



WeatherBug Achieve lessons and tools enable Indiana teachers to design lessons and activities using the interesting and relevant themes of weather as a window of opportunity to explore concepts in all subject areas. Live data engages student interest while tables, maps and graphs provide the foundation that connects the concepts and processes that enhance learning in all subject areas.

WeatherBug Achieve aligns with the Indiana Academic Standards in Math and Science and defines learning through observation, analysis and interpretation, problem solving, critical thinking and justification of conclusions and methodology. These key processes operate across WeatherBug Achieve in Math and Science to provide all classrooms in grades 9-12 with the tools to enhance learning and boost student achievement.

## 9<sup>th</sup> Grade – 12<sup>th</sup> Grade

# WeatherBug Achieve Standards Correlation

## Indiana Academic Standards

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# High School

## Math

Algebra I		Lesson/Project	Tools
<b>Standard 1</b>	Operations with Real Numbers	Averaging Weather Data, Dew Point, Estimating Energy Consumption	
<b>Indicator A1.1.1</b>	Compare real number expressions.	Averaging Weather Data, Dew Point, Estimating Energy Consumption	
<b>Indicator A1.1.5</b>	Use dimensional (unit) analysis to organize conversions and computations.	Dew Point	
<b>Standard 3</b>	Relations and Functions	Dew Point	
<b>Indicator A1.3.1</b>	Sketch a reasonable graph for a given relationship.	Dew Point	Weather Observations
<b>Indicator A1.3.2</b>	Interpret a graph representing a given situation.	Dew Point	Weather Observations, Weather Camera
<b>Indicator A1.3.3</b>	Understand the concept of a function, decide if a given relation is a function, and link equations to functions.	Dew Point	Weather Observations, Weather Camera
<b>Standard 4</b>	Graphing Linear Equations and Inequalities	Estimating Energy Consumption	
<b>Indicator A1.4.1</b>	Graph a linear equation.	Estimating Energy Consumption	Weather Observations, Weather Camera
<b>Indicator A1.4.2</b>	Find the slope, x-intercept and y-intercept of a line given its graph, its equation, or two points on the line.	Estimating Energy Consumption	Weather Observations, Weather Camera
<b>Indicator A1.4.3</b>	Write the equation of a line in slope-intercept form. Understand how the slope and y-intercept of the graph are related to the equation.	Estimating Energy Consumption	Weather Observations, Weather Camera
<b>Indicator A1.4.4</b>	Write the equation of a line given appropriate information.	Estimating Energy Consumption	Weather Observations, Weather Camera
<b>Standard 6</b>	Polynomials	Standard Deviation	
<b>Indicator A1.6.1</b>	Add and subtract polynomials.	Standard Deviation	

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<b>Indicator A1.6.4</b> Multiply polynomials.	Standard Deviation	
<b>Standard 9</b> Mathematical Reasoning and Problem Solving	Analyzing Graph and Image Data, Dew Point, Using Wind Chill Factor	
<b>Indicator A1.9.1</b> Use a variety of problem solving strategies, such as drawing a diagram, making a chart, guess-and-check, solving a simpler problem, writing an equation, and working backwards.	Using Wind Chill Factor	Weather Observations, Weather Camera, Map Gallery
<b>Indicator A1.9.2</b> Decide whether a solution is reasonable in the context of the original situation.	Analyzing Graph and Image Data, Using Wind Chill Factor	
<b>Indicator A1.9.3</b> Use the properties of the real number system and the order of operations to justify the steps of simplifying functions and solving equations.	Dew Point, Using Wind Chill Factor	
<b>Algebra II</b>	<b>Lesson/Project</b>	<b>Tools</b>
<b>Standard 1</b> Relations and Functions	Standard Deviation	
<b>Indicator A2.1.2</b> Use function notation. Add, subtract, multiply, and divide pairs of functions.	Standard Deviation	
<b>Indicator A2.1.4</b> Graph relations and functions with and without graphing technology.	Standard Deviation	Weather Observations, Weather Camera, Map Gallery
<b>Indicator A2.1.8</b> Interpret given situations as functions in graphs, formulas, and words.	Standard Deviation	Weather Observations, Weather Camera, Map Gallery
<b>Calculus</b>	<b>Lesson/Project</b>	<b>Tools</b>
<b>Standard 2</b> Differential Calculus	Calculus - Derivatives	
<b>Indicator C.2.1</b> Understand the concept of derivative geometrically, numerically, and analytically, and interpret the derivative as a rate of change.	Calculus - Derivatives	Weather Observations
<b>Indicator C.2.2</b> State, understand, and apply the definition of derivative.	Calculus - Derivatives	Weather Observations
<b>Standard 3</b> Applications of Derivatives	Calculus - Derivatives	
<b>Indicator C.3.3</b> Decide where functions are decreasing and increasing. Understand the relationship between the increasing and decreasing behavior of $f$ and the sign of $f'$ .	Calculus - Derivatives	Weather Observations
<b>Indicator C.3.5</b> Analyze curves, including the notions of monotonicity and concavity.	Calculus - Derivatives	Weather Observations

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<b>Indicator C.3.12</b> Model rates of change, including related rates problems.	Calculus - Derivatives	Weather Observations
<b>Pre-Calculus</b>		
<b>Lesson/Project</b>		<b>Tools</b>
<b>Standard 1</b> Relations and Functions	Estimating Energy Consumption	
<b>Indicator PC.1.1</b> Recognize and graph various types of functions, including polynomial, rational, algebraic, and absolute value functions. Use paper and pencil methods and graphing calculators.	Estimating Energy Consumption	
<b>Indicator PC.1.8</b> Understand curves defined parametrically and draw their graphs.	Estimating Energy Consumption	
<b>Indicator PC.1.9</b> Compare relative magnitudes of functions and their rates of change.	Estimating Energy Consumption	
<b>Probability and Statistics</b>		
<b>Lesson/Project</b>		<b>Tools</b>
<b>Standard 1</b> Descriptive Statistics	Averaging Weather Data, Calculus - Derivatives, Estimating Energy Consumption, Pressure, Relative Humidity	
<b>Indicator PS.1.1</b> Create, compare, and evaluate different graphic displays of the same data, using histograms, frequency polygons, cumulative distribution functions, pie charts, scatter plots, stem-and-leaf plots, and box-and-whisker plots. Draw these by hand or use a computer spreadsheet program.	Estimating Energy Consumption, Pressure, Relative Humidity	Weather Observations
<b>Indicator PS. 1.2</b> Compute and use mean, median, mode, weighted mean, geometric mean, harmonic mean, range, quartiles, variance, and standard deviation.	Averaging Weather Data, Calculus - Derivatives, Estimating Energy Consumption	Weather Observations
<b>Standard 2</b> Probability	Dew Point	
<b>Indicator PS.2.10</b> Use other continuous random variables and probability distributions to solve problems.	Dew Point	
<b>Integrated Mathematics I</b>		
<b>Lesson/Project</b>		<b>Tools</b>
<b>Standard 2</b> Algebra and Functions	Estimating Energy Consumption, Standard Deviation, Using Wind Chill Factor	
<b>Indicator IM1.2.2</b> Solve equations and formulas for a specific variable.	Using Wind Chill Factor	Weather Observations
<b>Indicator IM1.2.5</b> Solve word problems that involve linear equations, formulas, and inequalities.	Standard Deviation	
<b>Indicator IM1.2.6</b> Sketch a reasonable graph for a given relationship.	Standard Deviation	

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<b>Indicator IM1.2.7</b> Interpret a graph representing a given situation.	Standard Deviation	Weather Observations, Weather Camera
<b>Indicator IM1.2.8</b> Understand the concept of a function, decide if a given relation is a function and link equations to functions.	Standard Deviation	Weather Observations, Weather Camera
<b>Indicator IM1.2.10</b> Graph a linear equation.	Estimating Energy Consumption	Weather Observations, Weather Camera
<b>Indicator IM1.2.11</b> Find the slope, x-intercept and y-intercept of a line given its graph, its equation, or two points on the line.	Standard Deviation	Weather Observations, Weather Camera
<b>Indicator IM1.2.12</b> Write the equation of a line in slope-intercept form. Understand how the slope and y-intercept are related to the equation.	Standard Deviation	Weather Observations, Weather Camera
<b>Indicator IM1.2.14</b> Write the equation of a line that models a given situation and use (or the graph of the line) to make predictions. Describe the slope of the line in terms of the given situation, recognizing that the slope is the rate of change.	Estimating Energy Consumption	Weather Observations, Weather Camera
<b>Indicator IM1.2.15</b> Use the graph to estimate the solution of a pair of linear equations in two variables.	Standard Deviation	Weather Observations, Weather Camera
<b>Indicator IM1.2.20</b> Add and subtract polynomials.	Standard Deviation	
<b>Indicator IM1.2.21</b> Multiple and divide monomials.	Standard Deviation	
<b>Indicator IM1.2.22</b> Find powers and roots of monomials (only when the answer has an integer exponent).	Standard Deviation	
<b>Indicator IM1.2.23</b> Multiply polynomials.	Standard Deviation	
<b>Indicator IM1.2.29</b> Graph exponential functions.	Standard Deviation	
<b>Standard 4</b> Data Analysis and Statistics	Analyzing Graph and Image Data, Averaging Weather Data, Calculus - Derivatives, Relative Humidity	
<b>Indicator IM1.4.1</b> Construct a line plot.	Relative Humidity	Weather Observations
<b>Indicator IM1.4.2</b> Find measures of central tendency for a set of data.	Relative Humidity	Weather Observations
<b>Indicator IM1.4.12</b> Construct a scatterplot from a set of data.	Calculus - Derivatives, Relative Humidity	Weather Observations

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<b>Indicator IM1.4.15</b> Compare sets of data using scatterplots and the line $y = x$ , and interpret these comparisons for real-world data.	Analyzing Graph and Image Data, Averaging Weather Data, Calculus - Derivatives, Relative Humidity	Weather Observations, Weather Camera
<b>Indicator IM1.4.16</b> Recognize patterns in tables and graphs that are modeled by linear equations.	Relative Humidity	Weather Observations, Weather Camera
<b>Integrated Mathematics II</b>		
<b>Lesson/Project</b>		<b>Tools</b>
<b>Standard 3</b> Data Analysis and Statistics	Analyzing Graph and Image Data, Averaging Weather Data, Calculus - Derivatives, Pressure, Standard Deviation	
<b>Indicator IM2.3.1</b> Describe the association between two variables by interpreting a scatterplot.	Analyzing Graph and Image Data, Averaging Weather Data, Calculus - Derivatives, Pressure, Standard Deviation	Weather Observations, Weather Camera
<b>Integrated Mathematics III</b>		
<b>Lesson/Project</b>		<b>Tools</b>
<b>Standard 3</b> Data Analysis and Statistics	Standard Deviation	
<b>Indicator IM3.3.4</b> Understand the standard deviation as a measure of variability in a distribution.	Standard Deviation	Weather Observations
<b>Science</b>		
<b>Earth and Space Science I</b>		
<b>Standard 1 Principles of Earth and Space Science</b>		<b>Lesson/Project</b>
<b>Category</b> The Earth		<b>Tools</b>
<b>Indicator ES.1.10</b> Recognize and describe that the earth sciences address planet-wide interacting systems, including the oceans, the air, the solid earth, and life on Earth, as well as interactions with the Solar System.	A Renewable Resource, El Nino, Fronts, Ocean Currents, Satellite Maps, Seasonal Changes, Wind	Weather Observations, Weather Camera, Map Gallery
<b>Indicator ES.1.13</b> Explain the importance of heat transfer between and within the atmosphere, land masses, and oceans.	Ocean Currents, Satellite Maps	Weather Observations, Weather Camera, Map Gallery

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<b>Indicator ES.1.14</b> Understand and explain the role of differential heating and the role of Earth's rotation on the movement of air around the planet.	El Nino, Seasonal Changes	Weather Observations, Weather Camera, Map Gallery
<b>Indicator ES.1.15</b> Understand and describe the origin, life cycle, behavior, and prediction of weather systems.	A Renewable Resource, Fronts	Weather Observations, Weather Camera, Map Gallery
<b>Indicator ES.1.16</b> Investigate the causes of severe weather, and propose appropriate safety measures that can be taken in the event of severe weather.	El Nino	Weather Observations, Weather Camera, Map Gallery
<b>Indicator ES.1.20</b> Describe the relationship among ground water, surface water, and glacial systems.	A Renewable Resource	
<b>Indicator ES.1.21</b> Identify the various processes that are involved in the water cycle.	A Renewable Resource	Weather Observations, Weather Camera, Map Gallery
<b>Environmental Science, Advanced</b>		
<b>Standard 1 Principles of Environmental Science</b>		<b>Lesson/Project</b>
		<b>Tools</b>
<b>Category</b> Natural Resources	A Renewable Resource	
<b>Indicator Env.1.21</b> Differentiate between renewable and non-renewable resources, and compare and contrast the pros and cons of using non-renewable resources.	A Renewable Resource	
<b>Indicator Env.1.25</b> Recognize and describe alternative sources of energy provided by water, the atmosphere, and the sun.	A Renewable Resource	
<b>Indicator Env.1.27</b> Understand and describe the concept of integrated natural resource management and the values of managing natural resources as an ecological unit.	A Renewable Resource	