Strand: Reasoning, Lines, and Transformations

Standard of Learning (SOL) G.1b
The student will use deductive reasoning to construct and judge the validity of a logical argument consisting of a set of premises and a conclusion. This will include translating a short verbal argument into symbolic form.

Grade Level Skills:
- Translate verbal arguments into symbolic form using the symbols of formal logic.

Just in Time Quick Check

Just in Time Quick Check Teacher Notes

Supporting Resources:
- VDOE Mathematics Instructional Plans (MIPS)
  - G.1ab – Logic and Conditional Statements (Word) / PDF Version
- VDOE Word Wall Cards: Geometry (Word) | (PDF)
  - Logic Notation
  - Set Notation
  - Symbolic Representation in Logical Arguments
- Other VDOE Resources
  - Geometry , Module 1, Topic 2 – Translating Verbal Arguments Into Symbolic Form[eMediaVA]

Supporting and Prerequisite SOL: None

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SOL G.1b - Just in Time Quick Check

1. Let *a* represent: *Line segments JK and XY are congruent.* Let *b* represent: *Line segments JK and XY have the same length.*

   Translate the following argument into symbolic form.

Line segments *JK* and *XY* are congruent if and only if they have the same length.	
Line segments *JK* and *XY* have different lengths.	
Therefore, line segments *JK* and *XY* are not congruent.	

2. Let *p* represent: ∠*A* and ∠*B* are supplementary. Let *q* represent: $m\angle A + m\angle B = 180°$.

   Translate the following statement into symbolic form.

   $$m\angle A + m\angle B = 180° \text{ and are supplementary}.$$

3. Let *p* represent: $a^2 + b^2 = c^2$. Let *q* represent: $a + b > c$.

   Translate the symbolic representations into the verbal argument.

   a) $p \rightarrow q$

   b) $\sim q$

   c) $\therefore \sim p$

1. Let *a* represent: *Line segments JK and XY are congruent.* Let *b* represent: *Line segments JK and XY have the same length.*

   Translate the following argument into symbolic form.

Line segments *JK* and *XY* are congruent if and only if they have the same length.	
Line segments *JK* and *XY* have different lengths.	
Therefore, line segments *JK* and *XY* are not congruent.	

   A common error a student may make would be to improperly identify the second statement because it is negating using the opposite form, but does not use the word "not". This may indicate students only recognize negation when the word "not" is being used. Teachers are encouraged to use examples of negation where opposite statements are represented without the use of the word "not".

2. Let *p* represent: *∠A and ∠B are supplementary.* Let *q* represent: $m\angle A + m\angle B = 180°$.

   Translate the following statement into symbolic form.

   $$m\angle A + m\angle B = 180° \text{ and are supplementary.}$$

   A common error a student might make is to use the symbol for "or", ∨, rather than "and", ∧, when representing the symbolic form. This may indicate that some students have improperly applied their symbols. Teachers are encouraged to use VDOE Word Wall cards as a reference and should identify ways to help students recognize the use of these symbols. For example, the symbolic form for "and" looks similar to writing a capital A.

3. Let *p* represent: $a^2 + b^2 = c^2$. Let *q* represent: $a + b > c$.

   Translate the symbolic representations into the verbal argument.

   a) $p \rightarrow q$

   b) $\sim q$

   c) $\therefore \sim p$

A common error a student may make is not correctly negating symbols such as $=$, $\neq$, $<$, and $>$. This may indicate that a student does not understand how to negate statements involving equalities and inequalities. Teachers are encouraged to use examples including these types of symbols to allow students to practice negation in other forms. It is important that teachers explain the negation of symbols for example the negation of $>$ is actually $\leq$. Another error a student might make would be writing the verbal arguments when given symbolic forms. For example, a student may forget if or then in their first statement. This can become a more common error when lengthy statements are involved. Teachers could have the related argument pieces on index cards and have students place them in the correct order to create the entire statement to represent each symbolic form given.