

Science ISAT: Concepts and Processes – Nature of Science

Skills: Understand Concepts and Processes of Evidence, Models, and Explanation

Students:	<p>RIT Above 240:</p> <ul style="list-style-type: none"> • Extrapolates from data presented in tables using calculations
Students:	<p>RIT 231-240:</p> <ul style="list-style-type: none"> • Analyzes relationships using a simple mathematical model • Formulates hypotheses within the context of a scientific investigation • Extrapolates from data presented in graphs (exponential/logistic relationships)
Students:	<p>RIT 221-230:</p> <ul style="list-style-type: none"> • Distinguishes between the ideas of hypothesis, fact, observation, opinion, model, and theory • 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) • Differentiates among examples of models and observations • Selects appropriate scale models to represent data • Assesses how well a model represents a real life event, process, or concept • Distinguishes between testable and nontestable hypotheses for a given experimental setup • Describes results that would necessitate the revision of the hypothesis being tested • 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 • Describes qualities that make observations scientific
Students:	<p>RIT 211-220:</p> <ul style="list-style-type: none"> • Distinguishes examples of observations from facts, theories, and hypotheses • 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 results) • Explains how models help scientists to understand the physical world • Compares physical, mathematical, and conceptual models • Gives examples of conceptual (e.g., scientific) models • Evaluates the usefulness of a model • Describes circumstances that might lead to the revision of a scientific model • Orders the stages that are involved in creating a scientific model • Determines the hypothesis being tested, given a particular experimental setup or problem/question • Formulates testable hypotheses based on data
Students:	<p>RIT 201-210:</p> <ul style="list-style-type: none"> • Recognizes that scientific understanding is produced through use of empirical standards (i.e., the use of direct observation and measurement) • Distinguishes examples of theories from facts, observations, hypotheses • Classifies a particular statement as an observation • Distinguishes examples of observations from facts, theories, and hypotheses • Recognizes that scientific explanations must be based on observations and scientific knowledge • Recognizes that models are not identical to the object, process, or event they portray • Determines which model would be most useful in describing a particular process, event, or concept • Orders the stages that are involved in creating a scientific model • 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 • 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 • Draws conclusions from data presented in tables containing two manipulated (independent) variables

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- Draws conclusions from experimental observations
- Makes inferences that limit themselves to the data which has been presented and avoids speculation
- 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"
- Determines which observations are relevant to an investigation
- Predicts how objects will appear when viewed from different angles
- Distinguishes among examples of direct observations and predictions

Students:

RIT 191-200:

- Recognizes that scientific explanations must be based on observations and scientific knowledge
- Recognizes that models are useful to illustrate processes that are too large to manipulate
- Selects models to represent the parts of an object or process
- Explains that models are useful to examine things or processes which cannot be directly observed or tested
- Compares physical models to what they represent
- Forms hypotheses that are based on observations and data
- Understands that data collected in experiments must not be "fudged" or misrepresented
- Identifies the data being collected in a given scenario
- 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
- Draws conclusions from experimental observations
- Extrapolates from data presented in tables
- Extrapolates from data presented in graphs (linear relationships)
- 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

Students:

RIT 181-190:

- Recognizes that scientific theories depend on evidence
- Interprets simple bar graphs
- Interprets trends in bar graphs
- Interprets data represented as pictures or icons within a table or chart
- Interprets diagrams
- Makes inferences about common events and phenomena
- Describes characteristics of objects
- Understands that observations are useful in studying changes in an object over time

Students:

RIT 171-180:

- Forms hypotheses that are based on real-life experience
- Interprets simple bar graphs
- Interprets data in simple line graphs
- Draws conclusions from simple diagrams

Students:

RIT Below 171:

- *No Skills Listed*