Geo

**Unit 5 Review: Triangles**

5.1 Angles of Triangles

1) Construct the following triangles? Can you construct the following? If so, draw it.

a. Right Equilateral

No

b. Isosceles Right

c. Equilateral Acute Equiangular

d. Obtuse Scalene

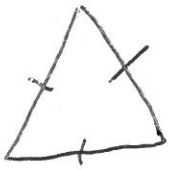

e. Equilateral Obtuse

No

f. Acute Right

No

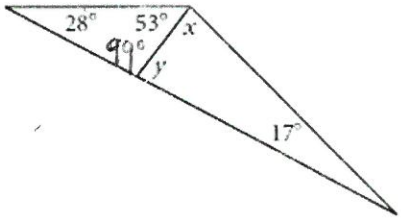
g. Isosceles Equilateral



i. Right Scalene

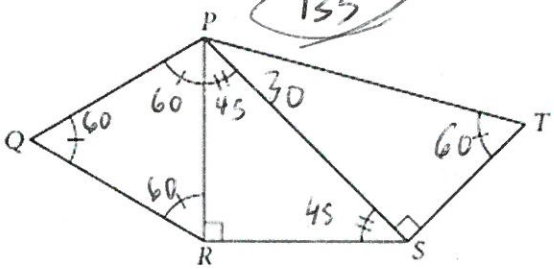
2) Find x and y.

$x =$ 82°, $y =$ 81°



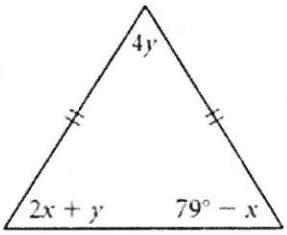

3) Find the measure of ∠QPT

135°




4) Find x and y (Hint: Set up a system of equations)

$x =$ 21, $y =$ 16




$2x+y=79-x$

$3x+y=79$

$-3x-15y=-303$

$-14y=-224$

$y=16$

$4y+2x+y+79-x=180$

$x+5y=101$

$x(-3)$

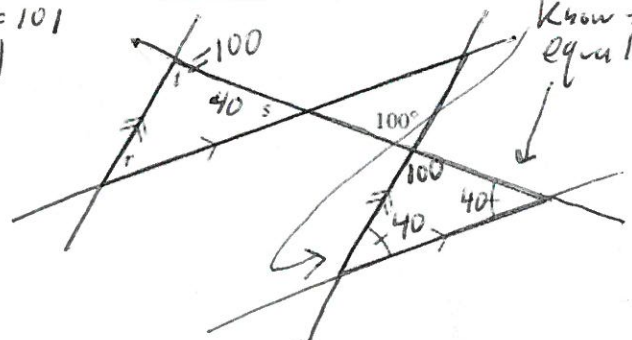
$x+5(16)=101$

$x=21$

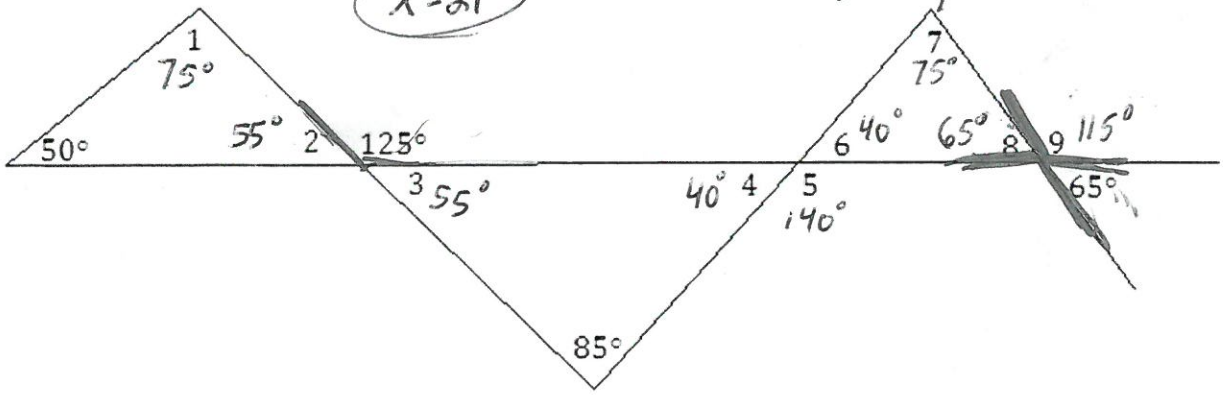
5) Find r, s, t.

$r =$ 40°, $s =$ 40°, $t =$ 100 A.I.A

When you see congruent angles, you know they are equal




6)



H 99

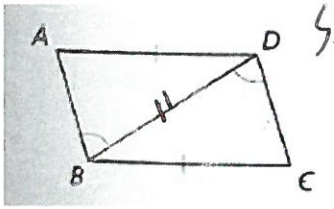
Answers to #7, #8 at end

7) $\triangle GEO \cong \triangle TRI, \angle G = 10x + 3y, \angle O = 55^\circ, \angle R = 5x + 8y$. Find x and y.

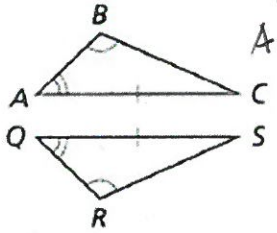
8) $\triangle PAC \cong \triangle BIG, \angle G = 8x + 3y, \angle A = 56^\circ, \angle B = 54^\circ, \angle I = 5x + 8y$. Find x and y.

9) Decide if the triangle congruent. If so, provide a the shortcut that proves they are congruent. Then, write a congruence statement.

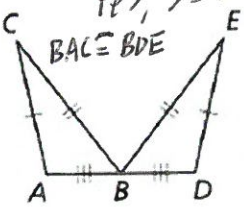
$\Delta ABD$ and $\Delta CDB$ No, SSA



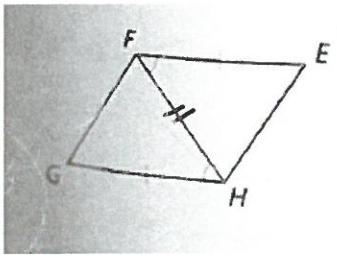

$\triangle ABC, \triangle QRS$ Yes AAS $ABC \cong QRS$



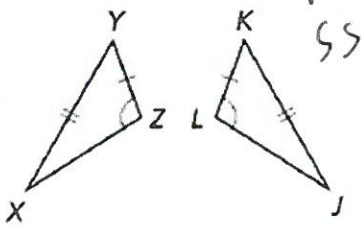

$\triangle ABC, \triangle DBE$ Yes, SSS BAC ≅ BDE



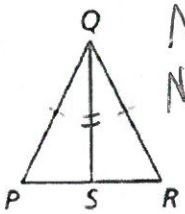

$\Delta EFH$ and $\Delta GHF$ Yes, SAS GHF ≅ EFH



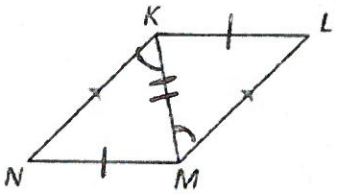

$\triangle XYZ, \triangle JKL$ NO, SSA



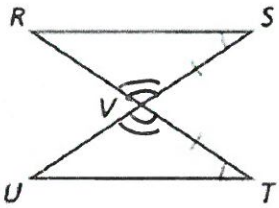

$\triangle PQS, \triangle RQS$ No, Not enough info.



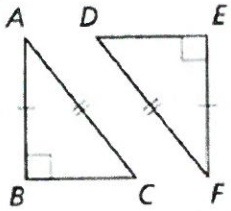

$\Delta KLM$ and $\Delta MNK$ No, SSA



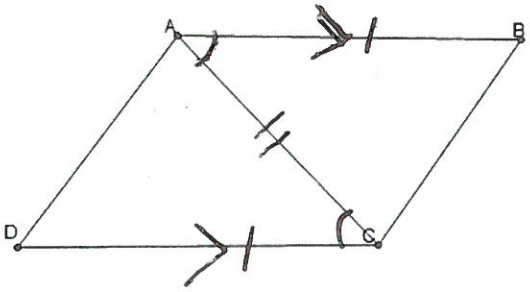

$\triangle RSV, \triangle UTV$ Yes, ASA



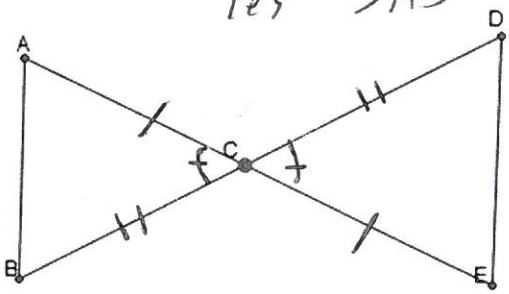

$\triangle ABC, \triangle FED$ HL

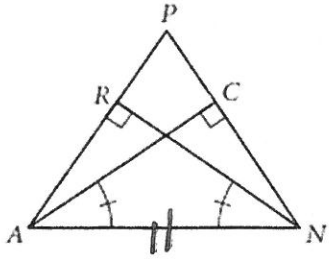


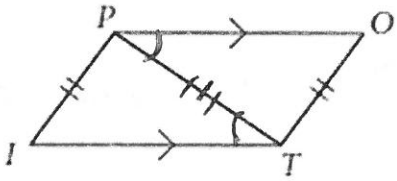

Given: AB | | DC and AB = DC Yes, SAS



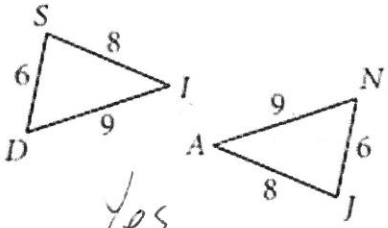

C is the midpoint of $\overline{AE}$ and $\overline{DB}$ Yes SAS



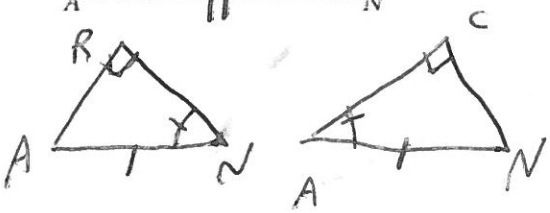


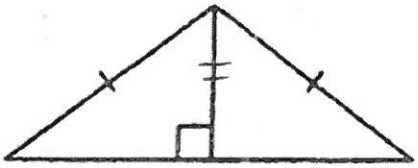

No, SSA




Yes, SSS

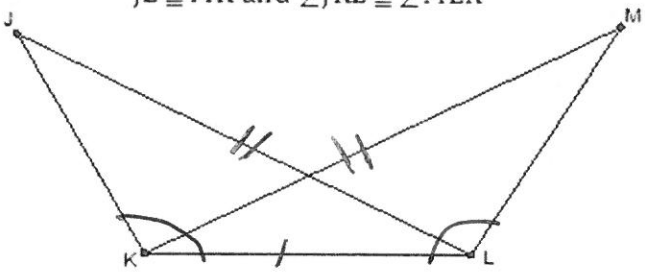


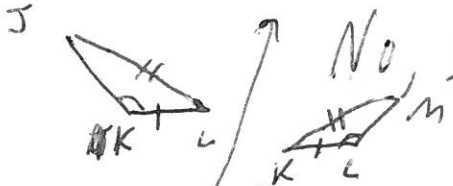

Yes, AAS



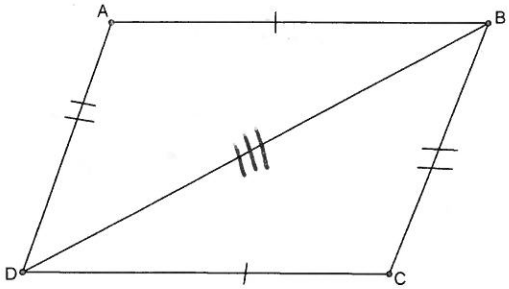
Yes, HL

$\overline{JL} \cong \overline{MK}$ and $\angle JKL \cong \angle MLK$

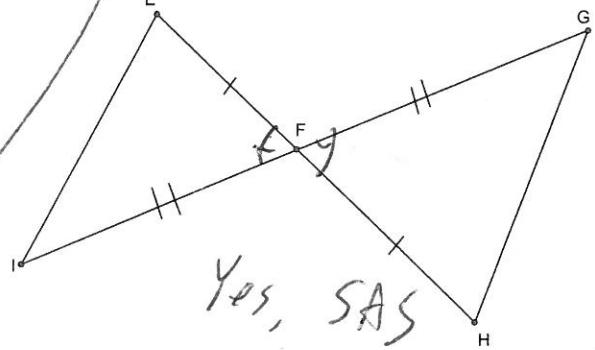



No, SSA



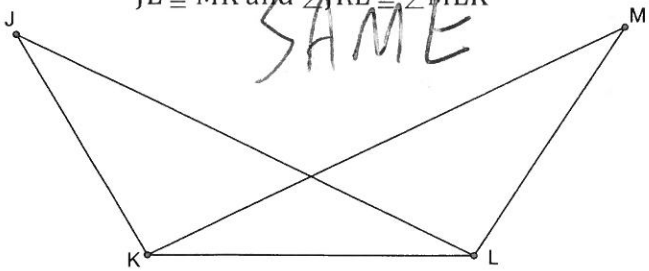

Yes SSS



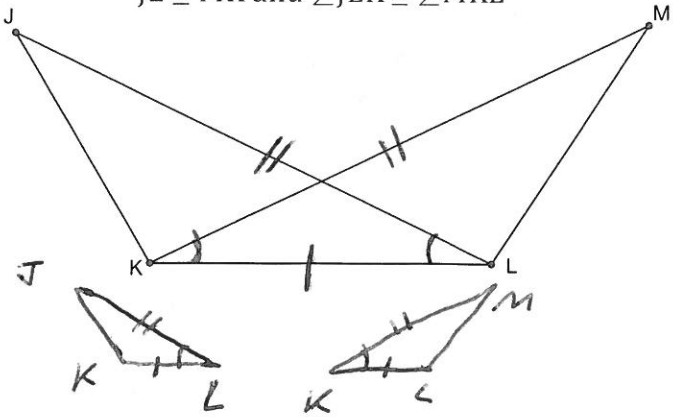

Yes, SAS

$\overline{JL} \cong \overline{MK}$ and $\angle JKL \cong \angle MLK$

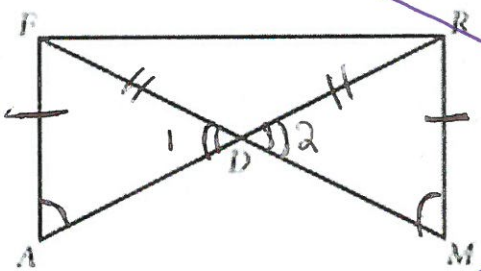
SAME




$\overline{JL} \cong \overline{MK}$ and $\angle JLK \cong \angle MKL$



10) Write a two column proof based off the information below (6 points).
Given: (< = Angle) m<A = m<M, RM = FA
Show: Show triangle FDR is isosceles

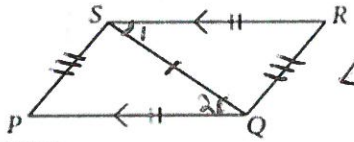



| S | R |
|---|---|
| $\angle A \cong \angle M$, RM = FA | Given |
| $\angle 1 \cong \angle 2$ | Vertical Angles Thm |
| $\triangle FAD \cong \triangle RMD$ | AAS |
| FD = RD | CPCTC |
| FDR is Isosceles | Definition of Isosceles |

11) On a separate piece of paper, prove the following.

**Given:** $\overline{PQ} \parallel \overline{SR}$ and $\overline{PQ} \cong \overline{SR}$

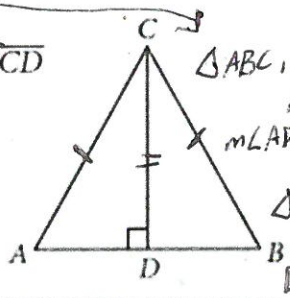
**Show:** $\overline{SP} \cong \overline{QR}$




| S | R |
|---|---|
| $\overline{PQ} \cong \overline{SR}$ & $PQ \parallel SR$ | Given |
| $\angle 1 \cong \angle 2$ | Alt. Int. Angles |
| SQ = SQ | Reflexive. |
| $\triangle PQS \cong \triangle RSQ$ | SAS |
| SP = RQ | CPCTC |

**Given:** Isosceles $\triangle ABC$ with $\overline{AC} \cong \overline{BC}$ and altitude $\overline{CD}$

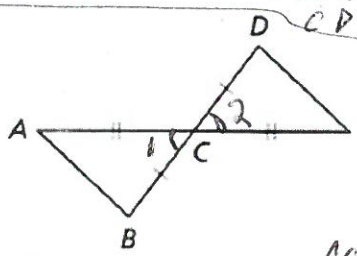
**Show:** $\overline{CD}$ is a median




| S | R |
|---|---|
| $\triangle ABC$ is iso / CD is alt. | Given |
| $AC \cong BC$ | Given |
| $m\angle ADC = m\angle BDC = 90°$ | Def of an Altitude |
| CD = CD | Reflexive. |
| $\triangle ADC \cong \triangle BDC$ | HL |
| AD = DB | CPCTC |
| D is a Midpoint | Def of Midpoint |
| CD is a median | Def of Median |

12) Write a two-column proof.

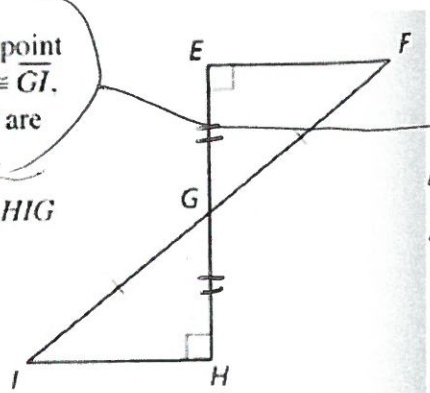
Given: C is the midpoint of $\overline{AE}$ and $\overline{BD}$.
Prove: $\Delta ABC \cong \Delta EDC$




| S | R |
|---|---|
| C is midpoint of $\overline{AE}$ & $\overline{BD}$ | Given |
| $\angle 1 \cong \angle 2$ | Vertical Angles Thm. |
| AC = CE, BC = CD | def of Midpoint |
| $\triangle BCA \cong \triangle DCE$ | SAS |

13) **Given** G is the midpoint of $\overline{EH}$, $\overline{FG} \cong \overline{GI}$, $\angle E$ and $\angle H$ are right angles.

**Prove** $\Delta EFG \cong \Delta HIG$

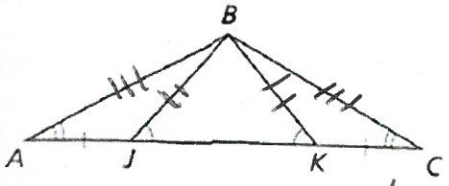



| S | R |
|---|---|
| | Given |
| EG = GH | Def of Midpoint. |
| $\triangle EFG \cong \triangle HIG$ | HL |

14) 3

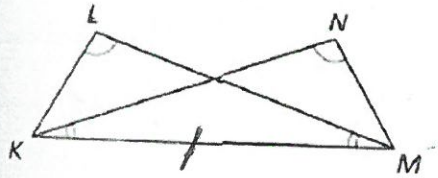
**Given** $\overline{AJ} \cong \overline{KC}$, $\angle BJK \cong \angle BKJ$, $\angle A \cong \angle C$

**Prove** $\triangle ABK \cong \triangle CBJ$




**Given** $\angle NKM \cong \angle LMK$, $\angle L \cong \angle N$

**Prove** $\triangle NMK \cong \triangle LKM$

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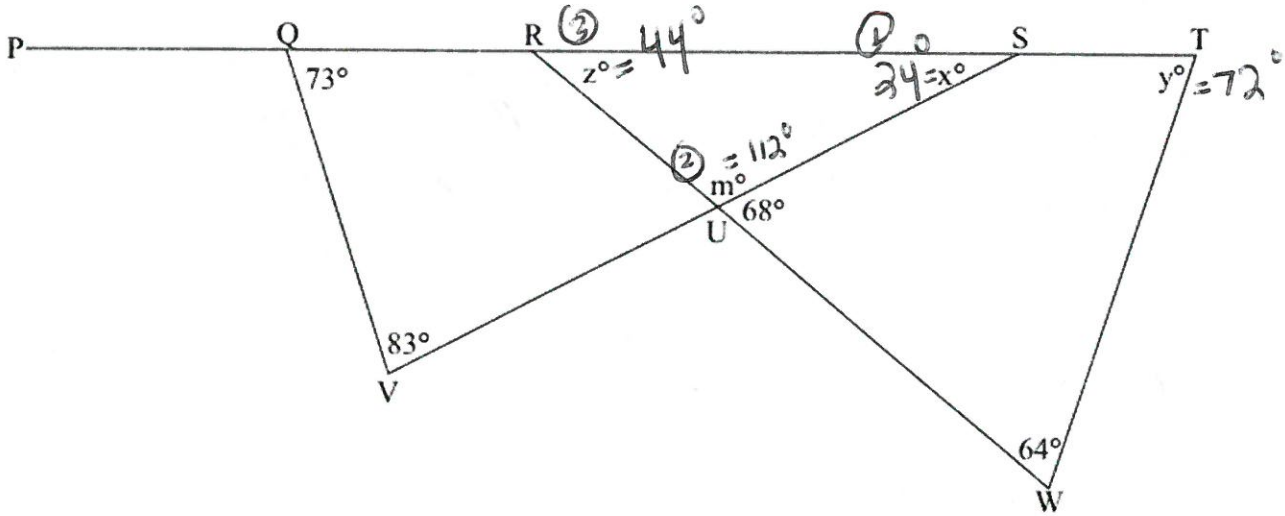
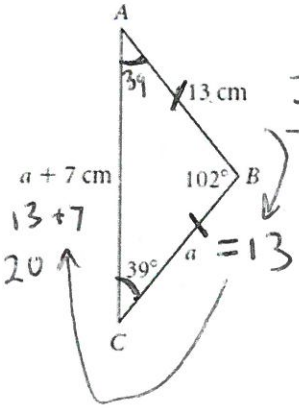
15) 4 Example 3: Determine the measures of all unknown angles in the figure below:



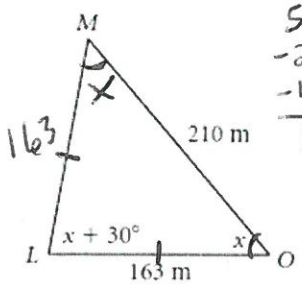

16) 5 In Exercises 4–6, find the measures.

**4.** $m\angle A =$ 39°, perimeter of $\triangle ABC =$ 46




180
−102
−39

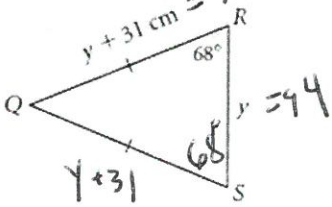
**5.** The perimeter of $\triangle LMO$ is 536 m. $LM =$ 163, $m\angle M =$ 50°




536
−210
−163
163

$x + x + x + 30 = 180$
$3x = 150$
$x = 50$

**6.** The perimeter of $\triangle QRS$ is 344 cm. $m\angle Q =$ 44°, $QR =$ 120




$y + 31 + y + 31 + y = 344$
$3y + 62 = 344$
$-62 \quad -62$
$3y = 282$
$y = 94$

15

~~16~~) **8.** $x =$ 21, $y =$ 16

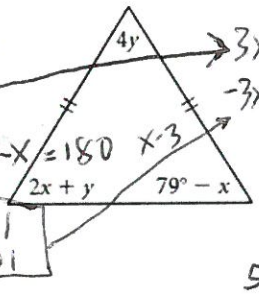
$2x + y = 79 - x$

$\boxed{3x + y = 79}$

$4y + 2x + y + 79 - x = 180$

$\boxed{5y + x = 101}$

$x + 5y = 101$




$3x + y = 79$

$x \cdot 3$

$-3x - 15y = -303$

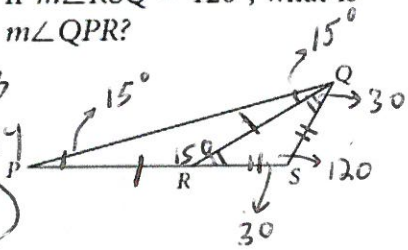
$-14y = -224$

$y = 16$

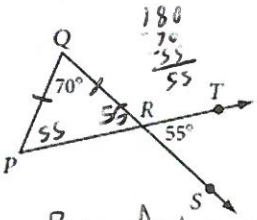
$5(16) + x = 101$

$x = 21$

**9.** $PR = QR$ and $QS = RS$. If $m\angle RSQ = 120°$, what is $m\angle QPR$?




**10.** Use the diagram to explain why $\triangle PQR$ is isosceles.




180
−70
−55
55

Base Angles are Equal

18) ~~6~~

Given:

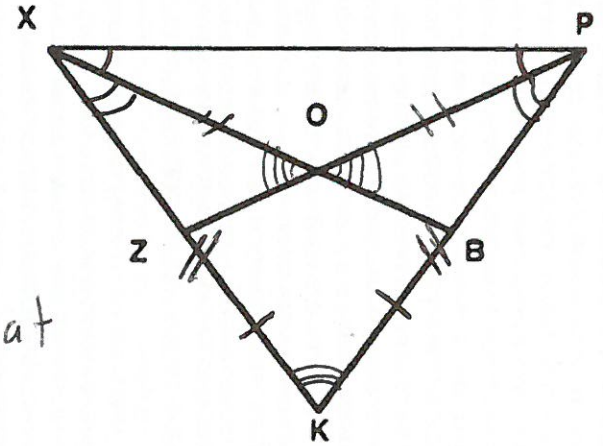
$\overline{XK} \cong \overline{PK}$

$\overline{ZK} \cong \overline{BK}$

$\angle OXP \cong \angle OPX$

Prove: $\overline{ZO} \cong \overline{OB}$

Proof at end

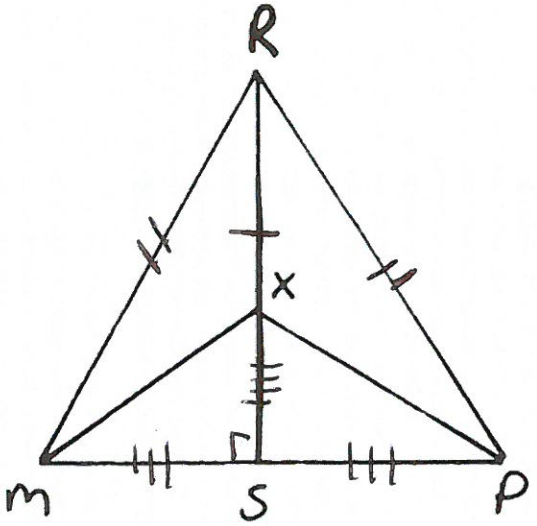



19)

Given: $\overline{RS} \perp \overline{MP}$

$\overline{MR} \cong \overline{PR}$

Prove: $\overline{MX} \cong \overline{PX}$



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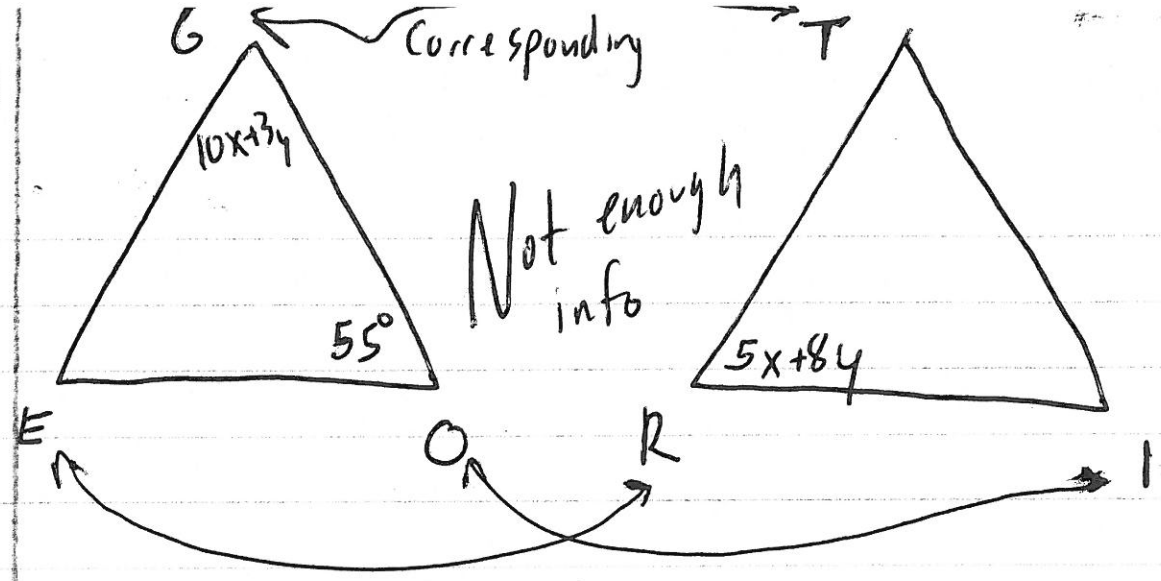


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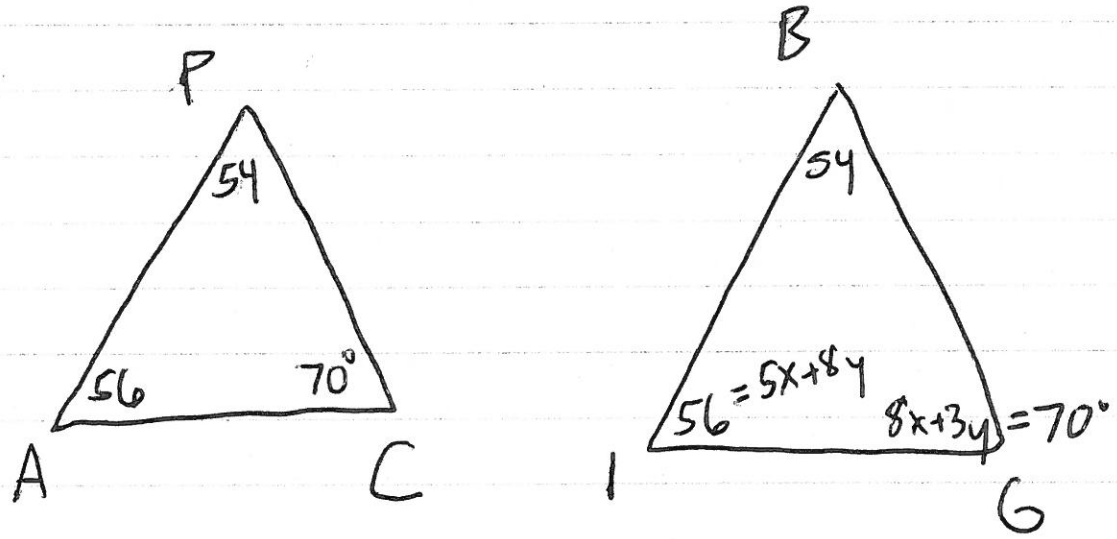


$-3(5x + 8y = 56)$ $\quad -15x - 24y = -168$

$8(8x + 3y = 70)$ $\quad 64x + 24y = 560$

$49x = 392$

$x = 8$

$5(8) + 8y = 56$

$-40 \qquad -40$

$8y = 16$

$y = 2$

13 (14)

| S | R |
|---|---|
| $AJ \cong KC$<br>$\angle BJK \cong \angle BKJ$<br>$\angle A \cong \angle C$ | Given |
| $\triangle BJK$ is Isosceles | Base Angles Theorem. |
| $BJ = BK$ | Def of Isosceles |
| $\triangle ABC$ is Isosceles | Base Angles Theorem |
| $AJ + JK = KC + JK$ | Addition POE |
| $AK = AJ + JK$ | Segment Addition POE |
| $JC = JK + KC$ | " " |
| $AK = JC$ | Substitution |
| $\triangle ABK \cong \triangle CBJ$ | SSS |

~~48~~ 13

| S | R |
| --- | --- |
| $\angle NKM \cong \angle LMK$ | Given |
| $\angle L \cong \angle N$ | Reflexive |
| $KM = KM$ | AAS |
| $\triangle NMK \cong \triangle LKM$ | |

16 (18)

| S | R |
|---|---|
| $\overline{XK} \cong \overline{PK}$ | Given |
| $\triangle XKP$ is isosceles | Def. of Isosceles |
| $\angle ZXP \cong \angle BPX$ | Base Angles Theorem |
| $m\angle ZXP = m\angle ZXO + m\angle OXP$ | Angle Addition Postulate |
| $m\angle BPX = m\angle BPO + m\angle OPX$ | |
| $m\angle ZXO + m\angle OXP = m\angle BPO + m\angle OPX$ | Transitive Property |
| $m\angle OXP = m\angle OPX$ | Given |
| $m\angle ZXO + m\angle OXP = m\angle BPO + m\angle OXP$ | Substitution |
| $-m\angle OXP \quad -m\angle OXP$ | Subtraction POE |
| $m\angle ZXO = m\angle BPO$ | |
| ~~$\angle K \cong \angle K$~~ | ~~Reflexive~~ [redacted] unnecessary |
| ~~$\triangle BKX \cong \triangle ZKP$~~ | ~~ASA~~ |
| $\triangle XOP$ is isosceles | Base Angles Theorem |
| $XO = PO$ | Def. Isosceles Triangle |
| $m\angle XOZ \cong m\angle POB$ | Vertical Angles Theorem |
| $\triangle XOZ \cong \triangle POB$ | ASA |
| $ZO = OB$ | CPCTC |