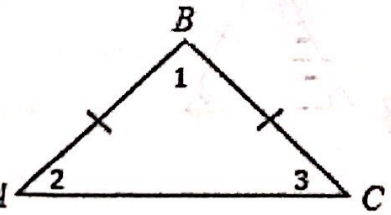# Isosceles Triangles

Parts of Isosceles Triangle:

- The two congruent sides are called the __legs ($\overline{AB}$, $\overline{BC}$)__
- The angle where the ~~sides~~ legs intersect is called the __vertex ($\angle B$)__
- The sides opposite the vertex angle is called the __base ($\overline{AC}$)__
- The angles along the base are called the __base angles ($\angle A$, $\angle C$)__

Isosceles Triangle Theorem	If two **sides** of a triangle are congruent, then the **angles** opposite those sides are congruent.
	Example: If $\overline{AB} \cong \overline{BC}$, then $\angle A \cong \angle C$
Converse of Isosceles Triangle Theorem	If two **angles** of a triangle are congruent, then the **sides** opposite those angles are congruent.
	Example: If $\angle A \cong \angle C$, then $\overline{AB} \cong \overline{BC}$

Directions: Find each missing angle measure.

1.

$m\angle J = \underline{68^\circ}$

$m\angle K = \underline{44^\circ}$

$68 + 68 = 136$

$180 - 136 = 44$

2.

$m\angle C = \underline{37}$

$m\angle E = \underline{37}$

$180 - 106 = 74$

$74/2 = 37$

3.

12 cm

$YZ = \underline{12\ cm}$

$m\angle Y = \underline{26^\circ}$

$77 + 77 = 154 \qquad 180 - 154 = 26$

Directions: Find the value of each variable.

4.

$5x + 9 = 8x - 30$

$39 = 3x$

$\boxed{13 = x}$

$(5x + 9)^\circ \qquad (8x - 30)^\circ$

5.

$(4x + 7)^\circ$

$(9x - 33)^\circ$

$4x + 7 = 9x - 33$

$\quad +33 \qquad +33$

$4x + 40 = 9x$

$-4x \qquad -4x$

$\dfrac{40}{5} = \dfrac{5x}{5} \qquad \boxed{x = 8}$

6.

$15x + 7$

$23x - 17$

$15x + 7 = 23x - 17$

$15x + 24 = 23x$

$24 = 8x$

$\boxed{13 = x}$

7.

74°

74°

$3x + 23$

$9x - 73$

$9x - 73 = 3x + 23$

$\quad +73 \qquad +73$

$9x = 3x + 96$

$-3x \qquad -3x$

$\dfrac{6x}{6} = \dfrac{96}{6} \qquad \boxed{x = 16}$

$9(5)+2$ $13(5)-18$ $17(5)+1$

8. In $\triangle RST$, if $\overline{RT} \cong \overline{ST}$, $m\angle R = 9x + 2$, $m\angle S = 13x - 18$, and $m\angle T = 17x + 1$, find x and the measure of each angle.
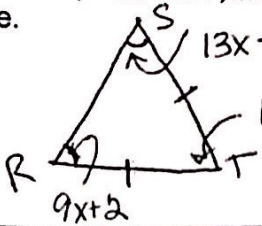
$13x-18$
$17x+1$
$9x+2$

$9x+2=13x-18$
$+18 \quad +18$
$9x+20=13x$
$-9x \quad -9x$

$\frac{20}{4}=\frac{4x}{4}$

$5=x$

$x = \underline{5}$
$m\angle R = \underline{47°}$
$m\angle S = \underline{47°}$
$m\angle T = \underline{86°}$

9. In $\triangle DEF$, if $\angle D \cong \angle E$, $DE = x + 4$, $EF = 4x - 8$, and $DF = 7x - 35$, find x and the measure of each angle.

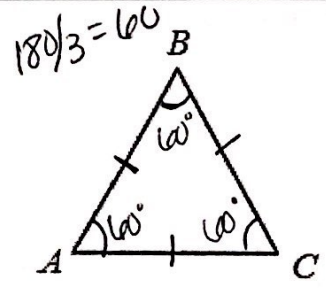$x+4$
$4x-8$
$7x-35$
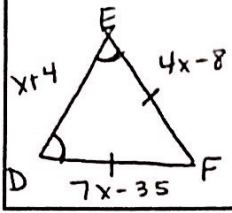
$7x-35=4x-8$
$3x=27$
$x=9$

$x=9$
$DE=13$
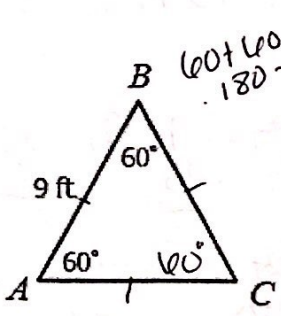$EF=28$
$DF=28$

Equilateral Triangles
A triangle is equilateral if and only if it is equiangular!

$180/3=60$

- If $m\angle A = m\angle B = m\angle C$, then $\underline{AB = BC = AC}$

- If $AB = BC = AC$, then $\underline{m\angle A = m\angle B = m\angle C}$

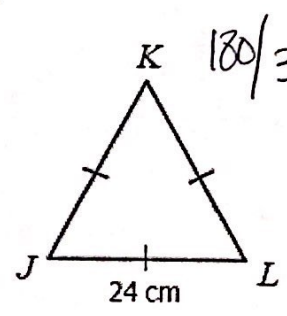**Directions**: Find each missing measure.

10.

$60+60=120$
$180-120=60$

$m\angle C = \underline{60°}$
$BC = \underline{9\ ft}$
$AC = \underline{9\ ft}$

$60°$
$9\ ft$
$60°$ $60°$

11.

$180/3$

$m\angle J = \underline{60°}$
$m\angle K = \underline{60°}$
$m\angle L = \underline{60°}$

$24\ cm$

12. If $\triangle PQR$ is an equilateral triangle, solve for x and y.

$14y-59$
60
$9y+1$
60
$11y-23$
60
$(7x-3)°$
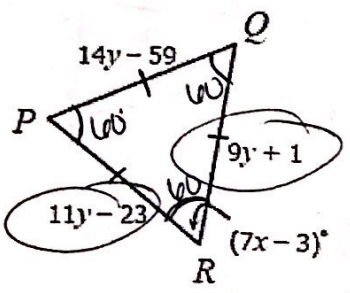
$7x-3=60$
$+3 \quad +3$
$\frac{7x}{7}=\frac{63}{7}$
$\boxed{x=9}$

$9y+1=11y-23$
$+23 \quad +23$
$9y+24=11y$
$-9y \quad -9y$
$\frac{24}{2}=\frac{2y}{2}$
$\boxed{y=12}$