

# 4.7

## Use Isosceles and Equilateral Triangles

- Goal** • Use theorems about isosceles and equilateral triangles.

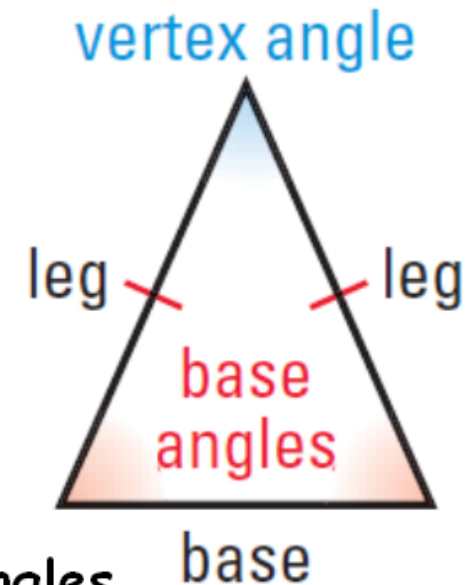
\*Remember: An isosceles triangle has two congruent sides.

These sides are called legs

The angle formed by the legs is the vertex angle

The third side is the base

The two angles adjacent to the base are called base angles



**THEOREMS***For Your Notebook***THEOREM 4.7 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  $\angle B \cong \angle C$ .

*Proof:* p. 265

**THEOREM 4.8 Converse of 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  $\overline{AB} \cong \overline{AC}$ .

*Proof:* Ex. 45, p. 269

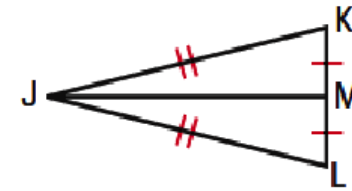
**EXAMPLE 1 Apply the Base Angles Theorem**

In  $\triangle DEF$ ,  $\overline{DE} \cong \overline{DF}$ . Name two congruent angles.

**PROOF** Base Angles Theorem

**GIVEN** ▶  $\overline{JK} \cong \overline{JL}$ , M is the midpoint of  $\overline{KL}$

**PROVE** ▶  $\angle K \cong \angle L$



Statements	Reasons

\*Remember: an equilateral triangle has three congruent sides!

## COROLLARIES

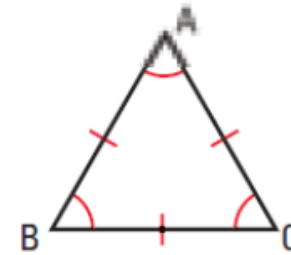
*For Your Notebook*

### Corollary to the Base Angles Theorem

If a triangle is equilateral, then it is equiangular.

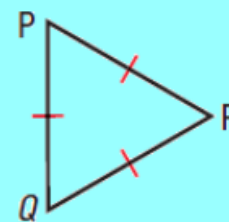
### Corollary to the Converse of Base Angles Theorem

If a triangle is equiangular, then it is equilateral.



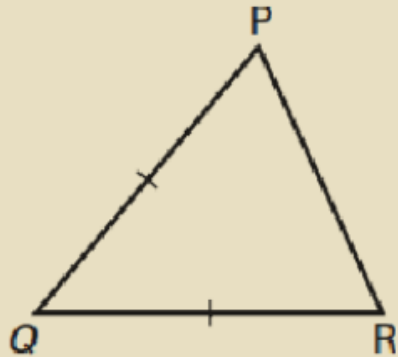
**EXAMPLE 2** Find measures in a triangle

Find the measures of  $\angle P$ ,  $\angle Q$ , and  $\angle R$ .



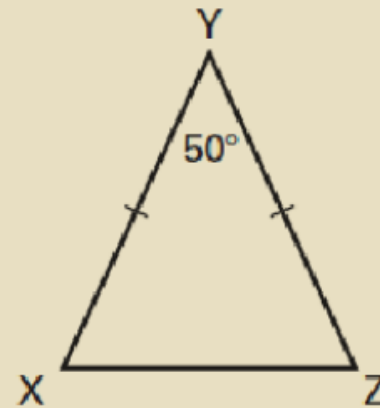
### Extra Example 1

In  $\triangle PQR$ ,  $\overline{PQ} \cong \overline{QR}$ . Name two congruent angles.



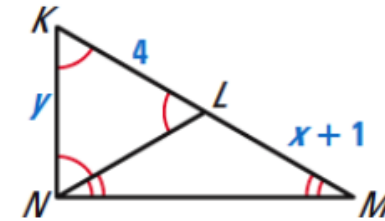
### Extra Example 2

Find the measures of  $\angle X$  and  $\angle Z$ .



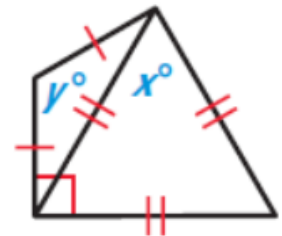
**EXAMPLE 3** Use isosceles and equilateral triangles

**xy** ALGEBRA Find the values of  $x$  and  $y$  in the diagram.



**GUIDED PRACTICE** for Examples 3 and 4

5. Find the values of  $x$  and  $y$  in the diagram.



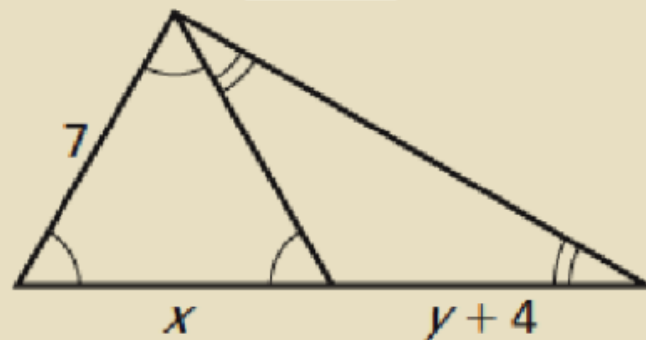


# Day 1 Assignment:

4.7 WS

### Extra Example 3

Find the values of  $x$  and  $y$  in the diagram.

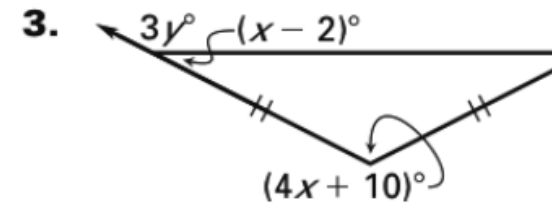
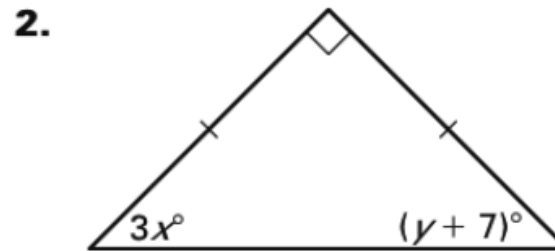
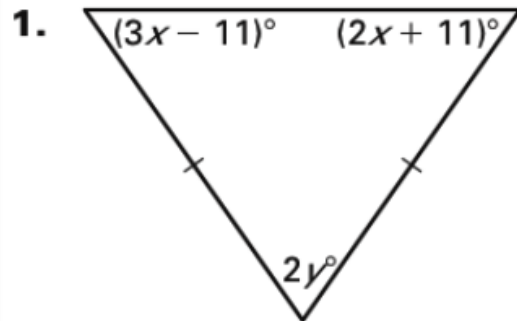


LESSON  
4.7

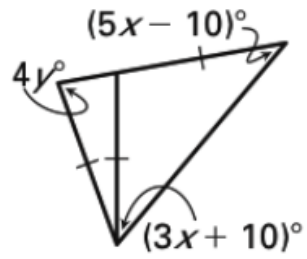
## Practice B

For use with pages 264–270

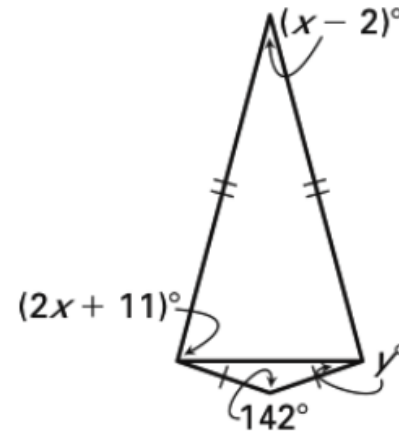
Find the values of  $x$  and  $y$ .



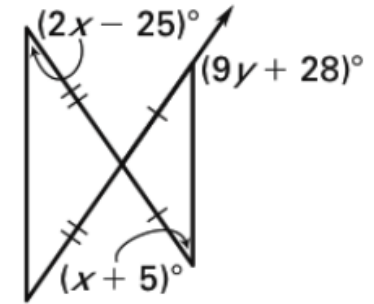
4.



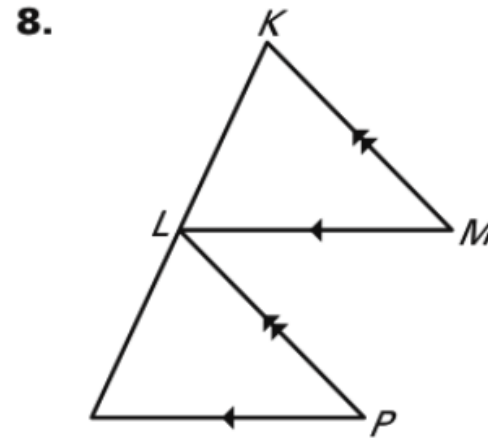
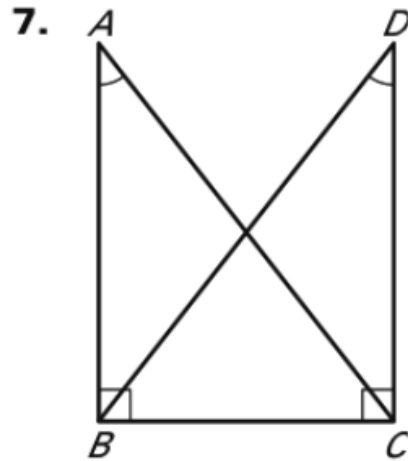
5.



6.



**Decide whether enough information is given to prove that the triangles are congruent. *Explain* your answer.**



**In Exercises 9 and 10, complete the proof.**

**9. GIVEN:**  $\overline{FG} \cong \overline{FJ}$ ,  $\overline{HG} \cong \overline{IJ}$

**PROVE:**  $\overline{HF} \cong \overline{IF}$

**Statements**

1.  $\overline{FG} \cong \overline{FJ}$

2.  $\underline{\hspace{1cm}}$

3.  $\overline{HG} \cong \overline{IJ}$

4.  $\underline{\hspace{1cm}}$

5.  $\overline{HF} \cong \overline{IF}$

**Reasons**

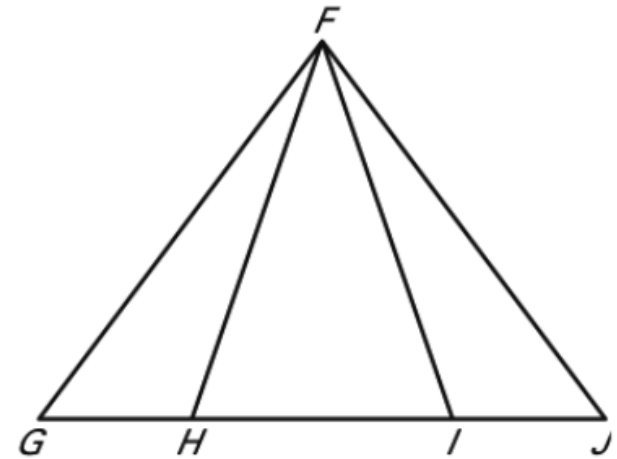
1.  $\underline{\hspace{1cm}}$

2. Base Angles Theorem

3.  $\underline{\hspace{1cm}}$

4. SAS Congruence Postulate

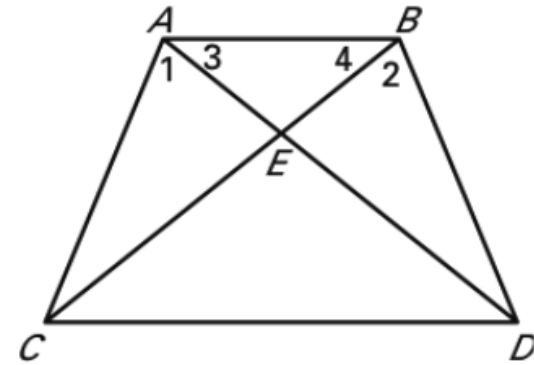
5.  $\underline{\hspace{1cm}}$



**10. GIVEN:**  $\angle 1 \cong \angle 2$ ,  $\overline{AC} \cong \overline{BD}$

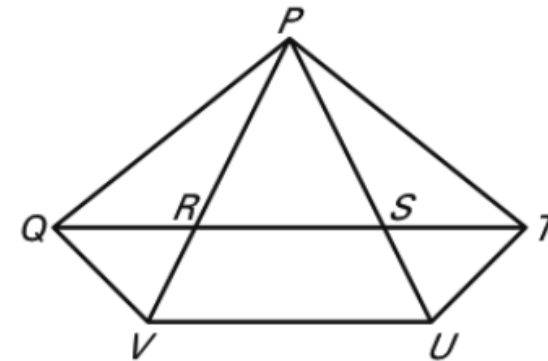
**PROVE:**  $\angle 3 \cong \angle 4$

Statements	Reasons
1. $\angle 1 \cong \angle 2$	1. <u>?</u>
2. $\overline{AC} \cong \overline{BD}$	2. <u>?</u>
3. $\angle AEC \cong \angle BED$	3. <u>?</u>
4. <u>?</u>	4. AAS Congruence Theorem
5. $\overline{AE} \cong \overline{BE}$	5. <u>?</u>
6. $\angle 3 \cong \angle 4$	6. <u>?</u>



**In Exercises 11–16, use the diagram. Complete the statement. Tell what theorem you used.**

11. If  $\overline{PQ} \cong \overline{PT}$ , then  $\angle \_? \cong \angle \_?$ .
12. If  $\angle PQV \cong \angle PVQ$ , then  $\_? \cong \_?$ .
13. If  $\overline{RP} \cong \overline{SP}$ , then  $\angle \_? \cong \angle \_?$ .
14. If  $\overline{TP} \cong \overline{TR}$ , then  $\angle \_? \cong \angle \_?$ .
15. If  $\angle PSQ \cong \angle SPQ$ , then  $\_? \cong \_?$ .
16. If  $\angle PUV \cong \angle PVU$ , then  $\_? \cong \_?$ .

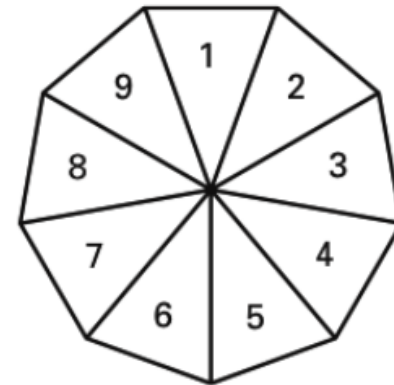




**In Exercises 17–19, use the following information.**

**Prize Wheel** A radio station sets up a prize wheel when they are out promoting their station. People spin the wheel and receive the prize that corresponds to the number the wheel stops on. The 9 triangles in the diagram are isosceles triangles with congruent vertex angles.

- 17.** The measure of the vertex angle of triangle 1 is  $40^\circ$ . Find the measures of the base angles.
- 18.** Explain how you know that triangle 1 is congruent to triangle 6.
- 19.** Trace the prize wheel. Then form a triangle whose vertices are the midpoints of the bases of the triangles 1, 4, and 7. What type of triangle is this?



## Assignment Day 2:

p. 267 (3-13, 15-17, 20,  
38-40)