

Antibiotics report

Activities 1.2.1 to 1.2.4. What your plates actually licence you to recommend

You measured clear zones around antibiotic disks in millimetres. Turning those millimetres into a recommendation is a real clinical microbiology task, and it has one trap in it that catches almost everybody the first time.

HELPS ON THE WEBXAM

60 TO 90 MINUTES

ONE SITTING

NEEDS YOUR ZONE MEASUREMENTS FROM 28 SEPTEMBER

What this is

Assemble your disk diffusion measurements into a report that names an antibiotic, explains what the zones do and do not prove, connects the result to how resistance evolves, and ends in one stewardship recommendation you can defend.

This write-up used to sit on 29 September. It came off the calendar so that **aseptic technique** could take a full class block on that date, two class days before you streak your own plates on 1 October. Until now you were being asked to work sterile on the strength of a 25 minute worksheet you did at home. That was the single weakest link in the whole semester and this item is what paid for fixing it.

DOES THIS HELP ON THE WEBXAM? YES, AND ON THE DOMAIN THIS COURSE IS THINNEST IN

Culturing is 16.49 percent of WebXam 072130, about one question in six, and Medical Interventions gets to a plate on only a handful of days all semester. Your zone measurements are plate data: they exist because a lawn grew, or failed to grow, on an incubated agar surface. Writing about them properly is one of the few chances this course gives you to think in that domain on paper.

It also lands in **Biotechnology Research and Experiments, 11.34 percent**, because the report has to say what the measurement can and cannot support.

The trap, before you start

A BIGGER ZONE DOES NOT MEAN A BETTER DRUG

It is the most natural conclusion in the world and it is wrong. A zone of inhibition is the ring where that antibiotic, at the concentration that reached that distance, stopped the organism growing. Two different antibiotics diffuse through agar at different rates because they are different sizes and different chemistries, and each one has its own clinical breakpoint, the zone diameter that counts as susceptible for that drug.

So a 22 millimetre zone for one drug and an 18 millimetre zone for another does not rank them. Within a single antibiotic, a wider zone does mean the organism is inhibited at a lower concentration of that drug. Across antibiotics, the comparison needs the breakpoint table.

Your report should say this out loud. Getting this right is most of the difference between a report that reads like a student wrote it and one that reads like a laboratory wrote it.

What you need in front of you

GATHER THESE FIRST

- **Your disk diffusion data table:** antibiotic name, zone measurement in millimetres, and the ranking you wrote.
- **Your plate photograph**, if you took one.
- **Your mechanism notes** on what each antibiotic class attacks.
- **Your resistance and stewardship notes** from the flipped work.

Absent for the lab, or your plate failed? See Mr. Mendoza and ask for the class dataset. Working from a shared dataset is normal practice and you simply say in your methods line whose data it is. What you must not do is write numbers you did not measure and present them as your own.

Build it in order

- 1 **Rebuild your data table cleanly.** One row per antibiotic disk: the drug, the zone diameter in millimetres, and the bacterial strain it was tested against. Include any disk that produced no zone at all, and write 0, not a blank. A zero is a result.

Done when: every disk on your plate has a row, including the ones that did nothing

- 2 **Write one sentence per drug saying what the zone means for that drug.** Not a ranking. What that measurement licences you to say about that organism and that antibiotic.

Done when: no sentence compares two different antibiotics by zone width alone

- 3 **Write the Claim.** Name the antibiotic you would recommend and say what your recommendation rests on. If your data alone cannot separate two drugs, say that instead and name what extra information would settle it. That is a stronger claim, not a weaker one.

Done when: a reader can tell what your recommendation is and what it is based on

- 4 **Write the mechanism paragraph.** For the drug you recommended, say what structure it attacks and why attacking that structure harms a bacterium and spares a human cell. Then say in one line why the same drug does nothing to a virus.

Done when: the mechanism explains the result rather than sitting beside it

- 5 **Write the resistance paragraph.** Explain how a population of bacteria becomes mostly resistant, using mutation and horizontal gene transfer. Then connect it to your own plate: if resistance to your recommended drug spread through this organism, which of your other disks would you fall back on, and what would the plate look like then?

Done when: you name a specific fallback drug from your own data

- 6 **Write one stewardship recommendation** that follows from what you just wrote. One sentence, specific enough that someone could actually do it. 'Use antibiotics responsibly' is not a recommendation, it is a mood.

Done when: your recommendation names an action and who takes it

- 7 **Add one limitation.** One real one is sitting right there: a disk diffusion result is a measurement on agar, and a patient is not agar. Say something specific about what that gap changes.

Done when: your limitation is about this method, not about being careless

- 8 **Name, period, submit.**

Done when: your plate photograph, if you have one, is attached and legible

Fill this in as you go

YOUR DISK DIFFUSION DATA, REBUILT CLEAN

ANTIBIOTIC ON THE DISK	ZONE IN MM	STRAIN TESTED	WHAT THIS MEASUREMENT LICENCES YOU TO SAY

YOUR CLAIM, IN ONE SENTENCE

YOUR STEWARDSHIP RECOMMENDATION, IN ONE SENTENCE

Zone of inhibition

The clear ring around a disk where the organism did not grow. Measured across the full diameter, through the disk, in millimetres.

Minimum inhibitory concentration

The lowest concentration of a drug that stops an organism growing. Within one antibiotic, a wider zone points to a lower MIC.

Breakpoint

The zone diameter that counts as susceptible for one specific drug against one specific organism. It is why zones cannot be compared across drugs without a table.

Horizontal gene transfer

Bacteria passing genes sideways to living neighbours rather than down to offspring. A resistance gene on a plasmid can cross into a susceptible cell in one event.

Stewardship

Using antibiotics in a way that keeps them working. It is a population-level argument, which is why it can conflict with what is best for one patient today.

If you get stuck

Two of my zones are within a millimetre of each other.

Then your data does not separate those two drugs and your report should say so. Measurement to the nearest millimetre by eye and ruler is not precise enough to call a one millimetre difference. Naming the resolution limit of your own method is exactly the kind of sentence that earns credit.

One disk had no zone at all.

That is a result and a useful one. It says this organism grew right up to the disk at that concentration. Report the zero and say what it tells you. Zeros are data.

My zone is not a circle.

Say so and describe the shape. Colonies growing inside a zone, or a zone with a ragged edge, can mean a resistant subpopulation is present. That observation is worth more than a tidy number.

I do not know which structure my antibiotic attacks.

It is in your mechanism notes from the flipped work, and Activity 1.2.1 Antibiotic Therapy in myPLTW has it. If the class of your disk is not obvious from its abbreviation, ask Mr. Mendoza which class it belongs to. Asking which class is fine. Guessing is not.

Can I say the biggest zone is the best antibiotic?

No, and the paragraph explaining why not is the strongest paragraph available to you in this report. Read the red panel on the first page again and write that.

What to hand in

THE FINISHED REPORT

- **Where it goes.** The same place as everything else. Your class form on the portal, or handed to Mr. Mendoza in person. Nothing about extra credit needs a different route.
- **What to hand in.** Your written pages, plus photographs of anything the handout asks you to photograph. Photographs of handwritten pages are fine. A photograph you cannot read is not.
- **Put your name and period on every page and every photograph filename.** Unlabelled work cannot be credited and it is the single most common way points get lost.
- **When.** Any day after the pack opens, right up to the last week of the semester. There is no deadline inside that window and no penalty for going slowly.
- **Feedback.** You get it back with a note. If a piece is short of full credit you may fix the named thing and resubmit once.

HOW BIG THIS ITEM IS: ONE WORK SESSION

About 60 to 90 minutes in one sitting. All writing and table work from data you already have. Nothing here needs the laboratory.

The point value is printed on the portal the day this item opens, on the item's own card and in the gradebook entry. It is not printed here, because a number on paper and a number in the gradebook that disagree is worse than no number at all. Extra credit in this class is capped per semester, so check the cap on the portal before you start a fourth item.