Warmup $3/\left(e^{i\pi} + 8\right)$

1. Name all of the properties of parallelograms. (Try to do it without looking) Draw a picture for each one and mark your diagram.

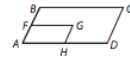- Math competition announcement

- **Parallelograms**
  - Opposite sides parallel
  - Opposite sides congruent
  - Opposite angles congruent
  - Consecutive angles are supplementary
  - Diagonals bisect each other

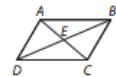## Homework

- p.1198 (16-21, 24)

16. Given: $ABCD$ and $AFGH$ are parallelograms.
Prove: $\angle C \cong \angle G$

Statements	Reasons
1. **ABCD and AFGH are parallelograms.**	1. **Given**
2. $\angle C \cong \angle A$, $\angle A \cong \angle G$	2. **Opposite angles of a parallelogram are congruent.**
3. $\angle C \cong \angle G$	3. **Trans. Prop. of Cong.**

17. If quadrilateral $RSTU$ is a parallelogram, then $\overline{RS} \cong \overline{ST}$.
Sometimes; opposite sides of a parallelogram are congruent, but consecutive sides, such as $\overline{RS}$ and $\overline{ST}$, may or may not be congruent.

18. If a parallelogram has a 30° angle, then it also has a 150° angle.
Always; consecutive angles of a parallelogram are supplementary, so the angle that is a consecutive angle to the 30° angle must measure 150°.

19. If quadrilateral $GHJK$ is a parallelogram, then $\overline{GH}$ is congruent to $\overline{JK}$.
Always; opposite sides of a parallelogram are congruent.

20. In parallelogram $ABCD$, $\angle A$ is acute and $\angle C$ is obtuse.
Never; opposite angles of a parallelogram are congruent; $\angle A$ and $\angle C$ are opposite angles, so they must have the same measure.

21. In parallelogram $MNPQ$, the diagonals $\overline{MP}$ and $\overline{NQ}$ meet at R with $MR = 7$ cm and $RP = 5$ cm.
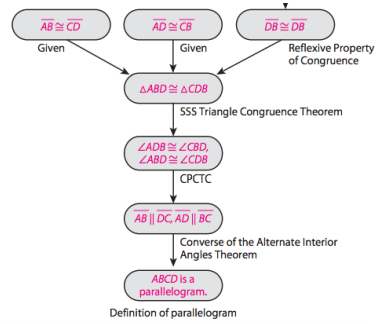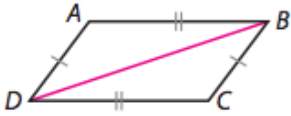**Never; diagonals of a parallelogram bisect each other.**

24. Justify Reasoning $ABCD$ is a parallelogram. Determine whether each statement must be true. Select the correct answer for each lettered part. Explain your reasoning.

	Yes	No
A. The perimeter of $ABCD$ is $2AB + 2BC$.	●	○
B. $DE = \frac{1}{2} DB$	●	○
C. $\overline{BC} \cong \overline{DC}$	○	●
D. $\angle DAC \cong \angle BCA$	●	○
E. $\triangle AED \cong \triangle CEB$	●	○
F. $\angle DAC \cong \angle BAC$	○	●

Given: $\overline{AB} \cong \overline{CD}$ and $\overline{AD} \cong \overline{CB}$
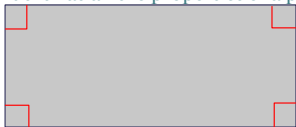
Prove: $ABCD$ is a parallelogram.
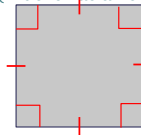

objective

Special Parallelograms

- Can you think of any special parallelograms?

- **Rectangle**
  - Has 4 right angles

  - (Plus it has all the properties of a parallelogram)

- **Square**
  - Has 4 right angles AND 4 congruent sides

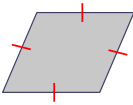 - (Plus it has all the properties of a parallelogram)

True statement:

- **"A square is a rectangle, but a rectangle isn't a square"**

- **What do I mean by this???**

- Can you draw a quadrilateral with all sides congruent, but it is NOT a square???

- <u>**Rhombus**</u> **(basically a diamond)**
  - Has 4 congruent sides

  - (Plus it has all the properties of a parallelogram)


Always, sometimes, never?

- A rectangle is a parallelogram   Always
- A square is a rectangle   Always
- A rectangle is a square   Sometimes
- A quadrilateral is a parallelogram   Sometimes
- A parallelogram is a quadrilateral   Always
- A rhombus is a square   Sometimes
- A rhombus is a parallelogram   Always
- A rhombus is a rectangle   Sometimes

Exploration: Diagonals

- On a giant whiteboard, draw a rectangle, square, and rhombus.
- Draw in the diagonals of each shape.
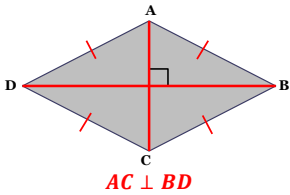- Try to come up with **properties** that you think are true about each one.

Put this proof in your notes.

- **FACT: The diagonals of a rectangle are congruent.**
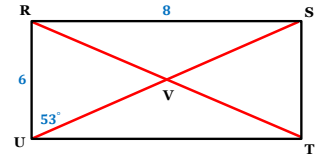

How could we prove this???

$AC \cong BD$
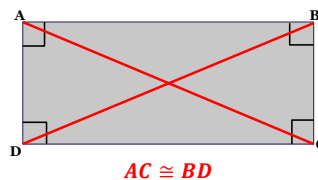
- **FACT: The diagonals of a rhombus are perpendicular.**

$AC \perp BD$

How could we prove this???
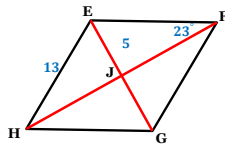
RSTU is a rectangle. Find each value.

1) TU
2) SV
3) $m\angle RVU$
4) $m\angle RSU$

EFGH is a rhombus. Find each value.

1) $m\angle FHG$
2) $m\angle EGH$
3) $m\angle HEF$
4) $perimeter$
5) JF

Homework

- Worksheet