

Lesson 4.12: Plan: Scale Drawing and Traffic Flow

Unit: Unit 4, Spaces We Live In (Environmental Design and Management) **Topic:** 4.3 Design a Room project **Grade:** 6 to 8 (written at grade 7; see Differentiation for the grade 6 support and grade 8 stretch) **Days:** 2 class periods of 40 minutes (days 107 and 108) **Room:** classroom or FACS lab, flat tables, good light

Standards

- NYS module line: NYS EDM 2. Environment and Interior Design b) Create a floor plan designed to meet the needs of individuals, families, or communities
- NYS module line: NYS EDM 2. Environment and Interior Design c) Incorporate the elements and principles of design into a design plan
- CTE theme line: CTE PSI 2. Design Process (Proactive) a) Implement a formal design process to solve a given problem by d. Brainstorming and examining possible solutions; e. Selecting the best solution for evaluation; h. Optimizing the solution for best form and function
- NYS FACS Learning Standard 2 (Intermediate), Key Idea: Students will know the basic principles of home and community safety. They can demonstrate the skills necessary to maintain their homes and workplaces in a safe and comfortable condition. They can provide a safe and nurturing environment for themselves and others.; Performance Indicator: Students know the basics of managing a safe and healthy home.
- CDOS Standard 3a Universal Foundation Skills: Basic Skills
- National FCS 3.0: 11.4.3 Draw an interior space to scale using architectural symbols.
- National FCS 3.0: 11.4.4 Place furniture with design principles, traffic flow, activity, and the room's architecture in mind.

The task named a PSI sub-line on “sketching.” No sub-line in PSI 2. a) says sketching; the drawing is the form that sub-lines d. and e. take here, so those are cited instead.

Enduring understanding and essential question

Big idea: A floor plan is a promise that everything fits and everyone can move. If the plan is wrong, the room is wrong, and the furniture has already been bought. **Essential question:** How do you prove a room works before anybody moves a single chair?

Objectives

By the end of this lesson, students will be able to:

1. (Low) Given the room dimensions on a client card, draw the room outline, doors, windows, and closet to scale on graph paper with the correct symbols and the scale written on the sheet.
2. (Mid) Place scaled furniture cut-outs to create the zones the client needs, then measure every path and check it against the rule (36 inches for a walker or wheelchair path, 30 inches everywhere else) and against balance, focal point, and proportion.

3. (High) Revise the plan after a peer review and justify in writing two changes made and one suggestion rejected.

Vocabulary

Tier 2 (general academic): scale, dimension, revise, justify, constraint Tier 3 (FACS): floor plan, traffic flow (traffic path), zone, clearance, turning circle, elevation (previewed for Lesson 4.14), focal point (from Lesson 4.7). See Vocabulary 04.md for Turkish, Portuguese, and Spanish.

Materials and setup

- Handout 04.12 - Scale Plan Guide Traffic Flow Rules and Peer Review Checklist.md, one per student: page 1 the plan guide and furniture sizes, page 2 the furniture cut-out sheet at 1/2 inch = 1 foot, page 3 the traffic flow rules, page 4 the peer review checklist
- Quarter-inch graph paper, two sheets per student (Day 1) plus one spare; 11 by 17 graph paper for tiny house teams if available [*Sal: if you have only letter size, tiny house teams draw at 1/4 inch = 1 foot*]
- Rulers marked in quarter inches, one per student; pencils with erasers; scissors, one per pair; glue sticks or removable tape
- A 36-inch and a 30-inch strip of masking tape on the floor near the door, labeled, for students to walk through
- A tape measure for the demo
- The client cards from Lesson 4.11 (each student keeps theirs in the project folder)
- Slides: Slides 04.12 - Plan Scale Drawing and Traffic Flow (Day 1 and Day 2 marked)
- Setup notes: photocopy the cut-out sheet on card stock if you can; it survives moving around. Put the two tape strips on the floor before class. [*Sal: a real walker or a borrowed wheelchair from the nurse's office, rolled through the 30-inch strip, makes the rule real in ten seconds.*]

Pre-assessment

Yesterday's exit slips ("the one thing I am not sure how to fit") and the do-now stack from Lesson 4.10 onward. Skim the stack for scale errors (a 12-foot wall drawn as 12 squares at the wrong scale) before class; that tells you whether the Day 1 demo needs to go slower.

Do now and hook (Time: 5 min each day)

Day 1 do now (floor plan stack, day 6): On the board: "Here is a plan of a 12 by 14 room with the bed in the middle of the floor [draw it on the board or show slide 1]. Redraw it at 1/4 inch = 1 foot with the bed against a wall and a straight path from the door to the window." Two minutes to draw, one to compare with a neighbor. Hook: walk through the 30-inch tape strip yourself, then carry a laundry basket through it, then ask a student to walk through with the borrowed walker. "Thirty inches is fine for you. It is not fine for Grandpa Okafor. Today every path in your plan gets measured."

Day 2 do now (floor plan stack, day 7): “Sketch a 6 by 9 foot entry with the front door on a short wall. Add a bench and a wall of hooks. Shade the walking path from the front door to the inside doorway. Is the path 36 inches? Write yes or no and how you know.” Two minutes to draw, one to check.

Procedure

Day 1: the scale plan

Step	Teacher will	Students will	Time
1. Demo: the outline, doors, windows, closet	Slides 2 to 5. State the project scale: $1/2$ inch = 1 foot (two graph squares per foot), which is the Lesson 4.10 scale doubled so a bedroom fills the sheet. Tiny house teams may use $1/4$ inch = 1 foot on letter paper or $1/2$ inch on 11 by 17. Draw the Okafor room on the board from the card: 11 by 12, door 3 feet wide on the 11-foot wall with the swing arc, window 4 feet centered on the far wall, closet 2 by 5. Write the scale in the corner and the client name at the top. Say the rule: the card’s numbers are not up for debate.	Draw their own client’s room outline on graph paper from the card, with the door swing, the windows, the closet, the scale, and the client name. Check with a partner: does 12 feet equal 24 squares?	10 min
2. Zones and furniture	Slides 6 to 8. Show the zone idea from Lesson 4.10: sleep, work, store, move. Draw the Okafor zones as light circles on the board. Then the cut-outs: the	Draw the client’s zones lightly. Cut out the furniture the client needs (from the Needs list first, wants second). Arrange it. Do not	17 min

	handout has 30 pieces of furniture at 1/2 inch = 1 foot with real dimensions (a twin bed is 3 feet by 6 feet 6 inches; a desk is 2 by 4). Cut, do not glue. Slide the pieces around. The bed goes first, then the desk or chair, then storage. Circulate. Ask every pair: "Which piece did you put down first, and why?"	glue yet.	
3. Check and freeze	Slide 9. Freeze the plan for tomorrow: trace lightly around each piece, or tape the pieces down with removable tape. Plans go in the folder. Preview: tomorrow every path gets measured and a peer gets to find your mistakes.	Trace or tape. Put the plan and loose pieces in the folder.	5 min

Closure Day 1 (3 min): on a sticky note, "The first piece I placed was ___ because . ***The piece I could not fit is .***" Two read aloud. Stick the notes on the board under the client's name.

Day 2: traffic flow, principles, peer review, revise

Step	Teacher will	Students will	Time
1. Direct instruction: the traffic flow rules	Slides 10 to 12. The rules, from the handout: 36 inches (3 feet, 6 squares at project scale) for any path a walker or wheelchair uses, and for the front entry; 30 inches (2.5 feet, 5 squares)	Shade every path on their plan with a pencil. Measure each in squares and write the width in inches beside it. Circle any path that fails. Draw the turning circle if the client uses a	8 min

	everywhere else; a 60-inch (5-foot) turning circle for a wheelchair, drawn as a circle 10 squares across; the door swing stays clear; nothing in front of a window that must open; a bed needs one open side. Show the Okafor plan on the board with the path shaded from the door to the bed to the closet, measured in squares. Then the principles check from Lessons 4.6 and 4.7: is there a focal point? Is the room balanced or is everything on one wall? Is the furniture in proportion to the room (a full bed in an 8 by 9 room eats it)?	wheelchair.	
2. Peer review	Slide 13. Pairs swap plans with a pair who has a different client. Give the peer review checklist (handout page 4): scale written, walls match the card, door swings clear, every path measured and passing, one open side of the bed, zones match the needs list, focal point named,	Review a partner's plan with the checklist. Write two things that work and one thing to change on the checklist. Hand it back.	10 min

	balance, proportion. Rule from Unit 1: mark, do not fix; write in colored pen; the owner decides.		
3. Revise	Slide 14. Release to revise. Circulate to the plans that had a failed path or a checklist “no.” Push: “You have a 28-inch path here and a 36- inch rule. What moves?”	Fix every failed path and every checklist “no” they agree with. Glue or tape the final furniture down. Write on the back: two changes made and why; one suggestion rejected and why.	12 min
4. Quick share	Slide 15. Two pairs hold up before and after. Class names what moved. Preview Lesson 4.13: every piece on this plan now has to be paid for.	Hold up the plan or look.	3 min

Closure Day 2 (2 min): exit card, "One path in my plan is ___ inches wide, which passes because ___." Cards sorted by pass or fail on the math; a fail gets a two-minute check at the start of Lesson 4.13.

Questions to ask

Monitor understanding:

- How many squares is 36 inches at our project scale? At $1/4$ inch = 1 foot?
- Show me the path from the door to the bed. Where is it narrowest?
- What is the focal point in your plan? What would a person see first from the door?

Deepen learning:

- Why does a bed need one open side? Who is that side for?
- Your peer suggested moving the desk under the window. What does the client gain and lose? (Light versus a desk that blocks the window from opening; a wheelchair user needs to reach the window latch.)
- In real construction, a plan like this is stamped by an architect before anyone builds. What is the architect's stamp promising?

Check for understanding

Day 1: circulate with a two-line clipboard check, “walls match the card” and “scale written.”
 Day 2: the exit card is the check; a “got it” card gives a width in inches, the rule it is checked against, and a reason. A card that says “it passes because it looks big enough” is a “needs more.”

Closure (Time: 3 min Day 1, 2 min Day 2)

Written above under each day.

Differentiation and supports

- ELL: the plan guide has a picture beside each rule (a walker with a 36-inch arrow, a bed with one side shaded open); the peer review checklist is yes or no boxes with a two-word label each, so a student can review without writing sentences; the words scale, path, clear, swing, and turn in Turkish, Portuguese, and Spanish on the handout margin (see Vocabulary 04.md); pair reviewers so at least one can read the checklist aloud.
- IEP and 504 (general): the room outline can be pre-drawn by the teacher for a student who needs it, with the student adding doors, windows, and furniture; pre-cut furniture pieces for a student who cannot use scissors; a larger scale (1 inch = 1 foot on 11 by 17) for a student with fine-motor or vision needs; extended time, the revision can finish in the first five minutes of Lesson 4.13.
- Grade 6 support: use the printed furniture cut-outs only (no drawing furniture by hand), measure three paths instead of every path, and skip the proportion line on the checklist.
- Grade 8 stretch: calculate the room’s floor area in square feet and the floor area covered by furniture, then state the percentage open (a good bedroom is roughly 50 to 60 percent open floor [Sal: this is a rule of thumb, not a code line; say so]); tiny house teams draw the loft as a second small plan at the same scale.
- UDL checkpoint used: multiple means of action and expression (cut-outs moved by hand before anything is drawn; a student may also photograph the arrangement instead of tracing) and multiple means of representation (the tape strips on the floor, the borrowed walker, and the shaded path on paper all show the same rule).
- No-kitchen or no-machine alternative: not a lab; no alternative needed. If graph paper runs out, the plan guide’s page 1 has a printable grid.

Assessment

Objective	Standards met	Learning task	Assessment (formative or summative; tool)
1. Draw the outline to scale with symbols	EDM 2. b); National FCS 11.4.3; CDOS 3a Basic Skills	Day 1, Step 1	Formative; clipboard check (walls match the card, scale written);

			summative on Rubric 04 criterion 2
2. Place furniture in zones and check paths and principles	EDM 2. b) and c); PSI 2. a) d. and e.; Std 2 PI B; National FCS 11.4.4	Day 1, Step 2; Day 2, Step 1	Formative; shaded and measured paths on the plan, exit card Day 2; summative on Rubric 04 criteria 2 and 4
3. Revise after peer review and justify	PSI 2. a) h.; CDOS 3a Basic Skills	Day 2, Steps 2 and 3	Formative; the two-changes-one-rejection note on the back of the plan, scored complete, partial, or missing for daily work; the note is read for Rubric 04 criterion 2

Homework

None. Optional: at home, measure the narrowest path in your own bedroom (the gap between the bed and the wall, or the dresser and the door). Write it in inches. Would it pass the 30-inch rule?

Connections

Math: scale factors, unit conversion (feet to inches to squares), area in square feet, percent of area (grade 8 stretch). This is the same scale math the math teacher does with maps and similar figures; share the handout so the math teacher can use a floor plan as a problem. Technology or art: if the school has a free floor-plan web app, the Day 2 plan can be redrawn digitally as an extension *[Sal: name the app the school allows]*.

Sources

- NYS Middle Level CTE FACS Content Module 04, Environmental Design and Management (nyctecenter.org, June 2018), lines 2. b) and 2. c). Copy in 02 Standards/NYS Module PDFs/.
- NYS Middle Level CTE Theme Module, Problem Solving and Innovation, line 2. a) sub-lines d., e., h. Same folder.
- NYS Learning Standards for Health, Physical Education, and Family and Consumer Sciences (1996), Standard 2, Intermediate. Wording per 02 Standards/STANDARDS SOURCES - web research.md, section 2. *[Sal: confirm against the NYSED PDF.]*

- National Standards for Family and Consumer Sciences Education 3.0 (LEAD FCS Education, 2018), competencies 11.4.3 and 11.4.4, per 02 Standards/STANDARDS SOURCES - web research.md, section 4.11.
- Clearances: 2010 ADA Standards for Accessible Design (ada.gov), section 403.5.1 (36-inch clear width) and 304.3 (60-inch turning space). The 30-inch general path and the furniture dimensions on the cut-out sheet are common residential planning figures, rounded to the nearest half foot for cutting.
- Sal's own materials: Lesson Dups/Unit_1_Interior_Design/education_teachingwork_floor_plan_frenzy_2026_04.docx (the floor plan idea used in Lesson 4.10; this lesson continues it at the project scale).

Teacher notes

- If Day 1 runs short, skip the zone circles and go straight to cut-outs; zones can be labeled on Day 2 after the paths are shaded. If Day 2 runs short, cut Step 4 and take the before-and-after at the start of Lesson 4.13.
- Common mistake: the door swing drawn the wrong way, into the hall. Interior doors on a bedroom swing into the room. Front doors usually swing in too. Say it during the demo.
- Common mistake: a path that is 36 inches at the door and 24 inches at the foot of the bed. The path is as wide as its narrowest point. Have students measure the pinch, not the entrance.
- Common mistake: measuring in squares and forgetting to convert. Six squares at project scale is 3 feet is 36 inches. Put the conversion line on the board and leave it there both days.
- The peer review is the same “mark, do not fix” routine from Lesson 1.19. Students know it; hold them to it.
- *[Sal: keep a few finished plans from each class, with permission and no names, for next year's Day 1 demo.]*