

Grade 7 • Unit 7 • Assessment Guide

Angles, Triangles, and Prisms

For the Parent or Teacher — What to look for

Unit 7 covers angle relationships, triangle conditions, and 3-D geometry. The hard ideas: triangle inequality (a triangle needs side+side > third side), the difference between 'unique triangle' and 'many possible,' and the distinction between SURFACE AREA (2-D, covers the outside) and VOLUME (3-D, fills the inside). Watch for confusion of complementary/supplementary, and for whether students remember to check ALL sides in the triangle inequality.

Problem 1 — Definitions

- Complementary: two angles whose measures add to 90° .
- Supplementary: two angles whose measures add to 180° .
- Vertical: opposite angles formed by two intersecting lines; they are EQUAL.
- ★ Common mix-up: 'supplementary = same as complementary' (both wrong). Strong: precise definitions including the sum.

Problems 2, 3 — Supp/Comp basic

- $180 - 53 = 127^\circ$. $90 - 27 = 63^\circ$.
- ★ Easy if they know the definitions. Wrong if they confuse 90 with 180.

Problem 4 — Intersecting lines, vertical angles

- Vertical angle to 65° : also 65° (vertical angles are equal).
- Adjacent angles: $180 - 65 = 115^\circ$ each.
- ★ Justification: 'vertical angles are equal' and 'adjacent angles on a line sum to 180° .'
- Weak: calls all four 65° (confuses vertical with adjacent).

Problem 5 — Three angles on a line

- $40 + x + 65 = 180$. $x = 75^\circ$.
- ★ Key: angles on a straight line sum to 180° .

Problem 6 — Triangle inequality

- (a) Yes ($3+4 > 5$). (b) NO ($2+3 = 5 < 7$). (c) Yes. (d) NO ($5+5 = 10 < 11$).
- ★ Triangle inequality: each side must be LESS than the sum of the other two.
- Strong: checks all three combinations. Weak: only checks one.
- Common error: $5 + 5 = 10$ 'almost equal' to 11 — students may say close enough; it's not.

Problem 7 — Unique/many/none

- (a) MANY (similar triangles — angles alone don't fix size).
- (b) UNIQUE (three sides determine a triangle, SSS).
- (c) NONE ($90 + 100 = 190 > 180$, impossible).
- ★ THE critical insight: angles $\rightarrow$ similar shape; angles + 1 side or all sides $\rightarrow$ unique.
- Strong: recognizes 'too much angle' in (c).

Problem 8 — Cross-sections

- (a) Square (same as the cube's face).

- (b) Smaller square (similar to the base).
- (c) Triangle (slice through apex).
- (d) Circle.
- ★ Spatial reasoning. Strong: visualizes accurately. Weak: random shapes.

Problem 9 — Triangular prism

- (a) Base area = $(1/2)(3)(4) = 6$ sq cm.
- (b) Volume = $6 \times 10 = 60$ cubic cm.
- (c) Surface area: 2 triangles ($2 \times 6 = 12$) + 3 rectangles ($3 \times 10 + 4 \times 10 + 5 \times 10 = 120$). Total = 132 sq cm.
- ★ THE diagnostic: do students remember the formula $V = (\text{base area}) \times \text{height}$, applied to ANY base shape? And do they handle the surface area systematically?
- Weak: only counts some faces; uses V formula for cube/rect prism ($l \times w \times h$) here, which doesn't work.

Problem 10 — Lin vs Diego

- Diego is correct.
- Supplementary just means 'angles whose measures sum to 180° '; they don't have to touch.
- Example: an angle of 130° in one part of the room and an angle of 50° in another are supplementary.
- ★ Tests whether students hold a strict mathematical definition (just the sum) vs an intuitive picture (adjacent ones).

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