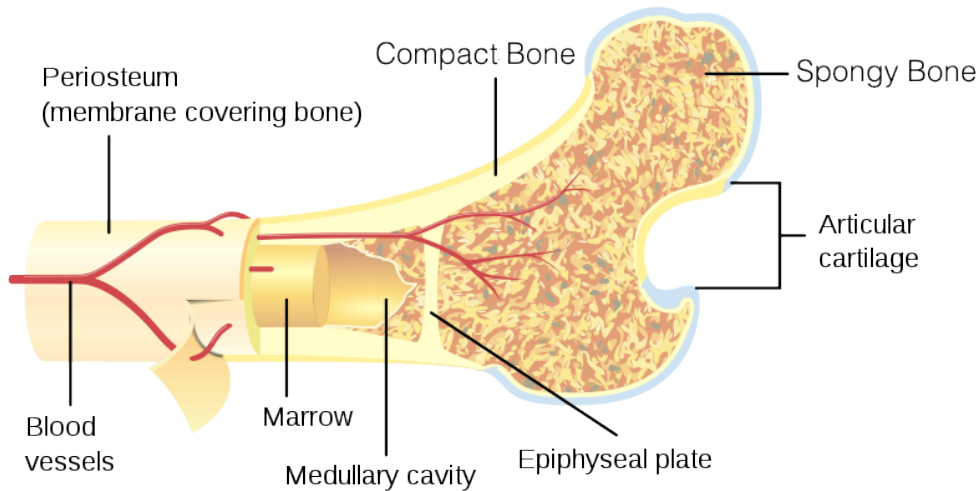


Name: _____ Date: _____

Head, Shoulders, Knees, and X-rays

Have you ever noticed how the most high impact sports, such as football, require the most protection? High impact sports are putting bodies at more risk for injury.

Your body does have some natural protection. This includes fat, which lines the muscle and organs to provide some cushion and shock absorption. Your bones are also built to absorb some shock. Review the image below:



Your bones are made up of compact bone and spongy bone. As you can see, compact bone is the outer layer of bone, and the inner bone is called spongy bone. Though it looks like a sponge, spongy bone is actually not soft and squishy, but it is not hard as compact bones. Spongy bone is where blood vessels and bone marrow are found. Notice that cartilage lines the ends of the bones. Cartilage is primarily responsible for shock absorption between bones. Bones can withstand a lot of pressure; in fact, your femur can withstand 1200 pounds of force per square inch (think of a steel rod!)

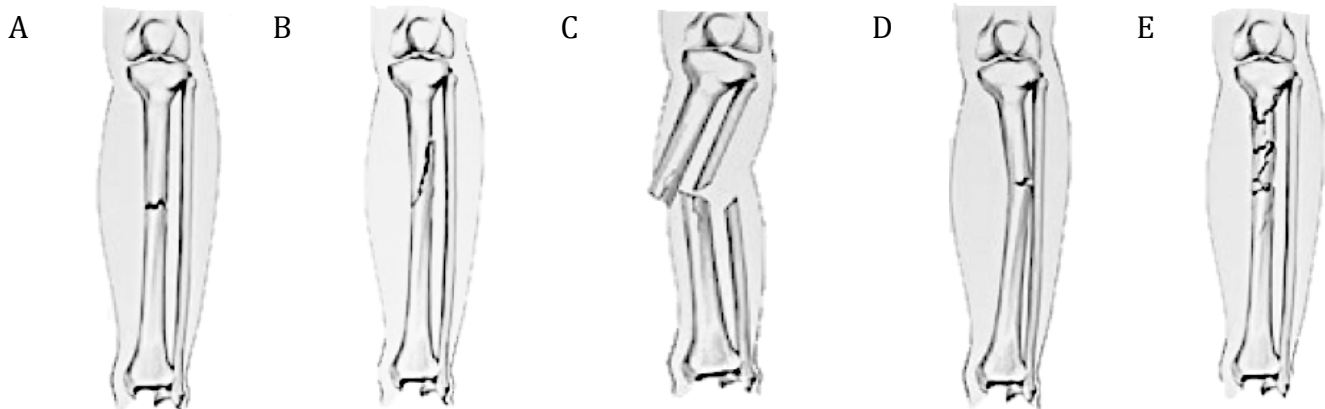
1. How does our body provide natural protection against injury?

2. What is the difference between compact and spongy bone?

Though bones do offer some support, they will crack under pressure. You have heard the term “fracture” before. Many students believe that bones are either fractured or broken- but really, the terms mean the same thing! There are actually many different types of fractures, as listed below:

Type of Fracture	Description
Greenstick	An incomplete fracture where the bone is slightly bent (hence “greenstick” [flexible]; occurs most often in children.
Spiral	A fracture that wraps around the bone in a looped or curved fashion.
Comminuted	A fracture in which the break breaks into several fragments.
Transverse	A bone that occurs at a right angle to the bone’s axis (or in other words it breaks clean across the bone).
Compound	This is a very serious fracture in which the bone breaks in half and separates. This fracture is most at risk breaking through the skin and leading to infection.

3. Use the table below to try to match each picture to the description by labeling pictures A-E as either greenstick, spiral, comminuted, transverse or compound.



Bones are connected to each other with structures called ligaments. For example, your patella (knee cap) is connected to your femur and tibia by three different ligaments: the anterior cruciate ligament (or ACL), the posterior cruciate ligament (PCL) and the medial cruciate ligament (MCL).

A sprain occurs when the ligaments are compromised in some way, either overstretched or torn. There can be mild sprains, and severe sprains. The ACL is a ligament that runs towards the front of the knee between the femur and tibia, and is one of the most common sprains in sports history; it often needs surgery to repair. Most ACL strains can be linked to stopping suddenly, like trying to stop on a dime and cut in another direction, or from hyperextension of the knee, or pivoting in place. Several sports regularly bring sources of stress like this down on the ACL.

Sprains can range from an overstretched ligament, which causes some discomfort, to a partial tear, which can lead to swelling and bruising, or a complete tear in which normally requires surgery.

4. What are ligaments? _____
_____.

5. What is a sprain? _____
_____.

6. Where is the ACL found and why is it a common sprain in sports?

_____.

Tendons are like ligaments, except they connect bones to muscle. Using your dominant hand, look at its palm with your hand outstretched. Looking at your wrist and forearm, wiggle your thumb back and forth. Do you see anything moving down there? That's a tendon! These are known as flexor tendons.

If a tendon is compromised, either pulled or twisted, it can lead to a strain. The muscle itself being twisted or pulled can also cause strains. Contact sports such as soccer, football, hockey, boxing, and wrestling put people at risk for strains. Gymnastics, tennis, rowing, golf, and other sports that require extensive gripping can increase the risk of hand and forearm strains. Just like sprains, strains can range from mild to severe.



One of the most common strains is something called plantar fasciitis. This is a tendon that runs up and down the arch of the foot. Running and sprinting can cause excessive pulling on the plantar fasciitis, straining the tendon. The best way to prevent this is to gently stretch the tendon before athletic activity.

Another common type of strain you may have heard of is “tennis elbow”, which seems to be specific to tennis players. This is the overstressing of the muscles and tendons at the elbow. It is usually caused by poor form, but not always.

7. What is a tendon? _____
_____.

8. What is a strain and what are two causes of strains? _____

_____.

9. What are two examples of common strains in sports??

_____.

10. What is the difference between a sprain and a strain? _____

_____.

Joint swelling may occur after an injury. Broken bones, muscle tears, as well as ligament and tendon tears near a joint can lead to swelling. This is why an ankle may appear to be three times bigger than its normal size after spraining it. Fluid build up and swelling is actually your body trying to help you. Inflammation and swelling make joints stiff, which can help immobilize them and prevent further movement that may cause damage to already injured joints. The surrounding fluids can help create an environment suitable for healing damaged tissue. As the sprain heals, the swelling goes down.

The swelling can also occur to muscle tears. After a workout involving muscles that you normally do not overwork, you will notice that you may be sore for up to a week afterwards! The pain is most uncomfortable about 1-2 days after the workout, and usually alleviates after that. The reason for this muscle soreness is typically due to tearing the delicate muscle fibers, which, as you now know, is known as a strain. Not only can swelling, occur, but bruising, as well!



11. Why do joints sometimes swell after an injury? _____

_____.

12. What causes muscle soreness days after a heavy workout?

_____.

Bruising can also accompany broken points, strains and sprains. If impacted hard enough, the body's delicate soft tissue can be injured. This may cause blood vessels (veins, arteries, and capillaries) under the skin to tear. Don't worry; your body is able to repair the broken blood vessels so that you don't bleed forever. But, some of the red blood cells might seep into the layers of your skin. This is what causes the bluish color of bruises. As the red blood cells are naturally broken down and removed by the body, the bruise changes colors and gradually disappears.

13. What causes a bruise to occur? _____

_____.

14. What causes a bruise to appear bluish in color?

_____.

Graph: Most Common Sports Injuries



Directions: For this particular graph you will be creating a **bar graph using the chart below**. You will need 4 different colors. Look at the chart to determine which colors you will need! Be sure to **label your axes (y axis= percentage of total injuries; x axis= type of injury)**. Please make a key on the graph to indicate **which sport is which color**. Please note that we will not be graphing all the sports injuries that take place in that sport, **only the most common ones throughout 4 different sports**.

Type of Injury	Football (blue)	Baseball (red)	Gymnastics (green)	Basketball (purple)
Fractures	10%	1%	2%	1%
ACL Sprain	5%	6%	10%	15%
Plantar fasciitis strain	20%	15%	6%	12%
Ankle Sprain	25%	20%	20%	20%
Quad Strain	10%	20%	10%	19%
Hamstring Pull (Strain)	15%	22%	12%	18%
Lower Back Pain	10%	10%	20%	9%
Achilles strain	5%	6%	20%	6%

Analysis Questions (answer after completing graph):

1. Of the 8 most common sports injuries, which one is THEE most common?

_____.

2. OF the 8 most common sports injuries, which one is the least common?

_____.

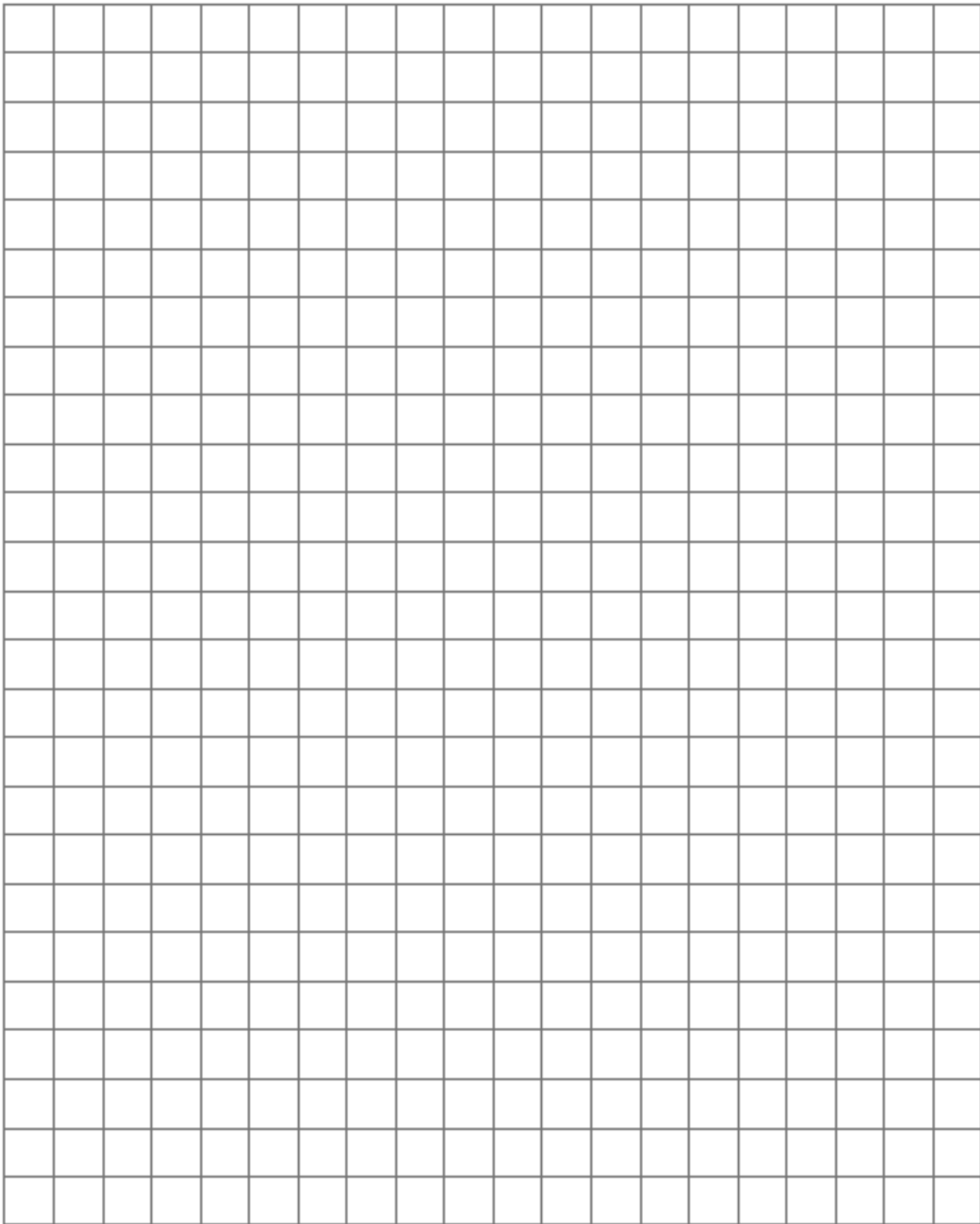
3. What is the most common injury in football? In gymnastics?

 _____.

4. Which sport is most likely to cause ACL sprains? _____

_____.

Graph title:



- Football
- Baseball
- Gymnastics
- Basketball