

Name: Key

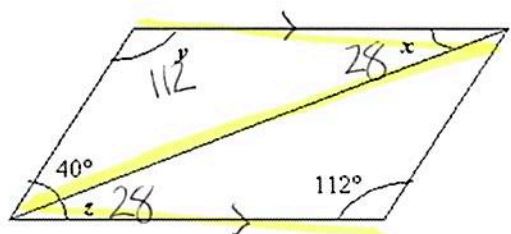
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UNIT 4

LESSON 5

AIM: HOW DO WE PROVE A QUADRILATERAL IS A PARALLELOGRAM?

Given the ~~PI~~ below
Do Now: Find the values of x , y and z .



$$180 - 112 - 40 = 28$$

$x = 28$ b/c opp. \angle 's of a \square are \cong

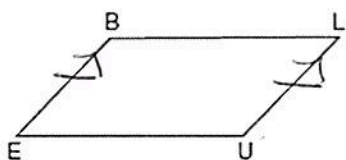
$y = 112$ b/c \angle 's in a Δ sum to 180

$z = 28$ b/c alt. int. \angle 's are \cong

REASONS TO PROVE A PARALLELOGRAM

1. Both pairs of opposite sides are \cong
2. Both pairs of opposite sides are \parallel
3. One pair of opp. sides are \cong and \parallel
4. Diagonals bisect each other
5. Both pairs of opp. \angle 's are \cong

1. In quadrilateral BLUE shown below, $\overline{BE} \cong \overline{UL}$.

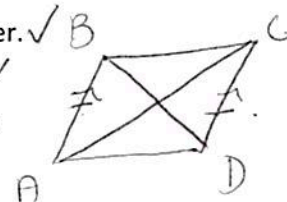


Which information would be sufficient to prove quadrilateral BLUE is a parallelogram?

- ~~1) $\overline{BL} \parallel \overline{EU}$~~
- 2) $\overline{LU} \parallel \overline{BE}$ one pair of opp. sides \cong & \parallel
- ~~3) $\overline{BE} \cong \overline{BL}$~~
- ~~4) $\overline{LU} \cong \overline{EU}$~~

2. Quadrilateral ABCD has diagonals \overline{AC} and \overline{BD} . Which information is not sufficient to prove ABCD is a parallelogram?

- 1) \overline{AC} and \overline{BD} bisect each other. B
- 2) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{AD}$
- 3) $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{CD}$
- 4) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$



\hookrightarrow need to be \cong and \parallel on same side!

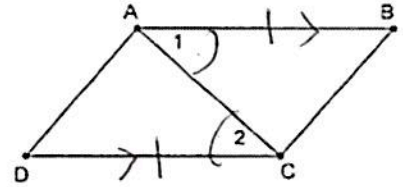
1. Given: ABCD is a quadrilateral

$$\overline{AB} \cong \overline{CD}$$

$$\angle 1 \cong \angle 2$$

Prove: ABCD is a parallelogram.

PLAN: one pair opp. sides \cong & \parallel ✓ ✓



STATEMENT

REASON

① ABCD is a quadrilateral

① Given

$$\overline{AB} \cong \overline{CD} \checkmark$$

$$\angle 1 \cong \angle 2$$

② $\overline{AB} \parallel \overline{CD} \checkmark$

② Alt. int. \angle 's are \cong

③ ABCD is a parallelogram

③ one pair of opposite sides are \parallel and \cong

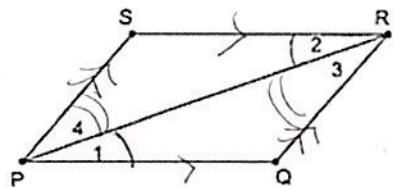
2. Given: PQRS is a quadrilateral

$$\angle 1 \cong \angle 2$$

$$\angle 3 \cong \angle 4$$

Prove: PQRS is a parallelogram.

PLAN: Both pairs of opp. sides are \parallel

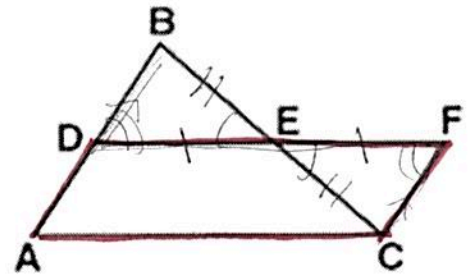


STATEMENT	REASON
① PQRS is a quadrilateral $\angle 1 \cong \angle 2$ $\angle 3 \cong \angle 4$	① Given
② $\overline{SR} \parallel \overline{PQ}$ and $\overline{SP} \parallel \overline{RQ}$	② Alt. int. \angle 's are \cong
③ PQRS is a \square	③ Both pairs of opp. sides are \parallel

****CHALLENGE QUESTION****

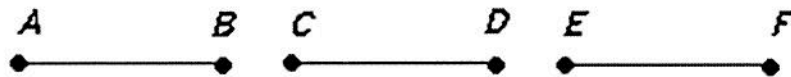
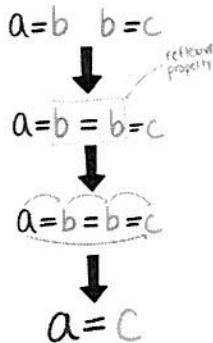
Given: E is the midpoint of DF ,
 DF bisects BC at E

Prove: $ACFD$ is a parallelogram



STATEMENT	REASON
① E is the midpoint of DF DF bisects BC at E	① Given
② $DE \cong EF$	② midpoint create 2 \cong segments
③ $BE \cong EC$	③ A bisector creates 2 \cong seg.
④ $\triangle BDE \cong \triangle CFE$	④ SAS \cong SAS
⑤ $\overline{BD} \cong \overline{FC}$	⑤ CPCTC
⑥ $\overline{FC} \cong \overline{DA}$	⑥ Transitive property
⑦ $\angle BDE \cong \angle EFC$	⑦ CPCTC
⑧ $\overline{AB} \parallel \overline{FC}$	⑧ alternate int. \angle 's are \cong
⑨ $ACFD$ is a \square	⑨ 1 pair opp. sides is \cong and \parallel

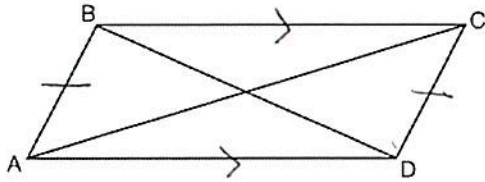
THE TRANSITIVE PROPERTY:



If AB is congruent to CD , and if CD is congruent to EF , then AB is congruent to EF

HOMEWORK

1. Quadrilateral $ABCD$ with diagonals \overline{AC} and \overline{BD} is shown in the diagram below.



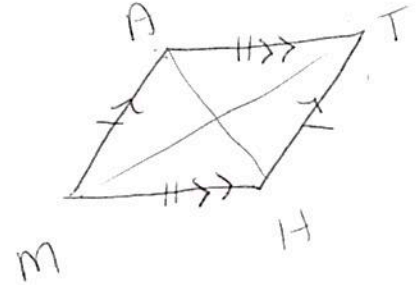
Which information is not enough to prove $ABCD$ is a parallelogram?

- 1) $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{DC}$ ✓
- 2) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{DA}$ ✓
- 3) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$ needs to be same side ✓
- 4) $\overline{AB} \parallel \overline{DC}$ and $\overline{BC} \parallel \overline{AD}$ ✓

2. Quadrilateral $MATH$ has both pairs of opposite sides congruent and parallel. Which statement about quadrilateral $MATH$ is always true?

- 1) $\overline{MT} \cong \overline{AH}$
- 2) $\overline{MT} \perp \overline{AH}$
- 3) $\angle MHT \cong \angle ATH$
- 4) $\angle MAT \cong \angle MHT$

Opp. sides are \cong



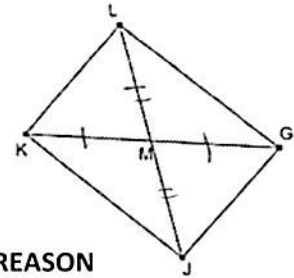
3. Given: $\triangle GKL$

\overline{LM} is a median to \overline{KG}
 $\overline{LM} \cong \overline{MJ}$

Prove: $GJKL$ is a parallelogram

Plan: Diagonals Bisect!

- 1) $\overline{LM} \cong \overline{MJ}$ ✓
- 2) $\overline{KM} \cong \overline{MG}$ ✓



STATEMENT

REASON

- 1) $\triangle GKL$
 \overline{LM} is a median to \overline{KG}
 $\overline{LM} \cong \overline{MJ}$ ✓
- 2) $\overline{KM} \cong \overline{MG}$ ✓
- 3) $GJKL$ is a \square

- 1) Given
- 2) A median creates 2 \cong segments
- 3) Diagonals bisect each other

