

Handout 4.10: Floor Plan Symbols, Graph Paper Guide, and Furniture Cut-Outs

Name: _____ Date: _____ Team: _____

Directions: Part 1 you fill in while I draw the symbols on the board. Part 2 is the scale rule and it stays in your project folder all unit. Part 3 is the record sheet your team fills in with the tape measure. Part 4 is the cut-out sheet; cut only the pieces your room needs and keep the rest. Part 5 is the rules every path has to pass, and the list of the eleven sketch prompts so you always know what is coming. Pencil only. This whole handout lives in the project folder.

Word bank in other languages

[Check with a native speaker before printing.] From the unit vocabulary list.

English	Turkish	Portuguese	Spanish
floor plan	kat planı	planta baixa	plano de planta
scale	ölçek	escala	escala
traffic flow	dolaşım (geçiş yolu)	fluxo de circulação	flujo de circulación
zone	bölge	zona	zona
tape measure	şerit metre	trena (fita métrica)	cinta métrica
universal design	evrensel tasarım	design universal	diseño universal

Part 1: The symbol legend

A floor plan is a room drawn from straight above. Everything in it is a symbol, and the symbols are the same on every plan in the country, which is why a stranger can read your drawing. Draw each one in the box.

Symbol	How to draw it	Draw it here
Wall	Two parallel lines close together, filled in dark. Thin lines for an inside wall, a little thicker for an outside wall.	
Door	Leave a gap in the wall the width of the door. Draw a straight line for the door panel standing open, and a quarter-circle arc from the end of that line back to the wall. The arc is the swing.	
Window	Leave a gap in the wall, then draw two or three thin lines across the gap, parallel to the wall.	
Closet	A small rectangle drawn off the room, open to the room. A straight line across the opening for a sliding or bifold door, a dashed line for a curtain, or a door with a swing arc if it has one.	
Stairs	A run of short parallel lines like a ladder, inside a long rectangle, with an arrow through the middle and the word UP (or DN for down).	
Sink	A rectangle with a small circle in the middle for the drain. A kitchen sink is a rectangle with two circles.	
Toilet	A small rectangle against the wall for the tank, with an oval sticking out from it into the room.	

Tub	A long rectangle against the wall, one end rounded, with a small circle at the square end for the drain.	
Stove (range)	A square with four small circles in it for the burners.	
Refrigerator	A square or a rectangle with the letters REF written inside it.	
Outlet	A short line drawn on the wall with two small dots beside it. Draw it on the inside of the wall line.	

Reading a real plan (Day 1). Find each of these on the plan I put up and circle it. Then answer.

[] the front door, and which way it swings [] a window [] the bathroom [] the kitchen [] a closet

How do you know which room is the bathroom without reading a label?

How do you know which room is the kitchen? _____

Draw the path a person walks from the front door to the kitchen sink. What does the path pass through? _____

The four zones. Every room gets split into jobs. Label them on the plan.

Zone	What happens there	Where it usually goes
Sleep		
Work		
Store		
Move		

Part 2: How to use the graph paper

The scale for this lesson is $1/4$ inch = 1 foot.

Every square on your graph paper is $1/4$ inch across. So at this scale:

One square = one foot. That is the whole rule.

Worked conversion 1. A bedroom wall is 12 feet long. How long is the line on the paper?

12 feet x 1 square per foot = **12 squares**. 12 squares x $1/4$ inch = $12/4 = 3$ inches of line on the paper.

Worked conversion 2. A path has to be 36 inches wide. How many squares is that?

36 inches $\div$ 12 inches per foot = **3 feet**. 3 feet x 1 square per foot = **3 squares**.

Two more you should be able to do in your head by tomorrow:

A 10-foot wall is _____ squares, which is _____ inches on the paper.

30 inches is _____ feet, which is _____ squares (one of them is a half square).

Four rules for every plan you draw this unit:

1. Write the scale in the bottom corner of the sheet. Every plan. No exceptions.
2. Write whose room it is at the top.
3. Use a ruler for every wall. A wall drawn freehand is a wall nobody can measure.
4. Pencil only, because you will move something.

Rounding. Measure to the nearest half foot, then draw to the nearest whole square.

Rounding to the nearest square is close enough at this scale and it keeps you on the grid lines. In Lesson 4.12 the scale doubles to $1/2$ inch = 1 foot, two squares per foot, and there a half foot is one whole square, so you can be exact.

If graph paper runs out. *[Sal: print a quarter-inch grid here, 34 squares wide by 44 squares tall, which fills a letter sheet and holds a room up to 34 by 44 feet at $1/4$ inch = 1 foot. Any free grid generator does it.]*

Part 3: Measuring record, our classroom

Each team measures the walls it is assigned. Hook the end of the tape in the corner. Read the tape to the nearest half inch, then round to the nearest half foot and write both numbers.

What we measured	Tape reading (feet and inches)	Rounded (feet, to the nearest half foot)	Squares at 1/4 inch = 1 foot
Wall A (the wall with the door)			
Wall B			
Wall C			
Wall D (the wall with the window)			
Width of the doorway			
Corner to the near edge of the door (along wall A)			
Width of window 1			
Corner to the near edge of window 1			
Width of window 2 (if there is one)			
Height of the ceiling (optional, and you need help for this one)			

Class numbers we agreed on: A ____ ft, B ____ ft, C ____ ft, D ____ ft

Check before you draw: do walls A and C match? Do B and D match? If they do not, this room is not a rectangle, which is normal, and your plan should show the shape it really is.

One thing that was harder to measure than I expected: _____

Part 4: Furniture cut-out sheet (1/4 inch = 1 foot)

Every piece below is drawn at the same scale as your plan. Cut only what your room needs. Label each piece before you cut it, or you will be holding an unmarked rectangle in two minutes.

How to read this table. The real size is the size of the actual furniture, in inches, the way a store lists it. The feet column is that size divided by 12. The squares column is what you draw and cut, rounded to the nearest whole square. Where the rounding moved by half a foot or more, the note says which direction, because on a tight plan six inches matters.

#	Piece	Real size (inches)	In feet	Squares to cut (wide by long)	Note
1	Bed, twin	39 by 75	3.25 by 6.25	3 by 6	The real bed is a few inches bigger than the cut-out. Leave a little extra
2	Bed, twin XL	39 by 80	3.25 by 6.67	3 by 7	
3	Bed, full (double)	54 by 75	4.5 by 6.25	5 by 6	Rounded up on the width
4	Bed, queen	60 by 80	5 by 6.67	5 by 7	
5	Bunk bed, twin over twin (floor space)	41 by 78	3.4 by 6.5	3 by 7	Takes one floor space, sleeps two. Needs headroom, not floor
6	Crib	28 by 52	2.3 by 4.3	2 by 4	
7	Nightstand	18 by 18	1.5 by 1.5	2 by 2	Rounded up both ways
8	Dresser, 6 drawer (long)	60 by 18	5 by 1.5	5 by 2	Rounded up on the depth
9	Dresser, 3 drawer	32 by 18	2.7 by 1.5	3 by 2	
10	Desk, student	48 by 24	4 by 2	4 by 2	Exact

11	Desk, small or wall fold-down	36 by 20	3 by 1.7	3 by 2	
12	Desk chair	18 by 18	1.5 by 1.5	2 by 2	Needs 30 inches behind it to pull out, which is 2.5 squares of path
13	Armchair with arms	30 by 30	2.5 by 2.5	3 by 3	
14	Sofa, 3 seat	84 by 36	7 by 3	7 by 3	Exact
15	Love seat, 2 seat	60 by 36	5 by 3	5 by 3	Exact
16	Bookcase, 3 shelf	30 by 12	2.5 by 1	3 by 1	
17	Cube storage, 9 cube	36 by 15	3 by 1.25	3 by 1	
18	Wardrobe or armoire	48 by 24	4 by 2	4 by 2	Use this if the room has no closet
19	Storage bench or toy bin	36 by 18	3 by 1.5	3 by 2	
20	TV on a stand	60 by 16	5 by 1.3	5 by 1	
21	Floor lamp	12 by 12	1 by 1	1 by 1	Exact
22	Dining table, round, seats 4	42 across	3.5 across	4 by 4, drawn as a circle	Rounded up. Each chair needs 2 by 2 and 30 inches to slide back
23	Dining table, rectangle, seats 6	72 by 36	6 by 3	6 by 3	Exact
24	Dining or side chair	18 by 18	1.5 by 1.5	2 by 2	
25	Area rug, 5	60 by 84	5 by 7	5 by 7,	A rug goes



	by 7			drawn with a dashed outline	under furniture, so draw it first and dashed
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Grade 8 stretch: pick any three pieces and write their real footprint in square feet (width in feet times length in feet). Then add the three and say what percent of your room's floor they cover.

Part 5: Traffic flow rules, the described bedroom, and the sketch prompts

The traffic flow rules

Traffic flow is the path people actually walk. Furniture never blocks it. Shade every path on your plan with a pencil, then measure the **narrowest** point of that path, not the entrance. A path is only as wide as its tightest pinch.

The rule	In inches	In feet	Squares at 1/4 inch = 1 foot
Any path a person using a walker or a wheelchair uses, and the front entry	36 inches	3 feet	3 squares
Every other path in a room	30 inches	2.5 feet	2.5 squares
A circle a wheelchair needs to turn all the way around	60 inches across	5 feet	5 squares across
Behind a chair so a person can push it back and stand up	30 inches	2.5 feet	2.5 squares

Three more rules that are not numbers:

- The door swing stays clear. Nothing parks in the arc.
- Nothing goes in front of a window that has to open, and nothing blocks a window that is an escape route from a bedroom.
- A bed needs at least one open side, so a person can get in and out of it and somebody can change the sheets.

Where the numbers come from: 36 inches and the 60-inch turning circle are from the 2010 ADA Standards for Accessible Design, sections 403.5.1 and 304.3. The 30-inch general path is a common planning guideline, not a code line.

The described bedroom (use this on Day 2 if you would rather not draw your own)

A bedroom, 11 feet by 12 feet.

- One door, 3 feet wide, on a short wall, 2 feet from the corner, swinging into the room.
- One window, 4 feet wide, centered on the far long wall.
- One closet, 2 feet deep by 5 feet wide, on the other long wall, with sliding doors.
- The person who sleeps here is a middle schooler who does homework in the room.

Draw it to scale, then place a bed, one storage piece, and one more piece the room needs. Pencil the four zones. Shade every path, measure the narrowest point, and fix the one that fails.

What I moved, and why: _____

The eleven sketch prompts (the daily floor plan do now)

Starting on day 104 and running to the last build day, every period opens with a five-minute floor plan sketch: two minutes to draw, one minute to check with a neighbor, and the sheet goes in your project folder. Eleven sheets. Staple them in order with your name on the first sheet and turn the stack in with the project. Each one is scored complete, partial, or missing. If you are absent, the prompt is on this list, so you can draw it and add it to the stack.

#	Lesson	The prompt
1	4.10 Day 1, do now	This classroom from straight above, with the door, the windows, and the teacher's desk. No scale yet
2	4.10 Day 1, closure	This room again with the desks arranged a different way, and one path from the door to the window shaded
3	4.10 Day 2, do now	A 10 by 11 bedroom at 1/4 inch = 1 foot, a 3-foot door with its swing on a short wall, a 4-foot window on a long wall, scale labeled
4	4.10 Day 2, closure	Any room in this building from above, to scale, with one path shaded, plus one line: the thing a floor plan can prove that a photograph cannot
5	4.11	A 10 by 12 room at 1/4 inch = 1 foot with a door and a window, using the symbols
6	4.12 Day 1	A 12 by 14 room redrawn with the bed against a wall and a straight path from the door to the window
7	4.12 Day 2	A 6 by 9 entry with the front door on a short wall, a bench and hooks, the path

		shaded and measured. Does it pass 36 inches?
8	4.13	Your client's room from memory, no looking at your plan
9	4.14 Day 1	Your client's room as a folded-down net (the floor in the middle, the four walls folded out flat)
10	4.14 Day 2	One wall of your client's room as an elevation (straight on, not from above) at 1/2 inch = 1 foot
11	4.14 Day 3	Any room with a 5-foot turning circle drawn in it, and the circle has to fit

Teacher key

Part 1, the symbols. Score the eleven boxes as a set: 9 or more correct is a yes on the clipboard check. The three students get wrong most often are the door swing (drawn as a straight line with no arc, or arcing into the hall), the closet (drawn as a closed box with no opening), and the stairs (drawn as a plain rectangle with no arrow).

Part 1, reading the plan. The bathroom is known by the toilet and tub symbols; the kitchen by the stove, the sink, and REF. Both answers have to name a symbol, not a size. The path from the front door to the kitchen sink usually passes through a hall and one doorway; the useful follow-up is what is in the way and whether the path would pass 36 inches. Zones: sleep is a bed and it goes away from the door where it is quiet; work is a desk and it goes near the window for the light; store is a closet and a dresser and it goes on a wall nobody walks along; move is the paths, and it is the zone students forget they have to leave empty.

Part 2. A 10-foot wall is 10 squares, which is 2.5 inches on the paper. 30 inches is 2.5 feet, which is 2.5 squares. The second one is the one students miss, and it is the one that matters on Day 2.

Part 3. Fill in your own room's real numbers before class and keep them in your pocket. A team more than a foot off gets sent back to the wall. Accept a rounded number that is within a half foot. If the room is not a rectangle, say so out loud and let the plans show the real shape; that is the most useful accident in the lesson.

Part 4. The sizes are real furniture sizes as retailers list them, rounded to the nearest whole square for cutting at this scale. They are planning figures, not code. The cut-out sheet at the project scale ($1/2$ inch = 1 foot, two squares per foot) is on page 2 of Handout 04.12 - Scale Plan Guide Traffic Flow Rules and Peer Review Checklist.md, rounded there to the nearest half foot; the two sheets agree on the real sizes and differ only in the scale and the rounding. Photocopy this page on card stock if you can. A student who cannot use scissors gets an envelope of pre-cut pieces.

Part 5. The path answer for prompt 7 is that a 6 by 9 entry with a bench 18 inches deep leaves 4 feet 6 inches of walking width, which passes 36 inches, but a row of hooks with coats on it eats another 6 inches and a pile of shoes eats more, which is the point worth making out loud. The turning circle in prompt 11 is 5 squares across at this scale and 10 squares across at the project scale, and students routinely draw it too small.

Printing notes. Print Parts 1, 2, 3, and 5 as one double-sided sheet per student, and Part 4 as a separate sheet on card stock. Keep ten spare Part 4 sheets; pieces get lost between the two days. Print one extra copy of Part 5's sketch prompt list to tape on the wall for the rest of the unit.