

Required response record

MI / Genetics of Disease - September 25, 2026

Your Sensitivity and specificity data table

Parts A to E in one data table: definitions and layout, ten sorted practice rows with counts, two computed rates, the 1,000-person practice rates and positive column, and two limit sentences

Every row and count is practice for the made-up Infection Q from Tuesday. No real disease, test or person. No classroom ELISA well, plate photo or lab result is used. Sensitivity counts the people with the condition who were caught; specificity counts the people without it who were cleared. Each needs a reference standard to be counted at all. A screening result is never a confirmation; in the scenario, only the confirmatory test settles the question. None of that supplies a reference standard for unknown samples, so a classroom run, by itself, cannot place its wells in the rows of this table or produce a sensitivity or specificity. This is your position about a practice scenario, not a rule and not medical advice.

Use your period and code, not your name.

Period and code

Date

Parts included: A, B, C, D, E

Route: paper handed in, or one PDF

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R1. Your one data table

Today you complete one Sensitivity and specificity data table with five parts. Part A defines the two rates and labels the layout. Part B sorts ten supplied practice rows and counts the cells. Part C computes the two rates from your counts. Part D computes them for Tuesday's 1,000-person practice table and reads its positive column. Part E states two limits. One table, submitted once.

Every row and count is practice for the made-up Infection Q from Tuesday. No real disease, real test or real person appears here. No classroom ELISA well, plate photo or lab result is used, and you will see in R6 why it could not be.

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R2. Two rates, two names

Tuesday you argued about a false alarm and a missed case. Today each error gets a rate.

Sensitivity is the proportion of people who have the condition whose test comes back positive. In the StatPearls chapter on diagnostic testing accuracy (NCBI Bookshelf, Issues of Concern), it is "the proportion of true positive tests out of all patients with a condition." Formula: $\text{sensitivity} = \text{true positives} \div (\text{true positives} + \text{false negatives})$, written $a \div (a + c)$.

Specificity is the proportion of people who do not have the condition whose test comes back negative. The same chapter calls it "the percentage of true negatives out of all subjects who do not have a disease or condition." Formula: $\text{specificity} = \text{true negatives} \div (\text{true negatives} + \text{false positives})$, written $d \div (b + d)$.

The letters come from the layout in F1: a is a true positive, b a false positive, c a false negative, d a true negative. Sensitivity uses only the row of people who have the condition (a and c). Specificity uses only the row of people who do not (b and d). A plain way to hold them: sensitivity counts the people with the condition who were caught; specificity counts the people without it who were cleared.

Write A1 in your own words and copy both formulas, naming the letters. Label A2.

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R3. The table needs a reference standard

A 2x2 table has rows for what is actually true and columns for what the screen said. To place anyone in a row, someone has to know whether that person really has the condition. That knowledge comes from a reference standard: a screening test is assessed by its agreement with a recognised gold standard method of establishing the diagnosis (NCBI Bookshelf, Methods of assessing diagnostic test accuracy). In Tuesday's scenario, the reference standard was the confirmatory laboratory test.

Your ten practice rows each carry a supplied status, decided by that scenario's reference standard, and a supplied screen result. You can sort them only because the status is given. Keep that fact for E2.

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R4. How to sort a row

Read the supplied status first, then the supplied result.

- Has Infection Q and screen positive: true positive (TP, cell a).
- Has Infection Q and screen negative: false negative (FN, cell c).
- Does not have Infection Q and screen positive: false positive (FP, cell b).
- Does not have Infection Q and screen negative: true negative (TN, cell d).

The name of a cell is the result (positive or negative) plus whether the result was right (true or false). Sort all ten rows in B1, then count in B2. Your four counts must add to 10, and TP + FN must equal the number of rows that have Infection Q. If they do not, one row is missing or doubled; find it before computing anything.

For C1 and C2, use your own counts. Write each rate as a fraction, then a decimal, then a percent rounded to the nearest whole percent. If a decimal repeats, write about before the percent. Rounding is not a measurement claim; it is a way to report a fraction.

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R5. Read the 1,000-person table, then read one column

Tuesday's practice table is reprinted on your handout: 100 people with Infection Q, of whom 95 screened positive and 5 negative; 900 without it, of whom 90 screened positive and 810 negative; 185 positive screens and 815 negative screens in all. Compute both rates in D1 using the row totals 100 and 900 as denominators.

Then read only the positive column for D2. Count the positive screens and count how many of them are true positives. Write one sentence on why a positive screen result is not a confirmation, using those two numbers. A screening result is never a confirmation; in the scenario, only the confirmatory test settles the question. If you want a name for the share of positive screens that are true, the StatPearls chapter calls it the positive predictive value, $a \div (a + b)$. It is optional vocabulary today, not a required calculation.

Why does a clinic have to choose? The StatPearls chapter states the general pattern: "Sensitivity and specificity are inversely related: as sensitivity increases, specificity tends to decrease, and vice versa." The word tends matters; it is a common pattern, not a law for every test. For E1, take a position: which error should the scenario's clinic most avoid, a false negative or a false positive, and why? Use Tuesday's stipulations, reprinted here: after a positive screen, a confirmatory test and about three days at home; after a negative screen, nothing further unless symptoms appear; Infection Q can be passed to others while a person has it and is treatable once confirmed. Name the error, name what happens next to that person, and connect it to the rate that error lowers. This is your position about a practice scenario, not a rule and not medical advice.

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R6. What a classroom run cannot tell you, and how to submit

You may run an ELISA in this course. A run like that has positive and negative controls: references with an expected result, used to check that the test worked (September 18 reading). A control tells you about the run. It does not tell you the true status of any other sample on the plate. A sample's positive or negative interpretation also needs the test's decision rule and the known control results. None of that supplies a reference standard for unknown samples, so a classroom run, by itself, cannot place its wells in the rows of this table or produce a sensitivity or specificity. Your practice rows could be sorted only because each row's status was supplied. Write E2 from this paragraph, in one sentence.

Hand the paper table to Mr. Mendoza before leaving, or submit one PDF to Wk5 Data table: Specificity vs sensitivity by the due time shown in Schoology. Use your period and code. Do not submit twice. Keep the table with Tuesday's CER record.

This is local John Hay practice connected by title to PLTW Medical Interventions Activity 1.1.6, Final Diagnosis. It does not complete that official activity, it plots no standard curve and it estimates no unknown; those need measured data this lesson does not supply.

If you were absent, or lose your place: the ten rows and the 1,000-person table are on the handout and the portal page. Complete A1 and A2, sort and count, compute, read the column, write the two limits, and submit once. No lab, photo or separate absence response.

References opened for this lesson: StatPearls, Diagnostic Testing Accuracy: Sensitivity, Specificity, Predictive Values and Likelihood Ratios, section Issues of Concern; Methods of assessing diagnostic test accuracy, NCBI Bookshelf. Background, not extra assignments.

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F1. The 2x2 layout and the two rates

Practice layout, printed blank for A2. This is a teaching diagram, not data from any real test, run or person.

	SCREEN POSITIVE	SCREEN NEGATIVE
HAS THE CONDITION (by the reference std.)		
DOES NOT HAVE IT (by the reference std.)		

This is the blank A2 layout. R2 and R4 name the four cells and the four letters; you write them in.

SORT A ROW: read the supplied STATUS first -> then the supplied RESULT -> write TP, FN, FP or TN

YOUR WORK: A1 define + formulas -> A2 label layout -> B1 sort ten rows -> B2 count (sum 10)
-> C1, C2 rates from your counts -> D1, D2 the 1,000-person table and its positive column
-> E1 which error to avoid (your position) -> E2 why a classroom run cannot fill this table
-> submit once

Full text equivalent. The layout is printed blank and has two rows and two columns. The rows are what is true for a person, decided by a reference standard: the person has the condition, or does not. The columns are what the screen reported: positive or negative. Cell a is a true positive, a person with the condition who screened positive; cell c is a false negative, a person with the condition who screened negative; cell b is a false positive, a person without the condition who screened positive; cell d is a true negative, a person without the condition who screened negative. Sensitivity is a divided by the sum of a and c, and uses only the row of people who have the condition. Specificity is d divided by the sum of b and d, and uses only the row of people who do not. Reading the positive column, a divided by the sum of a and b is the share of positive screens that are true; its optional name is positive predictive value. To sort a row, read the supplied status first, then the supplied result, then write TP, FN, FP or TN. Your work runs A1 to E2 in order and ends with one submission.

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Part A. The two rates and the 2x2 layout

A1. In your own words, define sensitivity and specificity. Then copy the two formulas from R2: sensitivity = $a \div (a + c)$ and specificity = $d \div (b + d)$, naming what a, b, c and d stand for.

Space: Four labeled lines. Sensitivity uses only the row of people who have the condition. Specificity uses only the row of people who do not.

Sensitivity definition:

Specificity definition:

Sensitivity formula with letters named:

Specificity formula with letters named:

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Part A. Label the printed layout

Label the 2x2 layout. Write the four cell names in the correct cells **FIRST**: TP where the condition is present and the screen is positive, FN where it is present and the screen is negative, FP where it is absent and the screen is positive, TN where it is absent and the screen is negative. **THEN** copy each letter from R4 beside its own cell name. The letters do not run left to right on this grid: a and c sit in the top row, b and d in the bottom. Letter them by reading order and sensitivity turns into a different rate without ever looking wrong. Circle the two cells sensitivity uses and box the two cells specificity uses.

Space: The printed 2x2 layout. Rows are what is true (has the condition or does not). Columns are what the screen said. A false positive sits in the row of people who do not have the condition, in the positive column.

	SCREEN POSITIVE	SCREEN NEGATIVE
HAS THE CONDITION (by the reference std.)		
DOES NOT HAVE IT (by the reference std.)		

This is the blank A2 layout. R2 and R4 name the four cells and the four letters; you write them in.

SORT A ROW: read the supplied STATUS first -> then the supplied RESULT -> write TP, FN, FP or TN

YOUR WORK: A1 define + formulas -> A2 label layout -> B1 sort ten rows -> B2 count (sum 10)
-> C1, C2 rates from your counts -> D1, D2 the 1,000-person table and its positive column
-> E1 which error to avoid (your position) -> E2 why a classroom run cannot fill this table
-> submit once

Four cell labels:

Four letters:

Circled and boxed cells:

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Part B. Sort the ten rows and count

Practice rows. The infection (Infection Q), the screen and every status and result are made up for this lesson. The status column is supplied by the scenario's reference standard so the rows can be sorted.

For each of the ten supplied practice rows S01 to S10, read the supplied reference-standard status, then the supplied screen result, and write TP, FN, FP or TN in the classification column. Space: One cell per row. Status first: has Infection Q means the answer is TP or FN; does not have it means FP or TN. Then the result decides which.

Row	Status by reference standard (supplied)	Screen result (supplied)	Your classification (TP, FN, FP or TN)
S01	has Infection Q	positive	
S02	does not have Infection Q	negative	
S03	has Infection Q	negative	
S04	does not have Infection Q	positive	
S05	does not have Infection Q	negative	
S06	has Infection Q	positive	
S07	does not have Infection Q	negative	
S08	has Infection Q	positive	
S09	does not have Infection Q	negative	
S10	does not have Infection Q	negative	

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Part B. Count the four cells

Count your B1 classifications: how many TP, FN, FP and TN. Check that the four counts add to 10 and that TP + FN equals the number of rows with Infection Q. Space: Four count boxes and one check line. If the counts do not add to 10, one row is classified twice or not at all. Go back to that row.

TP count:

FN count:

FP count:

TN count:

Sum check:

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Part C. Both rates from your own counts

C1. Sensitivity from your counts: $TP \div (TP + FN)$. Write the fraction, the decimal and the percent to the nearest whole percent.

Space: Three short lines. The denominator is the number of rows with Infection Q, not 10.

Fraction:

Decimal:

Percent:

C2. Specificity from your counts: $TN \div (TN + FP)$. Write the fraction, the decimal and the percent to the nearest whole percent. If the decimal repeats, write about before the percent.

Space: Three short lines. The denominator is the number of rows without Infection Q, not 10.

Fraction:

Decimal:

Percent:

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Part D. The 1,000-person table and its positive column

Practice numbers from Tuesday's scenario

Practice scenario. The infection, the test, the clinic and every number are made up for this lesson. Nothing here describes a real disease or a real test.

	Screen positive	Screen negative	Row total
Has Infection Q (100 people)	95 true positives	5 false negatives	100
Does not have Infection Q (900 people)	90 false positives	810 true negatives	900
Column total	185	815	1,000

What happens next in the scenario

- After a positive screen, the person is asked to take the confirmatory laboratory test and to stay home until its result returns, about three days later.
- After a negative screen, nothing further happens unless symptoms appear.
- In this scenario, Infection Q can be passed to others while a person has it, and it is treatable once confirmed.
- A screening result is never a confirmation; in the scenario, only the confirmatory test settles the question.

D1. For the 1,000-person practice table (95 TP, 5 FN, 90 FP, 810 TN), compute sensitivity and specificity as fractions and percents.

Space: Two lines. Use the row totals 100 and 900 as the denominators.

Sensitivity fraction and percent:

Specificity fraction and percent:

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Continued

D2. Read the positive column of the 1,000-person table: how many positive screens are there, and how many of them are true positives? Then write one sentence on why a positive screen result is not a confirmation, using those two numbers.

Space: Two short lines and two writing lines. Optional vocabulary: the share of positive screens that are true is called the positive predictive value, $a \div (a + b)$. You do not have to compute it.

Positive screens:

True positives among them:

Confirmation sentence:

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Part E. Two limits

E1. One sentence: which error should the scenario's clinic most avoid, a false negative or a false positive, and why? Use the scenario's stated next steps from Tuesday. This is your position, not a rule.

Space: Two writing lines. Name the error, name what happens next to that person in the scenario, and connect it to the rate that error lowers.

Position sentence:

E2. One sentence: why can a classroom ELISA run, by itself, not fill this table? Use the idea that a reference standard supplies the true status of each sample, and that a control checks the run rather than telling you the status of other samples.

Space: Two writing lines. Your practice rows could be sorted only because each row's true status was supplied. A run with unknown samples supplies no such status.

Limit sentence:

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Before you submit

Read the table once as a stranger would

- ☐ I define sensitivity and specificity as two separate rates, copy their formulas, and label the blank 2x2 layout in A2.
- ☐ I sort the ten supplied rows by reading the supplied status first, then the result, and my four counts add to ten.
- ☐ I compute both rates from my own counts, showing the fraction, the decimal and the rounded percent.
- ☐ I compute both rates for the 1,000-person table in D1 and read its positive column to explain why a positive screen is not a confirmation.
- ☐ I name in E1 which error the scenario's clinic should most avoid and why, I state why a classroom ELISA run cannot fill this table, and I submit one table once.

Complete one Sensitivity and specificity data table, Parts A to E. Hand the paper table to Mr. Mendoza before leaving, or submit one PDF to Wk5 Data table: Specificity vs sensitivity by the due time shown in Schoology. Use your period and code. Do not submit twice. Keep the table with Tuesday's CER record.

Hand the paper table to Mr. Mendoza before leaving, or submit one PDF. Do not submit twice.

Wk5 Data table: Specificity vs sensitivity

<https://clevelandmetro.schoology.com/assignment/8520303297>

Today's portal lesson

<https://mendozabiomed.org/learn/pltw-gend/day/2026-09-25>

A partner check of B1 and B2 is optional; guided notes are optional; neither is a submission.