existence of control groups and the relationship to experimental groups is not made obvious. • Samples are too small, biased, or not representative.	intermingled • Conclusions do not follow logically from the evidence given. • Existence of control groups and the relationship to experimental groups is not made obvious. • Samples are too small, biased, or not representative.	intermingled • Conclusions do not follow logically from the evidence given. • Existence of control groups and the relationship to experimental groups is not made obvious. • Samples are too small, biased, or not representative.
e. Recognize that everybody can do science and invent things and ideas.	**e.** Recognize that everybody can do science and invent things and ideas.	**e.** Recognize that everybody can do science and invent things and ideas.	**e.** Recognize that everybody can do science and invent things and ideas.	**e.** Recognize that doing science involves many different kinds of work and engages men and women of all ages and backgrounds.	**e.** Recognize that doing science involves many different kinds of work and engages men and women of all ages and backgrounds.	**e.** Recognize that doing science involves many different kinds of work and engages men and women of all ages and backgrounds.	**e.** Explain how different models can be used to represent the same thing. What kind of a model to use and how complex it should be depend on its purpose. Choosing a useful model is one of the instances in which intuition and creativity come into play in science, mathematics, and engineering	**e.** Explain how different models can be used to represent the same thing. What kind of a model to use and how complex it should be depend on its purpose. Choosing a useful model is one of the instances in which intuition and creativity come into play in science, mathematics, and engineering	**e.** Explain how different models can be used to represent the same thing. What kind of a model to use and how complex it should be depend on its purpose. Choosing a useful model is one of the instances in which intuition and creativity come into play in science, mathematics, and engineering
							f. Participate in group discussions on scientific topics by restating or summarizing accurately what	**f.** Participate in group discussions on scientific topics by restating or summarizing accurately what	**f.** Participate in group discussions on scientific topics by restating or summarizing accurately what

							others have said, asking for clarification or elaboration, and expressing alternative positions.	others have said, asking for clarification or elaboration, and expressing alternative positions.	others have said, asking for clarification or elaboration, and expressing alternative positions.
							g. Recognize that important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.	**g.** Recognize that important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.	**g.** Recognize that important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.
D. Technology	**D**. Technology	**D**. Technology	**D**. Technology	**D**. Technology	**D**. Technology	**D**. Technology	**D**. Technology	**D**. Technology	**D**. Technology
1. Design and make things with simple tools and a variety of materials.	**1.** Design and make things with simple tools and a variety of materials.	**1.** Design and make things with simple tools and a variety of materials.	**1.** Design and make things with simple tools and a variety of materials.	**1.** Develop designs and analyze the products: "Does it work?" "Could I make it work better?" "Could I have used better materials?"	**1.** Develop designs and analyze the products: "Does it work?" "Could I make it work better?" "Could I have used better materials?"	**1.** Develop designs and analyze the products: "Does it work?" "Could I make it work better?" "Could I have used better materials?"	**1.** Explain that complex systems require control mechanisms.	**1.** Explain that complex systems require control mechanisms.	**1.** Explain that complex systems require control mechanisms.
a. Make something out of paper, cardboard, wood, plastic, metal, or existing objects that can actually be used to perform a task.	**a.** Make something out of paper, cardboard, wood, plastic, metal, or existing objects that can actually be used to perform a task.	**a.** Make something out of paper, cardboard, wood, plastic, metal, or existing objects that can actually be used to perform a task.	**a.** Make something out of paper, cardboard, wood, plastic, metal, or existing objects that can actually be used to perform a task.	**a.** Choose appropriate common materials for making simple mechanical constructions and repairing things.	**a.** Choose appropriate common materials for making simple mechanical constructions and repairing things.	**a.** Choose appropriate common materials for making simple mechanical constructions and repairing things.	**a.** Explain that the choice of materials for a job depends on their properties and on how they interact with other materials.	**a.** Explain that the choice of materials for a job depends on their properties and on how they interact with other materials.	**a.** Explain that the choice of materials for a job depends on their properties and on how they interact with other materials.
b. Recognize that tools are used to do things better or more easily and to do some things that	**b.** Recognize that tools are used to do things better or more easily and to do some things that	**b.** Recognize that tools are used to do things better or more easily and to do some things that	**b.** Recognize that tools are used to do things better or more easily and to do some things that	**b.** Realize that there is no perfect design and that usually some features have to be sacrificed to get others, for	**b.** Realize that there is no perfect design and that usually some features have to be sacrificed to get others, for example, designs	**b.** Realize that there is no perfect design and that usually some features have to be sacrificed to get others, for example, designs	**b.** Demonstrate that all control systems have inputs, outputs, and feedback.	**b.** Demonstrate that all control systems have inputs, outputs, and feedback.	**b.** Demonstrate that all control systems have inputs, outputs, and feedback.

could not otherwise be done at all.	could not otherwise be done at all.	could not otherwise be done at all.	could not otherwise be done at all.	example, designs that are best in one respect (safety or ease of use) may be inferior in other ways (cost or appearance).	that are best in one respect (safety or ease of use) may be inferior in other ways (cost or appearance).	that are best in one respect (safety or ease of use) may be inferior in other ways (cost or appearance).			
c. Assemble, describe, take apart and reassemble constructions using interlocking blocks, erector sets and the like.	**c.** Assemble, describe, take apart and reassemble constructions using interlocking blocks, erector sets and the like.	**c.** Assemble, describe, take apart and reassemble constructions using interlocking blocks, erector sets and the like.	**c.** Assemble, describe, take apart and reassemble constructions using interlocking blocks, erector sets and the like.	**c.** Identify factors that must be considered in any technological design-cost, safety, environmental impact, and what will happen if the solution fails.	**c.** Identify factors that must be considered in any technological design-cost, safety, environmental impact, and what will happen if the solution fails.	**c.** Identify factors that must be considered in any technological design-cost, safety, environmental impact, and what will happen if the solution fails.	**c.** Realize that design usually requires taking constraints into account. (Some constraints, such as gravity or the properties of the materials to be used, are unavoidable. Other constraints, including economic, political, social, ethical, and aesthetic ones also limit choices.)	**c.** Realize that design usually requires taking constraints into account. (Some constraints, such as gravity or the properties of the materials to be used, are unavoidable. Other constraints, including economic, political, social, ethical, and aesthetic ones also limit choices.)	**c.** Realize that design usually requires taking constraints into account. (Some constraints, such as gravity or the properties of the materials to be used, are unavoidable. Other constraints, including economic, political, social, ethical, and aesthetic ones also limit choices.)
d. Recognize that some kinds of materials are better than others for making any particular thing, for example, materials that are better in some ways (such as stronger and cheaper) may be worse in other ways (such as heavier and harder to cut).	**d.** Recognize that some kinds of materials are better than others for making any particular thing, for example, materials that are better in some ways (such as stronger and cheaper) may be worse in other ways (such as heavier and harder to cut).	**d.** Recognize that some kinds of materials are better than others for making any particular thing, for example, materials that are better in some ways (such as stronger and cheaper) may be worse in other ways (such as heavier and harder to cut).	**d.** Recognize that some kinds of materials are better than others for making any particular thing, for example, materials that are better in some ways (such as stronger and cheaper) may be worse in other ways (such as heavier and harder to cut).				**d.** Identify reasons that systems fail-they have faulty or poorly matched parts, are used in ways that exceed what was intended by the design, or were poorly designed to begin with.	**d.** Identify reasons that systems fail-they have faulty or poorly matched parts, are used in ways that exceed what was intended by the design, or were poorly designed to begin with.	**d.** Identify reasons that systems fail-they have faulty or poorly matched parts, are used in ways that exceed what was intended by the design, or were poorly designed to begin with.
e. Explain that sometimes it is not possible to	**e.** Explain that sometimes it is not possible to	**e.** Explain that sometimes it is not possible to	**e.** Explain that sometimes it is not possible to						

make or do everything that is designed.	make or do everything that is designed.	make or do everything that is designed.	make or do everything that is designed.						
2. Practice identifying the parts of things and how one part connects to and affects another.	**2.** Practice identifying the parts of things and how one part connects to and affects another.	**2.** Practice identifying the parts of things and how one part connects to and affects another.	**2.** Practice identifying the parts of things and how one part connects to and affects another.	**2.** Investigate a variety of mechanical systems and analyze the relationship among the parts.	**2.** Investigate a variety of mechanical systems and analyze the relationship among the parts.	**2.** Investigate a variety of mechanical systems and analyze the relationship among the parts.	**2.** Analyze, design, assemble and troubleshoot complex systems.	**2.** Analyze, design, assemble and troubleshoot complex systems.	**2.** Analyze, design, assemble and troubleshoot complex systems.
a. Investigate a variety of objects to identify that most things are made of parts	**a.** Investigate a variety of objects to identify that most things are made of parts	**a.** Investigate a variety of objects to identify that most things are made of parts	**a.** Investigate a variety of objects to identify that most things are made of parts	**a.** Realize that in something that consists of many parts, the parts usually influence one another.	**a.** Realize that in something that consists of many parts, the parts usually influence one another.	**a.** Realize that in something that consists of many parts, the parts usually influence one another.	**a.** Provide evidence that a system can include processes as well as things.	**a.** Provide evidence that a system can include processes as well as things.	**a.** Provide evidence that a system can include processes as well as things.
b. Explain that something may not work if some of its parts are missing.	**b.** Explain that something may not work if some of its parts are missing.	**b.** Explain that something may not work if some of its parts are missing.	**b.** Explain that something may not work if some of its parts are missing.	**b.** Explain that something may not work as well (or at all) if a part of it is missing, broken, worn out, mismatched, or misconnected.	**b.** Explain that something may not work as well (or at all) if a part of it is missing, broken, worn out, mismatched, or misconnected.	**b.** Explain that something may not work as well (or at all) if a part of it is missing, broken, worn out, mismatched, or misconnected.	**b.** Explain that thinking about things as systems means looking for how every part relates to others. (The output from one part of a system (which can include material, energy, or information) can become the input to other parts. Such feedback can serve to control what goes on in the system as a whole.)	**b.** Explain that thinking about things as systems means looking for how every part relates to others. (The output from one part of a system (which can include material, energy, or information) can become the input to other parts. Such feedback can serve to control what goes on in the system as a whole.)	**b.** Explain that thinking about things as systems means looking for how every part relates to others. (The output from one part of a system (which can include material, energy, or information) can become the input to other parts. Such feedback can serve to control what goes on in the system as a whole.)
c. Explain that when parts are put together, they can do things that they couldn't do by themselves.	**c.** Explain that when parts are put together, they can do things that they couldn't do by themselves.	**c.** Explain that when parts are put together, they can do things that they couldn't do by themselves.	**c.** Explain that when parts are put together, they can do things that they couldn't do by themselves.				**c.** Analyze any system to determine its connection, both internally and externally to other systems and explain that a system may be thought of as containing subsystems and as being a subsystem of a larger system.	**c.** Analyze any system to determine its connection, both internally and externally to other systems and explain that a system may be thought of as containing subsystems and as being a subsystem of a larger system.	**c.** Analyze any system to determine its connection, both internally and externally to other systems and explain that a system may be thought of as containing subsystems and as being a subsystem of a larger system.

3. Examine a variety of physical models and describe what they teach about the real things they are meant to resemble.	**3.** Examine a variety of physical models and describe what they teach about the real things they are meant to resemble.	**3.** Examine a variety of physical models and describe what they teach about the real things they are meant to resemble.	**3.** Examine a variety of physical models and describe what they teach about the real things they are meant to resemble.	**3.** Examine and modify models and discuss their limitations.	**3.** Examine and modify models and discuss their limitations.	**3.** Examine and modify models and discuss their limitations.	**3.** Analyze the value and the limitations of different types of models in explaining real things and processes.	**3.** Analyze the value and the limitations of different types of models in explaining real things and processes.	**3.** Analyze the value and the limitations of different types of models in explaining real things and processes.
a. Explain that a model of something is different from the real thing but can be used to learn something about the real thing.	**a.** Explain that a model of something is different from the real thing but can be used to learn something about the real thing.	**a.** Explain that a model of something is different from the real thing but can be used to learn something about the real thing.	**a.** Explain that a model of something is different from the real thing but can be used to learn something about the real thing.	**a.** Explain that a model is a simplified imitation of something and that a model's value lies in suggesting how the thing modeled works.	**a.** Explain that a model is a simplified imitation of something and that a model's value lies in suggesting how the thing modeled works.	**a.** Explain that a model is a simplified imitation of something and that a model's value lies in suggesting how the thing modeled works.	**a.** Explain that the kind of model to use and how complex it should be depends on its purpose and that it is possible to have different models used to represent the same thing.	**a.** Explain that the kind of model to use and how complex it should be depends on its purpose and that it is possible to have different models used to represent the same thing.	**a.** Explain that the kind of model to use and how complex it should be depends on its purpose and that it is possible to have different models used to represent the same thing.
b. Realize that one way to describe something is to say how it is like something else.	**b.** Realize that one way to describe something is to say how it is like something else.	**b.** Realize that one way to describe something is to say how it is like something else.	**b.** Realize that one way to describe something is to say how it is like something else.	**b.** Investigate and describe that seeing how a model works after changes are made to it may suggest how the real thing would work if the same were done to it.	**b.** Investigate and describe that seeing how a model works after changes are made to it may suggest how the real thing would work if the same were done to it.	**b.** Investigate and describe that seeing how a model works after changes are made to it may suggest how the real thing would work if the same were done to it.	**b.** Explain, using examples that models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly, or that are too vast to be changed deliberately, or that are potentially dangerous.	**b.** Explain, using examples that models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly, or that are too vast to be changed deliberately, or that are potentially dangerous.	**b.** Explain, using examples that models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly, or that are too vast to be changed deliberately, or that are potentially dangerous.
				c. Explain that models, such as geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such	**c.** Explain that models, such as geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representations can never be exact in	**c.** Explain that models, such as geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representations can never be exact in	**c.** Explain that models may sometimes mislead by suggesting characteristics that are not really shared with what is being modeled.	**c.** Explain that models may sometimes mislead by suggesting characteristics that are not really shared with what is being modeled.	**c.** Explain that models may sometimes mislead by suggesting characteristics that are not really shared with what is being modeled.

				representations can never be exact in every detail.	every detail.	every detail.			
				d. Realize that one way to make sense of something is to think how it is like something more familiar.	**d.** Realize that one way to make sense of something is to think how it is like something more familiar.	**d.** Realize that one way to make sense of something is to think how it is like something more familiar.			
E. History of Science	**E**. History of Science	**E**. History of Science	**E**. History of Science	**E**. History of Science	**E**. History of Science	**E**. History of Science	**E**. History of Science	**E**. History of Science	**E**. History of Science

*Note: Highlighting identifies proposed assessment limits. All highlighted Indicators will be tested on the **Grades 5 and 8** MSA. The highlighted Objectives under each highlighted Indicator identify the limit to which MSA items can be written. Although all content standards are tested on MSA, not all Indicators and Objectives are tested. Objectives that are not highlighted will not be tested on MSA, however are an integral part of Instruction.*

Date: 12/30/2005