BIG FLOOR PLANS · COLLEGE & TRADES TRACK · 50 MINUTES

Occupant Load and Exits: teacher script

Fire-science, architecture and construction students tape a multipurpose room at full size, compute its occupant load two ways, then check exit count, door width and how far apart the exits are, and fix what fails.

Prep: Tape the 48 ft x 60 ft room. Tape a 12 ft x 24 ft stage on the east wall. Mark door A on the west wall 10 ft from the south corner and door B on the west wall 40 ft from it. Print one calculation sheet per team.

Min	Step and what to do	Ask	Listen for
0-5	**Hook** "Banquet tonight, concert next month. Same room. Same capacity?"	What changes between the two?	How tightly people are packed: tables versus rows of chairs.
5-15	**Net area** Measure the room and the stage; compute net area.	Why take out the stage?	The scenario counts it separately; the floor load is the audience area.
15-25	**Two loads** Divide net area by 15 (tables and chairs) and by 7 (chairs only). Round up.	What are the two loads?	173 and 371.
25-35	**Doors** Count exits needed; compute required width at 0.2 in per person; measure the doors.	Do two doors give enough width for the concert?	No: 74.2 in needed, 66 in provided.
35-45	**Separation** Measure the diagonal and the distance between the doors.	Are the doors far enough apart?	Not without sprinklers: 30 ft apart, half the diagonal is 38.4 ft.
45-50	**Exit ticket** Individual exit ticket.		

Common misconceptions

- **Learners may think:** Capacity is set by the floor area alone. **Address it:** The floor allows 371 for a concert, but the doors as built only serve 330.
- **Learners may think:** Two doors anywhere count as two exits. **Address it:** Doors close together can both be blocked by one fire; the separation rule decides.

Supports

- Give a formula card: net area / factor; occupants x 0.2 in; diagonal / 2 or / 3.
- Multilingual learners: label net area, occupant, exit and egress on the floor with pictures.
- Mobility: the diagonal and door measurements can be read from the print by a seated teammate.

References

- **International Building Code (IBC)**: Table 1004.5 occupant load factors (assembly unconcentrated 15 net, concentrated 7 net); Table 1006.3.3 (1-500 occupants: 2 exits); 1005.3.2 (0.2 in per occupant); 1007.1.1 exit separation (check the edition your jurisdiction adopted)
- **Perkins V (CTE)**: postsecondary and secondary CTE program context

Scenario sheet

Multipurpose room 48 ft (east-west) x 60 ft (north-south). Stage 12 ft x 24 ft on the east wall (not counted in the floor area). Door A on the west wall, 10 ft from the southwest corner; door B on the west wall, 40 ft from it. Each door is a 36-in leaf giving 33 in clear (scenario value). Not sprinklered.

Rules as quoted (IBC): occupant load = net area / 15 for tables and chairs, / 7 for chairs only, rounded up; 1-500 occupants need 2 exits; egress width 0.2 in per occupant; two exits at least half the room diagonal apart (one-third with a full sprinkler system).

LEARNER SHEET · OCCUPANT LOAD AND EXITS

Name _____ Date _____

Check	Work	Answer
Net area		
Occupant load: tables and chairs		
Occupant load: chairs only		
Exits required		
Egress width needed (concert) / provided		
Diagonal; half; distance A-B		
Fix		

Exit ticket

1. A room has 1,500 sq ft net, chairs only (7 sq ft net each). Occupant load?

2. 215 occupants at 0.2 in each: required egress width?

3. A room's diagonal is 80 ft, unsprinklered. Minimum distance between two exits?

Answer key

Check	Answer
Net area	48 x 60 - 288 = 2,592 sq ft
Tables and chairs	2,592 / 15 = 172.8, so 173
Chairs only	2,592 / 7 = 370.3, so 371
Exits required	2 (1-500 occupants)
Egress width	Banquet 34.6 in: passes with 66 in. Concert 74.2 in: fails with 66 in.
Separation	Diagonal 76.8 ft; half 38.4 ft; doors 30 ft apart: fails (would pass sprinklered at 25.6 ft).
Fix	Move door B to the middle of the north wall (55.5 ft from A) and make it a pair of 36-in leaves: 99 in clear, enough for 371.

Exit ticket

1. A room has 1,500 sq ft net, chairs only (7 sq ft net each). Occupant load?
   Answer: 215 (1,500 / 7 = 214.3, round up).
2. 215 occupants at 0.2 in each: required egress width?
   Answer: 43 in.
3. A room's diagonal is 80 ft, unsprinklered. Minimum distance between two exits?
   Answer: 40 ft (half the diagonal).

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

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