AOHS Health Careers Exploration

Lesson 8

Symptoms and Tests

Teacher Resources

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| Teacher Resource 8.2 | Answer Key: Diagnostic Tests Anticipation Guide |
| Teacher Resource 8.3 | Projectables: Diagnostic Images (separate PowerPoint file) |
| Teacher Resource 8.4 | Answer Key: Diagnostic Images Observation |
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Teacher Resource 8.1

Presentation Notes:   
Diagnostic Tests

Before you show this presentation, use the text accompanying each slide to develop presentation notes. Writing the notes yourself enables you to approach the subject matter in a way that is comfortable to you and engaging for your students. Make this presentation as interactive as possible by stopping frequently to ask questions and encourage class discussion.

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| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide1.JPG  A medical test performed to help diagnose a patient or detect disease or illness is called a diagnostic test. In this presentation, you will learn about the purpose of common diagnostic tests, who performs them, and how they are performed. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide2.JPG  Imagine that on a routine visit to his primary care physician a patient mentions that for several months he has been having increasing problems falling asleep. The patient chalks up his problems to stress at work, but the doctor wants to rule out various sleep disorders. The doctor recommends that the patient see a specialist. The specialist orders an electroencephalogram (EEG) for the patient, which will monitor the patient’s brain waves and give more information about his condition.  An EEG is one type of diagnostic test. Diagnostic tests give physicians more information about what is happening inside a patient’s body. They are tests performed by professionals who have specific training in operating machines and conducting the procedures necessary to do the test.  Diagnostic tests are important to help health care professionals diagnose diseases, but they are also extremely important in early detection and prevention. People in various age groups or with certain medical histories are routinely given diagnostic tests, even if they don’t have any symptoms of being ill. For example, an older man who has heart disease in his family will likely routinely be given diagnostic tests to monitor the health of his heart. Diagnostic tests are also given to confirm that a patient is free from disease. For example, a cancer survivor may be given routine diagnostic tests to confirm that he or she is still cancer free. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide3.JPG  An X-ray is a common diagnostic test. It is used to produce images of the inside of the body and diagnose an array of problems that include dental cavities, arthritis, bone cancer, and lung infections, like pneumonia. X-rays are performed at doctors’ and dentists’ office and at hospitals. In an emergency room, X-rays may be used to determine problems like broken or fractured bones or swallowed objects.  An X-ray is a fast, safe, and painless procedure. A small burst, or ray, of radiation passes through the body and records an image of a body part on film or a specialized plate. A radiologic technologist performs an X-ray. First, the technologist will position the body appropriately. Then he or she will make sure that the X-ray equipment is at the correct height and angle. The technologist will protect the patient from unnecessary radiation exposure by using a special shield. After the image is taken, the technologist will make sure that the image develops properly, and he or she will deliver it to a radiologist. The radiologist will interpret the results and given them to the patient’s doctor. The doctor will deliver the results to the patient. In an emergency room, the results of an X-ray can be obtained in just a few minutes. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide4.JPG  Like X-rays, computerized tomography scans, which are also called CT or CAT scans, take images of the inside of the body. But unlike X-rays, CT scans take many X-rays from different angles. A CT scan creates a cross-sectional image of the inside of the body.  CT scans are often compared to a loaf of bread. A physician can look at one slice, or part of the image, or he or she can put them together to create a 3-D image of the patient’s body. In this way, CT scans give much more information than X-rays. CT scans are frequently used to look for internal injuries after a car accident, to identify the location of a tumor or blood clot, or to detect signs of cancer and heart disease. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide5.JPG  The red lines in the top row of images show the angle at which each cross section image was taken. The bottom row shows what the actual image of each slice looks like.  Images courtesy of <http://www.med-ed.virginia.edu/courses/rad/headct/>. The images are included under fair-use guidelines of Title 17, US Code. Copyrights belong to respective owners. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide6.JPG  Like X-rays, CT scans are painless procedures. They are usually performed in a hospital or an outpatient facility. A CT technologist performs the procedure using a CT scanner. The technologist positions the patient on a narrow table. Sometimes the technologist uses straps or pillows to help the patient stay in the proper position. For the scan to be effective, the patient must stay still. Then the table slides into the large hole of the scanner, which is often described as an upright doughnut hole. Inside the machine, X-ray tubes rotate around the patient’s body. These tubes take various images. During the procedure, the technologist is in another room viewing the images on a monitor. The patient inside the machine is able to communicate with the technologist through an intercom.  After the images are taken, a radiologist will interpret the results and submit them to a physician. Then the physician will deliver the results to the patient. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide7.JPG  Like a CT scan, magnetic resonance imaging, or MRI, creates detailed images of organs and tissues, but an MRI machine doesn’t use X-rays. An MRI machine is a huge, tube-shaped magnet. It uses magnetic fields and radio waves to create high-resolution, cross-sectional 3-D images. It is used to diagnose a number of problems including spinal cord injuries, multiple sclerosis, stroke, damage caused by a heart attack, plaque in the blood vessels, and tumors on internal organs like the uterus, prostate, liver, and spleen.  An MRI is suited for examining soft tissue such as ligament and tendon injury, spinal cord injury, and brain tumors, while a CT scan is better suited for bone injuries, lung and chest imaging, and detecting cancers. CT scans are widely used in emergency rooms because the procedure takes less than 5 minutes. An MRI can take 30 minutes or more, and it costs more than a CT scan.  An MRI technologist performs the procedure. The MRI technologist has a patient lie on a table, which slides into the MRI machine, a tunnel that is open on both ends. During the procedure, the technologist monitors the images from another room. The procedure usually takes less than an hour. The procedure is painless, but the patient must stay still during the procedure. If the technologist is creating images of the patient’s brain, the patient may be asked to do simple actions inside the MRI machine, like tap his or her fingers or speak. As for other imaging tests, a radiologist will analyze the images and give the analysis to the patient’s physician, and the physician will deliver the results to the patient. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide8.JPG  A fetal ultrasound, or a sonogram, uses high-frequency sound waves to create an image of a baby in a woman’s uterus. These images are used by the woman’s physician to evaluate the baby’s growth and development and to track the progress of the pregnancy. The ultrasound can be performed at any point during the pregnancy. It is used for a variety of reasons, including to confirm a pregnancy, to determine the baby’s gestational age, to confirm the number of babies, to evaluate the heart rate and breathing of the baby, and to determine the position of the baby before delivery.  An ultrasound is also used for other diagnostic purposes, such as to scan the gallbladder, liver, or lymph nodes. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide9.JPG  A sonographer performs the fetal ultrasound. First, the sonographer explains the procedure to the pregnant woman and asks her to lie down on the exam table. The procedure is not painful. Then the sonographer applies a special gel to the woman’s abdomen. The sonographer moves a transducer, a small device that sends out sound waves, across the abdomen. The sound waves are converted into a gray image of the baby on the monitor. Both the patient and the sonographer can see the images. The sonographer will likely point out to the woman the different parts of the baby, as they may be hard to decipher. Depending on the stage of development, the woman may be able to see her baby’s face, hands, and even fingers. The sonographer stores and prints the images. He or she may take measurements of the baby based on the images. The sonographer delivers the images to the woman’s physician, who will give the woman the results. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide10.JPG  A mammogram is an X-ray image of a breast. It is used to detect tumors and other abnormalities in the breast. There are two main types of mammography: screening mammography and diagnostic mammography. Screening mammography is used for early breast cancer detection. It is used for patients who have no signs or symptoms of breast cancer. The frequency at which women receive screening mammograms is determined by their age and their risk factors for breast cancer. Diagnostic mammography is used to investigate suspicious changes in the breast, such as lumps or pain.  A mammographer performs the procedure. The mammographer explains the procedure and then helps position the patient, who will stand up at the mammography machine. During a mammogram, the patient’s breasts are compressed between two firm surfaces. The patient must stay still. An X-ray captures an image of the breast. The procedure can be uncomfortable or briefly painful, but it is not harmful. The mammographer will check the quality of the images and retake them if they are not clear. The procedure usually takes less than 30 minutes. A physician will deliver the results of the test to the patient. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide11.JPG  Osteoporosis is a disease that causes bones to become fragile and more likely to break. In the past, osteoporosis could only be detected after a patient broke a bone and the bones were already weak. But now bone density scans make it possible to know how at risk the patient is for the condition.  The bone density scan, or bone densitometry, uses X-ray technology to measure the thickness and strength of bones. The X-rays measure the amount of calcium and other minerals that are in a segment of a bone, usually the spine, hip, or forearm. A patient with strong bones will have a high mineral content.  The procedure is fast and painless. It is performed by a technician who is trained in bone density scans. The technician positions the patient on a padded platform. As with other diagnostic imaging tests, the patient must stay still. A mechanical arm, or detector, passes over the patient’s body, generating images on a computer monitor. A radiologist interprets the images, and then a physician delivers the results to the patient. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide12.JPG  An electrocardiogram, or ECG or EKG, is used to monitor the heart. It records the electrical impulses generated by cells in the upper-right chambers of the heart. Physicians use the reports created by an ECG to diagnose heart conditions, including irregularities in heart rhythm, problems with the heart valves, blocked arteries in the heart, or a heart attack. An ECG is a painless test. It is typically done in the doctor’s office or in the hospital. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide13.JPG  An ECG is performed by an ECG technician. First, the technician asks the patient to lie on the exam table. Then he or she uses a gel to attach 12 to 15 electrodes (small, flat metal discs) to the patient’s arms, legs, and chest. The technician may shave parts of the body where the electrodes will be placed. It’s important that the patient is warm and comfortable, because moving or shivering will interfere with the test. The technician monitors the heart’s activity on the screen for a few minutes, then she generates a report that will be analyzed by the patient’s physician. The physician looks for a consistent heart rhythm. The physician also looks for a heart rate that is between 50 and 100 beats per minute. If there are abnormalities, the physician will use the information to try to diagnose the problem. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide14.JPG  An electroencephalogram, or EEG, detects the electrical activity in the brain. It is one of the main diagnostic tests for epilepsy and other disorders such as inflammation of the brain, sleep disorders, brain tumors, memory impairment, and stroke. It can also be used to confirm brain death in a patient who is in a persistent coma.  An EEG is a painless procedure performed by an EEG technician. First, the technician marks the patient’s scalp. These marks indicate where the electrodes will be attached. Then the technician scrubs the spots. The technician attaches the electrodes to the scalp using a special adhesive. Wires attached to the electrodes are connected to an instrument that records the patient’s brain waves on a small computer. The patient is asked to relax during the test, which typically takes 30 to 60 minutes. Depending on what is being measured, the technician may ask the patient to do small tasks during the test, such as breathe deeply or look at a picture. After the test, the technician removes the electrodes and delivers the reports to the physician, who reviews them and then delivers the results to the patient. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide15.JPG  Physicians order blood tests for a number of reasons, ranging from confirming a pregnancy or a disease, like HIV, to checking how the body is responding to a type of medication.  A phlebotomist performs blood tests. First, the phlebotomist asks the patient to be seated in a comfortable position and expose the inside of the elbow. The vein in the inside of the elbow is used most frequently for blood sampling. Then the phlebotomist places a tourniquet, or a tight band, around the patient’s upper arm, making the vein fill with blood. The phlebotomist cleans the skin over the vein using an antiseptic wipe and then inserts a needle into the vein. A syringe is connected to the needle. The phlebotomist takes the required amount of blood and then removes the needle. The phlebotomist applies a piece of cotton to the area where the needle was inserted to stop the bleeding. Finally, he or she applies labels to the containers of blood, which is then analyzed in a lab. The results are sent to the patient’s physician, and the physician delivers the results to the patient. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide16.JPG  A physician uses a skin biopsy to diagnose certain skin conditions and diseases, including skin cancers, skin infections, blistering skin disorders, or skin tags, which are a benign tumor or growth. A skin biopsy removes cells or skin samples from the surface of the body.  Physicians perform skin biopsies. First, depending on the location of the biopsy, a physician may ask the patient to undress and change into a clean gown. Then the area of the skin that will be biopsied is marked. The physician applies a local anesthetic to numb the area so that the patient doesn’t feel pain during the biopsy.  There are different types of biopsy procedures. For the simplest procedure, the shave biopsy, the physician uses a sharp tool, double-edged razor, or scalpel to cut a sample of the skin. Then the physician applies pressure to stop the bleeding and topical medication and a bandage. Next, he or she gives the patient instructions on how to keep the area clean. All biopsies will likely cause scarring, but some scars will eventually fade. The physician sends the sample to the lab. Depending on the test, the results could take weeks or days. When the results are complete, the physician delivers them to the patient. |  |
| C:\Users\Mika\Documents\Pearson\2015\June\1\HealthCareers_Lesson8_Presentation_ROOT_052915\Slide17.JPG  Diagnostic tests help physicians diagnose diseases and aid in early detection and prevention. The tests also confirm that a patient is free from disease. The technicians and technologists who perform diagnostic tests play an important role in caring for the patient. |  |

Teacher Resource 8.2

Answer Key: Diagnostic Tests Anticipation Guide

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| There is one type of imaging that is the best way to produce an image of the inside of the body. | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: | There are several diagnostic tests that give more information about the inside of the body. Some of these tests are CT scans, MRIs, and X-rays. Each test is performed in a different way and is used for different purposes. |
| To get a proper magnetic resonance image, the patient has to lie perfectly still in a full-body-size magnet. | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: | Magnetic resonance imaging, or MRI, creates detailed images of organs and tissues. An MRI machine is a huge, tube-shaped magnet. An MRI technologist has a patient lie on a table, which slides into the MRI machine, a tunnel that is open on both ends. During the procedure, the technologist monitors the images from another room. The procedure is painless, but the patient must stay still during the procedure. |
| The best way to create an image of a baby before birth is using sound waves. | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: | A fetal ultrasound, or a sonogram, uses high-frequency sound waves to create an image of a baby in a woman’s uterus. These images are used by the woman’s physician to evaluate the baby’s growth and development and to track the progress of the pregnancy. |
| The mammogram image test is only for women. | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: | A mammogram image test is used more frequently with women, but it is not only for women. A mammogram is an X-ray image of a breast. It is used to detect tumors and other abnormalities in the breast. There are two main types of mammography: screening mammography and diagnostic mammography. Screening mammography is used for early breast cancer detection. Diagnostic mammography is used to investigate suspicious changes in the breast, such as lumps or pain. |
| The bone density scan causes osteoporosis. | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: | A bone density scan makes it possible to know how at risk patients are for developing osteoporosis. Osteoporosis is a disease that causes bones to become fragile and more likely to break. In the past, osteoporosis could only be detected after a patient broke a bone and the bones were already weak. The bone density scan, or bone densitometry, uses X-ray technology to measure the thickness and strength of bones. |
| An electrocardiogram measures activities of the brain. | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: | An electrocardiogram, or ECG or EKG, is used to monitor the heart. Physicians use the reports created by an ECG to diagnose heart conditions, including irregularities in heart rhythm, problems with the heart valves, blocked arteries in the heart, or a heart attack.  An electroencephalogram, or EEG, detects the electrical activity in the brain. It is one of the main diagnostic tests for epilepsy and other disorders such as inflammation of the brain, sleep disorders, brain tumors, memory impairment, and stroke. |
| Every skin biopsy includes removing a sample of human tissue and examining it. | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: | A skin biopsy removes cells or skin samples from the surface of the body. A physician examines a skin biopsy and uses it to diagnose certain skin conditions and diseases, including skin cancers, skin infections, blistering skin disorders, or skin tags, which are a benign tumor or growth. |

Teacher Resource 8.4

Answer Key: Diagnostic Images Observation

The text in the Observations column provides the answer to the question on the slide.

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| Image | Observations |
| C:\Users\cynth\Contacts\Documents\Pearson Foundation\Health Careers\Health Careers Post Versions\Lesson 7 - CMS and Fotolia images\801-5300.jpg | This image shows a pregnant woman’s uterus. The uterus is in the midsection of a woman’s body. The image depicts three oval-shaped sacs inside the uterus. Inside each of the oval-shaped sacs is a fetus, or a developing, unborn baby.  The image is a colored 3-D ultrasound scan of triplet fetuses, or three fetuses. A 3-D scan shows more details than a conventional scan. A sonographer took this image.  One common use of ultrasounds is to determine how many babies a pregnant woman is carrying. Triplets are very rare; they occur in about 1 in 8,000 pregnancies. |
| C:\Users\cynth\Contacts\Documents\Pearson Foundation\Health Careers\Health Careers Post Versions\Lesson 7 - CMS and Fotolia images\801-5306.jpg | This fetal ultrasound shows twin fetuses. A fetus is a developing, unborn baby. A sonographer took this image. At the time the image was taken, the fetuses were about 20 weeks old. At this stage of the pregnancy, the fetuses do not look like fully developed babies. One way to make sense of the image is to first locate the heads of the fetuses. One head is at the center left, and one is at the right. |
| C:\Users\cynth\Contacts\Documents\Pearson Foundation\Health Careers\Health Careers Post Versions\Lesson 7 - CMS and Fotolia images\801-5302.jpg | This 3-D ultrasound scan shows quadruplet fetuses, or four fetuses. They are 12 weeks old. On the far right, one fetus is clearly visible. It appears as if the fetus is lying on its side. The head is toward the top of the image. Its torso and leg are visible. The arm can also be seen, bent toward the head. The other three fetuses are arranged from top to bottom on the left. It is harder to make out the individual body parts of these fetuses.  It is very rare for a woman to become pregnant with quadruplets. This woman received fertility treatment, which assisted in her getting pregnant. Quadruplets are more common in women who receive fertility treatment. |
| C:\Users\cynth\Contacts\Documents\Pearson Foundation\Health Careers\Health Careers Post Versions\Lesson 7 - CMS and Fotolia images\801-5303.jpg | This colored 3-D ultrasound scan shows twin fetuses. To locate the fetuses, first look for two oval-shaped sacs. The fetuses are in the sacs. One fetus is toward the top of the image. The head is oriented toward the right. The other fetus is below it. Its head is oriented toward the top. |
| C:\Users\cynth\Contacts\Documents\Pearson Foundation\Health Careers\Health Careers Post Versions\Lesson 7 - CMS and Fotolia images\380-204.jpg | This MRI shows the brain of a 60-year-old male. The brain is healthy. The tissue, which is the light gray part of the image, is normal. Remember, an MRI machine uses magnetic fields and radio waves to create images of the inside of the body. |

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| C:\Users\cynth\Contacts\Documents\Pearson Foundation\Health Careers\Health Careers Post Versions\Lesson 7 - CMS and Fotolia images\801-5462.jpg | These MRI scans show images of the brain of a 76-year-old patient with dementia. The symptoms of dementia vary, but they include confusion and memory loss. There is no cure for dementia, and the cause is unknown. The brain of the patient has atrophied, or shrunk. Also, the fluid-filled spaces at the center of the brain have become larger. |
| C:\Users\cynth\Contacts\Documents\Pearson Foundation\Health Careers\Health Careers Post Versions\Lesson 7 - CMS and Fotolia images\801-5016.jpg | This series of CT scans show the brain of a 74-year-old patient with Alzheimer's disease, which causes a decrease in brain size and enlarged ventricle cavities, the dark regions at the center of the brain. The front of the skull is at the top of the scan. There is no cure for Alzheimer’s, and the cause is unknown. |
| C:\Users\cynth\Contacts\Documents\Pearson Foundation\Health Careers\Health Careers Post Versions\Lesson 7 - CMS and Fotolia images\380-156.jpg | This X-ray image shows the healthy chest of a 30-year-old male. The image shows the ribs, collarbones, and the spine. The size and the shape of the chest wall are normal. The main structures of the chest are also normal. The dark part of the chest represents lungs filled with air. The white parts of the X-ray show solid structures and fluids, like the rib cage and vertebrae. |
| C:\Users\cynth\Contacts\Documents\Pearson Foundation\Health Careers\Health Careers Post Versions\Lesson 7 - CMS and Fotolia images\387-1012.jpg | This is an X-ray image of the chest. However, unlike in the previous image, this patient is not healthy. The patient is a 71-year-old smoker who has lung cancer in the left lung. The image shows a white mass. The mass is on the right, toward the middle. |
| C:\Users\cynth\Contacts\Documents\Pearson Foundation\Health Careers\Health Careers Post Versions\Lesson 7 - CMS and Fotolia images\710-231.jpg | This image shows the normal bones of the hand, wrist, and arm. Notice how the bones are aligned. |
| C:\Users\cynth\Contacts\Documents\Pearson Foundation\Health Careers\Health Careers Post Versions\Lesson 7 - CMS and Fotolia images\380-145.jpg | This is an X-ray. It shows the wrist of a 57-year-old woman. The wrist is fractured. The woman injured it while playing tennis. Here the bones are not aligned. The fracture is visible from the position of the bones. On the left side, the bone seems to stick out to the side. |
| C:\Users\cynth\Contacts\Documents\Pearson Foundation\Health Careers\Health Careers Post Versions\Lesson 7 - CMS and Fotolia images\387-1048.jpg | This is an X-ray of the hand of an 8-year-old girl. She fractured the proximal phalanx of her fifth finger at the base. The bones of the finger are not aligned. The red part of the image shows where the fracture occurred. |

Teacher Resource 8.5

Answer Key: Reading Blood Test Results

Below is a patient’s blood lab report. Students answer the questions below the report.

**Greenstone Labs**

**Physician:** Yee, Janet, M.D.

**Patient:** Hart, Gregory K.

**DOB:** 12/2/51

**Sex:** M

**Patient ID:** 34569JT21

**Collection Date:** 3/8/11

**Collection Time:** 1345

**Fasting:** N

**Renal panel**

Results Reference Range

Bun/creat ratio 24.2 10.0–28.0

Sodium 143 135–145

Potassium 5.4 3.5–5.2

Chloride 105 96–110

Carbon dioxide 27 19–31

Albumin 4.1 3.3–4.9

Calcium 9.5 8.3–10.4

Phosphorus 3.6 2.5–4.5

1. What is the patient’s first name? Gregory
2. What is the doctor’s last name? Yee
3. DOB stands for “date of birth.” How old is the patient? Answers will vary depending on current year.
4. Is the patient a man or a woman? man
5. The collection date says when the blood was drawn. What month was the blood drawn?

March

1. Sometimes patients are required to fast, or not eat, before they have blood drawn. Did this patient have to fast?

No

1. This test is called a renal panel. A doctor uses this test to assess how a patient’s kidneys are functioning and to see if the patient is at risk for kidney disease. A renal panel tests different components in the patient’s blood, like chloride and sodium. What are two other components that are tested?

Answers will vary.

1. The results are shown in the results column. What was the result for phosphorus?

3.6

1. On a blood test, doctors look for results that fall outside of the normal reference range. For example, this patient’s results show 143 for sodium, and the reference range for sodium is 135–145. The patient’s results are within the normal reference range. Did the result for carbon dioxide fall in the normal reference range for this patient?

yes

1. Did the result for potassium fall in the normal reference range for this patient?

no

1. Based on this blood test, do you think the doctor thinks that the patient is at risk for kidney disease? Explain your answer.

We do not think that the patient is at risk for kidney disease. The patient’s results all fell in the normal reference range except for potassium.

Teacher Resource 8.6

Guide: Preparing for a Guest Speaker

Arrange for a radiologist, pathologist, or diagnostic technician (if possible, a member of your academy’s advisory board) to speak to the class. If it is not possible for the health care professional to visit the class, you can arrange for a teleconference using Google video chat, Skype, or other similar technology.

Before the activity, explain to the speaker that during the classroom visit you will ask him or her to provide a 15-minute overview of his or her work, and then students will have the opportunity to ask questions. Ask the speaker to prepare to address the following topics during the overview:

* Important roles and responsibilities of people in this profession
* Special skills required for people in this profession
* How he or she got into the field, including education and other jobs held
* Specific challenges of the job
* What the work environment and typical work day are like
* Types of interactions the speaker has with patients and other professionals
* Technology or machines typically used to perform the job

Teacher Resource 8.7

Quiz: Diagnostics

Directions: Answer the following questions in complete sentences.

1. Explain what a diagnostic test is.
2. Explain the difference between a radiologist and a radiologic technician.
3. Explain the difference between an ECG and an EEG.
4. Describe what a CT scanner looks like and how it works.
5. Who performs a fetal ultrasound and what are two reasons why it is performed?
6. Briefly describe the main steps a phlebotomist takes to draw a blood sample.
7. What is one way that an MRI and a CT scan are different?
8. What does a bone density scan test for?
9. What is the purpose of a mammogram?
10. Choose one diagnostic career and give the following information:

Education required:

Average salary:

Main duties:

Teacher Resource 8.8

Answer Key: Diagnostics Quiz

1. Explain what a diagnostic test is.

A diagnostic test provides information about the inside of the body. It helps physicians diagnose diseases and injuries, and it aids in early detection and prevention.

1. Explain the difference between a radiologist and a radiologic technician.

A radiologic technician performs diagnostic tests like X-rays and CT scans. A radiologist is a physician who analyzes the results.

1. Explain the difference between an ECG and an EEG.

An ECG monitors the heart and is used to diagnose heart conditions, while an EEG is used to diagnose brain disorders.

1. Describe what a CT scanner looks like and how it works.

The CT scanner is a large machine that looks like an upside-down donut. The patient lies on a table that slides into the scanner. The patient must stay very still. X-ray tubes rotate inside and take images.

1. Who performs a fetal ultrasound and what are two reasons why it is performed?

A sonographer performs a fetal ultrasound. Two reasons it is performed are to determine the position of the baby and to evaluate the baby’s heart rate.

1. Briefly describe the main steps a phlebotomist takes to draw a blood sample.

Identify a vein. Apply a tourniquet. Clean the skin. Insert the needle and extract blood. Remove the needle. Label the blood and send it to the lab.

1. What is one way that an MRI and a CT scan are different?

An MRI uses magnetic technology and a CT scan uses X-ray technology.

1. What does a bone density scan test for?

A bone density scan tests for the mineral content in bones. It tests how strong bones are.

1. What is the purpose of a mammogram?   
     
   A mammogram is used to detect breast cancer.
2. Choose one diagnostic career and give the following information: education required, average salary, main duties   
     
   (Answers will vary.)

Teacher Resource 8.9

Key Vocabulary: Symptoms and Tests

| Term | Definition |
| --- | --- |
| bone density scan | A diagnostic test that uses X-ray technology to determine the strength of bones and diagnose osteoporosis. |
| CT scan (computed tomography scan) | A diagnostic test that uses many X-rays to create a 3-D cross-sectional image of the inside of the body; performed by a CT technologist with a CT scanner. |
| diagnostic test | A test that is important in helping health care professionals diagnose diseases and aid in early detection and prevention; performed by professionals who have special training in operating the machines and conducting the procedures necessary to do the test. |
| ECG (electrocardiogram) | A diagnostic test used to monitor the heart; performed by an ECG technician. |
| EEG (electroencephalogram) | A diagnostic test used to diagnose epilepsy and other brain disorders; performed by an EEG technician. |
| electrodes | Small flat metal discs that have special adhesive to attach to the patient’s arms, legs, and chest (during an ECG) or to the patient’s head (during an EEG). |
| fetal ultrasound | A diagnostic test that uses high-frequency sound waves to create an image of a baby in the uterus; performed by a sonographer. |
| mammogram | A diagnostic test used to diagnose breast cancer; performed by a mammographer. |
| MRI (magnetic resonance imaging) | A diagnostic test that uses magnetic fields and radio waves to create 3-D images of the inside of the body; performed by an MRI technologist. |
| osteoporosis | A disease that causes fragile bones. |
| pathologist | A physician who specializes in understanding the ways that diseases and illnesses develop. Pathologists examine tissue samples, check the accuracy of lab tests, and interpret the results in order to facilitate the patient’s diagnosis and treatment. |
| PET scan (positron emission tomography scan) | A diagnostic test that takes images of the inside of the body to see how a patient’s tissues and organs are functioning; performed by a PET technologist. |
| phlebotomist | A health care professional who performs blood tests. |
| pneumonia | An infection of the lungs. |
| radiologist | A physician who specializes in interpreting diagnostic tests. |
| skin biopsy | A diagnostic test in which a skin sample is removed from the patient and tested to diagnose various skin conditions, such as skin cancer. |
| sonographer | A diagnostic technician who performs an ultrasound. |
| tourniquet | A tight band used by phlebotomists when drawing blood. |
| transducer | An instrument used by a sonographer to perform an ultrasound. |
| X-ray | A common diagnostic test that uses radiation to produce images of the inside of the body and diagnose an array of problems that include cavities, arthritis, bone cancer, and pneumonia; performed by a radiologic technologist or technician. |

Teacher Resource 8.10

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The following sources were used in the preparation of this lesson and may be useful for your reference or as classroom resources. We check and update the URLs annually to ensure that they continue to be useful.

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