

# The van Hiele Levels of Geometric Reasoning

(Developed by Pierre and Dina van Hiele-Geldorf in the late 1950's)

**Premise:**

**Important:**

**Level 0: Recognition/Visualization**  
Names

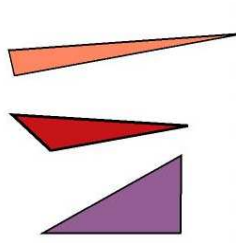
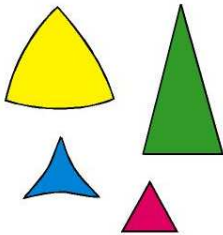
Visual Prototypes



Orientation Matters



Exclude Necessary Attributes



**Level 1: Analysis**  
Investigate properties



Vocabulary

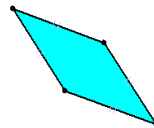
Use Properties

Miss Class Inclusions



**Level 2: Informal Deduction**  
Network

Class Inclusions



### **Level 3: Deduction (or Formal Deduction)**

Proofs

Necessary/Sufficient

#### **Definitions:**

Necessary

Sufficient

Statement/Converse

#### **Examples:**

Statement

Converse

Equivalent Definitions

#### **Examples:**

Definition 1

Definition 2

### **Level 4: Rigor**

Formal definitions, constructs, and different axiom systems

A student should understand the role and necessity of indirect proof and proof by contrapositive.