

The Named Argument Forms

Unit 2: Logic and Reasoning • Day 8 of 11 • Carroll Puzzle Resolved • Valid vs. Fallacy Table • Name Etymology

At a Glance

Pacing: Carroll puzzle resolution (15 min) • Valid vs. fallacy table review (10 min) • CYU (45 min) • Post-lesson reflection (10 min)

Materials: Boards and markers • Additional Carroll puzzles printed for extension groups

Opening — Resolving the Lewis Carroll Poultry Puzzle (≈15 min)

Ask groups who worked on the extension to share what they found. Then work through the solution together.

Full solution

(a) If duck → does not waltz. (b) If officer → waltzes. (c) If my poultry → duck.

Step 1: Contrapositive of (b): if does not waltz → not an officer.

Step 2: Chain (c), (a), contrapositive of (b):

my poultry → duck [c] → does not waltz [a] → not an officer [contra b]

Conclusion: My poultry are not officers.

What the puzzle demonstrates

Two tools working together: the law of syllogism (to chain) and the contrapositive (to rewrite premise b into a usable form). Neither alone is sufficient. This is a genuine proof move: you do not always have premises in the order you need them.

Extension | More Carroll-Style Puzzles

Each puzzle below requires the same two moves as the poultry puzzle: write the contrapositive of one or more premises, then chain them using the law of syllogism. Work out which premise needs its contrapositive before you start chaining.

Puzzle 1 — The Garden Party

(a) Everyone who was invited to the garden party brought a hat.

(b) No one who brought a hat forgot their gloves.

(c) All of Lady Pemberton's guests forgot their gloves.

What can you conclude about Lady Pemberton's guests and the garden party invitation list?

Puzzle 2 — The Naturalists

- (a) No naturalist who has studied abroad is ignorant of tropical insects.
- (b) Every entomologist has studied abroad.
- (c) Nobody who is ignorant of tropical insects should be trusted to collect specimens.

What can you conclude about entomologists and specimen collection?

Puzzle 3 — The Literary Society

- (a) No member of the literary society who has read Dickens is unfamiliar with Bleak House.
- (b) Anyone unfamiliar with Bleak House cannot appreciate Victorian serialization.
- (c) All subscribers to the quarterly review have read Dickens.

What can you conclude about subscribers to the quarterly review?

Teacher Note — Carroll Extension Answer Key

Puzzle 1:

Conditionals: (a) invited $\rightarrow$ brought hat. (b) brought hat $\rightarrow$ did not forget gloves. (c) Lady P's guests $\rightarrow$ forgot gloves.

Contrapositive of (b): forgot gloves $\rightarrow$ not brought hat. Contrapositive of (a): not brought hat $\rightarrow$ not invited.

Chain: Lady P's guests $\rightarrow$ forgot gloves [c] $\rightarrow$ not brought hat [contra b] $\rightarrow$ not invited [contra a]. $\therefore$ Lady Pemberton's guests were not invited to the garden party.

Puzzle 2:

Conditionals: (a) entomologist $\rightarrow$ studied abroad. (b) studied abroad $\rightarrow$ not ignorant of tropical insects. (c) ignorant of tropical insects $\rightarrow$ not trusted to collect.

Contrapositive of (c) not needed — chain runs forward: entomologist $\rightarrow$ studied abroad [a] $\rightarrow$ not ignorant of tropical insects [b].

We need: not ignorant $\rightarrow$ trusted. That is the contrapositive of (c). Chain: entomologist $\rightarrow$ not ignorant $\rightarrow$ should be trusted to collect specimens.

Puzzle 3:

Conditionals: (a) subscriber $\rightarrow$ read Dickens. (b) read Dickens $\rightarrow$ familiar with Bleak House. (c) familiar with Bleak House $\rightarrow$ can appreciate Victorian serialization (contrapositive of the given).

Chain: subscriber $\rightarrow$ read Dickens [a] $\rightarrow$ familiar with Bleak House [b] $\rightarrow$ can appreciate Victorian serialization [contra c]. $\therefore$ Subscribers to the quarterly review can appreciate Victorian serialization.

QUICK REVIEW — VALID FORMS VS. FALLACIES

One look at the comparison table — not a re-teaching. Then say:

The one thing to say

The valid forms use the conditional or its contrapositive — the two logically equivalent forms. The fallacies use the converse or the inverse — the two forms that are not equivalent. If you remember that, you do not need to memorize the fallacy names as separate facts.

60 seconds on the name etymology: Affirming = confirming something as true. The fallacy confirms the consequent (q) and incorrectly claims the antecedent (p) must be true. Denying = declaring something false. The fallacy declares the antecedent (p) false and incorrectly claims the consequent (q) must be false. Students who know these roots can reconstruct the names without memorizing.

Valid ✓	Symbolic Form	Fallacy X	Symbolic Form
Law of Detachment	$p \rightarrow q, p \therefore q$	Affirming the Consequent	$p \rightarrow q, q \therefore p$ X
Denying the Consequent	$p \rightarrow q, \neg q \therefore \neg p$	Denying the Antecedent	$p \rightarrow q, \neg p \therefore \neg q$ X
Law of Syllogism	$p \rightarrow q, q \rightarrow r \therefore p \rightarrow r$	Undistributed Middle	All A are C, all B are C $\therefore$ A=B X
Disjunctive Syllogism	$p \vee q, \neg p \therefore q$		

Extension: Additional Carroll-style puzzles

- Garden Party puzzle, Naturalists puzzle, Literary Society puzzle — all require the same two moves: contrapositive of one premise, then chaining. Answer keys in the download.