Chapter 25

Skin, Muscles and Bone

Day One:

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Collect the materials you will need for days two and three

National Science Education Standards covered this week:

Skin is the largest organ in the human body which acts to protect a system of muscles, bones and other organs.

Muscles contract to allow movement to exist in our bones through a connective tissue called tendons. The bones themselves are connected together with the help of other tissues known as ligaments. In areas of movement, a layer of cartilage exists between the bones in order to keep them from grinding together.

Definitions

Organs	parts of the body that have special jobs to do
Skin	the largest organ of the human body
Epidermis	"eh-pih-dur-miss"; the outer layer of skin cells that can be seen outside of your body
Muscle	an organ that helps you to move everything in your body
Skeletal muscles	muscles which stretch to allow your bones to move
Tendons	groups of cells that attach your skeletal muscles to your bones
Ligaments	bands of cells that connect your bones together
Cartilage	a "cushion" of cells between your bones to keep them from rubbing together
Contract	"to shorten"

Sample questions to ask your child after completing the weekly reading.

How is your skin like a sandwich baggie?

It is a bendable container that does not allow too many fluids to enter/exit and can be resealed if it becomes opened.

If you are always growing new skin cells, why don't you have a really thick layer of skin?

Your body produces new layers of skin cells inside your body. The layers we see on the outside of our body are constantly being scraped off.

Why are muscles always found in pairs?

Muscles can only pull. So when a muscle is pulling in one direction, its partner can pull back in the opposite direction.

Answers to worksheet questions:

Page 1:

Across

1. skeletal
3. skin
6. organs
7. epidermis
8. cartilage

Down:

2. tendons
4. ligaments
5. muscle
8. contract

Page 2:

9 - organs
1 - skin
6 - epidermis
5 - muscle
7 - skeletal muscles

3 - tendons
2 - ligaments
4 - cartilage
8 – contract

Page 3:

1. A
2. A
3. A
4. B
5. B
6. C

Day Two:

Today, you and your child will:

1. Review Day One using the following text
2. Run the first activity this week

The following text will give you the most important items to review for your activity today.

Skeletal muscles allow your bones to move due to connective tissue called tendons which attach muscle to bone.

When a muscle contracts, it shortens, which causes movement in our bones.

Muscles can only pull. They cannot push.

Modeling the arm

Objective:

Children will create a model of the arm and make prediction on its movement.

Materials:

two plastic rulers (the ones with all of the holes in them...you can use paint stirrers as well, if you drill holes into them.)
tape measure or another ruler
one paper clip
two feet of string
one metal brad
clear tape

Procedure:

Hold the rulers with the smooth sides together. Fasten them together with the brad through the end holes of both rulers.
Open the paper clip to make a hook. Tie one end of the string to one end of the clip.
Make an "l" shape with the two rulers. Hook the paperclip onto the end hole of the horizontal ruler that is farthest away from the joint.
Thread the other end of the string through the top end hole of the vertical ruler. You now have a model for the arm.
Place the model arm on a table. Slowly pull two inches of string through the end hole in the vertical ruler. This will raise the lower arm off of the table. Measure and record the distance between the tip of the bottom ruler and the table.
Move the paperclip hook to the center hole. Ask the child if they predict the arm will move a greater distance, a lesser distance or remain the same with the hook in this position. Again pull two inches through the end hole in the top ruler and record the distance the arm moves off of the table.
Move the paperclip hook to the hole that is closest to the joint. Ask the child for the same prediction, pull the string two inches and record the movement of the arm once again.

Explanation:

The horizontal and vertical rulers represent the lower and upper arm respectively. The paperclip acts like a tendon, connecting muscle to bone and the string acts like muscle, which moves the bones.

The child should see that by moving the hook on their arm model, they can move the bottom ruler different distances. As the hook was moved closer to the joint, they were able to move the lower arm the greatest distance. This is very important because this last trial is very similar to how our muscles and tendons cause our arms to move. The location of our muscles gives our bodies the ability to make very large motions in our bones with a very small amount of muscle contraction (when a muscle contracts, it shortens...which is similar to pulling on the string.) Remember, muscles can only pull, they cannot push.

Modeling the arm: Data chart

Ruler position	Distance the ruler is raised from the table
Position One: Farthest hole from the joint	
Position Two: Middle hole	
Position Three: Closest hole to the joint	

Day Three: Lab Activity

Today, you and your child will:

1. Review Day One using the following text
2. Run the first activity this week

The following text will give you the most important items to review for your activity today.

The size of the muscle is directly proportional to the amount of movement that muscle performs.

The larger the muscle, the greater the amount of movement it can perform. Therefore, you should notice a longer reaction time with a larger muscle (like a leg) than with a smaller muscle (like those found in a hand.)

ESP Activity: Worn Out

Objectives:

Does muscle size affect its stamina?

Materials:

measuring tape
clock with second hand

Procedure:

Measure the circumference of the wrist with a measuring tape.
Record the time it takes to open and close your hand 50 times (making sure to open your hand completely and close it tightly to make a fist each time.)
Increase the size of the muscle for experimentation. For example:

Circumference of bicep (straighten and bend elbow)
Circumference of the thigh (straighten and bend the knee)

Explanation:

The size of the muscle is directly proportional to the amount of movement that muscle performs. Smaller muscles undergo a shorter amount of movement than larger muscles, therefore they take a shorter amount of time to go through all 50 repetitions.

Independent Variable: Circumference of the muscle
Dependent Variable: Length of time to complete 50 repetitions
Hypothesis:

If the circumference of the muscle is (increased/decreased), then the length of time to complete 50 repetitions will (increase/decrease).