

Unit Summary

The hands-on activities in Frey's Inquiry Investigations™ Module *Human Biology and Health Issues* link to core science concepts, making them an excellent complement to existing curricula. Students investigate the human body systems, human senses, the eye-brain connection, blood and blood typing, food chemistry, nutrition, transdermal drug delivery systems, kidney function, transmission of viruses, and how pollutants accumulate in the lungs.

The Inquiry Investigations™ Module *Human Biology and Health Issues* consists of four investigative units featuring twenty-four hands-on laboratory activities. Each unit begins with a thorough introduction of the science skills and concepts presented in the lab activities that follow. The lab investigations can be performed in sequence (see pacing chart) or separately based upon the time available.

Suggested *Going Further* investigations allow students to design and carry out their own investigations, expanding their knowledge and understanding of human biology and health issues.

Unit 1: The Human Machine

Lab 1: Human Form and Function

In **Activity 1**, students learn about the various organ systems of the human body. Students also identify organs and organ systems, and become familiar with anatomical position.

Suggested *Going Further* investigations encourage students to investigate and research the different human body systems.

Lab 2: Understanding Human Senses

In **Activity 1**, students test the taste sensations of different areas of the tongue

In **Activity 2**, students measure the concentration of heat and cold receptors located on a given area of their arm.

In **Activity 3**, students investigate the distribution of touch receptors in the skin.

In **Activity 4**, students measure responses to sounds.

Suggested *Going Further* investigations encourage students to investigate the role of the inner ear in maintaining balance.

Lab 3: The Eye-Brain Connection

In **Activity 1**, students explore the structures of the eye and brain. Students also observe how their eyes react to different intensities of light.

In **Activity 2**, students determine their dominant eye and investigate their blind spot and near point. They also investigate afterimages.

In **Activity 3**, students investigate an optical illusion.

In **Activity 4**, students investigate photographic optical illusions.

In **Activity 5**, students investigate some typographical illusions.

In **Activity 6**, students investigate various contrast and color illusions.

Suggested *Going Further* investigations allow students to make flip books and investigate how cartoons are created.

Lab 4: Blood – the Marvelous Tissue

In **Activity 1**, students perform a blood typing procedure on simulated blood samples and analyze the results.

In **Activity 2**, students microscopically examine a simulated blood sample and determine cell counts.

Suggested *Going Further* investigations encourage students to explore human blood. They are asked to determine the exact number of red blood cells per microliter of blood using a precision counter chamber called a hemacytometer.

Unit 2: Human Physiology

Lab 5: Food Chemistry and Nutrition

In **Activity 1**, students use chemical indicator solutions to determine the presence of nutrients in unknown samples.

Suggested *Going Further* investigations encourage students to test the nutrient content in foods such as egg whites, butter, fruit juices, bread and cookies. They are also asked to design an experiment to test the claims made by various orange juice companies that their juices are rich in vitamin C.

Lab 6: The Science Behind Drugs

In **Activity 1**, students construct a simulated skin cell and demonstrate the semi-permeable nature of a cell membrane.

In **Activity 2**, students construct a simulated skin cell and observe the process of chemical diffusion through a simulated cell membrane.

Suggested *Going Further* investigations ask students to research the condition that each of the following transdermally delivered drugs is used to treat: nitroglycerine, clonidine, nicotine patch, scopolamine, and fentanyl.

Lab 7: Urinalysis

In **Activity 1**, students construct a model of a nephron using a semi-permeable membrane to filter a solution that simulates blood. The resulting filtrate resembles urine, which can be tested for salt and the presence of simulated red blood cells.

In **Activity 2**, students observe the qualitative physical characteristics of four simulated urine samples. Students also determine the pH of the urine samples.

In **Activity 3**, students use Biuret reagent to test for the presence of proteins in urine samples.

In **Activity 4**, students perform a qualitative test for the presence of glucose in the simulated urine samples using Benedict's solution.

Suggested *Going Further* investigations encourage students to investigate how blood dialysis machines work and how the process is similar to the activities in the lab.

Unit 3: Human Health Issues and Disease

Lab 8: Smoking

In **Activity 1**, students use the syringe pump of a smoking model to pull measured volumes of cigarette smoke through a filter disc placed in the model. Afterward, students observe the accumulation of smoke and tar on filter paper discs.

Suggested *Going Further* investigations ask students to dissect a cigarette and explore the filter.

Lab 9: Transmission of Viruses

In **Activity 1**, students simulate the exchange of body fluids to explore how viruses can spread.

Suggested *Going Further* investigations ask students to investigate how vaccines work and if they are 100% effective.

Unit 4: Comprehensive Inquiry Investigation

Lab 10: Culminating Lab

In **Activity 1**, students measure and calculate their reaction time.

In **Activity 2**, students measure and chart their range of vision.

Suggested *Going Further* investigations encourage students to investigate how human reaction times compare to animal reaction times. They are also asked to develop an experiment to test the reaction times of different insects.