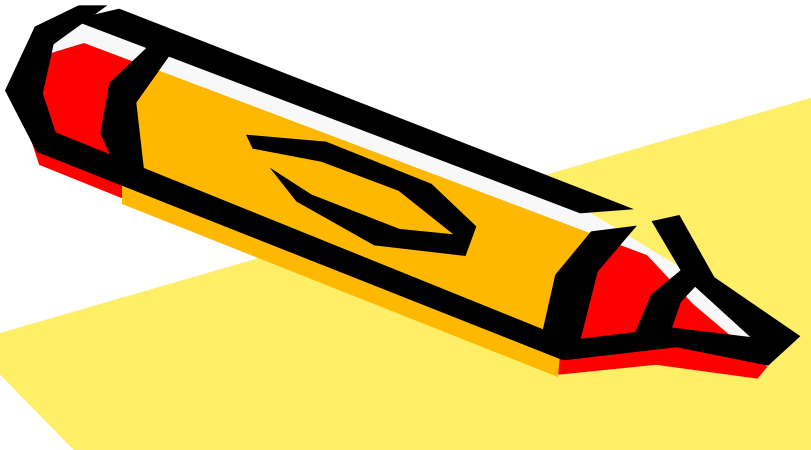
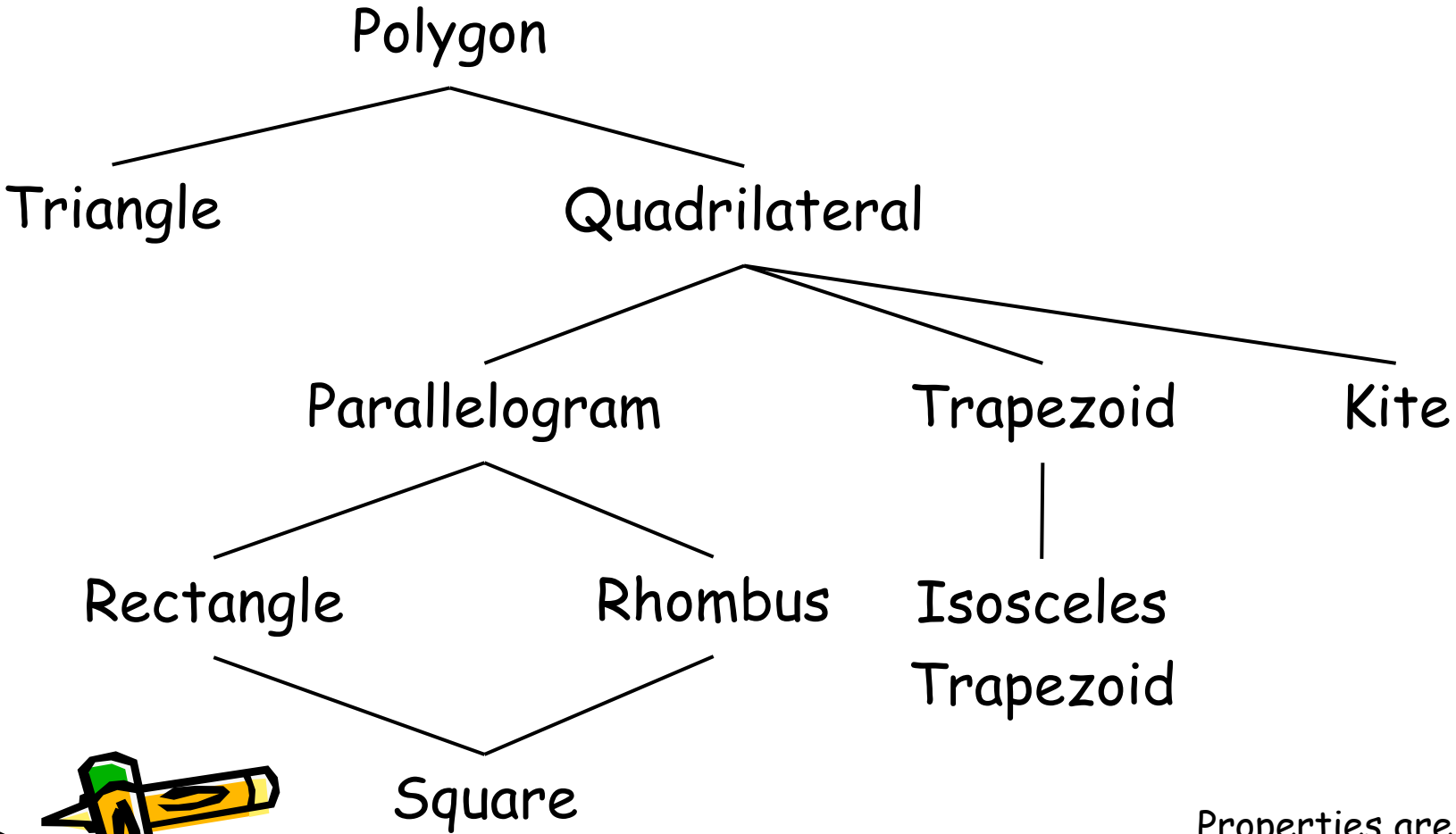


Geometry

Parallelograms

Our Polygon Family Tree

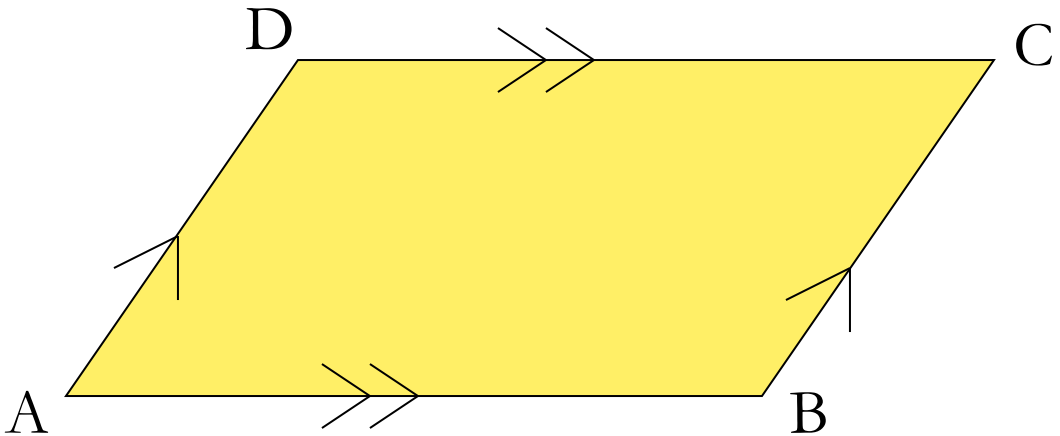


Properties are inherited as we move down the tree

Parallelograms

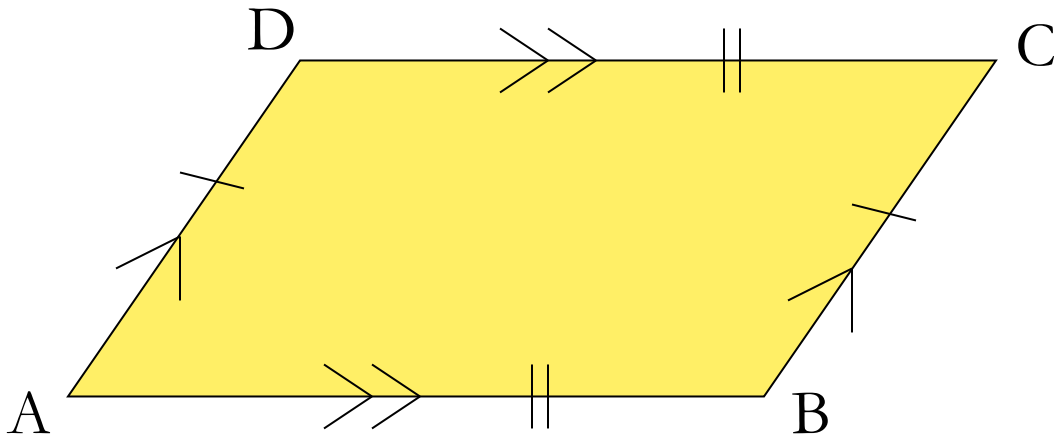
Definition and KEY property

A parallelogram is a quadrilateral with both pairs of opposite sides parallel to each other.



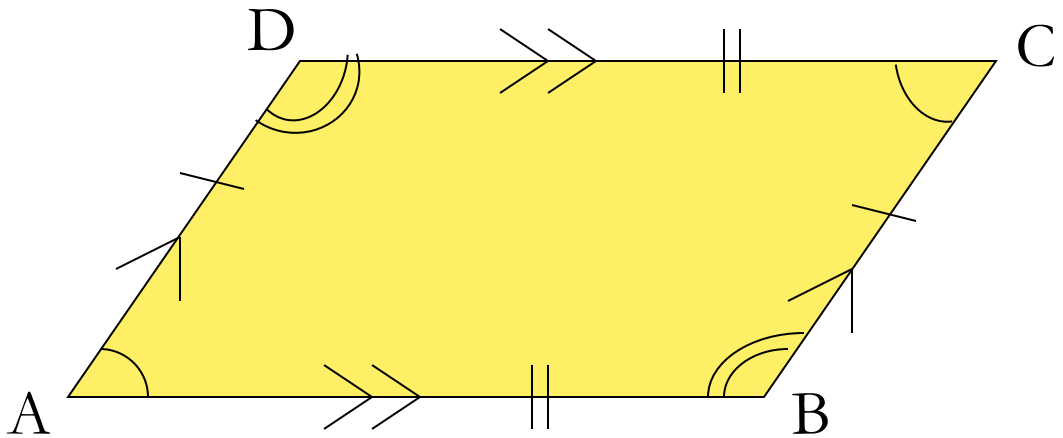
Properties of Parallelograms

- Both pair of opposite sides are congruent.



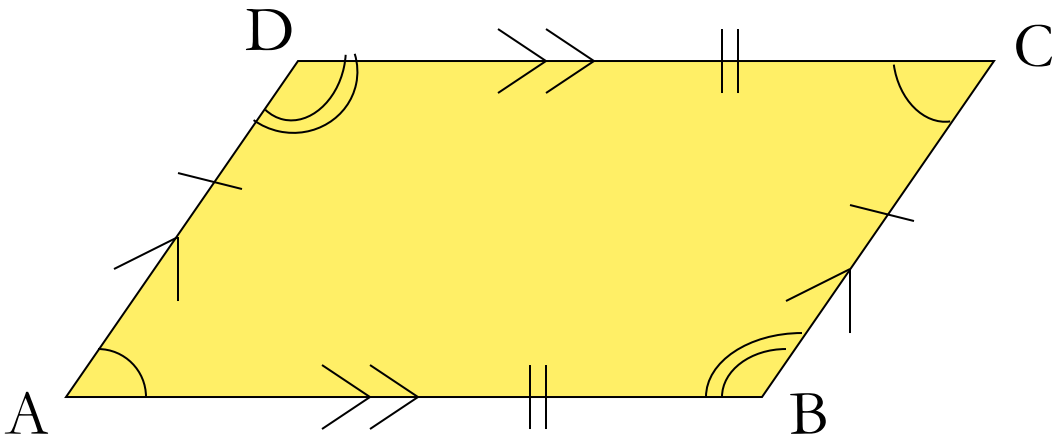
Properties of Parallelograms

- Both pair of opposite angles are congruent.



Properties of Parallelograms

- Consecutive angles are supplementary.

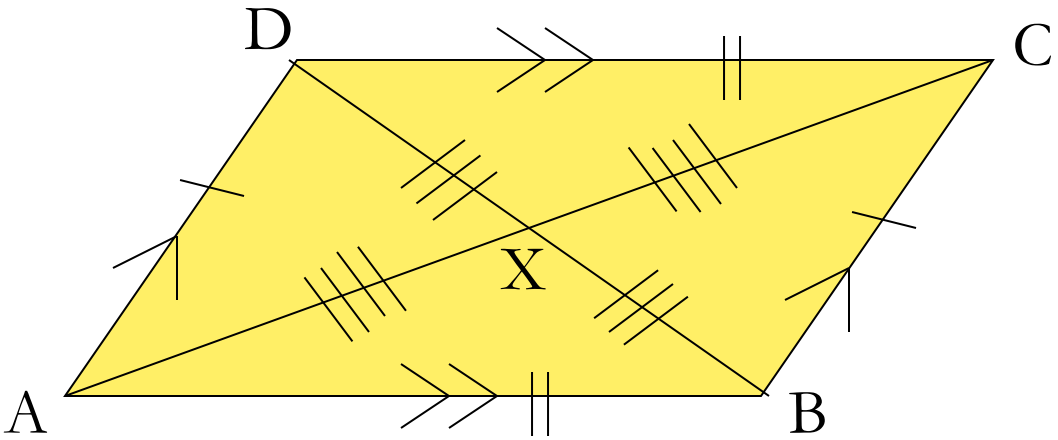


Pairs of Supplementary Angles:

- A and D
- D and C
- C and B
- A and B

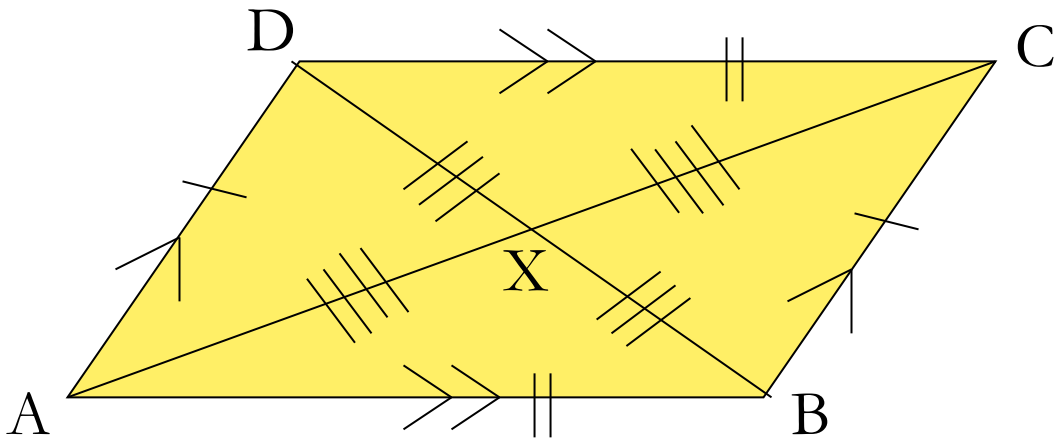
Properties of Parallelograms

- Diagonals bisect each other



Properties of Parallelograms

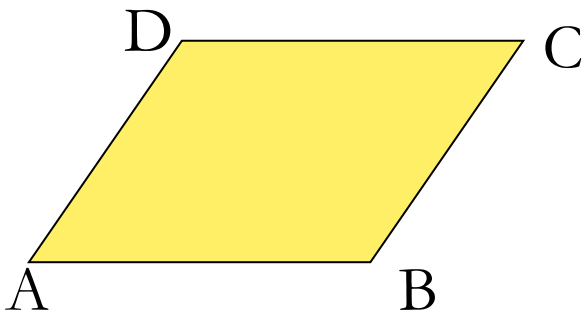
- Both pairs of opposite sides parallel
- Both pair of opposite sides are congruent.
- Both pair of opposite angles are congruent.
- Consecutive angles are supplementary.
- Diagonals bisect each other



What observations can you make about the triangles created by a parallelogram with the diagonals drawn in?

Naming Parallelograms

To name any polygon: start with one vertex and go around (clockwise or counter-clockwise) naming the other vertices.



This can be named several ways, including:

- ABCD
- ADCB
- DABC
- DCBA

However, it CANNOT be named, things like:

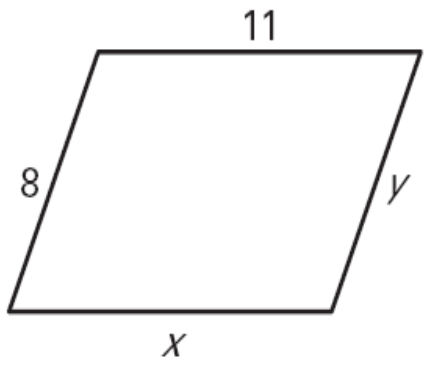
- DCAB
- ABDC

Notice in the figure, the diagonals (if we draw them in) are DB and AC. They are non-consecutive vertices. They must be either the 1st and 3rd, or 2nd and 4th, letters in the name.

Examples:

Find the value of each variable in the parallelogram.

1.



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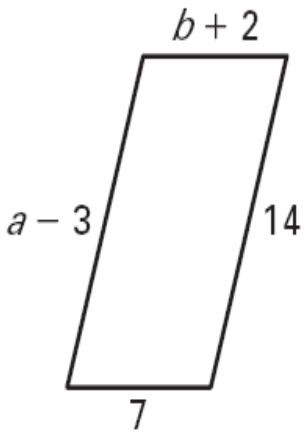
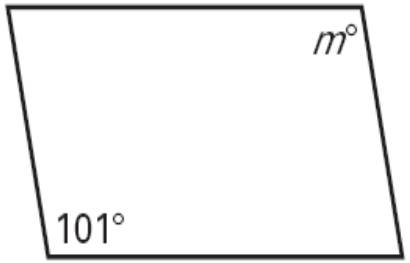


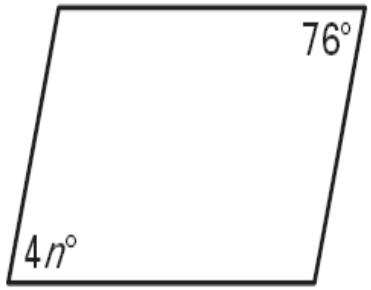
3.



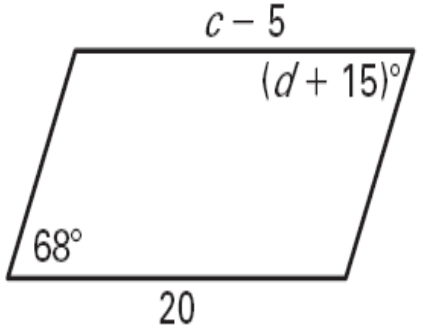
Examples:

Given each parallelogram, find the given variable:

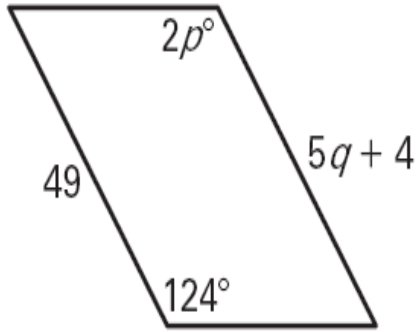
4.



5.

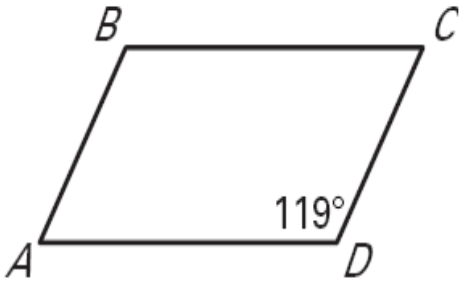


6.

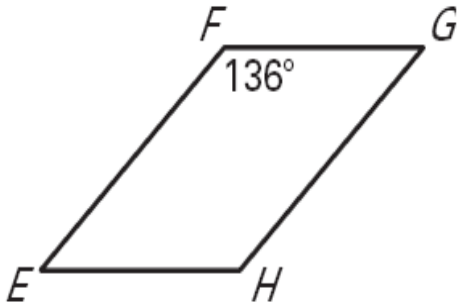


Examples:

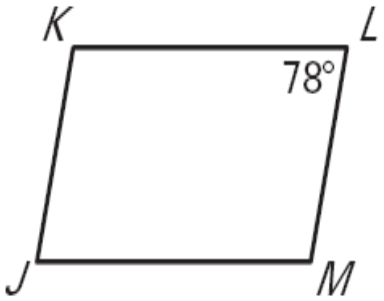
Given each parallelogram:



Find m∠B



Find m∠G

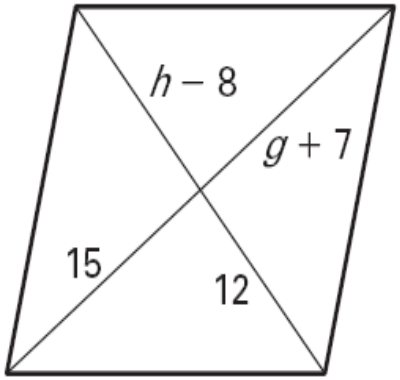


Find m∠M

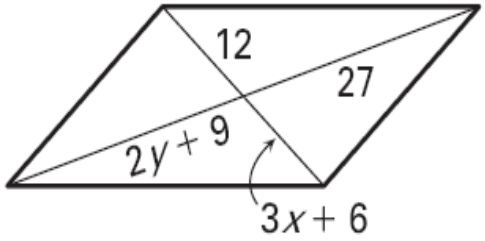
Examples:

Find the value of each variable in the parallelogram.

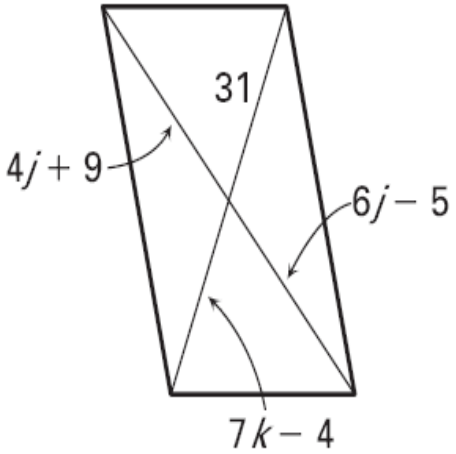
10.



11.



12.



Examples:

Use the diagram of parallelogram *MNOP* at the right to copy and complete the statement. *Explain*.

13. $\overline{MN} \cong$?

14. $\overline{MN} \parallel$?

15. $\overline{ON} \cong$?

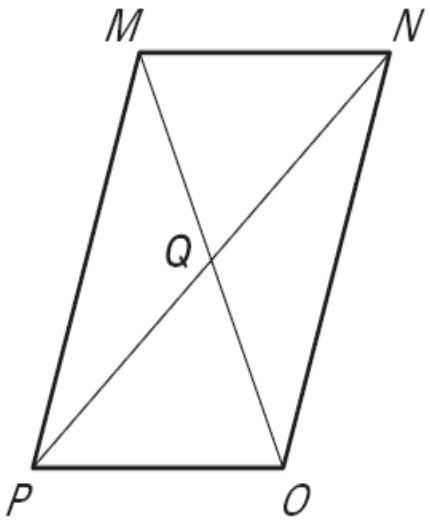
16. $\angle MPO \cong$?

17. $\overline{PQ} \cong$?

18. $\overline{QM} \cong$?

19. $\angle MQN \cong$?

20. $\angle NPO \cong$?



Examples:

Find the indicated measure in $\square HIJK$. *Explain*.

21. HI

22. KH

23. GH

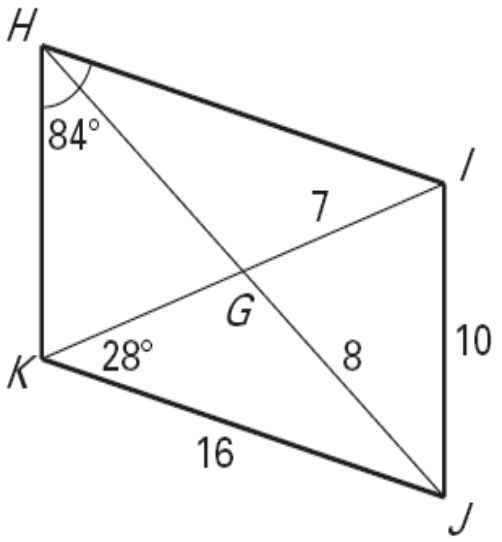
24. HJ

25. $\angle KIH$

26. $\angle JIH$

27. $\angle KJI$

28. $\angle HKI$



Examples:

In parallelogram DOGS the diagonals bisect at A. If DA = 16 and OA = 8, find the measurement of DG and OS.

Parallelogram CATS has both its diagonals drawn in. What can you determine about the resulting 4 triangles?