Check Your Understanding 3.1

Name: _____ Period: _____ Date: _____

Complete each problem. Write CPCTC in full before using it. Show all work.

Basic	Intermediate	Advanced
Constructions and What They Prove *→ Proof begins with what we can construct from axioms*		
Basic 1. Describe the steps of Euclid's Proposition 1 (constructing an equilateral triangle on a given segment AB). You may use words, a diagram, or both. You do not need to prove it — just describe the construction.	*Intermediate* 2. For each step of the equilateral triangle construction, state the postulate or common notion that justifies it. *(a) Drawing the two circles centered at A and B.* *(b) Naming the intersection point C.* *(c) Connecting A, B, C to form the triangle.* *(d) Concluding AC = BC = AB.*	*Advanced* 3. A student says: 'I drew an equilateral triangle freehand and measured all three sides with a ruler. They were all 4 cm. I have proven it is equilateral.' *(a) Explain specifically what is wrong with this argument.* *(b) Explain why Euclid's compass-and-straightedge construction does prove the result, while the measurement does not.* *(c) What postulate makes the construction argument work? Cite it by number.*
Algebra Spiral *Simplify*	*Algebra Spiral* Simplify each expression completely. *(a) $3x^2 - 5x + 2x^2 + 7x$* *(b) $4(2a - 3) - 2(a + 5)$* *(c) $(5y^3 - 2y + 1) - (3y^3 + y - 4)$*	

CYU 3.1 — Answer Key (Teacher Copy)

Constructions and What They Prove

1. Draw segment AB. Draw circle centered at A with radius AB. Draw circle centered at B with radius AB. Name one intersection point C. Connect AC, BC. Accept any accurate description.

2a. Postulate 3 — a circle can be drawn with any center and radius.

2b. The two circles must intersect (this follows from the construction; Euclid assumes it implicitly — a gap modern geometers flag).

2c. Postulate 1 — a straight line can be drawn between any two points.

2d. Common Notion 1 — things equal to the same thing are equal to each other. AC = AB (both radii of circle centered at A); BC = AB (both radii of circle centered at B); therefore AC = BC = AB.

3a. Measurement with a ruler introduces human error and depends on instrument precision. The student has shown the sides appear equal on one occasion, not that they must be equal.

3b. The construction works because it operates within the axiomatic system. Every step follows from a postulate or common notion. The conclusion is forced by logic, not by measurement.

3c. Postulate 3 (circles) and Common Notion 1 (transitivity of equality). Both are required.

Algebra Spiral

(a) $5x^2 + 2x$

(b) $6a - 22$

(c) $2y^3 - 3y + 5$