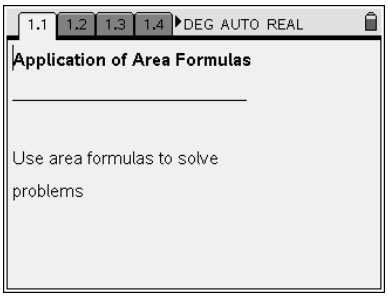
Application of Area Formulas

STUDENT ACTIVITY

Triangles, rectangles, trapezoids, and parallelograms can be used to solve real-world problems. This activity uses the area formulas for these shapes in manufacturing custom windows.



- **Open the TI-Nspire document *Application_of_Area_Formulas*.**
- **Press ctrl ▶ to move to page 1.2 and begin the activity.**

Suppose you design and manufacture custom windows and you have been hired to make windows for a house that is being built. On page 1.3 are the three windows that have been chosen for the project. The units are in feet, as indicated by the scale in the top right corner. In order to determine the amount of glass to order, you need to find the area of each window. You will use your knowledge of the area formulas for triangles, rectangles, and trapezoids. First, you must use the **Segment** tool (**MENU > Points & Lines > Segments**) to divide each window into these shapes.

- **Move to page 1.3.**

1. Now that you have used the **Segment** tool to divide each window, how many triangles are there? Rectangles? Trapezoids?

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2. What formula would you use to find the area of a triangle?

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3. What formula would you use to find the area of a rectangle?

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4. What formula would you use to find the area of a trapezoid?

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Window 1 now consists of a triangle and a rectangle. In order to find the area of the triangle, you need to know the height. Use the **Perpendicular** tool (**MENU > Construct > Perpendicular**) to create a perpendicular line from the top vertex of the triangle to the top segment of the rectangle. Use the **Segment** tool to create a segment on the perpendicular line to represent the height. Now you can use the **Length** tool (**MENU > Measurement > Length**) to find the length of the segment that represents the height of the triangle.

* Please note, any lengths or areas that appear with decimal places should be changed to zero decimal places using the **Attributes** tool.

5. Find the area of window 1 by finding the areas of the triangle and rectangle and then adding them together. Show your work below.

Window 2 now consists of a trapezoid and a rectangle. In order to find the area of the trapezoid, you need to know the height. Use the **Perpendicular** tool to create a perpendicular line from one of the top vertices of the trapezoid to the top segment of the rectangle. Use the **Segment** tool to create a segment on the perpendicular line to represent the height. Now you can use the **Length** tool to find the length of the segment that represents the height of the trapezoid.

6. Find the area of window 2 by finding the areas of the trapezoid and rectangle and then adding them together. Show your work below.

Window 3 now consists of two trapezoids. In order to find the area of a trapezoid, you need to know the height. Use the **Perpendicular** tool to create a perpendicular line from one of the top vertices of the trapezoid to the base. Use the **Segment** tool to create two segments on the perpendicular line to represent the height of each trapezoid. Now you can use the **Length** tool to find the lengths of the segments that represent the height of each trapezoid. Also, use the **Length** tool to find the length of the longer base common in both trapezoids.

7. Find the area of window three by finding the area of both trapezoids, then adding them together. Show your work below.

➢ **Move to page 1.20.**

Using the **Polygon** tool (**MENU > Shapes > Polygon**), outline all three windows on page 1.20 with separate polygons.

8. Use the **Area** tool (**MENU > Measurement > Area**) to find the area of each of the three polygons you just created. How did these areas compare to your results from Questions 5, 6, and 7?

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➢ **Move to page 1.23.**

Suppose the glass you order to manufacture windows comes in the shape of a parallelogram like on page 1.23.

9. Find the area of the parallelogram on page 1.23. Show your work below.

10. How many parallelogram pieces of glass must you order to make the three windows? Explain.

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