LESSON MAKER PRO

Logic Link Lab

Practice, apply, and challenge your symbol skills.

HIGH SCHOOL · MA.912.LT.4.1

MA.912.LT.4.1 "Translate propositional statements into logical arguments using propositional variables and logical connectives."

NAME _____ DATE _____

PART 1: PRACTICE

Choose a letter for each simple statement. Use ¬ for not, ∧ for and, ∨ for or, → for if...then, and ↔ for if and only if. In logic, or means one or both statements can be true.

WORKED EXAMPLE

Let p: "The library is open" and q: "I can print." Translate: "If the library is open, then I can print."

1. The first statement is p.
2. The second statement is q.
3. "If..., then..." uses →.
4. Write p → q.

Answer: p → q

PRACTICE 5 problems

1 Let p: "It is Friday" and q: "We have a quiz." Translate: "It is Friday and we have a quiz."

ANSWER _____

2 Let p: "I study" and q: "I pass the test." Translate: "If I study, then I pass the test."

ANSWER _____

3 Let p: "The bus is late." Translate: "The bus is not late."

ANSWER _____

4 Let p: "I bring a snack" and q: "I buy lunch." Translate: "I bring a snack or I buy lunch."

ANSWER _____

5 Let p: "A shape is a square" and q: "A shape has four equal sides and four right angles." Translate: "A shape is a square if and only if it has four equal sides and four right angles."

ANSWER _____

APPLY IT Show your work

1 Let p: “Maya registers by Friday,” q: “Maya brings her ID,” and r: “Maya may play in the game tournament.” Translate: “Maya may play in the game tournament only if she registers by Friday and brings her ID.”

WORK SPACE

ANSWER _____

2 Let p: “The video uploads,” q: “The audio is clear,” and r: “The project is accepted.” Translate: “The project is accepted if the video uploads and the audio is clear.”

WORK SPACE

ANSWER _____

CHALLENGE One step up

Let p: “A student finishes the coding task,” q: “A student passes the safety quiz,” and r: “A student earns the lab badge.” Translate: “A student earns the lab badge if and only if the student finishes the coding task and passes the safety quiz.” Explain why parentheses are needed.

WORK SPACE AND ANSWER

Logic Link Lab

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Let p: “It is Friday” and q: “We have a quiz.” Translate: “It is Friday and we have a quiz.”	**p∧q**
2	Let p: “I study” and q: “I pass the test.” Translate: “If I study, then I pass the test.”	**p→q**
3	Let p: “The bus is late.” Translate: “The bus is not late.”	**¬p**
4	Let p: “I bring a snack” and q: “I buy lunch.” Translate: “I bring a snack or I buy lunch.”	**p∨q**
5	Let p: “A shape is a square” and q: “A shape has four equal sides and four right angles.” Translate: “A shape is a square if and only if it has four equal sides and four right angles.”	**p↔q**

PART 2 · APPLY IT

1. **r → (p ∧ q)** “Only if” puts the condition after the arrow. Both p and q are required, so they are grouped with ∧.
2. **(p ∧ q) → r** The word “if” makes the upload-and-audio condition the first part of the conditional. Both conditions must occur together.

CHALLENGE

r ↔ (p ∧ q). The parentheses show that finishing the task and passing the quiz are one combined condition.

Accept equivalent variable order for ∧ and ∨, such as q ∧ p. Require parentheses when a conditional or biconditional uses a compound condition.