**UNIT PLAN**

Subject: Geometry  
Grade Level: 10-12  
Unit #: 10  
Unit Name: Reasoning and Proofs

**Big Idea/Theme:**  
The exploration of inductive and deductive reasoning strategy leads into a study of conditional statements, their inverses, converses, and contra-positives.

**Culminating Assessment:**  
Project: Investigating Advertising Slogans (attached)

<table>
<thead>
<tr>
<th>Unit Understanding(s)</th>
<th>Unit Essential Question(s):</th>
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<tr>
<td>Students will understand …</td>
<td>How do you differentiate the parts of a conditional statement and utilize them to construct new statements?</td>
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<td>• The different parts of a conditional statement can be rearranged to form new statements.</td>
<td>• How do you prove or disprove a statement?</td>
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<td>• There are a variety of ways to check the validity of a conditional statement, but only one way to disprove.</td>
<td>• What steps should be followed to construct a formal proof?</td>
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<td>• There are specific components to every proof.</td>
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**Students will know… / Students will be able to…**

- Choose the hypothesis and the conclusion from a conditional statement
- Write the converse, inverse, and contrapositives of a conditional statement
- Formulate conjectures using inductive reasoning.
- Use the law of detachment and the law of syllogism within deductive reasoning.
- Validate conjectures by using formal in informal proofs.
- Give counterexamples to disprove a statement.
### South Carolina Academic Standards:

**G-1.1** Formulate and demonstrate an understanding of the axiomatic structure of geometry by using undefined terms, definitions, postulates, theorems, and corollaries.

**G-1.2** Communicate knowledge of geometric relationships by using mathematical terminology appropriately.

**G-1.3** Apply basic rules of logic to determine the validity of the converse, inverse, and contrapositive of a conditional statement.

**G-1.4** Conjecture by using a variety of tools such as concrete models, graphing calculators, spreadsheets, and dynamic geometry software.

**G-1.5** Use inductive reasoning to formulate conjectures.

**G-1.6** Use deductive reasoning to validate conjectures with formal and informal proofs, and give counterexamples to disprove a statement.

**G-1.7** Understand the historical development of geometry.

**G-1.8** Connect geometry with other branches of mathematics.

**G-1.9** Demonstrate an understanding of how geometry applies to real world contexts (including architecture, construction, farming, and astronomy).

**G-1.10** Demonstrate an understanding of geometric relationships (including constructions through investigations by using a variety of tools such as straightedge, compass, Patty Paper, dynamic geometry software, and handheld computing devices).

### Interim Assessment (formative)

- Quizzes/Tests
- Observations
- Question and answer
- Journals
- Class discussion
- Board work
- Group activities

### Key Criteria (to meet the standard/rubric)

See attached project, rubric, and teacher notes on pages 3 and 4 of “Investigating Advertising Slogans”
Unit #10 Culminating Assessment
Project: Investigating Advertising Slogans

Objective
Explore logical reasoning as it applies to advertising slogans.

Materials
newspapers, magazines, radio, or television

Investigation
In this project, you will investigate the logic behind some advertising slogans. For example, what does the slogan “Healthy Vitamins, for a long healthy life” mean? Does it mean that if you do not take Healthy Vitamins, you will not have a long, healthy life? Is that what the advertisers would like you to think?

To analyze the logic of the slogan, first write it in if-then form. Also examine the inverse, converse, and contra positive forms to help you reach conclusions about the product slogan.

Conditional: If you take Healthy Vitamins, then you will live a long, healthy life.
Inverse: If you do not take Healthy Vitamins, you will not have a long, healthy life.
Converse: If you live a long, healthy life, then you are taking Healthy Vitamins.
Contra positive: If you do not live a long healthy life, then you did not take Healthy Vitamins.

The advertiser is hoping that you will accept the truth of their slogan and all of the conditionals associated with it.

Use a variety of media sources to investigate the advertising slogans for three different products. Analyze the logic of each slogan and identify the impact the slogan has on you or your family members.

1. Write each slogan in its original form. Identify the source it came from.
2. Write each slogan as a conditional statement in if-then form.
3. Write the inverse, converse, and contra positive of each statement.
4. What do you think about each slogan after examining all of its forms?
   Is it a realistic slogan? Can you suggest a way to improve the slogan to make it more appealing or more realistic?
5. Tell how you or someone in your family is affected by the slogan.
   Does it catch your interest? Would you buy the product based only on the slogan? Explain.

Present your Results
Write a report containing the information outlined above for each slogan. Include a cut-out of the advertisement or your own drawing of the product. Describe what you learned about the use of logic in the advertising slogans you selected.

Teacher Notes
It is important to have a wide variety of product slogans identified. You may want to identify some product categories, such as car dealerships, beverages, or clothing, and list them on the board. Remind students that media sources for slogans should be identified as completely as possible, including names and dates of magazine sources and call letters of radio or television sources. Encourage students to discuss their slogans and ideas at home with other family members.
Rubric

4  The student selects and writes three advertising slogans as conditional statements. The inverses, converses, and contra positives are written correctly. Media sources are sufficiently identified. The student thoroughly analyzes the logic, makes insightful suggestions for improvement, and describes the impact on the student or his or her family. The student writes an excellent general summary about the use of logic in advertising.

3  The student selects and writes three advertising slogans as conditional statements. Most of the inverses, converses, and contra positives are written correctly. Media sources are for the most part sufficiently identified. For each slogan, the student may have done some part incorrectly, such as analyzing the logic, making suggestions for improvement, or describing the impact on the student or his or her family. The general summary about the use of logic in advertising is sketchy.

2  The student selects and writes at least two advertising slogans as conditional statements. The student writes the inverses, converses, and contra positives of each conditional statement, but there are some errors. The media source of each slogan might not be identified. For each slogan, the student has done some part incorrectly. The general summary about the use of logic in advertising is poorly written.

1  The student selects and writes one or two advertising slogans as conditional statements. The student attempts to write the inverse, converse, and contra positive of each conditional statement. The media source of each slogan is not identified correctly or may be missing.