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## Vertical and Adjacent Angles

ID: 10893

Time required  
*15 minutes*

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### Activity Overview

*In this introductory or review activity, students will explore vertical and adjacent angles. They will define and identify pairs of angles. Then they will change the intersecting lines of a geometric model to make conjectures about the relationships of the pairs of angles.*

### Topic: Points, Lines & Planes

- *Congruency of vertical angles*
  - *Adjacent angles formed by two intersecting lines are supplementary.*
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### Teacher Preparation and Notes

- *This activity was written to be explored with Cabri Jr.*
- ***To download the Cabri Jr file VERTICAL and student worksheet, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter "10893" in the quick search box.***

### Associated Materials

- *Vertical\_Student.doc*
- *Vertical.8xv*

### Suggested Related Activities

*To download any activity listed, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter the number in the quick search box.*

- *Angle Relationships (TI-Nspire technology) — 8670*
- *Intersecting Lines and Vertical Angles (TI-84 Plus family) — 6858*

**Problem 1 – Exploring Vertical Angles**

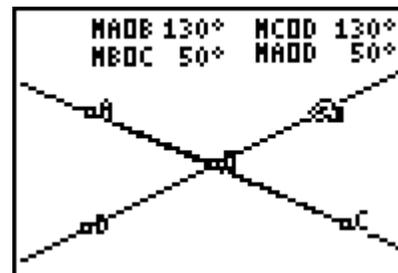
Students should first define the term *vertical angles* using their textbook or other source.

After opening Cabri Jr., student should press  $\boxed{Y=}$  and select Open and then VERTICAL to view the file. Introduce the geometric model (two intersecting lines).

Students should name the two pairs of vertical angles of the model.

Direct students to explore the model independently, by grabbing and dragging points *B* and/or *C*. To grab a point, move the cursor over the point and then press  $\boxed{ALPHA}$ . The cursor will change to a closed fist. Press  $\boxed{ALPHA}$  again to release the point.

Then they need to answer the questions on the worksheet.



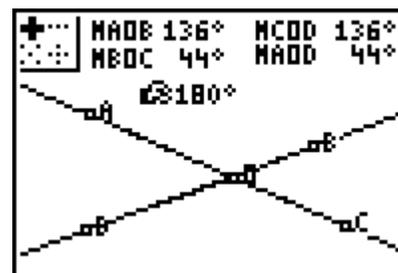
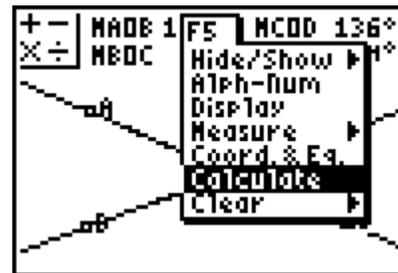
**Problem 2 – Exploring Adjacent Angles**

Students are to repeat the steps from Problem 1 with adjacent angles. They will need to first define the term *adjacent angles* using a textbook or other source.

Students are to use the same geometric model of intersecting lines from Problem 1. They need to name the four pairs of adjacent angles.

Have them explore the model independently and make a conjecture about adjacent angles.

They can also use the **Calculate** tool from the F5 menu ( $\boxed{GRAPH}$ ) to add the pairs of angles confirming that adjacent angles are supplementary. To do this, select one angle measurement, press  $\boxed{+}$ , and then select the adjacent angle measurement.



**Solutions – Student worksheet**

1. Two angles whose sides are opposite rays.
2.  $\angle AOB$  and  $\angle COD$ ;  $\angle BOC$  and  $\angle AOD$
3. Sample answers.

Location	1st	2nd	3rd	4th
$m\angle AOB$	130.6	118.5	90.4	79.4
$m\angle BOC$	49.4	61.5	89.6	110.6
$m\angle COD$	130.6	118.5	90.4	79.4
$m\angle AOD$	49.4	61.5	89.6	100.6

4. If  $\angle AOD$  and  $\angle BOC$  are vertical angles, then the  $m\angle AOD = m\angle BOC$ .
5. If  $\angle AOB$  and  $\angle COD$  are vertical angles, then the  $m\angle AOB = m\angle COD$ .
6. Vertical angles are congruent.
7. Adjacent angles are two coplanar angles that have a common side and a common vertex but no common interior points.
8.  $\angle AOB$  and  $\angle BOC$ ;  $\angle BOC$  and  $\angle COD$ ;  $\angle AOD$  and  $\angle COD$ ;  $\angle AOD$  and  $\angle AOB$
9. Adjacent angles formed by two intersecting lines are supplementary.
10. If  $\angle AOB$  and  $\angle BOC$  are adjacent angles formed by two intersecting lines, then  $\angle AOB$  and  $\angle BOC$  are supplementary.
11.  $3x = 75$   
 $x = 25$   
 $y = 180 - 75 = 105$
12.  $x + 10 = 4x - 35$   
 $3x = 45$   
 $x = 15$