

VOCABULARY

Parallel lines Two lines are parallel lines if they do not intersect and are coplanar.

Skew lines Two lines are skew lines if they do not intersect and are not coplanar.

Parallel planes Two planes that do not intersect are parallel planes.

Transversal A transversal is a line that intersects two or more coplanar lines at different points.

Corresponding angles Two angles are corresponding angles if they have corresponding positions.

Alternate interior angles Two angles are alternate interior angles if they lie between the two lines and on opposite sides of the transversal.

Alternate exterior angles Two angles are alternate exterior angles if they lie outside the two lines and on opposite sides of the transversal.

Consecutive interior angles Two angles are consecutive interior angles if they lie between the two lines and on the same side of the transversal.

POSTULATE 13 PARALLEL POSTULATE

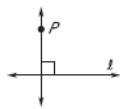
If there is a line and a point not on the line, then there is exactly one line through the point parallel to the given line.



There is exactly one line through P parallel to l .

POSTULATE 14 PERPENDICULAR POSTULATE

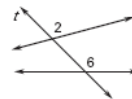
If there is a line and a point not on the line, then there is exactly one line through the point perpendicular to the given line.



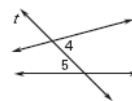
There is exactly one line through P perpendicular to l .

ANGLES FORMED BY TRANSVERSALS

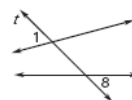
Two angles are corresponding angles if they have corresponding positions. For example, $\angle 2$ and $\angle 6$ are above the lines and to the right of the transversal t .



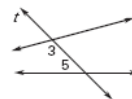
Two angles are alternate interior angles if they lie between the two lines and on opposite sides of the transversal.



Two angles are alternate exterior angles if they lie outside the two lines and on opposite sides of the transversal.

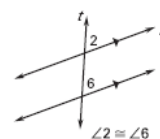


Two angles are consecutive interior angles if they lie between the two lines and on the same side of the transversal.



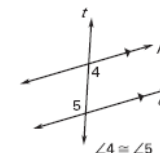
POSTULATE 15 CORRESPONDING ANGLES POSTULATE

If two parallel lines are cut by a transversal, then the pairs of corresponding angles are congruent.



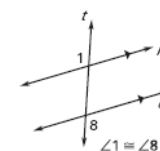
THEOREM 3.1 ALTERNATE INTERIOR ANGLES THEOREM

If two parallel lines are cut by a transversal, then the pairs of alternate interior angles are congruent.



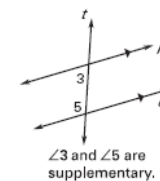
THEOREM 3.2 ALTERNATE EXTERIOR ANGLES THEOREM

If two parallel lines are cut by a transversal, then the pairs of alternate exterior angles are congruent.



THEOREM 3.3 CONSECUTIVE INTERIOR ANGLES THEOREM

If two parallel lines are cut by a transversal, then the pairs of consecutive interior angles are supplementary.

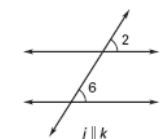


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Paragraph proof A proof can be written in paragraph form, called a paragraph proof.

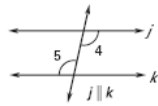
POSTULATE 16 CORRESPONDING ANGLES CONVERSE

If two lines are cut by a transversal so the corresponding angles are congruent, then the lines are parallel.



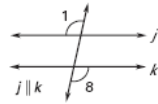
THEOREM 3.4 ALTERNATE INTERIOR ANGLES CONVERSE

If two lines are cut by a transversal so the alternate interior angles are congruent, then the lines are parallel.



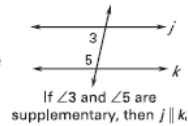
THEOREM 3.5 ALTERNATE EXTERIOR ANGLES CONVERSE

If two lines are cut by a transversal so the alternate exterior angles are congruent, then the lines are parallel.



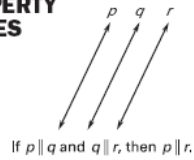
THEOREM 3.6 CONSECUTIVE INTERIOR ANGLES CONVERSE

If two lines are cut by a transversal so the consecutive interior angles are supplementary, then the lines are parallel.



THEOREM 3.7 TRANSITIVE PROPERTY OF PARALLEL LINES

If two lines are parallel to the same line, then they are parallel to each other.



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Slope The slope of a nonvertical line is the ratio of vertical change (rise) to horizontal change (run) between any two points on the line.

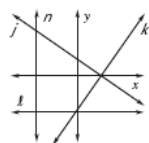
SLOPE OF LINES IN THE COORDINATE PLANE

Negative slope: falls from left to right, as in line j

Positive slope: rises from left to right, as in line k

Undefined slope: vertical, as in line n

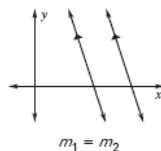
Zero slope (slope of 0): horizontal, as in line ℓ



POSTULATE 17 SLOPES OF PARALLEL LINES

In a coordinate plane, two nonvertical lines are parallel if and only if they have the same slope.

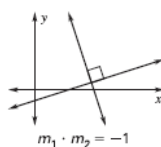
Any two vertical lines are parallel.



POSTULATE 18 SLOPES OF PERPENDICULAR LINES

In a coordinate plane, two nonvertical lines are perpendicular if and only if the product of their slopes is -1.

Horizontal lines are perpendicular to vertical lines.



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Slope-intercept form The general form of a linear equation in slope-intercept form is $y = mx + b$, where m is the slope and b is the y -intercept.

Standard form The general form of a linear equation in standard form is $Ax + By = C$, where A and B are not both zero.

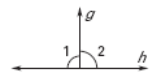
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Distance from a point to a line The distance from a point to a line is the length of the perpendicular segment from the point to the line.

THEOREM 3.8

If two lines intersect to form a linear pair of congruent angles, then the lines are perpendicular.

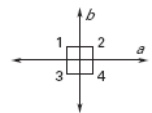
If $\angle 1 \cong \angle 2$, then $g \perp h$.



THEOREM 3.9

If two lines are perpendicular, then they intersect to form four right angles.

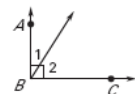
If $a \perp b$, then $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$ are right angles.



THEOREM 3.10

If two sides of two adjacent acute angles are perpendicular, then the angles are complementary.

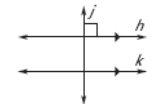
If $\overline{BA} \perp \overline{BC}$, then $\angle 1$ and $\angle 2$ are complementary.



THEOREM 3.11 PERPENDICULAR TRANSVERSAL THEOREM

If a transversal is perpendicular to one of two parallel lines, then it is perpendicular to the other.

If $h \parallel k$ and $j \perp h$, then $j \perp k$.



THEOREM 3.12 LINES PERPENDICULAR TO A TRANSVERSAL THEOREM

In a plane, if two lines are perpendicular to the same line, then they are parallel to each other.

If $m \perp p$ and $n \perp p$, then $m \parallel n$.

