7

Concepts and Processes

Contents

Subject: Concepts and Processes
Goal Strand: Constructing New Knowledge
RIT Score Range: Below 181

Skills and Concepts to Develop Below 181	Skills and Concepts to Introduce 181 - 190
Generate Questions	**Generate Questions**
• Asks questions that define the problem to be investigated, and which will allow relevant data or information to be collected	• Asks questions that define the problem to be investigated, and which will allow relevant data or information to be collected
Hypothesize	**Hypothesize**
• Forms hypotheses that are based on real-life experience	
Design Scientific Investigations, and Fair Tests	**Design Scientific Investigations, and Fair Tests**
• Sorts objects by a given characteristic* • Sorts living and non-living things using different characteristics*	• Recognizes that results differ slightly when an experiment is repeated in a different place, at a different time, or by a different person, but the general evidence gathered in an experiment should be replicable by anyone, anywhere* • Recognizes that the purpose of scientific inquiry is to better understand the natural world • Describes how theories are developed* • Sorts objects according to common characteristics • Sorts objects by a given characteristic*
Collect Data	**Collect Data**
• Explains how new tools and technologies affect the way we view the world*	• Describes characteristics of objects* • Understands that observations are useful in studying changes in an object over time*
Analyze Data	**Analyze Data**
• Interprets simple bar graphs • Interprets data in simple line graphs*	• Interprets simple bar graphs • Interprets trends in bar graphs • Interprets data represented as pictures or icons within a table or chart* • Interprets diagrams
Draw Conclusions	**Draw Conclusions**
• Draws conclusions from simple diagrams*	• Makes inferences about common events and phenomena
Communicate Findings and Investigations	**Communicate Findings and Investigations**
	• Describes observations clearly, objectively, and accurately
New Vocabulary: change, explain, gather, information, science, technology, variable	*New Vocabulary:* (data) log, accurate, average, belong, color, conclude, data, experiment, feet (measurement),

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	group, have in common, identify, notes, observation, population, probable reason, reason, result, scientific theory, scientist, smell, tool
New Signs and Symbols: none	*New Signs and Symbols:* C Celsius, ° degrees, E east, N north, S south, W west

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Subject: Concepts and Processes
Goal Strand: Constructing New Knowledge
RIT Score Range: 181 - 190

Skills and Concepts to Enhance Below 181	Skills and Concepts to Develop 181 - 190	Skills and Concepts to Introduce 191 - 200
Generate Questions	**Generate Questions**	**Generate Questions**
• Asks questions that define the problem to be investigated, and which will allow relevant data or information to be collected	• Asks questions that define the problem to be investigated, and which will allow relevant data or information to be collected	• Asks questions that define the problem to be investigated, and which will allow relevant data or information to be collected • Selects the appropriate research source to answer a specific question (e.g., personal interview, reference book, direct observation, experimental observation)* • Differentiates among testable and non-testable questions (terms not used)
Hypothesize	**Hypothesize**	**Hypothesize**
• Forms hypotheses that are based on real-life experience		• Forms hypotheses that are based on observations and data
Design Scientific Investigations, and Fair Tests	**Design Scientific Investigations, and Fair Tests**	**Design Scientific Investigations, and Fair Tests**
• Sorts objects by a given characteristic* • Sorts living and non-living things using different characteristics*	• Recognizes that results differ slightly when an experiment is repeated in a different place, at a different time, or by a different person, but the general evidence gathered in an experiment should be replicable by anyone, anywhere* • Recognizes that the purpose of scientific inquiry is to better understand the natural world • Describes how theories are developed* • Sorts objects according to common characteristics • Sorts objects by a given characteristic*	• Explains why a scientific investigation will work the same way in different places* • Recognizes that science is limited to understanding the physical causes of the physical world* • Recognizes that direct observations allow a phenomenon to be confirmed whereas inference and relying on others' opinions do not allow a phenomenon to be confirmed* • Describes the criteria used to establish scientific laws and theories* • Determines which procedure will answer a specific question* • Understands that the type of investigation a scientist does depends on the question he or she is answering* • Determines which variables in a particular experiment must stay the same for results to be considered valid • Orders the stages that are likely to occur in a scientific study* • Sorts objects according to common characteristics • Describes characteristics that have been used to sort objects or living things • Places objects into simple classification systems • Understands that classification is the process used to

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		sort objects or living things by attributes held in common*
Collect Data	**Collect Data**	**Collect Data**
• Explains how new tools and technologies affect the way we view the world*	• Describes characteristics of objects* • Understands that observations are useful in studying changes in an object over time*	• Understands that data collected in experiments must not be "fudged" or misrepresented* • Identifies the data being collected in a given scenario* • Describes characteristics of objects* • Distinguishes between visual observations and observations of mass, temperature, texture, etc.* • Determines which observations are relevant to an investigation* • Understands that observations describe physical characteristics of an object • Understands that personal bias can affect perception of things and events* • Uses technology in scientific investigations to gather accurate data*
Analyze Data	**Analyze Data**	**Analyze Data**
• Interprets simple bar graphs • Interprets data in simple line graphs*	• Interprets simple bar graphs • Interprets trends in bar graphs • Interprets data represented as pictures or icons within a table or chart* • Interprets diagrams	• Interprets data presented in simple tables (e.g., T-charts)* • Interprets data presented in tables and charts that show data in more than two columns or categories • Describes trends in data shown in tables that show change in one (responding/dependent) variable* • Explains why data may not be consistent from trial to trial* • Explains that different people may interpret the same data or observations differently*
Draw Conclusions	**Draw Conclusions**	**Draw Conclusions**
• Draws conclusions from simple diagrams*	• Makes inferences about common events and phenomena	• Draws conclusions from experimental observations • Extrapolates from data presented in tables • Extrapolates from data presented in graphs (linear relationships)*
Communicate Findings and Investigations	**Communicate Findings and Investigations**	**Communicate Findings and Investigations**
	• Describes observations clearly, objectively, and accurately	• Understands that a key part of the scientific process is accurate communication of procedures and results to others* • Describes observations clearly, objectively, and accurately • Evaluates written observations for accuracy and clarity*
New Vocabulary: change, explain, gather, information, science, technology, variable	*New Vocabulary:* (data) log, accurate, average, belong, color, conclude, data, experiment, feet (measurement), group, have in common, identify, notes, observation,	*New Vocabulary:* affect, control variables, direct observation, experimental result, hypothesis, investigation, prediction, study, test, valid

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	population, probable reason, reason, result, scientific theory, scientist, smell, tool	
New Signs and Symbols: none	*New Signs and Symbols:* C Celsius, ° degrees, E east, N north, S south, W west	*New Signs and Symbols:* cm centimeter/centimetre, cubic centimeter/centimetre

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Subject: Concepts and Processes
Goal Strand: Constructing New Knowledge
RIT Score Range: 191 - 200

Skills and Concepts to Enhance 181 - 190	Skills and Concepts to Develop 191 - 200	Skills and Concepts to Introduce 201 - 210
Generate Questions	**Generate Questions**	**Generate Questions**
• Asks questions that define the problem to be investigated, and which will allow relevant data or information to be collected	• Asks questions that define the problem to be investigated, and which will allow relevant data or information to be collected • Selects the appropriate research source to answer a specific question (e.g., personal interview, reference book, direct observation, experimental observation)* • Differentiates among testable and non-testable questions (terms not used)	• Asks questions that define the problem to be investigated, and which will allow relevant data or information to be collected
Hypothesize	**Hypothesize**	**Hypothesize**
	• Forms hypotheses that are based on observations and data	• Describes characteristics of a good hypothesis* • Determines the hypothesis being tested, given a particular experimental setup or problem/question • Formulates hypotheses for a given experimental set-up* • Classifies statements as predictions* • Distinguishes between testable and non-testable hypotheses (outside of an experimental context)* • Distinguishes among examples of hypotheses and observations*
Design Scientific Investigations, and Fair Tests	**Design Scientific Investigations, and Fair Tests**	**Design Scientific Investigations, and Fair Tests**
• Recognizes that results differ slightly when an experiment is repeated in a different place, at a different time, or by a different person, but the general evidence gathered in an experiment should be replicable by anyone, anywhere* • Recognizes that the purpose of scientific inquiry is to better understand the natural world • Describes how theories are developed* • Sorts objects according to common characteristics • Sorts objects by a given characteristic*	• Explains why a scientific investigation will work the same way in different places* • Recognizes that science is limited to understanding the physical causes of the physical world* • Recognizes that direct observations allow a phenomenon to be confirmed whereas inference and relying on others' opinions do not allow a phenomenon to be confirmed* • Describes the criteria used to establish scientific laws and theories* • Determines which procedure will answer a specific question* • Understands that the type of investigation a scientist does depends on the question he or she is answering* • Determines which variables in a particular experiment	• Explains why a scientific investigation will work the same way in different places* • Recognizes that scientific ideas are tentative and therefore subject to change* • Explains that as scientific knowledge increases, scientific ideas are subject to change • Understands that scientific knowledge is incomplete, and room exists for advancement in our understanding • Describes how scientific knowledge is modified as new information challenges previously held theories • Recognizes that scientific understanding is produced through use of empirical standards (i.e., the use of direct observation and measurement)* • Recognizes that direct observations allow a phenomenon to be confirmed whereas inference and

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	must stay the same for results to be considered valid • Orders the stages that are likely to occur in a scientific study* • Sorts objects according to common characteristics • Describes characteristics that have been used to sort objects or living things • Places objects into simple classification systems • Understands that classification is the process used to sort objects or living things by attributes held in common*	relying on others' opinions do not allow a phenomenon to be confirmed* • Understands that theories are based on multiple observations, concepts, principles, and historical perspective* • Distinguishes examples of theories from facts, observations, hypotheses* • Describes characteristics of theories • Classifies a particular statement as an observation • Distinguishes examples of observations from facts, theories, and hypotheses* • Describes factors that produce biased data* • Recognizes bias in scientific information* • Evaluates to determine which procedure will best answer a specific question or solve a specific problem • Infers the problem being investigated in an experiment, given the setup and/or results of the experiment • Evaluates and improves the quality of an experimental design* • Determines which variable (independent or manipulated) will be changed in the course of an investigation • Determines which variable should be controlled in an experimental design, when given the problem or question being studied* • Determines which variables in a particular experiment must stay the same for results to be considered valid • Determines whether experiments are fair or valid, based on their design* • Orders the stages that are likely to occur in a scientific study* • Describes alternative data-gathering strategies that may be used in place of the traditional scientific method* • Classifies example representing specific stages of a specific scientific investigation • Groups living things by similarities in the structure and function of external characteristics* • Explains how objects and living things are classified • Compares and contrasts characteristics in a given set of objects*
Collect Data	**Collect Data**	**Collect Data**
• Describes characteristics of objects* • Understands that observations are useful in studying changes in an object over time*	• Understands that data collected in experiments must not be "fudged" or misrepresented* • Identifies the data being collected in a given scenario*	• Determines which observations are relevant to an investigation* • Predicts how objects will appear when viewed from

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	• Describes characteristics of objects* • Distinguishes between visual observations and observations of mass, temperature, texture, etc.* • Determines which observations are relevant to an investigation* • Understands that observations describe physical characteristics of an object • Understands that personal bias can affect perception of things and events* • Uses technology in scientific investigations to gather accurate data*	different angles* • Distinguishes among examples of direct observations and predictions*
Analyze Data	**Analyze Data**	**Analyze Data**
• Interprets simple bar graphs • Interprets trends in bar graphs • Interprets data represented as pictures or icons within a table or chart* • Interprets diagrams	• Interprets data presented in simple tables (e.g., T-charts)* • Interprets data presented in tables and charts that show data in more than two columns or categories • Describes trends in data shown in tables that show change in one (responding/dependent) variable* • Explains why data may not be consistent from trial to trial* • Explains that different people may interpret the same data or observations differently*	• Interprets graphs (e.g., reads data) in which units are not given, or only partial data is given • Determines the type of data which will appear in a graph, based on its axes* • Analyzes data in line graphs* • Interprets data in complex graphs (exponential, logistic, multiple lines)* • Interprets data presented in tables and charts that show data in more than two columns or categories • Analyzes data presented in tables and charts • Examines data to pinpoint possible errors in data collection* • Analyzes data shown in diagrams
Draw Conclusions	**Draw Conclusions**	**Draw Conclusions**
• Makes inferences about common events and phenomena	• Draws conclusions from experimental observations • Extrapolates from data presented in tables • Extrapolates from data presented in graphs (linear relationships)*	• Draws conclusions from data presented in tables containing two manipulated (independent) variables* • Draws conclusions from experimental observations • Makes inferences that limit themselves to the data which has been presented and avoids speculation • Understands that to be scientific, explanations must be supported with evidence • Draws conclusions from complex tables, charts or graphs* • Draws conclusions from complex diagrams • Extrapolates from data presented in diagrams • Interpolates from data presented in graphs* • Interpolates from data presented in diagrams* • Explains that results are significant if they most likely did not occur by chance • Draws conclusions from data described as "significant"*

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Communicate Findings and Investigations	Communicate Findings and Investigations	Communicate Findings and Investigations
• Describes observations clearly, objectively, and accurately	• Understands that a key part of the scientific process is accurate communication of procedures and results to others* • Describes observations clearly, objectively, and accurately • Evaluates written observations for accuracy and clarity*	• Selects graphs as the most appropriate way to present trends in data* • Represents observations using symbols and diagrams* • Communicates results clearly and accurately
New Vocabulary: (data) log, accurate, average, belong, color, conclude, data, experiment, feet (measurement), group, have in common, identify, notes, observation, population, probable reason, reason, result, scientific theory, scientist, smell, tool	*New Vocabulary:* affect, control variables, direct observation, experimental result, hypothesis, investigation, prediction, study, test, valid	*New Vocabulary:* chance, common, control, decrease, design experiment, discard, formulate model, generalization, hold constant, increase, independent variable, interpret data, investigate, justify, material, pendulum, quality, quantity, random group, reject, reliable, scale (measurement), significant, statistics, texture, trial-and-error procedure
New Signs and Symbols: C Celsius, ° degrees, E east, N north, S south, W west	*New Signs and Symbols:* cm centimeter/centimetre, cubic centimeter/centimetre	*New Signs and Symbols:* . decimal point, g gram, mL milliliter/millilitre, pH, sec second

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Subject: Concepts and Processes
Goal Strand: Constructing New Knowledge
RIT Score Range: 201 - 210

Skills and Concepts to Enhance 191 - 200	Skills and Concepts to Develop 201 - 210	Skills and Concepts to Introduce 211 - 220
Generate Questions	**Generate Questions**	**Generate Questions**
• Asks questions that define the problem to be investigated, and which will allow relevant data or information to be collected • Selects the appropriate research source to answer a specific question (e.g., personal interview, reference book, direct observation, experimental observation)* • Differentiates among testable and non-testable questions (terms not used)	• Asks questions that define the problem to be investigated, and which will allow relevant data or information to be collected	• Differentiates among testable and non-testable questions • Recognizes that testable questions are most useful in scientific investigations, as they can be answered by investigating*
Hypothesize	**Hypothesize**	**Hypothesize**
• Forms hypotheses that are based on observations and data	• Describes characteristics of a good hypothesis* • Determines the hypothesis being tested, given a particular experimental setup or problem/question • Formulates hypotheses for a given experimental set-up* • Classifies statements as predictions* • Distinguishes between testable and non-testable hypotheses (outside of an experimental context)* • Distinguishes among examples of hypotheses and observations*	• Determines the hypothesis being tested, given a particular experimental setup or problem/question • Formulates testable hypotheses based on data presented in a table* • Evaluates whether or not hypotheses are supported by data* • Understands that predictions are more accurate when based on trends seen in data* • Makes predictions within the context of a scientific investigation • Classifies statements as hypotheses
Design Scientific Investigations, and Fair Tests	**Design Scientific Investigations, and Fair Tests**	**Design Scientific Investigations, and Fair Tests**
• Explains why a scientific investigation will work the same way in different places* • Recognizes that science is limited to understanding the physical causes of the physical world* • Recognizes that direct observations allow a phenomenon to be confirmed whereas inference and relying on others' opinions do not allow a phenomenon to be confirmed* • Describes the criteria used to establish scientific laws and theories* • Determines which procedure will answer a specific question* • Understands that the type of investigation a scientist does depends on the question he or she is answering*	• Explains why a scientific investigation will work the same way in different places* • Recognizes that scientific ideas are tentative and therefore subject to change* • Explains that as scientific knowledge increases, scientific ideas are subject to change • Understands that scientific knowledge is incomplete, and room exists for advancement in our understanding • Describes how scientific knowledge is modified as new information challenges previously held theories • Recognizes that scientific understanding is produced through use of empirical standards (i.e., the use of direct observation and measurement)* • Recognizes that direct observations allow a	• Recognizes that science changes as new theories and evidence arise* • Explains that scientific knowledge is tentative and therefore subject to change as new evidence is uncovered* • Gives examples of changes in scientific knowledge that have resulted from the appearance of new evidence* • Recognizes that when data is incomplete, great opportunity for advancement exists* • Recognizes that when little understanding of an area exists, scientists may interpret data and theory differently* • Explains that scientists investigate for many differing reasons, but the ultimate purpose is to understand the

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• Determines which variables in a particular experiment must stay the same for results to be considered valid • Orders the stages that are likely to occur in a scientific study* • Sorts objects according to common characteristics • Describes characteristics that have been used to sort objects or living things • Places objects into simple classification systems • Understands that classification is the process used to sort objects or living things by attributes held in common*	phenomenon to be confirmed whereas inference and relying on others' opinions do not allow a phenomenon to be confirmed* • Understands that theories are based on multiple observations, concepts, principles, and historical perspective* • Distinguishes examples of theories from facts, observations, hypotheses* • Describes characteristics of theories • Classifies a particular statement as an observation • Distinguishes examples of observations from facts, theories, and hypotheses* • Describes factors that produce biased data* • Recognizes bias in scientific information* • Evaluates to determine which procedure will best answer a specific question or solve a specific problem • Infers the problem being investigated in an experiment, given the setup and/or results of the experiment • Evaluates and improves the quality of an experimental design* • Determines which variable (independent or manipulated) will be changed in the course of an investigation • Determines which variable should be controlled in an experimental design, when given the problem or question being studied* • Determines which variables in a particular experiment must stay the same for results to be considered valid • Determines whether experiments are fair or valid, based on their design* • Orders the stages that are likely to occur in a scientific study* • Describes alternative data-gathering strategies that may be used in place of the traditional scientific method* • Classifies example representing specific stages of a specific scientific investigation • Groups living things by similarities in the structure and function of external characteristics* • Explains how objects and living things are classified • Compares and contrasts characteristics in a given set of objects*	natural world* • Describes characteristics of scientific thinking* • Recognizes that reasoning can be distorted by strong emotions* • Defines scientific theory* • Contrasts the terms hypothesis, theory, principle, law, model, and paradigm as used by scientists* • Classifies a particular scientific explanation as a theory* • Distinguishes examples of observations from facts, theories, and hypotheses* • Classifies a particular statement as an hypothesis* • Describes factors that produce biased data* • Explains that science limits itself to natural phenomena* • Explains that scientific explanations limit themselves to natural causes for natural phenomena* • Determines which information should be collected in an experiment to answer a specific question • Evaluates to determine which procedure will best answer a specific question or solve a specific problem • Evaluates which procedure will best test a given hypothesis* • Evaluates and improves the quality of an experimental design* • Classifies the objects or persons undergoing a specific portion of an experiment as the control group* • Explains the importance of controlling variables in an experiment* • Determines which variable should be controlled in an experimental design, when given the problem or question being studied* • Determines which variables are being controlled in a given experimental set-up* • Classifies example representing specific stages of a specific scientific investigation
Collect Data	**Collect Data**	**Collect Data**
• Understands that data collected in experiments must not be "fudged" or misrepresented*	• Determines which observations are relevant to an investigation*	• Limits observations to the descriptions of properties and processes that those that are observed using the

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• Identifies the data being collected in a given scenario* • Describes characteristics of objects* • Distinguishes between visual observations and observations of mass, temperature, texture, etc.* • Determines which observations are relevant to an investigation* • Understands that observations describe physical characteristics of an object • Understands that personal bias can affect perception of things and events* • Uses technology in scientific investigations to gather accurate data*	• Predicts how objects will appear when viewed from different angles* • Distinguishes among examples of direct observations and predictions*	senses and or tools that extend the senses, not what may have happened previously, or what might happen next* • Distinguishes among examples of observations and inferences*
Analyze Data	**Analyze Data**	**Analyze Data**
• Interprets data presented in simple tables (e.g., T-charts)* • Interprets data presented in tables and charts that show data in more than two columns or categories • Describes trends in data shown in tables that show change in one (responding/dependent) variable* • Explains why data may not be consistent from trial to trial* • Explains that different people may interpret the same data or observations differently*	• Interprets graphs (e.g., reads data) in which units are not given, or only partial data is given • Determines the type of data which will appear in a graph, based on its axes* • Analyzes data in line graphs* • Interprets data in complex graphs (exponential, logistic, multiple lines)* • Interprets data presented in tables and charts that show data in more than two columns or categories • Analyzes data presented in tables and charts • Examines data to pinpoint possible errors in data collection* • Analyzes data shown in diagrams	• Describes trends in line graphs where units are not given • Determines the type of data which will appear in a graph, based on its axes*
Draw Conclusions	**Draw Conclusions**	**Draw Conclusions**
• Draws conclusions from experimental observations • Extrapolates from data presented in tables • Extrapolates from data presented in graphs (linear relationships)*	• Draws conclusions from data presented in tables containing two manipulated (independent) variables* • Draws conclusions from experimental observations • Makes inferences that limit themselves to the data which has been presented and avoids speculation • Understands that to be scientific, explanations must be supported with evidence • Draws conclusions from complex tables, charts or graphs* • Draws conclusions from complex diagrams • Extrapolates from data presented in diagrams • Interpolates from data presented in graphs* • Interpolates from data presented in diagrams* • Explains that results are significant if they most likely did not occur by chance • Draws conclusions from data described as	• Draws conclusions from data presented in tables containing two manipulated (independent) variables* • Makes inferences that limit themselves to the data which has been presented and avoids speculation • Makes inferences using deductive reasoning • Determines which evidence will best support a particular inference • Draws conclusions from data presented in simple (T) tables or charts • Classifies statements as inferences* • Extrapolates from data presented in diagrams • Extrapolates from data given in a table, by estimating the trend shown* • Interpolates from data presented in tables* • Interpolates from data presented in graphs*

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	"significant"*	
Communicate Findings and Investigations	**Communicate Findings and Investigations**	**Communicate Findings and Investigations**
• Understands that a key part of the scientific process is accurate communication of procedures and results to others* • Describes observations clearly, objectively, and accurately • Evaluates written observations for accuracy and clarity*	• Selects graphs as the most appropriate way to present trends in data* • Represents observations using symbols and diagrams* • Communicates results clearly and accurately	• Selects the appropriate graph to represent data shown in a table*
New Vocabulary: affect, control variables, direct observation, experimental result, hypothesis, investigation, prediction, study, test, valid	*New Vocabulary:* chance, common, control, decrease, design experiment, discard, formulate model, generalization, hold constant, increase, independent variable, interpret data, investigate, justify, material, pendulum, quality, quantity, random group, reject, reliable, scale (measurement), significant, statistics, texture, trial-and-error procedure	*New Vocabulary:* controlled experiment, dependent, orderly pattern, phenomena, probable, scientific evidence, testable, theorize
New Signs and Symbols: cm centimeter/centimetre, cubic centimeter/centimetre	*New Signs and Symbols:* . decimal point, g gram, mL milliliter/millilitre, pH, sec second	*New Signs and Symbols:* a.m., p.m.

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Subject: Concepts and Processes
Goal Strand: Constructing New Knowledge
RIT Score Range: 211 - 220

Skills and Concepts to Enhance 201 - 210	Skills and Concepts to Develop 211 - 220	Skills and Concepts to Introduce 221 - 230
Generate Questions	**Generate Questions**	**Generate Questions**
• Asks questions that define the problem to be investigated, and which will allow relevant data or information to be collected	• Differentiates among testable and non-testable questions • Recognizes that testable questions are most useful in scientific investigations, as they can be answered by investigating*	
Hypothesize	**Hypothesize**	**Hypothesize**
• Describes characteristics of a good hypothesis* • Determines the hypothesis being tested, given a particular experimental setup or problem/question • Formulates hypotheses for a given experimental set-up* • Classifies statements as predictions* • Distinguishes between testable and non-testable hypotheses (outside of an experimental context)* • Distinguishes among examples of hypotheses and observations*	• Determines the hypothesis being tested, given a particular experimental setup or problem/question • Formulates testable hypotheses based on data presented in a table* • Evaluates whether or not hypotheses are supported by data* • Understands that predictions are more accurate when based on trends seen in data* • Makes predictions within the context of a scientific investigation • Classifies statements as hypotheses	• Distinguishes between testable and non-testable hypotheses for a given experimental setup* • Describes results that would necessitate the revision of the hypothesis being tested*
Design Scientific Investigations, and Fair Tests	**Design Scientific Investigations, and Fair Tests**	**Design Scientific Investigations, and Fair Tests**
• Explains why a scientific investigation will work the same way in different places* • Recognizes that scientific ideas are tentative and therefore subject to change* • Explains that as scientific knowledge increases, scientific ideas are subject to change • Understands that scientific knowledge is incomplete, and room exists for advancement in our understanding • Describes how scientific knowledge is modified as new information challenges previously held theories • Recognizes that scientific understanding is produced through use of empirical standards (i.e., the use of direct observation and measurement)* • Recognizes that direct observations allow a phenomenon to be confirmed whereas inference and relying on others' opinions do not allow a phenomenon to be confirmed*	• Recognizes that science changes as new theories and evidence arise* • Explains that scientific knowledge is tentative and therefore subject to change as new evidence is uncovered* • Gives examples of changes in scientific knowledge that have resulted from the appearance of new evidence* • Recognizes that when data is incomplete, great opportunity for advancement exists* • Recognizes that when little understanding of an area exists, scientists may interpret data and theory differently* • Explains that scientists investigate for many differing reasons, but the ultimate purpose is to understand the natural world* • Describes characteristics of scientific thinking* • Recognizes that reasoning can be distorted by strong	• Explains why scientific ideas may change over time* • Recognizes that despite the tentative nature of science, most core ideas of science have been confirmed through much observation and experimentation* • Recognizes that when an observation does not agree with accepted scientific theory, it may be because the observation is mistaken or fraudulent, or it may be because the theory is wrong* • Recognizes that any conclusion can be challenged by new evidence* • Recognizes that all scientific knowledge, regardless of age, can be reviewed, criticized, and if necessary, discarded* • Explains that because theories are models, they may be revised as more data becomes available* • Explains that as new theories develop, previous data is not discarded but is reevaluated*

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• Understands that theories are based on multiple observations, concepts, principles, and historical perspective* • Distinguishes examples of theories from facts, observations, hypotheses* • Describes characteristics of theories • Classifies a particular statement as an observation • Distinguishes examples of observations from facts, theories, and hypotheses* • Describes factors that produce biased data* • Recognizes bias in scientific information* • Evaluates to determine which procedure will best answer a specific question or solve a specific problem • Infers the problem being investigated in an experiment, given the setup and/or results of the experiment • Evaluates and improves the quality of an experimental design* • Determines which variable (independent or manipulated) will be changed in the course of an investigation • Determines which variable should be controlled in an experimental design, when given the problem or question being studied* • Determines which variables in a particular experiment must stay the same for results to be considered valid • Determines whether experiments are fair or valid, based on their design* • Orders the stages that are likely to occur in a scientific study* • Describes alternative data-gathering strategies that may be used in place of the traditional scientific method* • Classifies example representing specific stages of a specific scientific investigation • Groups living things by similarities in the structure and function of external characteristics* • Explains how objects and living things are classified • Compares and contrasts characteristics in a given set of objects*	emotions* • Defines scientific theory* • Contrasts the terms hypothesis, theory, principle, law, model, and paradigm as used by scientists* • Classifies a particular scientific explanation as a theory* • Distinguishes examples of observations from facts, theories, and hypotheses* • Classifies a particular statement as an hypothesis* • Describes factors that produce biased data* • Explains that science limits itself to natural phenomena* • Explains that scientific explanations limit themselves to natural causes for natural phenomena* • Determines which information should be collected in an experiment to answer a specific question • Evaluates to determine which procedure will best answer a specific question or solve a specific problem • Evaluates which procedure will best test a given hypothesis* • Evaluates and improves the quality of an experimental design* • Classifies the objects or persons undergoing a specific portion of an experiment as the control group* • Explains the importance of controlling variables in an experiment* • Determines which variable should be controlled in an experimental design, when given the problem or question being studied* • Determines which variables are being controlled in a given experimental set-up* • Classifies example representing specific stages of a specific scientific investigation	• Explains how experimental results may cause modification of a theory or hypothesis* • Recognizes that scientific knowledge accumulates most rapidly after the acceptance of a major new theory* • Recognizes that as scientific theories are continually reevaluated, minor shifts in scientific thinking may occur* • Recognizes that as scientific theories are continually reevaluated, major shifts in scientific thinking may occur* • Recognizes that scientific ideas that are supported by large amounts of data and observation are unlikely to change in the future* • Gives examples of changes in scientific knowledge that have resulted from the appearance of new evidence* • Recognizes that when there is insufficient data to answer the question, multiple scientific explanations may exist simultaneously* • Explains that when data is incomplete, new data can resolve competing theories* • Recognizes that when data is incomplete, great opportunity for advancement exists* • Recognizes that when little understanding of an area exists, scientists may interpret data and theory differently* • Recognizes that in areas of limited understanding, it may not be possible to determine which explanation is correct* • Recognizes that conclusions that are supported by insufficient data are weak* • Explains why areas of science with incomplete data are areas of opportunity* • Recognizes that the purpose of scientific inquiry is not the discovery of absolute truth* • Recognizes practices of science that distinguish it from other ways of knowing* • Explains how the use of logical arguments distinguishes science from other disciplines* • Recognizes that reasoning can be distorted by faulty data* • Recognizes that scientific understanding is produced through the use of logical arguments* • Recognizes that scientific understanding is produced through the use of skepticism*

* Both data from test items and review by NWEA curriculum specialists are used to place learning continuum statements into appropriate RIT ranges.
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		• Distinguishes hypotheses from conclusions and observations • Explains why there may be discrepancies between a scientific law and actual observations* • Relates scientific theory, generation of hypotheses, and experimentation* • Distinguishes between the ideas of hypothesis, fact, observation, opinion, model, and theory • Classifies a particular statement as an hypothesis* • Compares the terms hypothesis, theory, principle, law, model, paradigm as used by scientists* • Contrasts the terms theory and law* • Explains how certain factors may bias data* • Explains why explanations about the natural world that are based on personal beliefs cannot be considered science* • Explains why explanations about the natural world that are based on religious values cannot be considered science* • Explains why explanations about the natural world that are based on superstition cannot be considered science* • Explains why explanations about the natural world that are based on authority cannot be considered science* • Understands that the more precise a procedure is, the more likely it is that it will be replicable* • Determines which variable (independent or manipulated) is being tested in control setup, when this variable has been purposefully omitted from the setup* • Determines which variable (independent or manipulated) is being tested in a given experimental setup • Determines the independent variable by examining data presented as a line graph* • Determines the control group in a given experimental set-up* • Controls variables so that only the variable being tested changes over time
Collect Data	**Collect Data**	**Collect Data**
• Determines which observations are relevant to an investigation* • Predicts how objects will appear when viewed from different angles*	• Limits observations to the descriptions of properties and processes that those that are observed using the senses and or tools that extend the senses, not what may have happened previously, or what might happen	• Describes qualities that make observations scientific*

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• Distinguishes among examples of direct observations and predictions*	next* • Distinguishes among examples of observations and inferences*	
Analyze Data	**Analyze Data**	**Analyze Data**
• Interprets graphs (e.g., reads data) in which units are not given, or only partial data is given • Determines the type of data which will appear in a graph, based on its axes* • Analyzes data in line graphs* • Interprets data in complex graphs (exponential, logistic, multiple lines)* • Interprets data presented in tables and charts that show data in more than two columns or categories • Analyzes data presented in tables and charts • Examines data to pinpoint possible errors in data collection* • Analyzes data shown in diagrams	• Describes trends in line graphs where units are not given • Determines the type of data which will appear in a graph, based on its axes*	
Draw Conclusions	**Draw Conclusions**	**Draw Conclusions**
• Draws conclusions from data presented in tables containing two manipulated (independent) variables* • Draws conclusions from experimental observations • Makes inferences that limit themselves to the data which has been presented and avoids speculation • Understands that to be scientific, explanations must be supported with evidence • Draws conclusions from complex tables, charts or graphs* • Draws conclusions from complex diagrams • Extrapolates from data presented in diagrams • Interpolates from data presented in graphs* • Interpolates from data presented in diagrams* • Explains that results are significant if they most likely did not occur by chance • Draws conclusions from data described as "significant"*	• Draws conclusions from data presented in tables containing two manipulated (independent) variables* • Makes inferences that limit themselves to the data which has been presented and avoids speculation • Makes inferences using deductive reasoning • Determines which evidence will best support a particular inference • Draws conclusions from data presented in simple (T) tables or charts • Classifies statements as inferences* • Extrapolates from data presented in diagrams • Extrapolates from data given in a table, by estimating the trend shown* • Interpolates from data presented in tables* • Interpolates from data presented in graphs*	• Evaluates inferences within the context of a scientific investigation* • Classifies statements as inferences* • Extrapolates from data presented in graphs where units are not shown on one or more axes* • Evaluates the significance of results*
Communicate Findings and Investigations	**Communicate Findings and Investigations**	**Communicate Findings and Investigations**
• Selects graphs as the most appropriate way to present trends in data* • Represents observations using symbols and diagrams* • Communicates results clearly and accurately	• Selects the appropriate graph to represent data shown in a table*	• Explains that before experimental results are generalized to a wider set of conditions, it is important to repeat the experiment using these conditions (e.g., drug tests, use of model organisms)*
New Vocabulary: chance, common, control, decrease, design experiment, discard, formulate model, generalization, hold constant, increase, independent	*New Vocabulary:* controlled experiment, dependent, orderly pattern, phenomena, probable, scientific evidence, testable, theorize	*New Vocabulary:* finding (scientific), invalid (data), scientific

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variable, interpret data, investigate, justify, material, pendulum, quality, quantity, random group, reject, reliable, scale (measurement), significant, statistics, texture, trial-and-error procedure		
New Signs and Symbols: . decimal point, g gram, mL milliliter/millilitre, pH, sec second	*New Signs and Symbols:* a.m., p.m.	*New Signs and Symbols:* %

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Subject: Concepts and Processes
Goal Strand: Constructing New Knowledge
RIT Score Range: 221 - 230

Skills and Concepts to Enhance 211 - 220	Skills and Concepts to Develop 221 - 230	Skills and Concepts to Introduce 231 - 240
Generate Questions	**Generate Questions**	**Generate Questions**
• Differentiates among testable and non-testable questions • Recognizes that testable questions are most useful in scientific investigations, as they can be answered by investigating*		
Hypothesize	**Hypothesize**	**Hypothesize**
• Determines the hypothesis being tested, given a particular experimental setup or problem/question • Formulates testable hypotheses based on data presented in a table* • Evaluates whether or not hypotheses are supported by data* • Understands that predictions are more accurate when based on trends seen in data* • Makes predictions within the context of a scientific investigation • Classifies statements as hypotheses	• Distinguishes between testable and non-testable hypotheses for a given experimental setup* • Describes results that would necessitate the revision of the hypothesis being tested*	• Formulates hypotheses within the context of a scientific investigation*
Design Scientific Investigations, and Fair Tests	**Design Scientific Investigations, and Fair Tests**	**Design Scientific Investigations, and Fair Tests**
• Recognizes that science changes as new theories and evidence arise* • Explains that scientific knowledge is tentative and therefore subject to change as new evidence is uncovered* • Gives examples of changes in scientific knowledge that have resulted from the appearance of new evidence* • Recognizes that when data is incomplete, great opportunity for advancement exists* • Recognizes that when little understanding of an area exists, scientists may interpret data and theory differently* • Explains that scientists investigate for many differing reasons, but the ultimate purpose is to understand the natural world* • Describes characteristics of scientific thinking* • Recognizes that reasoning can be distorted by strong	• Explains why scientific ideas may change over time* • Recognizes that despite the tentative nature of science, most core ideas of science have been confirmed through much observation and experimentation* • Recognizes that when an observation does not agree with accepted scientific theory, it may be because the observation is mistaken or fraudulent, or it may be because the theory is wrong* • Recognizes that any conclusion can be challenged by new evidence* • Recognizes that all scientific knowledge, regardless of age, can be reviewed, criticized, and if necessary, discarded* • Explains that because theories are models, they may be revised as more data becomes available* • Explains that as new theories develop, previous data is not discarded but is reevaluated*	• Recognizes that when an observation does not agree with accepted scientific theory, it may be because the observation is mistaken or fraudulent, or it may be because the theory is wrong* • Recognizes that any conclusion can be challenged by new evidence* • Recognizes that all scientific knowledge, regardless of age, can be reviewed, criticized, and if necessary, discarded* • Explains that because theories are models, they may be revised as more data becomes available* • Recognizes that scientific knowledge accumulates most rapidly after the acceptance of a major new theory* • Recognizes that as scientific theories are continually reevaluated, minor shifts in scientific thinking may occur* • Recognizes that as scientific theories are continually

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emotions* • Defines scientific theory* • Contrasts the terms hypothesis, theory, principle, law, model, and paradigm as used by scientists* • Classifies a particular scientific explanation as a theory* • Distinguishes examples of observations from facts, theories, and hypotheses* • Classifies a particular statement as an hypothesis* • Describes factors that produce biased data* • Explains that science limits itself to natural phenomena* • Explains that scientific explanations limit themselves to natural causes for natural phenomena* • Determines which information should be collected in an experiment to answer a specific question • Evaluates to determine which procedure will best answer a specific question or solve a specific problem • Evaluates which procedure will best test a given hypothesis* • Evaluates and improves the quality of an experimental design* • Classifies the objects or persons undergoing a specific portion of an experiment as the control group* • Explains the importance of controlling variables in an experiment* • Determines which variable should be controlled in an experimental design, when given the problem or question being studied* • Determines which variables are being controlled in a given experimental set-up* • Classifies example representing specific stages of a specific scientific investigation	• Explains how experimental results may cause modification of a theory or hypothesis* • Recognizes that scientific knowledge accumulates most rapidly after the acceptance of a major new theory* • Recognizes that as scientific theories are continually reevaluated, minor shifts in scientific thinking may occur* • Recognizes that as scientific theories are continually reevaluated, major shifts in scientific thinking may occur* • Recognizes that scientific ideas that are supported by large amounts of data and observation are unlikely to change in the future* • Gives examples of changes in scientific knowledge that have resulted from the appearance of new evidence* • Recognizes that when there is insufficient data to answer the question, multiple scientific explanations may exist simultaneously* • Explains that when data is incomplete, new data can resolve competing theories* • Recognizes that when data is incomplete, great opportunity for advancement exists* • Recognizes that when little understanding of an area exists, scientists may interpret data and theory differently* • Recognizes that in areas of limited understanding, it may not be possible to determine which explanation is correct* • Recognizes that conclusions that are supported by insufficient data are weak* • Explains why areas of science with incomplete data are areas of opportunity* • Recognizes that the purpose of scientific inquiry is not the discovery of absolute truth* • Recognizes practices of science that distinguish it from other ways of knowing* • Explains how the use of logical arguments distinguishes science from other disciplines* • Recognizes that reasoning can be distorted by faulty data* • Recognizes that scientific understanding is produced through the use of logical arguments* • Recognizes that scientific understanding is produced through the use of skepticism*	reevaluated, major shifts in scientific thinking may occur* • Recognizes that scientific ideas that are supported by large amounts of data and observation are unlikely to change in the future* • Recognizes that when there is insufficient data to answer the question, multiple scientific explanations may exist simultaneously* • Explains that when data is incomplete, new data can resolve competing theories* • Recognizes that in areas of limited understanding, it may not be possible to determine which explanation is correct* • Explains why areas of science with incomplete data are areas of opportunity* • Recognizes that the purpose of scientific inquiry is not the discovery of absolute truth* • Explains how the use of logical arguments distinguishes science from other disciplines* • Explains how the use of skepticism distinguishes science from other disciplines* • Evaluates pseudoscientific claims in the media* • Defines scientific paradigm* • Explains how theories are used to answer questions* • Explains how laws are used to answer questions* • Explains how facts are used to answer questions* • Explains why explanations about the natural world that are based on personal beliefs cannot be considered science* • Explains why explanations about the natural world that are based on religious values cannot be considered science* • Explains why explanations about the natural world that are based on superstition cannot be considered science* • Explains why explanations about the natural world that are based on authority cannot be considered science* • Identifies the dependent variable in a given experimental setup*

* Both data from test items and review by NWEA curriculum specialists are used to place learning continuum statements into appropriate RIT ranges.
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	• Distinguishes hypotheses from conclusions and observations • Explains why there may be discrepancies between a scientific law and actual observations* • Relates scientific theory, generation of hypotheses, and experimentation* • Distinguishes between the ideas of hypothesis, fact, observation, opinion, model, and theory • Classifies a particular statement as an hypothesis* • Compares the terms hypothesis, theory, principle, law, model, paradigm as used by scientists* • Contrasts the terms theory and law* • Explains how certain factors may bias data* • Explains why explanations about the natural world that are based on personal beliefs cannot be considered science* • Explains why explanations about the natural world that are based on religious values cannot be considered science* • Explains why explanations about the natural world that are based on superstition cannot be considered science* • Explains why explanations about the natural world that are based on authority cannot be considered science* • Understands that the more precise a procedure is, the more likely it is that it will be replicable* • Determines which variable (independent or manipulated) is being tested in control setup, when this variable has been purposefully omitted from the setup* • Determines which variable (independent or manipulated) is being tested in a given experimental setup • Determines the independent variable by examining data presented as a line graph* • Determines the control group in a given experimental set-up* • Controls variables so that only the variable being tested changes over time	
Collect Data	**Collect Data**	**Collect Data**
• Limits observations to the descriptions of properties and processes that those that are observed using the senses and or tools that extend the senses, not what may have happened previously, or what might happen	• Describes qualities that make observations scientific*	

* Both data from test items and review by NWEA curriculum specialists are used to place learning continuum statements into appropriate RIT ranges.
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next* • Distinguishes among examples of observations and inferences*		
Analyze Data	**Analyze Data**	**Analyze Data**
• Describes trends in line graphs where units are not given • Determines the type of data which will appear in a graph, based on its axes*		
Draw Conclusions	**Draw Conclusions**	**Draw Conclusions**
• Draws conclusions from data presented in tables containing two manipulated (independent) variables* • Makes inferences that limit themselves to the data which has been presented and avoids speculation • Makes inferences using deductive reasoning • Determines which evidence will best support a particular inference • Draws conclusions from data presented in simple (T) tables or charts • Classifies statements as inferences* • Extrapolates from data presented in diagrams • Extrapolates from data given in a table, by estimating the trend shown* • Interpolates from data presented in tables* • Interpolates from data presented in graphs*	• Evaluates inferences within the context of a scientific investigation* • Classifies statements as inferences* • Extrapolates from data presented in graphs where units are not shown on one or more axes* • Evaluates the significance of results*	• Extrapolates from data presented in graphs (exponential/logistic relationships)*
Communicate Findings and Investigations	**Communicate Findings and Investigations**	**Communicate Findings and Investigations**
• Selects the appropriate graph to represent data shown in a table*	• Explains that before experimental results are generalized to a wider set of conditions, it is important to repeat the experiment using these conditions (e.g., drug tests, use of model organisms)*	• Evaluates written results for accuracy and clarity*
New Vocabulary: controlled experiment, dependent, orderly pattern, phenomena, probable, scientific evidence, testable, theorize	*New Vocabulary:* finding (scientific), invalid (data), scientific	*New Vocabulary:* none
New Signs and Symbols: a.m., p.m.	*New Signs and Symbols:* %	*New Signs and Symbols:* none

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Subject: Concepts and Processes
Goal Strand: Constructing New Knowledge
RIT Score Range: 231 - 240

Skills and Concepts to Enhance 221 - 230	Skills and Concepts to Develop 231 - 240	Skills and Concepts to Introduce Above 240
Generate Questions	**Generate Questions**	**Generate Questions**
Hypothesize	**Hypothesize**	**Hypothesize**
• Distinguishes between testable and non-testable hypotheses for a given experimental setup* • Describes results that would necessitate the revision of the hypothesis being tested*	• Formulates hypotheses within the context of a scientific investigation*	
Design Scientific Investigations, and Fair Tests	**Design Scientific Investigations, and Fair Tests**	**Design Scientific Investigations, and Fair Tests**
• Explains why scientific ideas may change over time* • Recognizes that despite the tentative nature of science, most core ideas of science have been confirmed through much observation and experimentation* • Recognizes that when an observation does not agree with accepted scientific theory, it may be because the observation is mistaken or fraudulent, or it may be because the theory is wrong* • Recognizes that any conclusion can be challenged by new evidence* • Recognizes that all scientific knowledge, regardless of age, can be reviewed, criticized, and if necessary, discarded* • Explains that because theories are models, they may be revised as more data becomes available* • Explains that as new theories develop, previous data is not discarded but is reevaluated* • Explains how experimental results may cause modification of a theory or hypothesis* • Recognizes that scientific knowledge accumulates most rapidly after the acceptance of a major new theory* • Recognizes that as scientific theories are continually reevaluated, minor shifts in scientific thinking may occur* • Recognizes that as scientific theories are continually reevaluated, major shifts in scientific thinking may occur* • Recognizes that scientific ideas that are supported by	• Recognizes that when an observation does not agree with accepted scientific theory, it may be because the observation is mistaken or fraudulent, or it may be because the theory is wrong* • Recognizes that any conclusion can be challenged by new evidence* • Recognizes that all scientific knowledge, regardless of age, can be reviewed, criticized, and if necessary, discarded* • Explains that because theories are models, they may be revised as more data becomes available* • Recognizes that scientific knowledge accumulates most rapidly after the acceptance of a major new theory* • Recognizes that as scientific theories are continually reevaluated, minor shifts in scientific thinking may occur* • Recognizes that as scientific theories are continually reevaluated, major shifts in scientific thinking may occur* • Recognizes that scientific ideas that are supported by large amounts of data and observation are unlikely to change in the future* • Recognizes that when there is insufficient data to answer the question, multiple scientific explanations may exist simultaneously* • Explains that when data is incomplete, new data can resolve competing theories* • Recognizes that in areas of limited understanding, it may not be possible to determine which explanation is	

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large amounts of data and observation are unlikely to change in the future* • Gives examples of changes in scientific knowledge that have resulted from the appearance of new evidence* • Recognizes that when there is insufficient data to answer the question, multiple scientific explanations may exist simultaneously* • Explains that when data is incomplete, new data can resolve competing theories* • Recognizes that when data is incomplete, great opportunity for advancement exists* • Recognizes that when little understanding of an area exists, scientists may interpret data and theory differently* • Recognizes that in areas of limited understanding, it may not be possible to determine which explanation is correct* • Recognizes that conclusions that are supported by insufficient data are weak* • Explains why areas of science with incomplete data are areas of opportunity* • Recognizes that the purpose of scientific inquiry is not the discovery of absolute truth* • Recognizes practices of science that distinguish it from other ways of knowing* • Explains how the use of logical arguments distinguishes science from other disciplines* • Recognizes that reasoning can be distorted by faulty data* • Recognizes that scientific understanding is produced through the use of logical arguments* • Recognizes that scientific understanding is produced through the use of skepticism* • Distinguishes hypotheses from conclusions and observations • Explains why there may be discrepancies between a scientific law and actual observations* • Relates scientific theory, generation of hypotheses, and experimentation* • Distinguishes between the ideas of hypothesis, fact, observation, opinion, model, and theory • Classifies a particular statement as an hypothesis* • Compares the terms hypothesis, theory, principle, law, model, paradigm as used by scientists*	correct* • Explains why areas of science with incomplete data are areas of opportunity* • Recognizes that the purpose of scientific inquiry is not the discovery of absolute truth* • Explains how the use of logical arguments distinguishes science from other disciplines* • Explains how the use of skepticism distinguishes science from other disciplines* • Evaluates pseudoscientific claims in the media* • Defines scientific paradigm* • Explains how theories are used to answer questions* • Explains how laws are used to answer questions* • Explains how facts are used to answer questions* • Explains why explanations about the natural world that are based on personal beliefs cannot be considered science* • Explains why explanations about the natural world that are based on religious values cannot be considered science* • Explains why explanations about the natural world that are based on superstition cannot be considered science* • Explains why explanations about the natural world that are based on authority cannot be considered science* • Identifies the dependent variable in a given experimental setup*	

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• Contrasts the terms theory and law* • Explains how certain factors may bias data* • Explains why explanations about the natural world that are based on personal beliefs cannot be considered science* • Explains why explanations about the natural world that are based on religious values cannot be considered science* • Explains why explanations about the natural world that are based on superstition cannot be considered science* • Explains why explanations about the natural world that are based on authority cannot be considered science* • Understands that the more precise a procedure is, the more likely it is that it will be replicable* • Determines which variable (independent or manipulated) is being tested in control setup, when this variable has been purposefully omitted from the setup* • Determines which variable (independent or manipulated) is being tested in a given experimental setup • Determines the independent variable by examining data presented as a line graph* • Determines the control group in a given experimental set-up* • Controls variables so that only the variable being tested changes over time		
Collect Data	**Collect Data**	**Collect Data**
• Describes qualities that make observations scientific*		
Analyze Data	**Analyze Data**	**Analyze Data**
Draw Conclusions	**Draw Conclusions**	**Draw Conclusions**
• Evaluates inferences within the context of a scientific investigation* • Classifies statements as inferences* • Extrapolates from data presented in graphs where units are not shown on one or more axes* • Evaluates the significance of results*	• Extrapolates from data presented in graphs (exponential/logistic relationships)*	• Extrapolates from data presented in tables using calculations*
Communicate Findings and Investigations	**Communicate Findings and Investigations**	**Communicate Findings and Investigations**
• Explains that before experimental results are generalized to a wider set of conditions, it is important to repeat the experiment using these conditions (e.g., drug tests, use of model organisms)*	• Evaluates written results for accuracy and clarity*	

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New Vocabulary: finding (scientific), invalid (data), scientific	*New Vocabulary:* none	*New Vocabulary:* none
New Signs and Symbols: %	*New Signs and Symbols:* none	*New Signs and Symbols:* none

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Subject: Concepts and Processes
Goal Strand: Constructing New Knowledge
RIT Score Range: Above 240

Skills and Concepts to Enhance 231 - 240	Skills and Concepts to Develop Above 240
Generate Questions	**Generate Questions**
Hypothesize	**Hypothesize**
• Formulates hypotheses within the context of a scientific investigation*	
Design Scientific Investigations, and Fair Tests	**Design Scientific Investigations, and Fair Tests**
• Recognizes that when an observation does not agree with accepted scientific theory, it may be because the observation is mistaken or fraudulent, or it may be because the theory is wrong* • Recognizes that any conclusion can be challenged by new evidence* • Recognizes that all scientific knowledge, regardless of age, can be reviewed, criticized, and if necessary, discarded* • Explains that because theories are models, they may be revised as more data becomes available* • Recognizes that scientific knowledge accumulates most rapidly after the acceptance of a major new theory* • Recognizes that as scientific theories are continually reevaluated, minor shifts in scientific thinking may occur* • Recognizes that as scientific theories are continually reevaluated, major shifts in scientific thinking may occur* • Recognizes that scientific ideas that are supported by large amounts of data and observation are unlikely to change in the future* • Recognizes that when there is insufficient data to answer the question, multiple scientific explanations may exist simultaneously* • Explains that when data is incomplete, new data can resolve competing theories* • Recognizes that in areas of limited understanding, it may not be possible to determine which explanation is correct* • Explains why areas of science with incomplete data are	

* Both data from test items and review by NWEA curriculum specialists are used to place learning continuum statements into appropriate RIT ranges.
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areas of opportunity* • Recognizes that the purpose of scientific inquiry is not the discovery of absolute truth* • Explains how the use of logical arguments distinguishes science from other disciplines* • Explains how the use of skepticism distinguishes science from other disciplines* • Evaluates pseudoscientific claims in the media* • Defines scientific paradigm* • Explains how theories are used to answer questions* • Explains how laws are used to answer questions* • Explains how facts are used to answer questions* • Explains why explanations about the natural world that are based on personal beliefs cannot be considered science* • Explains why explanations about the natural world that are based on religious values cannot be considered science* • Explains why explanations about the natural world that are based on superstition cannot be considered science* • Explains why explanations about the natural world that are based on authority cannot be considered science* • Identifies the dependent variable in a given experimental setup*	
Collect Data	**Collect Data**
Analyze Data	**Analyze Data**
Draw Conclusions	**Draw Conclusions**
• Extrapolates from data presented in graphs (exponential/logistic relationships)*	• Extrapolates from data presented in tables using calculations*
Communicate Findings and Investigations	**Communicate Findings and Investigations**
• Evaluates written results for accuracy and clarity*	
New Vocabulary: none	*New Vocabulary:* none
New Signs and Symbols: none	*New Signs and Symbols:* none

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Blank cells indicate data are limited or unavailable for this range or document version.

Subject: Concepts and Processes
Goal Strand: Reflecting on Knowledge
RIT Score Range: Below 171

Skills and Concepts to Develop Below 171	Skills and Concepts to Introduce 171 - 180
Constancy, Change and Equilibrium	**Constancy, Change and Equilibrium**
	• Describes ways in which things can change • Describes variables that cause change* • Identifies qualitative change in systems, given the conditions that occur before, during, and after an event* • Predicts what comes next in sequences of objects or events • Describes the sequence of elements within a pattern* • Determines causes for a given effect • Predicts effects of a particular action
Systems, Structure, Function, and Conservation	**Systems, Structure, Function, and Conservation**
• Recognizes examples of systems (term not used) and their parts*	• Describes the part that is missing from a diagram of a real-life system* • Selects the part that will turn a specific collection of components into a system* • Describes the component(s) of a given system that perform(s) a given role* • Orders objects and events
Characteristics, Limitations, Technology, Models	**Characteristics, Limitations, Technology, Models**
New Vocabulary: none	*New Vocabulary:* cause, change, interaction
New Signs and Symbols: none	*New Signs and Symbols:* ¢ cent sign

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Subject: Concepts and Processes
Goal Strand: Reflecting on Knowledge
RIT Score Range: 171 - 180

Skills and Concepts to Enhance Below 171	Skills and Concepts to Develop 171 - 180	Skills and Concepts to Introduce 181 - 190
Constancy, Change and Equilibrium	**Constancy, Change and Equilibrium**	**Constancy, Change and Equilibrium**
	• Describes ways in which things can change • Describes variables that cause change* • Identifies qualitative change in systems, given the conditions that occur before, during, and after an event* • Predicts what comes next in sequences of objects or events • Describes the sequence of elements within a pattern* • Determines causes for a given effect • Predicts effects of a particular action	• Describes changes that have occurred in a system* • Explains what caused a particular change in a common system to occur* • Predicts the next step for a given cycle (term not used)* • Determines causes for a given effect • Predicts effects of a particular action
Systems, Structure, Function, and Conservation	**Systems, Structure, Function, and Conservation**	**Systems, Structure, Function, and Conservation**
• Recognizes examples of systems (term not used) and their parts*	• Describes the part that is missing from a diagram of a real-life system* • Selects the part that will turn a specific collection of components into a system* • Describes the component(s) of a given system that perform(s) a given role* • Orders objects and events	• Understands that each part of a system (term not used) has a different function* • Infers the part of a given system that has been removed* • Orders steps of familiar procedures* • Orders objects to show levels of organization (simple to complex)*
Characteristics, Limitations, Technology, Models	**Characteristics, Limitations, Technology, Models**	**Characteristics, Limitations, Technology, Models**
		• Recognizes that scientific theories depend on evidence*
New Vocabulary: none	*New Vocabulary:* cause, change, interaction	*New Vocabulary:* none
New Signs and Symbols: none	*New Signs and Symbols:* ¢ cent sign	*New Signs and Symbols:* none

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Blank cells indicate data are limited or unavailable for this range or document version.

Subject: Concepts and Processes
Goal Strand: Reflecting on Knowledge
RIT Score Range: 181 - 190

Skills and Concepts to Enhance 171 - 180	Skills and Concepts to Develop 181 - 190	Skills and Concepts to Introduce 191 - 200
Constancy, Change and Equilibrium	**Constancy, Change and Equilibrium**	**Constancy, Change and Equilibrium**
• Describes ways in which things can change • Describes variables that cause change* • Identifies qualitative change in systems, given the conditions that occur before, during, and after an event* • Predicts what comes next in sequences of objects or events • Describes the sequence of elements within a pattern* • Determines causes for a given effect • Predicts effects of a particular action	• Describes changes that have occurred in a system* • Explains what caused a particular change in a common system to occur* • Predicts the next step for a given cycle (term not used)* • Determines causes for a given effect • Predicts effects of a particular action	• Gives examples of events that are likely to cause disequilibrium in a system (terms not used)* • Describes a constant rate of change for a familiar system* • Describes changes that have occurred in a system* • Classifies events as change* • Explains what caused a particular change in a common system to occur* • Describes the importance of direct observation in determining the cause of change to systems* • Gives real life examples of things that remain constant • Infers what is missing in sequences of patterns or events* • Extends patterns found in nature* • Predicts what comes next in a sequence of numbers showing a complex pattern (e.g., addition then subtraction, geometric progression) • Gives examples of cycles • Understands that patterns that recur regularly are called cycles • Infers what step is missing from a cycle showing repetitive change* • Understands that a cycle may have no beginning or end, but events within the cycle will proceed in a predictable fashion* • Understands that recognizing an event is cyclic can help us prepare for the future* • Gives examples of a cause and effect relationship • Explains how determining cause and effect relationships can be useful* • Classifies a given scenario as an example of cause and effect • Infers the possible causes for a given scenario (presented as a diagram)*

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Systems, Structure, Function, and Conservation	Systems, Structure, Function, and Conservation	Systems, Structure, Function, and Conservation
• Describes the part that is missing from a diagram of a real-life system* • Selects the part that will turn a specific collection of components into a system* • Describes the component(s) of a given system that perform(s) a given role* • Orders objects and events	• Understands that each part of a system (term not used) has a different function* • Infers the part of a given system that has been removed* • Orders steps of familiar procedures* • Orders objects to show levels of organization (simple to complex)*	• Describes characteristics used to order data shown in tables* • Orders steps of familiar procedures* • Understands that when components of systems interact, change occurs • Gives examples of interacting components*
Characteristics, Limitations, Technology, Models	**Characteristics, Limitations, Technology, Models**	**Characteristics, Limitations, Technology, Models**
	• Recognizes that scientific theories depend on evidence*	• Recognizes that scientific explanations must be based on observations and scientific knowledge*
New Vocabulary: cause, change, interaction	*New Vocabulary:* none	*New Vocabulary:* cause and effect relationship, cyclic pattern, evidence, exert, field, gradient, hypothesis, imbalance, interact, prediction, quantification, regular pattern, series, slope, speed
New Signs and Symbols: ¢ cent sign	*New Signs and Symbols:* none	*New Signs and Symbols:* ℃ Celsius, ° degrees

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Subject: Concepts and Processes
Goal Strand: Reflecting on Knowledge
RIT Score Range: 191 - 200

Skills and Concepts to Enhance 181 - 190	Skills and Concepts to Develop 191 - 200	Skills and Concepts to Introduce 201 - 210
Constancy, Change and Equilibrium	**Constancy, Change and Equilibrium**	**Constancy, Change and Equilibrium**
• Describes changes that have occurred in a system* • Explains what caused a particular change in a common system to occur* • Predicts the next step for a given cycle (term not used)* • Determines causes for a given effect • Predicts effects of a particular action	• Gives examples of events that are likely to cause disequilibrium in a system (terms not used)* • Describes a constant rate of change for a familiar system* • Describes changes that have occurred in a system* • Classifies events as change* • Explains what caused a particular change in a common system to occur* • Describes the importance of direct observation in determining the cause of change to systems* • Gives real life examples of things that remain constant • Infers what is missing in sequences of patterns or events* • Extends patterns found in nature* • Predicts what comes next in a sequence of numbers showing a complex pattern (e.g., addition then subtraction, geometric progression) • Gives examples of cycles • Understands that patterns that recur regularly are called cycles • Infers what step is missing from a cycle showing repetitive change* • Understands that a cycle may have no beginning or end, but events within the cycle will proceed in a predictable fashion* • Understands that recognizing an event is cyclic can help us prepare for the future* • Gives examples of a cause and effect relationship • Explains how determining cause and effect relationships can be useful* • Classifies a given scenario as an example of cause and effect • Infers the possible causes for a given scenario (presented as a diagram)*	• Gives examples of equilibrium in systems • Classifies a given event as an example of equilibrium • Understands that counterbalancing changes may be needed for systems to be maintained as conditions change • Explains how systems remain in equilibrium • Predicts how a particular change will affect the equilibrium of a system* • Gives examples of events that are likely to cause disequilibrium in a system (terms not used)* • Explains that very fast and very slow changes can be difficult to see or measure* • Represents change quantitatively* • Explains that change in nature is common and widespread* • Classifies events as change* • Describes properties of matter that remain constant after changes to systems • Determines the rate or gradient of change in systems, when given length of time and a total measurement of change* • Determines the location or time that a particular change is likely to occur when given the rate of change to a system* • Predicts what comes next in a sequence of numbers showing a complex pattern (e.g., addition then subtraction, geometric progression) • Gives evidence that supports the conclusion that a system (man-made or natural) has changed or evolved over time • Understands that evolution refers to changes to an entire species, not changes to an individual* • Describes characteristics of evolution • Makes inferences about the evolution of a system, given data about that system

* Both data from test items and review by NWEA curriculum specialists are used to place learning continuum statements into appropriate RIT ranges.
Blank cells indicate data are limited or unavailable for this range or document version.

		• Interprets data (diagrams) related to the evolution of a system* • Understands that rates describe the time it takes for a unit of a given event to occur* • Analyzes changes in scale
Systems, Structure, Function, and Conservation	**Systems, Structure, Function, and Conservation**	**Systems, Structure, Function, and Conservation**
• Understands that each part of a system (term not used) has a different function* • Infers the part of a given system that has been removed* • Orders steps of familiar procedures* • Orders objects to show levels of organization (simple to complex)*	• Describes characteristics used to order data shown in tables* • Orders steps of familiar procedures* • Understands that when components of systems interact, change occurs • Gives examples of interacting components*	• Explains why an object or collection of objects is a system • Classifies an example of parts that work together as a system* • Describes characteristics used to order sets of objects or events • Compares characteristics used to order sets of objects or events* • Understands that when components of systems interact, change occurs • Understands that interaction may occur across a distance, without components physically touching*
Characteristics, Limitations, Technology, Models	**Characteristics, Limitations, Technology, Models**	**Characteristics, Limitations, Technology, Models**
• Recognizes that scientific theories depend on evidence*	• Recognizes that scientific explanations must be based on observations and scientific knowledge*	• Explains that scientific theories depend on logically consistent arguments* • Recognizes that scientific explanations must be based on observations and scientific knowledge* • Explains how scientific knowledge and economics drive the development of technology* • Explains that scientific advances often depend on development of new technologies*
New Vocabulary: none	*New Vocabulary:* cause and effect relationship, cyclic pattern, evidence, exert, field, gradient, hypothesis, imbalance, interact, prediction, quantification, regular pattern, series, slope, speed	*New Vocabulary:* accelerate, apparent size, arrangement, balance (equilibrium), contact, disequilibrium, double-pan balance, evolution, evolutionary change, evolutionary trend, evolve, field of view, magnification power, material, observable, orderly, percentage, predictable, regular increase, reversible, scale model, scaled up
New Signs and Symbols: none	*New Signs and Symbols:* ℃ Celsius, ° degrees	*New Signs and Symbols:* ., . decimal point, ft feet, km kilometer/kilometre, %

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Subject: Concepts and Processes
Goal Strand: Reflecting on Knowledge
RIT Score Range: 201 - 210

Skills and Concepts to Enhance 191 - 200	Skills and Concepts to Develop 201 - 210	Skills and Concepts to Introduce 211 - 220
Constancy, Change and Equilibrium	**Constancy, Change and Equilibrium**	**Constancy, Change and Equilibrium**
• Gives examples of events that are likely to cause disequilibrium in a system (terms not used)* • Describes a constant rate of change for a familiar system* • Describes changes that have occurred in a system* • Classifies events as change* • Explains what caused a particular change in a common system to occur* • Describes the importance of direct observation in determining the cause of change to systems* • Gives real life examples of things that remain constant • Infers what is missing in sequences of patterns or events* • Extends patterns found in nature* • Predicts what comes next in a sequence of numbers showing a complex pattern (e.g., addition then subtraction, geometric progression) • Gives examples of cycles • Understands that patterns that recur regularly are called cycles • Infers what step is missing from a cycle showing repetitive change* • Understands that a cycle may have no beginning or end, but events within the cycle will proceed in a predictable fashion* • Understands that recognizing an event is cyclic can help us prepare for the future* • Gives examples of a cause and effect relationship • Explains how determining cause and effect relationships can be useful* • Classifies a given scenario as an example of cause and effect • Infers the possible causes for a given scenario (presented as a diagram)*	• Gives examples of equilibrium in systems • Classifies a given event as an example of equilibrium • Understands that counterbalancing changes may be needed for systems to be maintained as conditions change • Explains how systems remain in equilibrium • Predicts how a particular change will affect the equilibrium of a system* • Gives examples of events that are likely to cause disequilibrium in a system (terms not used)* • Explains that very fast and very slow changes can be difficult to see or measure* • Represents change quantitatively* • Explains that change in nature is common and widespread* • Classifies events as change* • Describes properties of matter that remain constant after changes to systems • Determines the rate or gradient of change in systems, when given length of time and a total measurement of change* • Determines the location or time that a particular change is likely to occur when given the rate of change to a system* • Predicts what comes next in a sequence of numbers showing a complex pattern (e.g., addition then subtraction, geometric progression) • Gives evidence that supports the conclusion that a system (man-made or natural) has changed or evolved over time • Understands that evolution refers to changes to an entire species, not changes to an individual* • Describes characteristics of evolution • Makes inferences about the evolution of a system, given data about that system	• Gives examples of equilibrium in systems • Predicts how a particular change will affect the equilibrium of a system* • Gives examples of systems which show balance* • Analyzes changes occurring within systems* • Gives examples of things in nature which do not change* • Determines the rate or gradient of change in systems, when given length of time and a total measurement of change* • Predicts patterns of change to systems* • Extrapolates using rate of change to a system* • Distinguishes cycles from non-cyclic events • Understands that events that occur regularly are called cyclic* • Understands that rates describe the time it takes for a unit of a given event to occur* • Analyzes changes in scale • Understands that correlations seen in data are most useful in making predictions when a cause-effect relationship is established*

* Both data from test items and review by NWEA curriculum specialists are used to place learning continuum statements into appropriate RIT ranges.
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	• Interprets data (diagrams) related to the evolution of a system* • Understands that rates describe the time it takes for a unit of a given event to occur* • Analyzes changes in scale	
Systems, Structure, Function, and Conservation	**Systems, Structure, Function, and Conservation**	**Systems, Structure, Function, and Conservation**
• Describes characteristics used to order data shown in tables* • Orders steps of familiar procedures* • Understands that when components of systems interact, change occurs • Gives examples of interacting components*	• Explains why an object or collection of objects is a system • Classifies an example of parts that work together as a system* • Describes characteristics used to order sets of objects or events • Compares characteristics used to order sets of objects or events* • Understands that when components of systems interact, change occurs • Understands that interaction may occur across a distance, without components physically touching*	• Classifies an example of parts that work together as a system* • Understands that adding or removing components of systems will cause changes to those systems* • Understands that interacting components of systems affect each other*
Characteristics, Limitations, Technology, Models	**Characteristics, Limitations, Technology, Models**	**Characteristics, Limitations, Technology, Models**
• Recognizes that scientific explanations must be based on observations and scientific knowledge*	• Explains that scientific theories depend on logically consistent arguments* • Recognizes that scientific explanations must be based on observations and scientific knowledge* • Explains how scientific knowledge and economics drive the development of technology* • Explains that scientific advances often depend on development of new technologies*	• Recognizes that a key assumption of science is that the universe is a vast, single system that operates according to a single, consistent set of rules* • Recognizes that a key assumption of science is that the rules which govern the universe can be discovered and understood by careful, systematic study* • Recognizes that scientific explanations are considered valid when they meet multiple criteria (e.g., consistency with the evidence seen in nature, respect for the rules of evidence, openness to criticism, communication of methods used, public communication of results)* • Explains that scientific theories depend on logically consistent arguments* • Applies the steps of technological design • Compares and contrasts the procedures used in scientific inquiry and technological design*
New Vocabulary: cause and effect relationship, cyclic pattern, evidence, exert, field, gradient, hypothesis, imbalance, interact, prediction, quantification, regular pattern, series, slope, speed	*New Vocabulary:* accelerate, apparent size, arrangement, balance (equilibrium), contact, disequilibrium, double-pan balance, evolution, evolutionary change, evolutionary trend, evolve, field of view, magnification power, material, observable, orderly, percentage, predictable, regular increase, reversible, scale model, scaled up	*New Vocabulary:* balance, coincidence, cyclic, cyclic phenomenon, episodic, indicate, number pattern, regulated, repeat, vary
New Signs and Symbols: ℃ Celsius, ° degrees	*New Signs and Symbols:* ., . decimal point, ft feet, km	*New Signs and Symbols:* cubic centimeter/centimetre

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	kilometer/kilometre, %	

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Subject: Concepts and Processes
Goal Strand: Reflecting on Knowledge
RIT Score Range: 211 - 220

Skills and Concepts to Enhance 201 - 210	Skills and Concepts to Develop 211 - 220	Skills and Concepts to Introduce 221 - 230
Constancy, Change and Equilibrium	**Constancy, Change and Equilibrium**	**Constancy, Change and Equilibrium**
• Gives examples of equilibrium in systems • Classifies a given event as an example of equilibrium • Understands that counterbalancing changes may be needed for systems to be maintained as conditions change • Explains how systems remain in equilibrium • Predicts how a particular change will affect the equilibrium of a system* • Gives examples of events that are likely to cause disequilibrium in a system (terms not used)* • Explains that very fast and very slow changes can be difficult to see or measure* • Represents change quantitatively* • Explains that change in nature is common and widespread* • Classifies events as change* • Describes properties of matter that remain constant after changes to systems • Determines the rate or gradient of change in systems, when given length of time and a total measurement of change* • Determines the location or time that a particular change is likely to occur when given the rate of change to a system* • Predicts what comes next in a sequence of numbers showing a complex pattern (e.g., addition then subtraction, geometric progression) • Gives evidence that supports the conclusion that a system (man-made or natural) has changed or evolved over time • Understands that evolution refers to changes to an entire species, not changes to an individual* • Describes characteristics of evolution • Makes inferences about the evolution of a system, given data about that system	• Gives examples of equilibrium in systems • Predicts how a particular change will affect the equilibrium of a system* • Gives examples of systems which show balance* • Analyzes changes occurring within systems* • Gives examples of things in nature which do not change* • Determines the rate or gradient of change in systems, when given length of time and a total measurement of change* • Predicts patterns of change to systems* • Extrapolates using rate of change to a system* • Distinguishes cycles from non-cyclic events • Understands that events that occur regularly are called cyclic* • Understands that rates describe the time it takes for a unit of a given event to occur* • Analyzes changes in scale • Understands that correlations seen in data are most useful in making predictions when a cause-effect relationship is established*	• Explains that equilibrium can be produced when changes occur in opposition to each other and at the same time* • Gives examples of maintenance of equilibrium (homeostasis) in the human body* • Describes characteristics of a gradient* • Gives examples of cyclic events* • Determines evolutionary trends in Earth/space, physical, and biological systems*

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Blank cells indicate data are limited or unavailable for this range or document version.

• Interprets data (diagrams) related to the evolution of a system* • Understands that rates describe the time it takes for a unit of a given event to occur* • Analyzes changes in scale		
Systems, Structure, Function, and Conservation	**Systems, Structure, Function, and Conservation**	**Systems, Structure, Function, and Conservation**
• Explains why an object or collection of objects is a system • Classifies an example of parts that work together as a system* • Describes characteristics used to order sets of objects or events • Compares characteristics used to order sets of objects or events* • Understands that when components of systems interact, change occurs • Understands that interaction may occur across a distance, without components physically touching*	• Classifies an example of parts that work together as a system* • Understands that adding or removing components of systems will cause changes to those systems* • Understands that interacting components of systems affect each other*	• Gives examples of inputs and outputs of systems*
Characteristics, Limitations, Technology, Models	**Characteristics, Limitations, Technology, Models**	**Characteristics, Limitations, Technology, Models**
• Explains that scientific theories depend on logically consistent arguments* • Recognizes that scientific explanations must be based on observations and scientific knowledge* • Explains how scientific knowledge and economics drive the development of technology* • Explains that scientific advances often depend on development of new technologies*	• Recognizes that a key assumption of science is that the universe is a vast, single system that operates according to a single, consistent set of rules* • Recognizes that a key assumption of science is that the rules which govern the universe can be discovered and understood by careful, systematic study* • Recognizes that scientific explanations are considered valid when they meet multiple criteria (e.g., consistency with the evidence seen in nature, respect for the rules of evidence, openness to criticism, communication of methods used, public communication of results)* • Explains that scientific theories depend on logically consistent arguments* • Applies the steps of technological design • Compares and contrasts the procedures used in scientific inquiry and technological design*	• Recognizes that scientific explanations are considered valid when they meet multiple criteria (e.g., consistency with the evidence seen in nature, respect for the rules of evidence, openness to criticism, communication of methods used, public communication of results)*
New Vocabulary: accelerate, apparent size, arrangement, balance (equilibrium), contact, disequilibrium, double-pan balance, evolution, evolutionary change, evolutionary trend, evolve, field of view, magnification power, material, observable, orderly, percentage, predictable, regular increase, reversible, scale model, scaled up	*New Vocabulary:* balance, coincidence, cyclic, cyclic phenomenon, episodic, indicate, number pattern, regulated, repeat, vary	*New Vocabulary:* cancellation, opposing forces, regular time interval
New Signs and Symbols: ., , . decimal point, ft feet, km	*New Signs and Symbols:* cubic centimeter/centimetre	*New Signs and Symbols:* none

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kilometer/kilometre, %		

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Subject: Concepts and Processes
Goal Strand: Reflecting on Knowledge
RIT Score Range: 221 - 230

Skills and Concepts to Enhance 211 - 220	Skills and Concepts to Develop 221 - 230	Skills and Concepts to Introduce 231 - 240
Constancy, Change and Equilibrium	**Constancy, Change and Equilibrium**	**Constancy, Change and Equilibrium**
• Gives examples of equilibrium in systems • Predicts how a particular change will affect the equilibrium of a system* • Gives examples of systems which show balance* • Analyzes changes occurring within systems* • Gives examples of things in nature which do not change* • Determines the rate or gradient of change in systems, when given length of time and a total measurement of change* • Predicts patterns of change to systems* • Extrapolates using rate of change to a system* • Distinguishes cycles from non-cyclic events • Understands that events that occur regularly are called cyclic* • Understands that rates describe the time it takes for a unit of a given event to occur* • Analyzes changes in scale • Understands that correlations seen in data are most useful in making predictions when a cause-effect relationship is established*	• Explains that equilibrium can be produced when changes occur in opposition to each other and at the same time* • Gives examples of maintenance of equilibrium (homeostasis) in the human body* • Describes characteristics of a gradient* • Gives examples of cyclic events* • Determines evolutionary trends in Earth/space, physical, and biological systems*	• Explains that equilibrium can be produced when changes occur in opposition to each other and at the same time* • Infers that a system is in balance due to forces equally opposing each other* • Recognizes examples of dynamic equilibrium in systems* • Infers that things that have come to rest are in equilibrium* • Classifies disparate events as examples of equilibrium* • Determines gradients of change to systems when given a table of relevant data* • Gives examples of gradient change* • Gives examples of evolutionary change* • Uses symbolic equations to represent change*
Systems, Structure, Function, and Conservation	**Systems, Structure, Function, and Conservation**	**Systems, Structure, Function, and Conservation**
• Classifies an example of parts that work together as a system* • Understands that adding or removing components of systems will cause changes to those systems* • Understands that interacting components of systems affect each other*	• Gives examples of inputs and outputs of systems*	• Understands that ordering sets of objects requires characteristics that have multiple forms (e.g., height, but not right/left-handedness)*
Characteristics, Limitations, Technology, Models	**Characteristics, Limitations, Technology, Models**	**Characteristics, Limitations, Technology, Models**
• Recognizes that a key assumption of science is that the universe is a vast, single system that operates according to a single, consistent set of rules* • Recognizes that a key assumption of science is that the rules which govern the universe can be discovered and understood by careful, systematic study*	• Recognizes that scientific explanations are considered valid when they meet multiple criteria (e.g., consistency with the evidence seen in nature, respect for the rules of evidence, openness to criticism, communication of methods used, public communication of results)*	

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Blank cells indicate data are limited or unavailable for this range or document version.

• Recognizes that scientific explanations are considered valid when they meet multiple criteria (e.g., consistency with the evidence seen in nature, respect for the rules of evidence, openness to criticism, communication of methods used, public communication of results)* • Explains that scientific theories depend on logically consistent arguments* • Applies the steps of technological design • Compares and contrasts the procedures used in scientific inquiry and technological design*		
New Vocabulary: balance, coincidence, cyclic, cyclic phenomenon, episodic, indicate, number pattern, regulated, repeat, vary	*New Vocabulary:* cancellation, opposing forces, regular time interval	*New Vocabulary:* none
New Signs and Symbols: cubic centimeter/centimetre	*New Signs and Symbols:* none	*New Signs and Symbols:* none

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Blank cells indicate data are limited or unavailable for this range or document version.

Subject: Concepts and Processes
Goal Strand: Reflecting on Knowledge
RIT Score Range: 231 - 240

Skills and Concepts to Enhance 221 - 230	Skills and Concepts to Develop 231 - 240	Skills and Concepts to Introduce Above 240
Constancy, Change and Equilibrium	**Constancy, Change and Equilibrium**	**Constancy, Change and Equilibrium**
• Explains that equilibrium can be produced when changes occur in opposition to each other and at the same time* • Gives examples of maintenance of equilibrium (homeostasis) in the human body* • Describes characteristics of a gradient* • Gives examples of cyclic events* • Determines evolutionary trends in Earth/space, physical, and biological systems*	• Explains that equilibrium can be produced when changes occur in opposition to each other and at the same time* • Infers that a system is in balance due to forces equally opposing each other* • Recognizes examples of dynamic equilibrium in systems* • Infers that things that have come to rest are in equilibrium* • Classifies disparate events as examples of equilibrium* • Determines gradients of change to systems when given a table of relevant data* • Gives examples of gradient change* • Gives examples of evolutionary change* • Uses symbolic equations to represent change*	• Gives examples of dynamic equilibrium in systems* • Infers that things that have come to rest are in equilibrium*
Systems, Structure, Function, and Conservation	**Systems, Structure, Function, and Conservation**	**Systems, Structure, Function, and Conservation**
• Gives examples of inputs and outputs of systems*	• Understands that ordering sets of objects requires characteristics that have multiple forms (e.g., height, but not right/left-handedness)*	
Characteristics, Limitations, Technology, Models	**Characteristics, Limitations, Technology, Models**	**Characteristics, Limitations, Technology, Models**
• Recognizes that scientific explanations are considered valid when they meet multiple criteria (e.g., consistency with the evidence seen in nature, respect for the rules of evidence, openness to criticism, communication of methods used, public communication of results)*		
New Vocabulary: cancellation, opposing forces, regular time interval	*New Vocabulary:* none	*New Vocabulary:* none
New Signs and Symbols: none	*New Signs and Symbols:* none	*New Signs and Symbols:* none

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Subject: Concepts and Processes
Goal Strand: Reflecting on Knowledge
RIT Score Range: Above 240

Skills and Concepts to Enhance 231 - 240	Skills and Concepts to Develop Above 240
Constancy, Change and Equilibrium	**Constancy, Change and Equilibrium**
• Explains that equilibrium can be produced when changes occur in opposition to each other and at the same time* • Infers that a system is in balance due to forces equally opposing each other* • Recognizes examples of dynamic equilibrium in systems* • Infers that things that have come to rest are in equilibrium* • Classifies disparate events as examples of equilibrium* • Determines gradients of change to systems when given a table of relevant data* • Gives examples of gradient change* • Gives examples of evolutionary change* • Uses symbolic equations to represent change*	• Gives examples of dynamic equilibrium in systems* • Infers that things that have come to rest are in equilibrium*
Systems, Structure, Function, and Conservation	**Systems, Structure, Function, and Conservation**
• Understands that ordering sets of objects requires characteristics that have multiple forms (e.g., height, but not right/left-handedness)*	
Characteristics, Limitations, Technology, Models	**Characteristics, Limitations, Technology, Models**
New Vocabulary: none	*New Vocabulary:* none
New Signs and Symbols: none	*New Signs and Symbols:* none

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