Worksheet Quadrilaterals Day 2 Special Parallelograms Name _____

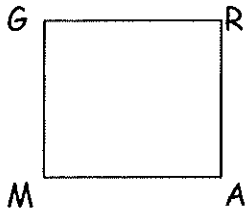
Classify each statement as always, sometimes or never true.

1. Opposite sides of a rhombus are parallel. Always
2. Diagonals of a parallelogram are equal. Sometimes
3. Diagonals of a rectangle are perpendicular. Sometimes
4. Diagonals of a square bisect opposite angles. Always
5. Opposite sides of a rectangle are equal. Always
6. All angles of a rhombus are right angles. Sometimes
7. Diagonals of a rhombus are equal. Sometimes
8. Opposite angles of a rectangle are equal. Always
9. A diagonal of a square forms two congruent triangles. Always
10. Diagonals of a parallelogram bisect each other. Always
11. Diagonals of a parallelogram do not intersect. Never

Classify each statement as true or false.

1. Opposite sides of a rectangle must be parallel. T
2. The diagonals of a rhombus must be perpendicular. T
3. Consecutive angles of a rhombus are always complementary. F
4. The diagonals of a rectangle are always perpendicular. F
5. Opposite sides of a parallelogram must be congruent. T
6. Each diagonal of a rectangle always bisects a pair of opposite angles. F

In 7-9, GRAM is a parallelogram.

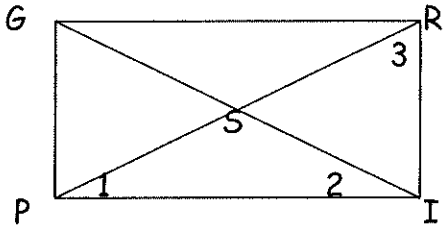


7. If $m\angle G = 90$, then GRAM is a rectangle

8. If $\overline{MA} \cong \overline{AR}$, then GRAM is a rhombus

9. If $\overline{GM} \perp \overline{GR}$ and $\overline{GM} \cong \overline{GR}$, then GRAM is a square

In 10-13, GRIP is a rectangle.



10. If $m\angle 1 = 20$, then $m\angle 2 =$ 20

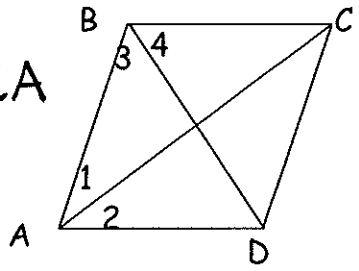
11. If GI = 15.2, then RS = 7.6

12. If PS = 6x-4 and GI = 28, then x = 3

13. If $m\angle 1 = 5t$ and $m\angle 3 = 8t-1$, then t = 7

In 14-17, ABCD is a rhombus.

14. If AB = 7.5, then BC = 7.5



15. Name all angles congruent to Angle 1. $\angle 2, \angle BCA, \angle DCA$

16. If $m\angle 1 = 40$, then $m\angle 3 =$ 50

17. If $m\angle 3 = 6x + 16$ and $m\angle 4 = 8x$, then x = 8

18. Use Coordinate Geometry to prove WXYZ is a rectangle.
W(0,5), X(3,5), Y(3,1), Z (0,1)

Slope of $\overline{WX} = \frac{5-5}{0-3} = \frac{0}{-3} = 0$

slope of $\overline{XY} = \frac{1-5}{3-3} = \frac{-4}{0}$ = undefined

slope of $\overline{ZY} = \frac{1-1}{3-0} = \frac{0}{3} = 0$

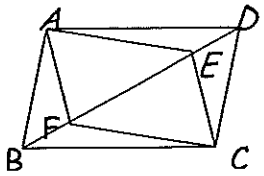
slope of $\overline{WZ} = \frac{1-5}{0-0} = \frac{-4}{0}$ = undefined

$\overline{WX} \perp \overline{XY}$, $\overline{XY} \perp \overline{ZY}$, $\overline{WZ} \perp \overline{ZY}$, $\overline{WZ} \perp \overline{WX}$

WXYZ is a rect. since it has 4 right $\angle$'s.

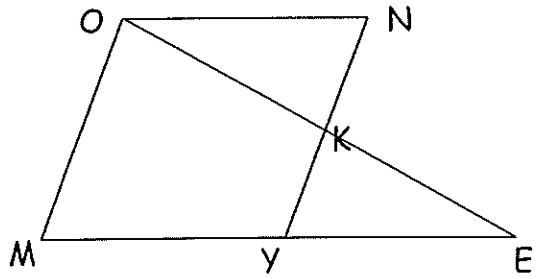
Proofs:

1. Given: Parallelogram *ABCD*; $\overline{DE} \cong \overline{BF}$
   Prove: *AFCE* is a parallelogram



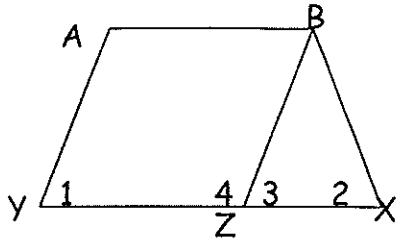
1. ▱ ABCD; $\overline{DE} \cong \overline{BF}$	1. given
2. $\overline{AB} \cong \overline{CD}$	2. If ▱, then opp. sides ≅.
3. $\overline{AB} \parallel \overline{DC}$; $\overline{AD} \parallel \overline{BC}$	3. If ▱, then opp. sides ∥.
4. $\angle ABF \cong \angle CDE$	4. If lines ∥, then alt. int. ∠'s ≅.
5. $\triangle ABF \cong \triangle CDE$	5. SAS
6. $\overline{AF} \cong \overline{CE}$	6. CPCTC
7. $\overline{AD} \cong \overline{CB}$	7. If ▱, then opp. sides ≅.
8. $\angle ADE \cong \angle CBF$	8. If lines ∥, then alt. int. ∠'s ≅.
9. $\triangle ADE \cong \triangle CBF$	9. SAS
10. $\overline{AE} \cong \overline{CF}$	10. CPCTC
11. AFCE is a ▱	11. If both prs. opp. sides ≅, then ▱.

2. Given: *K* is the midpoint of $\overline{OE}$ and $\overline{NY}$
   Y is the midpoint of $\overline{ME}$
   Prove: *MONY* is a parallelogram



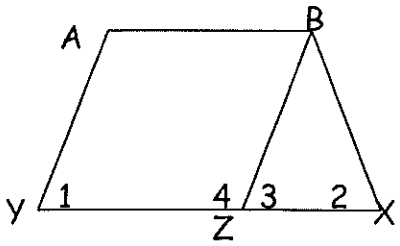
1. K is the midpt. of $\overline{OE}$ & $\overline{NY}$; Y is the midpt. of $\overline{ME}$	1. given
2. $\overline{NK} \cong \overline{YK}$, $\overline{OK} \cong \overline{KE}$, $\overline{MY} \cong \overline{YE}$	2. def. of midpt.
3. $\angle OKN \cong \angle EKY$	3. vert. ∠'s ≅
4. $\triangle OKN \cong \triangle EKY$	4. SAS
5. $\overline{NO} \cong \overline{YE}$	5. CPCTC
6. $\overline{MY} \cong \overline{NO}$	6. Trans.
7. $\angle N \cong \angle EYK$	7. CPCTC
8. $\overline{ON} \parallel \overline{MY}$	8. If alt. int. ∠'s ≅, then lines ∥.
9. MONY is a ▱	9. If 1 pr. of opp. sides is ≅ & ∥, then ▱.

3. Given: ABZY is a parallelogram, $\overline{ZY} \cong \overline{BX}, \measuredangle 1 \cong \measuredangle 2$
Prove: ABZY is a Rhombus



1. $\square$ ABZY, $\overline{ZY} \cong \overline{BX}$, $\measuredangle 1 \cong \measuredangle 2$	1. given
2. $\overline{AY} \parallel \overline{BZ}$	2. If $\square$, then opp. sides $\parallel$.
3. $\measuredangle 1 \cong \measuredangle 3$	3. If lines $\parallel$, then corres. $\measuredangle$'s $\cong$.
4. $\measuredangle 2 \cong \measuredangle 3$	4. Trans.
5. $\overline{BZ} \cong \overline{BX}$	5. If 2 $\measuredangle$'s of a $\triangle$ are $\cong$, then sides opp. them $\cong$.
6. $\overline{BZ} \cong \overline{ZY}$	6. Trans.
7. $\overline{AY} \cong \overline{BZ}$; $\overline{AB} \cong \overline{YZ}$	7. If $\square$, then opp. sides $\cong$.
8. $\overline{AY} \cong \overline{YZ} \cong \overline{BZ} \cong \overline{AB}$	8. Trans.
9. ABZY is a rhombus	9. If a quad. has 4 $\cong$ sides, then it is a rhombus.

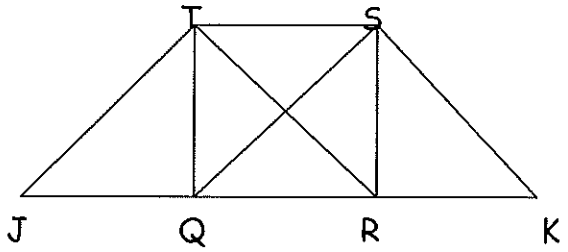
4. Given: $\square$ ABZY, $\overline{AY} \cong \overline{BX}$
Prove: $\measuredangle 1 \cong \measuredangle 2$ and $\measuredangle 1 \cong \measuredangle 3$



1. $\square$ ABZY, $\overline{AY} \cong \overline{BX}$	1. given
2. $\overline{AY} \cong \overline{BZ}$	2. If $\square$, then opp. sides $\cong$.
3. $\overline{BX} \cong \overline{BZ}$	3. Trans.
4. $\measuredangle 3 \cong \measuredangle 2$	4. If 2 sides of a $\triangle$ are $\cong$, then $\measuredangle$'s opp. them are $\cong$.
5. $\overline{AY} \parallel \overline{BZ}$	5. If $\square$, then opp. sides $\parallel$.
6. $\measuredangle 1 \cong \measuredangle 3$	6. If lines $\parallel$, then corres. $\measuredangle$'s $\cong$.
7. $\measuredangle 1 \cong \measuredangle 2$	7. Trans.

5. Given: Rectangle QRST, $\square$RKST

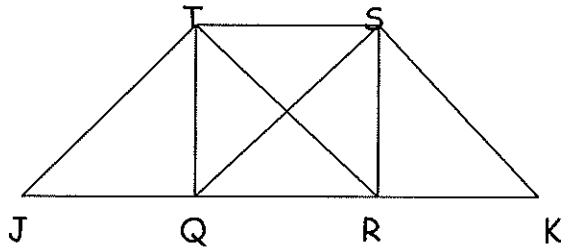
Prove: $\triangle$QSK is isosceles



1. Rect. QRST, $\square$ RKST	1. given
2. $\overline{RT} \cong \overline{QS}$	2. If rect., then diag. $\cong$.
3. $\overline{RT} \cong \overline{KS}$	3. If $\square$, then opp. sides $\cong$.
4. $\overline{QS} \cong \overline{KS}$	4. Trans.
5. ΔQSK is isos.	5. def. isos. $\triangle$

6. Given: Rectangle QRST, $\square$ RKST, $\square$ JQST

Prove: $\overline{JT} \cong \overline{KS}$



1. Rect. QRST, $\square$ RKST, $\square$ JQST	1. given
2. $\overline{JT} \cong \overline{QS}$; $\overline{SR} \cong \overline{RT}$	2. If $\square$, then opp. sides $\cong$.
3. $\overline{QS} \cong \overline{RT}$	3. If rect., then diag. $\cong$.
4. $\overline{JT} \cong \overline{SK}$	4. Trans.