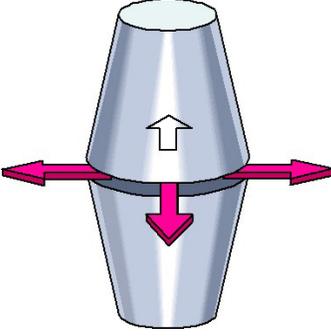
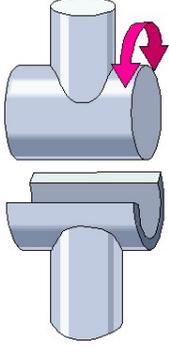
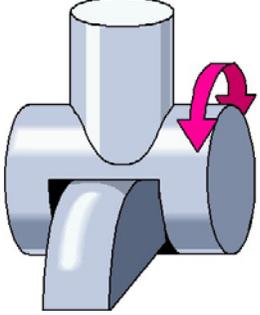
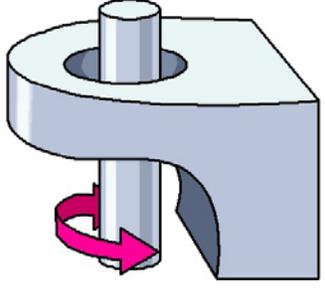
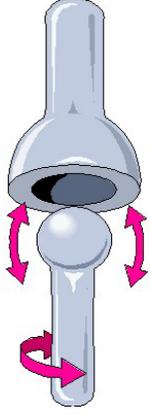


The Major Articulations of the Human Body

Introduction

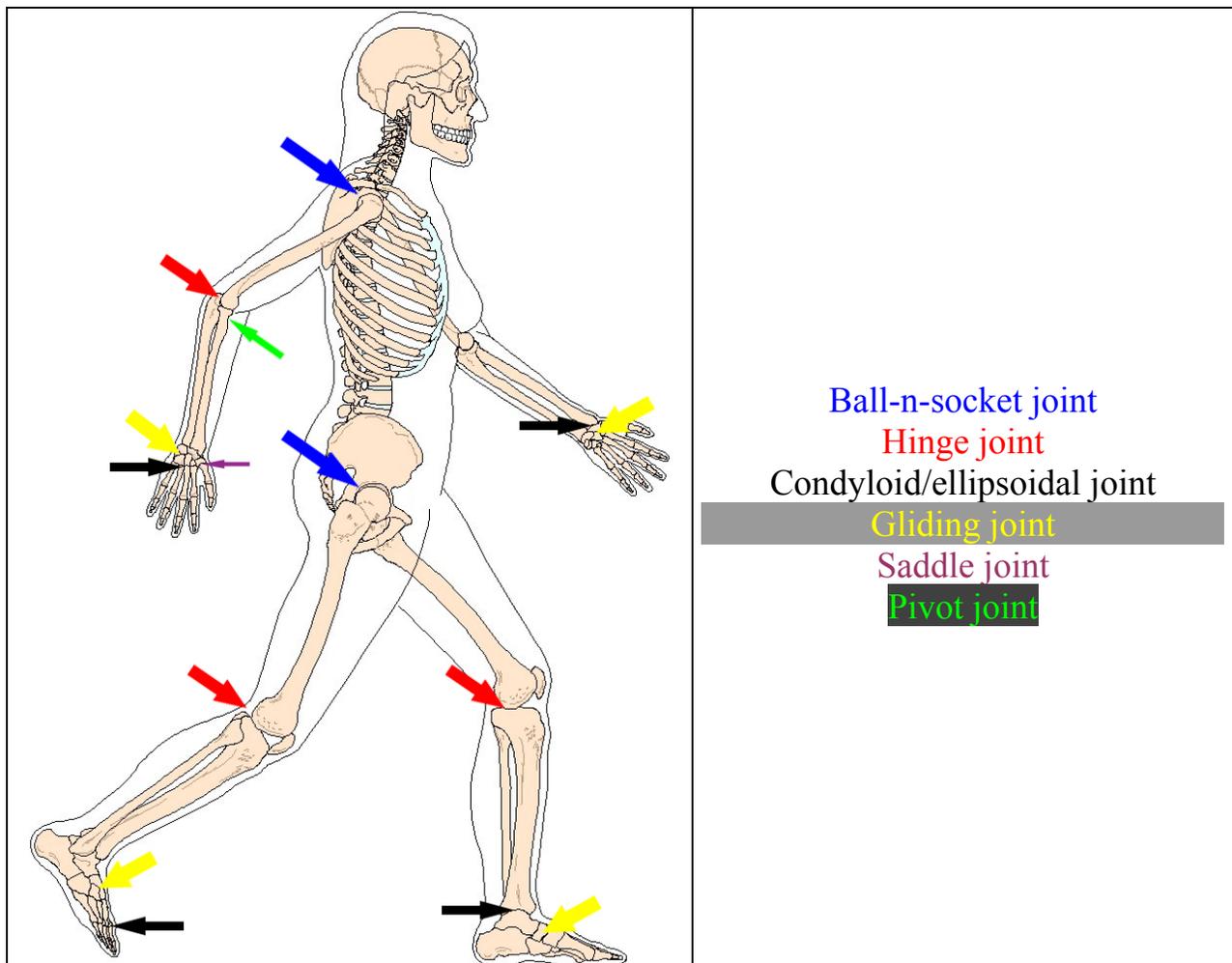
For simplicity's sake, this experiment examines the most significant set of articulations in the body. You will also have the opportunity to explore six various types of articulations. Use your text[s] for more detailed figures for this experiment. The table, below, illustrates the six general types of articulations:

<p>Articulation</p> <p>Gliding – bones are generally flat and permit side-to-side and back-n-forth movements. Examples include the movements between carpals</p>	<p>Illustration</p> 	<p>Articulation</p> <p>Condyloid (or ellipsoidal) – this joint is formed by the fitting of the condyle of one bone into the elliptical cavity of another. Examples include the movement of the metacarpals on the phalanges and the movement of the radius on the carpals.</p>	<p>Illustration</p> 
<p>Hinge – designed so that the convex surface of one bone fits into the concave surface of another bone. Examples include the radial head with the capitulum and the semi-lunar notch with the trochlea.</p>	<p>Illustration</p> 	<p>Saddle – is so called because one surface in the joint is saddle-shaped and the articular surface of the other bone is shaped like a rider in the saddle. The best example is the articulation between the trapezium and the first metacarpal.</p>	<p>Illustration</p> 
<p>Articulation</p> <p>Pivot – pivoting occurs when the rounded or conical surface of one bone articulates within a ring formed by a second bone and a ligament. Examples include the radius upon the ulna contained by the annular ligament.</p>	<p>Illustration</p> 	<p>Articulation</p> <p>Ball-n-socket – this joint is between a ball-like socket of one bone and a cuplike depression in the other. The only ball-n-socket joint in the upper extremity occurs between the head of the humerus and the glenoid fossa; the only ball-n-socket joint in the lower extremity occurs between the femoral head and the acetabulum.</p>	<p>Illustration</p> 

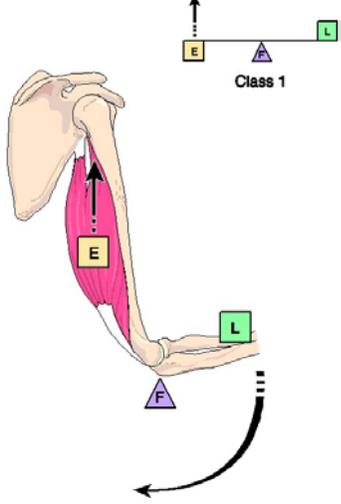
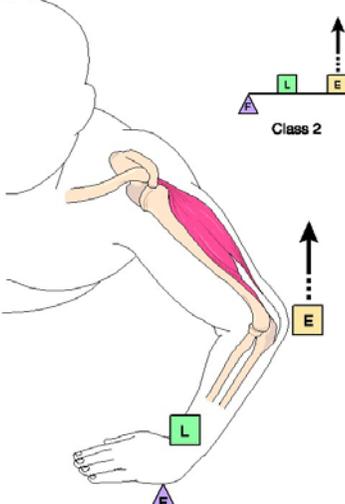
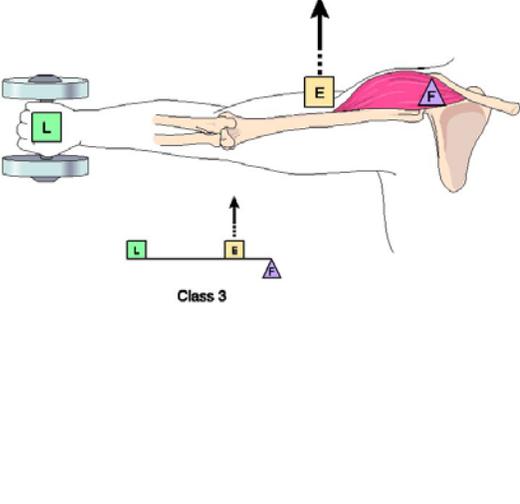
Depending on the kind of joint, movement may be around one, two, three or no axes. An example of movement about no axis is gliding movement. This kind of movement is called non-axial movement.

- Uniaxial, or mono-axial, movement is movement of a joint about one axis. The hinge joint is an example of this kind of movement.
- Biaxial movement occurs around two axes of motion. The condyloid joint is an example of an articulation with this kind of movement. This joint moves anterior to posterior and side-to-side.
- Triaxial movement involves movement around three axes of motion. The ball and socket joint is an excellent example of a joint which is capable of triaxial movement. This joint moves anterior to posterior, lateral to medial and rotates/circumducts.

The graphic, below, illustrates the 6 articulations (color coded) on an articulated, outlined, walking skeleton (can you tell which articulations are non-, uni-, bi- and tri-axial?):



Lastly, as you are discovering, when bones, ligaments and muscles are combined with a nervous system, the human operates mechanically like a robot, i.e., upon a system of levers. There are three classes of levers, interestingly enough, called Class 1, Class 2 and Class 3 levers. The table, below summarizes the levers, illustrates them from a physics point of view and provides common examples for comparison.

Class 1	Class 2	Class 3
<p>In the case of a Class I lever, the fulcrum (F) is between the load (L) and the moving force (P – E, too, in the graphic, below). One example is a teeter totter; another is the articulation between the head and cervical spine that allows us to nod our heads.</p>	<p>In the case of a Class II lever, the load (L) is between the fulcrum (F) and the moving force (P). One example is a wheel barrow; another is the articulation between our tibia and talus that allows us to plantarflex our foot as we step off.</p>	<p>In the case of a Class III lever, the moving force (P) is between the fulcrum (F) and the load (L). One example is carrying a loaded shovel; another is the articulation between the humerus and ulna that allows us to bend our elbow when we have a drink of something.</p>
		
<p>Another example is the resting of the occipital condyles upon the superior articulating surfaces of the atlas.</p>	<p>Another example is the tibia on the talus to permit plantarflexion.</p>	<p>Another example is the fulcrum being the elbow, the load being a mug of soda and the effort (E) being the biceps brachii.</p>
<p>A common example is a teeter totter.</p>	<p>A common example is a wheel barrow.</p>	<p>A common example is carrying a loaded shovel.</p>

Experimental

By using the articulated skeleton, the articulated hand and foot and the various disarticulated bones of the upper and lower extremities, identify the various types of articulations described in the tables, above. Note the bones, landmarks and ligaments involved, as well. In order to further

your remembrance of the ligaments in the major articulations of the human body, 1) identify the sites of their attachment on the skeleton and bones and 2) draw a sketch of the following articulations complete with ligaments in the following boxes:

Elbow	Shoulder	Hip	Knee

References

- 1) Gray's Anatomy: The Classic Collector's Edition.
- 2) Gray's Anatomy, 29th American Edition
- 3) Marieb, E.N.: Human Anatomy and Physiology. (Benjamin Cummings: Redland) ©1989.
- 4) SmartDraw Version 6.0