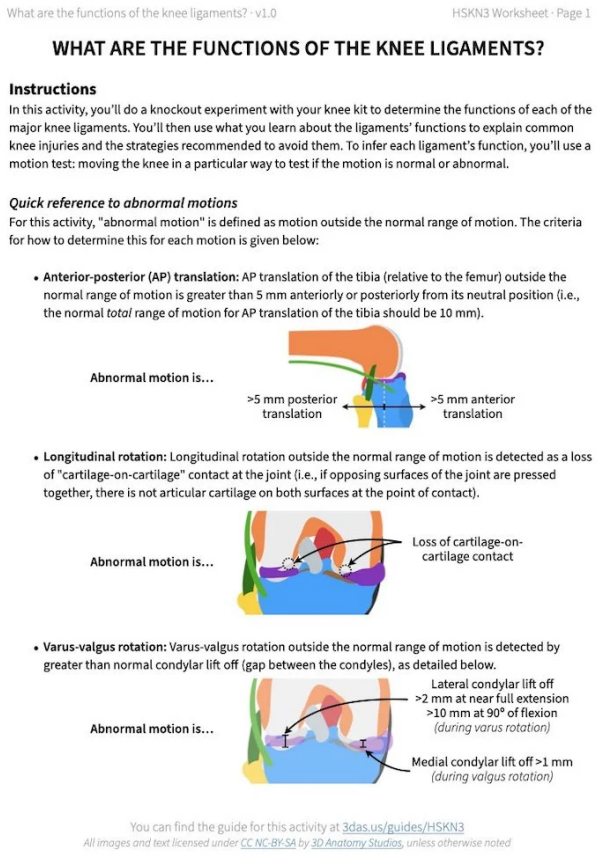
Materials needed

For this activity you'll need:

1. The worksheet for this activity (either opened in a PDF viewer on a desktop/tablet computer or printed out).



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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.

Quick reference to abnormal motions

For this activity, "abnormal 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… >5 mm posterior translation >5 mm anterior translation

- **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… Loss of cartilage-on-cartilage contact

- **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… Lateral condylar lift off >2 mm at near full extension >10 mm at 90° of flexion *(during varus rotation)* Medial condylar lift off >1 mm *(during valgus rotation)*

You can find the guide for this activity at 3das.us/guides/HSKN3

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2. A Human Knee Active Learning Kit (Basic or Full model). You do not need any of the muscles for this activity or the patella. If your knee kit has muscles attached, detach all the muscles and attach them to their designated spot on the parts plate(s). You can leave the patella to hang from the patellar ligament or you can remove the patella by detaching the patellar ligament from the tibia. Also be sure that your knee kit has the Iliotibial (IT) tract/band attached; this is one of the ligaments you will knock out. Once you've finished preparing your knee for this activity, it should look like one of the images below.

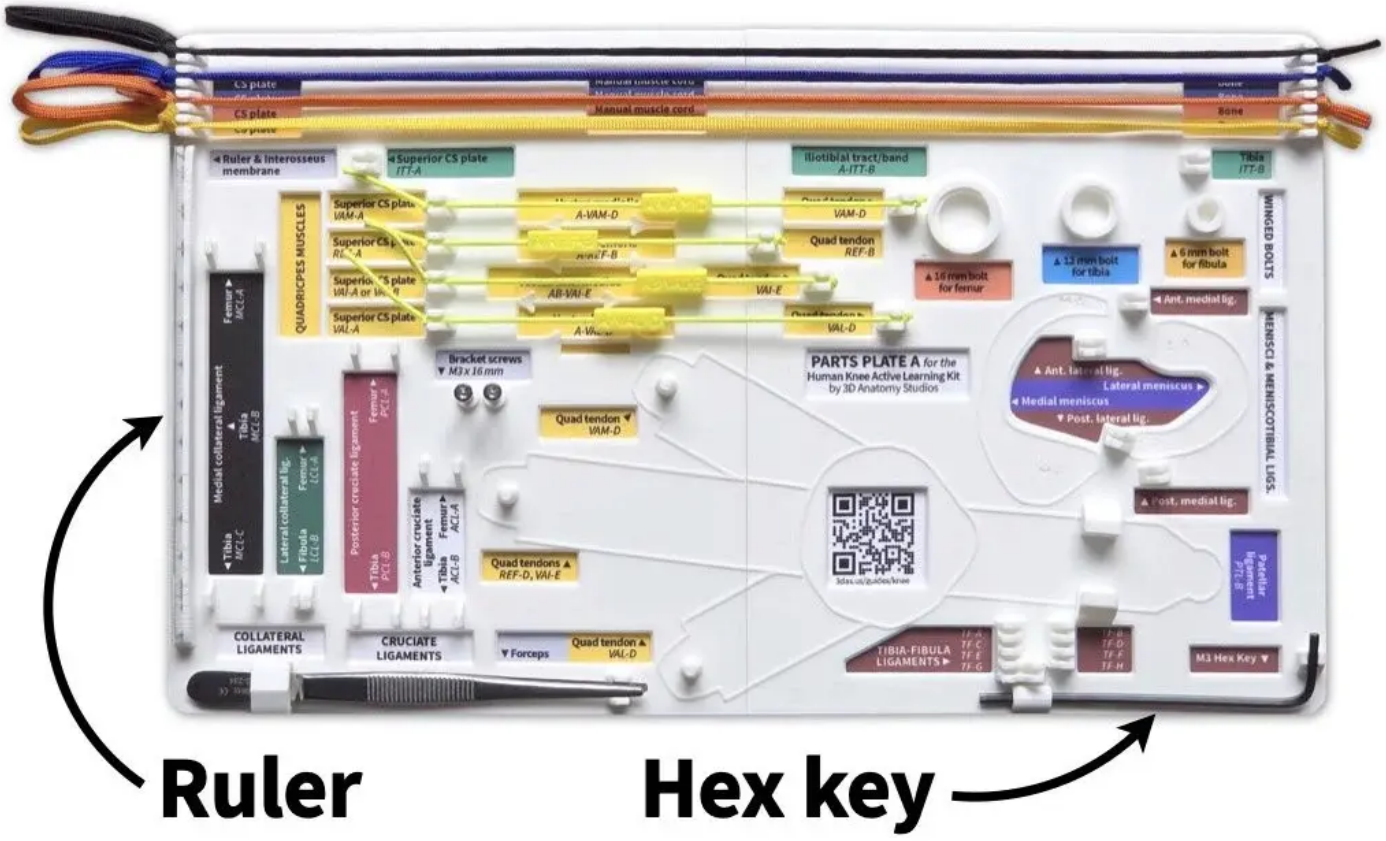
The knee kit with all of the muscles detached and with the patella either hanging loose by the patellar ligament (left) or with the patella removed (right). The black arrow in each photo indicates the IT band/tract.

> While this activity can be done with the Mini Knee Kit Model, be aware that the IT tract is a significant stabilizer of the knee. Since the Mini model does not include an IT tract, your results will not include its contributions. If you're doing this activity without an IT tract, it's best to assume that any conclusions you draw are for a knee in which the IT tract is already damaged or without taking into account its contributions.

3. The following items from Parts Plate A in your knee kit:

- Hex key (also called an Allen wrench)
- Ruler

The hex key (top) and ruler (bottom) from your kit. The hex key in your kit may differ in color or shape from the image above.



The ruler and hex key should be attached to Parts Plate A in your kit. The ruler fits into grooved holder on the left side and the hex key fits into a holder in the bottom right corner. The hex key in your kit may differ in color or shape from the image above.

Revision #30
Created 2026-02-03 15:53:31 UTC by Aaron Olsen
Updated 2026-05-13 20:27:11 UTC by Aaron Olsen