Warm-up: (write on the back of your notes page)

In Polygons (with *n* sides).....

* sum of int. angles = (*n*-2)(180°)

* sum of ext. angles = 360°

Regular

*** measure of <u>each</u> int. angle = $\frac{(n-2)(180^\circ)}{n}$

*** (measure of each ext. angle) = $\frac{360^\circ}{(\#\text{ of sides})}$

SECTION 3.5:
ANGLES OF A POLYGON

Standards:

1.0 - Students demonstrate understanding by identifying and giving examples of undefined terms, axioms, theorems, and inductive and deductive reasoning

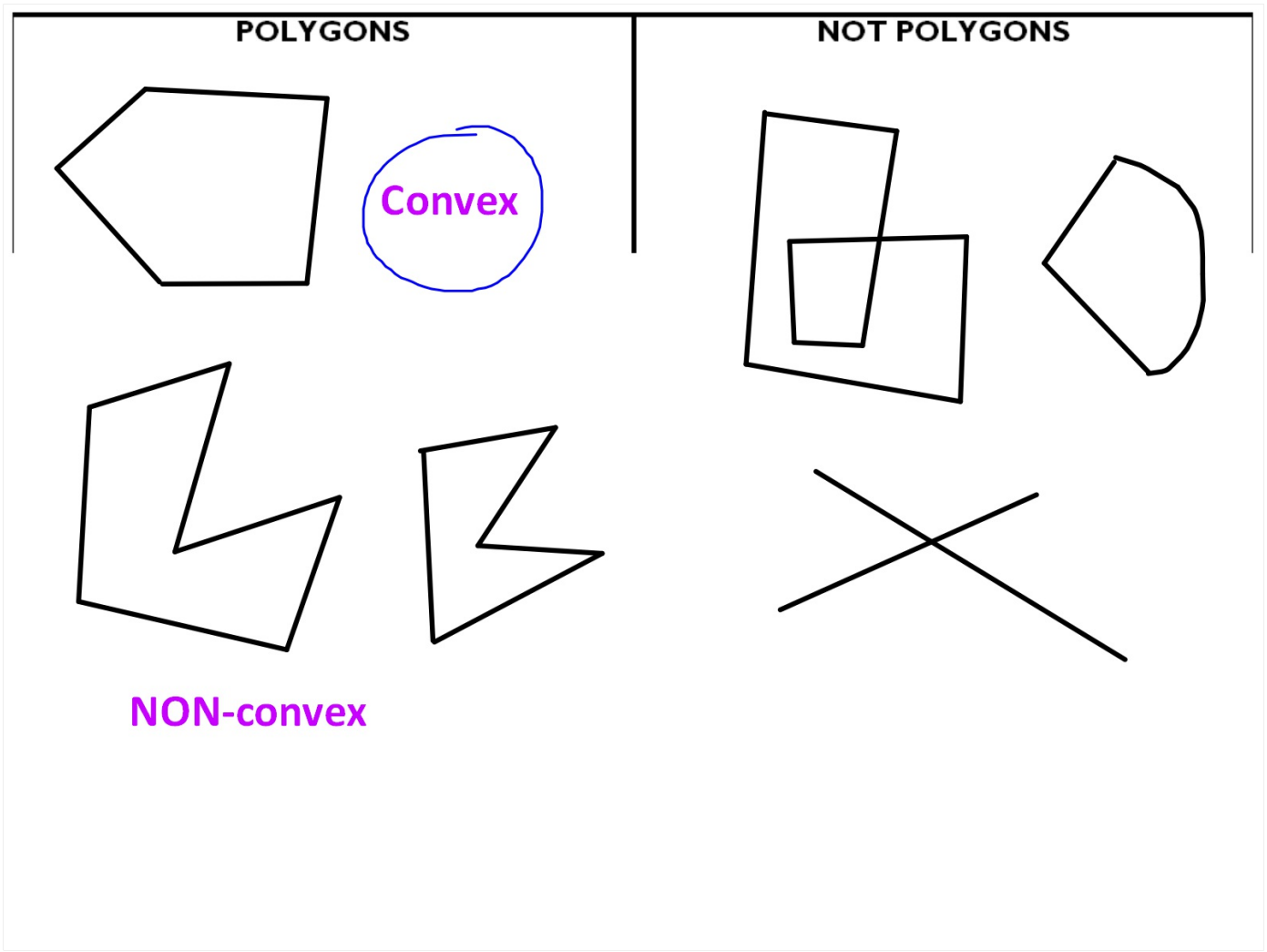
12.0 - Students find and use measures of sides and of interior and exterior angles of triangles and polygons to classify figures and solve problems

POLYGON

Many sides

Definition: a polygon is formed by coplanar segments (sides) such that:

1. **Each segment intersects exactly 2 other segments, one at each endpoint.**
2. **No two segments with a common endpoint are collinear.**


POLYGONS
NOT POLYGONS
Convex
NON-convex

CONVEX POLYGON

No line containing a side of the polygon contains a point in the interior of the polygon.

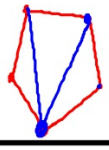
We will only work with convex polygons.....

Number of Sides	Name
3	triangle
4	quadrilateral
5	pentagon
6	hexagon
8	octagon
10	decagon
n	n-gon

20 20-gon

DIAGONAL OF A POLYGON

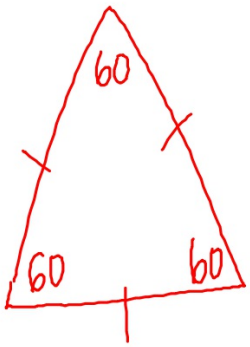
segment joining 2 non-consecutive vertices



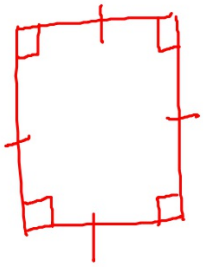
REGULAR POLYGON

A polygon that is equiangular (all ≅ angles) and equilateral (all ≅ sides)

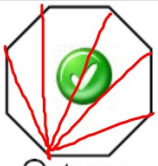
ex



ex



	ALL POLYGONS			REGULAR POLYGONS		
Figure	# of sides	# of triangles formed from one vertex	Sum of interior angles	Measure of one interior angle	Measure of one exterior angle	Sum of the exterior angles
 Triangle	3	1	180	$\frac{180}{3} = 60$	120	360
 Quadrilateral	4	2	$2(180)$ 360	$\frac{360}{4} = 90$	90	360
 Pentagon	5	3	$3(180)$ 540	$\frac{540}{5} = 108$	72	360

	ALL POLYGONS			REGULAR POLYGONS		
Figure	# of sides	# of triangles formed from one vertex	Sum of interior angles	Measure of one interior angle	Measure of one exterior angle	Sum of the exterior angles
 Hexagon	6	4	$4(180)$ 720	$\frac{720}{6}=120$	60	360
 Octagon	8	6	$6(180)$ 1080	$\frac{1080}{8}=135$	45	360
RULE	n	$n-2$	$(n-2)180$	$\frac{(n-2)180}{n}$	$180-\frac{(n-2)180}{n}$	360

THOREM

The sum of the measures of the interior angles of a convex polygon with n sides is $(n-2)180°$.

THEOREM

The sum of the measures of the exterior angles of any convex polygon, one angle at each vertex, is 360°

1-4: For each polygon, find (a) the interior angle sum and (b) the exterior angle sum.			
1) decagon a) int. sum = (10-2)180 1440 b) ext. sum = 360	2) 12-gon	3) 18-gon	4) 9-gon

Answer

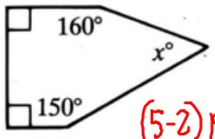
Answer

Answer

Answer

5-8: Find the value of x.

5)



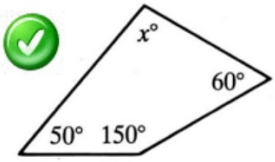
(5-2)180
540

$x + 150 + 90 + 90 + 160 = 540$

$x + 490 = 540$

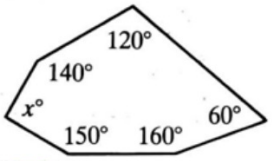
$x = 50$

6)



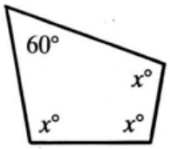
$= 360$

7)



$= 720$

8)



$= 360$

9-11: For each regular polygon, find the measure of (a) each interior angle and (b) each exterior angle.

9) decagon	10) 9-gon	11) 12-gon
a) $\frac{(10-2)180}{10} = \frac{1440}{10} = 144$ b) $180 - 144 = 36$	b) $ext = \frac{360}{9} = 40$ a) $int = 140$	

$ext = \frac{360}{10} = 36$

$int = 144$

Answer

$\frac{360}{n} = ext.\angle$

Answer

$\frac{360}{ext.\angle} = n$

Answer

12-13: How many sides does a regular polygon have if the measure of each exterior angle is:		**14-15: How many sides does a regular polygon have if the measure of each interior angle is:**	
12) 15°	13) 120°	14) 160°	15) 144°
$\frac{360}{15} = 24$ sides	$\frac{360}{120} = 3$ sides	ext = 20 $\frac{360}{20} = 18$ sides	ext = 36 $\frac{360}{36} = 10$ sides

Answer

Answer

Answer

Answer

HOMEWORK

Assignment #3.5a

- Worksheet 3.5A
- p.104 #1- 6, 8 - 15

1-25 all

(skip 7)

(1) a) $(4-2)180$

360

b) 360

(2) a) $(5-2)180$

540

b) 360

8

	9	15	30	60	45	24	180
ext ∠	40	24	12	6	8	15	2
int ∠	140	156	168	174	172	165	178