MYP Geometry Unit 2: Similarity and Congruence in Architecture

Similar/Congruent Triangles Unit Project – Geogebra constructions to determine congruent/similar triangles & quadrilaterals.

AOI: Human Ingenuity, Approaches to Learning Criteria: B – Application and Reasoning; C – Communication; D-Reflection

Link to Geogebra installer: http://www.geogebra.org/cms/en/installers

Project: Each student gets a database/pool of examples of similar and congruent figures in architecture (international examples). Students need to match the quadrilaterals and triangles to pictures they have selected of architecture and explain where they see similar triangles/quadrilaterals; congruent triangles/quadrilaterals, and justify their conclusions using geometry properties learned in class. (ASA, AAS, SSS, SAS, HL).

- Students select or are assigned a minimum of two pictures to analyze. They should cite the building/structure, architect if possible.
- Paste the picture into Sketchpad/Geogebra and superimpose triangles and quadrilaterals onto the architecture. Measure the sides and angles. Find potential similar and congruent triangles and quadrilaterals and measure angles and sides using superimposed figures. (Will need intensive modeling – Netbooks).
- Students will classify triangles and quadrilaterals accurately. They should identify as many different shapes as possible.
- Students summarize their findings in a conclusion as to why congruent shapes and the concept of similarity.
- Students must provide at least one independent example to achieve Advanced (not from the pool of pictures.) The pool of pictures will be posted on a web page off the teacher page.

Report Template: Picture with superimposed quadrilaterals & triangles			
Triangle/Quadrilateral 1	Comparison with Triangle/Quadrilateral 1	Congruent/Similar? Why? (What principles apply).	Classification of triangle/quadrilateral and why.
Triangle/Quadrilateral 2	Comparison with Triangle/Quadrilateral 2		
Triangle/Quadrilateral 3	Comparison with Triangle/Quadrilateral 3		
Triangle/Quadrilateral 4	Comparison with Triangle/Quadrilateral 4		
Triangle/Quadrilateral 5	Comparison with Triangle/Quadrilateral 5		

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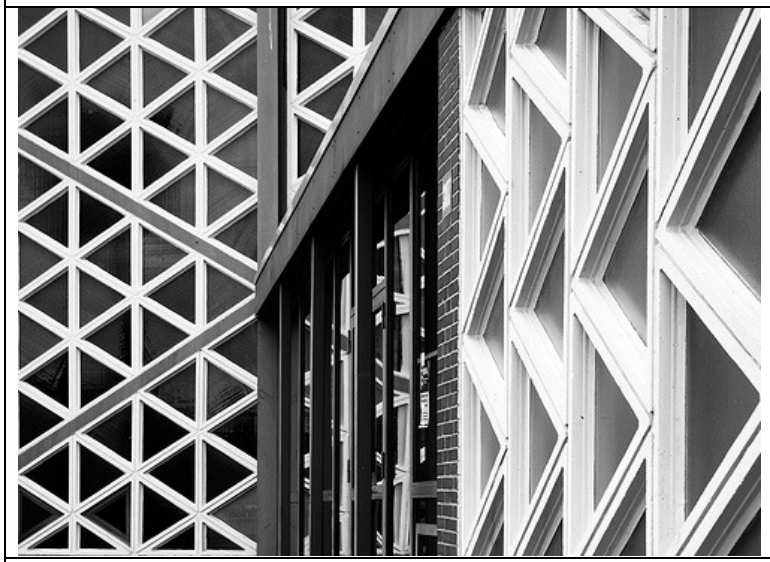
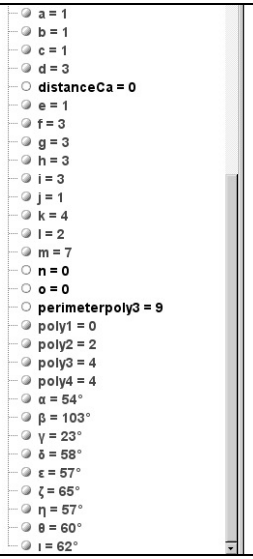
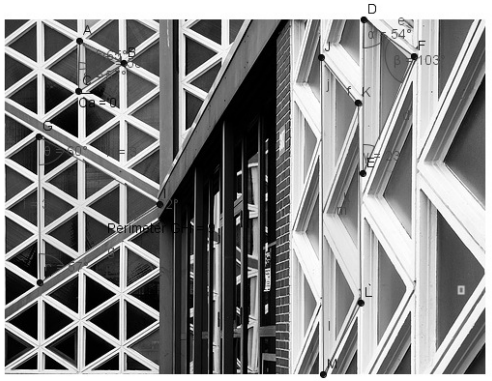
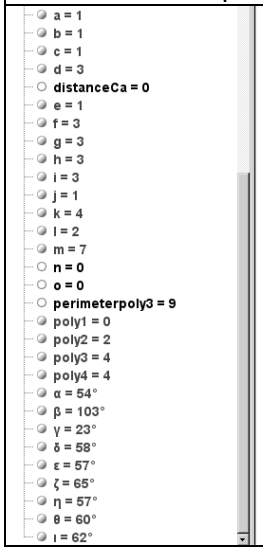
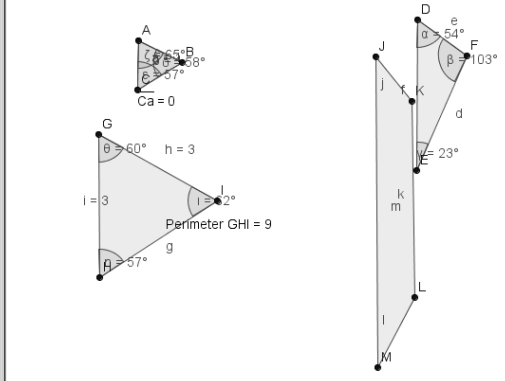
Example:

<table>
<tr><td>Assigned Picture will be pasted into Geogebra File.</td><td>Label and Identify Basic Geometry Figures (point, line segment, angle)</td></tr>
<tr><td>  </td><td> 

 </td></tr>
<tr><td>Draw and label polygons to compare; Measure angles/sides</td><td>Summarize findings: Classify all polygons (and reasons why).</td></tr>
<tr><td> 



</td><td>ΔABC ~ΔGIH through AA postulate.
Quad JKLM is a trapezoid since ∠J+∠K = 180 (two lines w/transversal and same side interior angles sum to 180 means parallel lines).

There are multiple instances of congruent triangles and similar triangles in this example. Congruent triangles aid in the aesthetics as well as useful architecture. Multiple instances of parallel lines, trapezoids also exist.

Guiding questions: Why do builders/architects use congruent shapes? Similar shapes? Symmetry?</td></tr>
</table>

MYP Geometry Unit 2: Similarity and Congruence in Architecture

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Teacher Name: **Mr. Eifler** Student Name: _____

CATEGORY	4	3	2	1
Matching Shapes Over Architecture	Student superimposes appropriate shapes over the architecture consistently and correctly.	Student superimposes reasonable shapes over the architecture most of the time.	Student sometimes superimposes reasonable shapes over the architecture. Correct use can be achieved with limited assistance.	Student rarely superimposes reasonable shapes over the architecture. Requires significant re-teaching.
Concepts of Similarity and Congruence	Explanation shows complete understanding of how similarity and congruence are applied in architecture with clear calculations and examples.	Explanation shows understanding of how similarity and congruence are applied in architecture with minor gaps. Calculations and examples may have minor errors.	Explanation shows some understanding of how similarity and congruence are applied in architecture. Significant gaps in calculations and examples. A proficient explanation can be achieved with limited assistance.	Explanation shows limited understanding of how similarity and congruence are applied in architecture.
Mathematical Terminology and Notation	Correct terminology and notation are always used, making it easy to understand what was done.	Correct terminology and notation are usually used, making it fairly easy to understand what was done.	Correct terminology and notation are used, but it is sometimes not easy to understand what was done.	There is little use, or a lot of inappropriate use, of terminology and notation.
Completion	Three or more pictures of different architecture are superimposed and analyzed correctly for congruence and similarity.	At least two pictures of different architecture are superimposed and analyzed for congruence and similarity with minor errors.	One or more pictures of different architecture are superimposed and analyzed for congruence and similarity. Significant errors exist in one or more examples.	One picture is are superimposed and analyzed for congruence and similarity, or incomplete examples are submitted. Significant re-teaching or analysis is required.
History and Summary	The history and location of each example is clear and engaging. The summary of the importance of congruence and similarity in architecture is clear and logical.	The history and location is clear and engaging for only one or two examples. The summary has minor errors or omissions.	The history and location is given for only one example, or has significant omissions. The summary has significant omissions or errors that could be corrected with additional instruction.	The history and location for the examples are mostly missing or difficult to follow. The summary requires major revision or is missing.

Criterion B: Investigating Patterns

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Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1-2	The student **applies, with some guidance**, mathematical problem-solving techniques to recognize **simple** patterns.
3-4	The student **selects and applies** mathematical problem-solving techniques to recognize patterns, and **suggests** relationships or general rules.
5-6	The student **selects and applies** mathematical problem-solving techniques to recognize patterns, and **suggests** relationships or general rules.
7-8	The student **selects and applies** mathematical problem-solving techniques to recognize patterns, **describes** them as relationships or general rules, **draws conclusions** consistent with findings, and **provides justifications or proofs**.

Criterion C: Communication in Mathematics

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1-2	The student shows **basic** use of mathematical language **and/or** forms of mathematical representation. The lines of reasoning are **difficult to follow**.
3-4	The student shows **sufficient** use of mathematical language **and** forms of mathematical representation. The lines of reasoning are **clear** though not always **logical** or **complete**. The student moves between different forms of representation **with some success**.
5-6	The student shows **good** use of mathematical language **and** forms of mathematical representation. The lines of reasoning are **concise**, **logical** and **complete**. The student moves **effectively** between different forms of representation.

Criterion D: Reflection in Mathematics

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1-2	The student **attempts** to explain whether his or her results make sense in the context of the problem. The student **attempts to describe** the importance of his or her findings in connection to real life.
3-4	The student **attempts** to explain whether his or her results make sense in the context of the problem. The student **attempts to describe** the importance of his or her findings in connection to real life. The student **attempts** to justify the degree of accuracy of his or her results where appropriate.
5-6	The student **critically explains** whether his or her results make sense in the context of the problem and provides a **detailed explanation** of the importance of his or her findings in connection to real life. The student **justifies** the degree of accuracy of his or her results where appropriate. The student **suggests improvements** to the method when necessary.

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OFFENDING COMMAND:

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