

Wk8 Lab notebook: Neuron parts and the synapse

Your goal: Label the parts of a neuron and explain how a signal crosses a synapse.

One product: Labeled neuron diagram (all five parts with signal-direction arrow) and a two-sentence explanation of synaptic transmission.

Question: How does a chemical synapse carry information from one cell to another?

Start the work

1. Read E1 and E2. Define the five parts and the chemical-synapse terms.
2. Make the R1 starter and inspect the different M1 communication model.
3. During the official block, complete the confirmed assigned portion or record the S1 gap and continue D1 practice.
4. Label the D1 neuron, add the direction arrow and synapse inset, and write your own two-sentence explanation.
5. Check the route, complete the preparation note and save a photo of the dated notebook page for your HBS section.

If you cannot open the assignment, save the photo and report the missing route. Original practice does not establish official activity completion.

Words you will use

Neuron

A specialized cell that receives and sends information.

Dendrite

A branched extension that receives many incoming signals.

Cell body (soma)

The main cell region containing the nucleus and supporting cell activity.

Axon

The extension along which an action potential travels toward terminals.

Myelin sheath

Insulating support-cell material around parts of some axons.

Axon terminal

An axon ending that can release neurotransmitter.

Action potential

A brief electrical change that travels along a cell membrane.

Chemical synapse

A junction using released chemical messengers to affect another cell.

Synaptic cleft

The small space separating cells at a chemical synapse.

Neurotransmitter

A chemical messenger released by a neuron.

Receptor

A protein that responds to a suitable chemical binding to it.

Diffusion

Net spreading of particles from higher toward lower concentration.

Presynaptic / postsynaptic

The sending side / receiving side of a particular synapse.

E1: Five structures in a simplified neuron

A neuron is a cell specialized for communication. Dendrites receive many incoming signals. The cell body, also called the soma, contains the nucleus and supports the cell. Inputs combine to influence whether the neuron sends an action potential.

The axon carries an action potential toward its terminals. An action potential is a brief electrical change that travels along the cell membrane. Axon terminals can release chemical messengers. A myelin sheath is insulation made by support cells around parts of some axons. It helps signals travel faster.

Use these five labels: dendrite, cell body (soma), axon, myelin sheath, axon terminal. For this simplified model, show incoming information toward the soma and outgoing information along the axon to the terminal. Myelin surrounds the axon; it is not another stop after the terminal. This model does not describe every neuron shape or connection.

E2: The chemical synapse

A synapse is a communication junction between a neuron and another cell. At a chemical synapse, an action potential arriving at a terminal can trigger neurotransmitter release. A neurotransmitter is a chemical messenger. It diffuses across the synaptic cleft, the small space between the cells, and binds suitable receptors on the receiving cell.

A receptor is a protein that responds to a matching chemical. Binding changes the receiving cell's activity; it does not guarantee that cell fires an action potential. The presynaptic cell sends at this junction. The postsynaptic cell receives. Other synapses are electrical: connecting channels allow ions, electrically charged particles, to pass between cells. Therefore, do not claim that every synapse requires a chemical messenger.

D1: Build or use your neuron outline

The printable record supplies an original neuron outline with five callouts. If you cannot open it, draw this outline on your notebook page. No image search, model kit or earlier student diagram is needed.

Draw a round cell body toward the left. Add three short branched extensions on its left side. From its right side, draw one long thin line ending in three small branches. Draw three separated sleeve shapes around the middle of that long line. Keep the line visible between sleeves. Add a small rounded end to each far-right branch.

Place callout A beside a short branch at the left; B beside the round body; C beside an uncovered portion of the long line. Place D beside one sleeve, with its leader ending on the sleeve. Place E beside a far-right rounded branch end. Keep every leader separate. Label A through E using all five terms in E1.

Add an arrow showing the modeled direction of information flow. It must run toward the body at the input side and away along the axon at the output side. On an inset, draw two separate cell edges with space between them. Show a sending terminal, chemical dots crossing the space and receptors on the receiving edge. Mark the cleft. These drawings show relationships, not real size or measured speed.

R1: Explanation and recovery

Start with a four-stop sketch: incoming branch, body, long output line, terminal. Then add the surrounding myelin. If stuck, match three jobs first: dendrite receives, axon carries, terminal releases. Return to all five labels; the shorter start does not waive the finished diagram.

Write exactly two sentences under the diagram. In the first, explain the event at the sending terminal and how the messenger crosses the cleft. In the second, explain receptor binding and one limit on the receiving response. Use your own words and the terms in E2. A wire jumping across the open cleft is not this chemical-synapse model.

Self-check: starting after the dendrite in this model, name the next three structures along the information route. Check the order against E1. Myelin belongs around the axon, not between the axon and terminal. Say your explanation aloud, or read it to yourself, then revise one unclear phrase.

E3: Real-drug extension: nicotine

Nicotine is a drug that can bind and activate nicotinic acetylcholine receptors. Acetylcholine is a neurotransmitter; nicotinic identifies a receptor type. This example acts at a receptor, rather than forming myelin or bridging cells with a wire. It can promote an electrical response at that receptor. This does not mean every message in the brain becomes faster.

If assigned the extension, mark the receptor on your inset and explain where nicotine acts using E3. Add why receptor activation is not a universal change in signal speed. This is a paper explanation, not a request to use nicotine or test a substance. Another real drug or toxin needs a checked source and a precise site of action.

P1: Prepare for the later brain lab

The brain dissection or virtual lab is on Thursday, March 11, 2027. Before that lab, review these region-function pairs: cerebrum, voluntary movement and information processing; cerebellum, movement coordination and balance; brainstem, vital functions such as breathing.

Gray matter contains many cell bodies and dendrites. White matter contains many myelinated axons. These are composition summaries, not a claim that either tissue has only one cell component. Record the three region-function pairs and this distinction as preparation. An actual specimen, approved procedure or assigned virtual view remains necessary for later identification work.

S1: Keep official work and weekly evidence separate

During the 25–45-minute official-work block, open myPLTW through Clever and ask for the assigned neuron and synapse screens. Today's official work is Activity 2.1.3 The Neuron and Activity 2.1.4 The Secret to Signals. Ask your teacher to confirm the activity, screens, stopping point, required evidence and whether both tasks must finish today.

Do the confirmed official portion if it is available. If access or the assigned portion is missing, note the exact gap. Use D1 and E2 for original practice during this block, then return to the official work when supplied. Do not mark an activity complete from this sheet or from merely viewing a page.

This week also requires a brain structure-function check, online evidence through Activity 2.1.2 Mapping Brain Function, tracker and weekly evidence. The teacher-posted data/model packet is a separate asynchronous route; ask for it if missing. Khan or BioDigital supplements do not establish that packet or

official completion. Brain-region identification, CNS/PNS sorting and injury-function tasks remain later unit work with their required inputs. CNS means brain and spinal cord; PNS means the nerves and ganglia outside them. Ganglia are groups of nerve-cell bodies outside the CNS.

This week runs the neuron lesson on Monday and the brain-data debate on Tuesday. Keep any separate tracker, preparation or submission requirement visible; this original diagram does not complete the week.

M1: a different communication model

Original teaching analogy: a library sends a request slip through a slot to a desk on the other side of a partition. The desk accepts slips in a specified format. The slot and receiving desk are distinct. No real library event or biological measurement is claimed.

Model explanation: A sender passes a paper request through the opening to the receiving desk. The desk checks the format before responding, so arrival alone does not promise the requested action.

The analogy separates transfer from response. A slip can represent a messenger and the desk a receiving site. A neuron does not read paper or make a conscious choice, and a receptor is a protein rather than a person. Use the explanation pattern, then write your own neuron-specific sentences.

Try the decision

A classmate says the chemical-synapse inset proves every neuron touches the next through a wire, so every arriving signal makes that cell fire. Which revision fits E1 and E2?

- Show chemical release across a cleft and receptor binding; say the receiving response is not guaranteed to be a new action potential.
- Connect the cell edges with one wire and remove neurotransmitters from every synapse.
- Keep chemical dots but state that every receptor binding forces the whole receiving neuron to fire.

Explain your choice using the reading. Discuss it or say it to yourself. This practice does not add another submission.

Your 80-minute flow

0–8 minutes	Make the four-stop starter. Predict how information crosses a chemical synaptic cleft, then revisit your prediction after E2.
8–25 minutes	Read E1/E2, use the word guide and compare M1 with a cell.
25–45 minutes	Do the confirmed official portion; if unavailable, record the gap and continue D1 practice.
45–62 minutes	Finish all five D1 labels, direction arrow and synapse inset.
62–75 minutes	Write two sentences, check the route and add P1 preparation. Use E3 only if assigned.
75–80 minutes	Save the dated page, submit through the posted route and record remaining official/weekly work.

Your response record

Use these labels on paper or in your document. The space below also works when this page is printed.

Start with four stops

Sketch the input branch, body, output line and terminal in order. Add the job of dendrite, axon and terminal. Before reading E2, predict how information might cross a chemical synaptic cleft. Revise that prediction after reading.

Use R1 if you are restarting. This sketch prepares the same final notebook page.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.

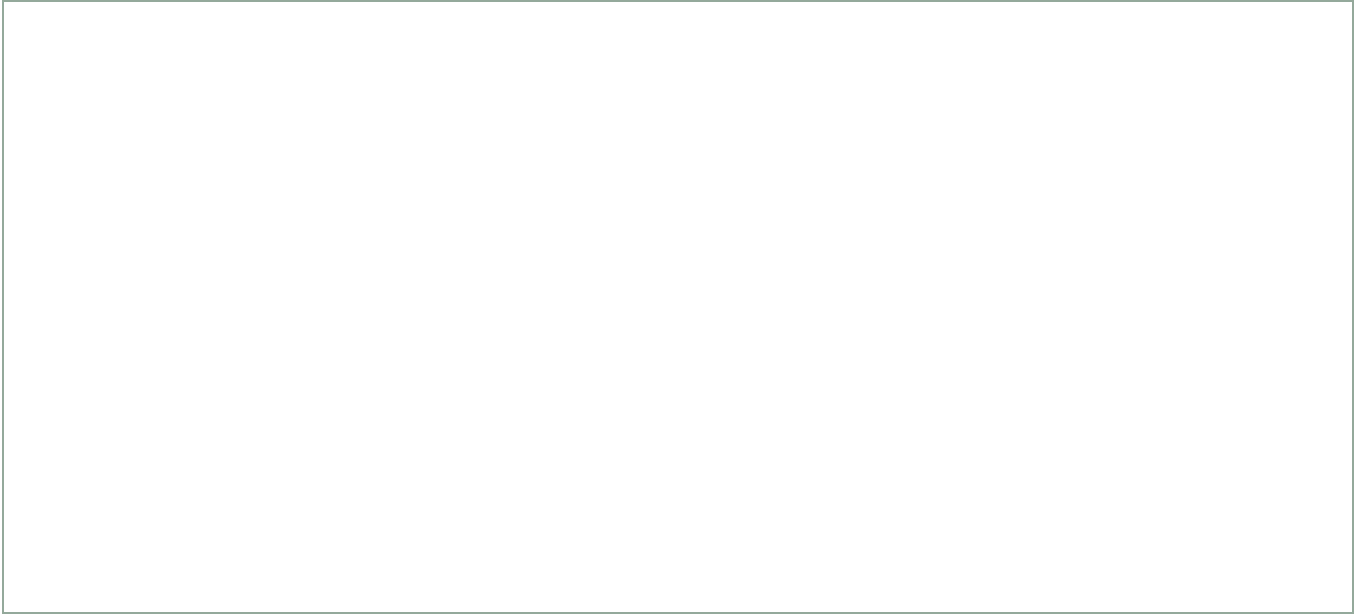
A large, empty rectangular box with a thin black border, intended for a student to draw a sketch of a neuron or synaptic cleft. The box is oriented horizontally and occupies a significant portion of the page below the instructions.

Five-part neuron diagram

Use D1. Label all five callouts, draw the information-flow arrow and add the chemical-synapse inset.

Check that each leader ends on the structure it names. Keep the two cell edges separate and identify the cleft and receptor.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.

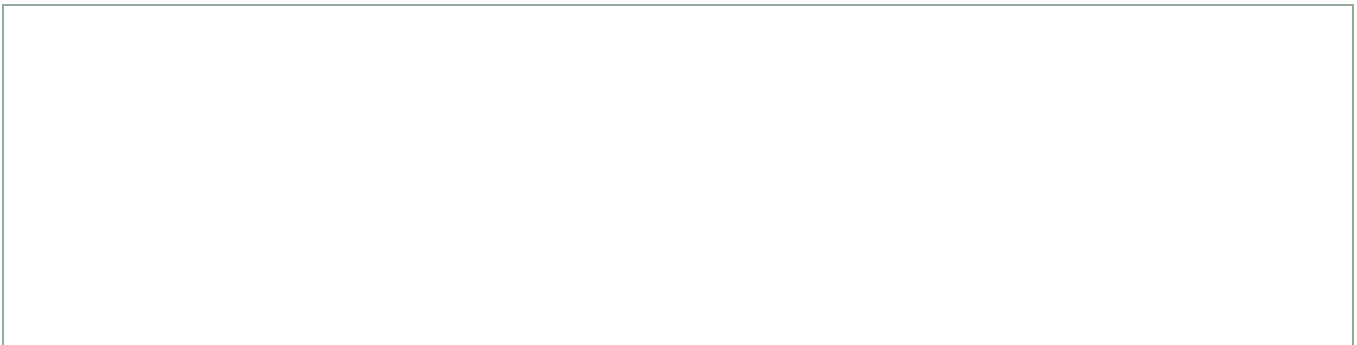


Two-sentence synapse explanation

Explain release and crossing in sentence one, then receptor binding and a response limit in sentence two.

Use E2. Connect the words to your inset. Do not claim every synapse is chemical.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.



Route check and optional extension

Name the three structures after the dendrite in the modeled route. If assigned, add the E3 receptor-action explanation and its speed limit.

Complete the route check. The drug extension is paper-only and stays on this record.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.



Prepare for the later lab

Record P1's three region-function pairs and gray/white distinction. Note which official work is complete, unavailable or awaiting an assigned portion.

Describe only what you checked and ask for anything you need. Follow the later lab, weekly packet and tracker directions separately. Use evidence from the work you actually do.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.



Check your product

- All five neuron labels point to the intended structures; myelin surrounds the axon.
- The arrow shows the modeled information route and the inset separates sending and receiving cells.
- Exactly two explanatory sentences connect release, diffusion and receptor binding without promising firing.
- Include the route check and preparation, and identify any official-task materials you need from the teacher.

Keep the limit: A complete labeled page explains this model. It cannot demonstrate a real reflex, drug effect, measured speed or completed online task.

Turn in your work

Submit a photo of your dated notebook page to Wk8 Lab notebook: Neuron parts and the synapse in your own HBS section. Keep the diagram and two sentences together. Follow the posted deadline.

If you cannot open the assignment, save the photo and report the missing route. Original practice does not establish official activity completion.

[Section 1292: Wk8 Lab notebook: Neuron parts and the synapse](#)

[Section 6792: Wk8 Lab notebook: Neuron parts and the synapse](#)

Carry forward

A chemical synapse links release, diffusion and receptor response; each step has a distinct place.

Use precise distinctions between a signal, a measurement and a prediction in the brain-data debate. Which brain-data claim describes a measurement, and which predicts something beyond it?

Sources and resources

[Open today's page](#)

NIH · Information about the Brain: Cells of the Nervous System

NIH Curriculum Supplement Series, 2007. Neuron structure and myelin sections inspected September 11, 2026.

<https://www.ncbi.nlm.nih.gov/books/NBK20367/>

OS · Communication Between Neurons, section 12.5

OpenStax, Anatomy and Physiology 2e. Chemical/electrical synapses and nicotinic receptors inspected September 11, 2026.

<https://openstax.org/books/anatomy-and-physiology-2e/pages/12-5-communication-between-neurons>

OS12 · Basic Structure and Function of the Nervous System, section 12.1

OpenStax, Anatomy and Physiology 2e. Gray/white matter and CNS/PNS definitions inspected September 11, 2026.

<https://openstax.org/books/anatomy-and-physiology-2e/pages/12-1-basic-structure-and-function-of-the-nervous-system>

OS13 · The Central Nervous System, section 13.2

OpenStax, Anatomy and Physiology 2e. Cerebral cortex, brain stem and cerebellum subsections inspected September 11, 2026.

<https://openstax.org/books/anatomy-and-physiology-2e/pages/13-2-the-central-nervous-system>