

WASH YOUR HANDS!!!!

An LCM lesson on bacteria and the transmission of germs.

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Wasilla Middle School, 7th Grade Science

STANDARDS: Science A14a, A14c, B1, B2, B6, D3
Math D1 – D5
Cultural B1, B3, B4

SCIENCE CONCEPT: Students will be able to demonstrate that many diseases are easily avoided through good personal hygiene including simple washing of hands using soap.

MATERIALS: Glow-germ/ black light
Agar plates
Q-tips
Anti-bacterial soap, regular hand soap
Slides/slip covers if needed
Microscopes

VOCABULARY: monerans, bacteria, decomposers, parasites, autotrophs, heterotrophs, antibiotics

GEAR UP: Put glow-germ on surfaces that students normally touch such as the door knob, desk top, your hand (shake students hands as they come in). Using the black light, show students the “germs” they have come in contact with. *Where did you pick up the germs? What other surfaces might have germs?* Have students wash hands. Again, use light to show how poorly they washed. *What do you need to do to get your hands clean??* Have students try again, pointing out that they need to actually scrub with more than water.

(inferring, predicting, observing, communicating)

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EXPLORE: Give each pair of students a culture plate and several Q-tips. Have them mark the dish into quadrants. They are to explore through the room (school) to locate four surface areas where they think bacteria may be located. Using a clean Q-tip, they are to take a “sample” and put it on the medium. Label the quadrant. Do this four times. Cover and let the samples grow. Make sure students thoroughly wash hands after taking samples. Check on samples daily.

Which area do you predict will grow the quickest? Which will have the most growth? What do you predict will be the “dirtiest” surface and why? After several days (week), using a dissecting scope and not opening dish, observe growth. How many colonies of bacteria are growing in each section? What does this tell you? Do you see any patterns in the growth? Students may count/compare/graph colonies by location. Teacher may make slides to look at more carefully. Students should not open petri dish without gloves and goggles. These sample growths will be used in the experiment section so do not destroy!

(observing, predicting, communicating, classifying, inferring)

GENERALIZE: Discuss the outcomes of the samples. Have students share which areas grew the best sample and why. Again, talk about how hard they had to wash to get the glow-germ off their hands. *Why couldn't you see the glow-germ without the black light? Why is it necessary to use soap to wash your hands? How can you tell if you have washed enough?* Discuss with students all the different kinds of hand-soaps that are on the market. *Why do you think there are so many soaps? How can we choose which soap works best if we can't see the germs on our hands?* Tell students they are going to do a soap test to see if anti-bacterial soap works better than regular soap.

(Communicating, inferring, predicting, classifying)

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EXPERIMENT:

1. Have students work together by combining in sets of three pairs. (six students with three petri dishes)
2. Students should record observations of the three sets of petri dishes using both qualitative and quantitative observations. Pictures, as well as written descriptions, should be included in observation notes.
3. Students will then decide which dish gets plain water (control), which gets anti-bacterial, and which gets regular soap.
4. Students predict which dish will have the least amount of living growth at the end of the experiment and why.
5. Using eyedropper, students apply soap or water to the assigned dish. Let the dish sit covered till next meeting time.
6. Students record observations of dishes after the soap application.
7. Students compare their observations from before and after.
8. Students analyze their observations and draw a conclusion based on the outcome.
9. Students will turn in a formal lab write up that includes conclusions based on data gathered.

(Observing, collecting data, controlling variables, communicating, experimenting, predicting, inferring)

INTERPRET: *How did the results of your experiment compare with your predictions? Why do you think you got the results you did? What does this experiment tell us about hand washing without using soap/ with using soap? How is this important to us? What conclusions can you draw from this experiment? How could we express this mathematically (statistically)? What other experiments or tests could we do to test your conclusion?*

(Interpreting data, communicating, inferring, predicting, classifying)

APPLY: *When or where is hand washing not always possible? How do people who don't have water maintain good health habits and prevent illness? Discuss how rural communities frequently do not have water systems for toilets (honey buckets) and how that might affect the community health. Discuss other places where people are "contained" in*

a close environment (school, village, home). *You are on a cruise ship having a great time when you find out that several people have gotten a nasty stomach flu. What will you do to protect yourself? What advice could you give the Captain that he could use to keep other people from getting sick?* Write a letter to the Captain telling him of your previous findings (experiment) and your recommendations.

(Communicating, interpreting data, inferring)

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EXTENSIONS:

1. Have students research village health statistics showing the relationship between honey buckets and septic systems.
2. Have a guest speaker with the health dept come visit to discuss the spread of disease.
3. Allow students to do the exercise again, using soaps of their choice or wet wipes, etc., to see if they come up with the same results.
4. Have students research epidemics, tying in location and sanitation to the epidemic.
5. Debate the pros/cons of anti-bacterial soap versus regular soap or other cleaners.

Bacteria Lab Sheet

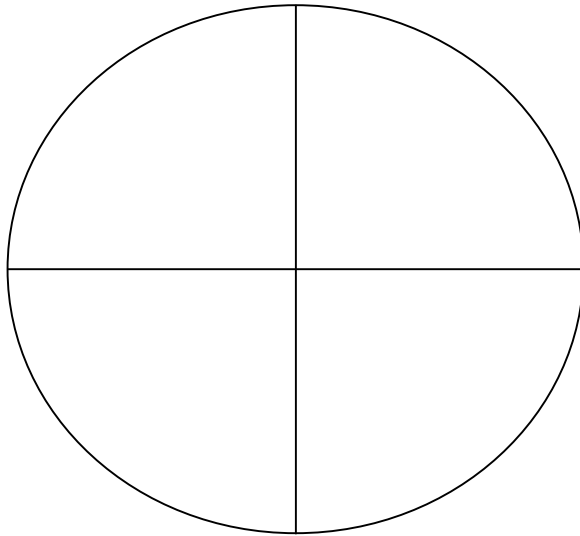
Quadrant A: _____

Quadrant B: _____

Quadrant C: _____

Quadrant D: _____

Diagram of Culture Plate
(label quadrants)



Day ____ Observations

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Scoring Guide

Parameters	Level 1	Level 2	Level 3	Level 4
How well do students understand “where” bacteria grow?	Student does not recognize that bacteria grow on a variety of surfaces. Sampling is difficult.	Student is able to recognize that bacteria grow on surfaces we come in contact with. Needs help with sampling choices.	Student is able to identify a variety of surfaces where bacteria might grow. Needs some help coming up with appropriate sampling areas.	Student is able to identify a variety of surfaces where bacteria might grow. Chooses appropriate sampling areas.
How well do students understand that using soap and diligent washing is required for good hygiene?	Student does not see the need to wash hands.	Student knows you need to wash your hands.	Student knows that washing hands with soap is needed.	Student is able to explain how to wash hands to be “germ free”.
How well do students see that using soap produces different results?	Student does not see the difference between soap and water for washing.	Student is able to recognize that soap had a different effect than water.	Student is able to explain that soaps worked differently but may be unclear as to which is best.	Student is able to explain how different soaps affect bacteria and which soap is best for cleanliness.

<p>How well do students understand that not all locals have the same sanitation facilities causing different health issues to arise?</p>	<p>Student does not recognize differences in community sanitation.</p>	<p>Student sees that modern sanitation isn't always available. Sees no connection to community health.</p>	<p>Student sees that modern sanitation is not always available but is not clear on the connection to community health.</p>	<p>Student is able to relate modern sanitation to good community health and explain why.</p>
<p>How well do students practice safe lab procedures while collecting and using samples?</p>	<p>Student needed constant reminding about lab procedures and expectations.</p>	<p>Student collected sampling and washed hands. With reminding, used proper lab procedures.</p>	<p>Student used Q-tips for sampling. Washed hands. Used proper lab procedures for the majority of the time (some reminding).</p>	<p>Student used sterile Q-tips for each sampling. Student washed hands after sampling. Student used safety equipment during lab proper lab procedures throughout.</p>