



BIOMECHANICS

STEM

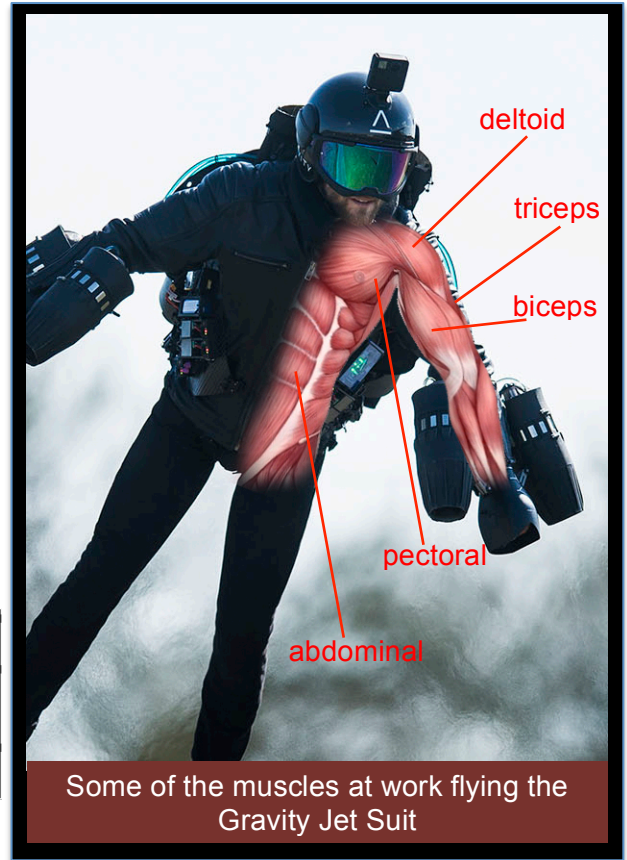
Some bones in the skeleton are joined rigidly together and cannot move against each other. Bones in the skull are joined like this. Other bones are joined to each other by flexible joints. Muscles are needed to move bones attached by **synovial joints**.

Skeletal muscles work in pairs to move the body. When you move your arm, the bicep contracts while the triceps muscle relaxes. The bicep pulls the bones together, bending the arm. The reverse happens when the arm straightens.

Muscles can only contract and pull bones - they never push them.

Different types of **synovial joint** allow different types of movement. The table below describes two types of joint:

Type of joint	Examples	Movement allowed
Hinge joint	Knee, elbow	The same as opening and closing a door, with no rotation (turning)
Ball and socket joint	Hip, shoulder	Back and forth in all directions, and rotation

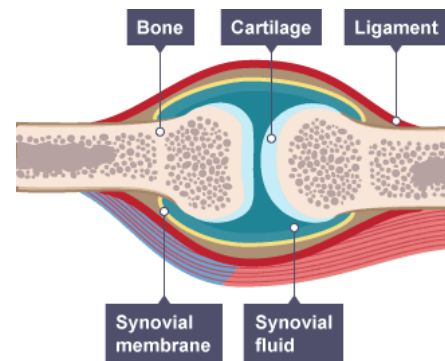


Some of the muscles at work flying the Gravity Jet Suit



The way in which muscles and bones work together to exert forces is called **biomechanics**.

If two bones just moved against each other, they would eventually wear away. To stop this happening, the ends of the **bones** in a joint are covered with a tough, smooth substance called **cartilage**. This is kept slippery by a liquid called **synovial fluid**. Tough **ligaments** join the two bones in the joint and stop the joint falling apart.



Muscles exert a force on bones when they contract. This happens for example when you lift or hold an object, or when you move a part of your body. If you hold an object weighing 10 N, keeping it still and with your forearm horizontal and your upper arm vertical, you would be exerting an upwards force of 10 N on the object. You could work out the force exerted by the biceps muscle to do this using the idea of moments.

