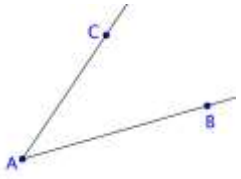
Angles in and Out of Polygons – Math 2 Guided Notes

This worksheet will explore various properties and vocabulary related to angles. Many of them you may have seen before, some may be new. You are expected to know all of them.



Vocabulary

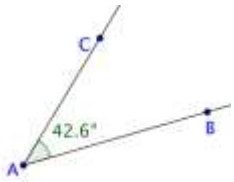
Straight Angles

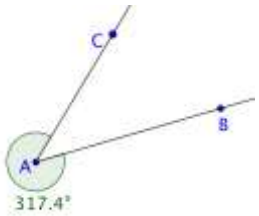
While we usually think of angles as looking like one of the two examples at the top right, the actual definition of an angle is **a figure formed by two _____ with the same _____**. That is why we can also have an angle that looks like a straight line, called a straight angle. It has an angle measure of 180°.

Reflex Angles

Most of the time we will be dealing with angles that are between 0° and 180° (acute, right and obtuse) but sometimes we want an angle that is _____ than that. The name for those angles is a reflex angle.

Angle ∠CAB = 42.6°
Reflex Angle ∠CAB = 317.4°

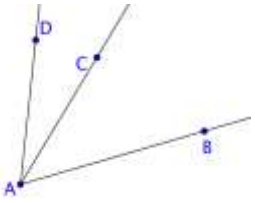




Adjacent Angles

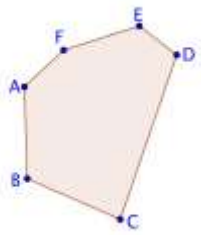
The word adjacent, in English, means _____.

If the diagram contains angles that are sharing a side, they are adjacent. ∠BAC is *adjacent* to ∠CAD.



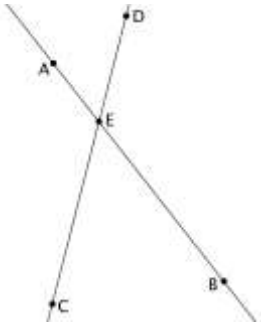
Consecutive Angles

In a polygon, two angles that share a _____ are consecutive. ∠AFE is *consecutive* to ∠FED (they share side FE).



Polygon Recap

Vertical (Opposite) Angles



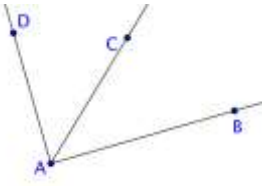
Vertical angles are also called Opposite angles. Either name is acceptable. They are angles formed when two straight lines _____ each other. ∠AED is opposite ∠BEC (and ∠AEC is opposite ∠BED). As we will prove, vertical angles are always equal.

Complementary and Supplementary Angles

When the measures of two angles (and only two angles) add to 90°, the angles are said to be complementary.

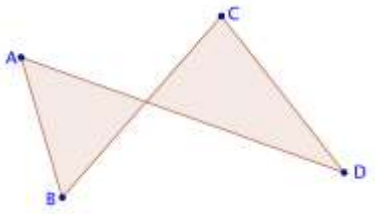
Adjacent Complementary Angles

if ∠BAC = 41° and ∠CAD = 49° then ∠BAC is the complement of ∠CAD



Non-Adjacent Complementary Angles

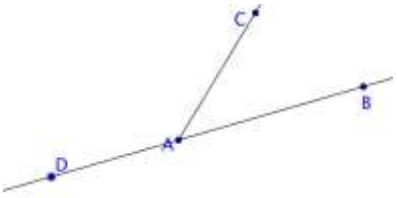
if ∠ABC = 55° and ∠ADC = 35° then ∠ABC is the complement of ∠ADC



When the measures of two angles (and **only two** angles) add to 180°, the angles are said to be supplementary. (Note: the three angles in a triangles are ***not*** supplementary!)

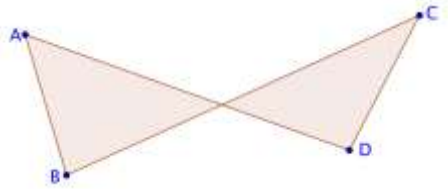
Adjacent Supplementary Angles

if ∠BAC = 41° and ∠CAD = 139° then ∠BAC is the supplement of ∠CAD



Non-Adjacent Supplementary Angles

if ∠ABC = 75° and ∠ADC = 105° then ∠ABC is the supplement of ∠ADC



Polygon Recap

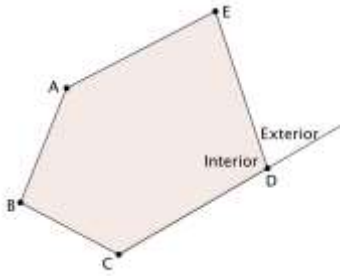
Interior and Exterior Angles

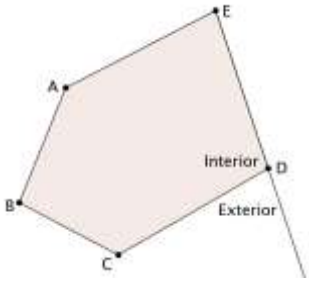
Polygons are closed figures made of _____ and _____. Triangles are the simplest polygons with the fewest number of sides/angles.

Equilateral polygons have _____ that are all the same _____.

Equiangular polygons have _____ that are all the same _____.

Regular polygons are equilateral and equiangular.



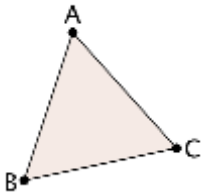
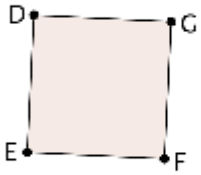
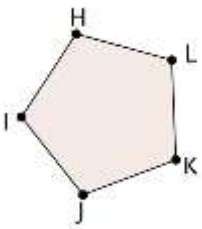
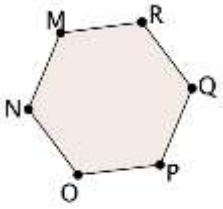


Interior angles of a polygon are the ones _____ the figure.

Exterior angles of a polygon are found by extending the side of a polygon to create an angle that is _____ to the interior angle.

Explorations

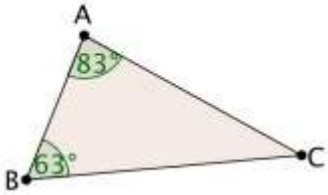
1. a. We have already made a conjecture about the sum of the angles in a polygon. Use your conjecture to find the measure of each interior angle for the following **regular polygons**. Then find the measure of each exterior angle in the regular polygons.

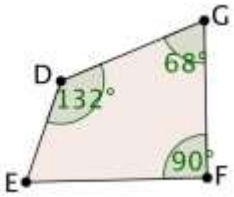
					
Interior Angle Measure					
Exterior Angle Measure					

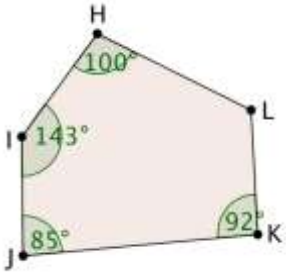
b. What is the sum of the exterior angles of the polygons?

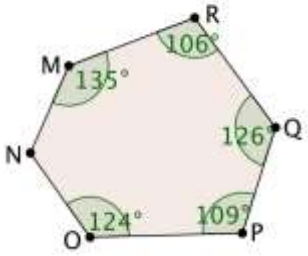
Polygon Recap

2. a. How do these questions change when we are not working with regular polygons? What is the value of the missing interior angle for the following polygons?







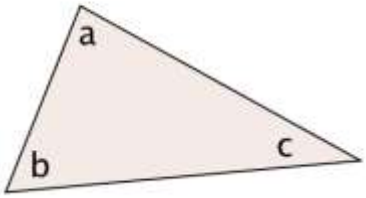


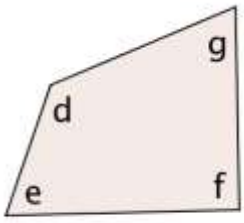
b. Find the measure of each exterior angle in at least two of the polygons.

c. What is the sum of the exterior angles of the polygons?

3. a. Do you have a conjecture about the sum of the exterior angles of any polygon?

b. What is the sum of the interior angles of these polygons?



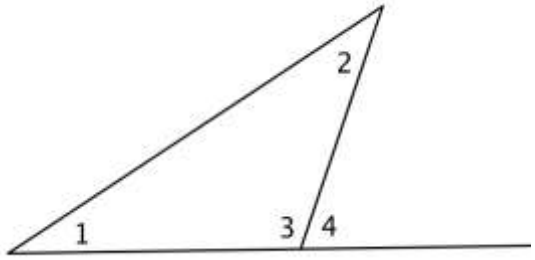


c. What are the exterior angles of these polygons? (Hint: use the variables and the fact that the interior and exterior angles are supplementary.)

d. What is the sum of these exterior angles? Can you use the information from part **b** to simplify your answer? Did you prove your conjecture?

Polygon Recap

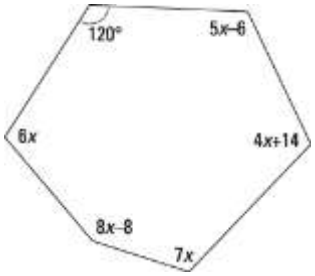
4. a. What is the relationship of angles 3 and 4?



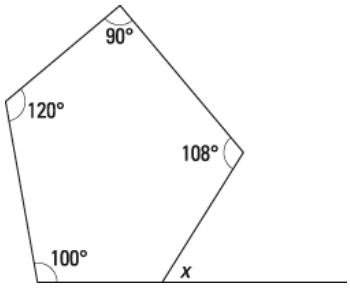
b. What is the relationship of angles 1, 2, and 3? What is the relationship of angles 1, 2 and 4?

Practice: Polygon Angle Sums

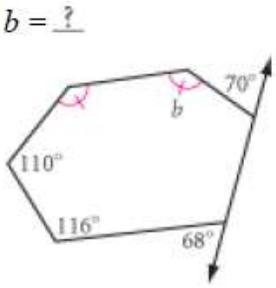
1. Find the value of *x*.



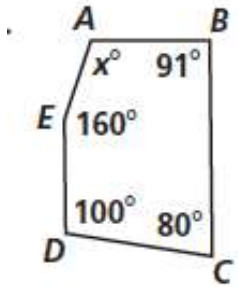
2. Find the value of *x*.



3.



4. Find the value of x.



5. Find the measure of each **exterior** angle in a regular 20-gon (icosagon).

6. Find the sum of the **interior** angles in a 14-gon.

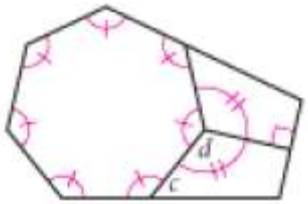
7. Find the sum of the **exterior** angles in a 50-gon.

8. The sum of the measures of the interior angles of a regular polygon is 1800°. How many sides does the polygon have?

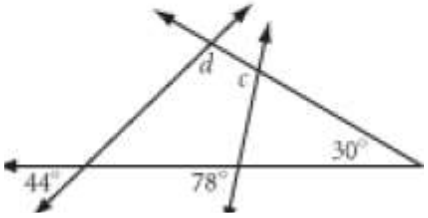
9. One exterior angle of a regular polygon measures 10°. What is the measure of each interior angle? How many sides does the polygon have?

Polygon Recap

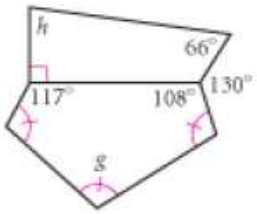
11. c = _____ d = _____



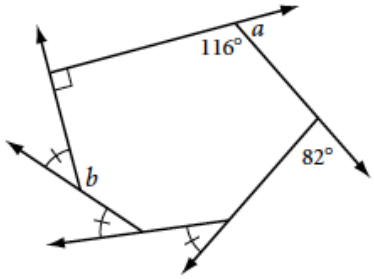
12. c = ____ d = ____



13. g = ___ h = ____

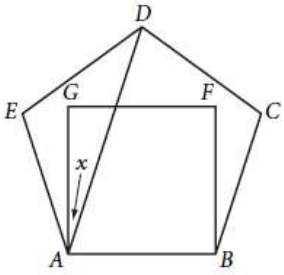


14. a = ____ b = _____



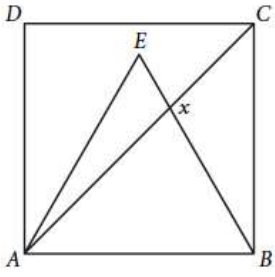
15. *ABCDE* is a regular pentagon. *ABFG* is a square.

x = _____

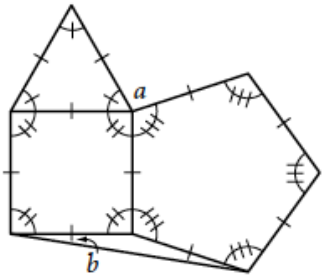


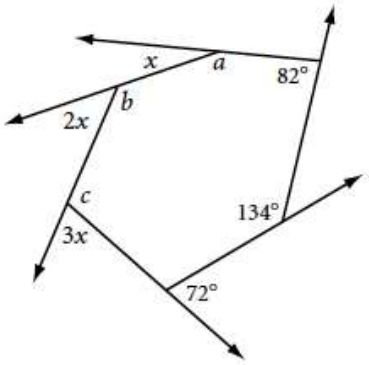
16. *ABCD* is a square. *ABE* is an equilateral triangle.

x = _____



17. a = ____ b = _____





18. a = ____ b = _____

c = ____

Polygon Recap