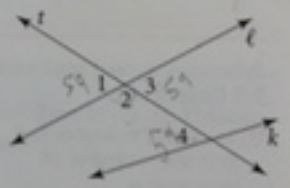
A **transversal** is a line that intersects two coplanar lines at two distinct points.
$\angle 1$ and $\angle 4$ are **corresponding angles.**
$\angle 3$ and $\angle 4$ are **alternate interior angles.**
$\angle 2$ and $\angle 4$ are **same-side interior angles.**



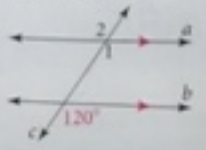
If two parallel lines are cut by a transversal, then

- corresponding angles are congruent.
- alternate interior angles are congruent.
- same-side interior angles are supplementary.

11. Suppose ℓ and k in the diagram above are parallel. If $m\angle 1 = 59$, what are the measures of $\angle 2$, $\angle 3$, and $\angle 4$?

Find $m\angle 1$ and then $m\angle 2$. Justify each answer.

12.



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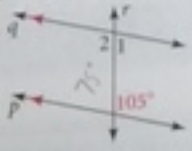

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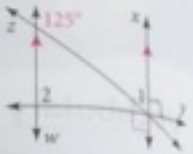


15. Writing Suppose both pairs of opposite sides of a quadrilateral are parallel. Which angles of the quadrilateral must be supplementary? Explain.

Two lines cut by a transversal are parallel if

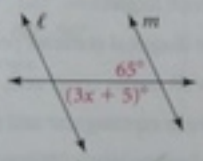
- corresponding angles are congruent.
- alternate interior angles are congruent.
- same-side interior angles are supplementary.

You can construct the line parallel to a given line through a given point not on the line. You can also construct the perpendicular to a given line at a given point on the line or through a given point not on the line.

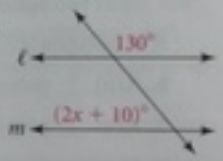
A **flow proof** uses arrows to show the logical connections between the statements. Reasons are written below the statements.

Algebra Find the value of x for which $\ell \parallel m$.

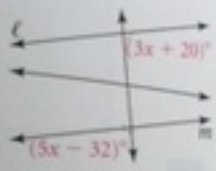
16.



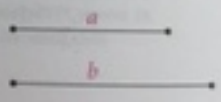
17.



18.



Use the segments at the right for Exercises 19 and 20.



19. Construct a rectangle with side lengths a and b.

20. Construct a quadrilateral with one pair of parallel opposite sides, each side of length $2a$.

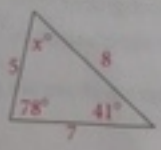
21. To construct a line parallel to a given line m through a point not on m, you need to know how to construct _?_ angles.

The sum of the measures of the angles of a triangle is 180. The measure of each **exterior angle** of a triangle equals the sum of the measures of its two **remote interior angles.**

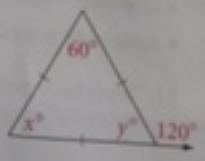
You can classify triangles according to their sides and angles.

Find the values of the variables. Then classify each triangle by its sides and angles.

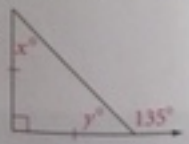
22.



23.



24.



In each of Exercises 25–28, the measures of the three angles of a triangle are given. Find the value of x and then classify the triangle by its angles.

25. $x + 10, x - 20, x + 25$

26. $x, 2x, 3x$

27. $20x + 10, 30x - 2, 7x + 1$

28. $10x - 3, 14x - 20, x + 3$

29. In a right triangle, what is always true about the angles?

A **polygon** is a closed plane figure with at least three sides. To name a polygon, start at any vertex and list the vertices consecutively in a clockwise or counterclockwise direction. A polygon is **convex** if no diagonal contains points outside the polygon. Otherwise, it is **concave.**

An **equilateral polygon** has all sides congruent. An **equiangular polygon** has all angles congruent. A **regular polygon** is equilateral and equiangular.

The sum of the measures of the angles of an n-gon is $(n - 2)180$. The sum of the measures of the exterior angles of an n-gon, one at each vertex, is 360.

Find the measure of an interior angle and an exterior angle of each regular polygon.

30. a hexagon **31.** an octagon **32.** a decagon **33.** a 24-gon

34. What is the sum of the measures of the exterior angles for each polygon in Exercises 30–33?

When a linear equation is in **slope-intercept form,** $y = mx + b$, the slope m and the y-intercept b are easily identified. When a linear equation is in **point-slope form,** $(y - y_1) = m(x - x_1)$, point (x_1, y_1) and slope m can easily be identified. The equation $Ax + By = C$, where A and B are not both zero, is in **standard form.** When a linear equation is in standard form, the x- and y-intercepts are readily found.

35. Name the slope and y-intercept of $y = 2x - 1$. Graph the line.

36. Name a point on and the slope of $y - 3 = -2(x + 5)$. Graph the line.

37. Graph $y = -\frac{1}{2}$.

38. Graph $3x - 4y = 12$.

39. Write an equation for the vertical line that contains $A(6, -9)$.

The slopes of two nonvertical parallel lines are equal. All vertical lines are parallel.

The product of the slopes of two nonvertical perpendicular lines is -1. In a plane, every vertical line is perpendicular to every horizontal line.

Determine whether $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are *parallel*, *perpendicular*, or *neither*.

40. $A(-1, -4), B(2, 11), C(1, 1), D(4, 10)$ **41.** $A(2, 8), B(-1, -2), C(3, 7), D(0, -3)$

42. $A(-3, 3), B(0, 2), C(1, 3), D(-2, -6)$ **43.** $A(-1, 3), B(4, 8), C(-6, 0), D(2, 8)$

44. Writing For $B(4, 8)$ and $D(2, 8)$, find the slope of $\overleftrightarrow{BD}$. Explain why the slope of any horizontal line is zero.