SwISTEM Equipment Links to High School Biology Standards

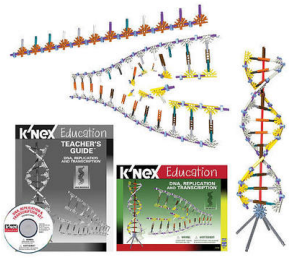
We have a full line of Vernier Labquest 2 and 3 and almost every sensor/ probe they make! We suggest using the labs featured in their manuals. Click on the link for a .pdf version of the lab manual. We also have links to other versions of the book– just ask!

Biology with Vernier
***Advanced Biology with Vernier* (perfect for AP Biology)**

Are these labs too much for your students? Try some from the Middle School Science with Vernier book. Labs 20-26 are all Biology labs.

HS-LS1-1 *"Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells."*

1. We have a set of **KNex DNA** molecules kits that are a nice hands-on way for students to build their own DNA molecule. See your options in the **KNex DNA Teacher Guide**.



2. We have a fun (and tasty!) way for students to build a DNA molecule using candy. Written by a local educator, this **Candy DNA activity** is guaranteed to be a hit!

Vernier lists the following labs as meeting this standard (all from the *Biology with Vernier* book):

BWV02: Limits on Cell Size
BWV 04: Membrane Diffusion
BWV06: Enzyme 02
BWV07: Photosynthesis
BWV 08: Alcohol and Membranes
BWV 09: Biological Membranes
BWV 10: Transpiration
BWV 11: Cell Respiration
BWV 12A: Yeast Respiration
BWV 12B: Fermentation
BWV 16A: Temperature and Respiration
BWV 16B: Temperature and Fermentation
BWV 17: Aerobic Respiration
BWV 23: Cold Blooded Temperature
BWV 26: Human Respiration
BWV 27: Heart Rate and Fitness
BWV 28: Monitoring EKG
BWV 29: Ventilation and Heart Rate
BWV 30: Oxygen and Human Respiration
BWV 31: Photosynthesis and Respiration

HS-LS1-2 *"Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.."*

1. **Giant Organs/ Systems**
   We have many high-quality anatomical models available: giant heart, actual size heart, respiratory system, lungs, giant skin, brain, giant kidney, ear, and eye. These models could be helpful in discussions about multicellular organisms.

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BWV 27: Heart Rate and Fitness
BWV 28: Monitoring EKG
BWV 29: Ventilation and Heart Rate
BWV 30: Oxygen and Human Respiration
BWV 31: Photosynthesis and Respiration

HS-LS1-3 *"Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis."*

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BWV06: Enzyme 02
BWV07: Photosynthesis
BWV 08: Alcohol and Membranes
BWV 09: Biological Membranes
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BWV 12A: Yeast Respiration
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BWV 17: Aerobic Respiration
BWV 23: Cold Blooded Temperature
BWV 26: Human Respiration

BWV 27: Heart Rate and Fitness
BWV 28: Monitoring EKG
BWV 29: Ventilation and Heart Rate
BWV 30: Oxygen and Human Respiration
BWV 31: Photosynthesis and Respiration

HS-LS1-4 *"Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms."*

1. **Microslide Viewers:** Microslide Viewers provide a microscope experience without the hassle. The viewers work with slide sets, including **Animal Mitosis**, **Cells of Plants and Animals**, **Meiosis**, and **Plant Mitosis**. Each set comes with student worksheets and slide descriptions.

2. **Cell Mitosis Model Set**: This demonstration set has a model for each stage of Mitosis. Each stage is labeled on the back, so it is perfect for quizzes or review.

3. We also have two great activities designed by a local educator. They are geared to Middle School, but they could be a fun introduction. The first involves drawing cells using chalk: **Cell Drawing Activity**, and the second is a fun activity called **Cell Organelle Riddles**.

Vernier lists the following lab as addressing this standard:

BWV 13: Population Dynamics

HS-LS1-5 *"Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy."*

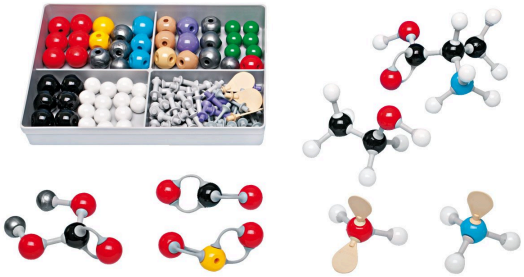
1. We have an outstanding Microslide Viewer Set that addresses **Photosynthesis Microslide Viewer Set**. Each set has 10 microslides, so request 10 viewers.

Vernier lists the following lab as addressing this standard (all from the *Biology with Vernier* book):

BWV 01: Energy in Food
BWV07: Photosynthesis
BWV 11: Cell Respiration
BWV 12A: Yeast Respiration
BWV 12B: Fermentation
BWV 16A: Temperature and Respiration
BWV 16B: Temperature and Fermentation
BWV 17: Aerobic Respiration
BWV 21: Physical Lake Profile
BWV 25: Primary Productivity
BWV 26: Human Respiration
BWV 27: Heart Rate and Fitness
BWV 29: Ventilation and Heart Rate
BWV 30: Oxygen and Human Respiration
BWV 31:Photosynthesis and Respiration

HS-LS1-6 *"Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules."*

1. We have 14 sets of **Organic Chemistry Model Sets**. They are extremely high quality model sets and are perfect for modeling any carbon based structures.



Vernier lists the following labs as meeting this standard (all from the *Biology with Vernier* book):

BWV 01: Energy in Food
BWV07: Photosynthesis
BWV 11: Cell Respiration
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BWV 16A: Temperature and Respiration
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BWV 21: Physical Lake Profile
BWV 25: Primary Productivity
BWV 26: Human Respiration
BWV 27: Heart Rate and Fitness
BWV 29: Ventilation and Heart Rate
BWV 30: Oxygen and Human Respiration
BWV 31:Photosynthesis and Respiration

HS-LS1-7 *"Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy"*

Vernier lists the following labs as meeting this standard (all from the *Biology with Vernier* book):

BWV 01: Energy in Food
BWV07: Photosynthesis
BWV 11: Cell Respiration
BWV 12A: Yeast Respiration

BWV 12B: Fermentation
BWV 16A: Temperature and Respiration
BWV 16B: Temperature and Fermentation
BWV 17: Aerobic Respiration
BWV 21: Physical Lake Profile
BWV 25: Primary Productivity
BWV 26: Human Respiration
BWV 27: Heart Rate and Fitness
BWV 29: Ventilation and Heart Rate
BWV 30: Oxygen and Human Respiration
BWV 31:Photosynthesis and Respiration

HS-LS2-1 *"Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales"*

Vernier lists the following labs as meeting this standard (all from the *Biology with Vernier* book):

BWV 13: Population Dynamics
BWV 14: Plants and Animals: Dissolved Oxygen
BWV 15: Biodiversity
BWV 19: Dissolved Oxygen
BWV 20: Watershed Testing
BWV 21: Physical Lake Profile
BWV 25: Primary Productivity

HS-LS2-2 *"Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales."*

Vernier lists the following labs as meeting this standard (all from the *Biology with Vernier* book):

BWV 13: Population Dynamics
BWV 14: Plants and Animals: Dissolved Oxygen
BWV 15: Biodiversity
BWV 18: Acid Rain

BWV 19: Dissolved Oxygen
BWV 20: Watershed Testing
BWV 21: Physical Lake Profile
BWV 25: Primary Productivity

HS-LS2-3 *"Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions."*

Vernier lists the following labs as meeting this standard (all from the *Biology with Vernier* book):

BWV07: Photosynthesis
BWV 11: Cell Respiration
BWV 13: Population Dynamics
BWV 14: Plants and Animals: Dissolved Oxygen
BWV 15: Biodiversity
BWV 20: Watershed Testing
BWV 21: Physical Lake Profile
BWV 25: Primary Productivity
BWV 31:Photosynthesis and Respiration

HS-LS2-4 "Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem."

Vernier lists the following labs as meeting this standard (all from the *Biology with Vernier* book):

BWV07: Photosynthesis
BWV 11: Cell Respiration
BWV 13: Population Dynamics
BWV 14: Plants and Animals: Dissolved Oxygen
BWV 15: Biodiversity
BWV 20: Watershed Testing
BWV 21: Physical Lake Profile
BWV 25: Primary Productivity
BWV 31:Photosynthesis and Respiration

HS-LS2-5 *"Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere."*

Vernier lists the following labs as meeting this standard (all from the *Biology with Vernier* book):

BWV07: Photosynthesis
BWV 11: Cell Respiration
BWV 13: Population Dynamics
BWV 14: Plants and Animals: Dissolved Oxygen
BWV 15: Biodiversity
BWV 20: Watershed Testing
BWV 21: Physical Lake Profile
BWV 25: Primary Productivity
BWV 31:Photosynthesis and Respiration

HS-LS2-6 *"Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem."*

Vernier lists the following labs as meeting this standard (all from the *Biology with Vernier* book):

BWV 13: Population Dynamics
BWV 14: Plants and Animals: Dissolved Oxygen
BWV 15: Biodiversity
BWV 18: Acid Rain
BWV 20: Watershed Testing

HS-LS2-7 *"Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity."*

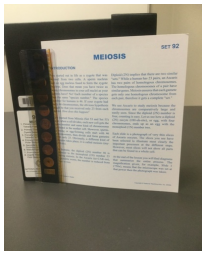
Vernier lists the following labs as meeting this standard(all from the *Biology with Vernier* book):

BWV 13: Population Dynamics
BWV 14: Plants and Animals: Dissolved Oxygen
BWV 15: Biodiversity
BWV 18: Acid Rain
BWV 20: Watershed Testing

HS-LS3-2 *"Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors."*

1. We have an excellent **Meiosis Set** that has a model for each stage of Meiosis

2. We also have a **Meiosis Microslide Viewer Set** that has a slide for each stage of Meiosis. We have 10 microslide sets, and the set comes with student worksheets. Microslide viewers also needed.



HS-LS4-2 *"Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment."*

Vernier lists the following lab as meeting this standard (from the *Biology with Vernier* book):

BWV 24: Lactase Action

HS-LS4-3 *"Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait."*

Vernier lists the following lab as meeting this standard (from the *Biology with Vernier* book):

BWV 24: Lactase Action

HS-LS4-4 *"Construct an explanation based on evidence for how natural selection leads to adaptation of populations."*

Vernier lists the following lab as meeting this standard (from the *Biology with Vernier* book:

BWV 24: Lactase Action

HS-LS4-5 *"Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species."*

Vernier lists the following lab as meeting this standard (from the *Biology with Vernier* book):

BWV 24: Lactase Action

HS-LS4-6 *"Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity."*

Vernier lists the following lab as meeting this standard (all from the *Biology with Vernier* book):

BWV 13: Population Dynamics

BWV 14: Plants and Animals: Dissolved Oxygen
BWV 15: Biodiversity
BWV 18: Acid Rain
BWV 19: Dissolved Oxygen
BWV 24: Lactase Action