

Activity 2.1.4

Routine Testing: In the Lab

Three panels, and what each one is actually asking the blood. The complete blood count, the lipid panel and the basic metabolic panel. What is counted, what a high or low value points at, and why the word normal has a footnote.

DATE	PORTAL DAY	LESSON	TURN IN
Wednesday 2026-10-16	Bloodwork and ranges	Lesson 2.1 Talk to Your Doc	Exit ticket

Where this sits. Day 1 of 2. Portal calendar label for today: Bloodwork and ranges.

01 Why today matters

Tomorrow you draw simulated blood and read a real patient's results, and results you cannot interpret are just numbers on a screen.

Today you learn what each of the three routine panels is asking, so that when you open the chart tomorrow you already know which body system every line is reporting on.

02 What you already know

- You know that a measurement is read against a range, and from Charlie's vitals you know a patient's own earlier values are often the better comparison.
- You know blood carries oxygen. Today you find out how much else it is carrying, and that most of a routine blood test is not about blood at all but about the organs the blood has just been past.

WHAT THIS SHEET WILL NOT TELL YOU

- No patient results are interpreted on this sheet. Tomorrow you open the chart.

03 Vocabulary

TERM	WHAT IT MEANS, PLAINLY
Plasma	The straw-colored liquid the blood cells float in. Everything dissolved in blood is dissolved in this.
Red blood cell (erythrocyte)	The cell that carries oxygen around the body.
White blood cell (leukocyte)	The family of cells that fight infection and respond to injury. There are five types.
Platelet (thrombocyte)	A cell fragment that makes blood clot. Too few and you bleed. Too many and you clot where you should not.
Complete blood count (CBC)	The panel that counts the cells: how many of each type, and how much oxygen-carrying protein they hold.

Hemoglobin	The protein inside red blood cells that actually grips the oxygen.
Hematocrit	The share of your blood volume that is red blood cells, given as a percentage.
Anemia	Not enough oxygen-carrying capacity in the blood. It shows up on more than one line of a blood count, which is the point of running a panel rather than a single test.
Reference range	The band of values that lab calls normal for that measurement. Different labs run different equipment, so the band is printed on the report and belongs to that report.
Lipid panel	The cholesterol test. It reports two carriers plus a total.
Lipoprotein	A package of fat and protein that moves cholesterol through blood, because fat does not dissolve in water.
LDL	Low-density lipoprotein. The carrier that delivers cholesterol out to cells.
HDL	High-density lipoprotein. The carrier that collects excess cholesterol and returns it to the liver.
Plaque	Fatty material building up inside an artery wall, narrowing the channel the blood has to move through.
Risk factor	Anything that raises a person's chance of a disease or injury. It is not a cause and it is not a diagnosis.
Basic metabolic panel (BMP)	The panel that measures dissolved substances rather than cells: sugar, salts and waste products.
Electrolyte	A dissolved mineral such as sodium, potassium, calcium or chloride. They hold the body's water balance and let nerves and muscle work.
Blood urea nitrogen and creatinine	Two waste products the kidneys are supposed to filter out. Their level in blood is a report on the kidneys, not on the wastes.
Biomarker	A measurable signal in the body that indicates risk, disease or injury. Cardiac biomarkers after a heart attack are the common example.
Fasting	Not eating for a set period before a test, usually 8 to 12 hours for cholesterol, so that the last meal is not part of the result.

Every term on this list is flagged for the illustrated glossary, scoped to this activity only. Terms are not shared forward or backward between activities, because a definition from a later activity can hand you an answer you were supposed to derive.

04 How to do the work

Reading and research day. You will build one table that you use again tomorrow, so build it properly.

- 1 Draw and label the composition of blood: plasma, red cells, white cells, platelets. Say in one line what each part does.
- 2 Build the blood count table. Rows: white blood cells, red blood cells, hemoglobin, hematocrit, platelets. Columns: what a low value can point at, what a high value can point at.
- 3 Fill in your assigned row by research, using health authority sources. For each cell, answer two questions: what does this say about how a body system is working, and which conditions are associated with it.
- 4 Share your row with the class and copy in the rows other groups researched. Everybody leaves with the whole table.
- 5 Copy the three cholesterol guideline tables below into your notebook. Read each one carefully, because the three rows do not all point the same direction and that is deliberate.
- 6 Write down, in your own words, what the two carriers do, and explain why the balance between them matters more than either number by itself.
- 7 Watch the cholesterol model and note what happens to the artery wall as excess builds up. Then answer: what happens to the pressure inside a vessel when the channel it flows through gets narrower, and why?

- 8 Record the substances measured in a basic metabolic panel and, next to each, the organ or system whose performance it reports on.
- 9 Research and record steps a person can take to keep cholesterol levels healthy. Distinguish clearly between changes with strong evidence behind them and advice you found without a source.

Total cholesterol guidelines.

TOTAL CHOLESTEROL	CATEGORY
below 200 mg/dL	optimal
200 to 239 mg/dL	borderline high
240 mg/dL and above	high

LDL guidelines. Read the direction of this one.

LDL	CATEGORY
below 100 mg/dL	optimal
100 to 129 mg/dL	near or above optimal
130 to 159 mg/dL	borderline high
160 to 189 mg/dL	high
190 mg/dL and above	very high

HDL guidelines. This one runs the other way. Notice it now, not in tomorrow's chart.

HDL	CATEGORY
60 mg/dL and above	considered protective against heart disease
40 to 59 mg/dL	protection rises as the value rises
below 40 mg/dL	a major risk factor for heart disease

05 Where students get stuck

- Assuming there is one normal range. There is not. Each lab runs its own equipment and publishes its own band, which is why the range is printed on the report next to the result. Read the range from the report you are holding, never from memory and never from a different report.
- Reading all three cholesterol tables the same way. On total and LDL, lower is the better direction. On HDL it is the opposite: the higher band is the protective one. Students who skim assume all three run the same way and then confidently misread a chart. Say out loud which direction each table runs before you use it.
- Treating a value outside the range as a diagnosis. An out-of-range value is a reason to look further. Anemia is the clean example of why: it shows on more than one line at once, which means a single line out of range does not settle it and several lines together might.
- Mixing up what causes what. The kidney markers are wastes the kidneys should have removed. A high level does not mean the wastes attacked the kidneys. It means the filter is not clearing them. Say which direction the causation runs, every time.
- Calling a risk factor a cause. A risk factor raises the chance of something across a population. It does not explain one person's illness and it does not predict it. Keep those sentences separate in your writing.
- Forgetting the fast. A cholesterol test usually asks for 8 to 12 hours without food, because the last meal is still in the blood otherwise. A result from an unfasted patient is not wrong, it is answering a slightly different question, and the chart should say which.

06 What you turn in

EXIT TICKET

One page, handed in at the end of the period. It must contain: your completed blood count table with all five rows filled in; the three cholesterol tables copied with the direction of each one stated in your own words; the basic metabolic panel substances each paired with the organ or system it reports on; and two sentences naming the single most useful thing you learned and the one thing you are still unsure about. The second sentence is not optional and it is not a place to be polite.

07 Check yourself

- ☐ A report shows a value of 44 for one measurement and the report's own printed range for it is 40 to 54. Your memory says the range is 45 to 60. Which do you use, and why? (Vocabulary, reference range)
- ☐ Name the two panels you would look at first if you wanted to know how well someone's kidneys are filtering, and say which lines you would read. (Vocabulary, the metabolic panel entries)
- ☐ Why does a low hemoglobin value on its own not settle a diagnosis, even when it is well outside the range? (Vocabulary, anemia)