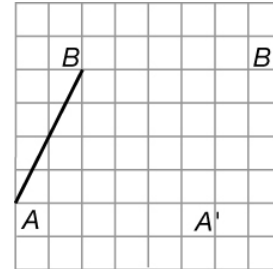


Labels

A label identifies a product and provides information about the nature and use of that product. Labels often involve geometric concepts.

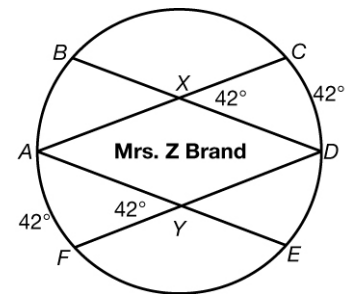
1. You can create a design for a label in the form of a parallelogram.

- a. On this grid, complete the sketch of parallelogram $ABB'A'$ in as efficient a way as possible. Explain your process.



- b. State a theorem from geometry that guarantees that your logic determines a parallelogram.

2. This diagram shows a circular portion of a label for a can. The diagram shows what appears to be a symmetric pattern with the brand name in the middle.



- a. Show that $m\widehat{AB} = m\widehat{CD} = m\widehat{AF} = m\widehat{DE}$.

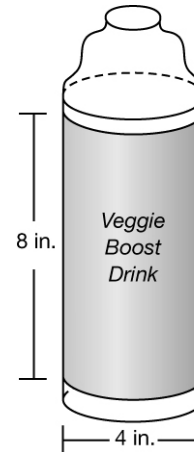
- b. Explain why $m\widehat{BC} = m\widehat{FE}$. Use the results of Part a.

- c. Explain why points A and D are endpoints of a diameter of the design.

3. A label printer needs to cut sheets of label paper for bottles. The label will cover the cylindrical part of the bottle exactly once.

- a. Find the area of the paper label. Give an exact answer and an answer to the nearest tenth of a square inch. Show your work.

- b. The cylindrical bottle cap has height 0.5 inches and radius 0.5 inches. Find the area of the outside of the bottle cap to the nearest tenth of a square inch. Show your work.



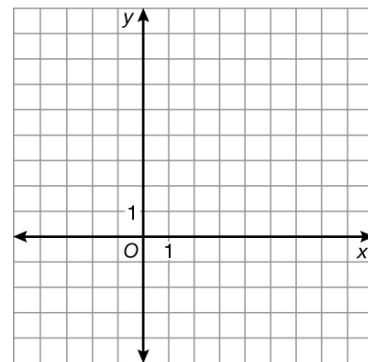
4. A label printer delivers labels to customers who produce bottles and cans. This table shows a delivery route using vectors from the printers' point O , to the last delivery location, point D .

Route	Vector $\langle x, y \rangle$
From O to A	$\langle 0, 6 \rangle$
From A to B	$\langle 7, -4 \rangle$
From B to C	$\langle 0, -5 \rangle$
From C to D	$\langle -5, -1 \rangle$

- a. On this grid, sketch and label the route from O to A , from A to B , from B to C , and then from C to D .

- b. Write the vector in component form that will take the delivery truck from D back to O . Show this vector on the grid.

- c. Write the sum of the five vectors in parts a and b. Simplify that sum. Then interpret it.



5. A label on a can in the shape of a right rectangular prism must meet the requirements below.

The label is a quadrilateral $ABCD$. All four sides of the label are 4 inches long. However, there are no right angles among the four interior angles. What word best describes the shape of the label? Justify your response.
