Watch Movie:  Heart Disease
   Answer the movie questions on the worksheet.

Complete activities 1-4.

Activity #1:
   Click on activity 1 - "Heart Tour" and take a narrated tour of the heart.

Activity #2: PhysioEx
   • Go to www.physioex.com, or click the link on the pathophysiology web page.
   • Click on the PhysioEx 6.0 For Human Physiology graphic.
   • Enter login name: healthsciences and password: wildcat05.
   • Click on “proceed to PhysioEx 6.0” (bottom-right corner).

   The page now appearing on the screen links a student to the “main menu” (for laboratory exercises) and “instructions and course materials”.

   To download and print the lab activity instructions,
   • Click on the “instructions and course materials” link.
   • Click the “worksheets” tab (left side of screen). Note: for all PhysioEx lab exercises, use the “for human physiology” links.
   • Click on lab 5, exercise 5 - Cardiovascular Dynamics.
   • Print exercise 5.

   Return to the PhysioEx page containing the “main menu” link by minimizing or closing the worksheet/instructions window.
   • Click on "Main Menu".
   • Click on the “Cardiovascular Dynamics” exercise.
   • Follow all instructions, and answer the questions on the worksheet.

Activity #3:
   Complete the cardiovascular case studies on the lab worksheet. Use graphics from patho website as indicated.

Activity #4:
   Complete the cardiovascular matching exercises on the lab worksheet.
Heart Disease Movie

1. List the 4 categories of heart disease.

2. Blood entering the left side of the heart comes from the ______ and carries oxygenated blood to _____________.

3. Blood entering the right side of the heart comes from the ___________ and is pumped to the _____________.

4. Which side of the heart is damaged in congestive heart failure?

5. List 3 symptoms of congestive heart failure.

6. What happens in severe congestive heart failure?

7. Right-sided heart failure leads to what condition?

8. List 3 symptoms of right-sided heart failure.

9. List 4 conditions that may lead to heart failure.

10. List 3 general symptoms of heart failure.

11. Two risk factors of heart disease are:

12. Treatment for heart disease may include:

13. Medications for heart disease include:

______________  Speeds up force of heart contractions
______________  Widens blood vessels
______________  Eliminate salt and water from the body.

14. Congenital heart conditions include ____________________ and ____________________.

15. What two dietary components may be adjusted to treat heart disease?
Case #1
A 51 year-old executive for a shipping company has been feeling some chest pains over the last year, particularly after climbing up the stairs to the accounting office. He had cholesterol screening done, which showed a total cholesterol of 250 and HDL component of 25. His fasting glucose is 145 mg/dl. He smokes half a pack of cigarettes a day and he is overweight. He is admitted to the hospital after onset of severe chest pain that was substernal and described as "crushing".

View images 1a and 1b.

Case 1a
Gross appearance of a similar heart with opened left anterior descending coronary artery.

Case 1b
Microscopic appearance of his left anterior descending coronary artery.

What is the diagnosis for this patient?

What are the risk factors for his disease?

Explain the symptomatology.

Case #2
A 32 year-old man was found down in his apartment when a friend came to visit. The friend called 911. On arrival in the emergency room, the patient was febrile, with a temperature of 38.9 C. Physical examination revealed a palpable spleen tip, splinter hemorrhages, needle tracks in the left antecubital fossa, and a heart murmur. Echocardiography reveals nodular lesions up to 1 cm involving the aortic valve, which also shows valvular insufficiency.

View images 2a and 2b.

Case 2a
The fingers with splinter hemorrhages are shown here.

Case 2b
This is an example of the gross appearance of his aortic valve at the time of admission.

Gram stains from blood cultures showed gram positive cocci in clumps.

What is the diagnosis?

Explain how this occurred?

Can you recommend treatment?

Case #3
A 34 year-old man works as an administrator in a nursing home. His job is not strenuous, but he comes to his physician complaining of shortness of breath on weekends when he is more active in sports with his family. Sleeping is becoming more difficult, and he reports a better night’s sleep if he props himself up on a couple of pillows. He has a frequent productive cough. He reports no chest pain. He has no history of alcohol or tobacco use.

On physical examination he is found to have a pulse of 75, respirations 28, temperature 36°C, and blood pressure 115/75. Examination of the chest reveals bilateral lower lung field rales. His heart has a regular rate and rhythm, but there is a faint murmur. He also has lower extremity edema.

What is your initial diagnosis?

Click on Slide 3a.
This is the gross appearance of a similar dilated heart.

Click on Slide 3b.
At high magnification, this alveolus is filled with pale pink edema fluid as well as macrophages. A few PMN’s suggest an early pneumonia.

How do you explain the symptoms manifested by this patient?

Is this process in the lung more typical of right or of left-sided failure?

Case #4
A 44 year-old African-American man has a history of hypertension. On arrival in the emergency room, his blood pressure is recorded as 220/150 mg Hg.

See slide 4.

What is the nature of the process seen in the renal artery shown here microscopically at high magnification?

What complications are likely to develop?

Case #5
A 13 year-old girl is taken to the pediatrician with flu-like symptoms. She has a fever and has been nauseated and vomiting. She is complaining of aching and stiffness in her joints.

On physical exam the physician notes swollen lymph nodes and tachycardia. He also notes some abnormal muscular movements. A faint rash on the chest and abdomen is present. The mother indicates that the rash is much worse when the child bathes.

Upon questioning, the mother indicated the child had a sore throat several weeks ago that had been untreated.

What is your diagnosis?

What causes this disease?
What diagnostic tests could help confirm your diagnosis?

What treatment would you recommend?
Alterations in Cardiovascular Function

Match the cardiovascular disease or condition on the left with the description on the right.

1. ___ Arteriole cold-induced vasospasm. a. Stress-induced hypertension
2. ___ Cause of angina b. Aneurysm
3. ___ Left atrial dilation with pulmonary hypertension c. Right-side heart failure
4. ___ Circulating matter blocks blood vessel d. Myocardial ischemia
5. ___ Systolic blood pressure greater than 140 e. Bruerger disease
6. ___ GI disorders, elevated venous pressure f. Tamponade
7. ___ Secondary hypertension g. Heparin
8. ___ Narrowing of artery lumen by platelet/fibrin mass h. Atherosclerosis
9. ___ Treatment for thrombi/emboli i. Raynaud syndrome
10. ___ Pericardial fluid pressure= diastolic pressure j. Mitral stenosis
11. ___ Pouching of vessel wall k. Thrombus
12. ___ Inflammatory disease of peripheral arteries/young male smokers. l. Temporary ischemia
13. ___ Blood clot attached to vessel wall m. Emboli
14. ___ Fat and fibrin deposits cause thickening of vessel wall. n. Hypertension
Alterations of Cardiovascular Function in Children

Match the disease description on the left with the childhood cardiovascular dysfunction on the right.

1. ___ Blood flows among all 4 heart chambers.
   a. Truncus Arteriosus

2. ___ Mixing of pulmonary and systemic blood.
   b. Kawasaki Disease

3. ___ Pulmonary artery and aorta connection fails to close.
   c. Tetralogy of Fallot

4. ___ Pulmonary circulation enters right atrium instead of left
   d. Coarctation of the aorta

5. ___ Abnormal movement of blood across intratrial septum
   e. Patent Ductus Arteriosus

6. ___ May cause increased blood flow to heart/decreased to extremities
   f. Hypoplastic left heart syndrome

7. ___ Infectious process causes self-limiting vasculitis with cardiac complications.
   g. Tricuspid atresia

8. ___ Increased pulmonary blood flow/Decreased systemic flow
   h. Transposition of great vessels

9. ___ 4 heart defects leads to cyanosis possible syncope and seizures
   i. Atrial Septic defect

10. ___ Mixing of oxygenated and unoxygenated blood
    j. Atrioventricular Canal Defect

11. ___ Underdeveloped left heart
    k. Total Anomalous Pulmonary Venous Connection
ANSWERS TO HEART DISEASE MOVIE WORKSHEET

1. List the 4 categories of heart disease. CONGESTIVE HEART FAILURE, CORONARY ARTERY DISEASE, VALVULAR HEART DISEASE, HEART ATTACKS.

2. Blood entering the left side of the heart comes from the _________ and carries oxygenated blood to ______________. LUNGS, ORGANS AND TISSUES OF THE BODY.

3. Blood entering the right side of the heart comes from the ___________ and is pumped to the ___________. VENOUS UNOXYGENATED BLOOD FROM THE BODY, LUNGS

4. Which side of the heart is damaged in congestive heart failure? LEFT

5. List 3 symptoms of congestive heart failure. SHORTNESS OF BREATH, COUGHING, BREATHING DISCOMFORT WHEN LYING DOWN.

6. What happens in severe congestive heart failure? LUNGS FILL WITH FLUID WHICH PREVENTS BLOOD FROM BEING OXYGENATED.

7. Right-sided heart failure leads to what condition? EDEMA

8. List 3 symptoms of right-sided heart failure. DILATED VEINS IN NECK, SWOLLEN LIVER AND SPLEEN, DIFFICULTY WALKING

9. List 4 conditions that may lead to heart failure. VALVULAR DEFECT, ARRHYTHMIA, MYOCARDITIS, ARTERIOSCLEROSIS

10. List 3 general symptoms of heart failure. SHORTNESS OF BREATH, ORTHOPNEA (DIFFICULT BREATHING WHILE LYING DOWN), CHRONIC FATIGUE

11. Two risk factors of heart disease are: SMOKING, OBESITY
12. Treatment for heart disease may include: **MEDICATIONS, SURGERY, LIFESTYLE CHANGES, OR A COMBINATION**

13. Medications for heart disease include:

   ___DIGITALIS____  Speeds up force of heart contractions
   ___VASODILATORS_  Widens blood vessels
   ___DIURETICS_____  Eliminate salt and water from the body.

14. Congenital heart conditions include ________________ and ______________. LEFT-SIDE OBSTRUCTION, MALFORMATIONS

15. What two dietary components may be adjusted to treat heart disease?  
   **FAT AND SALT INTAKE**
ANSWERS TO CARDIOVASCULAR WORKSHEET

Case #1
A 51-year-old executive for a shipping company has been feeling some chest pains over the last year, particularly after climbing up the stairs to the accounting office. He had cholesterol screening done, which showed a total cholesterol of 250 and HDL component of 25. His fasting glucose is 145 mg/dl. He smokes half a pack of cigarettes a day and he is overweight. He is admitted to the hospital after onset of severe chest pain that was substernal and described as "crushing".

View images 1a and 1b.

What is the diagnosis in this man? MYOCARDIAL INFARCTION

What are the risk factors for his disease? MALE SEX, OLDER AGE, SEDENTARY LIFESTYLE, SMOKING, PROBABLE DIABETES MELLITUS, HIGH TOTAL CHOLESTEROL WITH LOW HDL CHOLESTEROL, OBESITY

Explain the symptomatology. THE CORONARY ATHEROSCLEROSIS LEADS TO NARROWING OF THE ARTERIAL LUMENS. THIS CAN LEAD TO ISCHEMIA WITH ANGINAL PAIN

Case #2
A 32-year-old man was found down in his apartment when a friend came to visit. The friend called 911. On arrival in the emergency room, the patient was febrile, with a temperature of 38.9 C. Physical examination revealed a palpable spleen tip, splinter hemorrhages, needle tracks in the left antecubital fossa, and a heart murmur. Echocardiography reveals nodular lesions up to 1 cm involving the aortic valve, which also shows valvular insufficiency.

View images 2a and 2b.

Gram stains from blood cultures showed gram positive cocci in clumps.
What is the diagnosis? **INFECTIVE ENDOCARTITIS WITH BACTEREMIA**

Explain how this occurred? **THE PHYSICAL FINDINGS POINT TO INTRAVENOUS DRUG USE, AND PERSONS WHO USE DRUGS IN THIS FASHION ARE NOT USUALLY FOLLOWING STERILE TECHNIQUE. THUS, THERE IS A DECIDED RISK FOR INFECTION. THE MOST COMMON ORGANISM IN THIS SETTING IS STAPHYLOCOCCUS AUREUS, BUT OTHER BACTERIA SUCH AS PSEUDOMONAS OR STREPTOCOCCUS MAY BE THE CAUSE**

Can you recommend treatment? **LONG-TERM ANTIMICROBIAL THERAPY.**

**Case #3**

A 34-year-old man works as an administrator in a nursing home. His job is not strenuous, but he comes to his physician complaining of shortness of breath on weekends when he is more active in sports with his family. Sleeping is becoming more difficult, and he reports a better night's sleep if he props himself up on a couple of pillows. He has a frequent productive cough. He reports no chest pain. He has no history of alcohol or tobacco use.

On physical examination he is found to have a pulse of 75, respirations 28, temperature 36°C, and blood pressure 115/75. Examination of the chest reveals bilateral lower lung field rales. he heart has a regular rate and rhythm, but there is a faint murmur. He also has lower extremity edema.

What is your initial diagnosis? **IDIOPATHIC CARDIOMYOPATHY. BASED ON AN ECHOCARDIOGRAM THE CARDIOMYOPATHY IS CATEGORIZED AS DILATED (SEE SLIDE 3A).**

How do you explain the symptoms manifested by this patient? **THE PATIENT COULD HAVE SIGNS AND SYMPTOMS OF CONGESTIVE HEART FAILURE. PAIN IS USUALLY NOT A FEATURE OF CARDIOMYOPATHY. SINCE BOTH LEFT AND RIGHT HEART ARE FAILING, HE COULD HAVE**
PULMONARY CONGESTION AND EDEMA FROM LEFT HEART FAILURE, AND PERIPHERAL EDEMA FROM RIGHT HEART FAILURE

Is this process in the lung more typical of right or of left-sided failure? LEFT-SIDED HEART FAILURE

Case #4
A 44 year-old African-American man has a history of hypertension. On arrival in the emergency room his blood pressure is recorded as 220/150 mg Hg.

See slide 4.

What is the nature of the process seen in the renal artery shown here microscopically at high magnification? THIS IS A HYPERPLASTIC ARTERIOLOSCLEROSIS IN WHICH THERE IS LUMENAL NARROWING WITH PROMINENT INTIMAL PROLIFERATION ("ONION-SKINNING"). THIS LESION IS MOST LIKELY TO ACCOMPANY MALIGNANT HYPERTENSION. MALIGNANT HYPERTENSION, WHICH COMPlicATES ABOUT 1% OF CASES OF HYPERTENSION, IS MORE COMMON IN MEN.

What complications are likely to develop? HE COULD DEVELOP RENAL FAILURE, CEREBRAL HEMORRHAGE (STROKE), OR CONGESTIVE HEART FAILURE.

Case #5
A 13 year-old girl is taken to the pediatrician with flu-like symptoms. She has a fever and has been nauseated and vomiting. She is complaining of aching and stiffness in her joints.

On physical exam the physician notes swollen lymph nodes and tachycardia. He also notes some abnormal muscular movements. A faint rash on the chest and abdomen is present. The mother indicates that the rash is much worse when the child bathes.

Upon questioning, the mother indicated the child had a sore throat several weeks ago that had been untreated.
What is your diagnosis? **RHEUMATIC FEVER**

What causes this disease? **FOLLOWS AN UNTREATED PHARYNGEAL INFECTION CAUSED BY GROUP A B-HEMOLYTIC STREPTOCOCCUS.** **ANTIBODIES TO PROTEINS ON THE BACTERIA CROSS-REACT WITH NORMAL TISSUES INCLUDING HEART, MUSCLE, BRAIN CELLS, AND SYNOVIAL JOINTS.**

What diagnostic tests could help confirm your diagnosis? **POSITIVE THROAT CULTURE FOR B-STREP GROUP A, RISING ANTI-STREPTOLYSIN O TITER (ASO), ELEVATED WBC COUNT, ELEVATED ERYTHROCYTE SEDIMENTATION RATE (ESR) AND C-REACTIVE PROTEIN (ESR AND C-REACTIVE PROTEIN ARE TESTS FOR INFLAMMATION).**

What treatment would you recommend? **ELIMINATE STREP INFECTION WITH PENICILLIN OR ERYTHROMYCIN ANTIBIOTIC THERAPY.** **ANTI-INFLAMMATORYS SUCH AS SALICYLATES ARE USED TO TREAT INFLAMMATION.** **RHEUMATIC DISEASE IS TREATED WITH CARDIAC GLYCOSIDES, CORTICOSTEROIDS, DIURETICS, AND BEDREST.** **SURGICAL REPAIR MAY BE NEEDED TO REPAIR DAMAGED VALVES.**
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2. __l__ Cause of angina b. Aneurysm
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   g. Tricuspid atresia
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10. __g__ Mixing of oxygenated and unoxygenated blood  
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11. __f__ Underdeveloped left heart  
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http://chpweb.weber.edu/hthsci/labpages/