

# What Knowledge Do Secondary Geometry Teachers Need to be Effective?

Geometry Assessments for Secondary Teachers (GAST) Project – NSF DRK12 #0821967  
<http://cadrek12.org/projects/geometry-assessments-secondary-teachers-gast>

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## General Tips:

- In most instances, simply requiring students to explain their thinking is Level 3
  - Moving from describing “how and why” to *justifying* the “how and why” through application and evidence
- Activities that require the students to make conjectures are also Level 3
- Multiple answers to a question does **not** indicate level 3 – rather, the task should demand more reasoning
- Level 3 (Strategic Thinking) Depth of Knowledge requires reasoning, developing a plan or a sequence of steps and some complexity – e.g., more than one reasonable approach

## Level 3 suggested activities:

- Drawing Conclusions from Observations
- Citing Evidence and developing logical arguments for concepts
- Explaining Phenomena in terms of concepts
- Using concepts to solve problems
- Generalize a pattern – write a mathematical rule for a non-routine pattern
- Formulate a problem given a situation
- Develop a mathematical model for a complex situation
- Support ideas with details and examples
- Identify and justify a solution
- Determine the equations and solve and interpret a system

## Classroom Questions and Dialogue Generators

(from <http://redesign.rcu.msstate.edu>)

- How is \_\_\_\_\_ related to \_\_\_\_\_?
- What conclusions can you draw \_\_\_\_\_?
- How would you adapt \_\_\_\_\_ to create a different \_\_\_\_\_?
- How would you test \_\_\_\_\_?
- How can you predict the outcome if \_\_\_\_\_?
- What is the best answer? Why?

- What conclusion can be drawn from these data/problems?
- What is your interpretation of this data/problem/solution? Support your rationale.
- How would you describe the sequence of \_\_\_\_\_?
- What facts would you select to support \_\_\_\_\_?
- Can you elaborate on the reason \_\_\_\_\_?
- What would happen if \_\_\_\_\_?
- Can you formulate a theory for \_\_\_\_\_?
- Can you formulate a conjecture for \_\_\_\_\_?
- How would you test \_\_\_\_\_?
- Can you elaborate on the reason \_\_\_\_\_?

### **DOK Level 3 Activities for the Geometry Classroom**

- Geometry Problems - Circles and Triangles (area) - <http://map.mathshell.org/materials/lessons.php?taskid=222&subpage=problem>
- Inscribing and Circumscribing Right Triangles (area) - <http://map.mathshell.org/materials/lessons.php?taskid=403&subpage=problem>
- Solving Geometry Problems: Floodlights (Similarity)- <http://map.mathshell.org/materials/lessons.php?taskid=429&subpage=problem>
- Calculating Volumes of Compound Objects (Volume) - <http://map.mathshell.org/materials/lessons.php?taskid=216&subpage=concept>
- Evaluating Statements about Enlargement (2D and 3D) (Perimeter, Area & Volume relationships) - <http://map.mathshell.org/materials/lessons.php?taskid=213&subpage=concept>
- Evaluating Statements about Length and Area (length and area relationship) - <http://map.mathshell.org/materials/lessons.php?taskid=212&subpage=concept>
- A day at the beach (volume of geometric figures) - [http://schools.nyc.gov/NR/rdonlyres/C03D80B2-9213-43A9-AAA3-BB0032C62F4F/139657/NYCDOE\\_G10\\_ADayattheBeach\\_FINAL1.pdf](http://schools.nyc.gov/NR/rdonlyres/C03D80B2-9213-43A9-AAA3-BB0032C62F4F/139657/NYCDOE_G10_ADayattheBeach_FINAL1.pdf)
- Company Logo (triangle congruence) - [http://schools.nyc.gov/NR/rdonlyres/49162FEC-37E2-4A96-93C1-6671664FACD5/0/NYCDOEHSMathCompanyLogo\\_Final.pdf](http://schools.nyc.gov/NR/rdonlyres/49162FEC-37E2-4A96-93C1-6671664FACD5/0/NYCDOEHSMathCompanyLogo_Final.pdf)
- Problem Based Learning Curriculum Map with Links to Lessons from Georgia - <https://docs.google.com/document/d/19R0BNVRIL2tTE586L4EQJkkO7o1P2BrP-a7YNuV1neo/edit>
- Inside Mathematics Tasks – sorted by Geometry Standard - <http://insidemathematics.org/index.php/high-school-geometry>