

Piece It Together

Level A

You have 6 different pattern blocks of different colors. Organize the pattern blocks and draw the shape of each of them.

Determine the mathematical name of the shape of each of the blocks. List the attributes of the figures including the number of sides and the number of angles.

Compare the perimeter and area of the figures. Make a list indicating their relative sizes.

If the green triangle is one area unit in size, how does it compare with the trapezoid, blue rhombus, and hexagon?

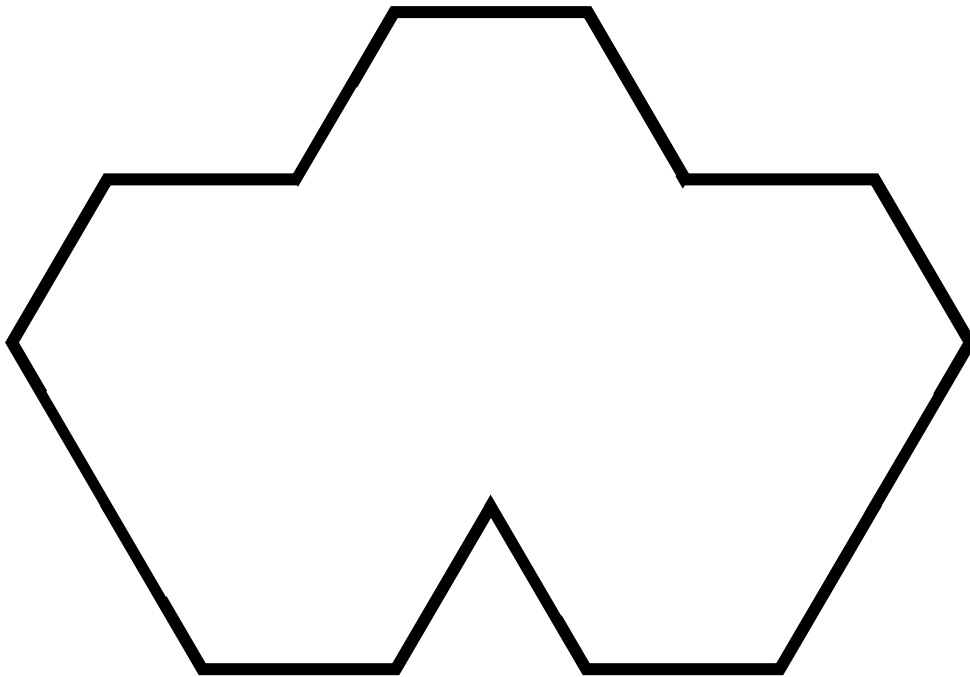
List the possible ways that a hexagon can be covered with the other pattern blocks.

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Level B

Consider the outline of the figure below. Investigate how to cover up that outline by arranging different pattern blocks to fit into the space exactly.

If you were to use only one type of pattern block, which block(s) can be used to cover the outline? Explain how you know for sure.



If you could use more than one type of pattern block, which combination of blocks could be used to cover the outline? Explain or draw your solutions.

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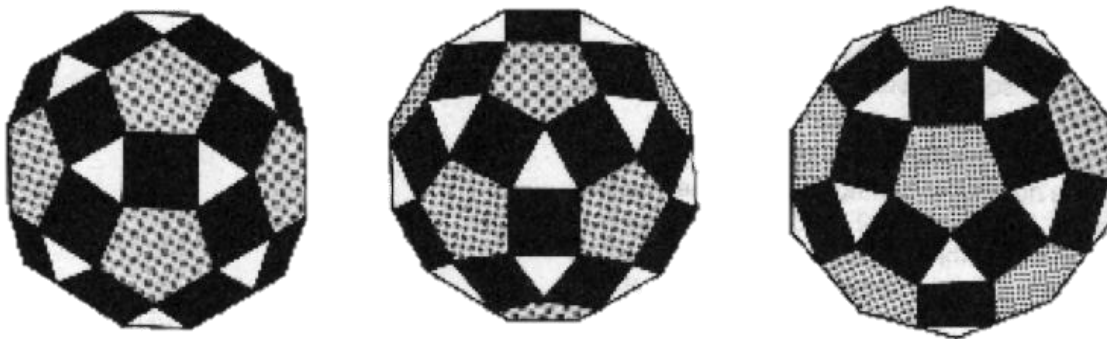
Level C

You work for a sporting goods manufacturer and you are finding that soccer is becoming more and more popular.

The top-selling soccer ball is made by **Everkick**. The design pattern of this ball is composed of pentagons and hexagons. Below are three views of the **Everkick** soccer ball. Analyze the design pattern and determine the number of pentagons and hexagons it takes to make a ball. Explain your conclusion using mathematical reasoning.



The **GoalScorer** ball is second on the list of best-selling soccer balls. It has a different design pattern. The design pattern of this ball is composed of pentagons, triangles, and squares. Below are three views of the **GoalScorer** soccer ball. Analyze the design pattern and determine the number of pentagons, triangles, and squares it takes to make a ball. Explain your conclusion using mathematical reasoning.



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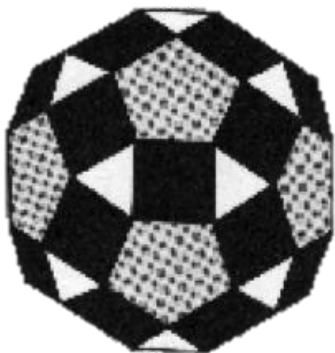
Level D

Soccer balls are made in different sizes for different age-group soccer leagues. There are three standard balls: a size 5, a size 4, and a size 3 soccer ball. Major League Soccer and the World Cup use a size 5 soccer ball. According to the rulebook, the circumference (around the equator of a sphere) of a size 5 soccer ball, when fully inflated, must be between 27 and 28 inches.

The top-selling soccer ball is made by **Everkick**. The design pattern of this ball is composed of regular pentagons and hexagons. Using geometry, determine the lengths of the sides of a pentagon and hexagon from a size 5 **Everkick** soccer ball. Explain the process you use to determine the dimensions.



The **GoalScorer** ball is second on the list of best-selling soccer balls. It has a different design pattern. The design pattern of this ball is composed of pentagons, triangles, and squares. Using geometry, determine the lengths of the sides of a pentagon, square, and triangle from a size 5 **GoalScorer** ball. Explain the process you used to determine the dimensions.



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Level E

You work for a sporting goods manufacturer and you are finding that soccer is becoming more and more popular. The top-selling soccer ball is made by **Everkick**. The design pattern of this ball is composed of regular pentagons and hexagons. The **GoalScorer** ball is second on the list of best-selling soccer balls. It has a different design pattern. The design pattern of this ball is composed of pentagons, triangles, and squares.



Everkick



GoalScorer

The executive board has assigned you the task of creating a new design pattern for the company's new soccer ball. Use various polygons to create a spherical-shaped object. Build a design model using construction paper and tape. Draw a blueprint design of the ball showing at least three different views of the soccer ball. List the types of polygons used in the design. For each polygon, state the quantity needed to construct a ball.

Prepare a design specification report for a size 5 soccer ball. State the volume, diameter, circumference, and surface area of the ball. Also, list the dimensions of each polygon used in your design, including the length of the sides, the measure of interior angles, the perimeter, and the area of the polygons.

