

Activity 2.1.2

Vital Signs

Your first patient's numbers, and what a change is allowed to mean. Calculate body mass index, count a heart rate from video and a breathing rate from audio, then compare this visit against last year and decide what deserves a second look.

DATE	PORTAL DAY	LESSON	TURN IN
Thursday 2026-10-14	Analyze vital signs	Lesson 2.1 Talk to Your Doc	CER

Where this sits. Day 2 of 2. Portal calendar label for today: Analyze vital signs.

01 Why today matters

Yesterday you learned how easy a measurement is to get wrong.

Today you take a real patient's file and work out the three values the nurse did not record, then set this year's numbers beside last year's and say, on the record, which differences are worth chasing.

02 What you already know

- You can now take all five vital signs yourself, and you know each one moves with position, activity and stress.
- You have the reference ranges from yesterday's sheet. You will also need the Patient History Report you started for this patient in Activity 2.1.1.
- If you do not have one open, start it from the Patient History Report template before you do anything else, because everything you calculate today gets written into it.

WHAT THIS SHEET WILL NOT TELL YOU

- This sheet gives you the formula, the bands and the method. It does not work out any patient's value or name any patient's category.

03 Vocabulary

TERM	WHAT IT MEANS, PLAINLY
Body mass index (BMI)	A single number worked out from weight and height. It was designed to describe populations, and it behaves badly when it is used to judge one person.
Race-based algorithm	A calculation whose original data came from a narrow group of people and which then gets applied to everybody. When the population it is used on does not match the population it was built from, it produces unequal care.
Hypertension	Blood pressure that stays high across repeated readings on separate occasions. The key word is stays. One high reading is a reading, not a condition.
Elevated blood pressure	The category between normal and hypertension. Its value is that it is a warning early enough to act on.

Baseline	A patient's own earlier measurements, used as the comparison for the new ones. Two people can have the same number and only one of them has changed.
Trend	A direction that holds across more than one time point. One value is a dot. Two are a line. Three start to be a trend.
Patient record	The running file that holds vitals, conditions, treatments, procedures, medicines, lab results and billing for one person over time.
Electronic health record	That same file kept digitally. Faster to share and search, and a much larger target if it is not protected.
Referral	A written order from a primary care physician sending a patient to a specialist or a specific service.

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

Work through the file in order. Do the arithmetic on paper and show it, because a wrong BMI usually turns out to be a unit problem you can see once it is written down.

- 1 Open the patient's chart and copy today's recorded vital signs into your Patient History Report exactly as given, with units. Do not round anything yet.
- 2 Convert the recorded height into inches. This is the step that goes wrong. Feet times twelve, plus the leftover inches.
- 3 Calculate body mass index. Weight in pounds, divided by height in inches squared, then multiplied by 703. Write every stage of the arithmetic, not just the answer.
- 4 Read your BMI value against the published category bands in the table below and record which band it falls in. Then read the note underneath the table, because it changes what you are allowed to conclude from that band.
- 5 Play the fifteen second heart rate video. Count every beat. Multiply by four. Watch it a second time and count again. If your two counts differ, watch a third time before you write anything down.
- 6 Play the one minute breathing audio. Count each full breath. That number is already breaths per minute, so do not multiply it by anything.
- 7 Add the heart rate and respiratory rate to the chart, with units.
- 8 Put today's full set of vitals beside the set from the previous annual exam. Build a three-column comparison: measurement, previous visit, today. Add a fourth column for the change and write the direction as well as the size.
- 9 Mark every row where the value crossed out of the usual range, and every row where it moved a long way while staying inside the range. Both matter, for different reasons.
- 10 Write your claim, evidence and reasoning. Then list what you would measure or ask next, and say what each of those would tell you that you do not know now.

Body mass index categories, as published. Read the note underneath before you use them.

CATEGORY	BMI VALUE
Underweight	below 18.5
Healthy weight	18.5 to 24.9
Overweight	25 to 29.9
Obese	30 and above

Blood pressure categories from the American College of Cardiology and the American Heart Association.

CATEGORY	SYSTOLIC (MM HG)	DIASTOLIC (MM HG)
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Normal	below 120	and below 80
Elevated	120 to 129	and below 80
Hypertension stage 1	130 to 139	or 80 to 89
Hypertension stage 2	140 or higher	or 90 or higher
Hypertensive crisis	above 180	and or above 120

WHAT BODY MASS INDEX CAN AND CANNOT TELL YOU

- It came from data on a narrow, mostly non-Hispanic white population from earlier generations, and it is applied now to a population that looks nothing like that.
- It tracks body fat reasonably well across a whole population and loses that power when you point it at one individual, which is exactly what you are doing today.
- In 2023 the American Medical Association adopted a policy saying it should be used alongside other measures, such as waist circumference, body composition and metabolic factors, and never as the only reason to deny somebody care or coverage.
- So: calculate it, record it, name the band, and then say in your reasoning what it does not establish. A conclusion built on this number alone is a conclusion you cannot defend.

05 Where students get stuck

- Squaring the height in feet. The formula wants inches. Five feet eight is 68 inches, and 68 squared is 4624. If you square 5.67 you get a BMI in the hundreds and it will look obviously wrong, which is the lucky version. Getting the units subtly wrong is the dangerous version.
- Losing the 703. That constant is what makes the pounds-and-inches version match the metric version. Without it your answer is off by a factor of about 700 and the band you read is meaningless.
- Multiplying the breathing count. The heart rate clip is fifteen seconds, so it needs times four. The breathing audio is a full minute, so it needs nothing. Multiplying it anyway is the single most common error on this activity, and the result still looks like a plausible number.
- A miscount of one becomes a miss of four. On a fifteen second count, every beat you miss costs four beats per minute in the final figure. That is why you watch it twice.
- Calling one reading a diagnosis. A single blood pressure value places a reading in a band. It does not place a person in a category. Hypertension is defined by readings that stay high across separate occasions, so the honest move is to name the band, say it is one reading, and say what you would do to find out whether it holds.
- Only flagging the rows that left the normal range. A value that moved a long way and is still technically normal can be the more interesting row, because the patient's own baseline is the comparison that matters, not the population range.

06 What you turn in

CER

A claim, evidence, reasoning response written into the Patient History Report. Claim: which findings from today's exam deserve further investigation. Evidence: the specific values, with units, from today and from the previous annual exam, plus your worked BMI arithmetic and both heart rate counts. Reasoning: for each finding, why that number or that change matters, which reference range or baseline you compared it against, and what the measurement cannot establish on its own. Finish with the next steps you would order and any referrals.

07 Check yourself

- ☐ A patient is 5 feet 4 inches and 150 pounds. Write out the BMI calculation, in order, without giving the final value away to your neighbor. (How to do the work, steps 2 and 3)
- ☐ A blood pressure reading falls in the stage 1 band. Write the one sentence you are allowed to put in the chart about it. (Vocabulary, hypertension)
- ☐ One value dropped from the top of the normal range to the bottom of it since last year. Is that worth flagging? Defend either answer in two sentences. (Vocabulary, baseline and trend)