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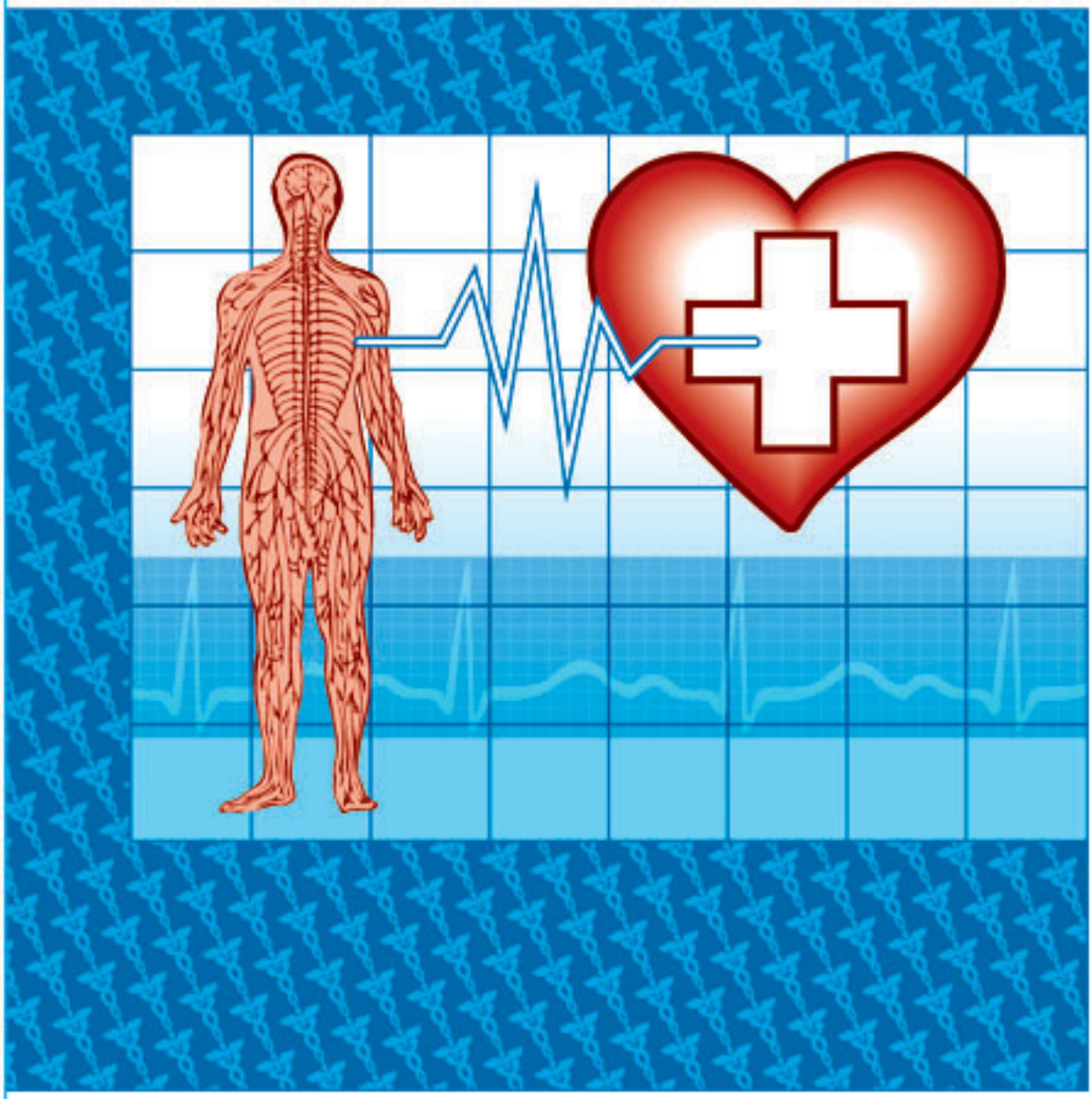
CODE BLUE



A Simulation Covering Six Major Body Systems and Important Public Health Issues

CODE BLUE

A Simulation Covering Six Major Body Systems and Important Public Health Issues

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The nationwide movement for high standards has not only determined what students should learn, but also has mandated that students demonstrate what they know. CODE BLUE addresses National Health Education, Science, and English Language Arts Standards. The teamwork and problem solving required in the simulation also address applied learning standards.

National Health Education Standards

Standard 1: The student will comprehend concepts related to health promotion and disease prevention.

- Explain the relationship between positive health behaviors and the prevention of injury, illness, disease, and premature death.
- Explain how health is influenced by the interaction of body systems.
- Describe ways to reduce risks related to adolescent health problems.

Standard 2: The student will demonstrate the ability to access valid health information and health-promoting products and services.

- Demonstrate the ability to locate health products and services.

Standard 3: The student will demonstrate the ability to practice health-enhancing behaviors and reduce health risks.

- Explain the importance of assuming responsibility for personal health behaviors.
- Analyze a personal health assessment to determine health strengths and risks.

Standard 6: The student will demonstrate the ability to use goal-setting and decision-making skills to enhance health.

- Demonstrate the ability to apply a decision-making process to health issues and problems individually and collaboratively.
- Analyze how health-related decisions are influenced by individuals, family, and community values.
- Develop a plan that addresses personal strengths, needs, and health risks.

National Science Education Standards

Content Standard C: Life Science

Structure and Function in Living Systems

- Living systems at all levels of organization demonstrate the complementary nature of structure and function. Important levels of organization for structure and function include cells, organs, tissues, organ systems, whole organisms, and ecosystems.
- Specialized cells perform specialized functions in multicellular organisms. Groups of specialized cells cooperate to form a tissue, such as a muscle. Different tissues are in turn grouped together to form larger functional units, called organs. Each type of cell, tissue, and organ has a distinct structure and set of functions that serve the organism as a whole.

STANDARDS

- The human organism has systems for digestion, respiration, reproduction, circulation, excretion, movement, control and coordination, and for protection from disease. These systems interact with one another.
- Disease is a breakdown in structures or function of an organism. Some diseases are the result of intrinsic failures of the system. Others are the result of damage by infection by other organisms.

Content Standard F: Science in Personal and Social Perspectives

Personal Health

- The potential for accidents and the existence of hazards imposes the need for injury prevention. Safe living involves the development and use of safety precautions and the recognition of risk in personal decisions.
- The use of tobacco increases the risk of illness.
- Alcohol and other drugs are often abused substances. Such drugs change how the body functions and can lead to addiction.
- Food provides energy and nutrients for growth and development. Nutrition requirements vary with body weight, age, gender, activity, and body functioning.

NCTE Standards for the English Language Arts

Standard 4: Students adjust their use of spoken, written, and visual language to communicate effectively with a variety of audiences and for different purposes.

Standard 5: Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.

Standard 8: Students use a variety of technological and informational resources to gather and synthesize information and to create and communicate knowledge.

Standard 12: Students use spoken, written, and visual language to accomplish their own purposes.

California Applied Learning Standards

Standard 2: Students will understand how to solve problems through planning and organization.

Standard 3: Students will understand how to solve problems through teaching and learning. Students will develop and implement a teaching-learning program.

Standard 6: Students will understand how to apply communication skills and techniques. Students will demonstrate ability to communicate orally and in writing.

Standard 8: Students will understand the importance of teamwork. Students will work on teams to achieve project objectives.

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CONTENTS

As they work in CODE BLUE, students learn about the body and how it functions, teaching each other about their own specialty. They also learn about several public health issues, how each affects the body, and how problems associated with these health issues can be prevented or avoided. Specifically, your students will experience the following:

Knowledge

- The components and workings of the circulatory, respiratory, nervous, digestive, muscular/skeletal and immune systems
- Relationship between positive health behaviors and the prevention of injury, illness, disease, and premature death
- How health is influenced by the interaction of the body systems
- Ways to reduce risks associated with adolescent health problems
- Location of health products and services

Skills

- Teaching teammates about the body systems through the use of personally created visual aids
- Researching various public health issues
- Speaking publicly to present solutions addressing public health problems
- Applying a decision-making process to health issues and problems individually and collaboratively
- Developing medical breakthroughs to deal with current health problems

Attitudes

- Recognizing the importance of assuming responsibility for personal health behaviors
- Understanding that health-related decisions are influenced by individual, family, and community values
- Appreciating the value of cooperation in problem solving

Essential Questions

The following questions can help focus your teaching and student learning throughout the unit:

- How do the different components of the body work together to enable humans to survive and interact with their environment?
- What are some public health issues that we face in society today? How do these affect the body? What can individuals do to avoid or prevent these?

PURPOSE

OVERVIEW

Students learn about six different systems in the body (the circulatory, respiratory, immune, muscular/skeletal, digestive, and nervous systems). In addition, they learn about important public health issues and the relationship between positive health behaviors and the prevention of injury, illness, disease, and premature death.

Medical Clinics
Students work in cooperative jigsaw groups to form Medical Clinics. Each member of the clinic is assigned, researches, and presents a different specialty. Specialists learn together in Expert Groups as they prepare for their presentations. Each specialty takes a Board Exam relevant to that specialty. Students must pass their Board Exam to be certified in their specialty prior to returning to their Medical Clinic and teaching others. Following all specialty presentations, the whole clinic must pass the Physiology Test before they "see" their first patient.

Challenge Codes
These puzzles complement the curriculum in a fun way. They can be used at any time during the unit. Choose to use them as required assignments, extra credit, or just for fun.

Medical Breakthroughs—Extensions to Learning
Each clinic has the opportunity to achieve medical breakthroughs that could lead to the betterment of society. These typically require creativity as students research a current medical problem and try to design a device or medication to help with the problem. These breakthroughs are optional. Successful breakthroughs may be used as extra credit for student grades.

Code Cards
Each Code Card presents the Medical Clinics with their first patient in an emergency situation. Each code deals with a public health issue, such as cigarette smoking, drug use, and eating disorders. You will only need one Code Card per clinic. There are 10 Code Cards in all. Choose the public health issues you feel will most benefit your class. Another option is to divide each Medical Clinic into two sub-committees, and use all ten (if you have five Medical Clinic groups). In order to complete the Code Card successfully, the Medical Clinic must research the problem and the solutions and present these on a three-paneled presentation board.

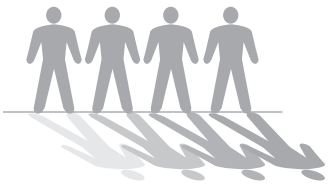
Grand Rounds
The culminating activity for the unit simulates a conference where physicians present interesting patients to one another. Each clinic presents their Code Card patient, using their presentation board to describe their patient, the problem, and their solutions. Consider inviting other classes or parents to tour the Medical Clinics' displays and to ask questions of the "physicians."

1. **Before Beginning**
   Carefully and thoroughly read through this Teacher Guide and the Student Guide before beginning. This will help you plan your time and adjust the unit to meet your students' needs and abilities. Interact employs certain editorial conventions to identify materials.
   a. In preparing materials, *class set* means *one per student*.
   b. One *Day* on the **Unit Time Chart** is the length of a normal class period—50 minutes to one hour.
   c. All transparency masters and student handouts are listed by name using ALL CAPITAL LETTERS.
   d. Teacher reference pages are named in **Bold**.
   e. Special events are named using *Italics* (e.g., *Grand Rounds*).

2. **Timing**
   CODE BLUE consists of 15+ hours of activities. (See the **Unit Time Chart** and **Daily Directions** for specifics on timing.) The schedule of this unit is flexible.
   Week 1—students work in Expert Groups to research and discuss one body system, create models and diagrams of their body system, and take a specialty-specific Board Exam.
   Week 2—students regroup in their Medical Clinics as they teach their body system and learn about the other five body systems, prepare and take a Physiology Test, work on Medical Breakthroughs and Challenge Codes, "see" their first patient (Code Card), and begin research.
   Week 3—students in their Medical Clinics complete their research, and prepare for and present at *Grand Rounds*.

15+ hours

3. **Grouping Students**
   The unit utilizes cooperative learning.
   a. **Jigsaw Groups—Medical Clinics**
      On Day 1 you will divide your class into groups, called Medical Clinics, of six students each. These Medical Clinics function as the jigsaw group. Students work together as well as individually to achieve their group goals of learning about six systems of the body, passing exams, working on Challenge Codes and Medical Breakthroughs, and finally on "seeing" and presenting their first patient.
   b. **Expert Groups—Medical Specialties**
      On Day 2 students are grouped into Expert Groups based on the role/specialty they play within their Medical Clinic. All the cardiologists form one Expert Group, all the pulmonologists form a second Expert Group, and so on. See **The Jigsaw Classroom** (page 12) for more information on this grouping strategy.



Jigsaw and Expert Groups

Jigsaw Groups have six students. If your classroom does not evenly divide into groups of six, have some groups of more than six. The "extra" students are assigned to any of the six specialties. These groups will have two specialists working on one or more of the six body systems.

TEACHING TIP

Students are generally very excited about having such important titles, call students by their new titles as often as possible.

4. **Assigning Specialties**
   Within each Medical Clinic there are six specialists, each student takes on the role of one of these specialists. Students work with other students (from other Medical Clinics) assigned to their same specialty in Expert Groups. Together they learn about their specialty area and prepare models and diagrams to teach their Medical Clinic about their specialty. Assign specialties or allow students to choose. Specialties within each clinic are as follows:
   a. Cardiologist—Circulatory System
   b. Pulmonologist—Respiratory System
   c. Infectious Disease Specialist—Immune System
   d. Orthopedic Surgeon—Muscular/Skeletal System
   e. Gastroenterologist—Digestive System
   f. Neurologist—Nervous System

5. **Materials**
   - Computer with Internet access — *several (Optional)*
   - Markers (variety of colors) — *at least six of each color*
   - Overhead projector — *one*
   - Poster board (for clinic sign; big enough for clinic name, individual physician names and specialties, and a logo) — *one per Medical Clinic*
   - Poster board or construction paper (for system diagrams) — *class set*
   - Presentation board (three-paneled) — *one per Medical Clinic*
   - Resources (variety of books dealing with each of the six body systems as well as the public health issues presented on the Code Cards) — *many*
   - Scratch paper — *one per Medical Clinic*
   - String or tape (to attach the clinic signs near the Medical Clinics) — *several yards per Medical Clinic*
   - Supplies to complete models — *teacher determined*

   As students learn about their specialties, they are required to create a model of one of the major components of their body system. Encourage students to be creative with their ideas and materials. Below are some suggestions for students having difficulty getting started.
   Cardiologists—Circulatory System
   - Hollow plastic ball, cut in half, for heart. (Paste in four chambers and use pipe cleaners to show blood flow.)
   - Paper or small cardboard box to draw/represent the heart
   - Plastic tubing, paper towel tubes, straws, string, or various yarn diameters/sizes/colors to represent arteries and veins

Pulmonologists—Respiratory System
- Bubble wrap or tissue paper to fill lungs
- Paper
- Plastic tubes or straws for bronchial tubes
- Two balloons connected to straws for lungs
- Two filled pillow cases for lungs, with paper towel tubes for bronchial tubes

Infectious Disease Specialists—Immune System
- Construction paper cut like matching puzzle shapes for virus and antibody
- Hook and loop tape and fabric
- Modeling clay
- Plastic building toys

Orthopedic Surgeons—Muscular/Skeletal System
- Animal bones (e.g., turkey, chicken) or sticks
- Door hinge for hinge joint, a ball in a bowl for ball and socket
- Fabric tape
- Modeling clay
- Rubber bands

Gastroenterologists—Digestive System
- Balloons for the stomach
- Plastic tubing or dryer tubing for intestines
- Zippered baggie with various food contents for a stomach and panty hose for the intestines

Neurologists—Nervous System
- Modeling clay
- Straws, string, yarn, etc. for neuron
- String or yarn
- Styrofoam brain with indentations carved to separate each section (each colored differently)
- Tubing for spinal cord

6. **Resources**
   a. Books

      Collect books as listed in the **Bibliography and Resources**. Enlist the help of your school and/or city librarian to locate these and additional sources. **Note**: The bibliography and resources are listed in the order of recommended use (not listed alphabetically). Resources listed first are those the authors found most useful for this unit. Additionally, resources are organized by topic (e.g., General Resources, Specialty Specific Resources). Carefully consider each resource.

b. Using the Internet
If you have access to the Internet, your students will benefit from up-to-date information on the six body systems, the various public health issues, and interesting information related to the Medical Breakthroughs. Before using the Internet, become familiar with your school's Acceptable Use Policy. Always preview any website you make available to your students. If your students do not have classroom access to the Internet, you may access the Internet and build a notebook of information printed off the various websites you locate.

7. **Reproducible Masters**
Duplicate the following in the quantity indicated in *Italics*.
- COOPERATIVE GROUP WORK RUBRIC — *class set or transparency + one to post*
- CARDIOLOGY BOARD EXAM — *one per cardiologist*
- PULMONOLOGY BOARD EXAM — *one per pulmonologist*
- INFECTIOUS DISEASE BOARD EXAM — *one per infectious disease specialist*
- ORTHOPEDIC BOARD EXAM — *one per orthopedic surgeon*
- GASTROENTEROLOGY BOARD EXAM — *one per gastroenterologist*
- NEUROLOGY BOARD EXAM — *one per neurologist*
- PHYSIOLOGY TEST — *class set*
- MEDICAL BREAKTHROUGHS — *as needed*
- MEDICAL BREAKTHROUGHS RUBRIC — *as needed*
- CHALLENGE CODE 1 — *as needed*
- CHALLENGE CODE 2 — *as needed*
- GRAND ROUNDS — *transparency*
- CODE CARDS — *one code per Medical Clinic*
- GRAND ROUNDS RUBRIC — *transparency*

8. **Teacher Reference**
Use the following for your reference.
- **Board Exams Answer Key**
- **Physiology Test Answer Key**
- **Challenge Code 1 and 2 Answer Key**

9. **Grand Rounds**
   Grand Rounds is a term for a conference where physicians present interesting patients to one another. During this culmination activity, each Medical Clinic presents their Code Card patient, using their presentation board to describe their patient, the problem, and their solutions. Consider inviting other classes or parents to tour the Medical Clinics' displays and to ask questions of the "physicians."

10. **Special Guest (Optional)**
    a. Invite a local physician to attend Day 1, to assist in introducing the unit. He/she could discuss the following:
       - why he/she became a physician
       - medical school and residency training (similar to the Expert Group work)
       - the various specialties
       - working with other physicians to assist patients

    b. Invite a local physician to attend *Grand Rounds*. This special guest can listen to the student presentations, point out the strengths of each, and possibly add any information he or she feels important to the subject.

The CHALLENGE CODE puzzles complement the curriculum in a fun way. They can be used at any time during the unit. Choose to use them as required assignments, extra credit, or just for fun.

Copy each Code Card onto colored paper and laminate. There are 10 CODE CARDS. Each team receives a different code, so you will only need one copy of each.

1. **Medical Breakthroughs**
   Each Medical Clinic has the opportunity to achieve medical breakthroughs that could lead to the betterment of society. These typically require creativity as students research a current medical problem and try to design a device or medication to help with the problem. These breakthroughs are optional. Successful breakthroughs may be used as extra credit for student grades. Be sure to have appropriate resources available to your students. The Internet is a wonderful resource.

2. **Specialty-specific Training**
   Consider the following optional interactive activities for each Expert Group of specialists. These activities offer opportunities for students to become further involved in their learning.

   Cardiologists—Circulatory System
   Students perform some sort of fitness test or activity (consider your district standards and use an appropriate activity to display heart rate, endurance, etc.).
   - Endurance—conduct a 10 minute jog/walk to test the distance students can run in 10 minutes (endurance). Place two cones 100 yards apart and assign student-partners. Half the students line up at the first marker and jog/walk from marker to marker for 10 minutes. The partners (those students not jogging/walking) count the number of times the student rounds a marker. After 10 minutes, record the scores. Repeat the procedure for the second group of students.
   - Heart Rate—Assign student-partners. Students sit still for five minutes and measure their heart rate (one student counts beats while other student watches the clock for one minute) and record. Follow with two minutes of vigorous exercise like running in place. Students measure their heart rate and record. Students take their heart rate every minute after this and determine how long it takes for it to return to original resting rate.

   Pulmonologists—Respiratory System
   - Students breath through a straw for several minutes to simulate what it is like to have asthma/difficulty breathing.

Neurologists—Nervous System

- Students pinch the skin on the outside of their elbows. They will notice that they do not feel much pain. However, when students pinch the skin on the inside of their arm at the same pressure, they will notice far more pain.
- Assign student-partners. One student claps his/her hands approximately 10 inches in front of his/her partner's face and watches the partner's blink reflex (the eyelids will close automatically). Students see if they can override this reflex with practice.

Gastroenterologist—Digestive System

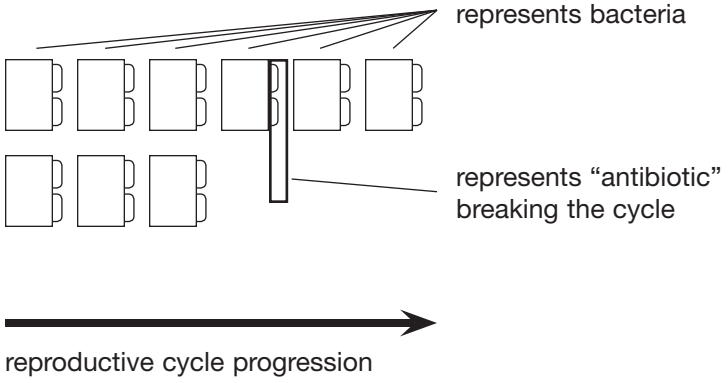
- Using a typical lunch brought to school, students place half of the contents whole into a zippered baggie. The other half is broken up into tiny parts and placed into a second zippered baggie. Students add water to each baggie, carefully taking out the air and then gently moosh the bags around to simulate the action of the stomach. The larger pieces just move around and stay whole.

Orthopedic Surgeon—Muscular/Skeletal System

- Students perform some sort of physical activity to display the use of bones and muscles working together (e.g., squats, stretches, push-ups, curl-ups, etc.). For example, when students stand upright with knees straight, little muscle power is required. However, when in a squat (with knees bent), muscle power is required to maintain this position and it is difficult to maintain this position long.

Infectious Disease Specialist—Immune System

- Using plastic building toys, students demonstrate how "antibiotics" are incorporated into the structure of actively reproducing "bacteria" and prevent the bacteria from completing its reproductive cycle (see diagram below).



TEACHING TIP

NOTE: strongly warn students not to keep pinching their elbow skin as damage can occur, they just will not feel it.

1. **Performance Assessments**
   CODE BLUE includes Rubrics to assess student work. Individual students may strive to achieve an Exemplary score using each of these Rubrics.

2. **Determine Assessment Standards**
   a. CODE BLUE is designed for middle school students. Therefore, establish your own level of what "meets standard" for your grade level.
   b. You will determine the number of activities that your students complete. Clearly state these expectations from the start, and notify students regarding which ones you will formally assess.
   c. "Meeting the standard" on the BOARD EXAM requires students to correctly respond to at least 80% of the questions posed. Students must pass this exam to become "certified" in their specialty and to teach the other members of their clinic.
   d. "Meeting the standard" on the PHYSIOLOGY TEST requires students to correctly respond to at least five of the six questions posed on a pass/fail basis. You decide if the student knows enough about each of the six systems. If yes, then pass. If no, then fail. This is a test to assess how well all of the material was taught and learned. It is designed to test basic knowledge of all of the body systems and must be passed by all members of a clinic before that clinic can begin to work on their first "patient."
   e. Determine what meets standard for the Challenge Code puzzles ahead of time and clarify with your students.
   f. The Medical Breakthroughs require creativity as students research a current medical problem and try to design a device or medication to help with the problem. These breakthroughs are optional. Successful breakthroughs may be used as extra credit for student grades. You determine what meets the standard. Be sure to clarify your expectations with students before they begin their work.
   g. "Meeting the standard" on the CODE CARD requires students to work together as a group (within their Medical Clinic). They must thoroughly research the problem presented, design appropriate solutions to the problem, present their findings (patient info, problem, and solution) on a three-paneled presentation board, and make an oral presentation during *Grand Rounds*.

Students must pass the BOARD EXAM before they are able to return to their Medical Clinics and teach others about their specialty. The Expert Group re-teaches any students who do not pass their Boards.

All students in the Medical Clinic must pass at least five of the six questions on the PHYSIOLOGY TEST before they can "see" their first patient. Medical Clinics with students with lower scores work to re-teach those students. The teacher intervenes to help Medical Clinics who are having difficulty. Consider orally re-testing those who do not pass.

Consider using the MEDICAL BREAKTHROUGHS RUBRIC for these projects.

Use the GRAND ROUNDS RUBRIC to assess both content and presentation skills when Medical Clinics complete their Code Card research and Grand Rounds presentation. This rubric can be used to assess individual students and/or the entire Medical Clinic.

h. Students who do not "meet the standard" on any part of the assessment must be required to redo that section. Sometimes students need a second chance to demonstrate what they know. Consider allowing students to redo the activity after reviewing with you. Also consider allowing them to complete the activity orally.

3. **What do Rubric Scores Mean?**
When completing performance assessments, focus on "student work." This work is *not* limited to written work. It includes demonstrated skills, oral exchanges, processes, strategies, and any other evidence that proves that the students have learned the targeted content or skill and can apply what they know.

4 – Exemplary
Generally this describes student work that exceeds the standard for the activity. The descriptor includes words such as "consistently," "complete," "with detail," "actively," and "willingly." Students who earn a "4" demonstrate leadership and knowledge during participation in the simulation.

3 – Expected
Generally this describes student work that meets the standard with quality. The descriptors lack some of the positive adjectives of a "4," but this student has mastered the content or skill and can demonstrate his/her understanding in an application setting.

2 – Nearly There
Generally this describes student work that almost meets the standard. Sometimes inconsistent effort or a misconception of the content will result in a "2" rating. This student needs a little reteaching, needs to try a little harder, or needs to revise his/her work in order to meet the standards described.

1 – Incomplete
Generally this rating describes student work that is ***incomplete***, that has not yet met the standard in content and/or skill. This student will require more instruction and another opportunity to demonstrate a knowledge or skill, or will require alternative instruction and assessment.

4. **Cooperative Group Assessment**
In addition to assessing content knowledge and skills, CODE BLUE includes a Rubric to assess cooperative group work (see page 26). Individual students working well within both their Jigsaw and Expert Groups may channel their competitiveness in a cooperative manner, striving to achieve a score of "4" using this Rubric.

Holding students accountable reinforces the importance of quality work.

Use this rubric whenever necessary to encourage and reinforce positive group behavior.

Building a Cooperative Community of Learners
Adapted from *The Jigsaw Classroom in 10 Easy Steps*

What is Jigsaw?
Developed by social psychologist Elliot Aronson in the early 1970s, **Jigsaw** is a specific cooperative learning technique shown to reduce conflict among students, improve motivation and accountability, promote structured learning, and increase enjoyment and meaningfulness of the learning process. In his latest book, *Nobody Left to Hate: Teaching Compassion after Columbine* (2000), Aronson says of secondary students' feelings toward school:

> *"For many, it is worse than unpleasant—they describe it as a living hell, where they are in the out-group and feel insecure, unpopular, put-down, and picked on."* (15)

The **Jigsaw Model**, designed to encourage empathy and compassion, is an ideal social structure to use with students at the middle school level. The model closely mirrors the authentic workplace where small and diverse groups of people must pull together in order to be successful. About the significance of empathy, Aronson writes that:

> *"The extent to which children can develop the ability to see the world from the perspective of another human being has profound implications for empathy, prejudice, aggression, and interpersonal relations in general. When you can develop the ability to understand what that person is going through, it increases the probability that your heart will open to another person."* (148–49)

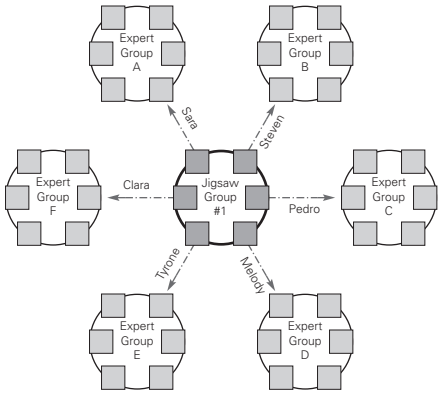
Just like a jigsaw puzzle, each piece—each student's part—is essential for the completion and full understanding of the final product or the final discussion and assessment. Thus, each student is essential. That is what makes this model so effective and so far-reaching socially, psychologically, emotionally, and academically. Dr. Aronson's website (jigsaw.org) contains his overview of the technique, its history, tips for classroom implementation and management, and the first chapter of his book.

Why Jigsaw?
Cooperative learning is more than placing students into groups and asking them to work together. Unstructured cooperative groups work for some of the people some of the time but have left many teachers dissatisfied with the overall experience. **Jigsaw** offers structure, function, and purpose.

The **Jigsaw** approach is a valuable tool in reducing student feelings of rejection, isolation, and anger. By design, students work in small, teacher-selected groups within an emotionally safe classroom. Classmates, who might otherwise never interact, work toward a common goal while learning to be inclusive, empathic, and genuinely appreciative of each group member.

How does it work?

Students are divided into small groups of four to six students. This initial group is the **Jigsaw Group**. Each member has one area of the content they are studying as his or her "expert area." For example, a class is studying World War II: in one **Jigsaw Group**, Sara, Steven, Pedro, Melody, Tyrone, and Clara are the individual pieces of this puzzle. Sara is responsible for researching Hitler's rise to power in pre-war Germany. Steven covers concentration camps. Pedro studies Britain's role in the war. Melody becomes the expert in the contribution of the Soviet Union. Tyrone handles Japan's entry into the war. Clara reads about the atom bomb's development.



The goal is for each of these six students to become "experts" in their assigned area of World War II. The only access the other five students have to the atom bomb development is what Clara brings back to the group from her research and expert time. In order to encourage and strengthen Clara's expertise, she meets in an **Expert Group** with all the other students assigned the atom bomb as their piece of the puzzle. These atom bomb specialists meet together, gather and share information, and rehearse their presentations for their own **Jigsaw Groups**. This rehearsal time is particularly useful for students who might have initial difficulty learning or organizing their part of the assignment, for it allows them to hear and rehearse with other experts.

When each "expert" is prepared, and the teacher deems it is time, the **Jigsaw Groups** reconvene in their initial heterogeneous configuration. Clara and all other atom bomb experts now have the responsibility to educate their fellow **Jigsaw Group** members about the atom bomb. After all "experts" have shared their expertise and group members have had the opportunity to question each other and draw conclusions, students are tested (or otherwise assessed) on what they have learned about WWII.

TEACHING TIP

"…over and over again, we have found that unbridled competition—the relentless concern with being number one, with beating the other person—can be, at best, limiting and, at worst, destructive and debilitating." - Elliot Aronson)

TEACHING TIP

*See **www.jigsaw.org** for a complete case study account of Carlos and the research that supports the Jigsaw Classroom.*

BIBLIOGRAPHY AND RESOURCES

Note: The following bibliography and recommended resources are listed in the order of recommended use (not alphabetically). Resources listed first are those the authors found most useful for this unit. Additionally, resources are organized by topic, beginning with general resources (those that can be used for all specialty areas). Later listings specifically cover one or more specialty areas. Carefully consider each resource.

General Resources

Rose, Marie (Ed.). *The Human Body*. Time Life Books, 1997.

The Visual Dictionary of Human Anatomy. DK Publishing, 1996.

Williams, Frances. *Inside Guides–Human Body*. DK Publishing, 1997.

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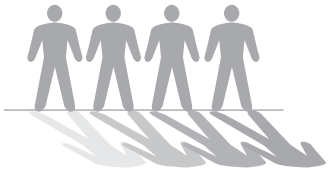
UNIT TIME CHART

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
Organize teams and assign roles Introduce unit Make clinic signs • COOPERATIVE GROUP WORK RUBRIC	Specialists meet to read about and discuss their body system	Specialists continue research Begin working on models and diagrams	Specialists continue working on assigned tasks Prepare for Board Exams	Board Exams Complete tasks Practice teaching • BOARD EXAMS (CARDIOLOGY, PULMONOLOGY, INFECTIOUS DISEASE, ORTHOPEDIC, GASTROENTER-OLOGY, NEUROLOGY **Teacher Reference** • **Board Exams Answer Key**
DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	**DAY 10**
Specialists teach their body system to the other members of their clinic	Continue teaching Study for Physiology Test	Physiology Test Medical Breakthroughs Challenge Codes • PHYSIOLOGY TEST • MEDICAL BREAKTHROUGHS and RUBRIC • CHALLENGE CODE 1 and 2 **Teacher Reference** • **Physiology Test Answer Keys** • **Challenge Code Answer Keys**	Introduce Code Cards Teams discuss Code Cards and begin planning • GRAND ROUNDS • CODE CARDS • GRAND ROUNDS RUBRIC	Research Code Card problems Begin planning solutions
DAY 11	**DAY 12**	**DAY 13**	**DAY 14**	**DAY 15**
Complete solutions to Code Cards Begin work on presentation boards	Complete work on presentation boards	Write scripts for Grand Rounds presentations	Rehearse presentations for Grand Rounds	*Grand Rounds* Debriefing



Jigsaw Groups
(Medical Clinics)

Day 1

Objectives

- Organize teams and assign roles
- Introduce unit
- Make clinic signs

Materials

- Student Guides — *class set*
- COOPERATIVE GROUP WORK RUBRIC — *class set or transparency + one to post*
- Markers — *at least one set per Medical Clinic*
- Poster boards (for clinic sign; big enough for clinic name, individual physician names and specialties, and logo) — *one per Medical Clinic*
- Scratch paper — *one per Medical Clinic*
- String or tape (to attach the clinic signs near the Medical Clinics) — *several yards per Medical Clinic*

Procedure

1. Distribute the Student Guides. Have students read along as you read the **Introduction** aloud to the students explaining that they are now about to embark on their new career as physicians.

2. Group students into their Medical Clinics and assign students to their specialties (see **Setup Directions #3, Grouping Students** on page 3 and **#4, Assigning Specialties** on page 4 for more information). Be sure to have at least one of each type of specialty in each group.

3. Distribute or illuminate COOPERATIVE GROUP WORK RUBRIC. Carefully review your expectations for all group work (with Medical Clinics as well as within Expert Groups).

4. Explain that their first task as a Medical Clinic is to design and create a sign to display outside of their clinic that shows their names and specialties. Distribute the poster board, scratch paper, and markers to each Medical Clinic. Using the poster board and markers, each sign should include the following:
   - The name of the clinic
   - Each person's name followed by *M.D.* (Joanne Johnson, M.D.)
   - Below each name, each person's specialty
   - A logo

5. As the groups finish, hang the signs from the ceiling above each Medical Clinic or tape them to a location nearby.

TEACHING TIP

Groups use the scratch paper to plan out their clinic sign before creating on the poster board. Encourage students to be creative and think of a catchy name for their clinic.

Explain that most companies have a symbol that is easily recognizable. Ask students to name examples.

Day 2

Objective

- Specialists meet to read about and discuss their body system

Materials

- Student Guides — *class set*
- Computer with Internet access — *several (Optional)*
- Resources (variety of books dealing with each of the six body systems) — *many*

Procedure

1. Remind students that in order to become board certified in their specialty, they need to learn about their specialty in detail and pass their Board Exam.

2. Inform students where each Expert Group will meet and instruct students to gather in the appropriate location.

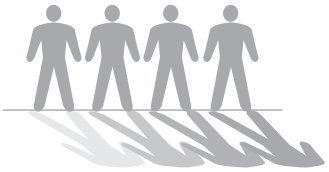
3. Instruct students to turn to the **Specialties and Systems** section of their Student Guide, found on pages 2–7. In their Expert Groups, students read together about the body system on which they are to focus and discuss it with the other members of their specialty.

4. Remind students that they will be given the Board Exam on Day 5, so they need to learn this material well over the next three days.

5. Instruct students to read the *Your Tasks* section for their specialty following the general information in their Student Guides.

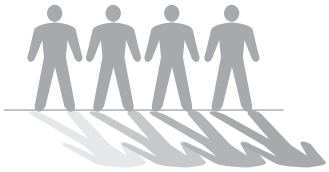
6. Inform students regarding the various resources you have acquired for their use during their Expert Group work. Students begin to examine the resources, carefully examining the pictures available.

7. Inform the class regarding the materials you have on hand for their models and diagrams. Students discuss the models and diagrams and determine if there are additional materials they need to bring to class the next day.



Expert Groups (Medical Specialties)

Locate six areas within the classroom for Expert Group work today.



Expert Groups
(Medical Specialties)

Days 3–4

Objectives

- Specialists continue research
- Begin working on models and diagrams
- Prepare for Board Exams

Materials

- Student Guides — *class set*
- Computer with Internet access — *several (Optional)*
- Markers (variety of colors) — *at least six of each color*
- Poster board or construction paper (for system diagrams) — *class set*
- Resources (variety of books dealing with each of the six body systems) — *many*
- Supplies to complete models — *teacher determined*

Procedure

1. Students work in their Expert Groups as they learn about the body system that is their specialty. Students carefully examine the resources available to them. If computers are available, students access the Internet to locate information on their topic. The **Bibliography and Resource** books should provide them with an array of pictures and diagrams to help them with their tasks, as well as give them a better understanding of their specialty.

2. Working in their Expert Groups, students design models and diagrams as appropriate for their specialty. Students must complete the following:
   - Create a model of a major component of their specialty system (specific information is included in *Your Tasks* within each specialty section in the Student Guide).
   - Draw a diagram, clearly labeling all components (specific information is included in *Your Tasks* within each specialty section in the Student Guide).

3. For the last five to ten minutes of each day, students quiz each other to prepare for the BOARD EXAM on Day 5.

TEACHING TIP

For model supply suggestions, see ***Setup Directions #5, Materials*** *on page 4.*

Encourage students to create unique models and diagrams.

Visit Interact's website for a list of suggested websites: www.teachinteract.com

Day 5

Objectives

- Take Board Exams
- Complete tasks
- Practice peer-teaching

Materials

- CARDIOLOGY BOARD EXAM — *one per cardiologist*
- PULMONOLOGY BOARD EXAM — *one per pulmonologist*
- INFECTIOUS DISEASE BOARD EXAM — *one per infectious disease specialist*
- ORTHOPEDIC BOARD EXAM — *one per orthopedic surgeon*
- GASTROENTEROLOGY BOARD EXAM — *one per gastroenterologist*
- NEUROLOGY BOARD EXAM — *one per neurologist*

Teacher Reference

- **Board Exams Answer Key**

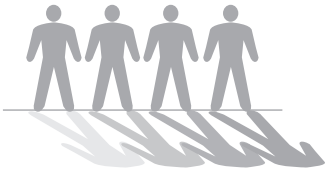
Procedure

1. Distribute the appropriate Board Exam to each student. Give students approximately 25 minutes to complete the exam.

2. As students complete their exams, they turn in to you for your correction. Correct each exam as it comes in and provide individual feedback once all exams are graded. Decide if you will allow students to keep their exams. They can be a useful resource as students prepare to teach, as well as when teaching, their Medical Clinic regarding their specialty.

3. Students not scoring 80% or above retake the exam the following day. All students must reach this requirement before they can teach their Medical Clinic about their specialty.

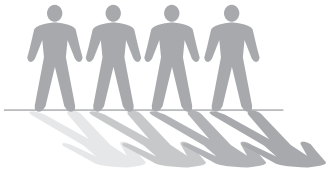
4. In their Expert Groups, students complete their models and diagrams and practice how they will teach their body system to their Medical Clinics. Teaching begins on Day 6. Students should stress the information provided in the Student Guide and not get into a lot of detail beyond that required for the Physiology Test.



Individuals and Expert Groups (Medical Specialties)

The Expert Group re-teaches any students who do not pass their Boards. If students do not pass their Boards, allow an extra day between Days 5 and 6 for test re-takes. Consider requiring students who "pass" to informally prove they know the answers to the one or two questions missed prior to "teaching" their Medical Clinic.

As students prepare how they will teach their body system, share the teaching strategies that you find most useful in your classroom.



Jigsaw Groups
(Medical Clinics)

Days 6–7

Objectives

- Specialists teach their body system to the other members of their clinic
- Study for Physiology Test

Materials

- Student Guides — *class set*
- Models and Diagrams (already created by students) — *one of each per student*
- Resources (variety of books dealing with each of the six body systems) — *many*

Procedure

1. Inform students that they will spend the next two days teaching the members of their Medical Clinic about their specialty. On Day 8, all students will be required to take a Physiology Test, which will test their knowledge of the various body systems being studied. All members of the clinic must pass the test before they will be allowed to "see" their first patient.

2. Using their models and diagrams, students peer-teach other members of their Medical Clinic about their specialty. Allot approximately 20 minutes per student.

3. With any remaining time on Day 7, team members quiz one another on all the information in preparation for the test.

TEACHING TIP

Decide ahead of time if you will require students to take notes during this peer-teaching time. Inform students if you will assess these notes. If so, establish clear expectations.

General information on all six specialties is included within the Student Guide (pages 2–7).

Day 8

Objectives

- Take Physiology Test
- Work on Medical Breakthroughs
- Work on Challenge Codes

Materials

- Student Guides — *class set*
- PHYSIOLOGY TEST — *class set*
- MEDICAL BREAKTHROUGHS — *as needed*
- MEDICAL BREAKTHROUGHS RUBRIC — *as needed*
- CHALLENGE CODE 1 — *as needed*
- CHALLENGE CODE 2 — *as needed*

Teacher Reference

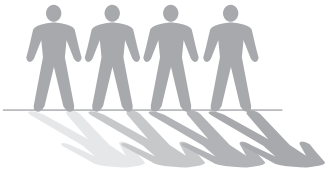
- **Challenge Code 1 and 2 Answer Key**

Procedure

1. Distribute PHYSIOLOGY TEST to each student. Give students approximately 30 minutes to complete the test. Explain to students that they must correctly respond to at least five of the six questions posed. If any member does not pass, they will need to re-teach the material to that person until they are able to pass the test. Only then will their clinic be allowed to treat patients.

2. Medical Clinics with students not achieving the minimum score need time to re-teach the material. Students need to re-take and pass the test following re-teaching.

3. If there are some Medical Clinics that are re-teaching the material, other Medical Clinics can use this time to complete one of the MEDICAL BREAKTHROUGHS or a CHALLENGE CODE.
   a. Medical Breakthroughs
      Explain to the class that completion of Medical Breakthroughs can result in extra credit. Medical Clinics can use the remainder of the class period to decide which breakthroughs they would like to complete and begin research. These will have to be completed primarily at home or when they are done with all other work.
   b. Challenge Codes
      Teams may also work on Challenge Codes 1 and 2. Choose to give these as required assignments, as extra credit, or just for fun!

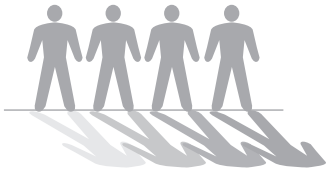


Individuals and Jigsaw Groups (Medical Clinics)

Intervene to help Medical Clinics who are having difficulty.

If all students pass the Test, decide if you will allow in-class time for Medical Breakthroughs and Challenge Codes.

Use MEDICAL BREAKTHROUGHS RUBRIC as appropriate. Consider whether students will write individual paragraphs and be assessed individually or whether Medical Clinics will turn in one paragraph for assessment.



Jigsaw Groups
(Medical Clinics)

TEACHING TIP

Copy each CODE CARD onto colored paper and laminate. There are 10 CODE CARDS. Each team receives a different code, so you will only need one copy of each. Choose the CODE CARD that work best for your class.

Day 9

Objectives

- Introduce Code Cards
- Teams discuss Codes and begin planning

Materials

- Student Guide — *class set*
- GRAND ROUNDS — *transparency*
- CODE CARDS — *one card per Medical Clinic*
- GRAND ROUNDS RUBRIC — *transparency*
- Computer with Internet access — *several (Optional)*
- Overhead projector — *one*
- Resources (variety of books dealing with each of the six body systems as well as the public health issues presented on the Code Cards) — *many*

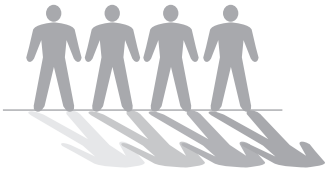
Procedure

1. Have students turn to **Grand Rounds** and **Grand Rounds Rubric** (page 8 of their Student Guides). On the overhead projector, illuminate your copy of GRAND ROUNDS. Read and discuss with the class. Explain the following:
   - Each Medical Clinic will receive a Code Card that will represent their first patient.
   - To successfully treat their patient, the Medical Clinic must research the problem and the solution and prepare a presentation.
   - Medical Clinics present their patient, his or her problem, and their solutions on a three-paneled presentation board.
   - Medical Clinics make a five-minute oral presentation to an audience at *Grand Rounds* on Day 15.

2. On the overhead projector, illuminate your copy of GRAND ROUNDS RUBRIC and discuss. Carefully review your expectations. Answer any questions they may have about the assignment.

3. Distribute one CODE CARD to each Medical Clinic. Medical Clinics read their Codes together and begin preparing for their presentations.

Days 10–12



Jigsaw Groups
(Medical Clinics)

Objectives

- Research Code Card problems
- Plan solutions
- Work on presentation boards

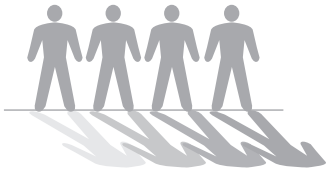
Materials

- Student Guide — *class set*
- Computer with Internet access — *several (Optional)*
- Presentation board (three-paneled) — *one per Medical Clinic*
- Resources (variety of books dealing with each of the six body systems as well as the public health issues presented on the Code Cards) — *many*

Procedure

1. Medical Clinics spend time researching their problem in books or on the Internet.

2. After planning their solutions to their Code, students begin to work on their presentation board, carefully displaying the required information. Advise students to refer back to the information provided on GRAND ROUNDS as well as the GRAND ROUNDS RUBRIC to guide their work.



Jigsaw Groups
(Medical Clinics)

Days 13–14

Objectives

- Write scripts for *Grand Rounds* presentation
- Rehearse presentations

Materials

- Student Guide — *class set*
- Computer with Internet access — *several (Optional)*
- Presentation board (three-paneled) — *one per Medical Clinic*
- Resources (variety of books dealing with each of the six body systems as well as the public health issues presented on the Code Cards) — *many*

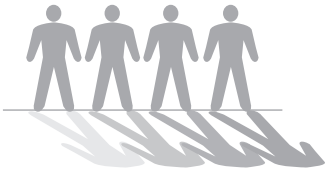
Procedure

1. Students write a script for their presentation and rehearse.

2. Advise students to refer back to the information provided on **Grand Rounds** and **Grand Rounds Rubric** (page 8 of their Student Guides) to guide their work.

3. Remind students that all members of the Medical Clinic participate in the *Grand Rounds* presentation.

Day 15



Jigsaw Groups (Medical Clinics)

Objectives

- *Grand Rounds* presentations
- Debriefing

Materials

- *Grand Rounds* presentation script (already written by Medical Clinics) — *one per Medical Clinic*
- Presentation boards (already created by Medical Clinics) — *one per Medical Clinic*

Procedure

1. Welcome the class to *Grand Rounds*, a time when physicians present interesting patients to one another.

2. Have Medical Clinics make their presentations to the audience.

3. **Debriefing**
   Ask the entire class to complete a reflection paragraph for each problem presented. They should address the following questions:
   - What choices did this patient make and what were the consequences?
   - How do these consequences affect the systems of the body?
   - What can the patient do to help himself or herself change his or her behavior and live a healthier life?

   After answering these questions for each of the problems presented, students write a final paragraph answering the question:
   - What is the most important thing that you learned through this experience?

Name: _____

Cooperative Group Work Rubric

Level 4 — Exemplary

You consistently and actively helped the group achieve its goals by encouraging the group to work together, and by willingly accepting and completing the necessary daily work.

Level 3 — Expected

You usually helped the group achieve its goals by communicating with other group members, by encouraging the group to work together, and willingly accepting and completing daily work.

Level 2 — Nearly There

You sometimes helped your group achieve its goals.

Level 1 — Incomplete

You did very little to help your group achieve its goals.

Name: _____

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CARDIOLOGY BOARD EXAM

Name_____ Date _____

1. How many chambers make up the human heart?

   a.1 b. 2 c. 3 d. 4

2. The thin muscular wall that separates the right side of the heart from the left side is called the _____.

   a. aorta b. ventricle c. septum d. ligament

3. Vessels that carry blood away from the heart are called _____.

   a. arteries b. veins c. capillaries d. alveoli

4. Each upper chamber of the heart is called a(n) _____.

   a. ventricle b. pulmonary artery c. spleen d. atrium

5. The _____ pumps oxygen-rich blood out of the heart to the rest of the body.

   a. right ventricle b. left ventricle c. right atrium d. left atrium

6. The smallest vessels in the body, where oxygen is exchanged for carbon dioxide, are _____.

   a. arteries b. veins c. capillaries d. alveoli

7. Each lower chamber of the heart is called a(n) _____.

   a. ventricle b. pulmonary artery c. spleen d. atrium

8. Vessels that carry blood toward the heart are called _____.

   a. arteries b. veins c. capillaries d. alveoli

9. The largest artery in the body is the _____.

   a. atrium b. pulmonary artery c. aorta d. vena cava

10. The _____ carries the oxygen-rich blood from the lungs into the heart.

    a. vena cava b. pulmonary vein c. aorta d. pulmonary artery

PULMONOLOGY BOARD EXAM

Name_____ Date _____

1. The function of the respiratory system is to supply the body with _____.

   a. blood b. nutrients c. oxygen d. carbon dioxide

2. The main component of the respiratory system is the _____.

   a. heart b. lungs c. capillaries d. diaphragm

3. The _____ is often called the "wind pipe."

   a. trachea b. esophagus c. bronchiole d. alveoli

4. Small blood vessels where oxygen is exchanged for carbon dioxide are called _____.

   a. veins b. capillaries c. alveoli d. bronchioles

5. The _____ is the large breathing muscle that contracts to create a vacuum, drawing air into the nose and mouth.

   a. intercostal muscle b. skeletal muscle c. trachea d. diaphragm

6. The small tubes within the lungs that transport air to the alveoli are called _____.

   a. bronchioles b. trachea c. capillaries d. bronchial tubes

7. The respiratory system removes a harmful waste product called _____.

   a. oxygen b. bile c. carbon dioxide d. carbon monoxide

8. _____ are tiny air sacs in the lungs which are surrounded by capillaries.

   a. Bronchioles b. Arteries c. Axons d. Alveoli

9. The human body contains two _____ which carry air into the lungs.

   a. trachea b. bronchial tubes c. bronchioles d. capillaries

10. The diaphragm separates the heart and lungs from the _____.

    a. skeletal muscles b. brain c. abdominal cavity d. mouth and nose

INFECTIOUS DISEASE BOARD EXAM

Name _____ Date _____

1. The _____ is/are NOT part of the immune system.
   a. lymph nodes b. spleen c. gall bladder d. white blood cells

2. The function of the immune system is to _____.
   a. destroy germs b. digest food c. carry oxygen d. provide movement

3. Bacteria and viruses are also called _____.
   a. B–cells b. macrophages c. antibodies d. germs

4. The very first line of defense against germs is the _____.
   a. macrophage b. T–cell c. lymph node d. skin

5. The _____ produce antibodies.
   a. B–cells b. T–cells c. macrophages d. bacteria

6. _____ are located throughout the body and house white blood cells.
   a. Capillaries b. Lymph nodes c. Antibodies d. Veins

7. B–cells, T–cells, and macrophages are all types of _____.
   a. germs b. viruses c. white blood cells d. antibodies

8. The _____ is usually the first cell to spot the invading germs.
   a. spleen b. macrophage c. T–cell d. lymph node

9. _____ coat germs to prevent them from harming the body and to make them easier to kill.
   a. Fungi b. T–cells c. Lymph nodes d. Antibodies

10. Without a properly functioning immune system, the body would be susceptible to _____.
    a. headaches b. high blood pressure c. infections d. type-2 diabetes

ORTHOPEDIC BOARD EXAM

Name_____ Date _____

1. The function of the muscular/skeletal system is to provide the body with _____.

   a. nutrients b. oxygen c. antibodies d. support

2. Smooth muscles can be found in the _____.

   a. arms b. internal organs c. legs d. nose

3. Bones come together at _____.

   a. tendons b. synapses c. joints d. muscles

4. _____ covers the bone ends to protect the bone from wear and tear.

   a. Ligament b. Cartilage c. Muscle d. Tendon

5. The heart and lungs are protected by the _____.

   a. skull b. cartilage c. smooth muscles d. ribs

6. _____ provide the power needed to move the joints and bones and thus produce body movement.

   a. Skeletal muscles b. Cardiac muscles c. Ligaments d. Smooth muscles

7. _____ are bands of strong tissue that connect bone to bone.

   a. Tendons b. Joints c. Ligaments d. Muscles

8. Found in the heart, _____ provides the power to pump blood to the rest of the body.

   a. skeletal muscles b. cardiac muscles c. ligaments d. smooth muscles

9. Muscles are attached to bone by tough fibrous bands called _____.

   a. tendons b. cartilage c. ligaments d. joints

10. The brain is protected by the _____.

    a. ribs b. skull c. cartilage d. tendons

GASTROENTEROLOGY BOARD EXAM

Name_____ Date _____

1. The function of the digestive system is to provide the body with _____.

   a. oxygen b. antibodies c. protection d. nutrients

2. Tiny food particles pass through the walls of the _____ and enter the blood stream.

   a. liver b. gall bladder c. small intestines d. large intestines

3. The _____ is the muscular tube that leads from the mouth into the stomach.

   a. trachea b. esophagus c. salivary gland d. intestine

4. Bile is stored in the _____.

   a. gall bladder b. liver c. pancreas d. salivary gland

5. The _____ produce the fluid that breaks down food while still in the mouth.

   a. intestines b. salivary glands c. gall bladders d. kidneys

6. The _____ absorbs most of the remaining water still in the food before it is released from the body as wastes.

   a. pancreas b. liver c. large intestine d. small intestine

7. Bile is made by the _____.

   a. stomach b. gall bladder c. pancreas d. liver

8. The _____ churns the food and produces acid that helps in digestion.

   a. small intestine b. stomach c. liver d. esophagus

9. The _____ releases enzymes into the small intestines.

   a. pancreas b. liver c. gall bladder d. stomach

10. The food we eat passes through the _____.

    a. liver b. gall bladder c. small intestines d. pancreas

NEUROLOGY BOARD EXAM

Name_____ Date _____

1. Which of the following is NOT part of the brain?

   a. cerebrum b. atrium c. cerebellum d. brain stem

2. Nerves are made up of cells called _____.

   a. axons b. dendrites c. synapses d. neurons

3. The _____ coordinates movement and balance.

   a. cerebrum b. atrium c. cerebellum d. brain stem

4. The body receives information from the environment through the _____.

   a. sensory nerves b. motor nerves c. spinal cord d. synapse

5. The _____ controls our heartbeat and breathing.

   a. cerebrum b. spinal cord c. brain stem d. atrium

6. The space between two neurons over which chemical messages are passed is called the _____.

   a. brain stem b. dendrite c. axon d. synapse

7. A _____ carries instructions to the muscles from the spinal cord.

   a. motor nerve b. sensory nerve c. dendrite d. cerebellum

8. Each neuron contains one long trunk called a(n) _____.

   a. dendrite b. synapse c. brain stem d. axon

9. The _____ controls our thinking and emotions.

   a. cerebrum b. cerebellum c. brain stem d. atrium

10. The _____ receives and relays information from the face, ears, eyes, nose and tongue.

    a. cerebrum b. cerebellum c. spinal cord d. brain stem

BOARD EXAMS ANSWER KEY
TEACHER REFERENCE

Cardiology

1. d
2. c
3. a
4. d
5. b
6. c
7. a
8. b
9. c
10. b

Orthopedics

1. d
2. b
3. c
4. b
5. d
6. a
7. c
8. b
9. a
10. b

Pulmonology

1. c
2. b
3. a
4. b
5. d
6. a
7. c
8. d
9. b
10. c

Gastroenterology

1. d
2. c
3. b
4. a
5. b
6. c
7. d
8. b
9. a
10. c

Infectious Disease

1. c
2. a
3. d
4. d
5. a
6. b
7. c
8. b
9. d
10. c

Neurology

1. b
2. d
3. c
4. a
5. c
6. d
7. a
8. d
9. a
10. d

PHYSIOLOGY TEST (1)

Name_____ Date _____

1. Describe the path that blood takes throughout the circulatory system. Be sure to use the names of the major organs and blood vessels involved.

2. What is the primary function of the immune system?

3. Describe the path that air takes throughout the respiratory system. Be sure to use the names of the major organs and air passages involved.

PHYSIOLOGY TEST (2)

4. What are the two major functions of the muscular/skeletal system?

5. Describe the path that food takes through the digestive system. Be sure to use the names of the major organs involved and what happens to the food in each.

6. What are the three major functions of the nervous system?

PHYSIOLOGY TEST ANSWER KEY
TEACHER REFERENCE

1. Describe the path that blood takes throughout the circulatory system. Be sure to use the names of the major organs and blood vessels involved.

   Oxygen-rich blood comes from the lungs into the heart. The heart pumps the blood through the arteries throughout the entire body. The arteries branch into tiny capillaries. Here the oxygen in the blood is exchanged for carbon dioxide in the tissues. The blood returns to the heart through the veins and then travels back into the lungs to get rid of the carbon dioxide and receive more oxygen.

2. What is the primary function of the immune system?

   The primary function of the immune system is to destroy any germs that invade the body.

3. Describe the path that air takes throughout the respiratory system. Be sure to use the names of the major organs and air passages involved.

   Air enters the body through the nose or mouth and then travels down the trachea into the bronchial tubes, which lead into the lungs. The bronchial tubes branch into smaller tubes called bronchioles. At the end of the bronchioles are aveoli which are surrounded by capillaries. Here the oxygen in the air is exchanged for carbon dioxide in the blood. Finally, the air is forced out of the lungs, up through the trachea, and out of the nose or mouth.

4. What are the two major functions of the muscular/skeletal system?

   The two major functions of the muscular/skeletal system is to provide structural support and protection for the body and also to provide the power needed for movement.

5. Describe the path that food takes through the digestive system. Be sure to use the names of the major organs involved and what happens to the food in each.

   Food starts in the mouth where it is chewed into smaller pieces. It then travels down the esophagus and into the stomach, which churns the food and produces acid to help in digestion. Next it goes into the small intestine where it is further digested into small particles. These tiny food particles pass through the walls of the small intestine into the blood stream. Any undigested food travels into the large intestine and out of the body.

6. What are the three major functions of the nervous system?

   The three major functions of the nervous system are to receive information from the environment, interpret that information, and create a response to it.

MEDICAL BREAKTHROUGHS

Medical breakthroughs are essential in our society to continue to improve our quality of health. In order to accomplish a breakthrough your Medical Clinic must write a detailed paragraph about the idea you have selected. Use imagination to create a descriptive paragraph. An illustration or model may help you convey your ideas more effectively.

Breakthrough Ideas

1. Heart transplants save lives daily. Design and describe a mechanical device that could function as a human heart.

2. What is cholesterol? Where does it come from? Why can it be harmful to the body? Design a method of removing excess cholesterol from the body.

3. How can fish get oxygen underwater? Design a device that would enable humans to breathe underwater without an oxygen tank.

4. Oh, my aching head! What causes headaches? Invent the perfect headache reliever.

5. Design an implant that can replace a damaged spinal cord.

6. Design a machine that can function as a stomach for someone who has had stomach cancer.

7. What's that awful smell? Why do certain foods give you gas? Invent an antidote.

8. Explain what causes hiccups and invent a new method of stopping them.

9. What is acne? Invent a new cure. (Teenagers everywhere will love you forever!)

10. What is a sprained ankle? Design a device that could be worn to prevent this from occurring. Design a knee joint that would provide more flexibility.

11. What is the common cold? Invent a cure.

12. Cats and dust and pollen, oh my! What are allergies? Invent an antidote.

13. Choose your own topic, but consult the Chief of Staff (your teacher) before you begin.

More Extra Credit

1. Design a board game appropriate for middle school students. The game should include questions dealing with all six of the body systems, and should be colorful and attractive.

2. Write an essay linking all six of the body systems together. How is one important to another?

MEDICAL BREAKTHROUGHS RUBRIC

4 — Exemplary

- Your medical breakthrough paragraph demonstrates a thorough, well-developed understanding of concepts addressed.
- You use ample details to clearly support your idea.
- You consistently use proper mechanics—paragraph form, sentence structure, grammar, punctuation, spelling, and capitalization.
- Your illustration or model clearly conveys your ideas.

3 — Expected

- Your medical breakthrough paragraph demonstrates a general, adequately-developed understanding of concepts addressed.
- You use some details to support your idea.
- You use proper mechanics—paragraph form, sentence structure, grammar, punctuation, spelling, and capitalization.
- Your illustration or model conveys your ideas.

2 — Nearly There

- Your medical breakthrough paragraph demonstrates a limited, partially-developed understanding of concepts addressed.
- You used few details to support your idea.
- You sometimes use proper mechanics—paragraph form, sentence structure, grammar, punctuation, spelling, and capitalization.
- Your illustration or model does not clearly convey your ideas.

1 — Incomplete

- Your medical breakthrough paragraph demonstrates a minimal, undeveloped understanding of concepts addressed.
- You used no details to support your idea.
- You do not use proper mechanics—paragraph form, sentence structure, grammar, punctuation, spelling, and capitalization.
- Your illustration or model is unclear.

CHALLENGE CODE 1

Emergency! Emergency! There has been a multi-car pile-up on the freeway and 20 people are being rushed into the emergency room, but no one can find the doctors! In order to save everyone from this tragedy, your Medical Clinic must find the six different types of physicians you have in your clinic, as well as the systems in which they specialize. They are all located in the puzzle below. Words may form across, up-and-down, diagonally, or backwards.

D	I	M	I	L	O	G	S	T	B	N	P	D	G	W	C	O	L	O	S	A	F
E	N	U	M	M	I	A	C	N	M	L	P	U	L	R	G	I	S	T	L	O	D
O	U	S	K	E	T	L	O	S	U	O	V	R	E	N	E	R	E	B	T	R	G
R	I	C	A	E	L	O	G	I	S	T	D	Y	P	E	V	N	S	A	U	T	K
Z	P	U	J	V	R	T	Y	U	I	O	P	L	O	U	S	D	A	F	G	H	J
C	V	L	B	I	N	M	Q	W	E	R	T	Y	U	R	I	O	E	P	A	O	S
X	G	A	S	T	R	O	E	N	T	E	R	O	L	O	G	I	S	T	C	P	V
B	N	R	E	S	P	E	T	Y	U	H	J	F	R	L	D	F	I	G	R	E	J
B	G	S	S	E	Z	X	R	A	S	D	N	T	M	O	T	E	D	A	I	D	S
T	N	K	D	G	F	C	T	S	T	E	S	S	D	G	A	G	S	E	C	I	G
G	M	E	E	I	O	V	F	D	E	I	I	A	C	I	N	J	U	B	U	C	M
H	J	L	R	D	L	B	G	L	G	H	O	D	Y	S	P	K	O	N	P	S	B
J	T	E	D	V	T	N	K	O	S	K	U	R	M	T	L	E	I	R	G	U	D
U	S	T	T	E	R	O	L	O	G	I	S	T	N	E	U	G	T	O	R	R	Y
D	F	A	N	N	P	O	Y	R	O	T	A	L	U	C	R	I	C	R	A	G	D
E	W	L	R	T	I	Y	U	O	L	O	P	C	C	S	F	B	E	R	T	E	A
L	I	M	M	D	D	I	G	E	C	I	R	C	P	U	L	M	F	N	E	O	R
O	W	E	R	E	S	P	I	R	A	T	O	R	Y	R	E	S	N	D	I	N	S
G	R	A	D	G	O	L	P	U	L	M	O	N	O	L	O	G	I	S	T	S	T
I	C	T	O	R	Y	O	L	O	G	I	S	T	I	N	F	E	G	A	S	T	R
S	I	M	D	I	G	C	A	R	R	E	S	M	U	S	O	E	T	O	R	T	H
T	S	E	R	I	S	T	O	L	O	R	T	E	D	G	T	Y	H	J	I	K	O

CHALLENGE CODE 2

Medical scientists around the world are in desperate need of your help. They have discovered that many diseases result from damaged genes, but are unable to determine their exact location. Everyone is now turning to you to solve the genetic code and rid the world of these horrible diseases.

To solve the code, find the word that goes with each definition and use the corresponding numbers to figure out the hidden message.

5 22 3 18 7 12	The important component of the air human's breathe
6 8 26 25 4 11	An upper chamber of the heart
6 12 8 25 16 5 10 3	Secreted by white blood cells to fight bacteria and viruses
7 14 5 1 2 6 18 4 14	Passageway for food from the mouth to the stomach
14 1 25 12 6 19 24 5 26 10	Thick bundle of nerves surrounded by vertebrae
21 7 11 4 26	Longest bone in the body
20 6 19 17	Without your bones and muscles working together, you would be unable to do this
19 25 15 7 26	Produces bile to aid in digestion

3 5 4 2 6 15 7 24 26 6 24 17 7 10 8 2 7

18 7 12 7 8 25 24 24 5 10 7 6 12 10 14 6 15 7 10

11 6 12 3 19 25 15 7 14! 20 6 3 8 5 18 5!

CHALLENGE CODE 1 and 2 ANSWER KEY
TEACHER REFERENCE

		M																			
E	N	U	M	M	I															O	
		S						S	U	O	V	R	E	N			E			R	
		C		E										E			S			T	
		U		V										U			A			H	
		L		I										R			E			O	
	G	A	S	T	R	O	E	N	T	E	R	O	L	O	G	I	S	T		P	
		R		S										L			I			E	
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		E		I						I				I			U			C	
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		L			I												E			E	
				D													F			O	
			R	E	S	P	I	R	A	T	O	R	Y				N			N	
		A					P	U	L	M	O	N	O	L	O	G	I	S	T		
	C																				

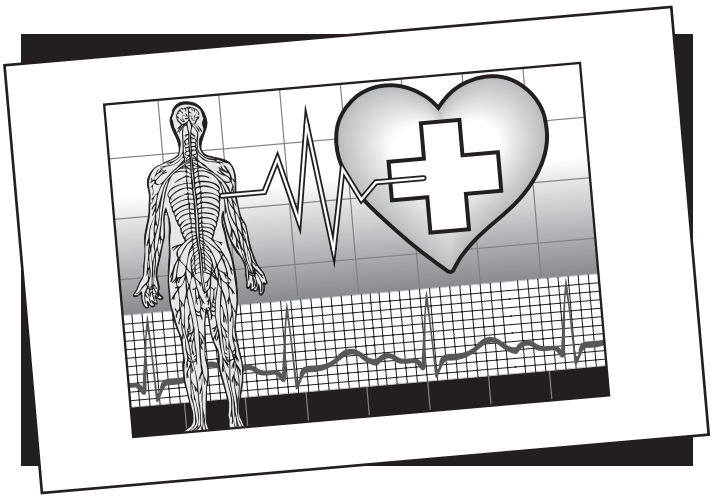
Challenge Code 2 Answer Key

Clue #	Answer
1.	oxygen
2.	atrium
3.	antibody
4.	esophagus
5.	spinal cord
6.	femur
7.	walk
8.	liver

Secret Message:
You have cracked the genetic code and saved many lives! Way to go!

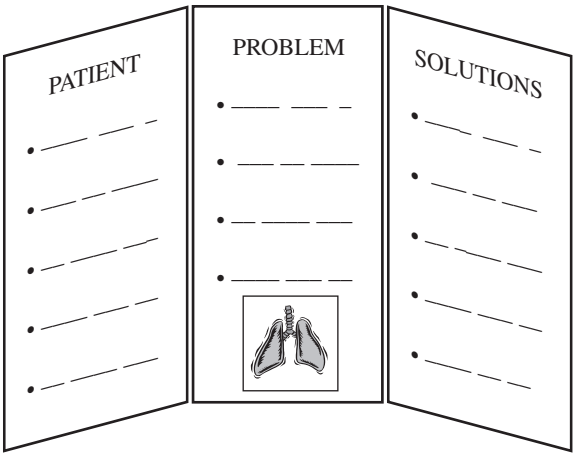
GRAND ROUNDS

Code Card
When you have passed all of the necessary exams and are ready to see your first patient, you will receive a **Code Card**. The Code Card will describe your patient, his or her symptoms, and the diagnosis. Your job is to research the problem and answer the accompanying questions in order to restore health to your patient.



Grand Rounds
Grand Rounds is a special conference physicians have to present interesting patients to one another. For your *Grand Rounds* presentation, you will be required to complete the following:

1. Prepare a three-paneled presentation board with the following information:
   - Your patient—his or her age, sex, and other details relevant to the issues being discussed
   - Problem—symptoms and diagnosis
   - Solutions—what the patient must do to become healthier



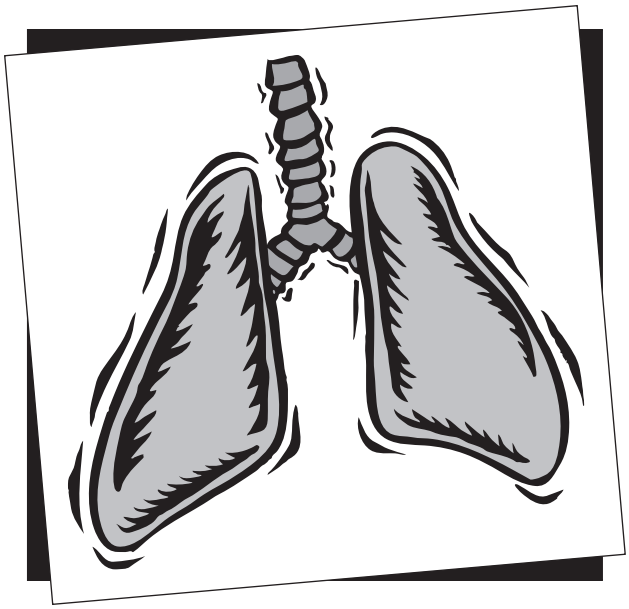
2. Prepare a five-minute oral presentation, carefully explaining all of the above information. Write a script and rehearse with your clinic colleagues before the big day! All physicians participate in the *Grand Rounds* presentation.

3. While preparing for *Grand Rounds*, think about and refer back to what you learned about the body systems. You may even be able to use some of the models and diagrams that were made.

Be clear and prepared. Remember, all of the other Medical Clinics are gathering this vital information from you! Your information could save many lives in the future.

Code Card 1

Mr. Simons, a 48-year-old male, is rushed to your emergency room coughing and gasping for air. After talking with him, you find out that he has smoked one pack of cigarettes a day since he was in sixth grade. X-rays confirm that he has a mass in his lungs.



What effect has smoking had on the systems of Mr. Simons' body over the years? What must he do to become healthier? What resources are available to help him?

Code Card 2

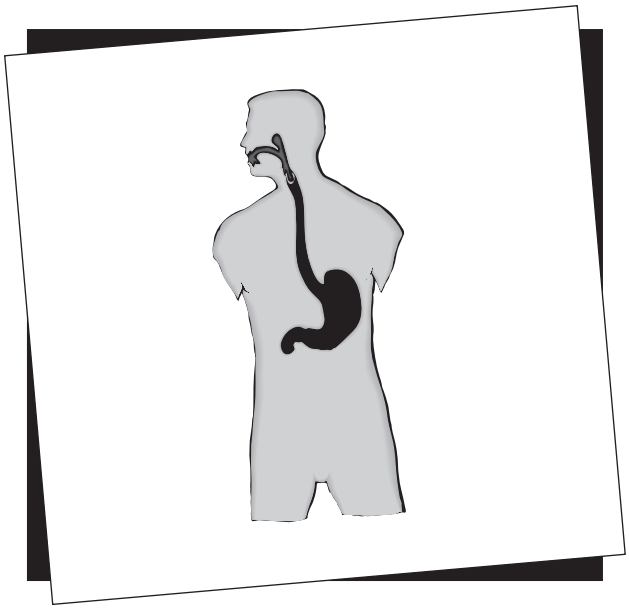
Shana, a 17-year-old female, was found unconscious by her friends at a party and is brought to your emergency room. After interviewing her friends, you discover that she was using illegal drugs throughout the evening. Lab tests confirm this, and Shana is now in a coma.

Describe at least three drugs Shana may have taken. What effects would each have on the systems of her body? What resources are available to help her choose a healthier lifestyle?

Code Card 3

Mr. Henshaw, a 45-year-old male, is brought to your emergency room vomiting blood. You discover that he has been heavily drinking alcohol since high school. His drinking has caused him to lose his job, but he has been unable to stop.

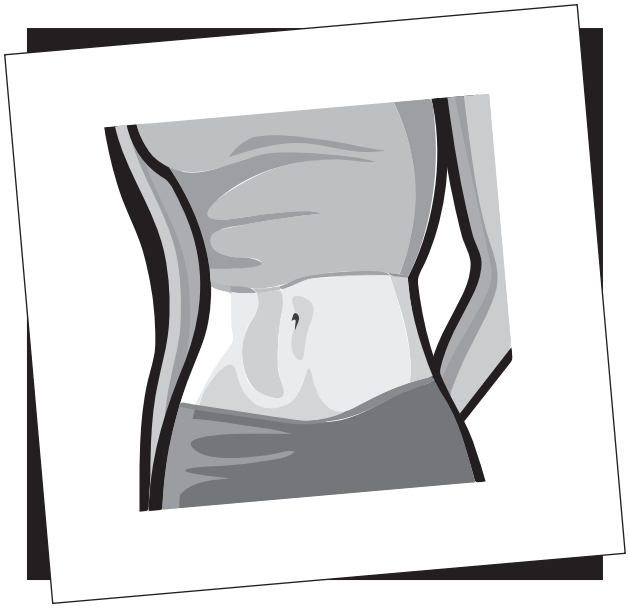
What effect has alcohol had on the systems of Mr. Henshaw's body over the years? What must he do to become healthier? What resources are available to help him?



Code Card 4

Melissa, a 16-year-old female, is rushed into your emergency room after collapsing in class. During the medical exam you realize that Melissa, although five feet, five inches tall, weighs only 87 pounds. Her mother reveals to you that she has been having difficulty lately getting Melissa to eat anything.

What effects has anorexia nervosa or bulimia had on the systems of Melissa's body? What must she do to become healthier? What resources are available to help her?



Code Card 5

Juan, a 15-year-old male, is brought to the emergency room complaining of chest pain. Blood tests reveal that he has steroids in his system. After discussing this with Juan, he admits that he has been using steroids in order to "bulk up" so that he can make the football team this year.

What effects has steroids had on the systems of Juan's body? What healthier alternatives are there for Juan? What resources are available to help him?

Code Card 6

Alexia, a 13-year-old female, fell off of her bicycle while riding to school. Unfortunately she was not wearing any protective gear. She was found unconscious and rushed to your emergency room. Your physical exam shows that she may have a brain injury.

What types of protective gear should Alexia have been wearing? In what other circumstances should she also wear protective gear? What other injuries could occur as a result of not wearing the appropriate gear?

Code Card 7

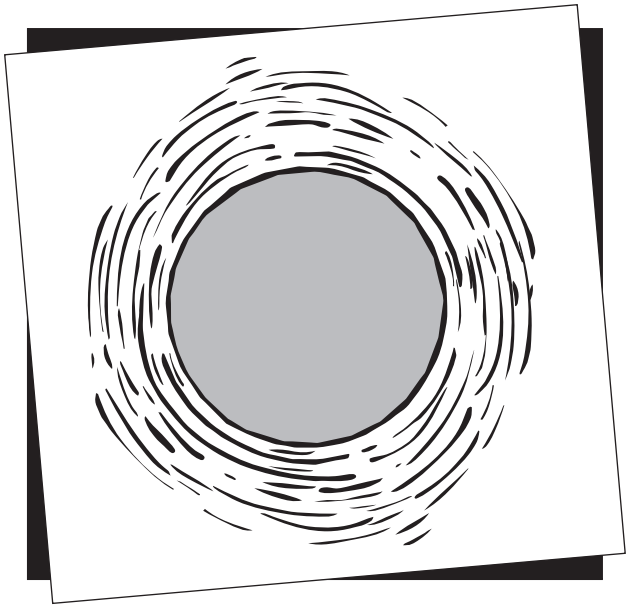
Daryl, a 17-year-old male, is rushed into the emergency room after being found confused and disoriented. Lab tests reveal that he has Type-2 Diabetes.

What is Type-2 Diabetes? What factors most likely contributed to the development of Type-2 Diabetes in Daryl? What effect can this disease have on the systems of his body? What must Daryl do to become healthier? What resources are available to help him?

Code Card 8

Ella, a 14-year-old female, is brought to the emergency room with second-degree burns on most of her body. Was she caught in an awful house fire? No, she was out in the sun too long and suffers from terrible sunburn.

What effect can repeated sun exposure have on Ella's body? What are the best ways she can prevent this from happening? What resources are available to help her?



Code Card 9

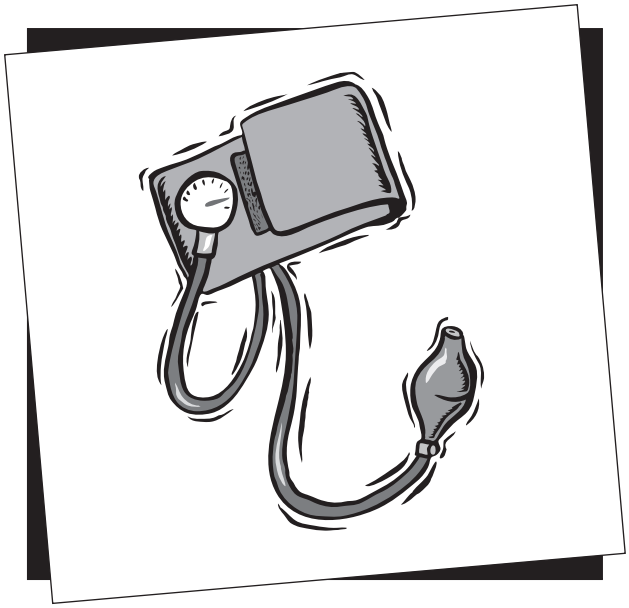
Sean, a 13-year-old male, is brought into the emergency room with a locked jaw and muscle spasms. You discover that he stepped on a nail one week ago, and you diagnose him with tetanus, a disease now considered extremely rare. After talking with his father, you learn that Sean never received his vaccination shots.

Without any vaccinations, for what other diseases may Sean be at risk? How do vaccinations work to prevent disease? What should Sean do to become healthier? What resources are available to help him?

Code Card 10

Ms. Ferguson, a 27-year-old female, comes into the emergency room with a very painful headache and blurred vision. After doing a thorough examination, you discover that she has extremely high blood pressure.

What effect can high blood pressure have on Ms. Ferguson's body? What must she do to become healthier? What resources are available to help her?



GRAND ROUNDS RUBRIC

Content—Presentation Board
Preparation, organization, and detail

4 — Exemplary
- Provides an **excellent explanation** of your patient, the problem, and related solutions.
- **Very well organized**, **neat**, and **attractive** with **more information** than expected.
- **Spelling** and **grammar** are consistently correct.
- **Consistently provides** detailed descriptions.

3 — Expected
- Provides an **accurate and appropriate explanation** of your patient, the problem, and related solutions in an **organized** manner.
- **Organized**, **neat**, and **attractive** with the **necessary information**.
- Most **spelling** and **grammar** are correct.
- **Provides some** detailed descriptions.

2 — Nearly There
- Provides only **some information** about your patient, the problem, and related solutions and/or is **somewhat disorganized**.
- **Seldom provides** detailed descriptions.

1 — Incomplete
- Offers **too little information** or is **disorganized**.

Presentation
Volume, clarity, eye contact, and visual aids

4 — Exemplary
- Your voice was **very clear** and **loud**.
- You **maintained eye contact** with the audience.
- You **effectively used your presentation board** and other visual aids.

3 — Expected
- Your voice was **loud and clear**.
- You **made eye contact** with the audience.
- You **used your presentation board** and other visual aids.

2 — Nearly There
- Your voice was **not loud** enough or you **did not speak clearly**.
- You **seldom made eye contact** with the audience.
- You did not effectively use your presentation board and/or other visual aids.

1 — Incomplete
- The audience **could not understand** your presentation.

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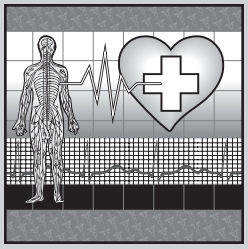


STUDENT GUIDE

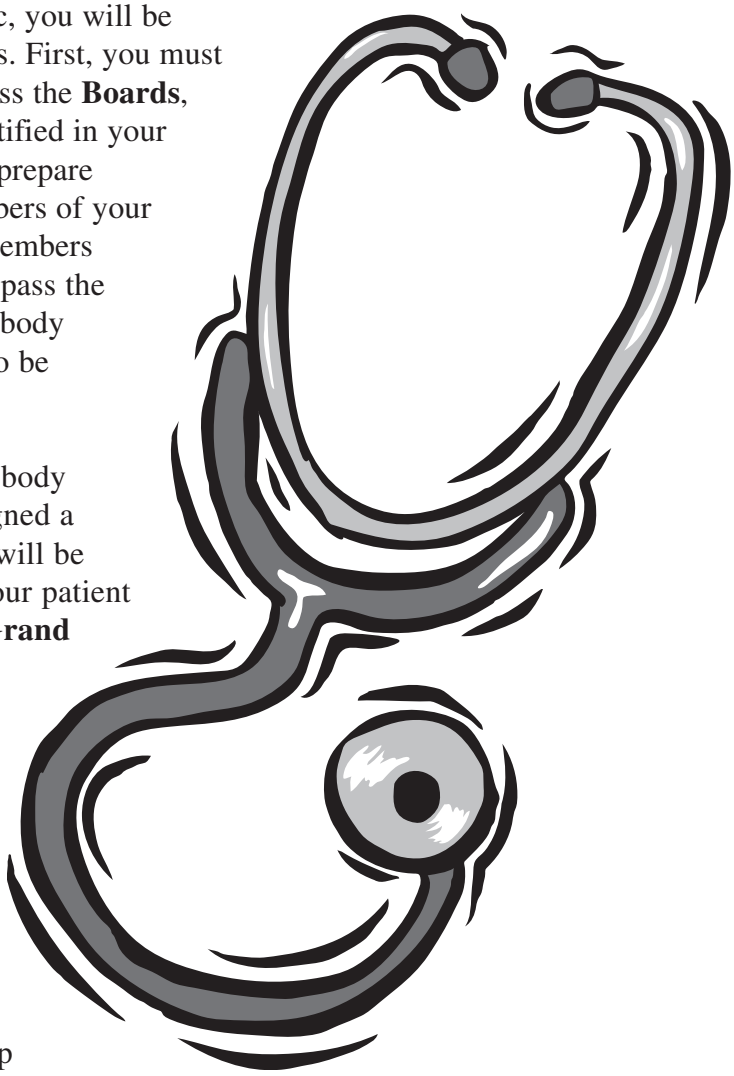
Student Name: _____

CODE BLUE

INTRODUCTION

Congratulations! You have just completed medical school and have recently been hired to work in a Medical Clinic. However, before you begin treating patients, you need to be fully trained in your specialty. Together with others in your specialty, you will attend advanced training to learn one of six body systems. You will be the only physician in your clinic with your particular specialty, so you must work very hard to learn your system well. Your clinic is relying on you for this information!

During your time with your clinic, you will be required to complete several tasks. First, you must learn about your specialty and pass the **Boards**, an exam qualifying you to be certified in your specialty. Additionally you must prepare materials to teach the other members of your clinic about your specialty. All members of your clinic will be required to pass the **Physiology Test** dealing with all body systems in order for your clinic to be allowed to treat patients.



After you have learned about all body systems, your clinic will be assigned a patient to treat. As a group, you will be asked to find solutions to help your patient and to present your findings at **Grand Rounds**, a conference where physicians gather to discuss interesting patients.

Lastly, because of the constant advancements in medical technology, your clinic may choose to accomplish **Medical Breakthroughs**. Through research and creativity, your group can invent a device or medication that can treat current medical problems.

Good luck on each of these endeavors!

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Code Blue

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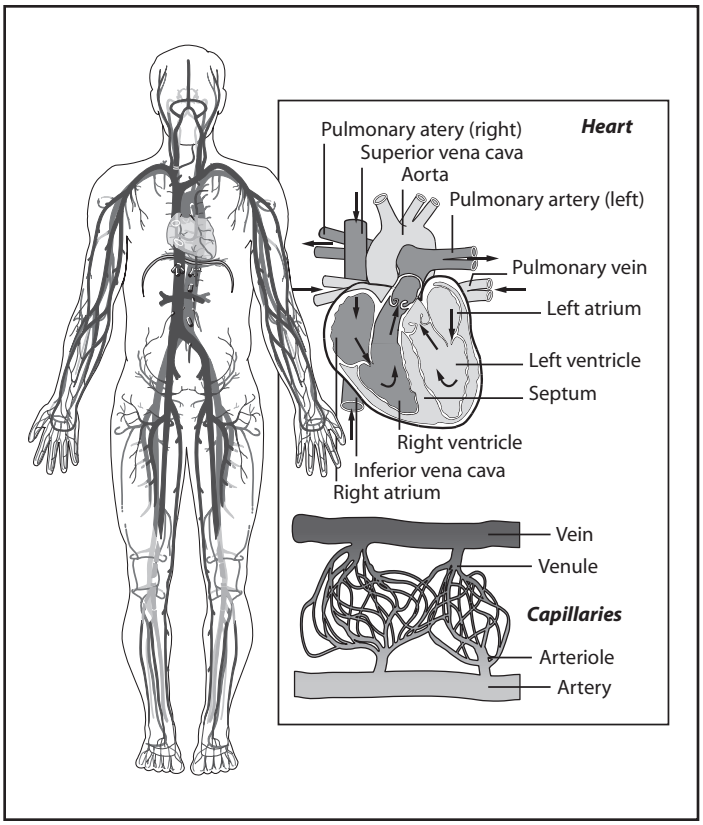
Cardiologists—The Circulatory System

The circulatory system consists of the heart and blood vessels. Its function is to circulate blood containing oxygen and nutrients throughout the body, thus providing the organs of the body with the energy and nutrition needed to live.

The **heart** is divided into a right and left side by a thin muscular wall called the **septum**. Each side has two chambers, an upper chamber called the **atrium** and a lower chamber called the **ventricle**.

Now, let's trace the path of blood around the circulatory system:

First, the **left atrium** receives oxygen-rich blood from the lungs and passes it to the left ventricle. The **left ventricle** pumps the oxygen-rich blood out of the heart. From here, the blood enters the **aorta**, the largest artery of the body. **Arteries** are vessels that transport blood away from the heart. The aorta branches into smaller arteries that transport the oxygen-rich blood to the entire body. The arteries then branch into tiny vessels called capillaries. **Capillaries** are extremely thin, only one cell thick! It is here that the oxygen and nutrients in the blood are exchanged for carbon dioxide and wastes in the tissues.



Now oxygen-poor blood travels to the right side of the heart through vessels called veins. **Veins** are vessels that transport blood towards the heart. The **right atrium** receives the oxygen-poor blood and passes it to the right ventricle. The **right ventricle** then pumps the blood through the **pulmonary arteries** into the capillaries of the lung where the carbon dioxide is exchanged for oxygen. Finally, the **pulmonary veins** carry the oxygen-rich blood to the left atrium of the heart, beginning the cycle again.

Your Tasks

Use the above information and other resources to complete the following:

1. Create a three-dimensional model of the heart, clearly demonstrating all four chambers and valves. NOTE: a purchased model is not an option.
   - The model can be a cross-section model or an open-and-shut model (where you can open the model and look inside)
   - Work with color and different materials to show the various components
   - Consider using paper, plastic tubing of varying diameters, string or yarn of different dimensions, different colored straws, etc.
   - Be creative with the use of color and the size of the various materials

2. Draw a diagram showing the path of blood through the circulatory system, clearly labeling all components.

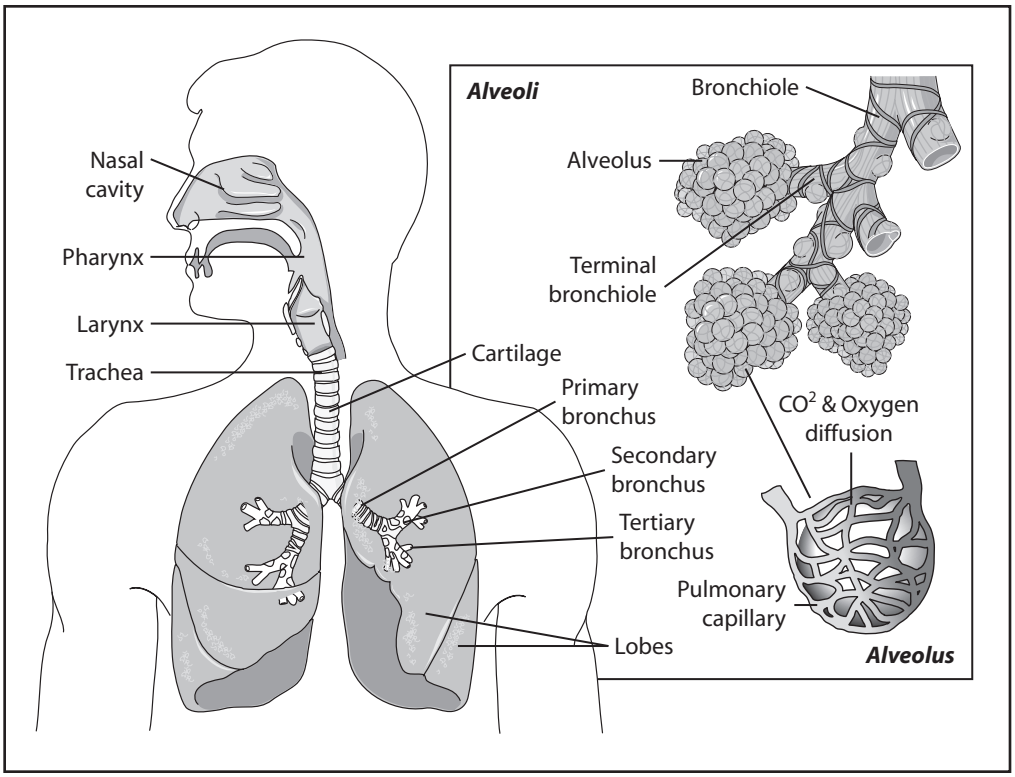
3. Using the model and diagram you create, teach your Medical Clinic members about the circulatory system.

Pulmonologists—The Respiratory System

The function of the respiratory system is to supply the body with oxygen, which is needed to live, and to remove carbon dioxide, which can be harmful if allowed to accumulate. The main component of this system is the lungs.

Now, let's follow the air we breathe through the respiratory system:

The air we breathe contains **oxygen**, which enters the body when we take a breath. A breath begins when the **diaphragm**, the large breathing muscle that separates the heart and lungs from the abdominal cavity, contracts. This creates a vacuum, drawing air into the nose and mouth. The air then travels down the **trachea**, often called the "wind pipe." From here, the air enters the two **bronchial tubes**, which lead into the lungs.



Inside the lungs, the bronchial tubes branch into smaller tubes called **bronchioles**. At the end of the bronchioles the air enters tiny sacs called **alveoli**. The alveoli are surrounded by small blood vessels called **capillaries**. Capillaries are extremely thin, only one cell thick! It is here that the oxygen in the air is exchanged for **carbon dioxide** in the blood. Finally, the carbon dioxide that is now in the alveoli is forced out of the lung, up through the trachea, and out of the mouth or nose when the diaphragm relaxes.

Your Tasks

Use the above information and other resources to complete the following:

1. Create a three-dimensional model of the lungs.
   NOTE: a purchased model is not an option.
   - The model can be a cross-section model or an open-and-shut model (where you can open the model and look inside)
   - Work with color and different materials to show the various components
   - Consider using paper, bubble wrap, tissue paper, plastic tubing of varying diameters, straws, etc.
   - Be creative with the use of color and the size of the various materials

2. Draw a diagram showing the path air travels through the respiratory system, clearly labeling all components.

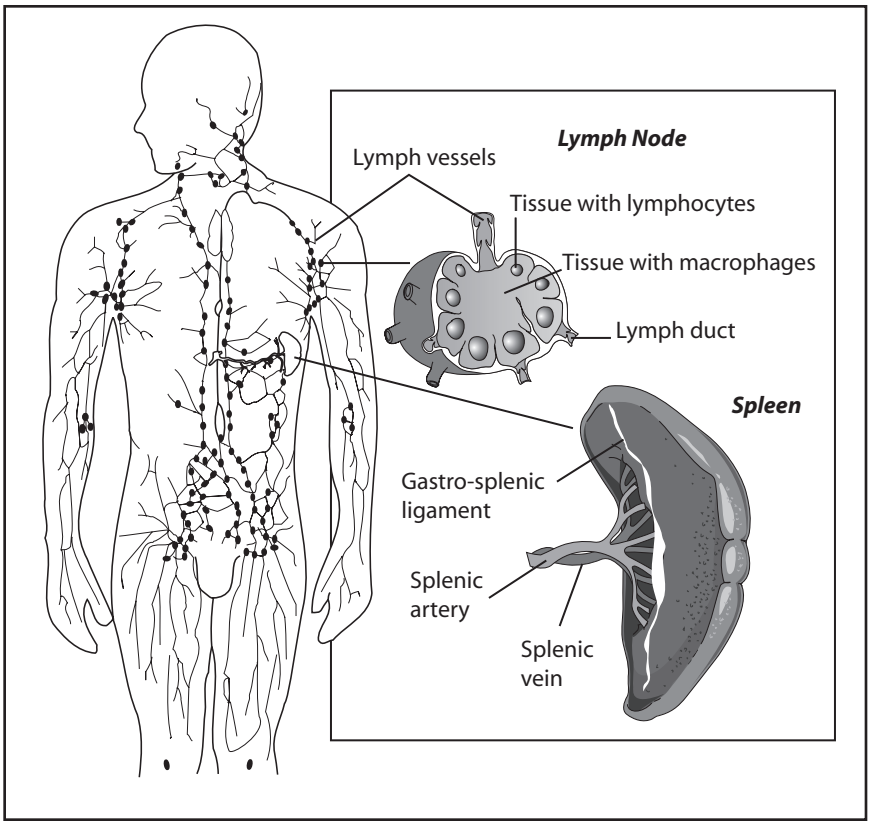
3. Using the model and diagram you create, teach your Medical Clinic members about the respiratory system.

Infectious Disease Specialists—The Immune System

The immune system is made up of white blood cells, antibodies, lymph nodes, and the spleen. Its function is to destroy any germs that invade the body.

Now, let's see what happens to a germ after it enters the body:

When germs—**bacteria** or **viruses**—enter the body, one type of **white blood cell** called a **macrophage** is usually the first to spot them. Once it finds a germ, the macrophage eats it and quickly travels to a nearby **lymph node** or the **spleen**, which house other white blood cells.



Here, the macrophage tells the two other types of white blood cells, the T-cells and B-cells, that germs are invading the body. The **T-cells** find out what the germ looks like from the macrophage and go immediately to attack the germ. The **B-cells** don't kill the germs directly like the other white blood cells. They make a weapon called an **antibody** that is made to fit perfectly onto the invading germs. The antibodies are released into the bloodstream and eventually coat the germ, preventing it from harming the body. This makes it easier for the T-cells to attack and kill the germ.

Let's not forget about the **skin**! It is our first line of defense against invading organisms. It provides a waterproof barrier that protects the body from infection and injury.

Your Tasks

Use the above information and other resources to complete the following:

1. Create a three-dimensional model of a virus or bacteria and an antibody that could attach to it.
   NOTE: a purchased model is not an option.
   - The model can be a cross-section model or an open-and-shut model (where you can open the model and look inside)
   - Work with color and different materials to show the various components
   - Consider using modeling clay, plastic building toys, hook and loop tape with fabric, etc.
   - Be creative with the use of color and the size of the various materials

2. Draw a diagram of the human body, showing the location of the lymph nodes and spleen.

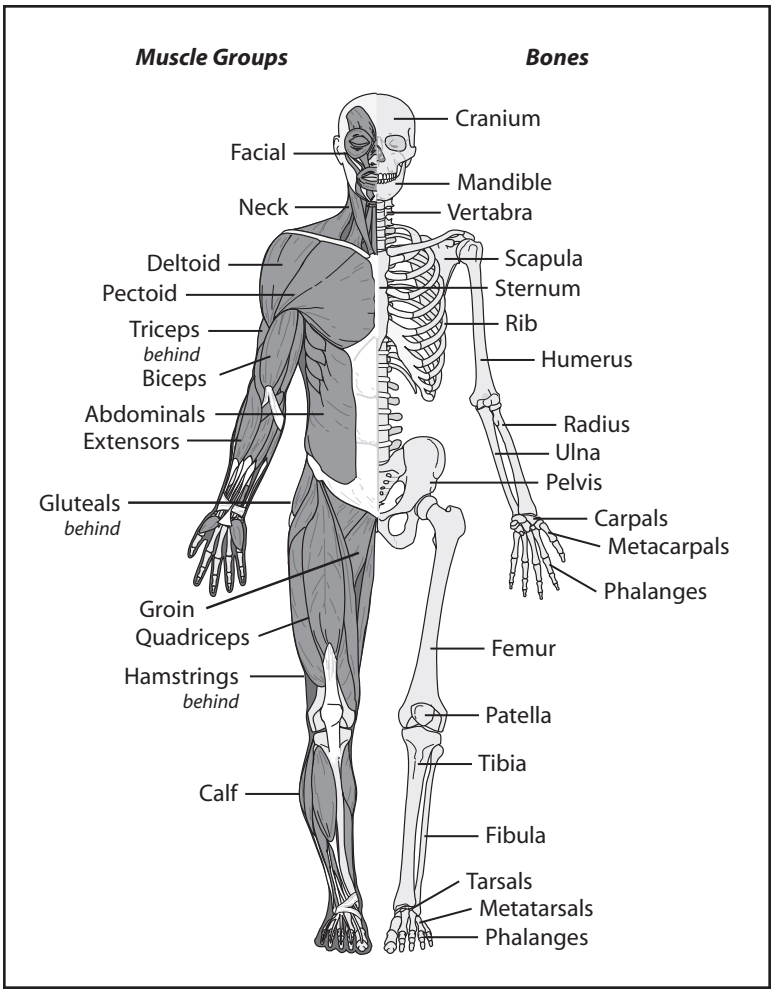
3. Using the model and diagram you create, teach your Medical Clinic members about the immune system.

Orthopedic Surgeons—The Muscular/Skeletal System

The muscular/skeletal system consists primarily of bones and muscles. Its function is to provide structural support and protection, as well as the power needed for movement.

Now, let's see how bones and muscles work together to get you to class safely and on time:

The **skeleton** is made up of several different types of **bones**. The skull protects the brain, and the ribs protect the heart, lungs, and several abdominal organs. Bones come together at **joints**. There are many different types of joints, including ball-and-socket, hinge, and pivot joints. **Ligaments** are bands of strong tissue that connect bone to bone and thus hold the joints together. **Cartilage** covers the bone ends to help the joint move smoothly and to protect the bones from wear and tear.



Muscles are attached to bone by tough fibrous bands called **tendons**. **Skeletal muscles** provide the power needed to move the joints and bones and thus produce body movement. Two other types of muscle found in the body are cardiac and smooth muscles. **Cardiac muscle** is found in the heart, and it provides the power to pump blood to the rest of the body. **Smooth muscle** is found in the walls of the body's internal organs. Smooth muscle performs many actions that are completely involuntary, such as forcing food through the intestinal tract.

Your Tasks

Use the above information and other resources to complete the following:

1. Create three-dimensional models showing all three types of joints, including the ligaments and cartilage. NOTE: purchased models are not an option.
   - The model can be a cross-section model or an open-and-shut model (where you can open the model and look inside)
   - Work with color and different materials to show the various components
   - Consider using modeling clay, fabric tape, rubber bands, animal bones (e.g., turkey, chicken), sticks, etc.
   - Be creative with the use of color and the size of the various materials

2. Draw a diagram of the inside of a bone, including its different layers.

3. Using the model and diagram you create, teach your Medical Clinic members about the muscular/skeletal system.

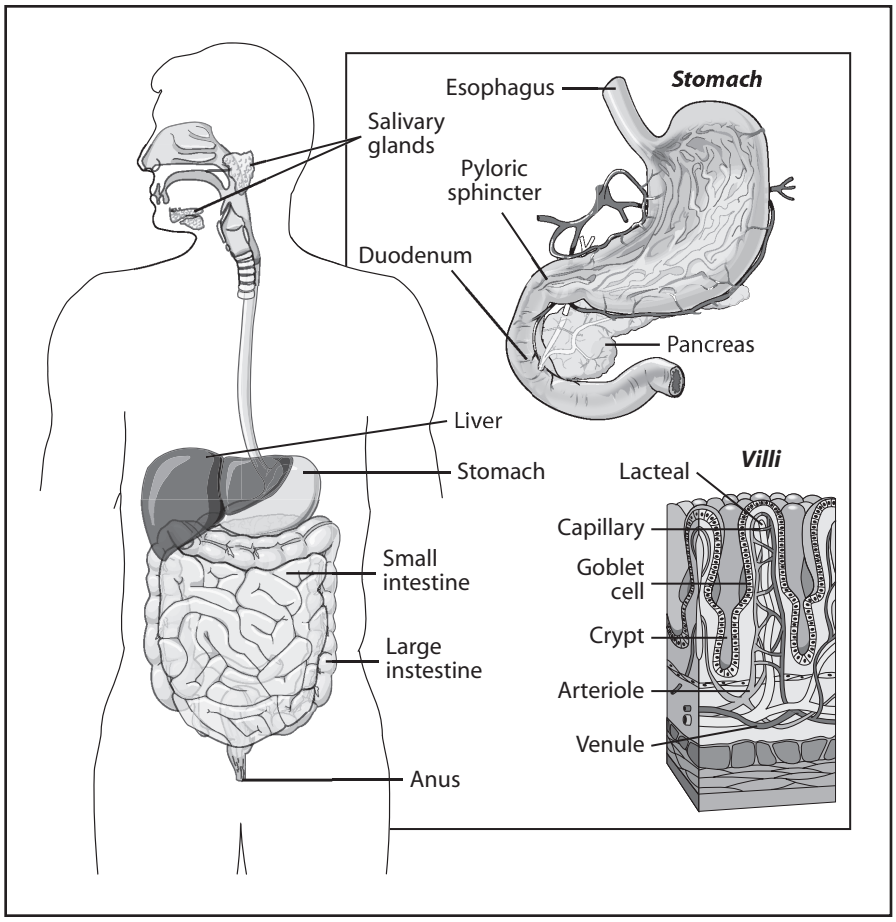
Gastroenterologists—The Digestive System

The function of the digestive system is to break down the food you eat into small particles the body uses for nutrition. This system consists of many parts, including the stomach and intestines.

Now let's see what happens to the food you eat as it moves through the digestive system:

The digestive process begins in the mouth where food is chewed into smaller pieces. While in the mouth, the food is broken down further by **saliva**, which is produced by the **salivary glands**. The partially digested food then travels down a muscular tube called the **esophagus** into the stomach. The **stomach** churns the food and produces acid that helps in digestion.

The food leaves the stomach and enters the **small intestine**. Here, enzymes from the **pancreas**, as well as bile made by the **liver** and stored in the **gall bladder**, are added to further digest food into very small particles. These tiny food particles pass through the walls of the small intestine and enter the blood stream where they provide nutrition for the body. The undigested food travels down the small intestine into the **large intestine**. The large intestine absorbs most of the remaining water. The material left over, now called feces, leaves the body through the anus.



Your Tasks

Use the above information and other resources to complete the following:

1. Create a three-dimensional model of the stomach.
   NOTE: a purchased model is not an option.
   - The model can be a cross-section model or an open-and-shut model (where you can open the model and look inside)
   - Work with color and different materials to show the various components
   - Consider using balloons, plastic tubing, dryer tubing, etc.
   - Be creative with the use of color and the size of the various materials

2. Draw a diagram showing the path food takes through the digestive system, clearly labeling all components, including the pancreas, liver, and gall bladder.

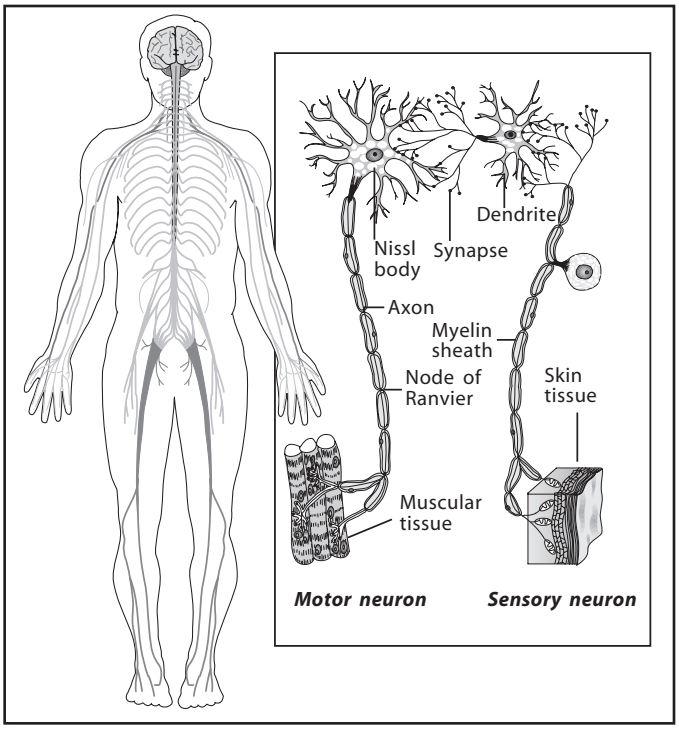
3. Using the model and diagram you create, teach your Medical Clinic members about the digestive system.

Neurologists—The Nervous System

The function of the nervous system is to receive information from the environment, interpret that information, and create a response to it. The three main parts of the nervous system are the brain, spinal cord, and nerves.

The **brain** has three main parts: the cerebrum, cerebellum, and brain stem. The **cerebrum** controls our thinking, emotions, sensations, memory, and movement. The **cerebellum** coordinates movement and balance. The **brain stem** is an extension of the spinal cord located at the base of the brain. It receives and relays information from the face, eyes, ears, nose, and tongue. The brain stem is also responsible for keeping our heart beating and for our breathing.

The **spinal cord** is made up of millions of nerves. Like the brain stem, it also receives and relays information. The information it processes comes from all areas of the body not processed by the brain stem.



Nerves are made up of millions of cells called **neurons**. Each neuron has a long trunk called an **axon** and many smaller branches called **dendrites**. They pass on messages by releasing chemicals over small spaces between axons and dendrites called **synapses**.

Now, let's see how all of these components work together to relay messages throughout your body:

The body receives information from the environment through the **sensory nerves** that are located in the sensory organs, such as the eyes, ears, nose, and skin. These sensory nerves carry the message to the **spinal cord**. The spinal cord relays the message to the **brain**. The brain then makes sense out of the information and sends its own instructions back down the spinal cord. A different type of nerve called a **motor nerve** carries these instructions to the muscles. The muscles then do what the nerves have instructed them to do.

Your Tasks

Use the above information and other resources to complete the following:

1. Create a three-dimensional model of the central nervous system—include the parts of the brain, spinal cord, and a neuron.
   NOTE: a purchased model is not an option.
   - The model can be a cross-section model or an open-and-shut model (where you can open the model and look inside)
   - Work with color and different materials to show the various components
   - Consider using modeling clay, string, yarn, plastic tubing, etc.
   - Be creative with the use of color and the size of the various materials

2. Draw a diagram showing the path a stimulus travels throughout the nervous system.

3. Using the model and diagram you create, teach your Medical Clinic members about the nervous system.

Code Card

When you have passed all of the necessary exams and are ready to see your first patient, you will receive a **Code Card**. The Code Card will describe your patient, his or her symptoms, and the diagnosis. Your job is to research the problem and answer the accompanying questions in order to restore health to your patient.

Grand Rounds

Grand Rounds is a special conference physicians have to present interesting patients to one another. For your *Grand Rounds* presentation, you will be required to complete the following:

1. Prepare a three-paneled presentation board with the following information:
   - Your patient—his or her age, sex, and other details relevant to the issues being discussed
   - Problem—symptoms and diagnosis
   - Solutions—what the patient must do to become healthier

2. Prepare a five-minute oral presentation, carefully explaining all of the above information. Write a script and rehearse with your clinic colleagues before the big day!
   All physicians participate in the *Grand Rounds* presentation.

3. While preparing for *Grand Rounds*, think about and refer back to what you learned about the body systems. You may even be able to use some of the models and diagrams that were made.

Be clear and prepared. Remember, all of the other Medical Clinics are gathering this vital information from you! Your information could save many lives in the future.

Grand Rounds Rubric

Content—Presentation Board
Preparation, organization, and detail

4 — Exemplary
- Provides an **excellent explanation** of your patient, the problem, and related solutions.
- **Very well organized**, **neat**, and **attractive** with **more information** than expected.
- **Spelling** and **grammar** are consistently correct.
- **Consistently provides** detailed descriptions.

3 — Expected
- Provides an **accurate and appropriate explanation** of your patient, the problem, and related solutions in an **organized** manner.
- **Organized**, **neat**, and **attractive** with the **necessary information**.
- Most **spelling** and **grammar** are correct.
- **Provides some** detailed descriptions.

2 — Nearly There
- Provides only **some information** about your patient, the problem, and related solutions and/or was **somewhat disorganized**.
- **Seldom provides** detailed descriptions.

1 — Incomplete
- Offered **too little information** or was **disorganized**.

Presentation
Volume, clarity, eye contact, and visual aids

4 — Exemplary
- Your voice was **very clear** and **loud**.
- You **maintained eye contact** with the audience.
- You **effectively used your presentation board** and other visual aids.

3 — Expected
- Your voice was **loud and clear**.
- You **made eye contact** with the audience.
- You **used your presentation board** and other visual aids.

2 — Nearly There
- Your voice was **not loud** enough or you **did not speak clearly**.
- You **seldom made eye contact** with the audience.
- You did not effectively use your presentation board and/or other visual aids.

1 — Incomplete
- The audience **could not understand** your presentation.