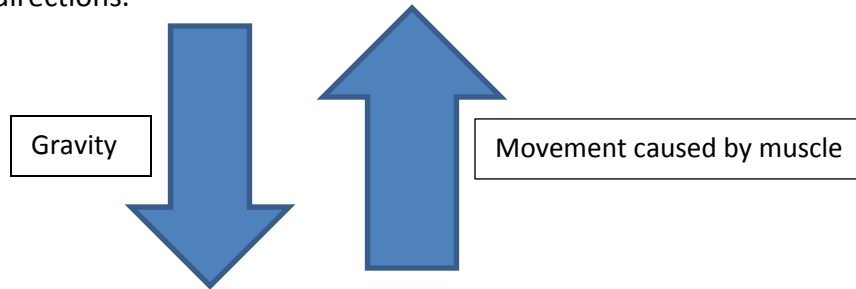


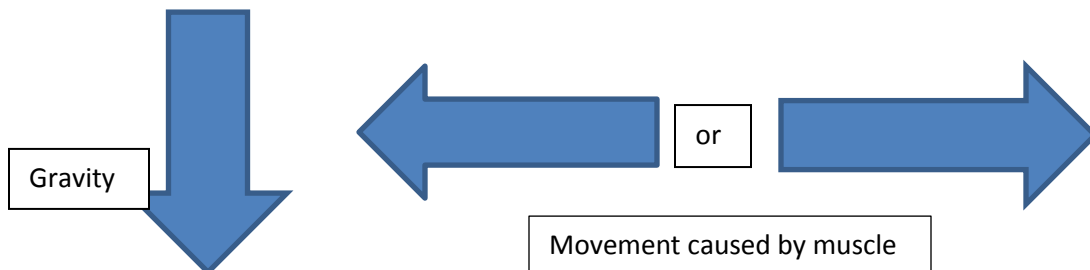
Positions related to Gravity

Gravity is a force that is always occurring in a downward motion perpendicular to the floor.

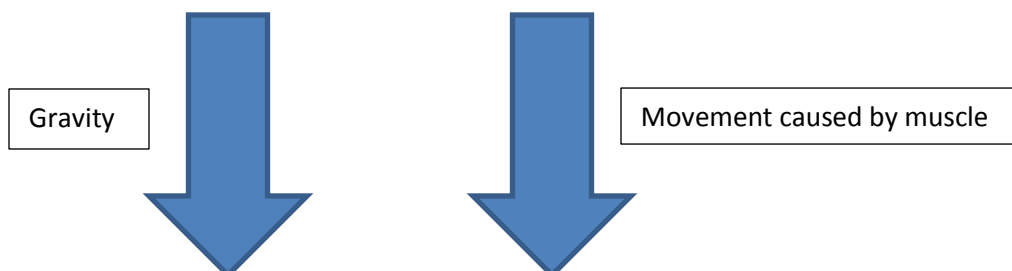
Against Gravity: When the body is put in a position that requires the muscle-in-question to move a limb perpendicular to the floor and in an upward motion (ie. Elbow flexion while in the anatomical position) this is considered an “against gravity” position for that particular muscle. The force of gravity is perpendicular to the floor and so is the movement of the limb. Therefore, the two forces are parallel to each other. However, they are occurring in *opposite* directions.



Gravity Eliminated: When the body is put in a position that requires the muscle-in-question to move a limb parallel to the floor (and therefore perpendicular to the force of gravity), this is considered a “gravity eliminated” position for that particular muscle. The force of gravity is perpendicular to the floor and the movement of the limb is parallel to the floor. Therefore, the two forces are perpendicular to each other. An example would be hip internal and external rotation while in the anatomical position.



Gravity Assisted: When the body is put in a position that requires the muscle-in-question to move a limb perpendicular to the floor and in a downward motion (ie. Elbow extension while in the anatomical position) this is considered a “gravity assisted” position for that particular muscle. The force of gravity is perpendicular to the floor and so is the movement of the limb. Therefore, the two forces are parallel to each other. Please note that they are occurring in *the same* directions.



To really simplify things, our body parts can basically move in two ways: parallel with the floor or perpendicular to the floor. When the body (or a body part) moves parallel with the floor, it is in a gravity-eliminated position.

When the body (or body part) moves perpendicular to the floor, it is either moving toward the floor (gravity-assisted) or away from the floor (against gravity).

Isometric contractions can occur when the body part moves parallel to the floor, perpendicular to the floor and toward the floor, or perpendicular and away from the floor. As long as a muscle is contracting, and there is no change in the length of the muscle, and no change in the angle of the joint, an isometric contract is occurring.

If a body part is moving parallel to the floor and the muscle length IS changing and a joint IS moving, then it is due to a concentric contraction. In other words, eccentric contractions do not occur in a gravity-eliminated position.

If a body part is moving perpendicular to the floor and the joint is moving: it is due to a concentric contraction if the body part is moving away from the floor (against gravity) and it is due to an eccentric contraction if the body part is moving toward the floor (gravity-assisted).