BIG FLOOR PLANS · COLLEGE & TRADES TRACK · 50 MINUTES

Lay Out the Stair: teacher script

Carpentry students turn a floor-to-floor height into risers and treads, draw the stair at full size on the floor, and find the headroom problem in the framed opening before the stringers are cut.

Prep: Clear a floor area about 13 ft x 10 ft. Tape the lower floor line and a vertical reference line for the first riser. Print one stair sheet per team.

Min	Step and what to do	Ask	Listen for
0-5	**Hook** "Every step the same height, every time. Why do inspectors care so much?"	What happens if one riser is different?	People trip: feet expect the same step.
5-15	**Risers and treads** Divide 106 in by 7 3/4 in and round up; then find the riser height and the run.	How many risers, how tall?	14 risers at 7 9/16 in; 13 treads, run 11'-4 1/2".
15-30	**Draw it full size** Tape the side view on the floor: each riser and tread, the nosing line, and the upper floor framing with the opening edge.	Does the run fit the space?	Yes: 11'-4 1/2" in 11'-6".
30-40	**Headroom** Measure straight up from the nosing line to the underside of the header.	Is it 6 ft 8 in?	No: about 74 1/2 in, short by 5 1/2 in.
40-45	**Fix** Lengthen the opening until the headroom passes.	How long must the opening be?	At least 127 5/8 in: frame it 10'-8".
45-50	**Exit ticket** Individual exit ticket.		

Common misconceptions

- **Learners may think:** Use the maximum riser height and let the top step make up the difference. **Address it:** Every riser must be equal; divide the total rise evenly.
- **Learners may think:** Headroom only matters at the top of the stair. **Address it:** It is measured along the whole stair; the header edge of the opening is the usual tight spot.

Supports

- Give a formula card: risers = rise / 7.75 rounded up; run = treads x tread depth.
- Multilingual learners: label riser, tread, nosing, stringer and header on the full-size drawing.
- Mobility: the measure role can read the side view from a seat; the layout role tapes.

References

- **International Residential Code (IRC)**: R311.7.1 width 36 in; R311.7.2 headroom 6 ft 8 in; R311.7.5.1 riser 7 3/4 in maximum; R311.7.5.2 tread 10 in minimum (check the edition your jurisdiction adopted)
- **Perkins V (CTE)**: postsecondary and secondary CTE program context

Scenario sheet

Straight stair between two floors. Total rise, finished floor to finished floor: 106 in (8'-10"). Stair width 36 in. Upper floor framing and finish: 12 in deep. Space available for the run on the plan: 11'-6". Tread depth chosen: 10 1/2 in. The opening in the upper floor is framed 10'-0" long, ending at the top riser.

Rules as quoted (IRC; check your adopted edition): risers 7 3/4 in maximum and all equal; treads 10 in minimum; width 36 in minimum; headroom 6 ft 8 in, measured straight up from the sloped line along the tread nosings.

LEARNER SHEET · LAY OUT THE STAIR

Name _____ Date _____

Step	Work	Answer
Risers (rise / 7.75, round up)		
Riser height		
Treads		
Total run		
Fits the space?		
Headroom at the header		
Opening length that passes		

Exit ticket

1. Total rise 98 in, 7 3/4 in maximum riser. How many risers, how tall?

2. 13 risers and 10 in treads. Total run?

3. Headroom measures 6 ft 5 in. Pass for 6 ft 8 in?

Answer key

Step	Answer
Risers	106 / 7.75 = 13.68, so 14
Riser height	106 / 14 = 7.571 in (about 7 9/16 in)
Treads	14 - 1 = 13
Total run	13 x 10.5 = 136.5 in (11'-4 1/2")
Fits?	Yes: 1.5 in to spare in 11'-6"
Headroom	Header is 16.5 in past the first nosing; nosing line there 19.5 in up; 94 - that = 74.5 in: fails by 5.5 in
Fix	Opening at least 127.6 in; frame 128 in (10'-8"): headroom 80.3 in, passes

Exit ticket

1. Total rise 98 in, 7 3/4 in maximum riser. How many risers, how tall?
   Answer: 13 risers at about 7 9/16 in (98 / 13 = 7.54).
2. 13 risers and 10 in treads. Total run?
   Answer: 120 in (12 treads x 10 in).
3. Headroom measures 6 ft 5 in. Pass for 6 ft 8 in?
   Answer: No: 3 in short.

Scoring: 1 point each, plus 1 for a correct opening fix. 3 or more = secure.

Free to copy for teaching. Big Floor Plans, Lay Out the Stair, 2026. Codes and standards change: use the edition your jurisdiction or program adopted. Full-size prints: bigfloorplans.com/get-a-quote