Chapter 3 Highlights

Parallel lines theorems:

|| *l*'s → ≅ corresponding ∡'s
|| *l*'s → ≅ alternate interior ∡'s
|| *l*'s → ≅ alternate exterior ∡'s
|| *l*'s → supplementary same side interior ∡'s

|| *l*'s → ∡ relationships defined

How can I prove that lines are parallel?

≅ corresponding ∡'s → || *l*'s
≅ alternate interior ∡'s → || *l*'s
≅ alternate exterior ∡'s → || *l*'s
Supplementary same side interior ∡'s → || *l*'s
Two *l*'s ⊥ same *l* → || *l*'s
$m_1 = m_2$ → || *l*'s

Generally: ∡ relationships defined → || *l*'s
(Converses of Parallel Line Theorems)
Or line relationships defined → || *l*'s

How can I prove that lines are perpendicular?

Linear pair of ≅ ∡'s → ⊥ lines
A line ⊥ to one of 2 || *l*'s → ⊥ lines
$m_1m_2 = -1$ → ⊥ lines

Generally: ∡ or line relationships defined → ⊥ *l*'s

Vocabulary reminders:

- Vertical angles: two non-adjacent angles formed by intersecting lines which share a common vertex → vertical angles
- Linear pair: two adj angles whose non-common sides form opposite rays → linear pair
- Supplementary: sum of angles = 180° → supplementary angles

Constructions:

1. Copy segment
2. Copy angle
3. Segment bisector
4. Angle bisector
5. Parallel line through a point (key: copy angle made by a transversal) – *New!*
6. Perpendicular line through a point (key: make segment then bisect) – *New!*

Other helpful reminders:

1. Remember to decorate your picture with any angle degrees known; then write a system of equations (2 equations for 2 variables).
2. Remember to check your answer when solving a system of equations.

Slope:

2 non-vertical lines are || iff they have the same slope.
*Remember: All vertical lines are all ||.
2 non-vertical lines are ⊥ iff their slope product is -1 *or*
the lines are vertical & horizontal.
*Remember:⊥ lines have slopes which are opposite reciprocals.

$$slope = \frac{rise \updownarrow}{run \leftrightarrow} \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \frac{\triangle y}{\triangle x}$$

Linear Equations:

Slope-Intercept Form: $y = mx + b$
Point-Slope Form: $y - y_1 = m(x - x_1)$
Vertical Line: $x = c$
Horizontal Line: $y = c$

Linear Solutions and Line Comparisons:

Type of Lines	Parallel Lines	Intersecting Lines (includes perpendicular lines!)	Coincident Lines
Number of algebraic solutions	No algebraic solution (0=number)	Unique algebraic solution (*x,y*)	Identity algebraic solution (0=0) → infinite possible solutions
Slope comparison	Same Slope	Different Slopes	Same Slopes
y-intercept comparison	Different *y*-intercept	Irrelevant	Same *y*-intercepts