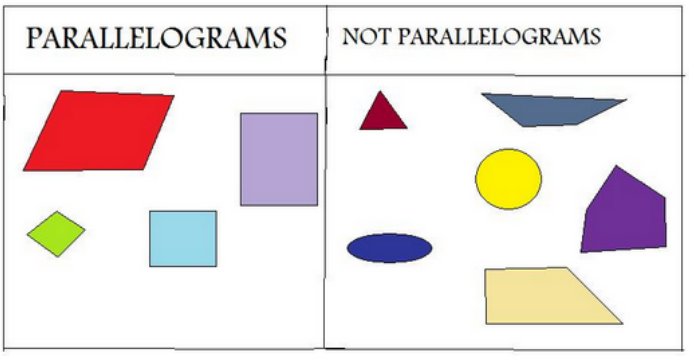
Name_____Period____




Unit 12 Day 3

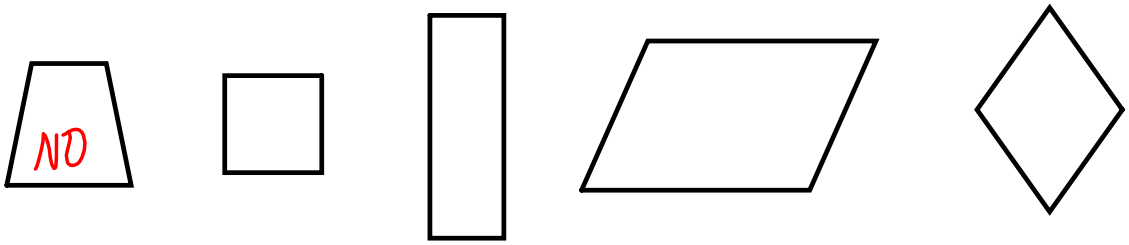
Parallelograms

I can_____

What is a quadrilateral ? 4 sided polygon

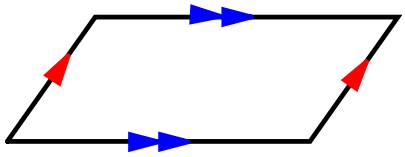
What makes a quadrilateral a Parallelogram? 2 sets of opp. sides parallel

Which one is not a parallelogram?

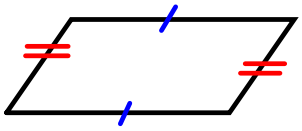



# Define parallelogram:

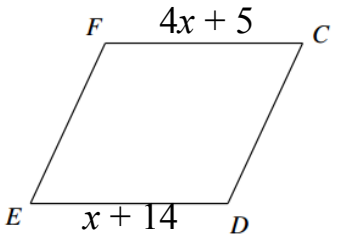
If a quadrilateral is a parallelogram then its opposite sides are parallel.



If a quadrilateral is a parallelogram then its opposite sides are congruent.



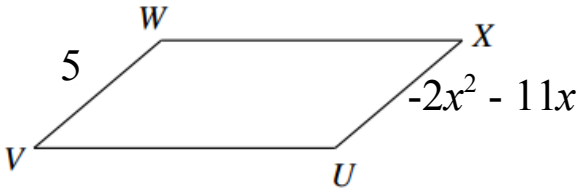
Let's practice. Given the following parallelograms. Find $x$.




$4x+5=x+14$

$3x=9$

$x=3$




$-2x^2-11x=5$

$2x^2+11x+5=0$

$(2x+1)(x+5)=0$

$x=-1/2 \quad x=-5$

Can $x$ equal a negative number? Yes

If lines are || then all the angle relations will hold true.

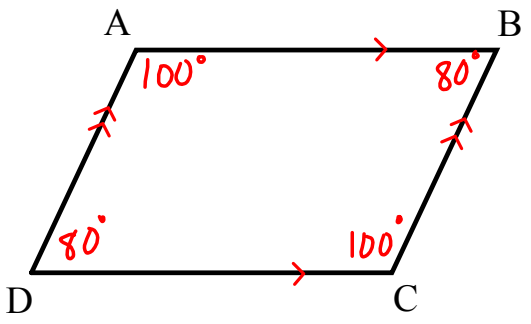
What is the angle relationship between

$\angle A$ and $\angle B$ add $180^\circ$

$\angle B$ and $\angle C$ add $180^\circ$

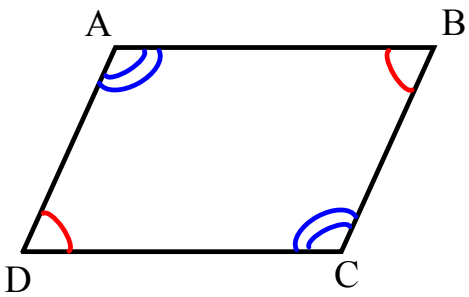
$\angle C$ and $\angle D$ add $180^\circ$

$\angle A$ and $\angle D$ add $180^\circ$




So if $m\angle A = 100^0$ , what are the measures of the other angles?

If a quadrilateral is a parallelogram then its consecutive angles are supplementary.




$m\angle A + m\angle B = 180^o$

$m\angle B + m\angle C = 180^o$

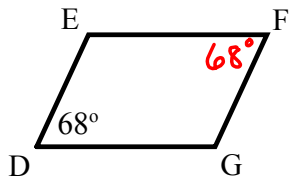
$m\angle C + m\angle D = 180^o$

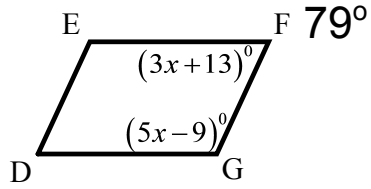
$m\angle D + m\angle A = 180^o$

If a quadrilateral is a parallelogram then its opposite angles are congruent

Given the following parallelograms.

Use the properties of a ▱ to find x and then the measure of angle F.



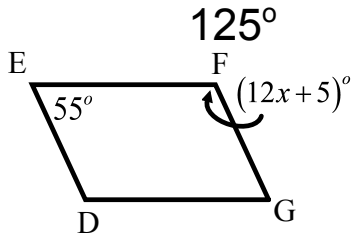




$3x+13+5x-9=180$

$8x+4=180$

$8x=176$

$x=22$

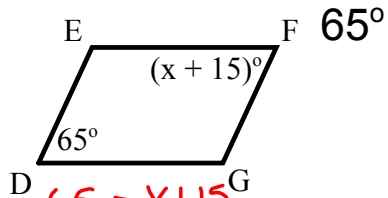



$55+12x+5=180$

$12x+60=180$

$12x=120$

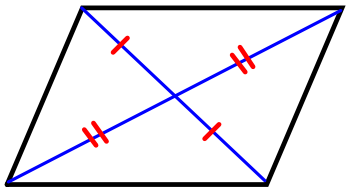
$x=10$



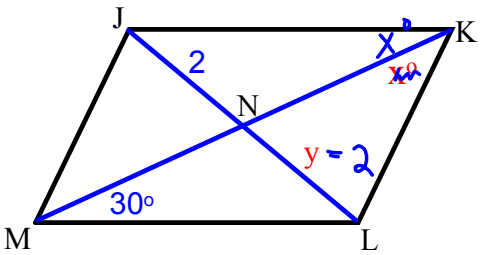

$65=x+15$

$x=50$

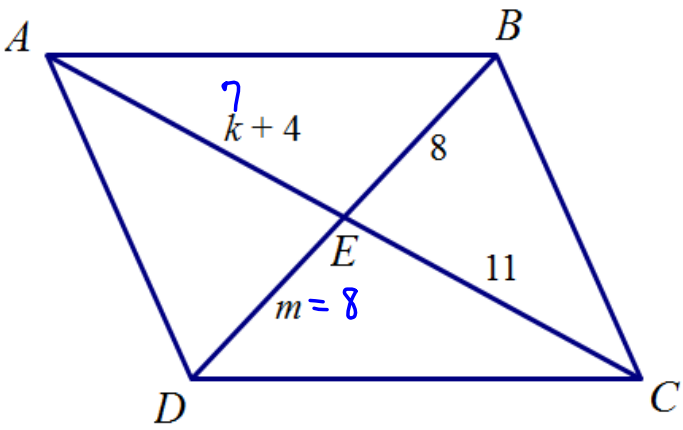
If a quadrilateral is a parallelogram then its diagonals bisect each other.



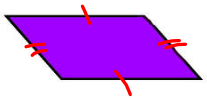
Given ▱ JKLM: Find x and y.



Given ▱ ABCD: Find k and m.



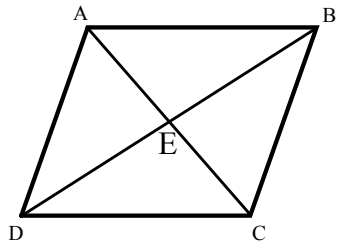

## 5 properties of a parallelogram



1. opp sides ≅
2. opp. sides ∥
3. opp ∠'s ≅
4. consecutive ∠'s add 180°
5. diagonals bisect each other

Let's make this list together.

Given ▱ABCD. Find x.




1. If $m\angle ABC = (2x + 5)^o$ and $m\angle BCD = (4x + 7)^o$

$2x+5+4x+7=180$

$6x+12=180$

$6x=168$

$x=28$

2. AE = 5x + 2 and EC = 7x - 6

$5x+2=7x-6$

$8=2x$

$x=4$

3. If $m\angle ABC = (8x - 16)^o$ and $m\angle ADC = (4x + 20)^o$

$8x-16=4x+20$

$4x=36$

$x=9$

4. DB = 6x - 20 and DE = 2x + 5

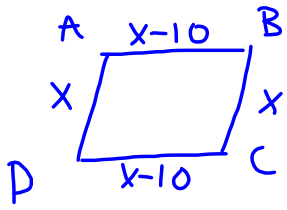
$6x-20=2(2x+5)$

$6x-20=4x+10$

$2x=30$

$x=15$

The perimeter of parallelogram ABCD is 96 cm. AB is 10 cm less than BC. What is the length of the smaller sides? (draw a picture)




$4x-20=96$

$4x=116$

$x=29$

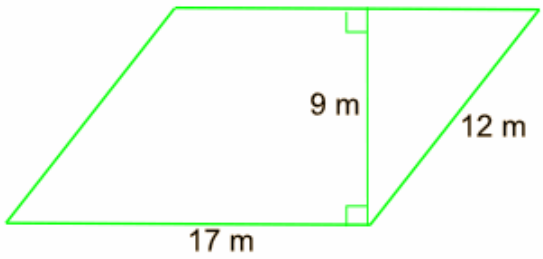
One last item

Area of a parallelogram: $A = bh$

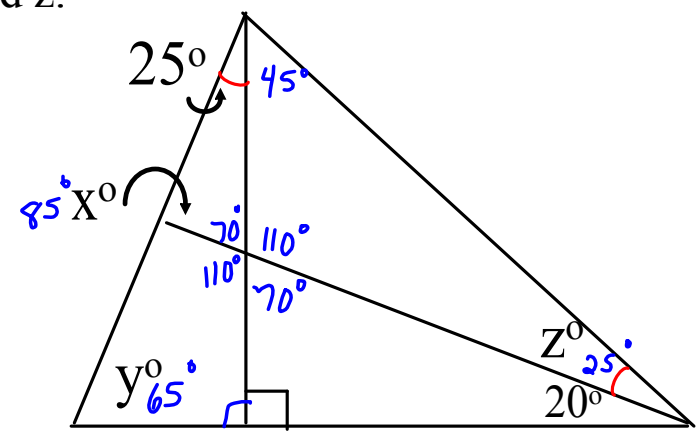
$A = 17(9)$

$A = 153 m^2$

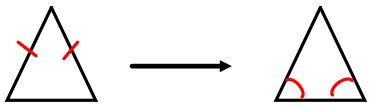
Calculate the area of this parallelogram:

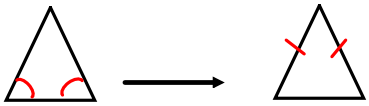


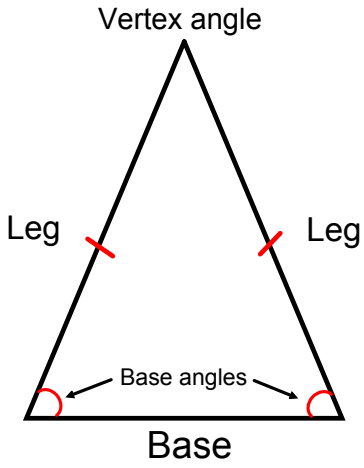

Find the values of x, y and z.



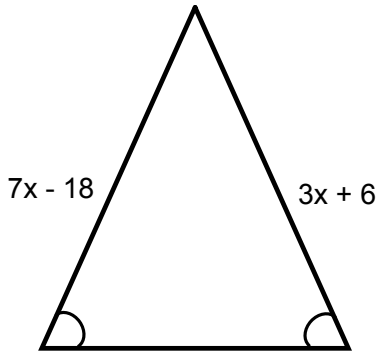
# Isosceles Triangle Theorem

If  .

If  .




Find the value of x.

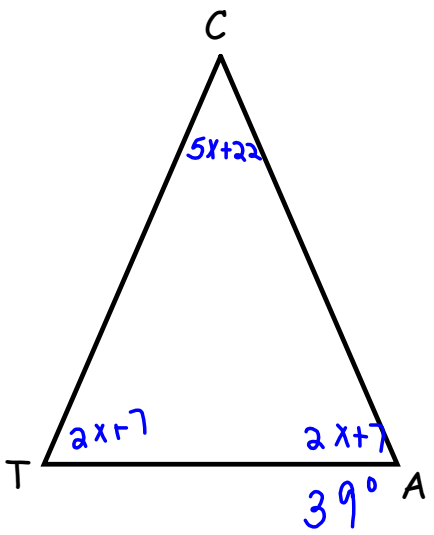



$7x - 18 = 3x + 6$

$4x = 24$

$x = 6$

△CAT is an isos. triangle with vertex angle C.




1. If AC = 3x + 8 and CT = 5x - 12 , find AC.

38

$3x+8=5x-12$

$20=2x$

$x=10$

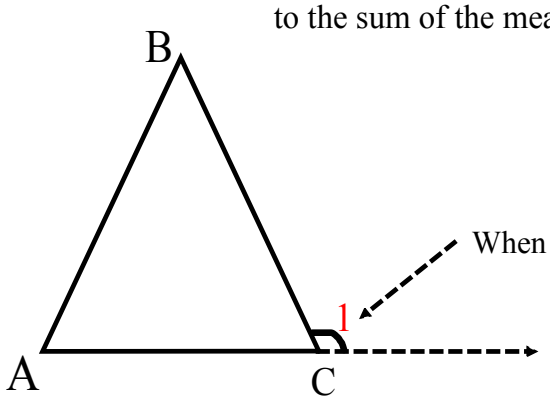
2. If $m\angle T = 2x + 7$, and $m\angle C = 5x + 22$ , find $m\angle A$

$9x+36=180$

$9x=144$

$x=16$

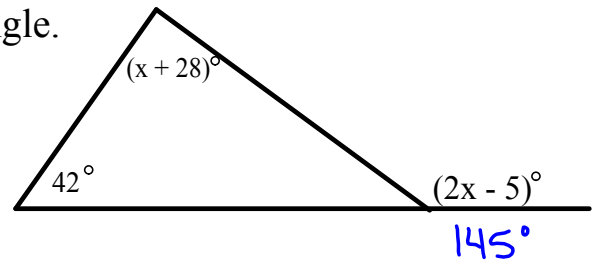
Exterior Angle Theorem: The measure of an exterior angle of a triangle is equal to the sum of the measures of the two nonadjacent interior angles.




When a side is extended it creates an exterior angle.

$m\angle 1 = m\angle A + m\angle B$

Find the measure of the exterior angle.

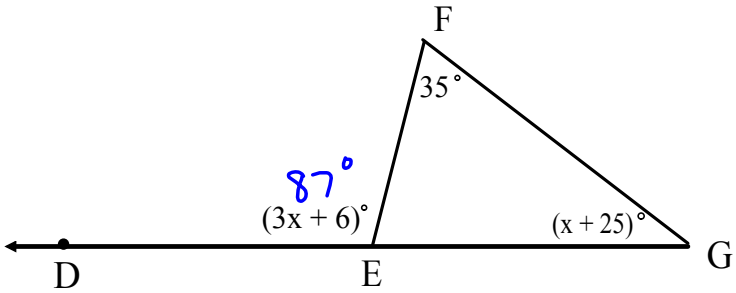



$42 + x + 28 = 2x - 5$

$x + 70 = 2x - 5$

$75 = x$

Find the m ∠DEF

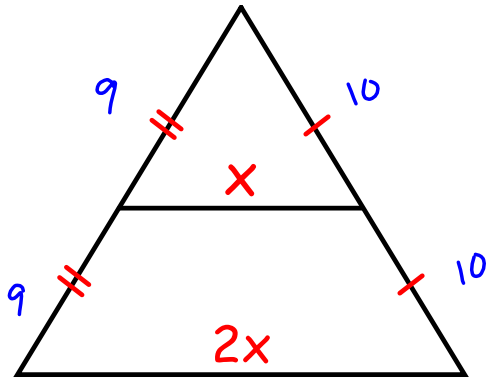



$x + 60 = 3x + 6$

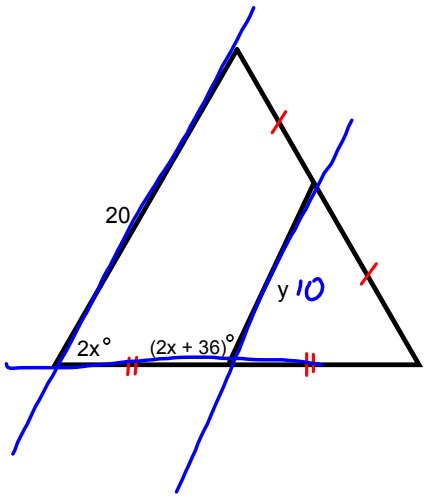
$54 = 2x$

$x = 27$

**Midsegment Theorem**: The segment connecting the midpoints of two sides of a triangle is parallel to the third side and is half the length.




Find x and y.



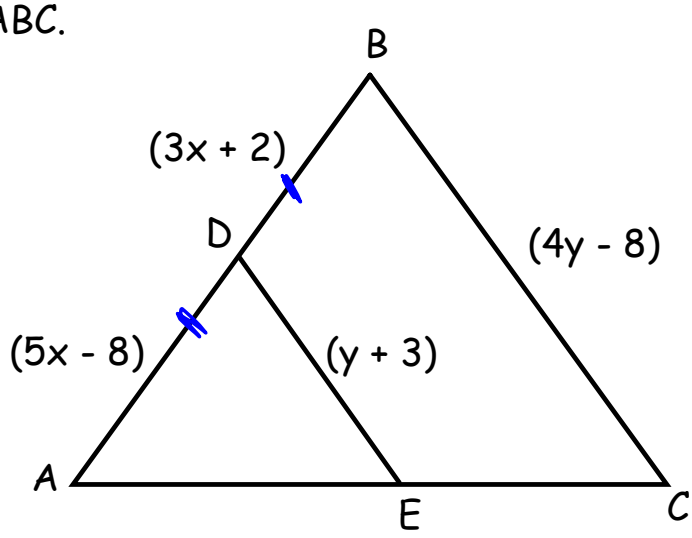

$2x + 2x + 36 = 180$

$4x + 36 = 180$

$4x = 144$

$x = 36$

$\overline{DE}$ is a midsegment of $\triangle ABC$.
Find x and y.




$3x+2=5x-8$
$10=2x$
$x=5$

$2(y+3)=4y-8$
$2y+6=4y-8$
$14=2y$
$y=7$