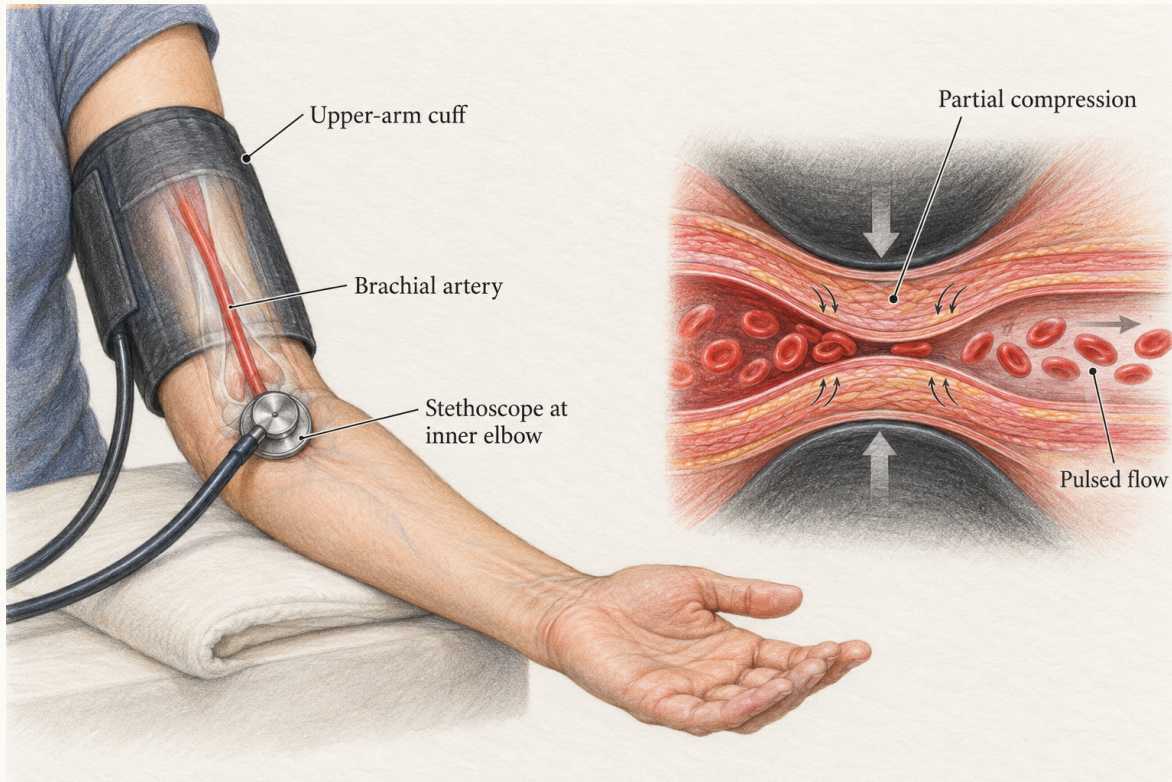


Hear the transition

A complete beginner guide to manual blood pressure with a cuff, pressure gauge, and stethoscope.

The fictional learner hears almost nothing through an expensive stethoscope. The equipment looks right, yet the needle keeps falling. The next useful step is to check the setup and learn which sound transition matters. This guide follows BP-A, an original adult training model, from preparation to a defensible 118/76 mmHg record.



Know, pages 2 to 3: understand pressure, terms, and equipment. Do, pages 4 to 8: prepare, fit the cuff, estimate a target, and listen while releasing pressure. See it done, pages 9 to 11: follow the exact sound and gauge evidence. Your work, pages 12 to 13: troubleshoot and explain separate fictional examples. Page 14 is your source and term reference.

Begin with the companion model or simulation. Any live practice is voluntary and teacher- or nurse-supervised. Keep real health information private. You may use fictional records instead. No new required submission is added.

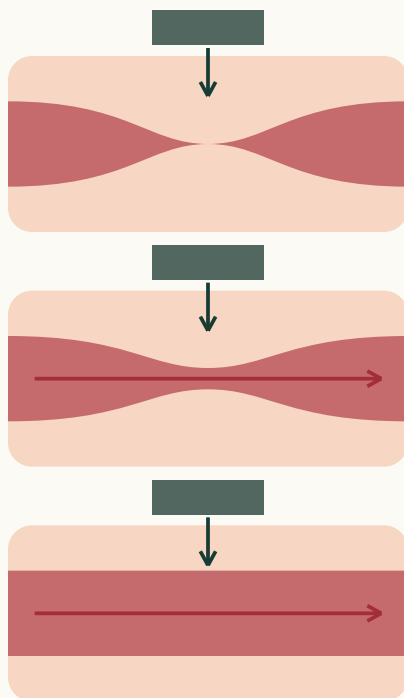
Illustration: approved colored-pencil teaching schematic, not to scale. The cuff contains air; no instrument enters the artery. The small artery inset explains partial compression rather than depicting a patient measurement.

Pressure changes within each beat

Blood pressure is the force per unit area exerted by blood against artery walls.

An artery carries blood away from the heart. A vein carries blood toward the heart. The brachial artery runs through the upper arm and is the listening site for this method. A ventricle is a lower pumping chamber of the heart. The left ventricle ejects blood into the body's arteries.

Systole is ventricular contraction and ejection. Systolic pressure, the upper number, is the peak arterial pressure during that part of the beat. Diastole is the relaxation interval between beats. Diastolic pressure, the lower number, is the lower arterial pressure during that interval. Artery recoil helps maintain pressure and forward flow between contractions, so pressure does not drop to zero. A pulse is the arterial pressure wave associated with each heartbeat. The pulse-related cuff sounds used in this method are called Korotkoff sounds. [S3, S6]



Cuff pressure above systolic

The cuff prevents flow through the compressed segment. No Korotkoff sounds.

Between systolic and diastolic

Pulsatile reopening and tissue vibration can produce rhythmic Korotkoff sounds.

Cuff pressure below diastolic

The artery stays sufficiently open through the beat. Korotkoff sounds disappear.

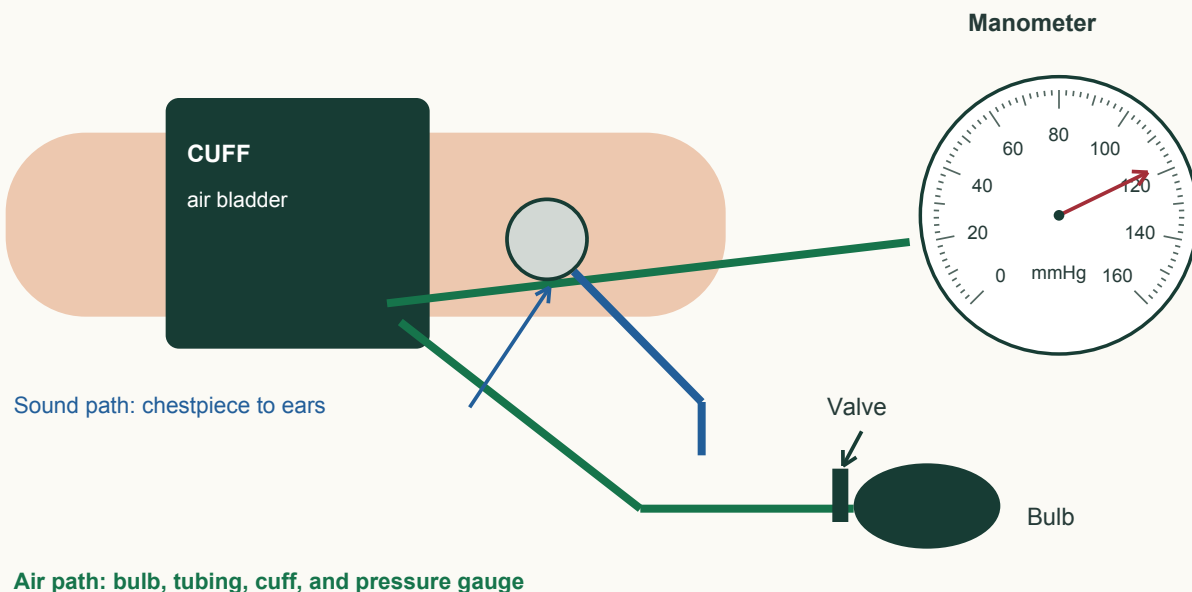
mmHg means millimeters of mercury, a historical pressure unit. A mechanical, or aneroid, gauge can report mmHg without containing mercury. The manual cuff method estimates arterial pressure from sound transitions while known external pressure falls. The gauge measures the cuff's air pressure, not blood directly. [S1, S3]

The sounds are not heart-valve "lub-dub" clicks. During partial cuff compression, arterial pulse waves can drive arterial-wall and surrounding-tissue vibration. Recent research emphasizes nonlinear pulse-wave motion and tissue shear vibration; sound generation is more complex than flow turbulence alone. [S5]

Trace air and sound separately

A sphygmomanometer is the cuff-and-pressure instrument used to measure blood pressure.

The cuff is the wrap. Its inflatable inner bladder applies pressure around the arm. The bulb pumps air into that bladder. The valve controls air release. The manometer is the pressure gauge; an aneroid version uses a mechanical pressure-sensitive element and a needle. The stethoscope carries sound from its chestpiece to your ears. These are two different pathways.



Also gather a tape for mid-upper-arm circumference, a cuff whose printed range matches that measurement, a timer or second hand, and manufacturer-approved cleaning supplies. One "adult" cuff does not fit every adult. Correct fit depends on the arm and the cuff's specified range. [S1]

Before use, the teacher checks that a fully deflated aneroid gauge rests at zero and that tubing, connections, valve, and stethoscope are intact. A nonzero resting needle, leak, crack, or damaged part needs attention; do not correct a result by subtracting an imagined offset. Calibration is verification against an appropriate standard and is handled through the equipment procedure. [S1]

The gauge drawing is a simplified 0 to 160 mmHg teaching scale with 2 mmHg divisions. Real instruments may have a wider range. Read your instrument's actual markings.

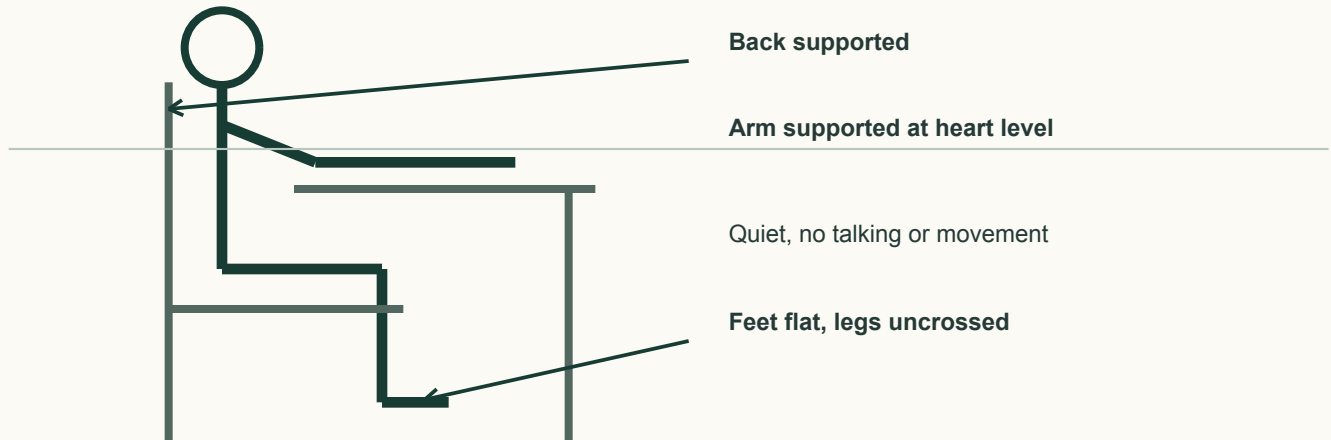
Give the measurement a fair start

Position and rest affect the result. Good technique begins before inflation.

In the story, the teacher first offers a choice: use the model or volunteer for supervised practice. Permission to practice is not permission to share a health number. Keep a volunteer's record private. Never put a real classmate's values in the public practice table, class chat, or a shared presentation.

Ask the teacher or nurse privately whether an arm is appropriate for a cuff. Mention any intravenous (IV) line, dialysis access, prior procedure, injury, or other concern before starting. Do not choose an arm by guessing about a medical condition. If there is pain, numbness, or discomfort, stop and fully release cuff pressure. Never leave a cuff inflated or repeatedly pump it without rest.

POSTURE SCHEMATIC, NOT TO SCALE



For a standard resting measurement, avoid exercise, caffeine, and tobacco for 30 minutes beforehand. Empty the bladder. Sit quietly for at least 5 minutes, with back supported, feet flat, and legs uncrossed. Support the bare arm so the cuff is at heart level; do not hold it up using muscle effort. Avoid tight rolled-up clothing that constricts the arm. [S1, S2]

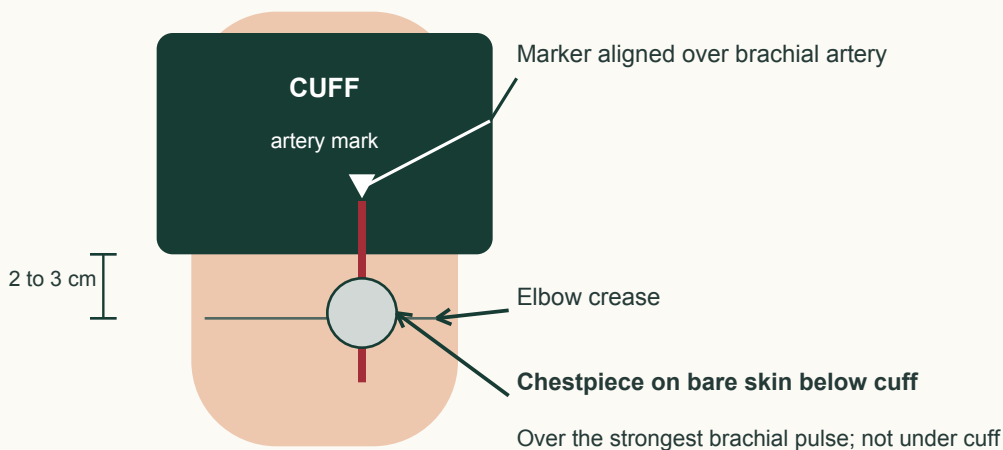
Prepare a quiet space. Talking, tense muscles, dangling feet, and unsupported posture can affect a reading. A record should describe conditions honestly. If the setup is interrupted, reset and rest instead of pretending the preparation happened. [S2]

Make the listening site predictable

To palpate means to feel with your fingers. To auscultate means to listen with an instrument.

With the arm comfortably supported, use finger pads to find the brachial pulse on the inner elbow toward the medial, or body-facing, side. This is where the brachial artery lies close enough to feel. Do not use your thumb; its own pulse can confuse you. If you cannot locate the pulse, ask the teacher before inflating anything.

Measure the middle of the upper arm around its circumference. Select a cuff whose manufacturer's printed range includes that measurement. Wrap it snugly according to its instructions, align its artery marker with the brachial artery, and place the lower cuff edge 2 to 3 cm above the elbow crease. The chestpiece needs room below the cuff. [S1]



Arrange the gauge so you can see it without twisting or losing your listening position. Keep its face close to eye level and read squarely to reduce parallax, the apparent shift caused by viewing an angled needle. The pulse at the wrist, called the radial pulse, has a separate job: it will help estimate an inflation target on the next page.

A cuff under clothing, a misplaced artery marker, or a chestpiece squeezed under the cuff can undermine the measurement. Fix the fit before trying again. Needle wiggles do not replace listening endpoints.

Choose an inflation target safely

A palpatory estimate helps avoid missing the true first sound or inflating to an arbitrary number.

The teacher supervises this step. At the wrist, find the radial pulse with your finger pads before you begin. Gently close the valve, usually clockwise, without forcing it. While continuing to feel the pulse, inflate until the radial pulse disappears. Read and remember the gauge at that point. Then fully deflate the cuff. This is an approximate palpatory systolic estimate, not a full blood pressure reading. [S1, S3]

BP-A teaching event	Fictional value / action
Radial pulse disappears	Approximately 120 mmHg
After this estimate	Fully release cuff pressure; rest at least 1 minute
Listening inflation target	$120 + 30 = 150$ mmHg
Listening deflation rate	About 2 mmHg per second

This guide uses the AHA statement's 30 mmHg above the pulse-disappearance estimate for the listening target. In BP-A, the target is 150 mmHg. The approximate palpatory estimate of 120 and the later listening onset of 118 need not match exactly. They are different observations, and palpation provides an estimate. [S1]

After full deflation, wait at least 1 minute, or the teacher's specified 1 to 2 minute interval, before the listening measurement. The arm needs recovery time. Repeated rapid pumping can cause discomfort and distort the procedure. If the starting pulse cannot be felt, a target cannot be set reliably by this method; get help instead of selecting 200 mmHg by habit.

Why estimate if you plan to listen?

An auscultatory gap is temporary disappearance of sounds during deflation before they return. Without an adequate starting target, a listener could miss the earlier systolic onset and mistake the later returning sounds for the first onset. The palpatory estimate helps protect against that error. A beginner who suspects a gap should fully release pressure and ask the teacher, rather than diagnose the pattern. [S1, S3]

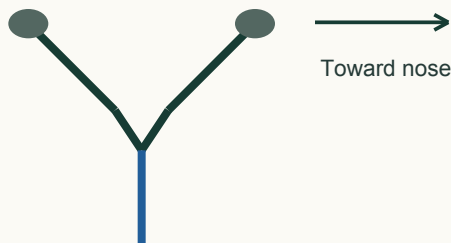
Stop and fully deflate for pain, numbness, or discomfort. The target is teacher-established for the model or appropriate volunteer; it is never permission to keep pumping until you hear something.

Give the faint sound a clear path

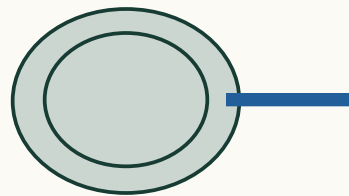
Price cannot overcome a backward earpiece, an inactive chestpiece, noise, or rubbing.

Hold the headset so the eartips point forward toward your nose as they enter your ears. This follows the direction of the ear canals. Use a comfortable seal; loose tips leak sound and painfully tight tips distract you. Inspect tubing and connections for damage. Clean shared equipment according to the manufacturer's instructions and the teacher's routine. [S4]

EARPIECES FACE FORWARD



CHESTPIECE AND ACTIVE FACE



Bell or diaphragm: follow your model's instructions

On a two-sided chestpiece, rotate the stem to activate the intended side if that model requires it. The open side must be the side you place on the arm. Stethoscopes differ, so use the exact manufacturer's instructions. Some have tunable diaphragms whose response changes with pressure. Do not assume that pressing as hard as possible improves hearing. [S4]

Place the active bell or diaphragm directly on bare skin over the strongest brachial pulse, below the cuff. Hold it steady with a light, comfortable seal. Do not tuck it under the cuff. Keep your fingers from rubbing the chestpiece, and prevent tubing from scraping against the cuff, clothing, desk, or each other. [S1, S3, S4]

Before inflation, settle your hands, gaze, and listening position. If the teacher uses an equipment check, follow the appropriate procedure. Do not strike or hard-tap a chestpiece while it is in your ears. Once pressure is high, do not spend time hunting around the arm for a sound; release fully and reposition.

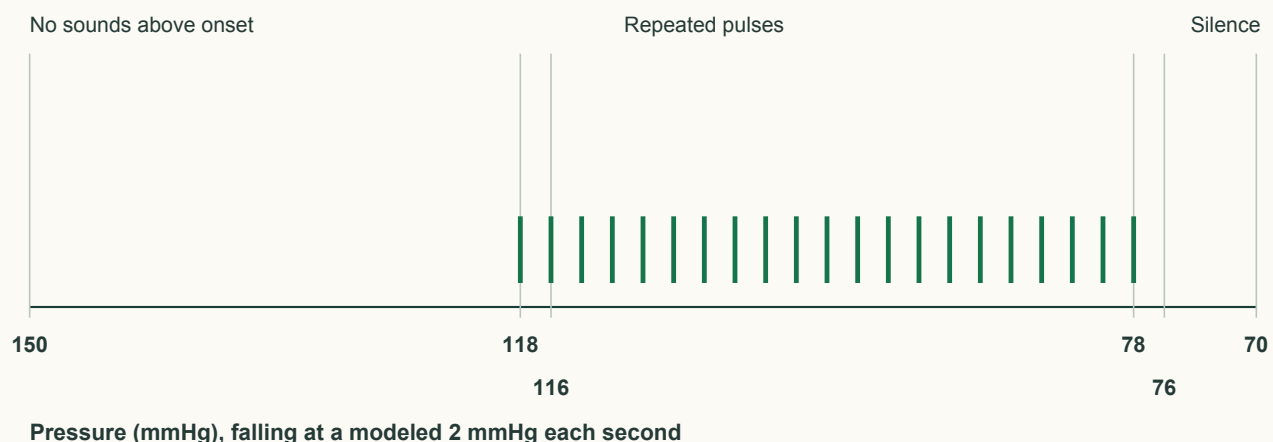
Quiet comes first. A teacher may demonstrate with a dual-head training stethoscope if available, so learner and teacher hear the same signal. If the sound is still unclear, use the fictional model and ask for a technique check.

Release slowly enough to read

The valve controls how much time you have to identify each sound transition.

For BP-A, the teacher-established target is 150 mmHg. With the stethoscope already settled, gently close the valve and inflate promptly to that target. Open the valve only slightly, usually counterclockwise, so the gauge falls about 2 mmHg per second. A change of 10 mmHg should take about 5 seconds. Keep breathing normally; no talking or breath-holding. [S1, S3]

Read the gauge while listening. Do not fix your eyes on every needle twitch. A transmitted pulse can move the needle, but the onset and disappearance of the sounds are the endpoints for this method. If pressure drops too fast or you lose your listening position, fully release, rest, and ask the teacher before repeating.



In the idealized simulation, pressure falls from 150 to 70 mmHg over 40 seconds: $(150 - 70) / 2 = 40$. At second 16 it reaches 118 mmHg and the first modeled tap occurs. At second 17, the next tap at 116 mmHg confirms that the onset is part of a repeated pattern. Keep the first onset level, 118, for the systolic value.

Later taps continue once per second in this simplified model, down to a last modeled tap at 78 mmHg at second 36. The first expected beat with no modeled sound is at 76 mmHg at second 37. That is the model's disappearance transition. Continue listening briefly to confirm silence at following expected beats, then fully release remaining cuff pressure promptly.

The timeline uses artificial, perfectly regular pulses and a constant pressure drop to make the method visible. Real pulses, pressures, and sound transitions vary. A trained observer determines real endpoints; the animated needle and synthetic sounds do not calibrate equipment.

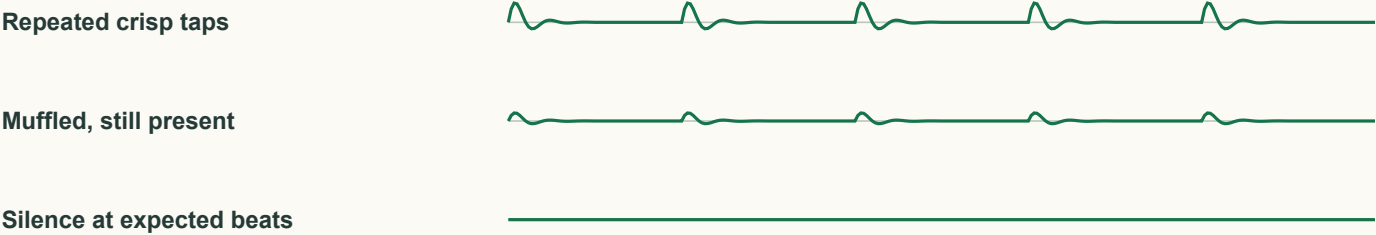
A tap, a muffle, then silence

Korotkoff sounds are pulse-synchronous events, not a continuous tone and not the heart's valve sounds.

At first, above systolic pressure, the compressed artery does not reopen through the cuffed segment and you hear no Korotkoff sounds. As cuff pressure falls, the first sounds may be faint, crisp taps. Listen for the same kind of event repeating with successive pulses. Do not wait for a dramatic, loud noise before marking the first onset. [S1, S3]

Phase	What you may hear	What to do
I	First clear, repetitive tapping	Mark the first onset when at least 2 consecutive beats support it.
II	Softer swishing or murmur-like sounds	Continue listening and releasing slowly.
III	Sharper or louder tapping	Do not replace the earlier systolic onset with the loudest sound.
IV	Muffling or a softer, duller quality	Continue; muffling is not the usual adult diastolic endpoint.
V	Disappearance of sounds	Identify disappearance; verify ongoing silence, then fully deflate.

Listen to the difference, not the loudness alone



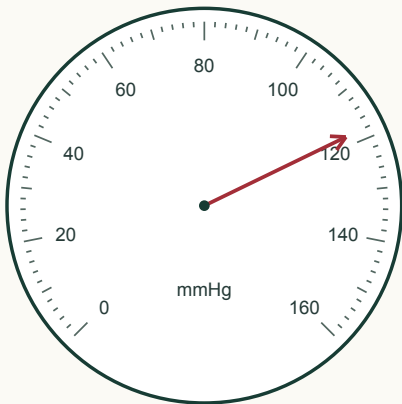
BP-A's first tap is 118 mmHg; the next at 116 confirms repetition. The first onset remains 118. The sounds later soften, but they are still audible. The disappearance transition is 76 mmHg. Record 118/76 mmHg, not 118 over the muffling value and not 118 over the last audible tap at 78.

If sounds seem to persist to zero, disappear only briefly and return, or never become clear, stop, fully deflate, and ask the qualified teacher or nurse. Document uncertainty. Never turn persistent sound into a diastolic value of zero. [S1, S3]

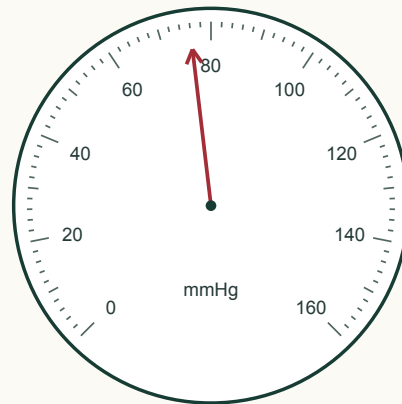
Every small tick has a value

This teaching gauge has a 2 mmHg interval. Read the scale you actually have.

An aneroid dial often labels only selected larger values. Count the spaces, not just the printed numbers. If there are ten equal intervals between 100 and 120, each interval is $20 / 10 = 2$ mmHg. On that scale, the tick immediately below 120 is 118. Between 60 and 80, the ticks are 62, 64, 66, 68, 70, 72, 74, 76, and 78 before 80.

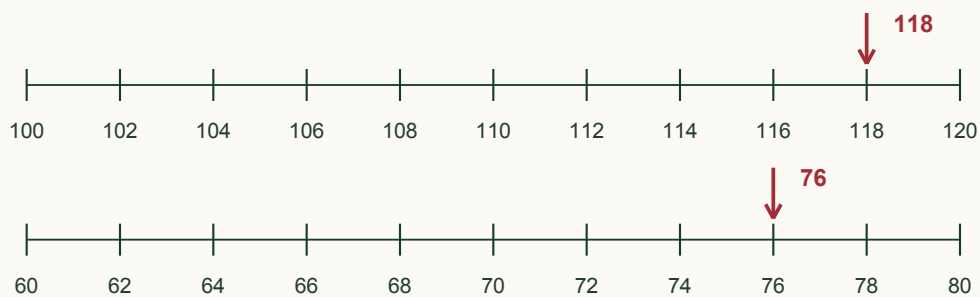


118 mmHg: first repeated onset



76 mmHg: disappearance

Magnified tick-strip reading examples



Keep your viewing angle square to the dial and the gauge visible while your chestpiece stays still. Under the teaching protocol, read to the nearest 2 mmHg when the instrument has 2 mmHg graduations. Do not round every result to 5 or 10 because those numbers look tidier. Never add precision that the scale cannot support. [S1, S3]

The gauge is an air-pressure indicator. Its pointer may move in tiny pulses. Needle bumps do not tell you which sound was the first repeated tap or when the sounds disappeared.

Make the record match the evidence

Read the worked narrative, then explain why each number is supported.

The learner has checked a zeroed gauge, suitable cuff, quiet setting, and supported arm. The teacher-led radial estimate was approximately 120 mmHg. After full deflation and at least a minute of rest, the listening target is 150 mmHg. The eartips face forward, the correct chestpiece side is active, and the chestpiece rests gently on bare skin over the brachial pulse below the cuff.

The learner releases pressure at about 2 mmHg each second. At 118, a faint tap appears. At 116, another similar pulse follows. That repetition makes the first onset at 118 usable. Later sounds change in quality and become muffled. The learner continues, rather than stopping at muffling. After the last modeled tap at 78, the expected beat at 76 is silent; the next expected beats remain silent. Remaining cuff pressure is fully released.

Teaching record item	BP-A entry
Result	118/76 mmHg, original fictional adult training model
Systolic evidence	First onset 118, corroborated by next tap at 116
Diastolic evidence	Disappearance transition 76; subsequent expected beats silent
Context to retain	Arm and position, cuff size, time, rest and conditions
Repeat plan	Teacher-led repeat after 1 to 2 minutes; retain each observation

For a real supervised measurement, document the arm, supported position, cuff size, time, relevant conditions, and any uncertainty along with both values and units. Take repeat measurements at the specified interval, generally 1 to 2 minutes apart under this protocol. Do not silently replace a difficult observation with a preferred value or average away a technique problem. [S1, S3]

What this record does and does not mean

Systolic 118 is the pressure at the first repeated onset, and diastolic 76 is the disappearance transition in this fictional model. This activity does not classify a learner's health. One practice number cannot establish a diagnosis, and adult examples must not be treated as pediatric decision thresholds. A health concern belongs with a qualified professional.

Do not combine BP-A with an older 120/80 teaching clip. Different recordings can be separate examples, but they must keep their own numbers. The new companion model here is explicitly 118/76.

Troubleshoot in a useful order

Fully release pressure before resetting. Better technique is the next step, not more pumping.

Return to the learner at the start of the story. The stethoscope may be excellent, yet a poor seal or a rushing valve can still hide a faint onset. Work through a short, ordered check with the teacher. Change one feature at a time so you can tell what improved the signal.

Priority	Check and correction	Why it helps
1 Room	Quiet voices, pause movement, reduce distracting equipment noise.	Faint taps are easily masked by room sound.
2 Ears	Eartips forward toward nose; comfortable seal and correct fit.	A leak or reversed angle weakens the sound path.
3 Instrument	Correct active face; tubing and connections intact. Follow this model's instructions.	An inactive side or leak can make good placement seem silent.
4 Cuff and site	Correct cuff range, artery marker and lower-edge position; locate brachial pulse.	The cuff and chestpiece must be at the intended artery.
5 Contact	Active face below cuff on bare skin; light steady seal; no rubbing or tube scraping.	Contact noise can overwhelm or imitate pulse sounds.
6 Release	Aim for 2 mmHg/sec. Practice valve control on the model.	Rapid deflation may pass endpoints before you can read.
7 Help	Teacher listens with a training device if available, or checks technique. Use the fictional alternative.	Shared listening and feedback are more useful than repeated blind attempts.

A verified automatic blood-pressure instrument may be used under teacher supervision for an appropriate comparison. It generally estimates values from cuff-pressure oscillations (small pressure pulses), not from your audible Korotkoff endpoints. It does not teach your ears what a tap sounds like, and agreement alone does not prove that every manual step was correct. [S1]

If you still cannot hear a reliable onset and disappearance, record "unable to obtain a reliable reading" and ask the teacher. Keep uncertainty visible. Never invent 120/80, enter zero, pump repeatedly, or turn audio up to an uncomfortable level.

Practice with fictional evidence

These independent examples are separate from any assigned PLTW patient or classmate.

Example B: the reading that should not be invented

The learner hears scraping from tubing and releases the cuff too quickly. No reliable first onset is captured. A number would be a guess. The appropriate record is Unable to obtain a reliable reading; cuff fully released, rest and teacher assistance requested. Before another attempt, inspect the rubbing, listening site, and valve control. A missing endpoint is not a diastolic zero.

Optional practice C: use the actual transition

In a separate original fictional model, first repetitive taps begin at 126 mmHg, the sounds muffle at 88 mmHg, and sounds disappear at 82 mmHg with continued silence. Explain why the record is 126/82 mmHg. The first number follows onset; the second follows disappearance. The muffling event is a change in sound quality, not the usual adult endpoint. Do not attach a health label to this teaching record.

Rehearse the whole method aloud

Before. Choose the model or an appropriate supervised volunteer. Preserve privacy. Check equipment and cuff range. Prepare rest and posture. Locate brachial and radial pulses. Fit the cuff. Obtain a teacher-led palpatory estimate. Fully release and rest.

During. Set eartips and active chestpiece. Settle below the cuff. Inflate to the established target. Release about 2 mmHg/sec. Identify repeated first onset and later disappearance. Confirm silence. Release fully.

After: state both values and mmHg, retain conditions and uncertainty, allow the repeat interval, and ask for help when an endpoint is unclear.

Reasoning checks

Why does diastolic pressure remain above zero between beats? Why is the chestpiece below the cuff? How does a palpatory estimate help when sounds briefly disappear? Why is the first faint repeated tap more useful than the loudest tap? What would you record if you missed the onset? Explain each answer with a mechanism or a specific step, rather than a memorized slogan.

Use the 6 Rs. Record the evidence and Reduce it to the two endpoints and conditions. Review the sequence and Reflect on uncertainty. Recite your reasoning. Revise a technique or claim that the evidence does not support.

Keep the evidence accessible

The guide is self-contained. These sources support the method and provide professional context.

Aneroid: a pressure gauge using a mechanical element rather than a mercury column. Auscultation: listening to body sounds with an instrument. Brachial: relating to the upper arm. Calibration: comparison with an appropriate known standard. Diaphragm / bell: chestpiece listening surfaces; use according to the model. Korotkoff sounds: pulse-related sounds during partial arterial compression. Palpation: feeling with finger pads. Radial: the artery at the thumb side of the wrist. mmHg: millimeters of mercury, a pressure unit. Systolic / diastolic: peak and lower arterial pressures associated with ventricular ejection and relaxation.

Companion file: [Manual-Blood-Pressure-Simulation.html](#). Open it from the same downloaded folder, or use the simulation link in the lesson. The audio and gauge are synthetic teaching models, not recordings of a person. Start playback at a comfortable level; you can use its visual evidence and transcript instead of audio.

[S1] AHA. Measurement of Blood Pressure in Humans (2019).
<https://pmc.ncbi.nlm.nih.gov/articles/PMC11409525/>

[S2] CDC. Measuring Your Blood Pressure.
<https://www.cdc.gov/high-blood-pressure/measure/index.html>

[S3] NEJM. Blood Pressure Measurement, clinician demonstration.
<https://pmc.ncbi.nlm.nih.gov/articles/PMC2825670/>

[S4] Littmann. Classic III instructions; Cardiology IV product guidance.
https://www.littmann.com/content/dam/public/language-masters/en_gb/msb/document/2021/2_Littmann_Classic-III_IFU-IFU.pdf

[S4b] Littmann. Cardiology IV Stethoscope.
<https://www.littmann.com/en-gb/home/cardiology-iv-stethoscope/>

[S5] Baranger et al. The fundamental mechanisms of Korotkoff sounds generation (2023).
<https://www.science.org/doi/10.1126/sciadv.adi4252>

[S6] AHA. Understanding Blood Pressure Readings.
<https://www.heart.org/en/health-topics/high-blood-pressure/understanding-blood-pressure-readings>

Source review: October 16, 2026. Clinical measurement is supervised professional work. The sound-mechanism explanation uses the published primary research abstract; full mechanistic review is outside this lesson. [S4] includes model-specific guidance: always use the instructions for your own instrument.

Original vector diagrams and fictional cases were created for this resource. The colored-pencil brachial plate is approved AI-generated educational artwork reused from the Physical Exam guide. It is a simplified schematic, not clinical imaging or an anatomical scale drawing.