

Parallel
and
Perpendicular
Lines
Unit

3-1 Lines and Angles

Vocabulary

Parallel - coplanar lines that will never intersect

Skew - lines that are not coplanar or parallel and do not intersect

Transversal - a line that intersects two or more lines

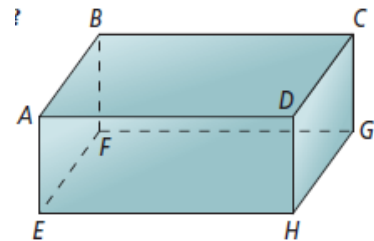
Symbols:

Parallel \parallel

Perpendicular \perp

Marking Figures Parallel \gg

In the figure below, name a set of parallel lines, parallel planes, and a set of skew lines.



Got It? Use the figure at the right. Which segments are parallel to \overline{AD} ?

Got It? Reasoning Explain why \overline{FE} and \overline{CD} are *not* skew.

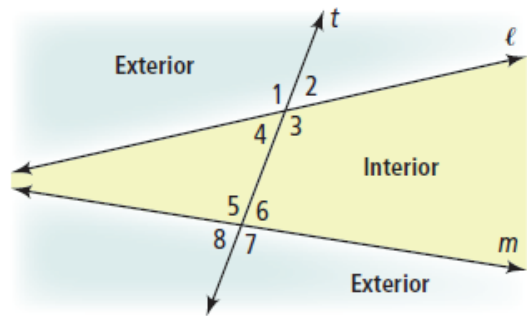
Angle Pairs Formed by Transversals

Alternate interior angles are nonadjacent interior angles that lie on opposite sides of the transversal.

Same-side interior angles are interior angles that lie on the same side of the transversal.

Corresponding angles lie on the same side of a transversal t and in corresponding positions.

Alternate exterior angles are nonadjacent exterior angles that lie on opposite sides of the transversal.



Use the diagram above. Draw a line from each angle pair in Column A to its description in Column B.

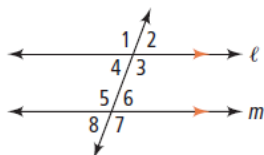
Column A	Column B
18. $\angle 4$ and $\angle 6$	alternate exterior angles
19. $\angle 3$ and $\angle 6$	same-side interior angles
20. $\angle 2$ and $\angle 6$	alternate interior angles
21. $\angle 2$ and $\angle 8$	corresponding angles

3-2 Properties of Parallel Lines

Use these ONLY when you know lines are parallel!

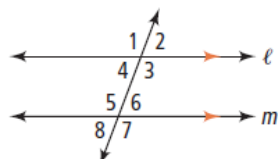
Corresponding Angles Postulate

- If corresponding angles on parallel lines, then **congruent**



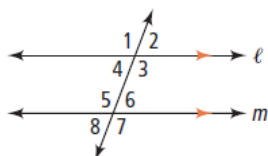
Alternate Interior Angles Theorem

- If alternate interior angles on parallel lines, then **congruent**



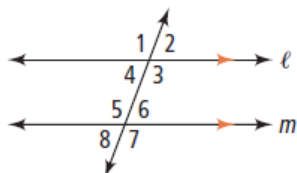
Alternate Exterior Angles Theorem

- If alternate exterior angles on parallel lines, then **congruent**

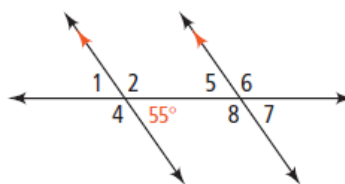


Same Side Interior Angles Theorem

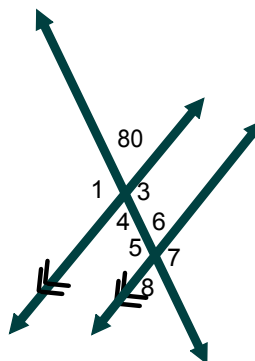
- If same side interior angles on parallel lines, then **supplementary**



Find the measures of all of the angles at the right.
HINT: You will need to use Vertical Angles Theorem and/or Linear Pair Postulate.



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HINT: You will need to use Vertical Angles Theorem and/or Linear Pair Postulate.

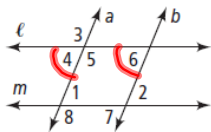


3-3 Proving Lines Parallel

Use these ONLY when proving two lines parallel!

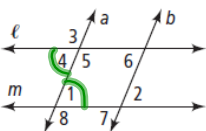
Converse of Corresponding Angles Postulate

- If corr. angles are congruent, then lines are parallel



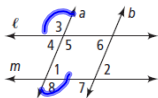
Converse of Alternate Interior Angles Theorem

- If alt. int. angles are congruent, then lines are parallel



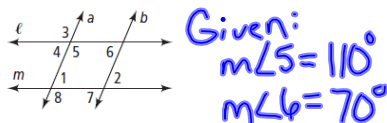
Converse of Alternate Exterior Angles Theorem

- If alt. ext. angles are congruent, then lines are parallel

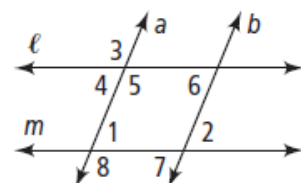


Converse of Same Side Interior Angles Postulate

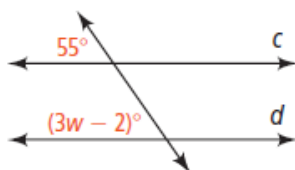
- If same side int angles are supplementary, then lines are parallel



Got It? Which lines are parallel if $\angle 6 \cong \angle 7$? Justify your answer.



Got It? What is the value of w for which $c \parallel d$?



3-4 Parallel and Perpendicular Lines

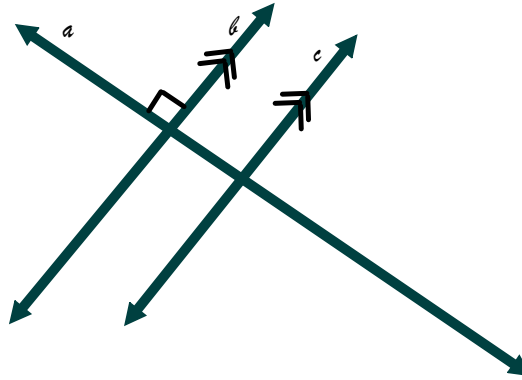
Transitive Property of Parallel Lines

-If $a \parallel b$ and $b \parallel c$, then $a \parallel c$.

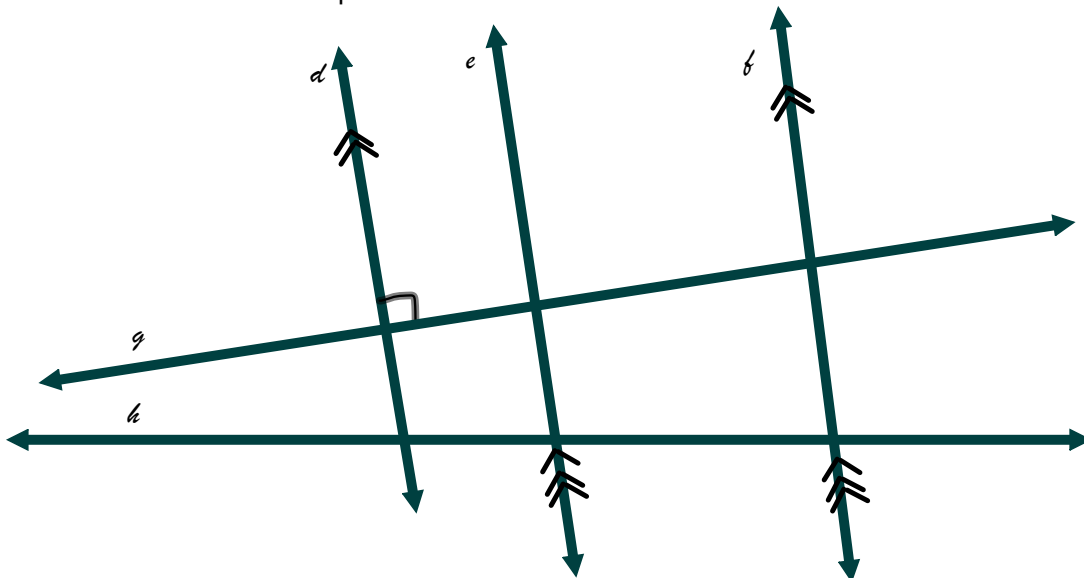


Perpendicular Transversal Theorem

-If $a \perp b$ and $b \parallel c$, then $a \perp c$.



Can you make some conclusions about the lines below based on the Transitive Property of Parallel Lines and the Perpendicular Transversal Theorem?

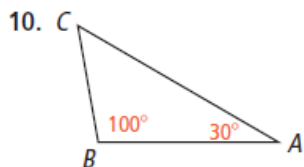


3-5 Parallel Lines and Triangles

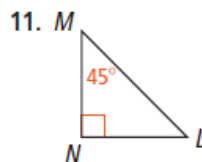
Triangle Sum Theorem (Pass Out Triangles)

- The sum of the 3 angles in a triangle is 180°

Find each angle measure.

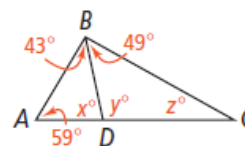


$m\angle C =$



$m\angle L =$

Got It? Use the diagram at the right. What is the value of z ?



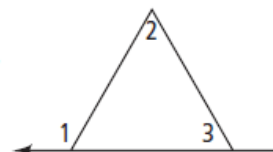
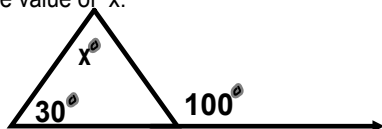
Triangle Exterior Angle Theorem

An exterior angle of a polygon is an angle formed by a side and an extension of an adjacent side. For each exterior angle of a triangle, the two nonadjacent interior angles are its **remote interior angles**.

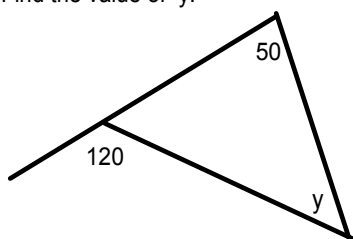
The measure of each exterior angle of a triangle equals the sum of the measures of its two remote interior angles.

18. $m\angle 1 = m\angle 2 + m\angle 3$

Find the value of x .



Find the value of y .



3-7 Equations of Lines in a Coordinate Plane

Slope

Find the slope of the line containing (5,3) and (-4, 2).

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

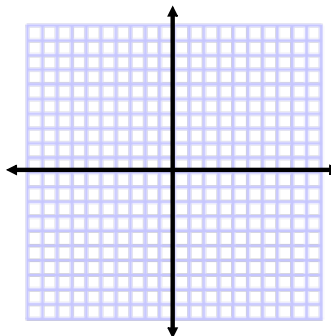
Slope Intercept Form

-Looks like $y = mx + b$

-Use when you know the slope and y intercept! Sometimes it is easier to put an equation in slope intercept form before graphing!

Graph: $y=2x+3$

Graph: $-2x+2y=-10$



Graph: $y = -2x + 4$

Write the equation, in slope intercept form, for the line that has a slope of $1/3$ and a y intercept of -2 . Then graph it.

Point Slope form

-Looks like $y - y_1 = m(x - x_1)$

-Use when you know the slope and a point on the line!

Write an equation, in point slope form, for the line that passes through $(-3,1)$ and has a slope of -3 .

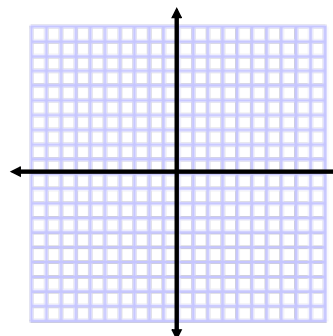
Write an equation, in point slope form, for the line that passes through $(5,-1)$ and has a slope of $1/2$.

Horizontal Lines - Slope is zero!!! $y = \#$

Vertical Line - Slope is undefined!!! $x = \#$

Graph: $x = 2$

Graph: $y = -3$



Chapter 3-8 Slopes of Parallel and Perpendicular Lines

Slopes of Parallel Lines

-They are the same when in slope intercept or point slope form!

Slopes of Perpendicular Lines

-They will be negative reciprocals when in slope intercept or point slope form!

-The slope will equal (-1) when multiplied together.

Parallel, Perpendicular, or Neither?

1. $y + 3x = 2x - 5$ and $y = -x + 2$

2. $y = -3x + 8$ and $y = 1/3x - 4$

Write an equation, in point slope form, of the line that is parallel to $y = 4x - 2$ and contains point (4,2).