Bandit™ STEM Electrophoresis Kit assembly instructions

Teach electrophoresis from the inside out. The Bandit™ STEM Electrophoresis Kit allows students to build a working gel electrophoresis apparatus. Then, they use their fully functioning system to run an electrophoresis lab.

Materials needed

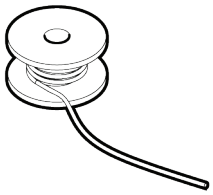
To complete an electrophoresis activity, you will need both the Bandit™ STEM Electrophoresis Kit (QP-1400-01) and a dye electrophoresis Learning Lab™ (sold separately).
Visit links.minipcr.com/bandit-labs to see available dye electrophoresis Learning Labs™.

Supplied with Bandit™ STEM Electrophoresis Kit (QP-1400-01):

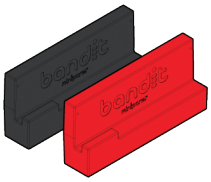
USB-C cable

Electrode cable

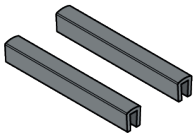
Bandit™ circuit controller



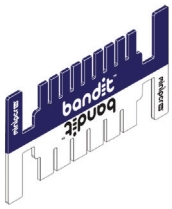
Electrode wire (20 cm needed per Electrodam™)



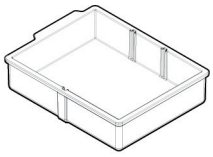
Pair of Electrodams™



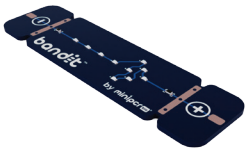
Comb supports (2)



Comb

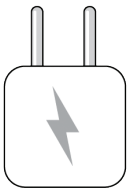


Buffer chamber



Light strip

Supplied by user: USB-C power source (*e.g.*, phone charger)
Available at minipcr.com



Questions? Email support@minipcr.com or call +1 781-990-8727

Pouring gels (before or during class period)

Protective gloves and eyewear should be worn for the entirety of this experiment.

Important Gel Pouring Notes

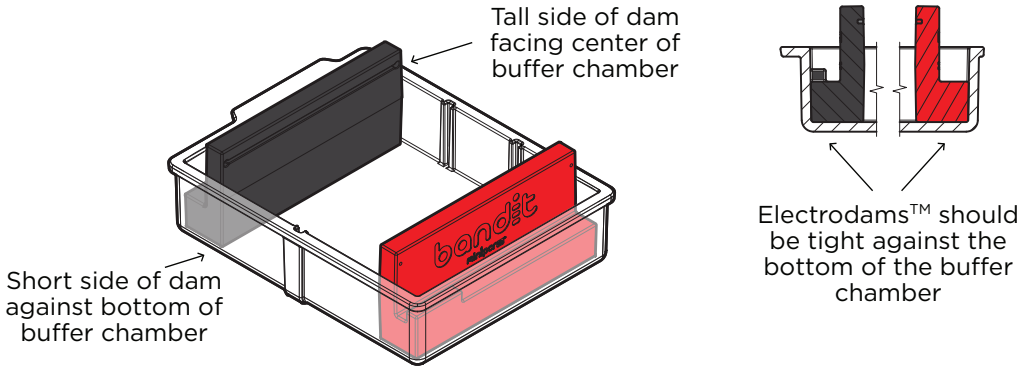
- Gels can be prepared up to five days ahead of time and stored at room temperature.
- Gels can be stored for up to five days at room temperature in an airtight container. See detailed storage instructions at the bottom of page 4.

Prepare 1X TBE buffer (to be completed by teacher in advance)

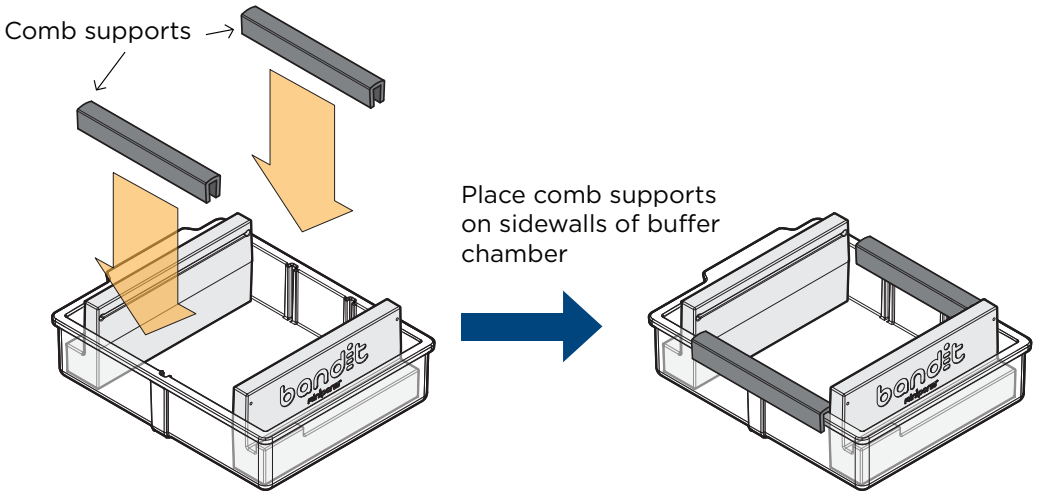
- Prepare at least 60 ml of buffer for every Bandit™ electrophoresis system you plan to use.
- 30 ml of the buffer will be used to make your gel and 30 ml will be used as running buffer.
- TBE buffer is often provided as liquid concentrate or powder.
- Follow manufacturer's instructions to prepare 1X TBE buffer solution.

Set up the Bandit™ buffer chamber and Electrodams™ for gel casting

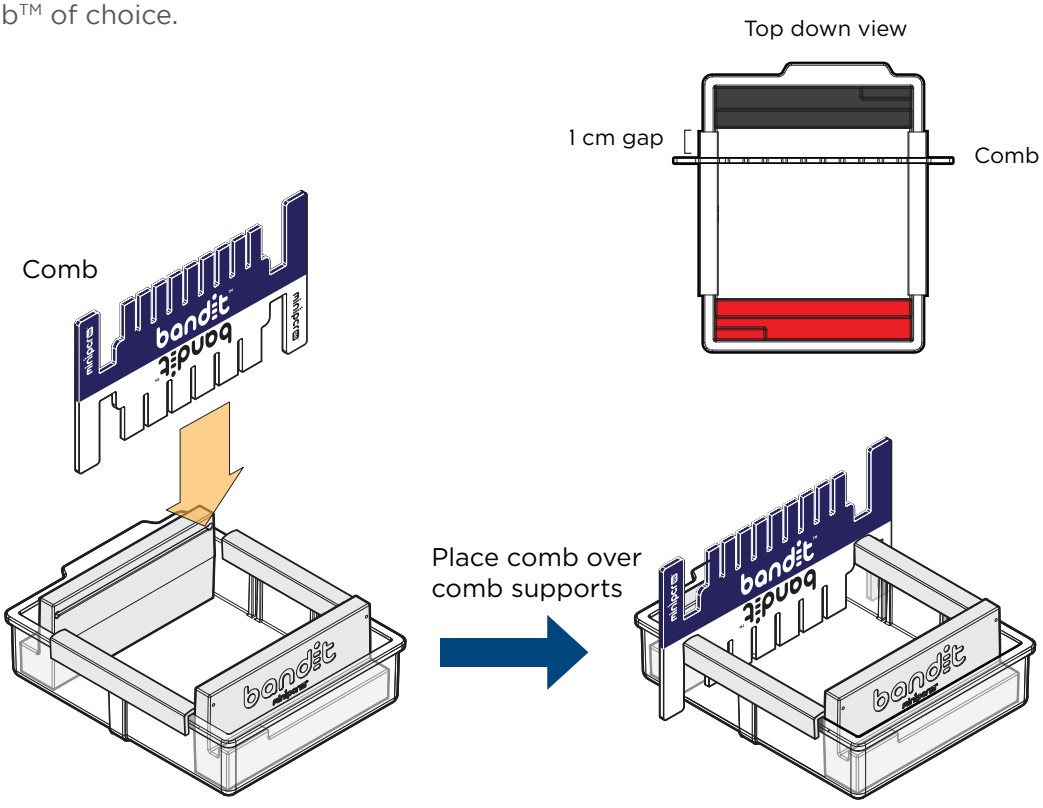
1. Place the Electrodams™ at the ends of the buffer chamber
   - The Electrodams™ must be inserted in the correct orientation, as described below.
   - The short side of the Electrodams™ should sit flat against the bottom of the buffer chamber and the tall side should face the center of the buffer chamber.
   - Be sure that the Electrodams™ sit tightly against the bottom of the buffer chamber.



2. Place the comb supports over the sidewalls of the buffer chamber



3. Place the comb in the buffer chamber, resting over the comb supports
   - The comb should be straight (parallel with the back of the buffer chamber).
   - For most introductory applications, the white side of the comb with six teeth should be facing down. The comb orientation will be specified in the lab guide for your Learning Lab™ of choice.
   - For most applications, the comb should be placed approximately 1 cm from the black Electrodam™. The comb placement will be specified in the lab guide for your Learning Lab™ of choice.

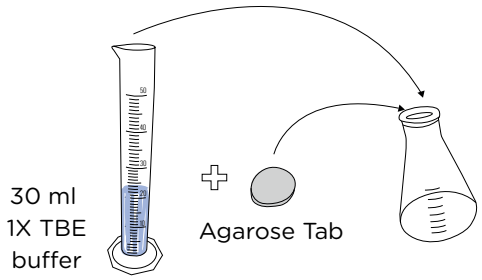


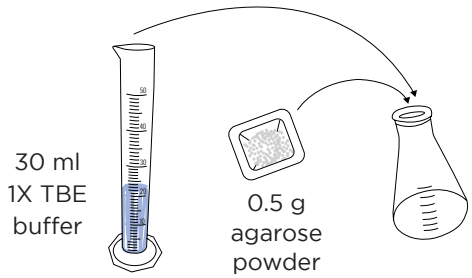
Prepare the gel

1. Prepare an agarose solution
   - Obtain a heat-resistant container such as a glass Erlenmeyer flask or beaker that is at least three times the volume you wish to add.
   - Gels can be prepared with Agarose Tabs™ or agarose powder.

   If using Agarose Tabs™:
   - Combine 30 ml room temperature 1X TBE buffer and one Agarose Tab™ for each gel you plan to pour.
   - Allow the tabs to soak until they fully disintegrate (this could take a few minutes).
   - Swirl the flask or beaker to ensure the tabs have fully disintegrated before heating.

   If using agarose powder:
   - Combine 30 ml 1X TBE buffer and 0.5 g agarose powder for each gel you plan to pour.
   - Swirl the flask or beaker until reagents are well mixed.

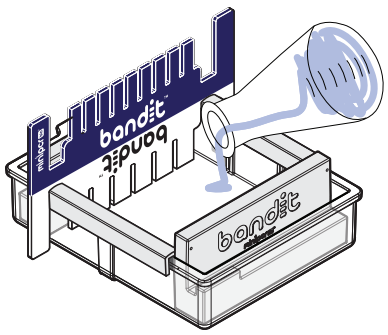




2. Heat solution
   - Expect to heat for about 60 seconds per 30 ml of liquid in a standard microwave.
   - Heat until the solution boils and continue until agarose is fully dissolved. No agarose particles should remain.

Caution: The solution may boil over the top of some containers. The solution will be very hot.

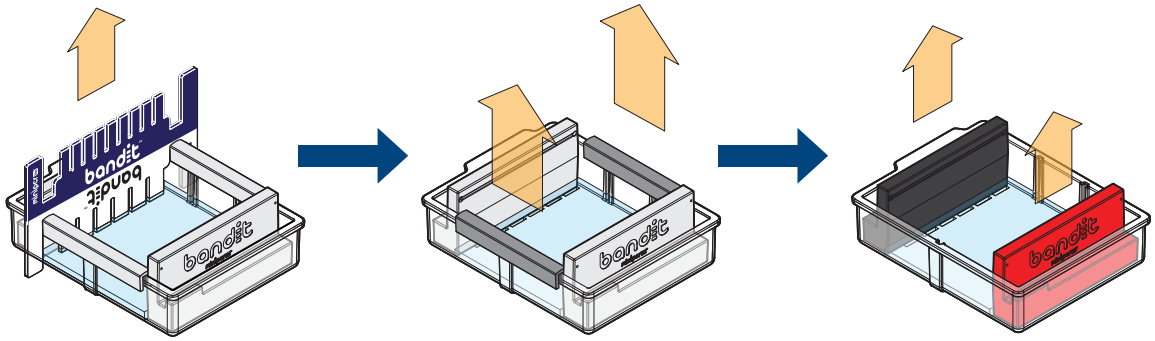
3. Pour the agarose solution into the prepared Bandit™
   - The agarose solution should cover the bottom of the gel tray and the bottom 3 mm of the comb (roughly the bottom 1/3 of the comb).
   - Note: If the lab you are performing uses colored dyes, there is no need to add DNA stain.



4. Allow gel to solidify completely
   - Gels will typically be ready in about 10 minutes.
   - Gel is ready when cool and firm to the touch.
   - Gels can be stored in an airtight container at room temperature for up to five days before use. You can:
     - Store gel in the assembled Bandit™: Cover assembled Bandit™ system with plastic wrap or put it in an airtight container, then move it to a location where it will not be disturbed.
     - Remove gel from the BanditTM: Follow the instructions on page 5 to remove the comb and Electrodams™. Remove the gel from the buffer chamber and store in an airtight container.

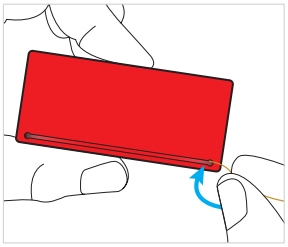
Prepare Bandit™ for gel run

1. Remove the comb, comb supports, and Electrodams™ by pulling firmly upwards



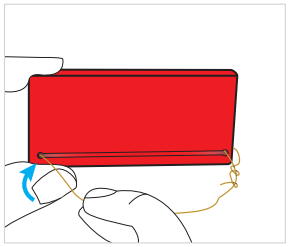
Remove comb | Remove comb supports | Remove Electrodams™

2. Prepare the electrodes
   - Note: The electrode wire can remain attached to the Electrodams™ for several uses. If the electrode wires are already in place, proceed to step 3.
   - If the Electrodams™ do not already have wire attached, cut two approximately 20 cm (8 inch) pieces of electrode wire from the included spool.

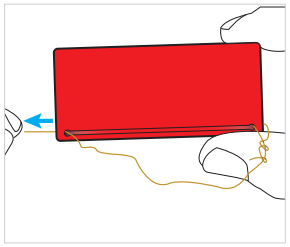


- Starting from the tall side of the Electrodam™ with a channel present, thread the wire through one of the small holes.
- You only need about 2 cm of wire to come through on the other side.

- Flip the Electrodam™ over.
- Twist the short free end of the wire that you just threaded through the hole around the longer piece of the wire to prevent it from slipping back through the hole.

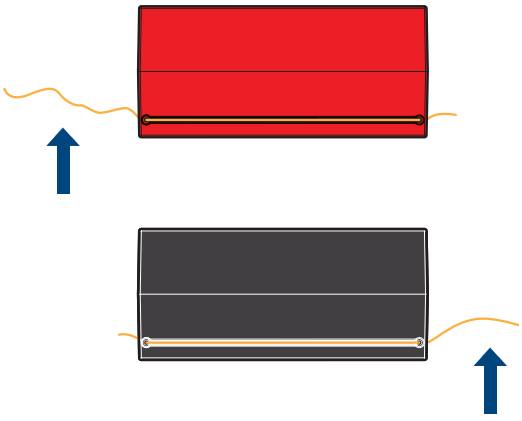


- Flip the Electrodam™ back over so you are looking at the side with the channel again.
- Thread the loose end of the wire through the small hole on the other side of the Electrodam™.

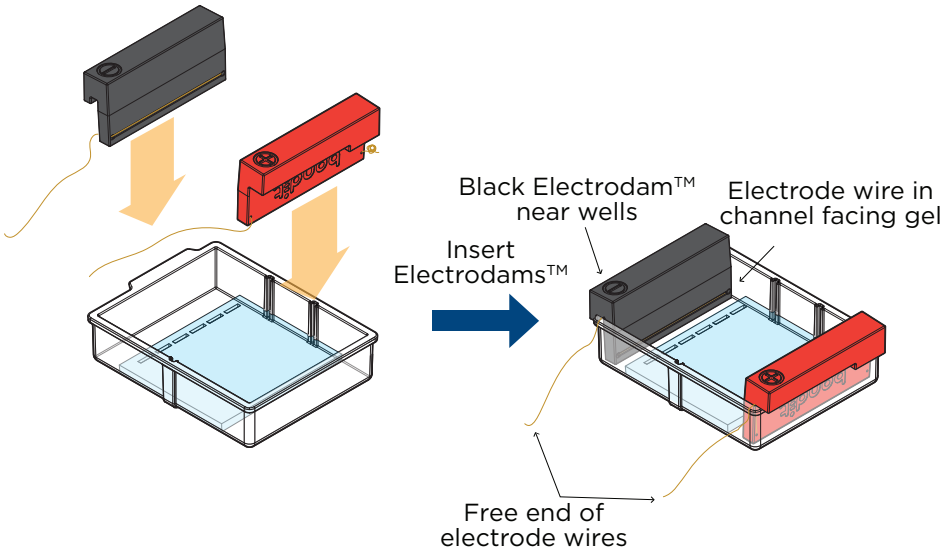


- Slowly pull the long free end of the wire until it is taut and the electrode wire sits flush in the channel.

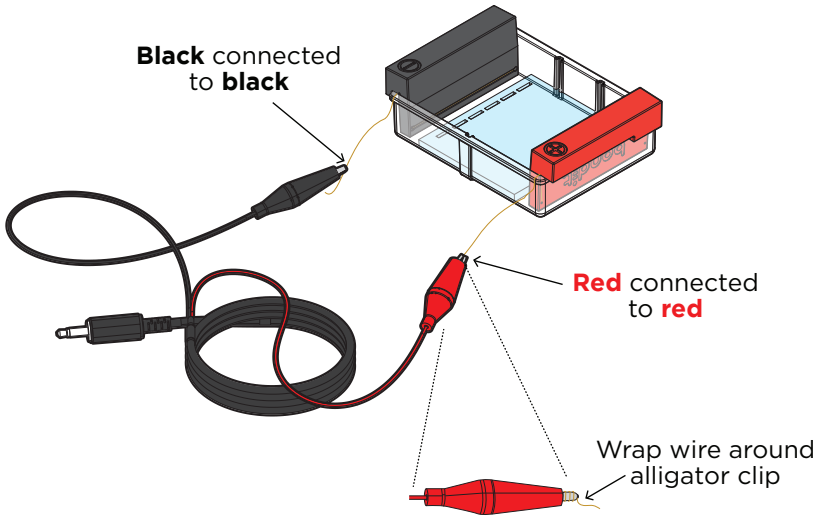
   - Repeat for the other Electrodam™, but thread the electrode wire from the opposite side so that the long free ends of the electrode wires extend in opposite directions.



3. Insert the Electrodams™
   - The Electrodams™ should have the electrode wires threaded (refer to page 5 for detailed instructions).
   - The Electrodams™ should be inserted with the electrode wire near the bottom of the buffer chamber, facing the gel. They will be upside down compared to when you used them to make your gel.
   - Place the **black Electrodam™** in the buffer chamber at the end of the gel closest to the wells of the gel.
   - Place the **red Electrodam™** at the other end of the buffer chamber, away from the wells of the gel.
   - Make sure you leave a ~1 cm gap between the ElectrodamsTM and the edge of the gel.
   - Make sure that the long free ends of the electrodes are accessible

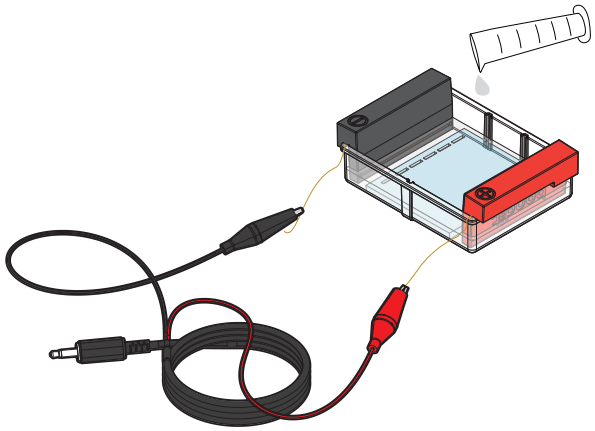


4. Connect the electrodes
   - Connect the **black alligator clip** to the free electrode wire coming out of the **black Electrodam™**.
   - Connect the **red alligator clip** to the free electrode wire coming out of the **red Electrodam™**.
   - It may help to wrap the electrode wires around the alligator clips to ensure good contact.

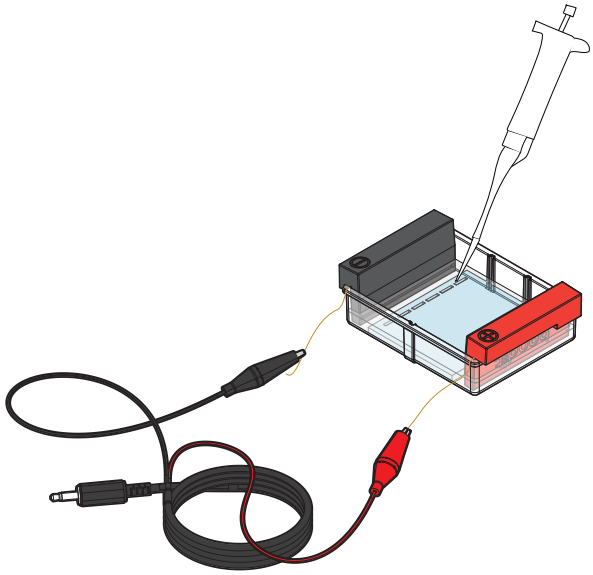


Running the gel

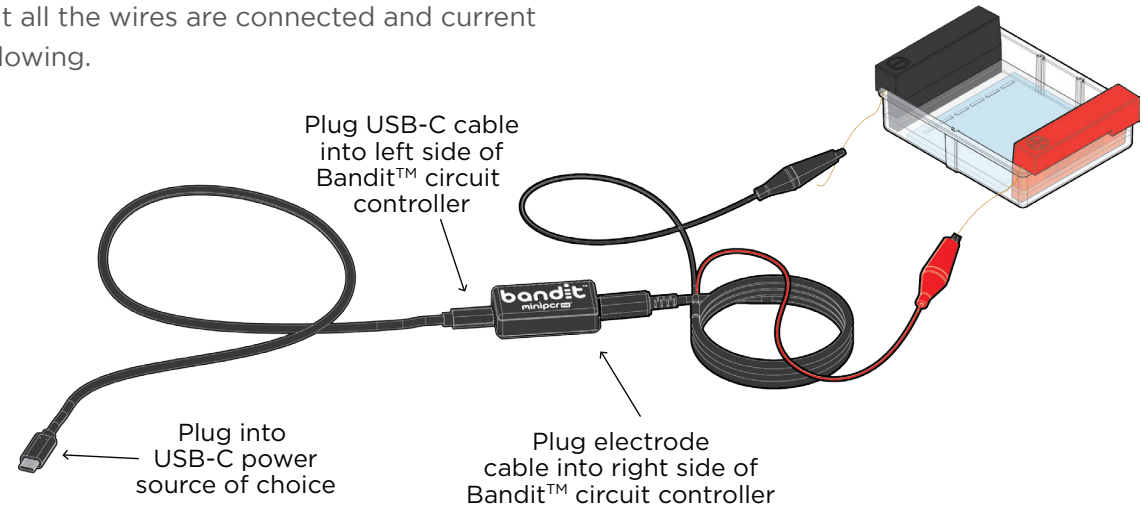
1. Add 30 ml of 1X TBE electrophoresis buffer
   - The buffer should just cover the gel and fill the wells, in addition to the spaces between the Electrodams™ and the gel.
   - Ensure that there are no air bubbles in the wells (shake the gel gently if bubbles need to be dislodged).



2. Use a micropipette to load samples onto the gel in the order specified in the lab guide for your Learning Lab™ of choice.



3. Connect the power cables
   - Plug the wire connected to the alligator clips into the round port on the right side of the Bandit™ circuit controller.
   - Plug the USB-C cord into the USB-C port on the left side of the Bandit™ circuit controller.
   - Plug the other end of the USB-C cord into your power source of choice.
     Note: USB-C power source is provided by the user.
   - A small light on the right side of the Bandit™ circuit controller will illuminate to indicate that the power is on.
   - Look for bubbles on the electrode wires to verify that all the wires are connected and current is flowing.



4. Conduct electrophoresis for 15-25 minutes
   - The run time will be specified in the lab guide of your Learning Lab™ of choice.