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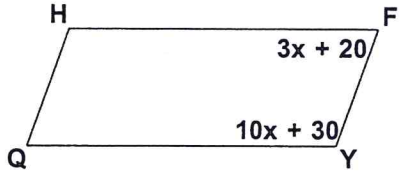
Date _____
Geometry

Quadrilateral Properties with Algebra Angles

1. HFYQ is a parallelogram. Find m$\angle FHQ$



Consecutive angles of a parallelogram are supplementary.

$3x+20+10x+30=180$

$13x+50=180$

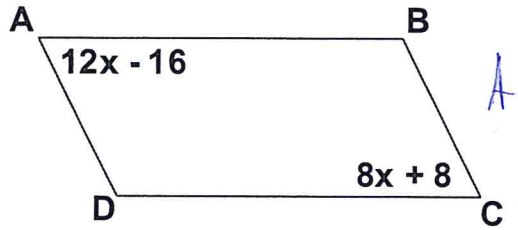
$-50 \quad -50$

$\frac{13x}{13}=\frac{130}{13}$

$x=10$

$\angle FHQ \cong \angle FYQ$ because a parallelogram has opposite sides congruent. $10(10)+30=130$

2. ABCD is a parallelogram. Find m$\angle BCD$.



A parallelogram has opposite angles congruent.

$12x-16=8x+8$

$-8x \quad -8x$

$4x-16=8$

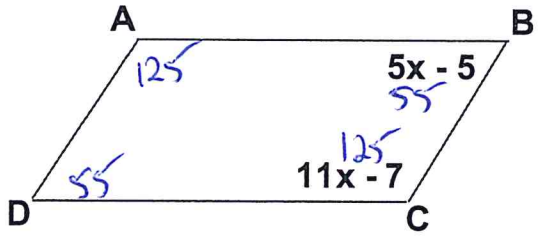
$+16 \quad +16$

$\frac{4x}{4}=\frac{24}{4}$

$x=6$

$8(6)+8=56$

3. ABCD is a parallelogram. Find the measure of all four angles.



A parallelogram has consecutive angles supplementary.

$5x-5+11x-7=180$

$16x-12=180$

$+12 \quad +12$

$\frac{16x}{16}=\frac{192}{16}$

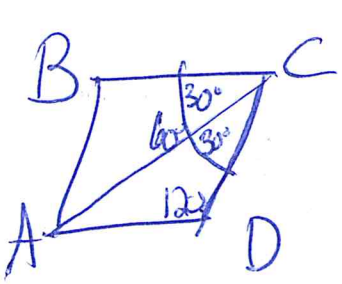
$x=12$

$5(12)-5=55$

$11(12)-7=125$

A parallelogram has opposite angles congruent.

4. In rhombus ABCD, $\angle ACD = 30$. Find $\angle BDC$ and explain your answer.

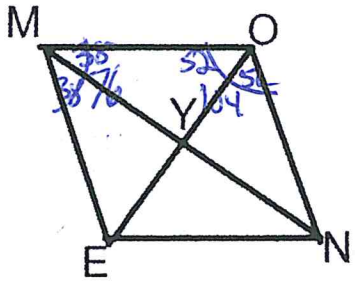


$180-60=120$

A rhombus has diagonals that bisects its angles so $\angle BCD=60°$.

A rhombus has consecutive angles supplementary so $\angle BDC=120°$.

5. In rhombus MONE, $\angle OME = 76$. Find $\angle YON$ and explain your answer.



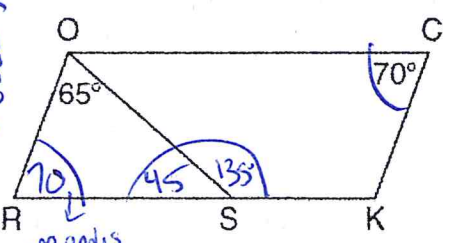
180
−76
104

104/2 = 52

A rhombus has consecutive sides supplementary and diagonals that bisects its angles.

6. In the diagram below of parallelogram *ROCK*, $m\angle C$ is 70° and $m\angle ROS$ is 65°. What is $m\angle KSO$?

1) 45°
2) 110°
3) 115°
4) 135°

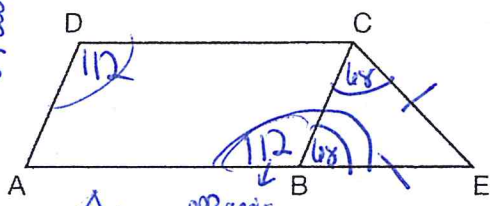


opp angles ≅

△RSO

70 + 65 + x = 180
135 + x = 180
−135 −135
x = 45

7. In the diagram below, *ABCD* is a parallelogram, $\overline{AB}$ is extended through *B* to *E*, and $\overline{CE}$ is drawn.



opp angles ≅

△BCE

68 + 68 + x = 180
136 + x = 180
−136 −136
x = 44

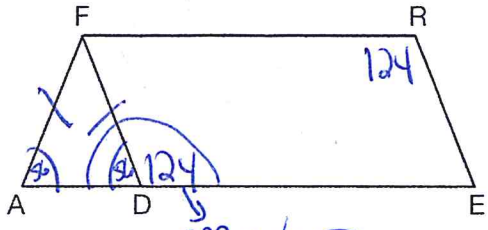
If $\overline{CE} \cong \overline{BE}$ and $m\angle D = 112°$, what is $m\angle E$?

1) 44°
2) 56°
3) 68°
4) 112°

8. In the diagram of parallelogram *FRED* shown below, $\overline{ED}$ is extended to *A*, and $\overline{AF}$ is drawn such that $\overline{AF} \cong \overline{DF}$.

If $m\angle R = 124°$, what is $m\angle AFD$?

1) 124°
2) 112°
3) 68°
4) 56°



opp angles ≅

△AFD

56 + 56 + x = 180
112 + x = 180
−112 −112
x = 68

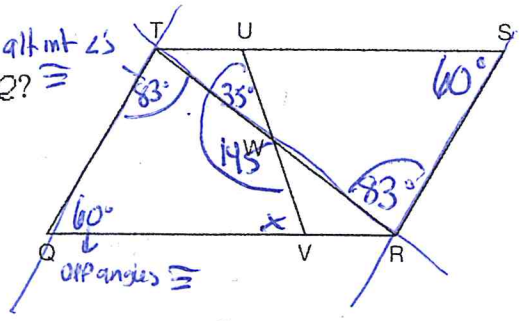
1) Look for linear pairs
2) Look for triangles (180°)
3) Bisects
4) Equilateral

5) Angle Bisector
6) Parallelogram has ∠ opposite sides ≅ consecutive sides supplementary
7) ≠
8) Look for quadrilaterals (360°)

9. In parallelogram $QRST$ shown below, diagonal $\overline{TR}$ is drawn, U and V are points on $\overline{TS}$ and $\overline{QR}$, respectively, and $\overline{UV}$ intersects $\overline{TR}$ at W.

If $m\angle S = 60°$, $m\angle SRT = 83°$, and $m\angle TWU = 35°$, what is $m\angle WVQ$?

1) 37°
2) 60°
3) 72°
4) 83°



alt int ∠s ≅

Quad QTWV

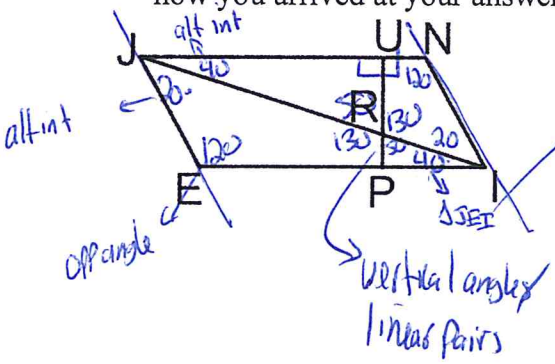
$60+83+145+x=360$

$288+x=360$

$-288 \quad -288$

$x=72$

10. In parallelogram JNIE shown below, diagonal $\overline{JI}$ is drawn, $\overline{UP} \perp \overline{JN}$, $\overline{JI}$ intersects $\overline{UP}$ at R. If $m\angle JNI = 120$ and $m\angle JIN = 20$, find $m\angle PRI$ and $m\angle RJU$. Explain how you arrived at your answer.



90°

alt int

alt int

opp angle

vertical angles / linear pairs

△JEI

$20+120+x=180$

$140+x=180$

$-140 \quad -140$

$x=40$

△JUR

$40+90+x=180$

$130+x=180$

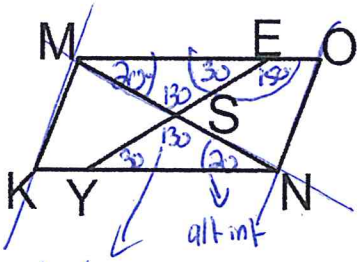
$-130 \quad -130$

$x=50$

$\angle PRI = 50°$

$\angle RJU = 40°$

11. In parallelogram MONK shown below, diagonal $\overline{MN}$ is drawn, $\overline{MN}$ intersects $\overline{EY}$ at S. If $m\angle EMS = 20$ and $m\angle OES = 150$, find $m\angle NSY$. Explain how you arrived at your answer.



△MES

$20+30+x=180$

$50+x=180$

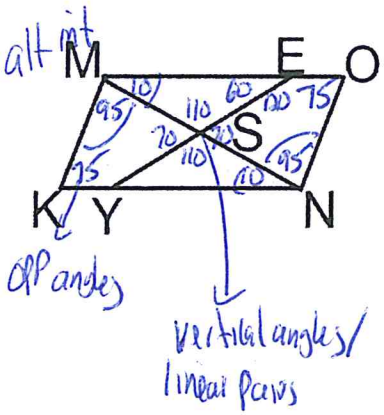
$-50 \quad -50$

$x=130$

alt int

vertical angles are congruent.

12. In parallelogram MONK shown below, diagonal $\overline{MN}$ is drawn, $\overline{MN}$ intersects $\overline{EY}$ at S. If $m\angle MON = 75$, $m\angle OES = 120$, and $m\angle ONS = 95$, find $m\angle ESM$. Explain how you arrived at your answer.



Quad SNOE

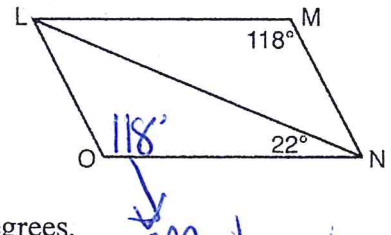
$120+75+95+x=360$

$290+x=360$

$-290 \quad -290$

$x=70$

13. The diagram below shows parallelogram $LMNO$ with diagonal $\overline{LN}$, $m\angle M = 118°$, and $m\angle LNO = 22°$.



Explain why $m\angle NLO$ is 40 degrees.

opposite angles of a parallelogram are congruent

The angles of a triangle add to 180:

$\triangle NLO$

$118+22+x=180$

$140+x=180$

$-140 \quad -140$

$x=40$