WHAT ARE THE FUNCTIONS OF THE KNEE LIGAMENTS?

Instructions

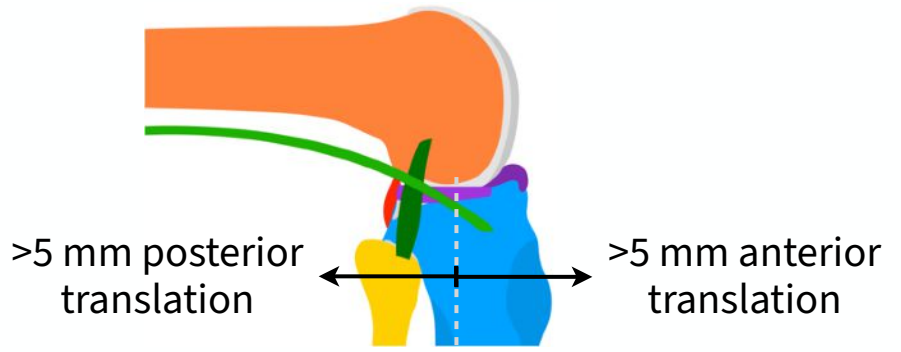
In this activity, you'll do a knockout experiment with your knee kit to determine the functions of each of the major knee ligaments. You'll then use what you learn about the ligaments' functions to explain common knee injuries and the strategies recommended to avoid them. To infer each ligament's function, you'll use a motion test: moving the knee in a particular way to test if the motion is normal or abnormal.

How do you determine abnormal/excess motion?

For this activity, abnormal/excess motion is defined as motion outside the normal range of motion. The criteria for how to determine this for each motion is given below:

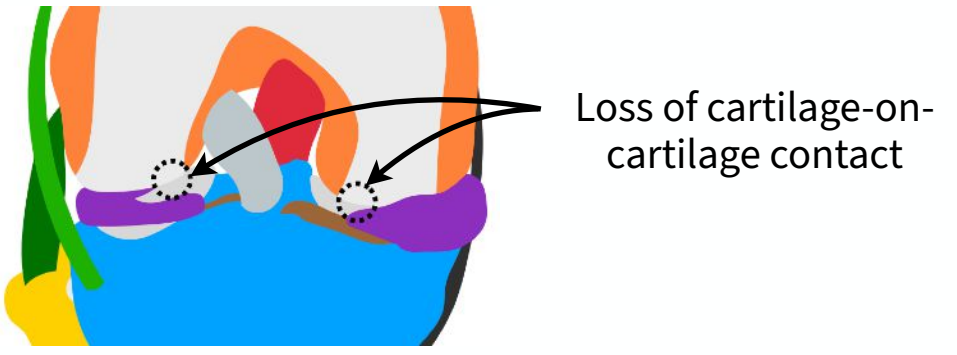
- **Anterior-posterior (AP) translation:** AP translation of the tibia (relative to the femur) outside the normal range of motion is greater than 5 mm anteriorly or posteriorly from its neutral position (i.e., the normal *total* range of motion for AP translation of the tibia should be 10 mm).

Abnormal motion is…



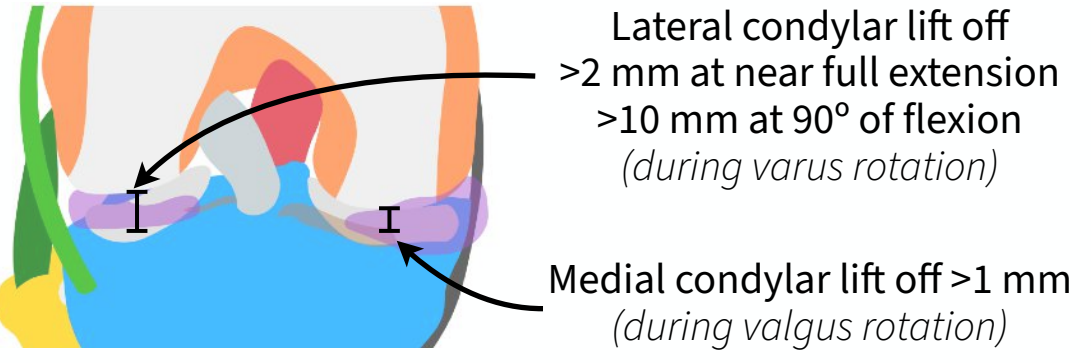
- **Longitudinal rotation:** Longitudinal rotation outside the normal range of motion is detected as a loss of "cartilage-on-cartilage" contact at the joint (i.e., if opposing surfaces of the joint are pressed together, there is not articular cartilage on both surfaces at the point of contact).

Abnormal motion is…



- **Varus-valgus rotation:** Varus-valgus rotation outside the normal range of motion is detected by greater than normal condylar lift off (gap between the condyles), as detailed below.

Abnormal motion is…



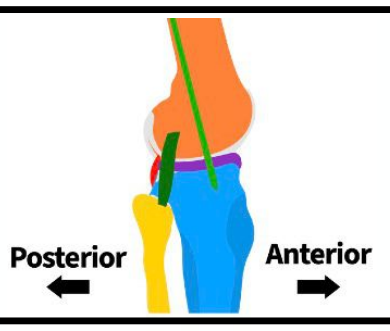
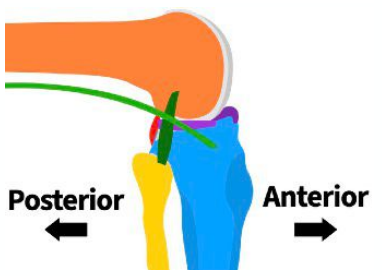
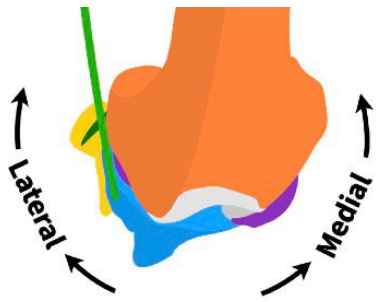
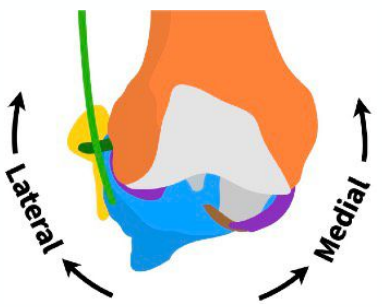
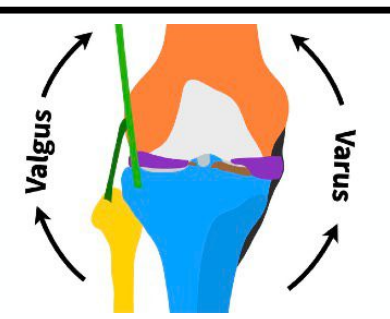
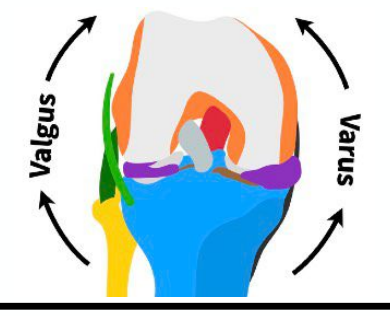
For a more complete explanation of determining abnormal motions, check out the motion videos linked below.

Find the motion videos at:
guides.3das.us/link/91

Find the station worksheet at:
guides.3das.us/link/145

How do you fill in the motion test table?

As you perform your knock out experiments, you'll complete the motion test table on your worksheet. The first column of the table has been filled in below to help you understand how to complete the table.

Motion test	Outcome after knockout is excess motion toward… Ligament functions to limit excess motion toward… The motion that can injure ligament is… Injury can cause pain/instability when moving…					
	MCL	PCL	ACL	LCL	IT Tract	MCL +ACL
Ant.-Pos. translation of tibia Near full extension 	✓					
Ant.-Pos. translation of tibia At 90° flexion 	**ANT** minor when tibia is laterally rotated					
Longitudinal rotation of tibia Near full extension 	**LAT**					
Longitudinal rotation of tibia At 90° flexion 	**LAT**					
Varus-Valgus rotation Near full extension 	**VAL**					
Varus-Valgus rotation At 90° flexion 	**VAL**					

The table has columns for each ligament (or combination of ligaments) and rows for each motion test.

If the motion test results in normal motion (no abnormal/excess motion), you'll write a checkmark (✓) for that column and row. For example, if you knock out the MCL, you should find that there is no excess AP translation at near full extension.

If the motion test results in excess motion, you'll write in the direction in which there is excess motion. For example, if you knock out the MCL, you should find that the tibia rotates longitudinally more laterally than it normally would (i.e., excess lateral longitudinal rotation).

You can abbreviate the directional terms as follows:

ANT = Anterior	**POS** = Posterior
MED = Medial	**LAT** = Lateral
VAR = Varus	**VAL** = Valgus

You'll perform each motion test at near full extension and at 90° flexion.