

Check Your Understanding 1.1

Name: _____

Period: _____

Date: _____

Show all work. Use correct notation throughout.

Basic	Intermediate	Advanced
What Makes a Good Definition → Classification and differentiation		
<i>Basic</i> 1. State the two elements that every good definition must have. 2. A student defines a dog as: 'A dog is an animal.' Is this a good definition? Explain what is missing. 3. A student defines a square as: 'A shape with four equal sides and four right angles.' Is this a good definition? What does it classify and what does it differentiate?	<i>Intermediate</i> 4. Write a definition for each term. For each, identify the larger category it belongs to and the feature(s) that distinguish it from other members of that category. (a) <i>Isosceles triangle</i> (b) <i>Prime number</i> (c) <i>Parallel lines</i>	<i>Advanced</i> 5. Write a definition for 'bicycle' that correctly includes all bicycles and excludes all non-bicycles. Test your definition against at least three edge cases (e.g., a tricycle, a unicycle, a broken bicycle with one wheel removed). Revise if needed. 6. Why is it impossible to define every term in a mathematical system? What are 'undefined terms' and why must every system have some?
Algebra Spiral <i>Exponent Properties — Product and Power Rules</i>	<i>Algebra Spiral</i> Simplify each expression. Write your answer without negative exponents. (a) $x^3 \cdot x^5$ (b) $(y^4)^3$ (c) $4^0 + 3x^0$	

Answers — CYU 1.1**What Makes a Good Definition**

1. Classification (what larger category it belongs to) and differentiation (what distinguishes it from other things in that category).
2. Not a good definition. It classifies (animal) but does not differentiate — cats, horses, and fish are also animals. It fails to distinguish a dog from other animals.
3. Good definition. Classifies: shape (or quadrilateral). Differentiates: four equal sides AND four right angles. This combination includes all squares and excludes all non-squares.
- 4a. A triangle (category) with exactly two equal sides (differentiation).
- 4b. A whole number greater than 1 (category) that has exactly two factors: 1 and itself (differentiation).
- 4c. Two lines in the same plane (category) that never intersect (differentiation).
5. Accept any careful definition that handles edge cases. Key features: two wheels, human-powered, designed for riding. A tricycle fails (three wheels). A unicycle fails (one wheel). A broken bicycle — accept either answer with clear reasoning about whether the definition applies to intended design vs. current state.
6. Every definition requires other words. Those words must also be defined, which requires more words. This chain cannot continue forever without going in circles. Undefined terms are the starting terms that are accepted without definition — they are so basic that defining them would only make things worse. Every logical system must start somewhere.

Algebra Spiral

- (a) x^8
(b) y^{12}
(c) 4