

Name: \_\_\_\_\_

Key

Date: \_\_\_\_\_

HR: \_\_\_\_\_

# Advanced Review: Quadrilateral Practice

## True or False with Counter Examples

For Exercises 1 - 10, identify each statement as true or false. For each false statement, sketch a counterexample or explain why it is false.

1. The diagonals of a parallelogram are congruent.

False



2. The consecutive angles of a rectangle are congruent and supplementary.

True they are 90°

3. The diagonals of a rectangle bisect each other.

True

4. The diagonals of a rectangle bisect the angles.

False



5. The diagonals of a square are perpendicular bisectors of each other.

TRUE holds props of rectangle, rhombus and parallelogram

6. Every rhombus is a square.

False



NOT a square but <sup>is</sup> a rhombus.

7. Every square is a rectangle.

True

8. A diagonal divides a square into two isosceles right triangles. TRUE

9. Opposite angles in a parallelogram are always congruent.

TRUE

10. Consecutive angles in a parallelogram are always congruent

False

Consecutive interior  $\angle$ s are suppl.



**Identifying Properties:** In problems 1-8 below, list the letters of the quadrilaterals that the properties hold true for: a) Parallelogram      b) Rectangle      c) Rhombus      d) Square

1. Diagonals bisect each other.

a, b, c, d

3. All sides are congruent.

c, d

5. Opposite angles are congruent.

a, b, c, d

7. Diagonals are perpendicular.

c, d

2. All  $\angle$ 's are right  $\angle$ 's

b, d

4. Opposite sides are congruent.

a, b, c, d

6. Diagonals are congruent.

b, d

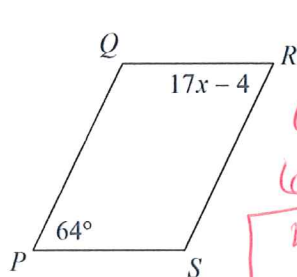
8. Opposite sides are parallel.

a, b, c, d

**Applying Properties:**

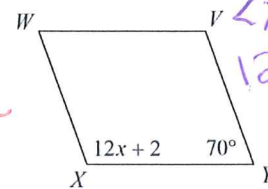
Solve for x and write the justification for each step for the parallelograms below.

1.



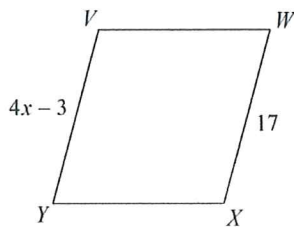
$\angle P \cong \angle R$  OP  $\angle$ s of a Parallelogram are  $\cong$   
 $64 = 17x - 4$   
 $68 = 17x$   
 $4 = x$

2.



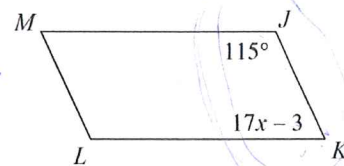
con. int  $\angle$ s are suppl.  
 $\angle X + \angle Y = 180$   
 $12x + 2 + 70 = 180$   
 $12x + 72 = 180$   
 $12x = 108$   
 $x = 9$

3.



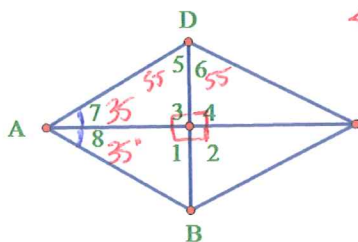
$VY \cong WX$  op. sides of a para are  $\cong$   
 $4x - 3 = 17$   
 $4x = 20$   
 $x = 5$

4.



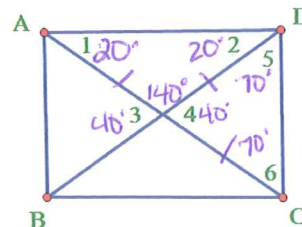
con. int  $\angle$  are suppl.  
 $\angle J + \angle K = 180$   
 $115 + 17x - 3 = 180$   
 $17x + 112 = 180$   
 $17x = 68$   
 $x = 4$

5. ABCD is a rhombus. If  $m\angle 8 = 35^\circ$ , Find the measure of  $\angle 1, \angle 2, \angle 3, \angle 4, \angle 5, \angle 6, \angle 7$ .



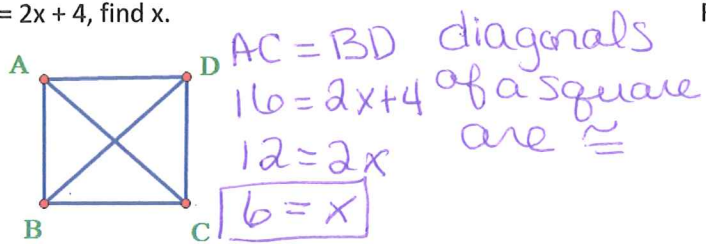
$\angle 1 = 90^\circ, \angle 2 = 90^\circ$   
 $\angle 3 = 90^\circ, \angle 4 = 90^\circ$   
 $\angle 5 = 55^\circ, \angle 6 = 55^\circ$   
 $\angle 7 = 35^\circ$

6. ABCD is a rectangle. If  $m\angle 1 = 20^\circ$  find the measures of  $\angle 2, \angle 3, \angle 4, \angle 5, \angle 6$ .

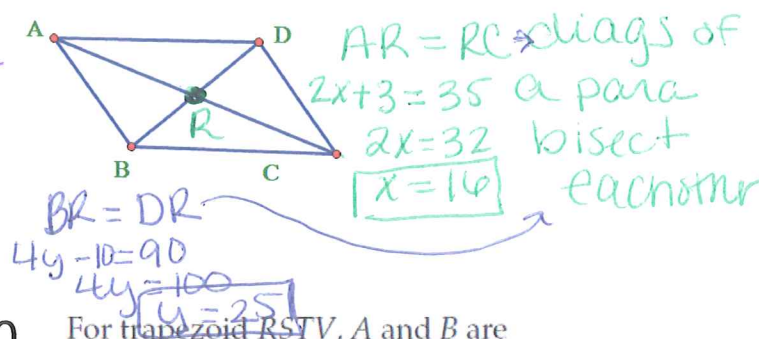


$\angle 2 = 20^\circ$   
 $\angle 3 = 40^\circ$   
 $\angle 4 = 40^\circ$   
 $\angle 5 = 70^\circ$   
 $\angle 6 = 70^\circ$

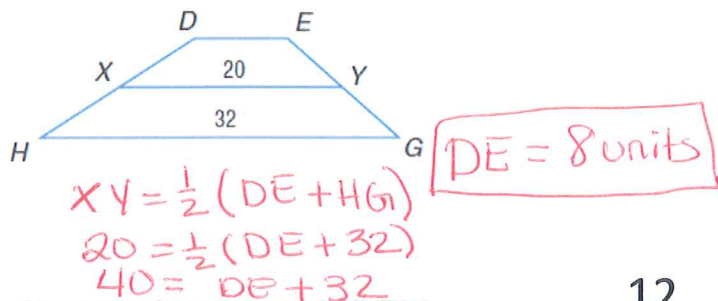
7. ABCD is a square. If  $AC=16$ in and  $BD=2x+4$ , find  $x$ .



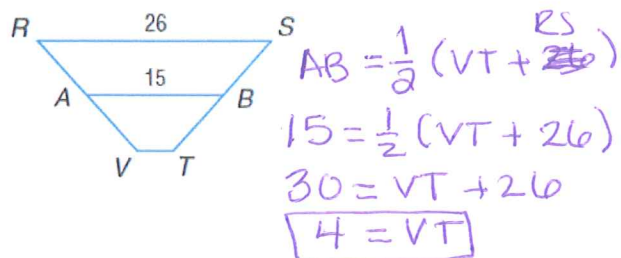
8. ABCD is a parallelogram.  $AR=2x+3$ ,  $RC=35$ ,  $BR=4y-10$ ,  $DR=90$ . Find  $x$  and  $y$ .



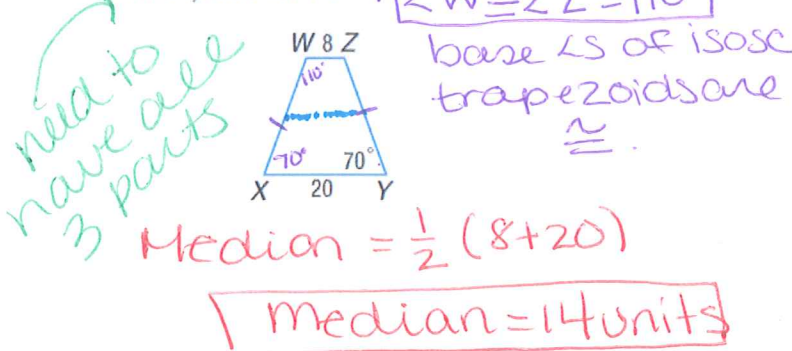
9. For trapezoid DEGH, X and Y are midpoints of the legs. Find DE.



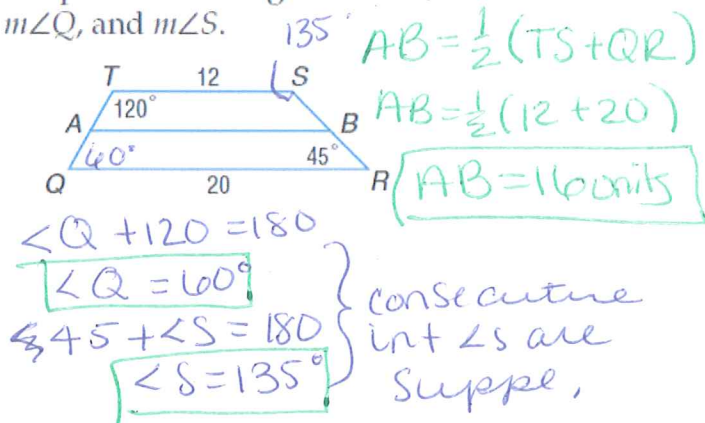
10. For trapezoid RSTV, A and B are midpoints of the legs. Find VT.



11. For isosceles trapezoid XYZW, find the length of the median,  $m\angle W$ , and  $m\angle Z$ .



12. For trapezoid QRST, A and B are midpoints of the legs. Find AB,  $m\angle Q$ , and  $m\angle S$ .

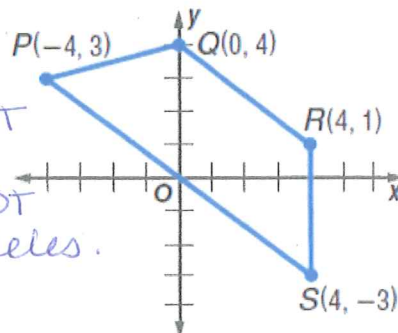


13. a) Is the figure a trapezoid? Is it an isosceles trapezoid?

Explain, using math, how you know.

Slope PS =  $-\frac{3}{4}$  > Yes  
 Slope QR =  $-\frac{3}{4}$  b/c this has one pair of op. sides //

ISOSCELES?  
 $PQ = \sqrt{17}$   
 $RS = 4$   
 NOT = SO NOT ISOSCELES.



b.) Find the midpoints of PQ and RS and draw the median.

Midpt of PQ:  $(-2, \frac{7}{2})$   
 Midpt of RS:  $(4, -1)$

Name: \_\_\_\_\_

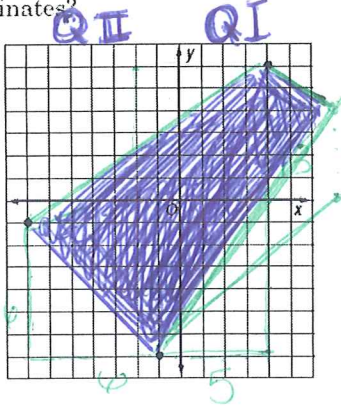
Key

Date: \_\_\_\_\_

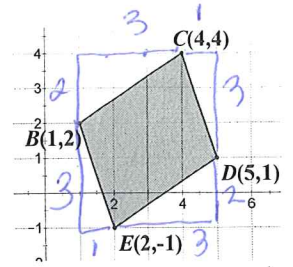
HR: \_\_\_\_\_

# Advanced Review: Quadrilateral Practice

1. **PLAZA** In order to give the feeling of spaciousness, an architect decides to make a plaza in the shape of an isosceles trapezoid. Three of the four corners of the plaza are shown in the coordinate plane. If the fourth corner is in the first quadrant, what are its coordinates?



2. Determine whether the figure is a trapezoid, a parallelogram, a square, a rhombus or a general quadrilateral given the vertices B(1,2), C(4,4), D(5,1) and E(2,-1). SHOW ALL WORK in your explanations.



check slopes  
 slope BC =  $\frac{2}{3}$  //  
 slope CD =  $-3$   
 slope DE =  $\frac{2}{3}$  //  
 slope EB =  $-3$

op. sides are parallel

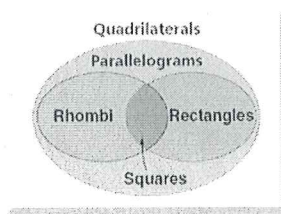
**BC // CD, DE // EB**  
**BE ≅ CD, BC ≅ DE**  
 ∴ it is a parallelogram

Show dist.  
 BE =  $\sqrt{3^2 + 1^2}$   
 BE =  $\sqrt{10}$   
 CD =  $\sqrt{3^2 + 1^2}$   
 CD =  $\sqrt{10}$

BC =  $2^2 + 3^2$   
 BC =  $\sqrt{13}$   
 DE =  $\sqrt{2^2 + 3^2}$   
 DE =  $\sqrt{13}$

3. Use the Venn diagram to determine whether each statement is *always*, *sometimes*, or *never* true.

- A parallelogram is a square. **S**
- A square is a rhombus. **A**
- A rectangle is a parallelogram. **A**
- A rhombus is a rectangle but not a square. **N**
- A rhombus is a square. **S**



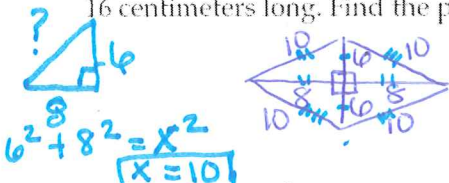
4. **AIRPORTS** A simplified drawing of the reef runway complex at Honolulu International Airport is shown below.



How many trapezoids are there in this image?

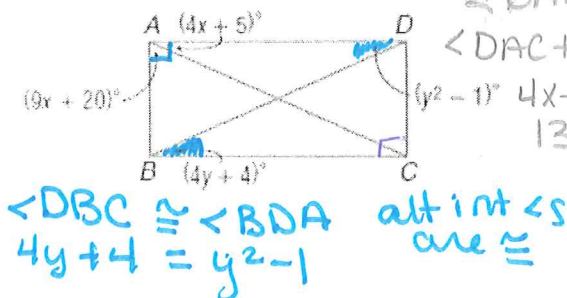
3

5. **PERIMETER** The diagonals of a rhombus are 12 centimeters and 16 centimeters long. Find the perimeter of the rhombus.



P = 40cm

7. Find x and y if ABCD is a rectangle



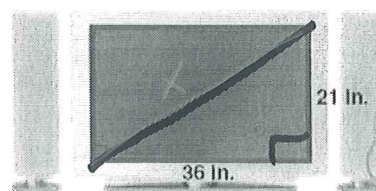
$\angle BAD = 90$  def of a rectangle  
 $\angle DAC + \angle BAC = 90$   
 $4x + 5 + 9x + 20 = 90$   
 $13x + 25 = 90$   
 $13x = 65$   
 $x = 5$

$\angle DBC \cong \angle BDA$  alt int  $\angle$ s are  $\cong$   
 $4y + 4 = y^2 - 1$

6. True or false? "A quadrilateral is a square if and only if it is also a rectangle." Explain.

True, a square must always have all right angles.

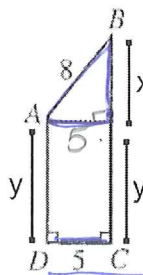
8. **TELEVISION** Television screens are measured on the diagonal. What is the measure of the diagonal of this screen?



$21^2 + 36^2 = x^2$   
 $\sqrt{1737} = \sqrt{x^2}$   
 $3\sqrt{193}$   
**X = 3√193 in**

9. ACT QUESTION!

Find  $x$  and  $y$  if the perimeter is 39m.



$x^2 + 5^2 = 8^2$   
 $x = \sqrt{39}$

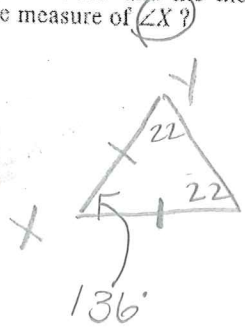
$y \approx 9.89$   
 or  $26 - \sqrt{39}$

$5 + y + 8 + x + y = 39$   
 $2y + 13 + \sqrt{39} = 39$

11. ACT QUESTION!

In  $\triangle XYZ$ ,  $\overline{XY} \cong \overline{XZ}$  and the measure of  $\angle Y$  is  $22^\circ$ . What is the measure of  $\angle X$ ?

- A.  $136^\circ$
- B.  $79^\circ$
- C.  $68^\circ$
- D.  $44^\circ$
- E.  $22^\circ$



Base LS of isosc  $\triangle$ s are  $\cong$

$2y + 19.24 = 39$

10. ACT QUESTION!

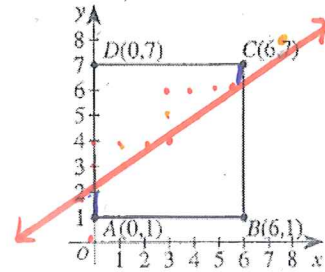
Each side of a quadrilateral is 12 cm long. Which 2 of the following *must* also describe this quadrilateral?

- I. Square (sides of equal length and  $90^\circ$  angles)
  - II. Rhombus (sides of equal length)
  - III. Rectangle ( $90^\circ$  angles)
  - IV. Parallelogram (opposite sides parallel)
- A. I and II only  
 B. I and III only  
 C. II and III only  
 D. II and IV only  
 E. III and IV only

12. ACT QUESTION!

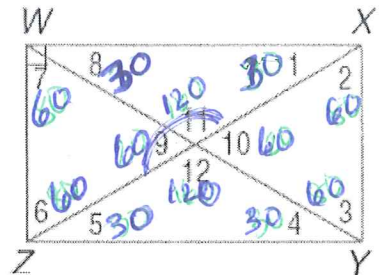
Square  $ABCD$  is shown below in the standard  $(x,y)$  coordinate plane. The line  $y = ax + 2$  divides the square into 2 congruent regions if  $a = ?$

- A.  $\frac{2}{3}$
- B.  $\frac{1}{6}$
- C.  $\frac{5}{6}$
- D.  $\frac{6}{7}$
- E. 1



$WXYZ$  is a rectangle. Find each measure if  $m\angle 1 = 30$ .

- 13.  $m\angle 2 = 80^\circ$
- 14.  $m\angle 3 = 80^\circ$
- 15.  $m\angle 4 = 30^\circ$
- 16.  $m\angle 5 = 30^\circ$
- 17.  $m\angle 6 = 80^\circ$
- 18.  $m\angle 7 = 80^\circ$
- 19.  $m\angle 8 = 30^\circ$
- 20.  $m\angle 9 = 20^\circ$
- 21.  $m\angle 12 = 160^\circ$



22. FIND THE ERROR McKenna and Consuelo are defining a rectangle for an assignment. Who is correct? Explain.

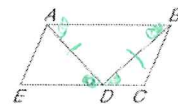
**McKenna:** A rectangle is a parallelogram with one right angle.

**Consuelo:** A rectangle has a pair of parallel opposite sides and a right angle.

11 properties make the other LS  $90^\circ$

Right trapezoid

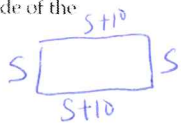
23. MULTIPLE CHOICE In the figure, quadrilateral  $ABCE$  is a parallelogram. If  $\angle ADE \cong \angle BDC$ , which of the following *must* be true? (Lesson 6-4)



- F.  $\overline{AD} \cong \overline{DB}$
- G.  $\overline{ED} \cong \overline{AD}$
- H.  $\overline{ED} \cong \overline{DC}$
- I.  $\overline{AE} \cong \overline{DC}$

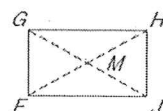
Base LS of isosc  $\triangle$  are  $\cong$

24. REVIEW A rectangular playground is surrounded by an 80-foot fence. One side of the playground is 10 feet longer than the other. Which of the following equations could be used to find  $s$ , the shorter side of the playground?



- F.  $10s + s = 80$
- G.  $4s + 10 = 80$
- H.  $s(s + 10) = 80$
- J.  $2(s + 10) + 2s = 80$

25. If  $FJ = -3x + 5y$ ,  $FM = 3x + y$ ,  $GH = 11$ , and  $CM = 13$ , what values of  $x$  and  $y$  make parallelogram  $FGHJ$  a rectangle?



$-3x + 5y = 11$   
 $3x + y = 13$   
 leg = 24  
 $y = 4$   
 $3x + 4 = 13$   
 $3x = 9$   
 $x = 3$

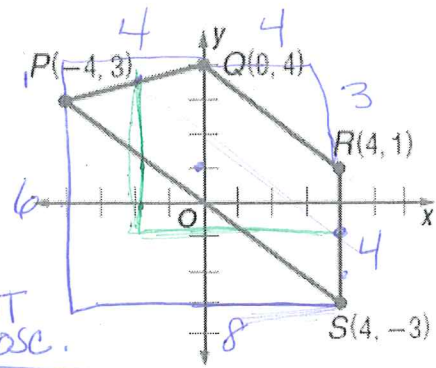
- A.  $x = 3, y = 4$
- B.  $x = 4, y = 3$
- C.  $x = 7, y = 8$
- D.  $x = 8, y = 7$

OP. sides of a rectangle are  $\cong$   
 $FJ = GH$   
 $-3x + 5y = 11$   
 $GM = FM$  diags of a rect are  $\cong$   
 $3x + y = 13$   
 $3x = 9$   
 bisect each other

26. a) Is the figure a trapezoid? Is it an isosceles trapezoid?  
Explain, using math, how you know.

check trapezoid  
Slope PS =  $-\frac{6}{8} = -\frac{3}{4}$   
Slope QR =  $-\frac{3}{4}$

Isosc?  
PQ =  $\sqrt{16+4^2}$   
PQ =  $\sqrt{20}$   
RS = 4 > close  
But NOT ISOSC.



b.) Find the midpoints of PQ and RS.

$\left(\frac{-4+0}{2}, \frac{3+4}{2}\right) = \left(-2, \frac{7}{2}\right)$  Midpt PQ  
 $\left(\frac{0+4}{2}, \frac{4+(-3)}{2}\right) = \left(2, \frac{1}{2}\right)$  Midpt RS

c.) Is the median  $y = -\frac{3}{4}x + 1$ ?

NO

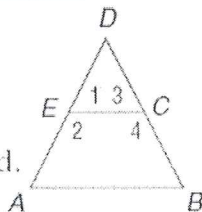
d.) Find the length of the median.

$\sqrt{4.5^2 + 6^2} = \sqrt{56.25} = 7.5 \text{ units}$

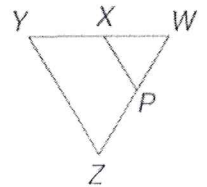
**Fill in the missing portions of the proofs.**

27. Given: E and C are midpoints of  $\overline{AD}$  and  $\overline{DB}$ ;  $\overline{AD} \cong \overline{DB}$  and  $\angle A \cong \angle B$ .

Prove: ABCE is an isosceles trapezoid.



28. Given: ZYXP is an isosceles trapezoid.



Prove:  $\triangle PWX$  is isosceles.

1. \_\_\_\_\_

- 2.  $\triangle ADB$  is isosceles
- 3.  $\angle A \cong \angle B$
- 4.  $\angle A \cong \angle C$

- 5.  $EC \parallel AB$
- 6.  $\frac{1}{2}AD = \frac{1}{2}DB$

7.  $AE = \frac{1}{2}AD$ ,  $BC = \frac{1}{2}BD$

8.  $\frac{1}{2}AD = \frac{1}{2}BD$

9. ABCE is an isosceles trapezoid

- 1. Given
- 2. def of isos.  $\triangle$
- 3. base  $\angle$ s of isos.  $\triangle \cong$

4. Substitution

5.  $\cong$  corr  $\angle$ s form  $\parallel$  lines

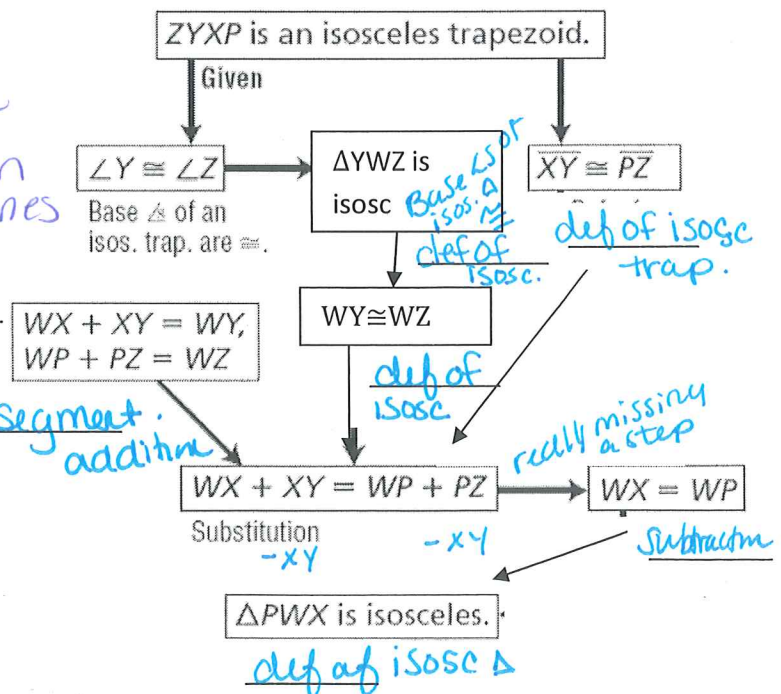
6. Multiplication

7. def of midpt

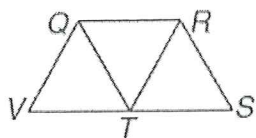
8. substitution

9. Def of Isosc. trap.

Proof:



29. Given:  $QRST$  and  $QRTV$  are rhombi.  
Prove:  $\triangle QRT$  is equilateral.

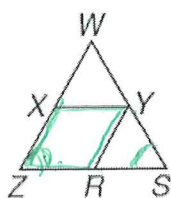


Proof:

Statements (Reasons)

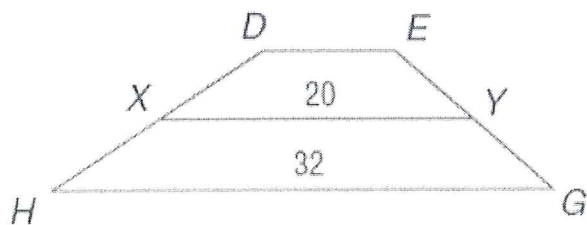
1.  $QRST$  and  $QRTV$  are rhombi. (given)
2.  $\overline{QV} \cong \overline{VT} \cong \overline{TR} \cong \overline{QR}$ ,  $\overline{QR} \cong \overline{TS} \cong \overline{RS} \cong \overline{QT}$   
(def of equilateral rhombi)
3.  $TR \cong QR \cong QT$  (Reflexive / Substitution)
4.  $\triangle QRT$  is equilateral. (def ab Equilateral)

30. Given:  $\square XYRZ$ ,  $\overline{WZ} \cong \overline{WS}$   
Prove:  $\angle XYR \cong \angle S$

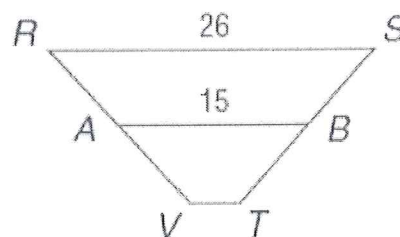


1. para  $XYRZ$  = given
2.  $\angle R \cong \angle S$  2. base  $\angle$ s of isosc  $\triangle \cong$
3.  $\angle Z \cong \angle XYR$  3. Op.  $\angle$ s of a para are  $\cong$
4.  $\angle XYR \cong \angle S$  4. Substitution

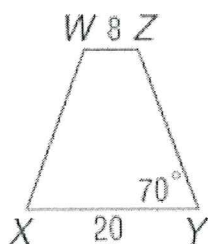
31. For trapezoid  $DEGH$ ,  $X$  and  $Y$  are midpoints of the legs. Find  $DE$ .



32. For trapezoid  $RSTV$ ,  $A$  and  $B$  are midpoints of the legs. Find  $VT$ .



33. For isosceles trapezoid  $XYZW$ , find the length of the median,  $m\angle W$ , and  $m\angle Z$ .



34. For trapezoid  $QRST$ ,  $A$  and  $B$  are midpoints of the legs. Find  $AB$ ,  $m\angle Q$ , and  $m\angle S$ .

