Area of a Triangle Between Parallel Lines

by – Chris Czapleski

Activity overview

This is an investigation of what happens to the area of a triangle when one vertex moves along a line parallel to the side opposite the vertex.

Concepts

Area of a triangle
Area of trapezoid
The distance between parallel lines is measured along the perpendicular between them

Teacher preparation

Students should know that the area of a triangle depends upon the length of a side and the altitude to that side.

Classroom management tips

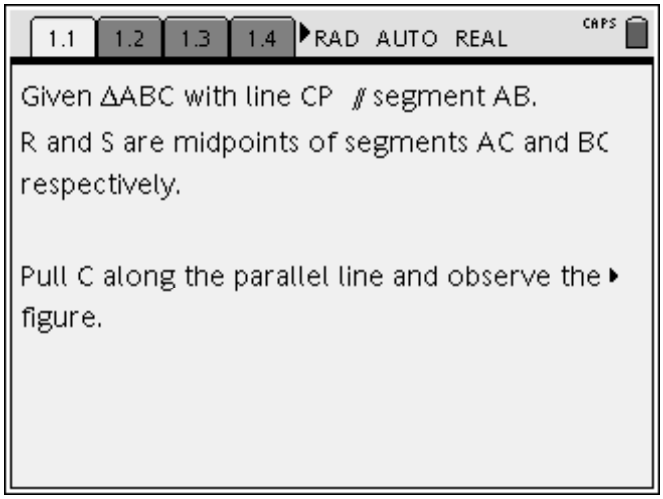
Students should work in pairs or groups in order to observe the share their conjectures.

TI-Nspire Applications

Dynamic Geometry
Data Collection
Use of notes

Step-by-step directions

Insert a NOTES page to introduce the investigation.

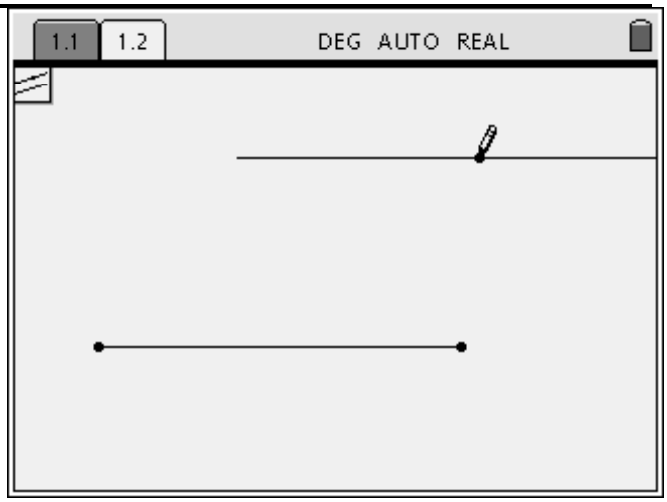


Insert a GRAPHS AND GEOMETRY page.

Choose MENU; 2:VIEW; 1: HIDE AXES. You can use *ctrl g* to hide the entry line.

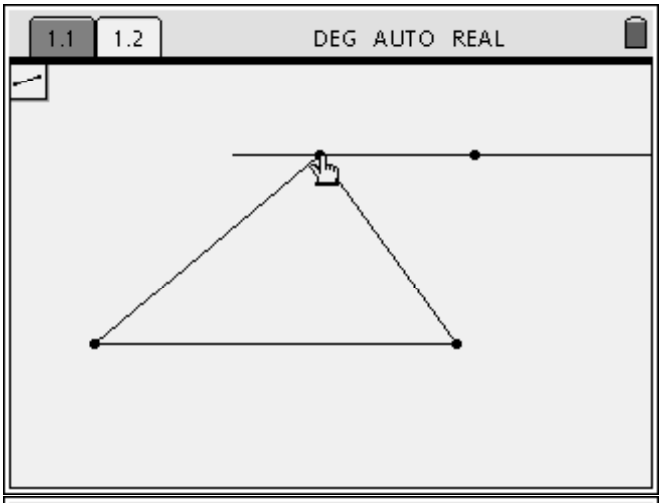
Choose MENU;6: POINTS AND LINES;5:SEGMENT to draw the bottom of the triangle. To quit a tool press *esc*.

Choose MENU;9:CONSTRUCTION; 2:PARALLEL, move the cursor close to the segment and press enter. Move the curser toward the top of the page and a parallel line will appear, press enter when it is where you want it.



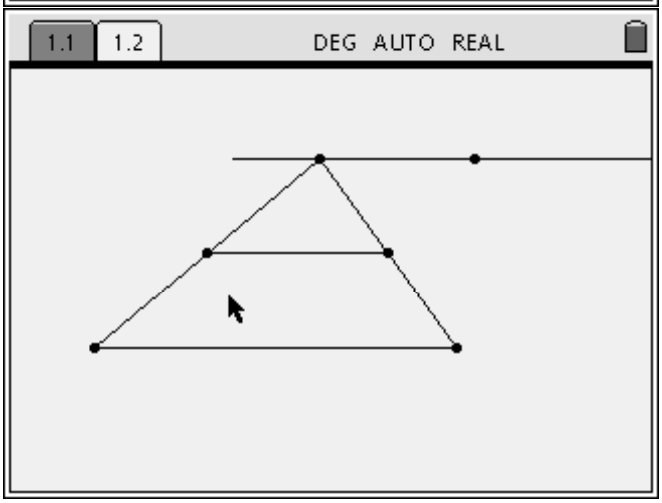
Choose MENU;6: POINTS AND LINES;2:POINT ON; and place a point on the parallel line.

Choose MENU;6: POINTS AND LINES;5:SEGMENT to draw the other sides of the triangle.



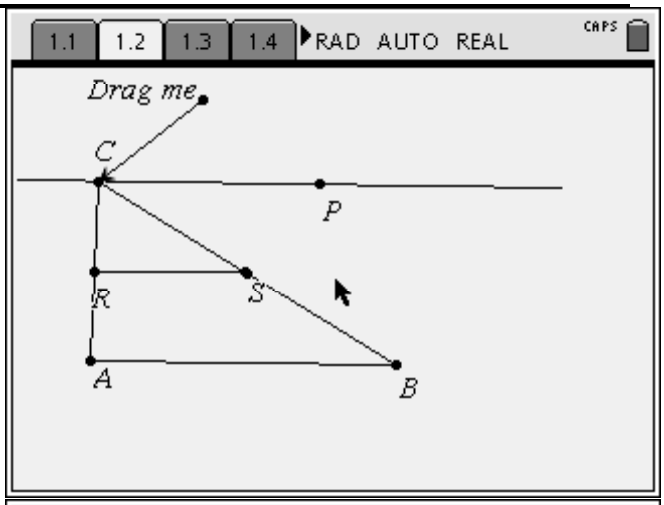
Choose MENU;9: CONSTRUCTION; 5: MIDPOINT and place a midpoint on each of the non-parallel sides.

Choose MENU;6: POINTS AND LINES;5:SEGMENT to connect the midpoints

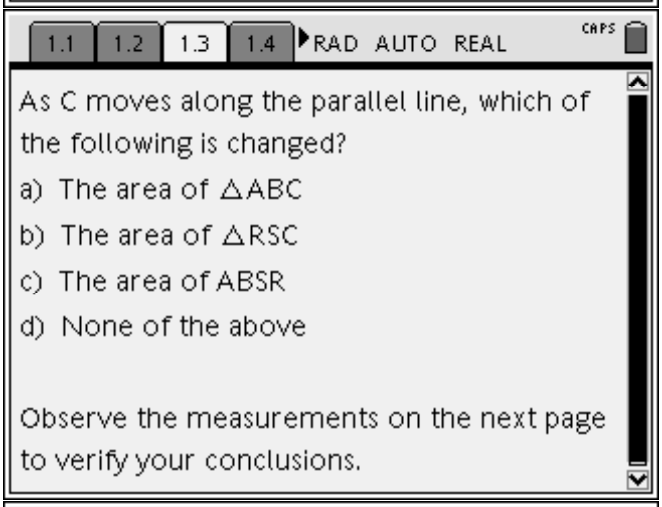


Choose MENU: 1:TOOLS; 5: TEXT to label the points A,B, C, R, S and P. You can also enter Drag me at the top of the page while the tool is open.

Choose MENU;6: POINTS AND LINES;8:VECTOR to connect Drag me to point C.



Add another NOTES page with further instructions.

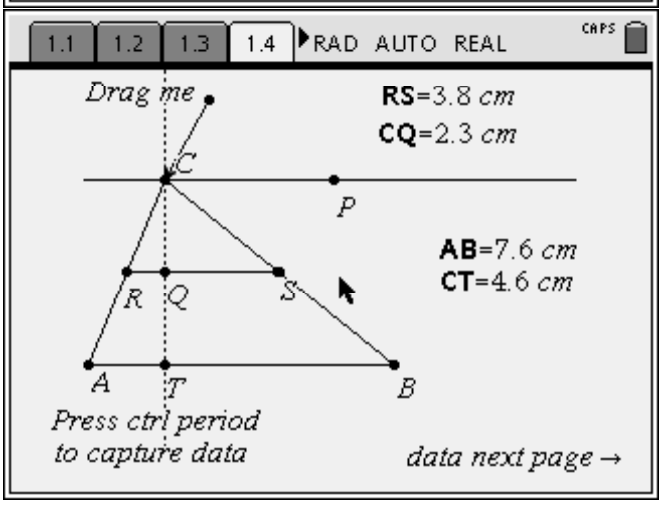


To draw the altitudes choose MENU;9:CONSTRUCT;1:PERPENDICULAR move the cursor to C and press enter, then move it to AB and press enter. A perpendicular line appears.

Choose MENU; 1:TOOLS; 3: ATTRIBUTES and move the cursor to the perpendicular and press enter. Change the line style to dotted.

Choose MENU; 6:POINTS & LINES;3: INTERSECTION POINTS and place points at the intersection of RS and AB.

Choose MENU: 1:TOOLS; 5: TEXT to label the points Q and T. You can also enter the additional text while the tool is open.



Now measure the length of RS, AB, CQ, and CT.

Choose MENU;7:MEASUREMENT;1:LENGTH, AB and RS can be measured by moving the cursor near them and pressing enter. To measure CQ you must move the cursor to C press enter and then move to Q and press enter. This same procedure is used to measure CT.

To attach variables to the values move the cursor to the measurement, press ENTER and the number will turn gray, press *ctrl var*, label the value with the appropriate letters.

Now collect some data.

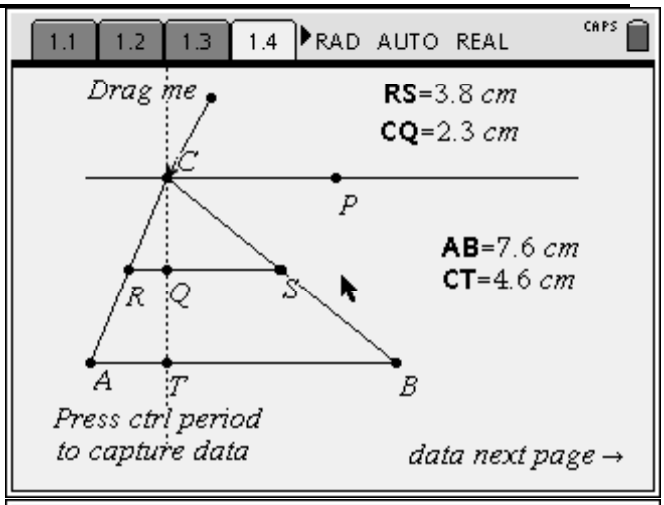
The data was entered manually by doing the following:

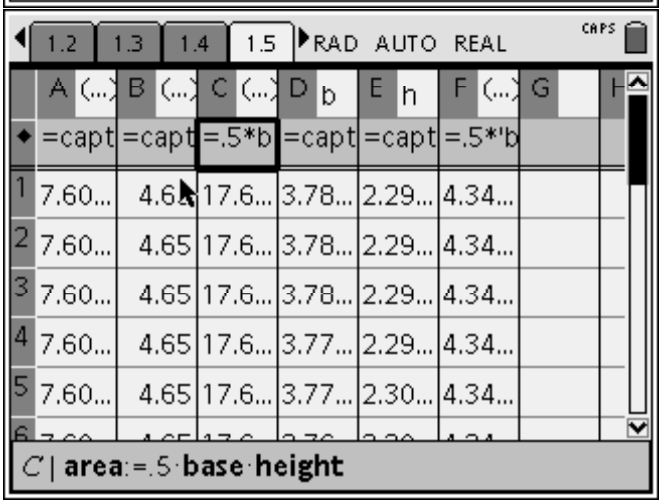
Place the cursor in the white box next to the A and enter the word *base,* next to B enter *height,* next to C *area,* next to D *b*, next to E *h*, and finally next to F *area2.*
In the gray box below A choose MENU;3:DATA; 2:DATA CAPTURE; 2:MANUAL DATA CAPTURE, enter AB for the variable.

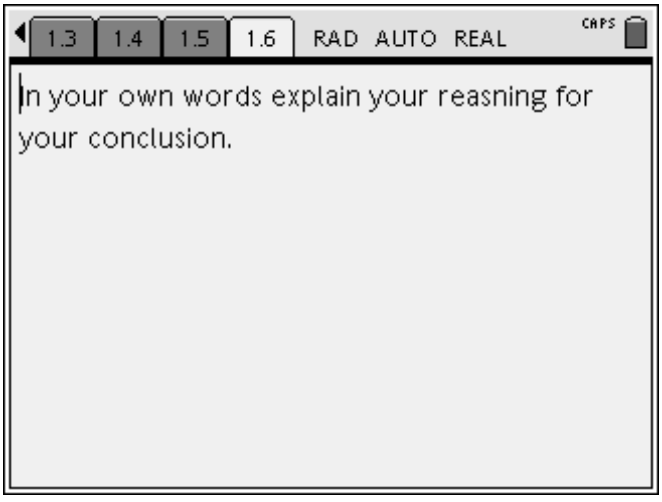
Enter the variables into columns B, D, and E in the same manner.

In the gray box under C enter .5*base*height.
In the gray box under F enter .5*b*h. When prompted for a reference, choose *variable reference*.

Add another NOTES page for the final question.







Activity extensions

- *Dynamic Geometry can be used to investigate a large variety of geometric concepts.*

Student TI-Nspire Document

Triangle.tns