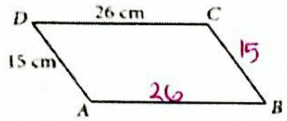
Unit 5C Review Name: Key

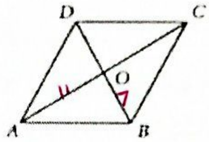
Section 1: Properties of Parallelograms

In Exercises 1–7, $ABCD$ is a parallelogram.

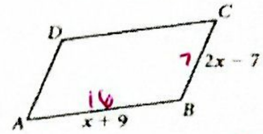
1. Perimeter $ABCD$ = 82



2. $AO = 11$, and $BO = 7$.
AC = 22, BD = 14

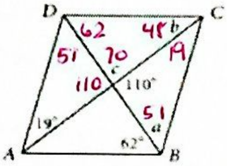


3. Perimeter $ABCD = 46$.
AB = 16, BC = 7

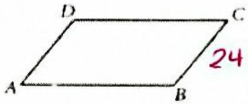


$2(2x-7)+2(x+9)=46$
$4x-14+2x+18=46$
$6x+4=46$
$6x=42$
$x=7$

4. a = 51°, b = 48°,
c = 70°

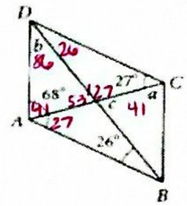


5. Perimeter $ABCD = 119$, and
$BC = 24$. AB = 35.5



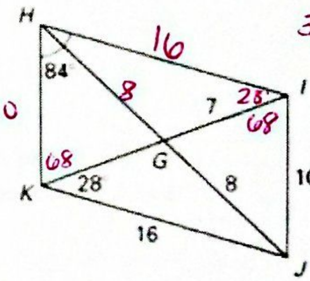
$48+2x=119$
$2x=71$
$x=35.5$

6. a = 41°, b = 86°.
c = 53°



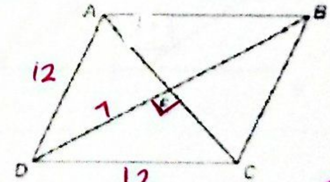
Find the measure in the parallelogram *HIJK*.
Explain your reasoning.

12. HI = 16
13. KH = 10
14. GH = 8
15. HJ = 16
16. $m\angle KIH$ = 28°
17. $m\angle JIH$ 96°
18. $m\angle KJI$ = 84°
19. $m\angle HKI$ 68°



$360-168=2x$
$192=2x$
$96=x$

Quadrilateral ABCD is a rhombus. diagonals bisect opp. ∠s. , diago. are ⊥



22. If m∠BAE = 32°, find m∠ECD. 32°
23. If m∠EDC = 43°, find m∠CBA. 86°
24. If m∠EAB = 57°, find m∠ADC. 123°
25. If m∠BEC = 3x − 15, solve for x.
$3x-15=90$
$3x=105$
$x=35°$
26. If m∠ADE = 5x − 8 and m∠CBE = 3x + 24, solve for x.
$5x-8=3x+24$
$2x=32$
$x=16$
27. If m∠BAD = 4x + 14 and m∠ABC = 2x + 10, solve for x.
$4x+14+2x+10=180$
$6x+24=180$
$6x=156$
$x=26$
28. If DC = 12 and ED = 7, find AD and AC.
AD = 12
$AC = 2\sqrt{12^2-7^2}$
$= 2\sqrt{144-49}$
$= 2\sqrt{95}$

Unit 5C Review

Name:_______________

Section 2: Proofs

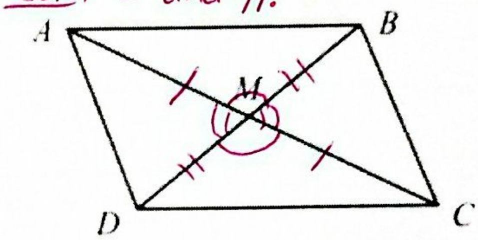
5 Ways of Showing that a Quadrilateral is a Parallelogram:

- 2 pairs of opposite sides are parallel (def.)
- 2 pairs of opposite sides are ≅
- Opposite ∠s are ≅. (2 pairs)
- Angle is supplementary to both of its consecutive angles.
- The diagonals bisect each other.

(which one of these is the def. of parallelogram?)

Also, you can show one pair of sides are both ≅ and //.

1. Use the diagram at the right to prove the following theorem: "If the diagonals of a quadrilateral bisect each other, then the quadrilateral is a parallelogram."

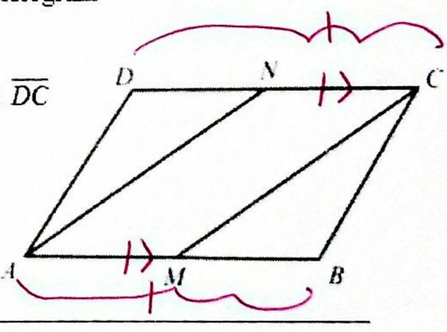


Given: $\overline{AC}$ and $\overline{BD}$ bisect each other

Prove: ▱ABCD

Statements	**Reasons**
1. $\overline{AC}$ and $\overline{BD}$ bisect each other	1. Given
2. M is the midpoint of $\overline{AC}$; M is the midpoint of $\overline{BD}$	2. Def. of segment bisector
3. $\overline{AM} \cong \overline{CM}$; $\overline{BM} \cong \overline{DM}$	3. Def. of midpoint
4. ∠AMB ≅ ∠CMD; ∠AMD ≅ ∠CMB	4. Vertical ∠ Thm.
5. ΔAMB ≅ ΔCMD ; ΔAMD ≅ ΔCMB	5. SAS Postulate.
6. $\overline{AD} \cong \overline{BC}$, $\overline{AB} \cong \overline{CD}$	6. CPCTC
7. ABCD is a parallelogram	7. If both pairs of opp. sides of a quad. are ≅, then the quad. is a parallelogram

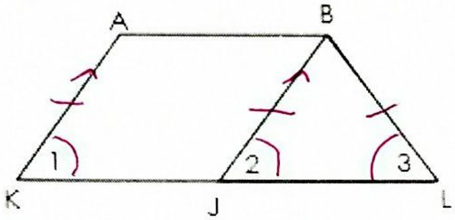
2. **Given**: Parallelogram ABCD; M and N are midpoints of $\overline{AB}$ and $\overline{DC}$
Prove: AMCN is a parallelogram



Statements	**Reasons**
1. ▱ABCD, M and N are mdpts of $\overline{AB}$ and $\overline{DC}$.	1. Given
2. $\overline{AB} \parallel \overline{DC}$ (so $\overline{AM} \parallel \overline{NC}$)	2. Def. of parallelogram
3. $\overline{AB} \cong \overline{DC}$, or AB = DC	3. Parall. Prop = opp. sides are ≅.
4. $\frac{1}{2}AB = \frac{1}{2}DC$	4. Multiplication Prop. of =.
5. $AM = \frac{1}{2}AB$; $NC = \frac{1}{2}DC$	5. Def. of Midpoint.
6. AM = NC, or $\overline{AM} \cong \overline{NC}$	6. Substitution Prop. of =
7. ▱ AMCN	7. One pair of opp. sides is both parallel and congruent.

7. Given: $\angle 1 \cong \angle 2$; $\angle 2 \cong \angle 3$; $\overline{AK} \cong \overline{BL}$

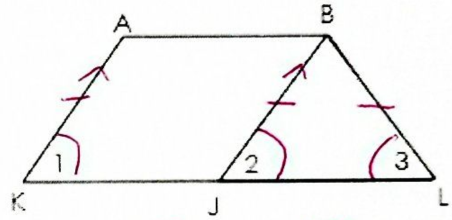
Prove: $ABJK$ is a parallelogram



	S	R
1)	$\angle 1 \cong \angle 2$, $\angle 2 \cong \angle 3$; $\overline{AK} \cong \overline{BL}$	Given
2)	$\overline{BL} \cong \overline{BJ}$	Converse of Isosceles $\triangle$ Thm.
3)	$\overline{AK} \cong \overline{BJ}$	Transitive Prop of $\cong$.
4)	$\overline{AK} \parallel \overline{BJ}$	Corresponding $\angle$ Post. (converse of)
5)	$\square ABJK$	One pair of opp. sides is both $\cong$ and $\parallel$.

8. Given: $\overline{AK} \cong \overline{BJ}$; $\overline{BJ} \cong \overline{BL}$; $\angle 1 \cong \angle 3$

Prove: $ABJK$ is a parallelogram



S	R
$\overline{AK} \cong \overline{BJ}$, $\overline{BJ} \cong \overline{BL}$; $\angle 1 \cong \angle 3$	Given
$\angle 2 \cong \angle 3$	Isosceles $\triangle$ Thm.
$\angle 1 = \angle 2$	Substitution Prop. of $\cong$
$\overline{AK} \parallel \overline{BJ}$	Converse of Correspond. $\angle$ Post.
$\square ABJK$	One pair of opp sides is both $\parallel$ and $\cong$.

Section 3: Coordinate Geometry

Graph the given points on graph paper. Use slope and the Distance Formula to determine the most precise name for quadrilateral *ABCD*.

4. $A(3, 5)$, $B(6, 5)$, $C(2, 1)$, $D(1, 3)$

I suspect it is a trapezoid.
To disprove it is a parallelogram and prove it is a trapezoid, I can show that only 1 pair of opp. sides are $\parallel$.

$\overline{AD} \parallel \overline{BC}$: $m_{AD} = \frac{3-5}{1-3} = \frac{-2}{-2} = 1$ ✓

$m_{BC} = \frac{1-5}{2-6} = \frac{-4}{-4} = 1$

$\overline{CD} \nparallel \overline{AB}$: $m_{CD} = \frac{3-1}{1-2} = \frac{2}{-1} = -2$ ✓

$m_{AB} = \frac{5-5}{6-3} = \frac{0}{3} = 0$

5. $A(-1, 1)$, $B(3, -1)$, $C(-1, -3)$, $D(-5, -1)$

I suspect it is a rhombus therefore I should show that the diags bisect each other ($\square$ prop) and they are $\perp$ (rhombus) but they are not $\cong$ (rectangle).

Mdpt $AC = \left(\frac{-1+-1}{2}, \frac{1+-3}{2}\right) = (-1, -1)$ } $\square$ ✓

mdpt $DB = \left(\frac{3+-5}{2}, \frac{-1+-1}{2}\right) = (-1, -1)$

m_{AC} = undefined (vertical) } Rhombus ✓

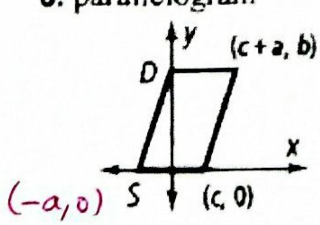
m_{DB} = 0 (horizontal)

AC = 4 units } Not a rectangle.

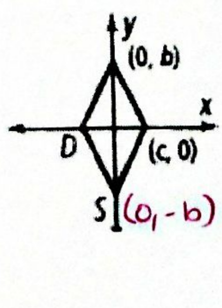
BD = 8 units

Give coordinates for points *D* and *S* without using any new variables.

6. parallelogram



7. rhombus



8. isosceles trapezoid