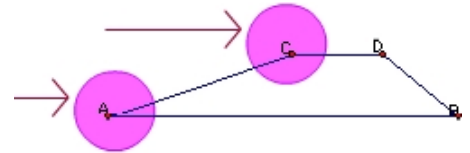


Overview: A two part lesson beginning with an exploratory/discovery examination of trapezoids using the Geometer's Sketchpad and concluding with drills employing knowledge that was discovered in part I.

Students will use the Geometer's Sketchpad to construct a trapezoid and then discover that angles sharing a common leg such as $\angle DCA$ and $\angle CAB$ are supplementary. After this discovery, students will employ this rule to solve several problems.



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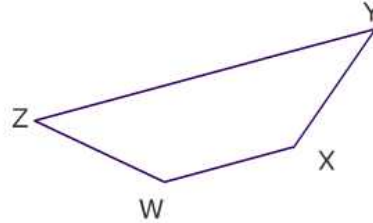
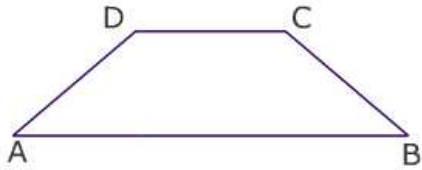
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Activity is on next page

Part 1. Exploring Trapezoids with Sketchpad

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Identify the bases and legs of the trapezoids below.



	Trapezoid ABCD	Trapezoid WXYZ
Bases		
Legs		

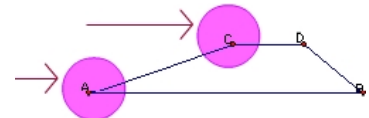
Make Predictions

Do you think any angles in the trapezoid above are congruent? If so, which pairs?


Do you think any angles in the trapezoid above are supplementary? If so, which?


SKETCHPAD

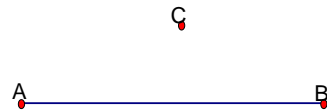
In this part of the lesson, you will use the Geometer's Sketchpad to explore the relationship between interior angles of a trapezoid that share a common leg such as the two angles circled in the picture on the right.




Task #1) Create the Bases of your Trapezoid

- a. Use the line segment tool  to create a line segment. Label the end points A and B.

- b. Use the point tool  to create point c.
Your screen should look like →



- c. Click anywhere on the white part of the screen in order to deselect everything.

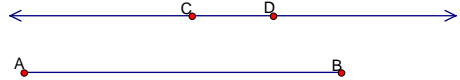
Then use the select tool  to highlight your line segment (\overline{AB} in the picture) and your point (c in the picture above).

- d. Click on the “Construct” menu ,chose “Parallel Line” then use the point tool

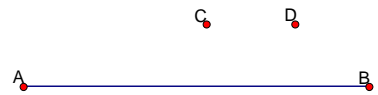


to add a second point to your new line.

Your screen should look like→

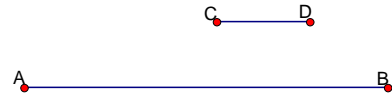


- e. Now, let’s change line \overline{CD} into a segment so that it only goes from C to D. This is a two step process. First deselect everything by clicking on the white of the screen, then select the line \overline{CD} . Only the line itself should be selected. Go to the “Display” menu and select “Hide Parallel Line.” Your screen should now look like→



- f. Use the line segment tool to create a segment from C to D.


Your screen should look like→



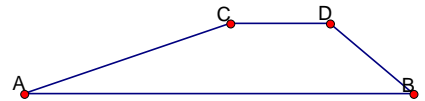
Congratulations, You have now created the two bases of your trapezoid!

Task #2) Create the legs of your Trapezoid

- a) Click somewhere on the white of the screen to deselect everything, then

create a line segment  between A and C. Do the same between D and B.

Picture→



Task #3) Display the measurements of the angles

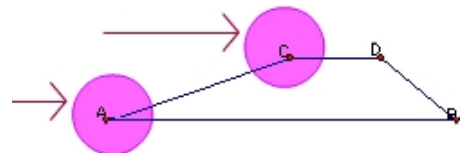
Since we did this just yesterday, I will go over only one example of how to display the measurement of an angle.

- a) Deselect everything by clicking somewhere on the white part of the screen. Let’s find the measure of $\angle CAB$: Select point C, then A then B (order matters!), click on the “Measure” menu then select “angle.” Do this for each angle.

Task #4) This is the most challenging task.

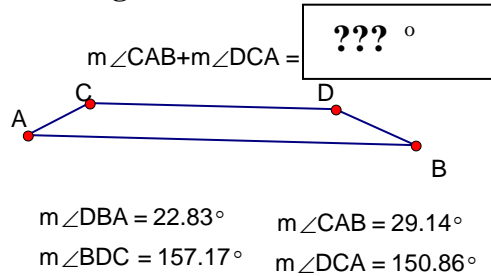
- a) Deselect everything then select one of the text boxes (where it says how big the angle is), click on the “Measure” menu. Select “Calculate” find the “Values” menu and choose one of the angles, then press “+” and then, return to the sketchpad document for a second, and click on the other angle that shares the same leg. (See picture below for clarification)

For instance, the two angles to click in the picture on the right are $\angle DCA$ and $\angle CAB$:



b) Now display the same rule for the other pair of angles on base DB ($\angle CDB$ and $\angle DBA$.)

Your final product look something like the one below

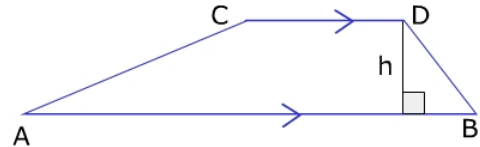


If you have extra time, try to do the following:

- 1) Display the slope of the two parallel sides (*Hint*: very similar to how to display the length of a segment)
- 2) Display the area of a trapezoid using the formula for area of a trapezoid
 - a. *Hint*: Remember that the height H is always perpendicular to the two bases. (Try selecting point D and segment AB then click on the “Construct” Menu and you should be able to figure it out from there.
- 3) Color in the inside of the trapezoid (*Hint*: Select only points A, B, C, D)

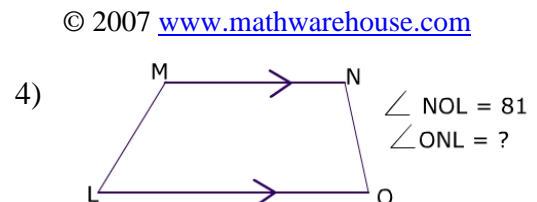
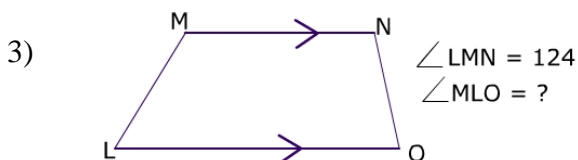
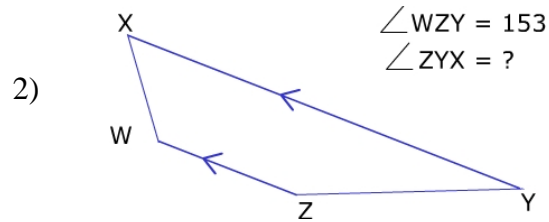
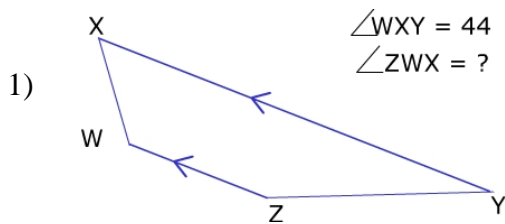
$$\text{Area} = \text{Height} \times \left(\frac{\text{Sum of Bases}}{2} \right)$$

$$h \times \left(\frac{\overline{AB} + \overline{CD}}{2} \right)$$



Part III. Practice

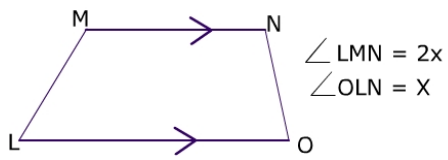
Answers @ www.mathwarehouse.com/geometry/quadrilaterals/trapezoid.php



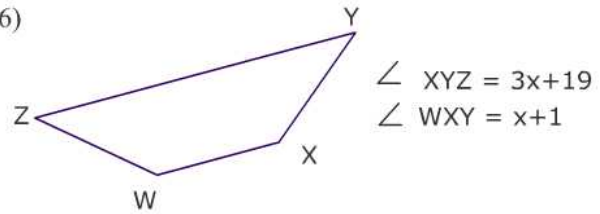
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In the problems below, find the value of x.

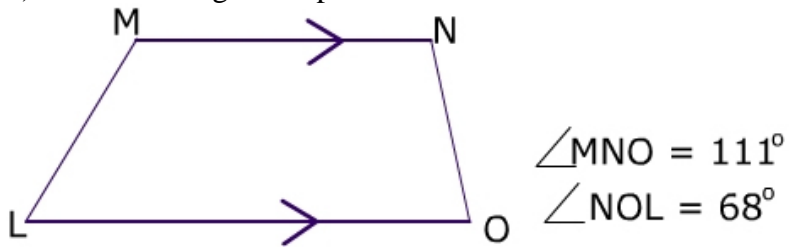
5)



6)



7) What is wrong in the picture below?



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