

Sums of Polygon Angles

A polygon is a flat figure whose sides are straight line segments which don't cross and have no loose endpoints.

When two sides meet at a corner, they form an interior angle as measured by rotating one side to the other through the interior of the shape.

Use only the fact that one turn around is 360 degrees to figure out the following questions. (So don't assume a right angle is 90 degrees without justifying!)

Interior Angles

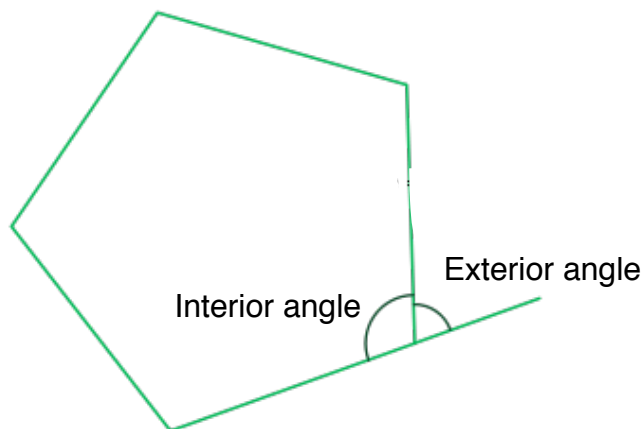
1. How many different interior angles are there in all the different pattern blocks? What are their values?
2. For each pattern block, find the sum of all the interior angles. What patterns do you notice?
3. Use your work in #2 to predict what the interior angles should sum to in a 5-sided figure. (Don't build one before predicting.) Then build one and check your prediction. Do the same for a 7-sided figure.
4. Turn your observations into a formula. You don't need to prove your formula... yet.

Exterior Angles

5. The exterior angle at a corner is defined (as in the figure) as the supplement of the interior angle.

Do #1 through #4 with "interior" replaced with "exterior".

Can you explain the formula you get for the sum of exterior angles of a polygon?



Concave Polygons

6. Try out your formula for the sum of interior angles on different **concave** (dented inward) polygons that you construct. Confirm your old formula or create a new formula.
7. Try out your formula for the sum of exterior angles on different **concave** polygons that you construct. Confirm your old formula or create a new formula.

(Hint: you'll probably want to define the exterior angles as being measured in a consistent direction, and consider angles in the other direction as negative!)