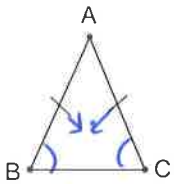
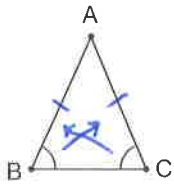
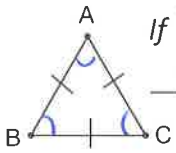
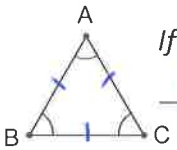
Geometry – A
4.7
Study Guide

Name: Key

Date: _____ Period: _____

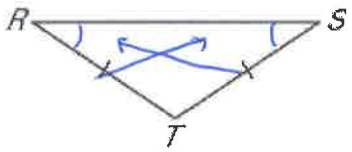

I can use theorems about isosceles and equilateral triangles to solve problems.

First things first: Some theorems that will help you solve problems in this section.

| Theorem | Explanation | Picture |
|---|---|---|
| Base Angles Theorem | If two sides of a triangle are congruent, then the angles opposite them are congruent |  If $\overline{AB} \cong \overline{AC}$, then $\angle B \cong \angle C$ |
| Converse of the Base Angles Theorem | If two angles of a triangle are congruent, then the sides opposite them are congruent |  If $\angle B \cong \angle C$, then $\overline{AB} \cong \overline{AC}$ |
| Corollary of the Base Angles Theorem | If a triangle is equilateral, then it is equiangular |  If $\overline{AB} \cong \overline{BC} \cong \overline{AC}$, then $\angle A \cong \angle B \cong \angle C$ |
| Corollary to the converse of the Base Angles Theorem | If a triangle is equiangular, then it is equilateral |  If $\angle A \cong \angle B \cong \angle C$, then $\overline{AB} \cong \overline{AC} \cong \overline{BC}$ |

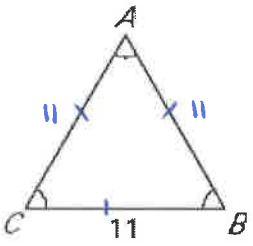
Now let's try some examples:

1) In the diagram, $\overline{RT} \cong \overline{ST}$.
Please name two congruent angles.




By the base angles theorem,
$\angle R \cong \angle S$

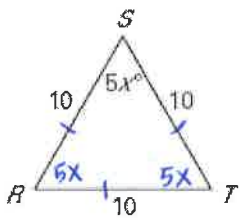
2) Find *AC* and *AB* in the triangle below.




Since $\triangle ABC$ is equiangular, it is also equilateral, so all sides are congruent
$AC = 11$ and $AB = 11$

**Please solve for *x*.**

3)



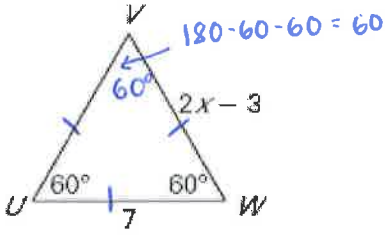

Since $\Delta RST$ is equilateral, it is also equiangular, which means each angle has a measure of $5x°$.

$5x+5x+5x=180$

$15x=180$

$\boxed{x=12}$

4)



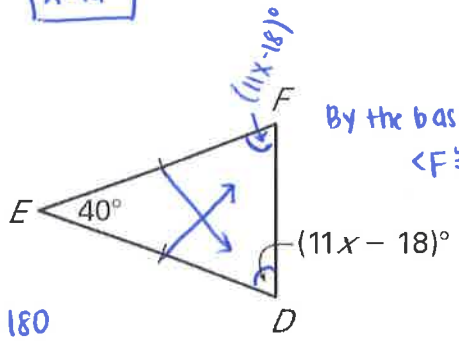

Since all angles have a measure of $60°$, $\Delta UVW$ is equiangular and also equilateral, which means $\overline{UW} \cong \overline{VW}$

$2x-3=7$

$2x=10$

$\boxed{x=5}$

5)




By the base angles theorem, $\angle F \cong \angle D$ so $m\angle F = (11x-18)°$

$40+11x-18+11x-18=180$

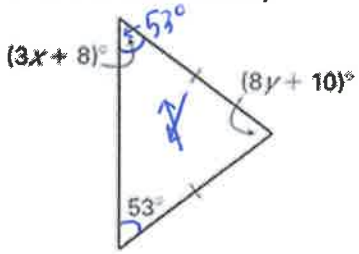
$22x+4=180$

$22x=176$

$\boxed{x=8}$

**Please find the values of x and y.**

6)




By the base angles theorem, $53=3x+8$

$45=3x$

$\boxed{x=15}$

Using the triangle sum theorem,

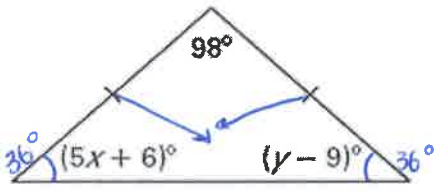
$53+53+8y+10=180$

$8y+116=180$

$8y=64$

$\boxed{y=8}$

7)




By the base angles theorem, $5x+6=y-9$, but there are 2 variables so we do not have enough info to solve.

Since we know the vertex angle, and we know the 2 base angles are $\cong$, we can take the total $\Delta$ sum of $180°$ and subtract the $98°$ angle we know:

$180-98=72$.

The 72 is the angle measure we need to share between the 2 base angles, so we can divide by 2 to get a base angle measure of $36°$.

$5x+6=36$

$5x=30$

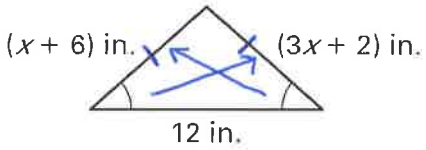
$\boxed{x=6}$

$y-9=36$

$\boxed{y=45}$

**Please find the perimeter of the triangle.**

8)




By the base angles converse, the sides (x+6) in and (3x+2) in are congruent. To solve for x, set the sides equal:

$x+6 = 3x+2$

$6 = 2x+2$

$4 = 2x$

$\boxed{x=2}$

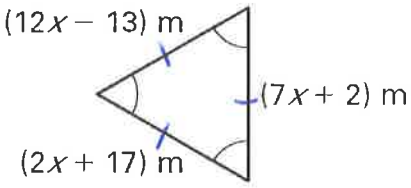
Perimeter $= x+6+3x+2+12$

$= 2+6+3(2)+2+12$ ← substitute in $x=2$

$= 8+6+14$

$\boxed{P = 28 \text{ inches}}$

9)




Since the Δ is equiangular, it is equilateral. To solve for x, set <u>any</u> two sides equal:

$2x+17 = 7x+2$

$17 = 5x+2$

$15 = 5x$

$\boxed{x=3}$

Perimeter $= 12x-13+7x+2+2x+17$

$= 12(3)-13+7(3)+2+2(3)+17$

$= 36-13+21+2+6+17$

$= 23+23+23$

$\boxed{P = 69 \text{ meters}}$