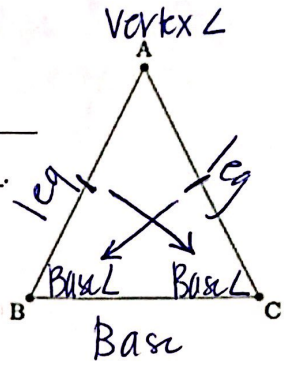
# Unit 2 Lesson 10 – Isosceles Triangles




**Isosceles Triangle:** A triangle that has two congruent sides.

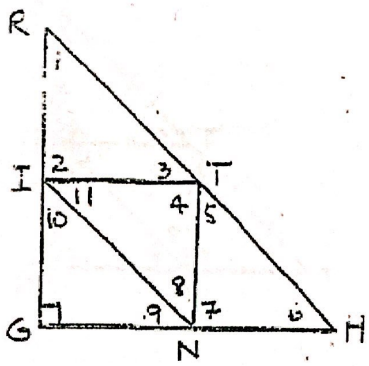
- The congruent sides are called Legs and the 3rd (non-congruent side) is called the Base.
- The angle formed by the legs is called the Vertex angle. (∠A)
- The angles **opposite** the congruent legs are called the Base angles. (∠B and ∠C)

**Isosceles Triangle Theorem (ITT):** If 2 sides of a triangle are congruent then the angles opposite those sides are congruent

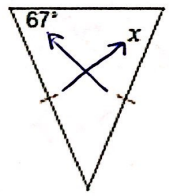
- So in the triangle above, since $\overline{AB}$ is marked as congruent to $\overline{AC}$ (two sides of a triangle are congruent) we can conclude that ∠B ≅ ∠C (the angles opposite those sides are congruent).

**Practice:**

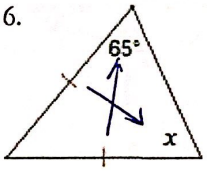
1. If $\overline{RI} \cong \overline{IT}$, which angles are congruent? ∠1 and ∠3
2. If $\overline{TN} \cong \overline{IT}$, which angles are congruent? ∠11 and ∠8
3. If $\overline{TN} \cong \overline{NH}$, which angles are congruent? ∠5 and ∠6
4. If $\overline{GI} \cong \overline{GN}$, which angles are congruent? ∠10 and ∠9



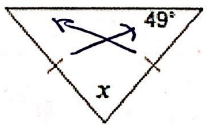

**Determine the value of x:**

5. 

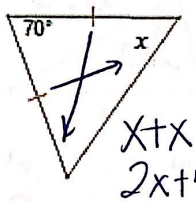
X = 67°

6. 

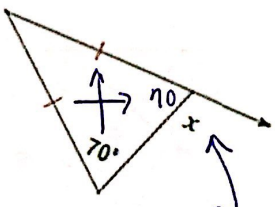
X = 65°

7. 

49+49+x=180
98+x=180
X=82°

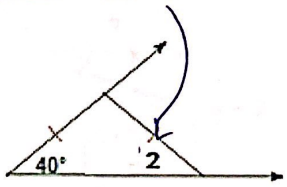
8. 

X+X+70=180
2x+70=180
2x=110
X=55°

9. 

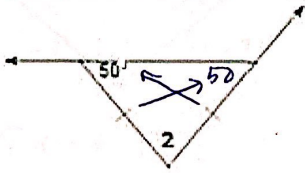
180−70=110°

10. $m\angle 2 = 4x - 4$

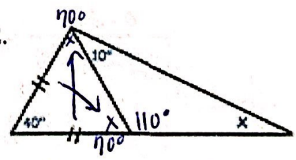


4x−4 = 40
4x = 44
X = 11

11. $m\angle 2 = x + 88$

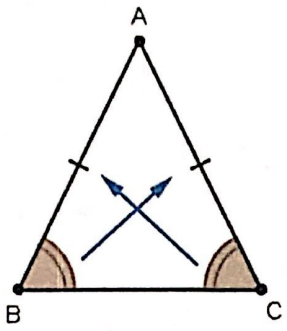


50+50+x+88=180
x+188=180
X=−8

12. 

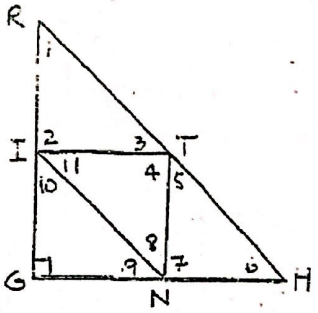
2x+40=180
2x=140
X=70
10+110+x=180
120+x=180
x=60°

**Converse of the Isosceles Triangle Theorem:** if 2 angles of a triangle are congruent then the SIDES opposite those angles are congruent.




- So in the triangle pictured above, since $\angle B$ is marked as congruent to $\angle C$ (two angles of a triangle are congruent) we can conclude that $\overline{AB} \cong \overline{AC}$ (the sides opposite those angles are congruent).

**Practice:**

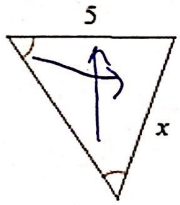



1. If $\angle 9 \cong \angle 10$, which segments are congruent? $\overline{IG}$ and $\overline{NG}$
2. If $\angle 11 \cong \angle 8$, which segments are congruent? $\overline{IT}$ and $\overline{NT}$
3. If $\angle 5 \cong \angle 6$, which segments are congruent? $\overline{NT}$ and $\overline{NH}$
4. If $\angle 1 \cong \angle 6$, which segments are congruent? $\overline{RG}$ and $\overline{HG}$

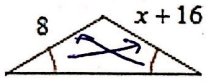
**Determine the value of x:**

4. 

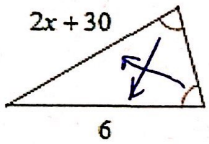
$X = 7$

5. 

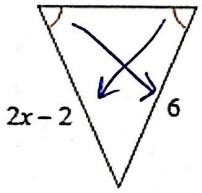
$X = 5$

6. 

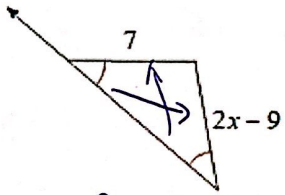
$X + 16 = 8$
$X = -8$

7. 

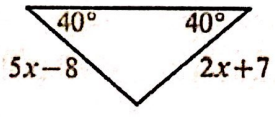
$2x + 30 = 6$
$2x = -24$
$X = -12$

8. 

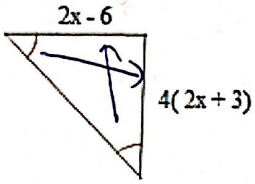
$x - 2 = 6$
$2x = 8$
$X = 4$

9. 

$2x - 9 = 7$
$2x = 16$
$X = 8$

10. 

$5x - 8 = 2x + 7$
$3x = 15$
$X = 5$

11. 

$2x - 6 = 4(2x + 3)$
$2x - 6 = 8x + 12$
$-6x = 18$
$X = -3$