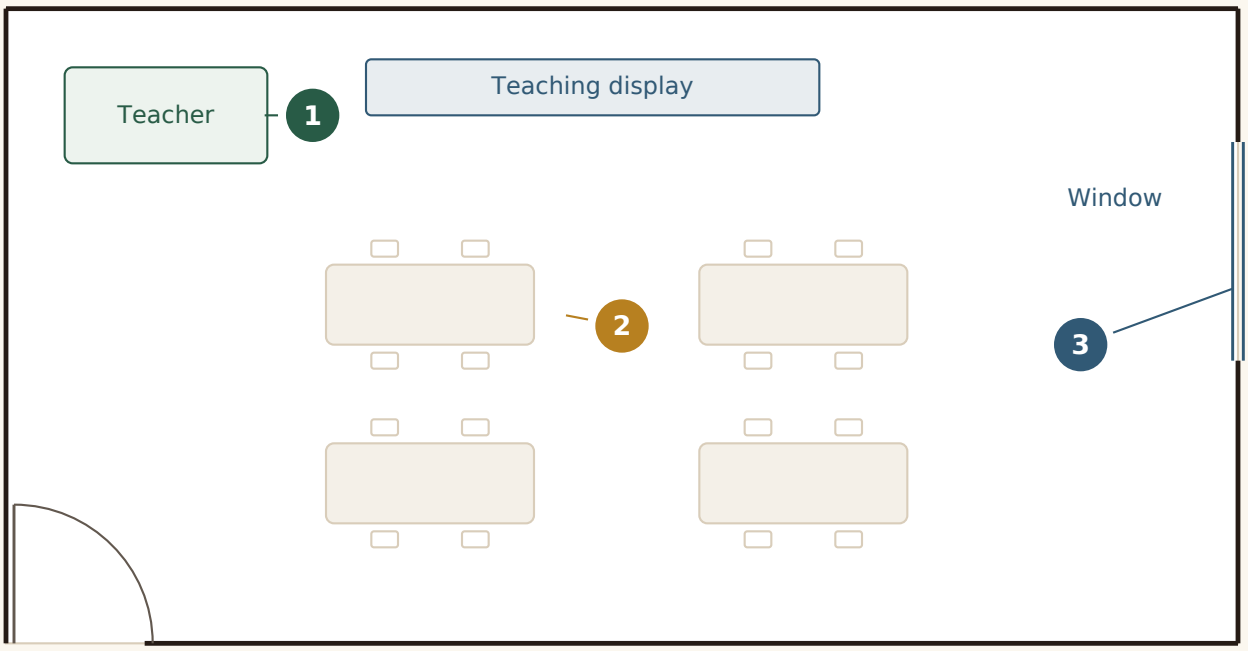
YOUR ROOM. YOUR IDEAS.

Design a better classroom.

A visual starter guide for middle and high school students. No engineering experience required.



Classroom concept • not to scale

1 Teacher zone 2 Group tables 3 Window

What if the lights, charging spots and Wi-Fi actually worked for the way you learn?

You are the designer. Read the room, solve a few problems, then sketch a classroom that works better for everyone.

START HERE

A pencil and paper are enough. This is a design activity, not an electrical installation.

MISSION BRIEFING

Make the room work.

Engineering starts with people, not a page full of equations.

1. **NOTICE**

   What works? What gets in the way?

2. **CHOOSE**

   Sketch a solution and say why it belongs there.

3. **CHECK**

   Look for conflicts. Revise. Explain your decision.

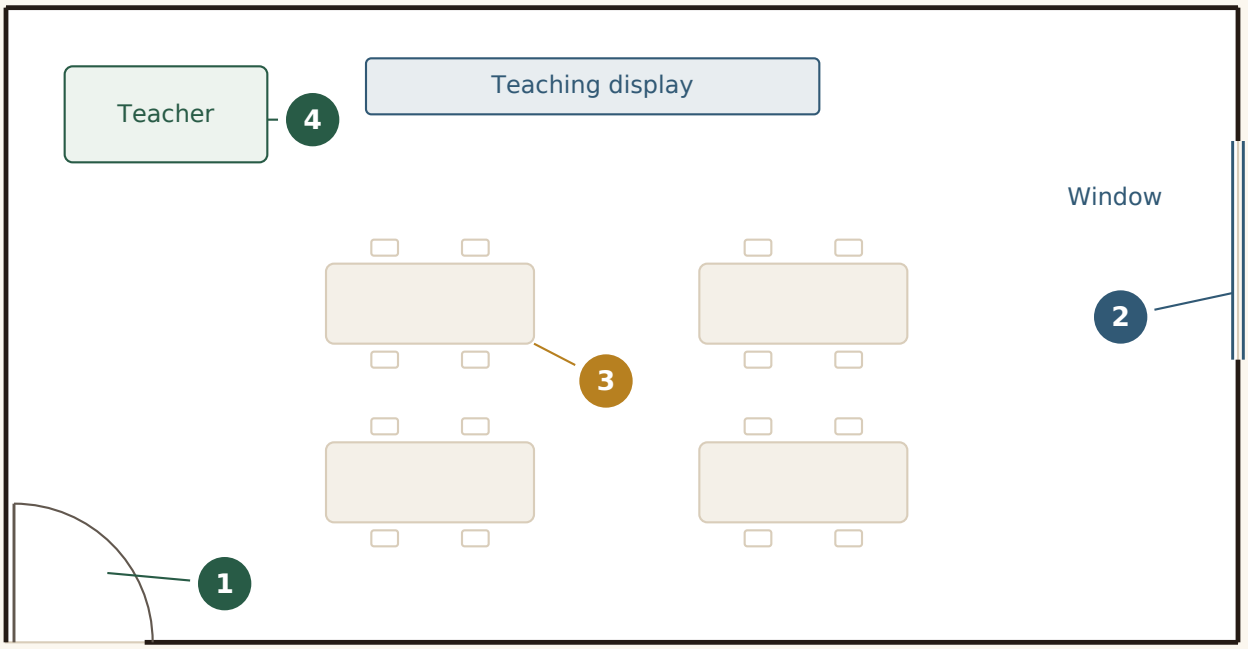
> **A NOTE FROM JOEL**
>
> I studied electrical engineering at RIT. I struggled, changed how I studied, and kept going. Getting stuck is a reason to ask a better question, not proof that you do not belong.

Your first challenge: Name one classroom problem. Who does it affect? What would improve if you solved it?

LOOK BEFORE YOU DESIGN

Read the room from above.

A floor plan is a view from above. Learn the room before adding equipment.



Classroom concept • not to scale

1 Door and swing: leave room to enter.
2 Windows: notice daylight and glare.
3 Group tables and chairs: keep walking routes clear.
4 Teacher zone: controls should be easy to reach.

TRY IT

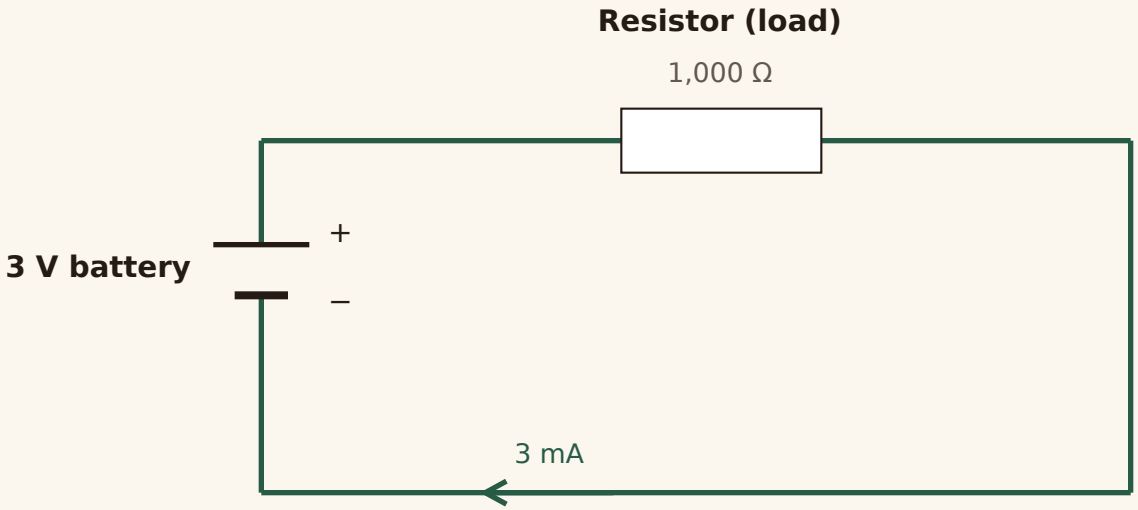
Trace a path from the door to a desk. Then trace a path to the teacher. What might block either route?

Real drawings also use dimensions, notes and a symbol legend.

A SMALL ELECTRICITY MODEL

A circuit needs a full loop.

The sketch uses a 3 V battery and a 1,000 Ω resistor. Trace the complete path through both.



Closed DC circuit • arrow shows conventional current

Voltage (V) is the electrical push. Current (A) is charge flowing. Resistance (Ω) limits that flow. Power (W) is how quickly energy is used.

PAPER EXAMPLE • DIRECT CURRENT

If V = 3 volts and R = 1,000 ohms:
I = V ÷ R = 0.003 amps = 3 milliamps.
This simple model does not describe every building system.

Predict: opening the loop stops the steady current. Explain why.
Safety: do not test this with a wall outlet or open electrical equipment.

THREE SYSTEM FAMILIES

Same room. Different jobs.

Construction teams group systems into specification divisions. Start with the job, then learn the number.

26 POWER + LIGHT

Power distribution, receptacles and lighting help the room run.

27 COMMUNICATION

Networks and audiovisual systems help information move.

28 SAFETY + SECURITY

Fire alarm and electronic security systems help protect people.

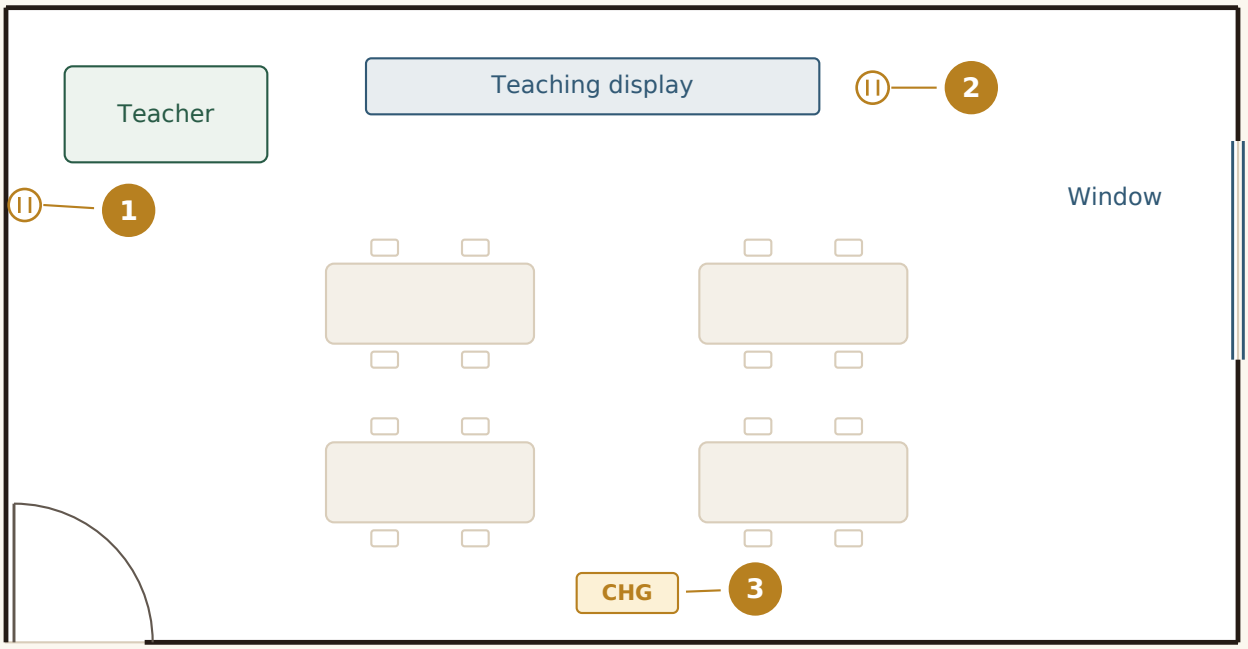
CONNECT THE DOTS

A display may need both power and a signal. One device can involve more than one team. Those teams must coordinate.

POWER WITH A PURPOSE

Start with what needs power.

Gold circles show receptacles. CHG marks a charging station concept. Match each number to its explanation.



Classroom concept • not to scale

1 Teacher equipment: keep the connection accessible.
2 Display: coordinate its power and signal needs.
3 Student charging: avoid cables across a walking route.

This sketch shows connection locations. Building power follows a path: source → distribution panel → protected circuit → equipment. A panel distributes power. A circuit breaker provides circuit protection.

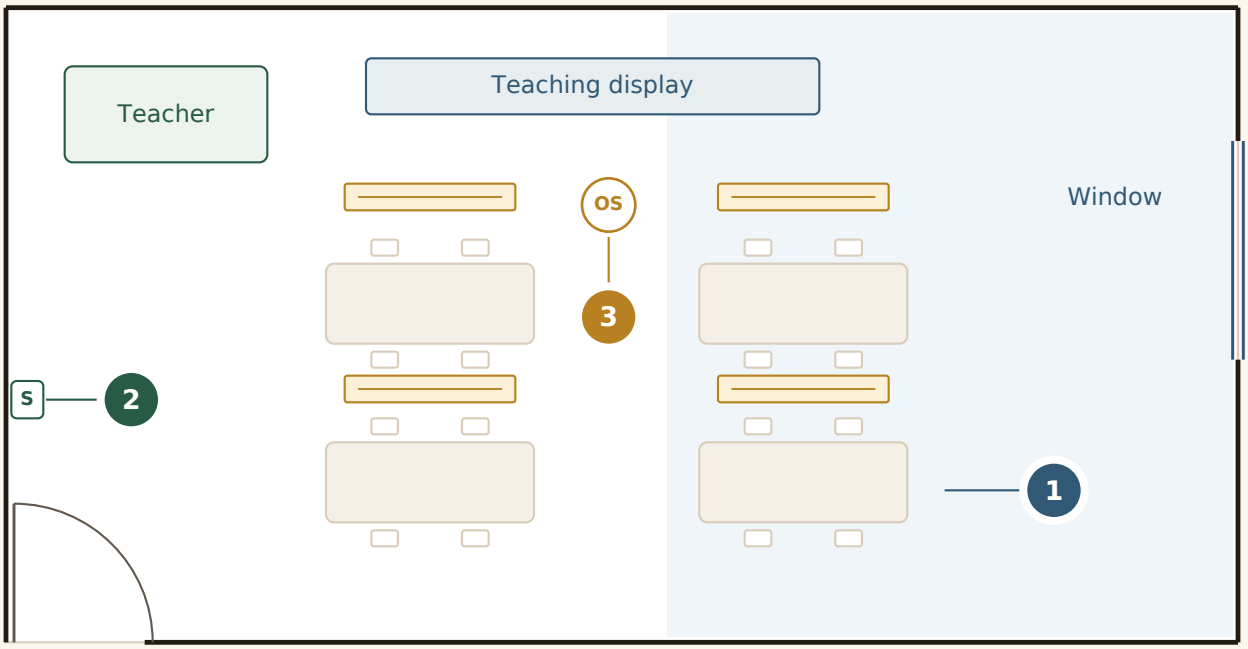
DECIDE + DEFEND

Sketch one useful charging location. Name who uses it and one thing you must ask before finalizing it.

LIGHTING THAT HELPS PEOPLE

Let the room change modes.

Gold bars are lights. S is a switch; OS is an occupancy sensor. The blue area groups the window-side lights.



Classroom concept • not to scale

1 Blue zone: its two lights may dim when daylight is enough.
2 Switch (S): the teacher can change the lighting mode.
3 Occupancy sensor (OS): detects people; placement matters.

MAKE A CHOICE

Which lights would you dim for a presentation? What happens if a sensor cannot see part of the room? Explain your choice.

Concept only. Actual zones and sensor locations require project review.

INFORMATION + PROTECTION

A connection is not just a cable.

Read each row from left to right. These show system relationships, not installation wiring.

NETWORK

Network → Ethernet cable → access point → Wi-Fi → device

DISPLAY

Computer or network → signal connection → display

FIRE ALARM

Control panel → supervised circuit → alarm devices

An access point provides wireless coverage, but it still needs a network connection and power. Some network devices receive power through Ethernet cable. That is called Power over Ethernet (PoE).

ASK BEFORE YOU PLACE

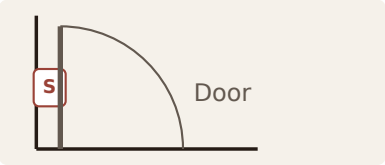
Where does the network connection come from? What might block wireless coverage? Who confirms and tests the alarm system?

Observe safely. Never disconnect, cover or test an alarm device yourself.

QUALITY CHECK

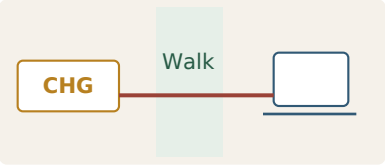
Find five design problems.

Each sketch shows one deliberate problem. Match the picture to the explanation, then propose a fix.



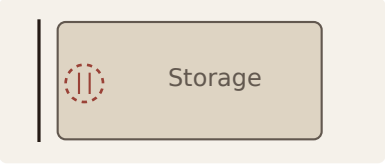
1 Door blocks a switch

The open door hides the switch on the wall.



2 Cord crosses a walking route

A charging cord runs across the path between tables.



3 Storage hides a receptacle

The dashed symbol is behind fixed storage.



4 Ceiling devices collide

The light and sensor are drawn in the same location.



5 Display connections are unknown

Power and signal needs have not been confirmed.

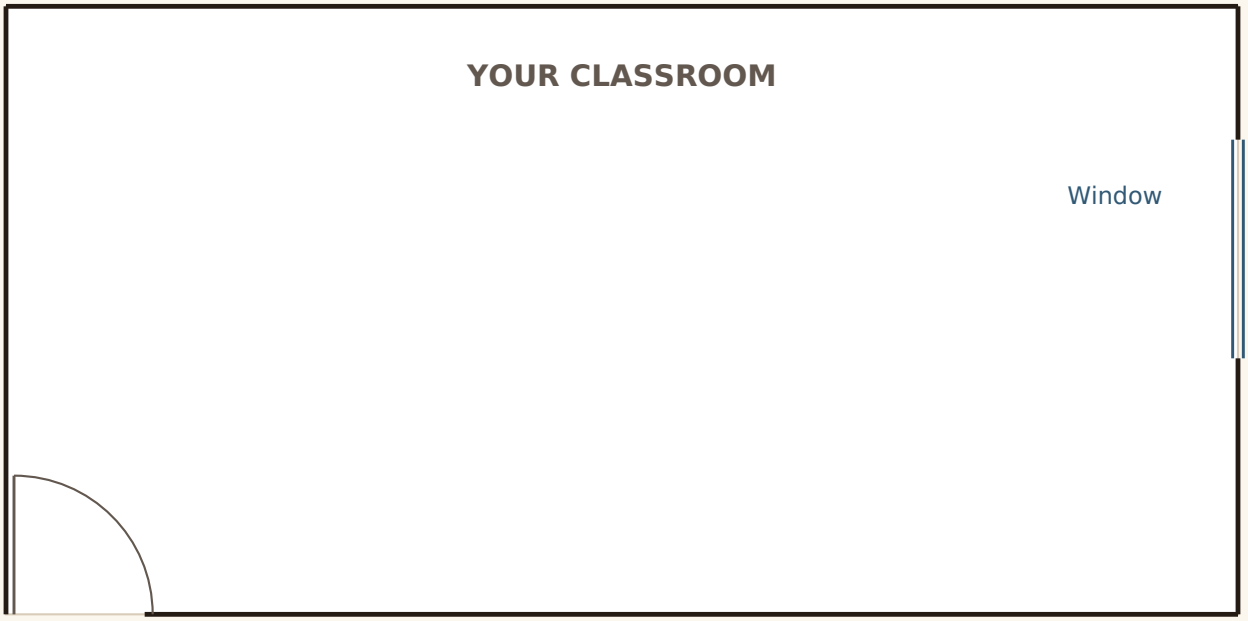
YOUR REDLINE

Pick a problem. Write: “Move or change ___ because ___.” A useful correction includes the reason.

YOUR DESIGN CHALLENGE

Build your classroom concept.

Sketch a first draft. Then use the checks on page 11 to review your choices.



Classroom concept • not to scale

Brief: your class needs a display, a teacher workstation, group tables and student charging. Keep a clear entry and walking route. Use daylight when it helps.

Sketch in layers: furniture first, then power, lights, controls and communication. Make a legend. Mark a question beside anything uncertain.

My strongest decision:

One thing I need to confirm:

COMPARE, DO NOT COPY

Good designs have reasons.

There is no single correct classroom layout. Here are checks and possible improvements.

Spot-the-problems answers

1 • Door conflict

Put the control where the open door does not hide it.

2 • Trip hazard

Change the charging location or cable route so people can walk safely.

3 • Blocked connection

Coordinate the outlet with storage and keep it usable.

4 • Ceiling clash

Separate the devices and check their actual mounting and coverage needs.

5 • Missing connections

Confirm the display’s power, signal and mounting before placing it.

CHECK YOUR OWN PLAN

Can people move? Can they reach controls? Do equipment and connections line up? What changes if the desks move?

TAKE THE NEXT STEP

Explain it like an engineer.

Your sketch is a concept. Your reasoning is the important part.

YOUR 60-SECOND TEACH-BACK

“I placed ___ here because ___. It needs ___. I checked ___. I still need to confirm ___.”

What happens in a real project?
The team checks applicable codes, owner requirements, accessibility, equipment information and field conditions. Contractors ask questions, proposed products are reviewed, and installed systems are tested. A sketch alone is not a construction plan.

Explore the team
Electrical engineers design systems. Electricians install and troubleshoot them. Architects plan spaces. Technology specialists connect people and information. Good projects need all of them.

Keep exploring with this guide
Sketch, review, and revise your classroom concept using the student activities.

JOEL’S LAST QUESTION

Who does your design help, and how will you know it works? Keep asking that question.