Grade 7 · Unit 1 · Assessment Guide

Scale Drawings

For the Parent or Teacher — What to look for

Unit 1 introduces the key idea that scaling multiplies lengths by a constant factor, preserves angles, and scales area by the SQUARE of that factor. The classic misconceptions: (1) adding instead of multiplying, (2) thinking angles scale, (3) confusing length-scale with area-scale, and (4) reversing which scale gives the bigger drawing. Look for evidence of multiplicative thinking and proportional reasoning, not just numerical correctness.

Part A — Warm-up scale factors

- 12 ÷ 4 = scale factor 3. 5 × 2 = 10 in. 3 ÷ 9 = 1/3. 6 × 1/2 = 3 cm.
- Watch for: students who add/subtract instead of multiplying. "4 to 12 — added 8" is the classic mistake.
- Strong: writes the relationship as multiplication ("3 times bigger").

Problem 1 — Scaled copy P → Q

- (a) Scale factor P → Q is 3. (b) Q → P is 1/3.
- (c) Angles are PRESERVED. The corresponding angle is still 53°.
- ★ (d) is the diagnostic: do they say angles DON'T scale? Weak: "angles also multiply by 3 to get 159°." Strong: "only side lengths multiply by the scale factor; angles stay the same."

Problem 2 — Andre adds instead of multiplies

- ★ THE most diagnostic single question. Andre is WRONG.
- Adding 3 to (2, 3, 4) gives (5, 6, 7). Side ratios are 5/2, 6/3=2, 7/4 — NOT equal.
- A real scaled copy with factor 3 would be (6, 9, 12).
- Strong: shows that the ratios aren't constant when you add. The very heart of scaling is multiplicative.
- Weak: "it just doesn't look right" with no calculation.

Problem 3 — Area scales by the square

- (a) 8 cm × 12 cm. (b) Original area = 6 sq cm. Scaled = 96 sq cm.
- (c) Area was multiplied by 16, which is 4^2 (= scale factor squared).
- ★ (d) is the diagnostic. Strong: "the area scale factor is the side-length factor SQUARED." Weak: "area scales by 4 too" (the classic mistake).

Problem 4 — Map scale

- (a) 8 × 50 = 400 km. (b) 175 ÷ 50 = 3.5 cm. (c) 1 cm to 5,000,000 cm (since 50 km = 5,000,000 cm).
- Strong: handles both directions (map → real, real → map) without confusion.
- Weak: divides when they should multiply, or vice versa. The unit conversion in (c) is the toughest part — many students don't realize they need to convert km to cm.

Problem 5 — Floor plan with multi-step cost

- Actual: 14 ft × 20 ft. Area = 280 sq ft. Cost = $1,680.
- ★ Multi-step real-world problem. Watch for students who calculate area in INCHES (17.5 sq in) and forget to scale.
- Strong: scales lengths first, then computes area. Or computes area in inches and multiplies by 16 (4^2).

Problem 6 — Two methods for same area

- Method 1: 28 m × 15 m = 420 sq m.
- Method 2: drawing area = 105 sq cm. Scale factor for area is $2^2 = 4$. So 105 × 4 = 420 sq m.
- ★ Both methods should give 420 sq m. This is THE test of whether they understand area scaling.
- Weak: Method 2 gives 210 (multiplied by 2 instead of 4) — the classic linear-vs-area confusion.

Problem 7 — Which measurements are correct?

- Only (a) is correct.
- (b) wrong: angles don't double.
- (c) wrong: 6 cm isn't 4 × 2 — sides should be 8 cm and 12 cm.
- (d) is TEMPTING but wrong because the AREA is 4× (not just 4 times bigger — it's actually 4×, which is 2^2 so that part is correct). Wait — actually (d) says area is 4 times the original. With scale factor 2, area IS 4 times the original. So (d) is ALSO correct.
- Note for the grader: BOTH (a) and (d) are correct. The trick is whether students remember angles AND know area scales by factor².
- Watch for students who circle (b) — they think angles scale.

Problem 8 — Choosing an appropriate scale

- Room: 12 ft × 15 ft. Paper: 8 in × 10 in.
- Scale 1 inch = 2 ft gives drawing 6 in × 7.5 in. ✓ Fits with room to spare.
- Scale 1 inch = 1 ft gives 12 in × 15 in. Too big.
- Scale 1 inch = 3 ft gives 4 in × 5 in. Fits but small.
- Strong: tests their proposed scale and justifies the choice. Weak: picks a number with no checking.

Problem 9 — Comparing two scales

- Drawing A: 1 cm = 2 m, so 1 m on the building = 0.5 cm on paper.
- Drawing B: 1 cm = 5 m, so 1 m on the building = 0.2 cm on paper.
- Drawing A is LARGER.
- ★ This is conceptually tricky. Many students pick B because '5 is bigger.' Strong answer reasons about how many cm one real meter takes up in each drawing.

Problem 10 — Student-generated problem

- Strong: a coherent problem with a sensible scale, plausible measurements, and a verifiable answer key.
- Weak: scale that doesn't make sense ("1 cm = 1 cm"); numbers that don't compute correctly.
- ★ A strong sign that they understand how scale drawings work in the real world.

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