Sterility

Sterility is very important in operating rooms where surgeons perform surgery. Sterility means that there are no germs, like bacteria and viruses, in the operating room. If there are any germs, they can enter the patient's wounds and make them very sick. For example, if a Staphylococcus bacteria was introduced to a surgical wound from a contaminated glove, the patient could develop a "Staph" infection, which often causes boils and oozing blisters. Sometimes, the staph bacteria can invade deeper into the body or enter the bloodstream resulting in fever, joint, and muscle pain.

To keep the surgical wound sterile, surgeons create a "sterile field", which is like a protective bubble around the wound and operating table. Everything that enters this bubble should be sterile. This includes instruments like scalpels and clamps, clothing, and gloves. The sterile field ensures that the patient's wound stays clean and free of germs.

When a surgeon gets ready to operate, she thoroughly scrubs her hands with soap to ensure that they are clean. Then, an assistant helps the surgeon put on gloves. Sometimes, the surgeon's assistant can accidentally introduce germs from their hands onto the gloves. The surgeon then touches the surgical wound, introducing the contaminants into the patient's bloodstream.

Robot Requirements

- Must be at least 10 inches tall.
- Must have arms to hold the glove open.
- Must be made of plastic or another material that can be sterilized.

STEM CAREER ADVENTURES

Robot Design

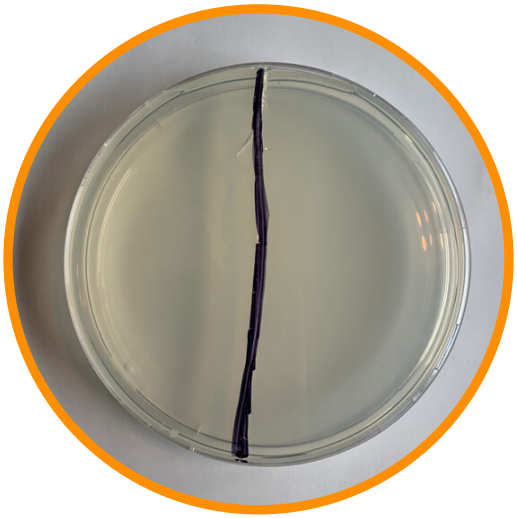
Use the space below to sketch a design of what your robot will look like! Make sure to label any important parts or features!

Teacher Prep and Tips

Follow these steps for each group.

Use a sterile utensil to gently carve a line down the center of the plate into the agar surface.

Trace the carved line with a permanent marker on the bottom of the dish.



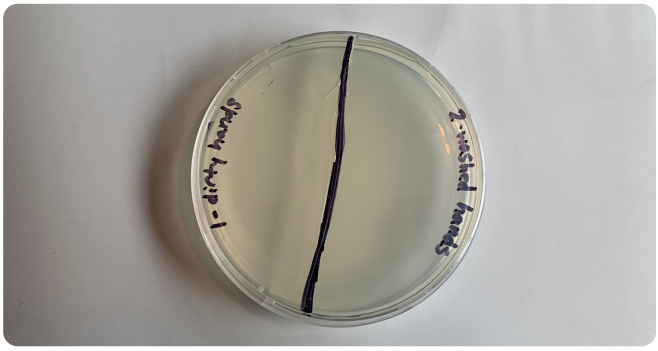
Teacher Tips:

- Prepared petri dishes should be refrigerated until used and always stored upside down.
- This keeps condensation from forming on the lid. When ready to use, let dishes come to room temperature before taking samples (about one hour).
- After students add the swab, replace cover on the dish and tape it closed. Store upside down.
- Let the bacteria grow in an undisturbed warm location. Do not place in sunlight or on a heating register.
- You should see growth within a couple of days. The dishes will start to smell which means the bacteria are growing.
- Before disposing of dishes in the trash, the bacteria should be destroyed with bleach.

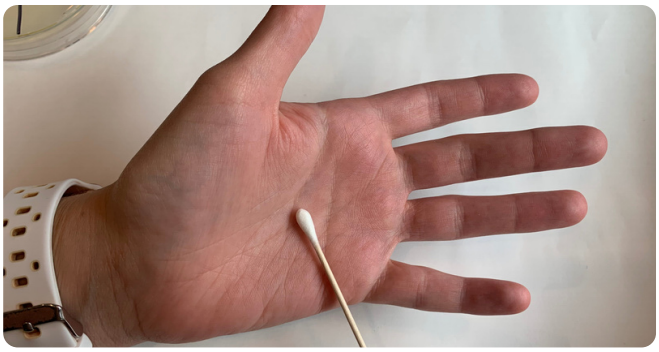
Testing for Bacteria

Follow the steps below to test your device.

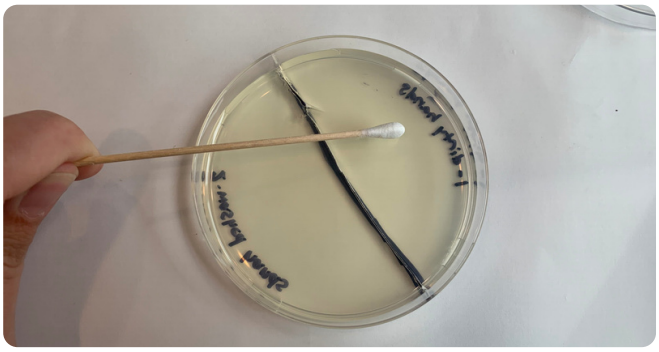
- Choose one group member to swab for bacteria.
- Acquire two prepared petri dishes from your teacher.
- Place Dish 1 (with Quadrant 1 and 2) in front of your group.



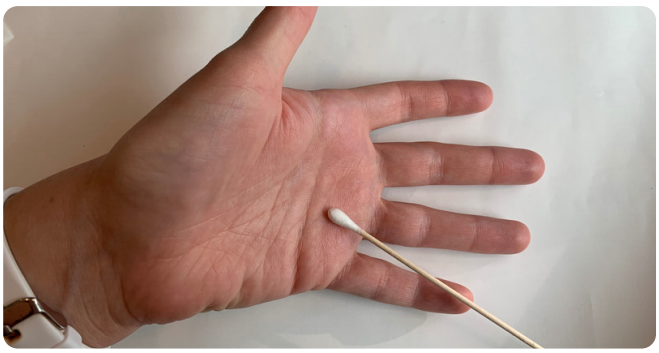
- Use a cotton swab to swab the palm of your chosen group mate. This will be your “dirty” sample.



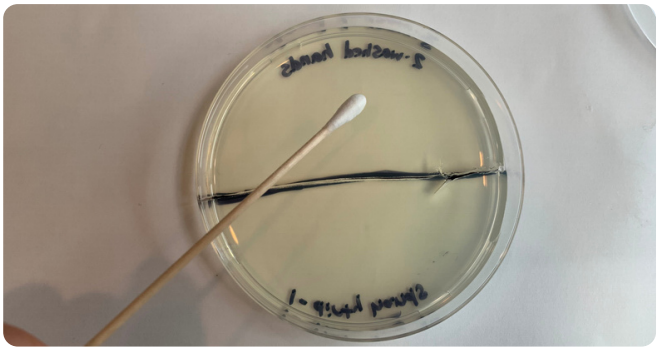
- Inoculate Quadrant 1 by streaking a pattern gently across the agar surface without tearing into it.
- Make sure that you are only streaking the swab across the agar surface in Quadrant 1!



- Have the chosen group mate wash their hands thoroughly with soap and water. Have the group mate dry their hands with a clean paper towel.
- Use a new cotton swab to swab the freshly washed palm of your group mate.



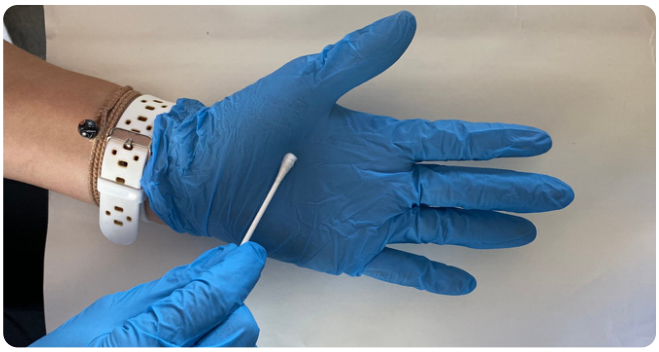
- Inoculate Quadrant 2 by streaking a pattern gently across the agar surface without tearing into it.
- Make sure that you are only streaking the swab across the agar surface in Quadrant 2!



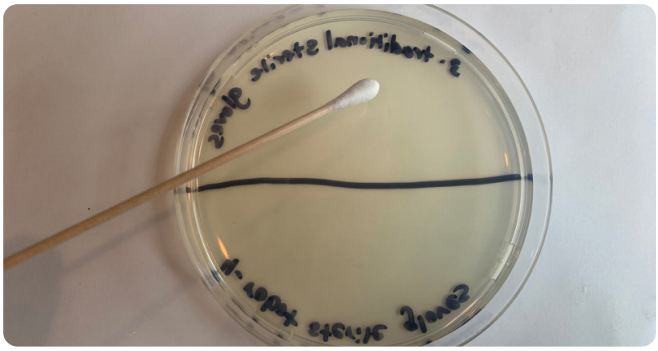
Sterile Glove Machine

- Place Dish 1 aside.

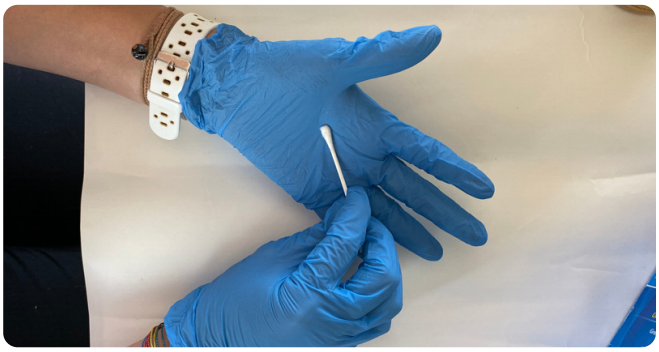
- Place Dish 2 (Quadrants 3 and 4) in front of your group.
- Have the same classmate follow the steps on Handout: Putting on Sterile Gloves
- Use a new cotton swab to swab the palm of your group mate's glove.



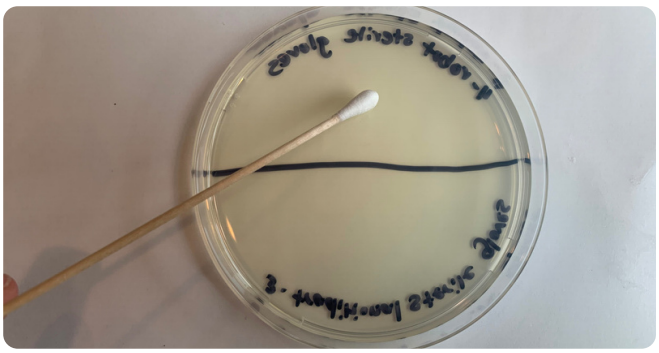
- Inoculate Quadrant 3 by streaking a pattern gently across the agar surface without tearing into it.
- Make sure that you are only streaking the swab across the agar surface in Quadrant 3!



- Remove the sterile glove from your group mate.
- Use your robot prototype to put a new sterile glove on your group mate.
- Use a new cotton swab to swab the palm of your group mate's glove.



- Inoculate Quadrant 4 by streaking a pattern gently across the agar surface without tearing into it.
- Make sure that you are only streaking the swab across the agar surface in Quadrant 4!



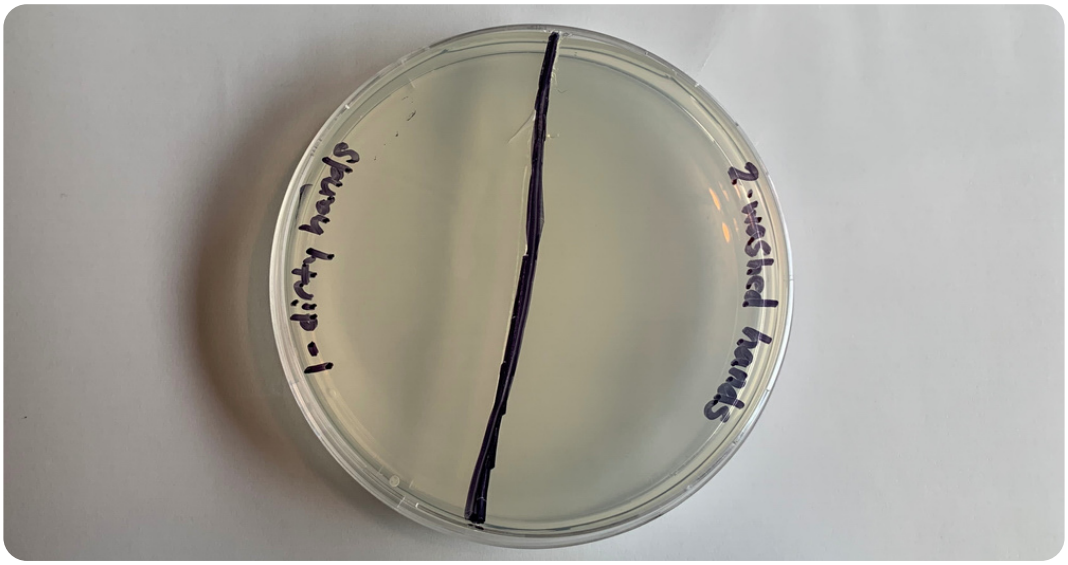
Agar Plates

Follow these steps to prepare your dishes.

- Note: only write around the edges of the dish, so you can see your bacteria growth.

Dish 1:

- Label quadrant 1: “1 - Dirty Hands”
- Label quadrant 2 : “2 - Washed Hands”



Dish 2:

- Label quadrant 3: “3 - Traditional Sterile Gloves”
- Label quadrant 4 : “4 - Robot Sterile Gloves”