

Date:

Title:

(A) Lesson Objectives

- a. Name the regular polygons, given the number of sides from 3 to 10
- b. Define and work with the interior angles of regular polygons
- c. Define and work with the exterior angles of regular polygons
- d. Apply the solving of linear equations to the context of solving for angles in polygons

(B) Explorations

- a. Name the polygon, given the number of sides that it has:

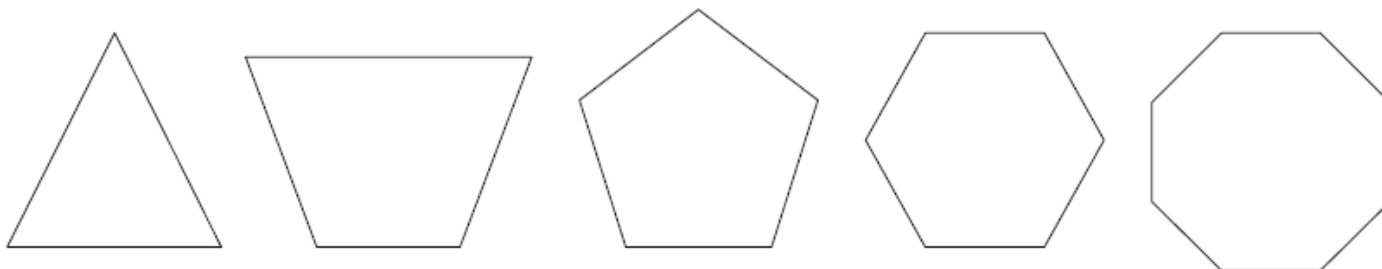
Description	name
Interior Angles	
Exterior Angles	
Regular polygon	
A polygon with 3 sides	
A polygon with 4 sides	
A polygon with 5 sides	
A polygon with 6 sides	
A polygon with 7 sides	
A polygon with 8 sides	
A polygon with 9 sides	
A polygon with 10 sides	
A polygon with 12 sides	

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b. Investigating Polygon Angle Sum

i. Directions: Starting at only one vertex, draw diagonals to form triangles in the polygons.



Name	# of sides	#of triangles	Degrees of the angles in a triangle??	Sum of interior angles
Triangle				
Quadrilateral				
Pentagon				
Hexagon				
Octagon				
Decagon				
n-gon				

1. Find the sum of the measure of the interior angles of a regular polygon that has 8 sides.
2. How would you find the measure of ONE interior angle?
3. Find the sum of the measure of the interior angles of a regular polygon that has 16 sides.
4. How would you find the measure of ONE interior angle?
5. Find the sum of the measure of the interior angles of a regular polygon that has 13 sides.
6. How would you find the measure of ONE interior angle?
7. Find the sum of the measure of the interior angles of a regular polygon that has 15 sides.
8. How would you find the measure of ONE interior angle?
9. Determine the number of sides in a polygon whose sum of the interior angles is 1440° ?
10. What is the measure of ONE interior angle?
11. Determine the number of sides in a polygon whose sum of the interior angles is 1800°
12. If the number of sides of a regular polygon is unknown and can be represented by $3x + 2$ and the total degrees of the polygon's interior angles is 1980, what is the measure of 1 angle in terms of x ? What kind of polygon are you dealing with

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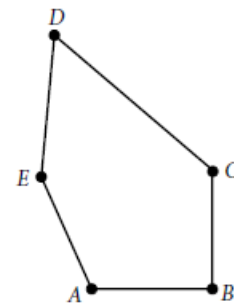
- c. Investigating the Polygon Exterior Angle Sum:

http://www.geogebra.org/en/upload/files/english/Barbara_Perez/Hexagon_Exterior.html

- d. Find the sum of the measures of the exterior angles of a regular polygon that has 12 sides.
e. What is the measure of a single angle?
f. Find the number of sides of a regular polygon each of whose exterior angles contains 5 degrees.
g. Find the sum of the measures of the exterior angles of a regular polygon that has 720 sides.
h. What is the measure of a single angle?
i. Find the number of sides of a regular polygon each of whose exterior angles contains 13 degrees.
j. **Challenge Problem**** The measure of each exterior angle of a polygon can be expressed as $x-5$ and the number of sides by $10x$. Determine
i. The number of degrees in each exterior angle
ii. The number of sides that this polygon has.

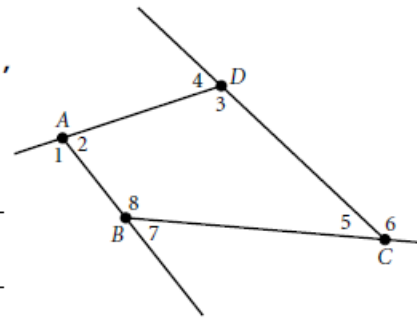
In the figure at the right, $m\angle A = 4x + 7$, $m\angle B = 4x - 18$, $m\angle C = 5(x - 1)$, $m\angle D = 2x + 1$, and $m\angle E = 7x - 39$. Find the indicated measures.

4. x _____ 5. $m\angle A$ _____
6. $m\angle B$ _____ 7. $m\angle C$ _____
8. $m\angle D$ _____ 9. $m\angle E$ _____



In the figure at the right, $m\angle 1 = 5x + 11$, $m\angle 4 = 3x + 1$, $m\angle 6 = 8x - 19$, and $m\angle 7 = 3x - 13$. Find the indicated measures.

10. $m\angle 2$ _____ 11. $m\angle 3$ _____
12. $m\angle 8$ _____ 13. $m\angle 5$ _____



14. What are the interior and exterior angle measures of a regular nonagon?

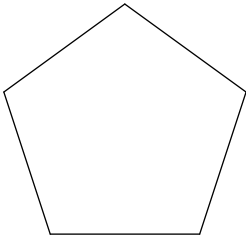
15. How many sides does a regular polygon with interior angle measure of 168° have?

16. How many sides does a regular polygon with exterior angle measure of 20° have?

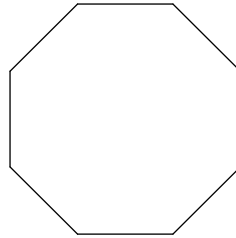
Polygons and Angles

Find the measure of one interior angle in each polygon. Round your answer to the nearest tenth if necessary.

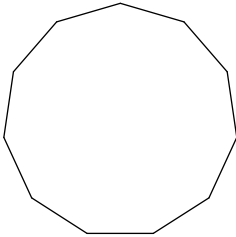
1)



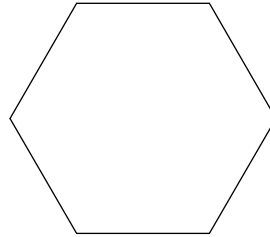
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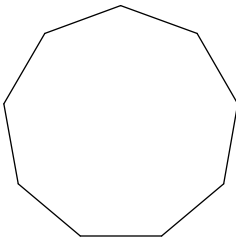
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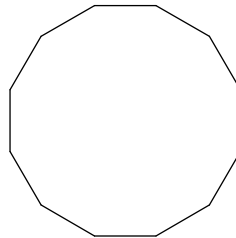
4)



5)



6)



7) regular 24-gon

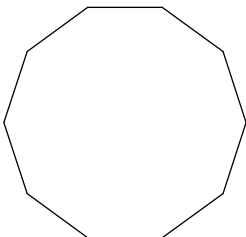
8) regular quadrilateral

9) regular 23-gon

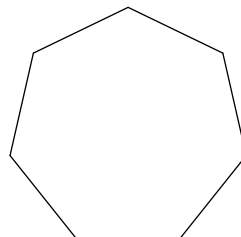
10) regular 16-gon

Find the measure of one exterior angle in each polygon. Round your answer to the nearest tenth if necessary.

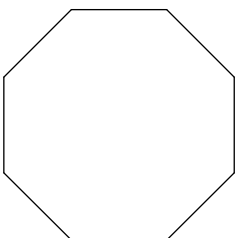
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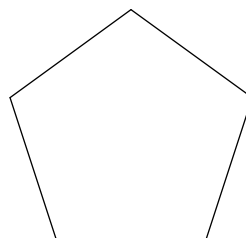
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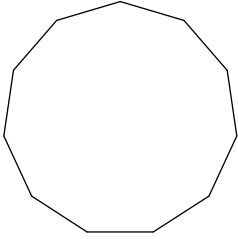
13)



14)



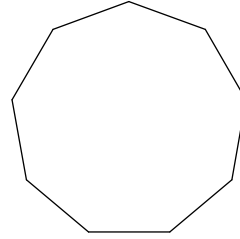
15)



17) regular 13-gon

19) regular 20-gon

16)

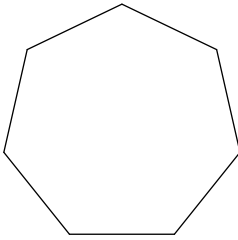


18) regular 16-gon

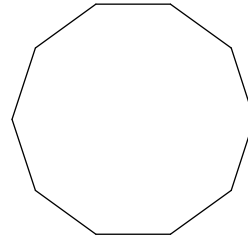
20) regular 23-gon

Find the interior angle sum for each polygon. Round your answer to the nearest tenth if necessary.

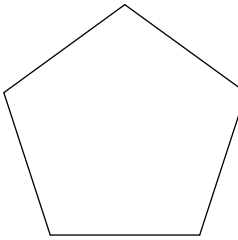
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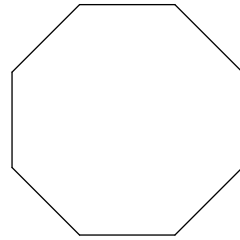
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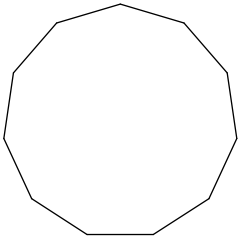
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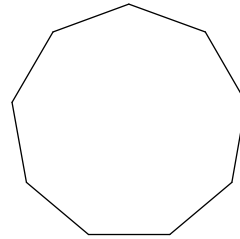
24)



25)



26)



27) regular quadrilateral

28) regular 18-gon

29) regular dodecagon

30) regular 15-gon

Critical thinking questions:

31) What is the exterior angle sum of a 500-gon?

32) Is there a regular polygon with an interior angle sum of 9000° ? If so, what is it?