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Unit 7, Lesson 3**Nonadjacent Angles**

Let's look at angles that are not right next to one another.

3.1 Finding Related Statements

Given a and b are numbers, and $a + b = 180$, which statements also must be true?

$a = 180 - b$

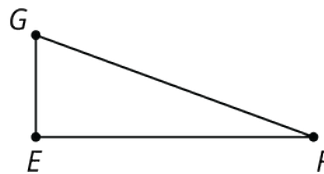
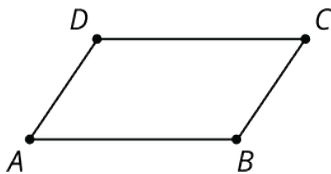
$a - 180 = b$

$360 = 2a + 2b$

$a = 90$ and
 $b = 90$

3.2 Polygon Angles

Use any useful tools in the geometry toolkit to identify any pairs of angles in these figures that are complementary or supplementary.

**3.3 Vertical Angles**

Use a straightedge to draw two intersecting lines. Use a protractor to measure all four angles whose vertex is located at the intersection.

Compare your drawing and measurements to the people in your group. Make a conjecture about the relationships between angle measures at an intersection.



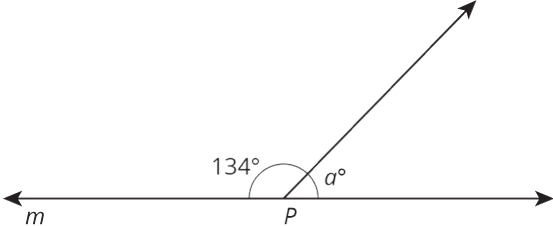
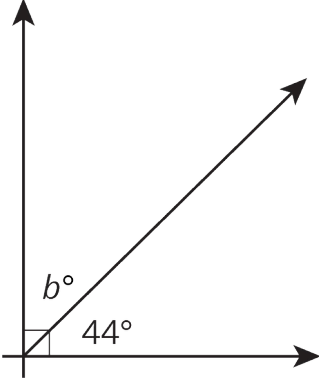
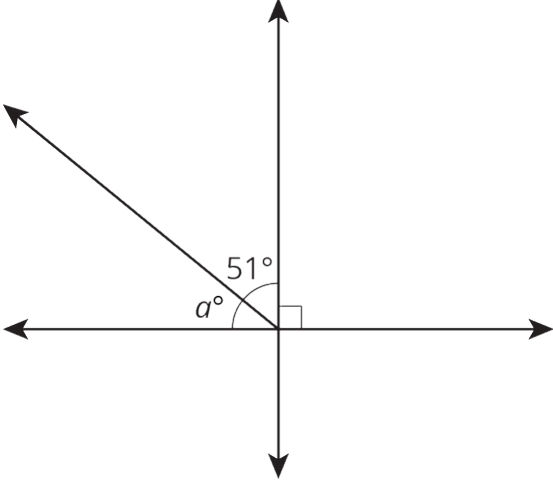
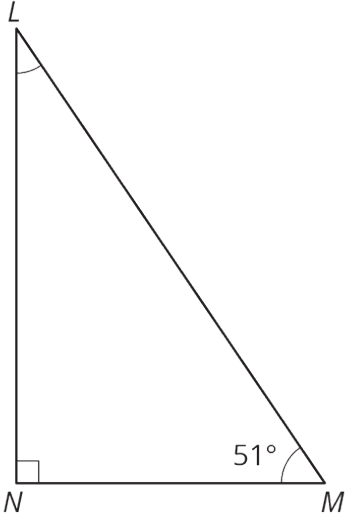
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3.4 Row Game: Angles

Find the measure of the angles in one column. Your partner will work on the other column. Check in with your partner after you finish each row. Your answers in each row should be the same. If your answers aren't the same, work together to find the error and correct it.

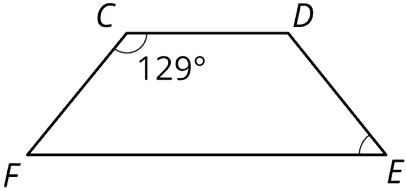
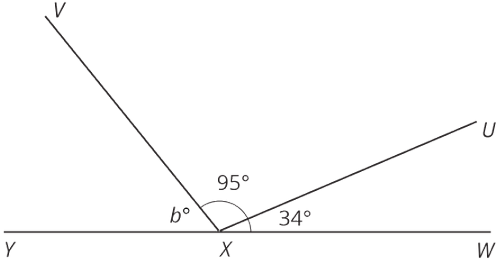
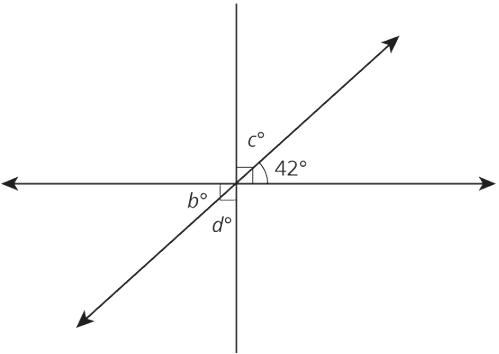
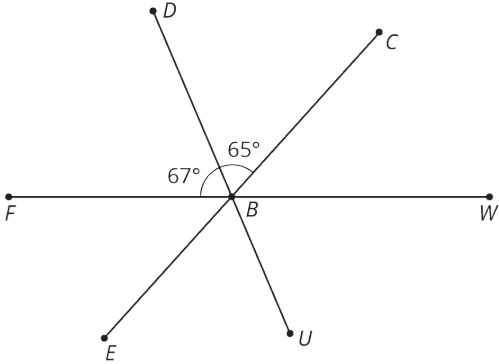
column A	column B
<p data-bbox="240 678 651 709"><i>P</i> is on line <i>m</i>. Find the value of <i>a</i>.</p> 	<p data-bbox="873 611 1105 642">Find the value of <i>b</i>.</p> 
<p data-bbox="329 1188 561 1220">Find the value of <i>a</i>.</p> 	<p data-bbox="792 1125 1195 1224">In right triangle <i>LMN</i>, angles <i>L</i> and <i>M</i> are complementary. Find the measure of angle <i>L</i>.</p> 



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column A	column B
<p>Angle C and angle E are supplementary. Find the measure of angle E.</p>  <p>A trapezoid with vertices C, D, E, and F. Angle C is labeled 129°.</p>	<p>X is on line WY. Find the value of b.</p>  <p>A diagram showing a line WY with point X on it. A ray XV and a ray XU are drawn from point X. Angle VXY is labeled b°, angle VXU is labeled 95°, and angle XUW is labeled 34°.</p>
<p>Find the value of c.</p>  <p>A diagram showing two intersecting lines. One line is horizontal and the other is vertical. A third line intersects them at the same point. Angles are labeled: c°, 42°, b°, and d°.</p>	<p>B is on line FW. Find the measure of angle CBW.</p>  <p>A diagram showing three lines intersecting at point B. Line FBW is horizontal. Lines DBC and EBU are vertical. Lines DC and EU are diagonal. Angles are labeled: 67°, 65°.</p>
<p>Two angles are complementary. One angle measures 37 degrees. Find the measure of the other angle.</p>	<p>Two angles are supplementary. One angle measures 127 degrees. Find the measure of the other angle.</p>

Lesson 3 Summary

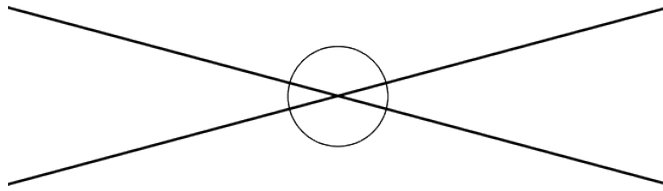
When two lines cross, they form two pairs of **vertical angles**. Vertical angles are across the intersection point from each other.



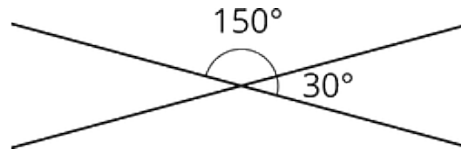
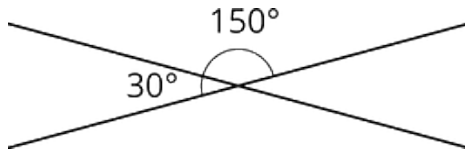
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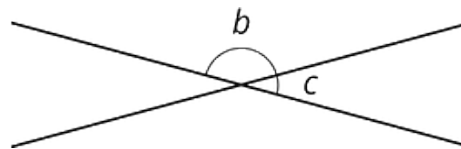
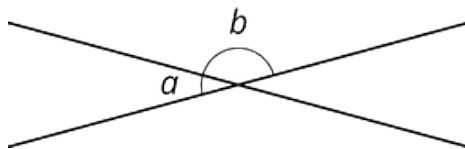
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Vertical angles always have equal measure. We can see this because they are always supplementary with the same angle. For example:



This is always true!



$$a + b = 180 \text{ so } a = 180 - b.$$

$$c + b = 180 \text{ so } c = 180 - b.$$

That means $a = c$.

Glossary Terms

vertical angles