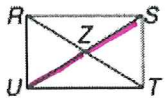
Rectangles, Rhombi, and Squares HW

ALGEBRA *RSTU* **is a rectangle.**

1. If $UZ = x + 21$ and $ZS = 3x - 15$, find US.



$UZ = ZS$ diagonals of a rectangle bisect each other

$x+21 = 3x-15$

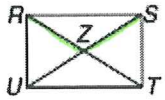
$36 = 2x$

$\boxed{18 = x}$

$US = 18+21+3(18)-15$

$\boxed{US = 78}$

2. If $RZ = 3x + 8$ and $ZS = 6x - 28$, find UZ.



$RZ = ZS$ diags of a rectangle are $\cong$ and bisect each other

$3x+8 = 6x-28$

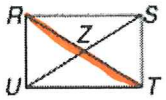
$36 = 3x$

$\boxed{12 = x}$

$UZ = 3(12)+8$

$\boxed{UZ = 44}$

3. If $RT = 5x + 8$ and $RZ = 4x + 1$, find ZT.



$RT = RZ + ZT$ Segment addition

$RZ \cong ZT$ diagonals of a rectangle bisect each other

$RT = RZ + RZ$

$5x+8 = 4x+1 + 4x+1$

$5x+8 = 8x+2$

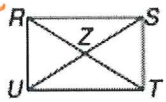
$6 = 3x$

$2 = x$

$ZT = 4(2)+1$

$\boxed{ZT = 9}$

4. If $m\angle SUT = 3x + 6$ and $m\angle RUS = 5x - 4$, find $m\angle SUT$.



$\angle SUT + \angle RUS = \angle TUR$ angle addition

$\angle TUR = 90°$ a rectangle has 4 right $\angle$s

$3x+6+5x-4=90$

$8x+2=90$

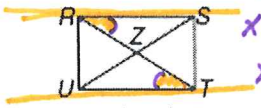
$8x = 88$

$\boxed{x = 11}$

$\angle SUT = 3(11)+6$

$\boxed{\angle SUT = 39°}$

5. If $m\angle SRT = x^2 + 9$ and $m\angle UTR = 2x + 44$, find x.



$\angle SRT \cong \angle UTR$ // lines form $\cong$ alt int $\angle$s.

$x^2+9 = 2x+44$

$x^2-2x-35=0$

$(x-7)(x+5)=0$

$\boxed{x=7 \text{ or } x=-5}$ ✓

Because both $x=7$ and $x=-5$ come out to be $\cong$ $\angle$s Both 7 and -5 are answers

Check answers

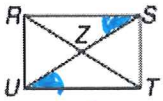
$\angle SRT = 7^2+9$

$\angle SRT = 58°$

$\angle SRT = (-5)^2+9$

$\angle SRT = 34°$

6. If $m\angle RSU = x^2 - 1$ and $m\angle TUS = 3x + 9$, find $m\angle RSU$.



$\angle RSU = \angle TUS$ // lines form $\cong$ alt int $\angle$s

$x^2-1 = 3x+9$

$x^2-3x-10=0$

$(x-5)(x+2)=0$

$x=5$ $\cancel{x=-2}$

Check:

$\angle RSU = (-2)^2-1 = 3°$ ✓

$\angle RSU = (5)^2-1 = 24°$ ✓

$\angle TUS = 3(-2)+9 = 3$ ✓

$\angle TUS = 3(5)+9 = 24$ ✓

$\boxed{\angle RSU = 3° \text{ or } 24°}$

Check:

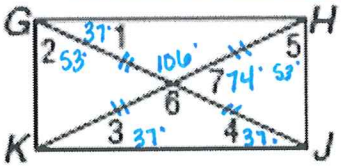
$\angle UTR = 2(-5)+44$

$\angle UTR = 34°$

$\angle UTR = 2(7)+44$

$\angle UTR = 58°$

GHJK **is a rectangle. Find each measure if** $m\angle 1 = 37$.



7. $m\angle 2$ 53°

8. $m\angle 3$ 37°

9. $m\angle 4$ 37°

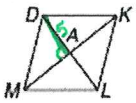
10. $m\angle 5$ 53°

11. $m\angle 6$ 106°

12. $m\angle 7$ 74°

Rhombi/Squares

Use rhombus *DKLM* **with** $AM = 4x$, $AK = 5x - 3$, **and** $DL = 10$.



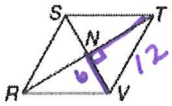
1. Find x.

2. Find AL.

3. Find $m\angle KAL$.

4. Find DM.

Use rhombus *RSTV* **with** $RS = 5y + 2$, $ST = 3y + 6$, **and** $NV = 6$.



5. Find y.

6. Find TV.

7. Find $m\angle NTV$.

8. Find $m\angle SVT$.

9. Find $m\angle RST$.

10. Find $m\angle SRV$.

For # 7-10 Need 30-60-90° Δs

Rhombi / Square

$AM = 4x$, $AK = 5x - 3$ and $DL = 10$

1. Find x

$AM = AK$ diagonals of a Rhombus bisect each other

$4x = 5x - 3$

$-x = -3$

$\boxed{x = 3}$

2. Find AL

$DL = AL + AL$

$DL = 2AL$

$10 = 2AL$

$\boxed{5 = AL}$

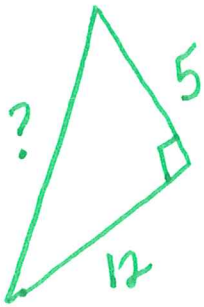
3. $\angle KAL$

$\angle KAL = 90°$ diagonals of a rhombus are $\perp$.

4. DM

$AM = 3(4)$

$\boxed{AM = 12}$



$12^2 + 5^2 = ?^2$

$\sqrt{169} = 13$

$\boxed{DM = 13}$ ★

$RS = 5y + 2$, $ST = 3y + 6$, $NV = 6$

5. Find y

$RS = ST$ def of Rhombus all 4 $\cong$ sides

$5y + 2 = 3y + 6$

$2y = 4$

$\boxed{y = 2}$

6. Find TV.

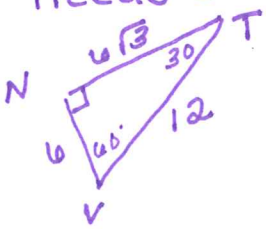
$TV = RS$ def of Rhombus all 4 $\cong$ sides

$TV = 5(2) + 2$

$\boxed{TV = 12}$

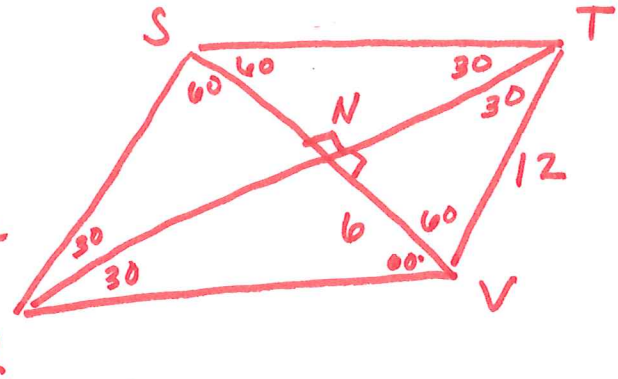
7. Find $m\angle NTV$.

needs 30° 60° 90° Δs.



$m\angle NTV = 30°$

8. $m\angle SVT = 60^\circ$

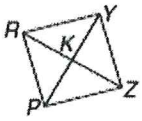


9. $m\angle RST = 120^\circ = 60 + 60$ angle addition

10. $\angle SRV = 30 + 30$
$= 60^\circ$ angle addition

Rhombi/Squares Continued

Use rhombus *PRYZ* with $RK = 4y + 1$, $ZK = 7y - 14$, $PK = 3x - 1$, and $YK = 2x + 6$.



#3 needs Pythagorean Theorem

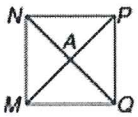
1. Find PY.

2. Find RZ.

3. Find RY.

4. Find $m\angle YKZ$.

Use rhombus *MNPQ* with $PQ = 3\sqrt{2}$, $PA = 4x - 1$, and $AM = 9x - 6$.



#5-8 need 45°-45°-90° Δs

5. Find AQ.

6. Find $m\angle APQ$.

7. Find $m\angle MNP$.

8. Find PM.

On graph paper, show all work and follow all instructions. Failure to show work on graph paper will result in a zero.

9. Determine whether the figure with vertices F(-4,-3),G(3,-1), H(2,3) and J(-5,1) is a rectangle.

10. Determine whether the figure with vertices F(-4,-3),G(-5,8), H(6,9) and J(7,-2) is a rectangle.

11. Determine whether the figure with vertices E(-2,-1), F(-4,3), G(1,5) H(3,1) is a rhombus.

12. Determine whether the figure with vertices W(1,10), F(-4,0), Y(1,7) Z(-4,7) is a rhombus.

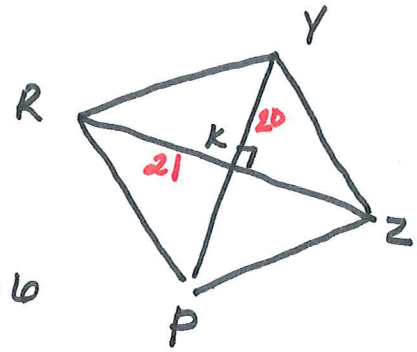
13. Determine whether the figure with vertices A(0,3), B(-3,0), C(0,-3), and D(3,0) is a square.

14. Determine whether the figure with vertices A(-4,0), B(-3,3), C(2,2), and D(1,-1) is a square.

continued Rhombi / Squares

$RK = 4y+1$, $ZK = 7y-14$, $PK = 3x-1$, $YK = 2x+6$

1. Find PY



$PY = PK + PY$ segment addition

1st Find x.

diagonals of a Rhombus bisect each other.

$PK = KY$

$3x - 1 = 2x + 6$

$\boxed{x = 7}$

$PY = 3(7) - 1 + 2(7) + 6$

$\boxed{PY = 40 \text{ units}}$

2. RZ

Find y 1st

$RK = ZK$ diagonals of a Rhombus bisect each other.

$4y + 1 = 7y - 14$

$15 = 3y$

$\boxed{5 = y}$

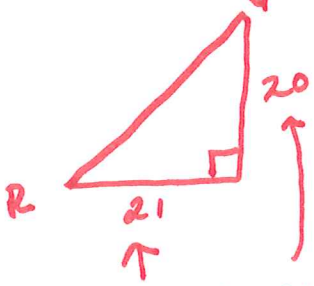
Now Find RZ

$RZ = RK + KZ$ segment addition

$RZ = 4(5) + 1 + 7(5) - 14$

$\boxed{RZ = 42 \text{ units}}$

3. Find RY



$20^2 + 21^2 = RY^2$

$841 = RY^2$

$\sqrt{841} = RY$

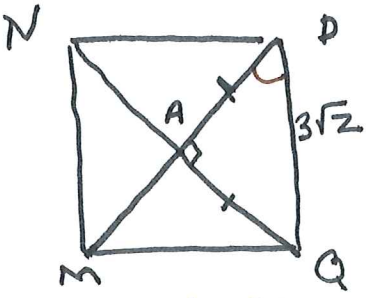
$\boxed{29 = RY}$

To get those diagonals PY and RZ ÷ in half because diagonals bisect each other.

4. $\angle YKZ = 90°$ diagonals of a rhombus are $\perp$.

$PQ = 3\sqrt{2}$, $PA = 4x - 1$

$AM = 9x - 6$



5. Find AQ.

$\triangle PAQ$ is a Right $\triangle$ with hypot. of $3\sqrt{2}$ so $\triangle PAQ$ is an isosceles RT $\triangle$.

$\boxed{\therefore \text{ AQ is a } \cong \text{ leg in } \triangle PAQ, AQ = 3.}$

6. Find $\angle APQ$

Because $\triangle PAQ$ is a $45°-45°-90°$ $\triangle$,

$\boxed{m\angle APQ = 45°}$

7. Find $m\angle MNP$

$m\angle MNP = 45 + 45°$

$\boxed{m\angle MNP = 90°}$

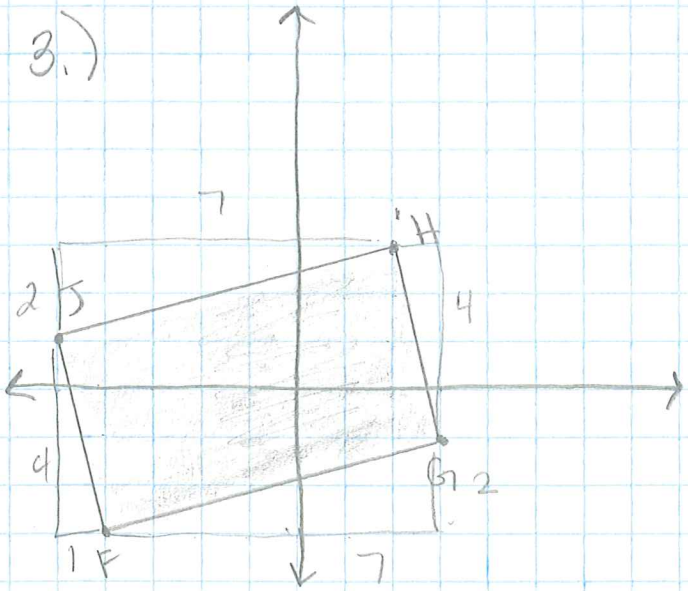
8. Find PM

$PM = PA + AM$

$PM = 3 + 3$

$\boxed{PM = 6}$

3.)



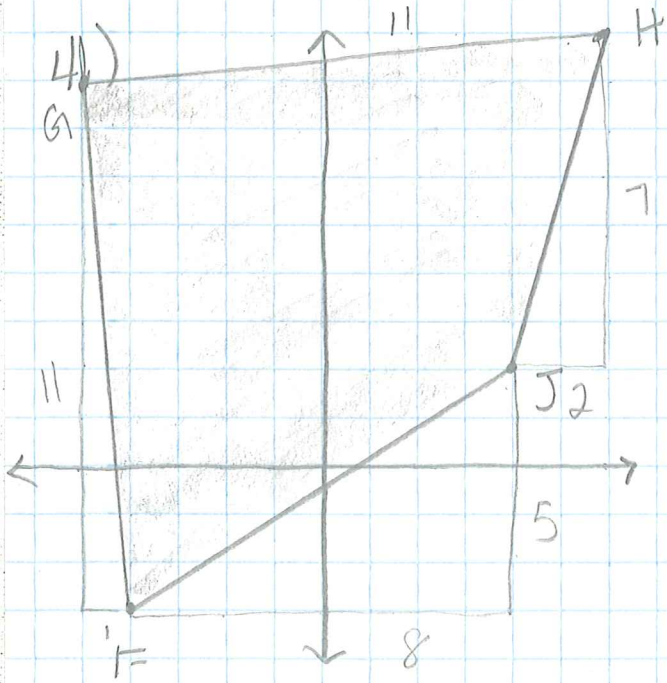
Check for rectangle slopes should be ⊥

Slope JH $= \frac{2}{7}$ Slope FG $= \frac{2}{7}$

Slope JF $= -4$ Slope HG $= -4$

NO, consecutive sides are not ⊥ so NOT a rectangle

4.)

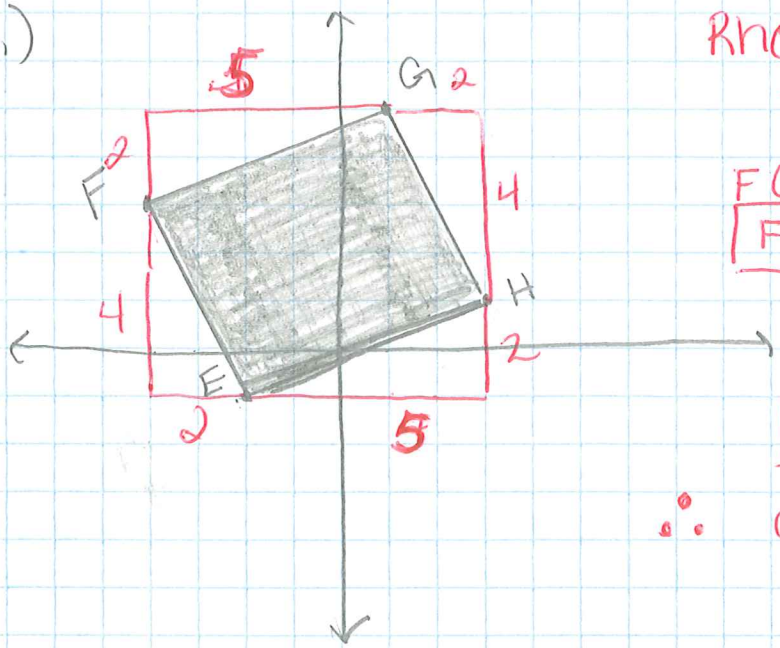


Slopes:

Slope of GH $= \frac{1}{11}$ Slope of HJ $= \frac{7}{2}$

Slope FJ $= \frac{5}{8}$ Slope GF $= -11$

5.)



Rhombus: check for 4 ≅ sides

$FG = 2^2 + 5^2$ $\boxed{FG = \sqrt{29}}$

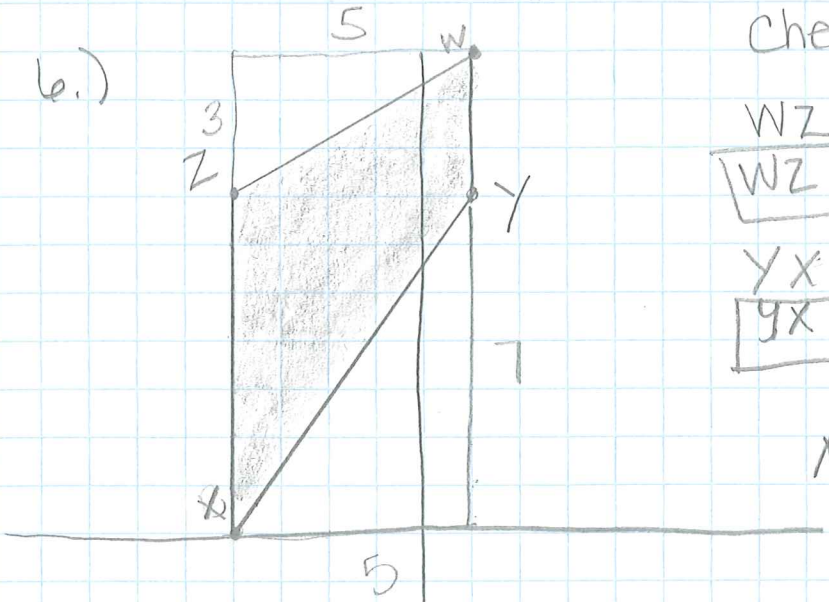
$GH = 2^2 + 4^2$ $\boxed{GH = 2\sqrt{5}}$

$EH = 5^2 + 2^2$ $\boxed{EH = \sqrt{29}}$

$FE = 4^2 + 2^2$ $\boxed{FE = 2\sqrt{5}}$

∴ op. sides are ≅ but not ALL four sides are ≅ so NO, EFGH is NOT a Rhombus

6.)



Check to see side length.

$WZ = 3^2 + 5^2$

$\boxed{WZ = \sqrt{34}}$

$\boxed{WY = 3}$

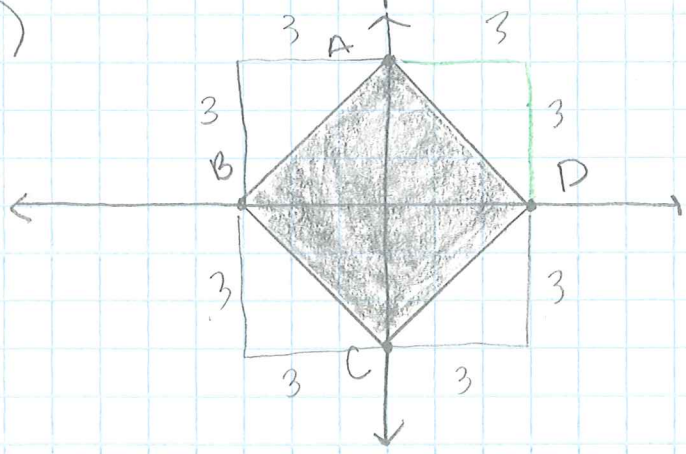
$\boxed{XZ = 7}$

$YX = 5^2 + 7^2$

$\boxed{YX = \sqrt{74}}$

No sides are $\cong$ ∴ NOT a Rhombus.

7.)



SQUARE:

Check 4 $\cong$ sides

consecutive sides $\perp$

$AB = 3^2 + 3^2$ $\quad$ $BC = 3\sqrt{2}$

$= \sqrt{18} = 3\sqrt{2}$

$CD = 3\sqrt{2}$ $\quad$ $AD = 3\sqrt{2}$

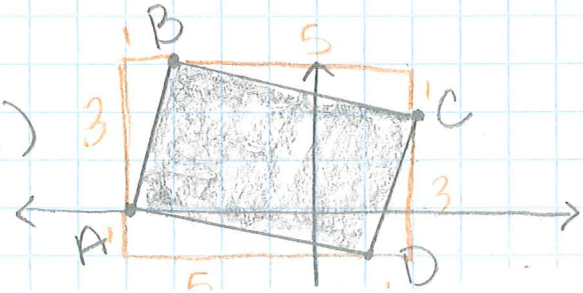
So, ALL 4 sides are $\cong$ ✓

slope AB = 1
slope AD = −1
slope CD = 1
slope BC = −1

} slopes show consecutive sides are $\perp$

∴ ABCD is a square.

8.)



$BC = 5^2 + 1^2$ $\quad$ $CD = 3^2 + 1^2$

$BC = \sqrt{26}$ $\quad$ $CD = \sqrt{10}$

NOT $\cong$ ∴ All 4 sides are NOT $\cong$ so NOT A SQUARE