



### Problem 1 – Determining the area of a triangle

On page 1.3, use the **Coordinates and Equations** tool to label each vertex of the triangle. Then find the area with the formula,

$$\text{Area} = \frac{1}{2} \left| \det \begin{bmatrix} x_1 & x_2 & x_3 \\ y_1 & y_2 & y_3 \\ 1 & 1 & 1 \end{bmatrix} \right|.$$

- What is the area of the triangle on page 1.3?

Use page 1.5 to find the area of a triangle with the vertices given.

- $(-4, 10)$ ,  $(16, 12)$ , and  $(12, -12)$
- $(-16, 12)$ ,  $(-6, 10)$ , and  $(14, -4)$

Construct the two triangles given above on page 1.7.

- Using the **Area** tool, how do your answers using the formula compare to the area shown on the screen?

### Problem 2 – Area of any convex polygon

You can use the formula on page 1.2 to find the shape of any convex polygon by dividing the polygon into triangles and finding the area of each.

Step 1: Use the **Triangle** tool to divide the heptagon on page 2.2 into triangles.

Step 2: Calculate the area of each using the determinant formula on page 2.3.

Step 3: Add to find the total area.

- What is the area of the heptagon?

### Problem 3 – A formula for the area of a quadrilateral

Use the quadrilateral on page 2.3 to find a formula for the area of any convex quadrilateral. The formula is similar to that for the area of a triangle. Test your formula on page 3.3.

- What formula do you find for the area of a convex quadrilateral?