Background: Skeletal muscle is the most abundant tissue in the body of healthy adults, comprising anywhere from about 30 to 50% of total body mass. The amount of muscle mass varies due to age, sex, and physical activity. For example, adolescent males have a dramatic increase in the amount of muscle mass because of rising levels of testosterone, which targets skeletal muscle cells and causes them to hypertrophy (grow). In contrast, both men and women lose muscle mass in old age, whereas relative proportions of body fat increase. At every stage of life, females have more body fat than males and correspondingly less muscle relative to body mass. Movement occurs when muscle cells (fibers) shorten, or contract. At the molecular level, the motor proteins myosin and actin interact to pull the ends of cells closer together. A whole muscle, such as the bicep, is comprised of millions of cells that work together to pull on connective tissue and bone and produce movement at joints.

Activity 1: Chicken Wings and Muscle Structure
Chicken wings are homologous to the upper limb of humans; that is, they have many of the same structures due to their shared evolutionary history as vertebrates.
CAUTION: Raw chicken may be contaminated by Salmonella. Keep your hands away from your face and mouth throughout this investigation. Wash your hands and wipe the desks after the dissection.

1. Examine the chicken skeleton and human skeleton and identify the humerus, ulna, radius, and wrist (carpal), hand (metacarpal) and finger bones (phalanges) on each.

2. Use scissors to cut the skin lengthwise to the joint between the upper wing and lower wing. Carefully peel the skin from the wing.

Examine the fat under the skin.

What is the layer between the skin and muscle called? **Epidermis**

What is its function? **Keeps the body warm and to store energy**

Which joint in your body corresponds to this joint in the chicken wing? **Elbow**

3. Remove the skin of the lower wing in the same way that you removed the skin from the upper wing. Leave the skin on the wing tip. Use scalpel and scissors to carefully remove the skin from the joint between the upper and lower wing. Be careful not to cut any tendons or ligaments. How will you recognize tendons and ligaments?

What is a tendon? **Connects muscle to bone**

What is a ligament? **Connects bone to bone**

4. Observe the thin, transparent, shiny layer covering the muscles. This is the deep fascia, or epimysium, which surrounds an entire muscle and separates it from its neighbors. The epimysium consists mostly of strong collagenous fibers, which support the skeletal muscle tissue. This thin but strong packaging enables the muscles to carry out their specific intended action both in isolation and in concert with other muscles. Record your notes and observations below:

This shiny layer covers the muscles and separates muscle from the fatty layer.
5. Carefully insert the tip of the scissors under the thin connective tissue and remove some of the connective tissue to expose the skeletal muscle tissue underneath. Use a toothpick or dissecting needle to separate the muscles. Observe how the muscles are arranged in pairs on opposite sides of the bones.

Locate the flexors and extensors of the elbow joint. These would be the anterior and posterior muscle groups attached to the humerus.

When muscles such as these act in opposition to one another, they are called ______________.
Contracting and relaxing.

Clean Up!
Place the chicken wing and the protective gloves in a plastic bag for disposal and wash hands thoroughly with soap and water. Carefully clean work area with disinfectant spray.

Post-Lab Questions
1. What structures of the chicken wing and human upper limb are homologous? Explain why they are homologous.

Our structure are homologous because we both have biceps and triceps.
2. List five specific tissues that you examined in the chicken wing. Where are they located?

Fatty tissues that are found below the skin, connective tissue found in between muscles and bones, skin tissue found on top of the fatty tissue, skeletal muscle tissue found along the muscle tissue, deep fascia along the muscle tissue.

3. What is the role of blood vessels and nerves in skeletal muscle function?

Nerves send messages to other bones and blood vessels send oxygen to different places in the body.

Activity 2: Muscles and Movement

Muscles produce movement by crossing joints. Briefly define and demonstrate the following movements with reference to the human skeleton.

Flexion: The action of moving limbs

Extension: To return to original state

Abduction: To move away from the central axis of the body

Circumduction: Circular movement of the limb

Pronation: Rolling an ankle

Supination: To rotate or turn

Plantarflexion: The extension of the ankle moving the foot away from the body.

Dorsiflexion: The act of bending backwards
Using the list below, match the movement with the term that best describes the action.

A. Extension  
B. Rotation  
C. Flexion  
D. Abduction

1. Starting with your head on your chest, raise your head to look straight ahead.

2. Cross your arms in front of your chest.

3. Sitting with your arms at your side and shoulders facing the table, reach for your textbook on the table.

4. Placing your arm our straight, alternate the “thumbs up, thumbs down” position.

Do the following activities and list at least 3 major muscles involved in each.

1. Walking: Groin, gluts, quads

2. Crunches/Sit-Ups: Obliques, abdominals, Latimus dorsi

3. Push-Ups: Biceps, triceps, pectorals