9. The converse of the corresponding angles theorem requires the angles to be congruent and corresponding. $\angle 1$ and $\angle 2$ are congruent but they are not corresponding, so this theorem cannot be used.

12. The Converse of the Corresponding Angles Theorem states that if two lines and a transversal form corresponding angles that are congruent, then the lines are parallel. $\angle 2$ and $\angle 3$ are corresponding and congruent, so by the Converse of the Corresponding Angles Theorem to determine that $p \parallel q$.

13. The Converse of the Alternate Interior Angles Theorem states if two lines and a transversal form alternate interior angles that are congruent, then the lines are parallel. $\angle 6$ and $\angle 7$ are congruent and are alternate interior angles, so by the Converse of the Alternate Interior Angles Theorem $p \parallel q$.

14. The Converse of the Alternate Exterior Angles Theorem states if two lines and a transversal form alternate exterior angles that are congruent, then the lines are parallel. $\angle 1$ and $\angle 4$ are congruent and are alternate exterior angles, so by the Converse of the Alternate Exterior Angles Theorem $r \parallel s$.

15. The Converse of the Same-Side Interior Angles Theorem states if two lines and a transversal form same-side interior angles that are supplementary, then the lines are parallel. Since $\angle 5$ and $\angle 8$ are supplementary, we can apply the converse of the same-side interior angles theorem to determine that $r \parallel s$.

19. Apply the Converse of the Alternate Exterior Angles Theorem, which states that if two lines and a transversal form alternate exterior angles that are congruent, then the lines are parallel. In order for the two alternate exterior angles to be congruent, they must be equal. Thus,

$$10x + 5 = 12x - 9$$
$$14 = 2x$$
$$x = 7$$

20. Apply the Converse of the Alternate Exterior Angles Theorem; the line c will be parallel to the line b if angle $\angle 1$ is congruent to the alternate exterior angle of value 74°. Thus, $m\angle 1 = 74^\circ$.

21. In order to reach maximum speed, the skier must have parallel skis passing straight through the finish line. Thus, the finish line should be perpendicular to her skis. In order to achieve maximum speed, apply the Converse of the Alternate Exterior Angles Theorem, which states that the alternate exterior angles must be congruent for the two skis to be parallel. In order for the pair of alternate exterior angles $\angle 1$ and 70° to be congruent, they must be equal; thus $m\angle 1 = 70^\circ$.

22. **a.** Apply the Converse of the Same-Side Interior Angles Theorem so that $\angle 1$ is supplementary to 125°.

$$125^\circ + m\angle 1 = 180^\circ$$
$$m\angle 1 = 55^\circ$$

b. Apply the Converse of the Corresponding Angles Theorem so that $\angle 2$ is congruent to $\angle 1$.

$$m\angle 2 = m\angle 1$$
$$m\angle 2 = 55^\circ$$

25. **Part A** Using the Converse of the Corresponding Angles Theorem, $\angle 1$ and $\angle 2$ are congruent, and thus $m\angle 2 = 125^\circ$; Using the Converse of the Same-Side Interior Angles Theorem, $\angle 1$ and $\angle 3$ are supplementary, and thus $m\angle 3 = 55^\circ$.

Part B Sample: Using Theorem 2-9, if the angle formed by each aisle is perpendicular to a line on the floor, then the aisles are parallel.