**E X P L O R A T I O N S**

## Activity 10

<table>
<tr><td>**Special Parallelograms**</td><td>Construct the geometric object by following the instructions below, and then answer the questions about the object.</td></tr>
</table>

**1.** Create a rhombus.

   **a.** Construct segment $\overline{AC}$.

   **b.** Construct the perpendicular bisector of segment $\overline{AC}$.

   **c.** Find the point of intersection and label it $X$.

   **d.** From the Curves Toolbar, select **Circle**.

   **e.** Move the pointer to point $X$ until the message **This center point** appears.  Click once.

   **f.** Drag to point $C$ until the message **This radius point** appears.  Click once.

   **g.** Find the points of intersection between the circle and the perpendicular bisector and label them $B$ and $D$.
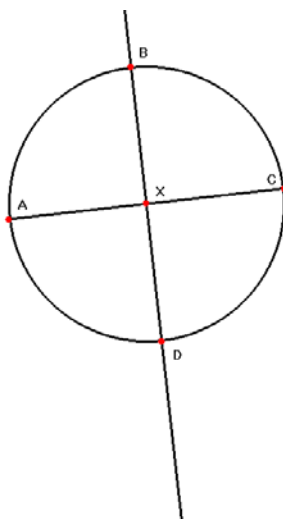


**Figure 10.1**

   **h.** From the Draw Toolbar, select **Hide/Show**.

   **i.** Move the pointer to the circle until the message **This circle** appears.  Click once.

**j.**  Move the pointer to the line $\overline{BD}$ until the message **This line** appears.  Click once.

**k.**  Construct segments $\overline{AB}$, $\overline{BC}$, $\overline{CD}$, $\overline{AD}$, and $\overline{BD}$.
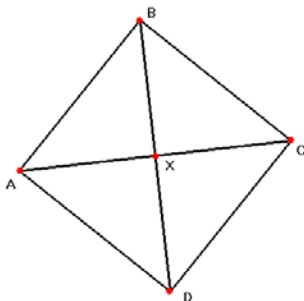


**Figure 10.2**

**2.**  Measure and label the following eight angles.

| m ∠BAC | m ∠ DAC | m ∠ DBC | m ∠ ABD | m ∠ ACB | m ∠ DCA | m ∠ CDB | m ∠ BDA |
|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |

**3.**  Based on your measurements, how are $\overline{AC}$ and $\overline{BD}$ related to the opposite angles of the rhombus?

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**4.**  Alter the rhombus.

**5.**  Alter the angles two more times and record.

| m ∠BAC | m ∠ DAC | m ∠ DBC | m ∠ ABD | m ∠ ACB | m ∠ DCA | m ∠ CDB | m ∠ BDA |
|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

**6.**  Write a statement summarizing how the diagonals are related to the angles of the rhombus.

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**7.**  Clear the screen.

**8.**  Create a rectangle.

**a.**  Construct and label segment $\overline{AB}$.

**b.**  Construct a line perpendicular to segment $\overline{AB}$ through point $A$.

**c.**  From the Points Toolbar, select **Point On Object**.

**d.**  Place a point on the line through $A$ and label it $C$.

**e.**  Construct a line perpendicular to $\overline{AC}$ through $C$.

**f.**  Construct a line parallel to line $\overline{AC}$ through point $B$.
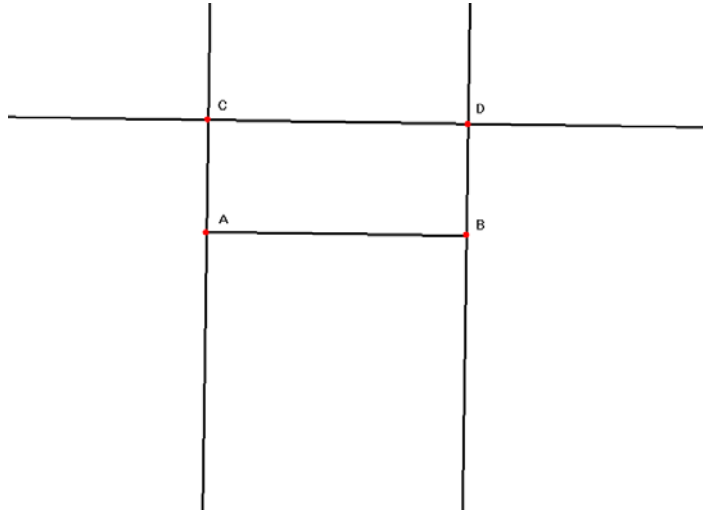
**g.** Find the point of intersection and label it $D$.



**Figure 10.3**

**h.** Hide lines $\overline{CD}$, $\overline{AC}$ and $\overline{BD}$.

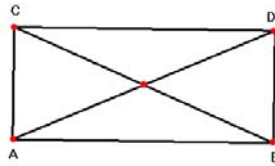**i.** Construct segments $\overline{AC}$, $\overline{CD}$, $\overline{BD}$, $\overline{CB}$ and $\overline{AB}$.



**Figure 10.4**

**9.** Measure and label the lengths of $\overline{AD}$ and $\overline{BC}$ and record.

$\overline{AD}$ = _____          $\overline{BC}$ = _____

**10.** Alter the rectangle.

**11.** Measure the lengths again and record.  Alter and record again.

$\overline{AD}$ = _____          $\overline{BC}$ = _____

**12.** What can you conclude about the diagonals of a rectangle?

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