

Experimental-Setup Build

Classroom-ready printable pack · Grades 5–8

Pack contents

Two identical safe-equipment picture sets, setup mats, safety cards, and model challenges. Two student sets are included.

Teacher directions

1. Use picture cards for the communication activity. The teacher chooses a challenge appropriate to local facilities and training.
2. The Describer arranges the setup and states equipment, orientation, measurement points, and safety controls.
3. The Builder recreates the picture-card setup. No student handles real equipment during the barrier round.
4. Compare with the reference, identify hazards, and obtain teacher approval before any separate hands-on investigation.

Before class

- Print at 100% on US Letter paper. Use cardstock or laminate for reuse.
- Cut on the thick solid borders. Keep Set A and Set B separate.
- Give challenge/model cards only to the Describer.
- Use a folder, book, or tabletop barrier so partners cannot see each other's work.

Accessibility and accommodations

Use four equipment cards at first; provide the equipment key; allow the Builder to repeat each step. Cards use names, abbreviations, silhouettes, and patterns.

Laboratory safety

Picture-card simulation only. It is not authorization to perform an experiment. Real laboratory work requires direct teacher supervision, activity-specific risk assessment, written procedures, appropriate PPE, maintained safety equipment, and compliance with school/district rules. Students must not touch equipment or chemicals unless specifically instructed. Report damaged equipment or incidents immediately.

Storage-envelope labels

Experimental-Setup Build

Set A — Describer

Count pieces before storing.

Experimental-Setup Build

Set B — Builder

Count pieces before storing.

Experimental-Setup Build

Challenge / model cards

Count pieces before storing.

Experimental-Setup Build

Teacher reference

Count pieces before storing.

Student language supports

Position: above · below · beside · between · near · far · left · right · clockwise**Clarify:** “Please repeat...” · “Is ___ beside ___?” · “What should I place next?”**Compare:** same · different · rotate · move · replace · sequence

Movable pieces

Set A

Cut on the solid borders. This set is identical to the partner set.



Movable pieces

Set B

Cut on the solid borders. This set is identical to the partner set.



Laboratory setup mat

Cut the page in half. Both partner mats are identical.

Set A — Laboratory setup mat

work zone • measurement zone • waste zone • PPE check

top / far

center

bottom / near

Set B — Laboratory setup mat

work zone • measurement zone • waste zone • PPE check

top / far

center

bottom / near

Describer-only challenge cards

Keep these cards hidden from the Builder.

Challenge 1: Measure liquid volume — simulation

goggles, apron, graduated cylinder, wash bottle, waste container

no real liquid required

Challenge 2: Filter a mixture — simulation

goggles, apron, ring stand, funnel, filter paper, receiving beaker

teacher approval required for real work

Challenge 3: Compare mass — simulation

goggles, balance, two beakers, waste container

keep balance area dry

Challenge 4: Organize test tubes — simulation

goggles, rack, three tubes, dropper, waste container

openings point away from people

Challenge 5: Find the hazard

place one missing-PPE or unsupported-equipment scenario, then have Builder correct it

teacher checks correction

Experimental-Setup Build reference

Equipment and safety reference

Measure liquid volume: graduated cylinder on a level surface; read at eye level as instructed. **Hold a test tube:** use a rack when stored; never point an opening toward a person. **Filter:** funnel supported over a receiving container. **Heat:** not included in student challenge cards; heat sources require separate teacher procedures and controls. **Electrical equipment:** keep dry and inspect before use.

Cards show generic equipment, not a complete experiment. Chemical identity, quantity, disposal, ventilation, and PPE depend on the teacher-approved procedure.

Safety framing checked against ACS secondary-school guidance and the NIOSH/CPSC School Chemistry Laboratory Safety Guide.

Quality check after a round

- Can each student identify pieces by shape or label without relying on color?
- Do both models match in pieces, order, orientation, and relative position?
- Which direction was most precise? Which should be revised?