

Chapter 2 Study Sheet — reasoning and proofs on one page.

2.1 Conditional Statements

Conditional $p \rightarrow q$ · **Converse** $q \rightarrow p$ · **Inverse** $\sim p \rightarrow \sim q$ ·
Contrapositive $\sim q \rightarrow \sim p$

Conditional $\equiv$ **contrapositive**; **converse** $\equiv$ **inverse**.
Biconditional $p \leftrightarrow q$: both directions true.

2.2 Reasoning

Inductive: pattern $\rightarrow$ conjecture. One counterexample kills a conjecture.

Deductive: Law of Detachment ($p \rightarrow q$ true, p true $\Rightarrow$ q true) ·
Law of Syllogism ($p \rightarrow q$, $q \rightarrow r \Rightarrow p \rightarrow r$)

2.3 Point, Line & Plane Postulates

2 points $\rightarrow$ one line · line has ≥ 2 points · 2 lines meet in 1 point · 3 noncollinear points $\rightarrow$ one plane · plane has ≥ 3 noncollinear points · 2 points in a plane $\rightarrow$ their line is in the plane · 2 planes meet in a line

2.4-2.5 Properties for Proofs

Equality: Add / Subtract / Multiply / Divide both sides ·
Substitute equals · Distribute $a(b + c) = ab + ac$

Both = and $\cong$: Reflexive ($a = a$) · Symmetric (flip) · Transitive (chain)

Proof skeleton: Given $\rightarrow$ definitions turn words into equations $\rightarrow$ algebra $\rightarrow$ Prove.

2.6 Theorems

All right angles $\cong$ · Vertical angles $\cong$ · Linear pair $\rightarrow$ supplementary

Congruent Supplements: supplementary to the same angle $\rightarrow \cong$ · **Congruent Complements**: complementary to the same angle $\rightarrow \cong$