Congruent Triangles Unit Questions

Classify the Triangles by **Sides** or **Angles**
Class Work

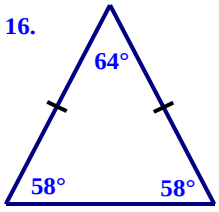
In problems #1-10, choose the most appropriate description for the given triangle. (Equilateral, Scalene, Isosceles, Obtuse, Acute, Right, Equiangular)

1. Side lengths: 3 cm, 4 cm, 5 cm
2. Side lengths: 3 cm, 3 cm, 4 cm
3. Side lengths: 2 cm, 3 cm, 2 cm
4. Side lengths: 5 cm, 5 cm, 5 cm
5. Side lengths: 2 cm. 3 cm, 4 cm
6. Angle Measures: 30°, 60°, 90°
7. Angle Measures: 60°, 60°, 60°
8. Angle Measures: 92°, 37°, 51°
9. Angle Measures: 88°, 67°, 25°
10. Angle measures: 37°, 39°, 104°

Complete the statement using **ALWAYS**, **SOMETIMES**, and **NEVER**.

11. An isosceles triangle is _____ a scalene triangle.
12. An equilateral triangle is _____ an isosceles triangle.
13. An isosceles triangle is _____ an equilateral triangle.
14. An acute triangle is _____ an equiangular triangle.
15. An isosceles triangle is _____ a right triangle.

For #16-20, classify the triangles by Sides & Angles

16.


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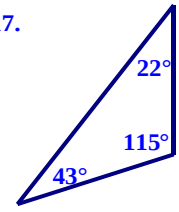

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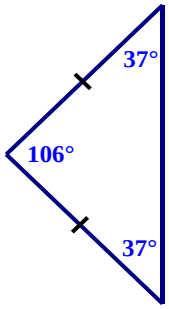

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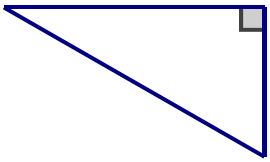

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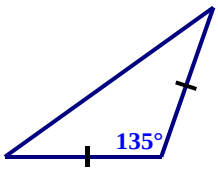


Classify the Triangles by **Sides** or **Angles**
Home Work

In problems #21-30, choose the most appropriate description for the given triangle. (Equilateral, Scalene, Isosceles, Obtuse, Acute, Right, Equiangular)

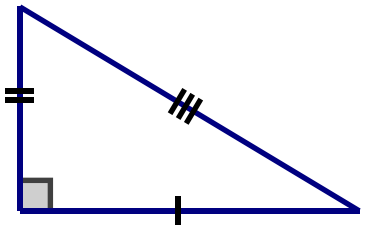
21. Side lengths: 5 cm, 6 cm, 7 cm
22. Side lengths: 2 cm, 2 cm, 3 cm
23. Side lengths: 3 cm, 3 cm, 3 cm
24. Side lengths: 3 cm, 4 cm, 4 cm
25. Side lengths: 4 cm, 3 cm, 2 cm
26. Angle Measures: 60°, 60°, 60°
27. Angle Measures: 60°, 30°, 90°
28. Angle Measures: 33°, 52°, 95°
29. Angle Measures: 37°, 43°, 100°
30. Angle measures: 25°, 67°, 88°

Complete the statement using **ALWAYS**, **SOMETIMES**, and **NEVER**.

31. A scalene triangle is _____ an equilateral triangle.
32. An equilateral triangle is _____ an obtuse triangle.
33. An isosceles triangle is _____ an acute triangle.
34. An equiangular triangle is _____ a right triangle.
35. An right triangle is _____ an isosceles triangle.

For #36-40, classify the triangles by Sides & Angles

36.



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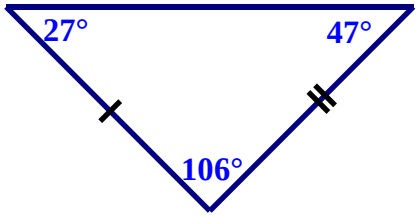

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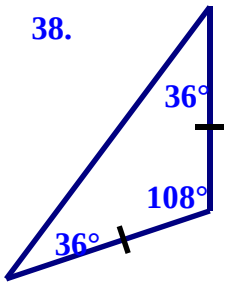

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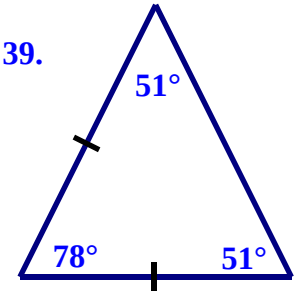

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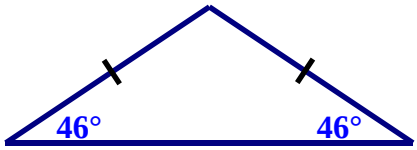
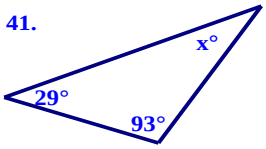


Triangle Sum & Exterior Angle Theorems

Class Work

In the given triangles, solve for the missing variable(s).

41.



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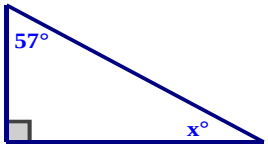

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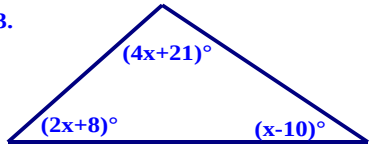

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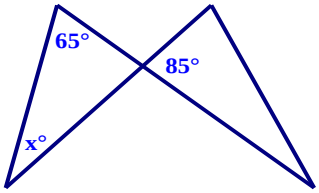

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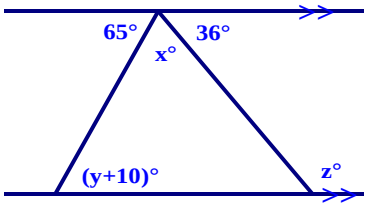

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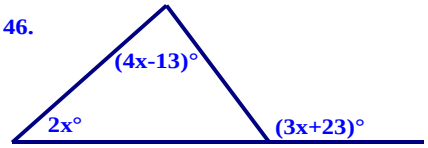

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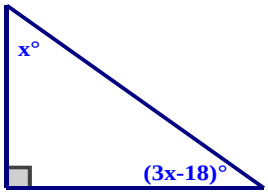

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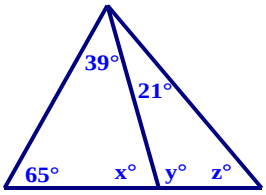
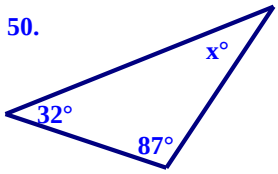


Home Work

In the given triangles, solve for the missing variable(s).

50.



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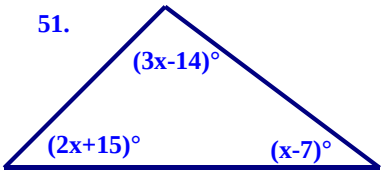

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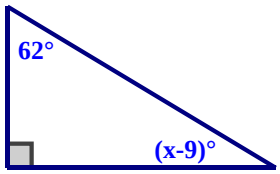

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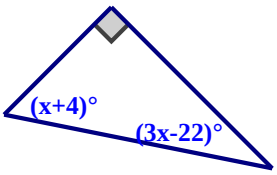

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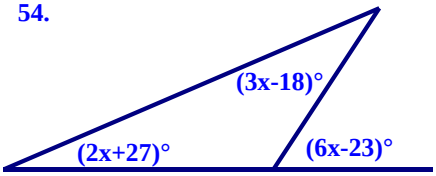

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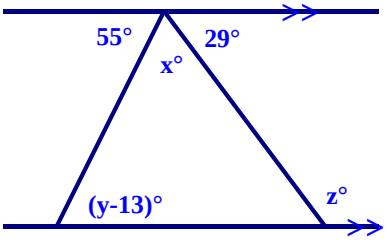

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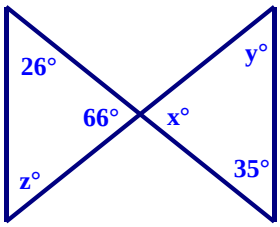

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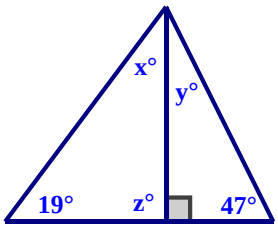

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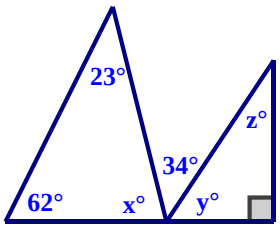
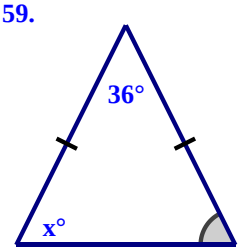


Isosceles Triangles – BAT Theorems

Class Work

#59-67: Find the missing variable(s) for the sides and/or angles.

59.



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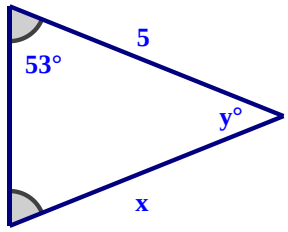

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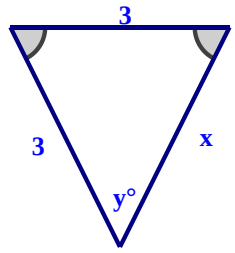

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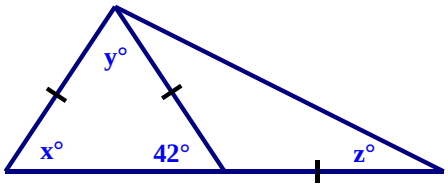

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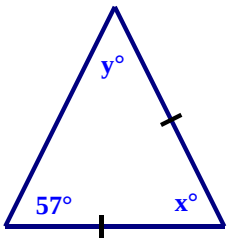

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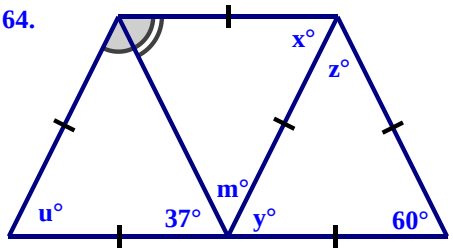

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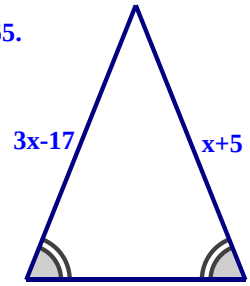

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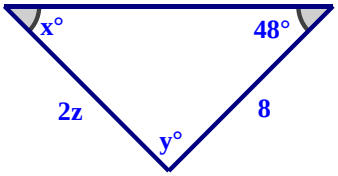

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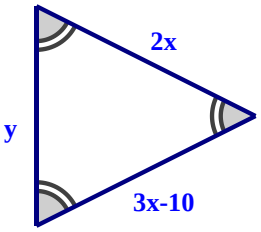


Congruence & Triangles

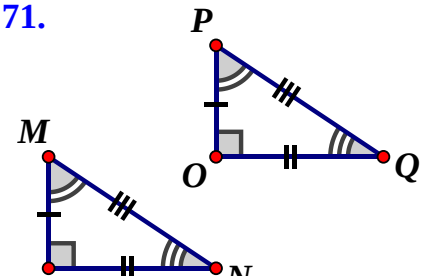
Class Work

For the triangles below, list the corresponding pairs of sides and angles.

68. ΔABC ≅ ΔPKL **69. △FPL ≅ △XRK** **70. △BFG ≅ △MNT**

List the corresponding sides & angles. Write a congruence statement.

71.



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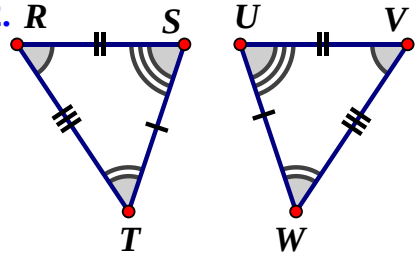
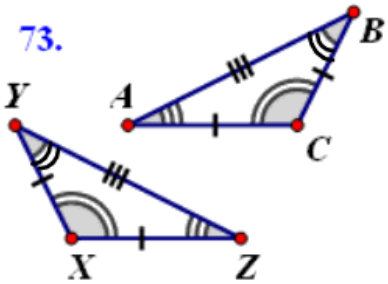


73.

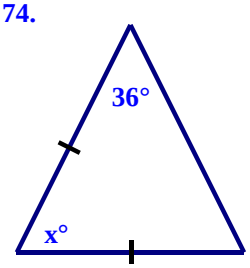


Isosceles Triangles – BAT Theorems

Home Work

#74-82: Find the missing variable(s) for the sides and/or angles.

74.



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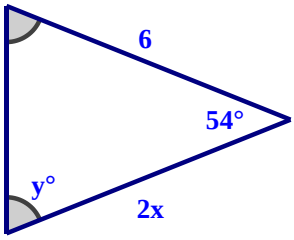

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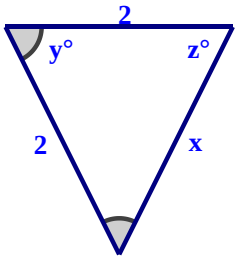

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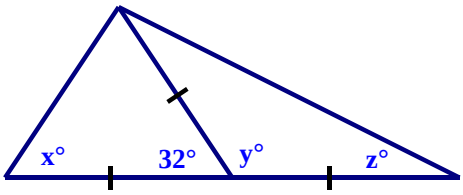

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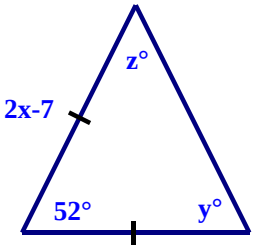

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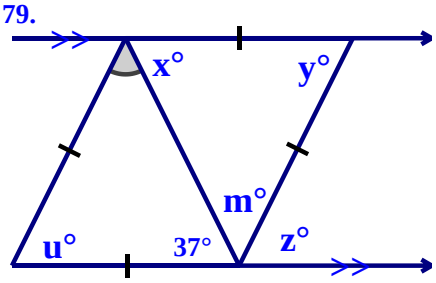

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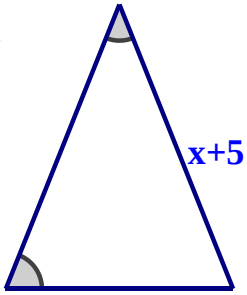
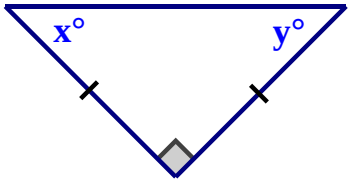


4x-16

81.



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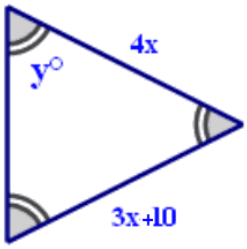


Congruence & Triangles

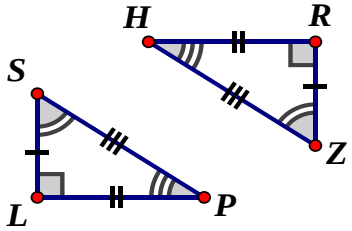
Home Work

For the triangles below, list the corresponding pairs of sides and angles.

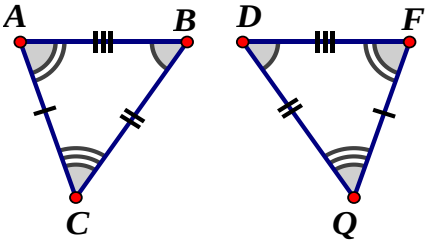
83. ΔCPA ≅ ΔIBF **84. △IAC ≅ △BPA** **85. △TNZ ≅ △LRK**

List the corresponding sides & angles. Write a congruence statement.

86.



87.



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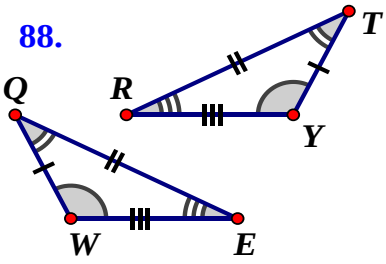


Congruence – Congruent parts: SSS & SAS Triangle Congruence

Class Work

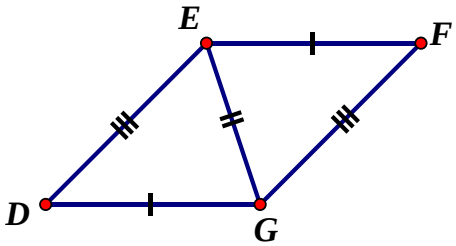
Identify the corresponding congruent sides & angles.

89.

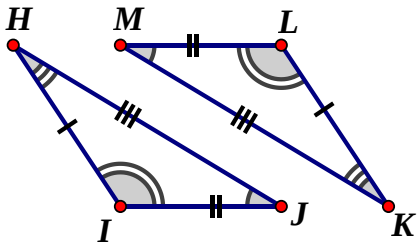
△DHL ≅ △FED

$\overline{DH}$ ≅ ?
$\overline{FD}$ ≅ ?
∠E ≅ ?
∠L ≅ ?

90. **△DEG, △FEG**

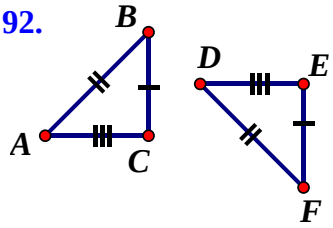


91. **△HIJ, △MLK**



Are the triangles congruent? If so, state the congruence postulate and write a congruence statement.

92.



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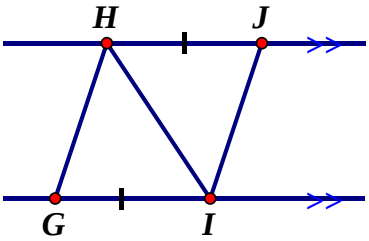

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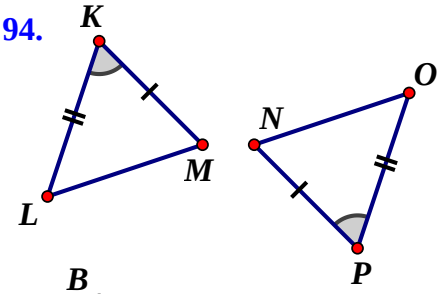

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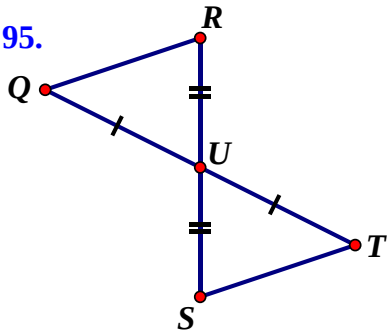

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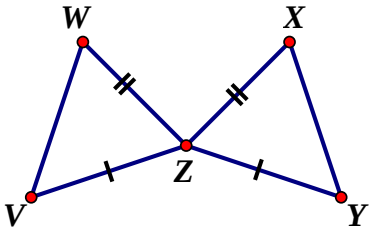

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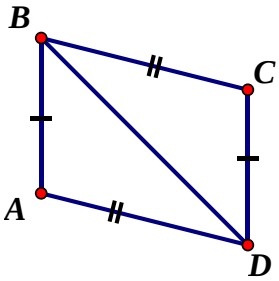

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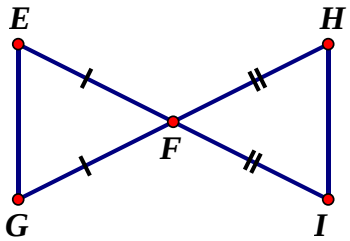

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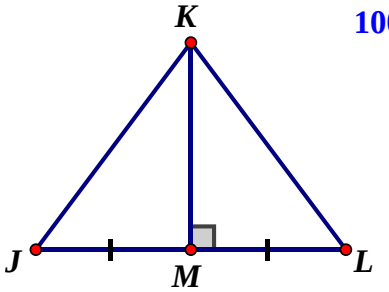

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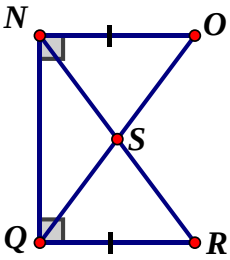


△ONQ, △RQN

Congruence – Congruent parts: SSS & SAS Triangle Congruence

Home Work

Identify the corresponding congruent sides & angles.

101. $\triangle ABX \cong \triangle FHL$

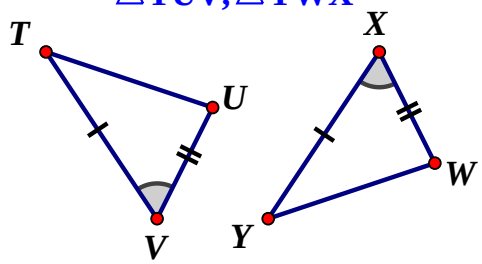
$\overline{BX} \cong$?

$\overline{XA} \cong$?

$\angle H \cong$?

$\angle X \cong$?

102. $\triangle TUV, \triangle YWX$



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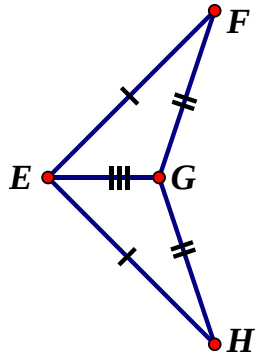
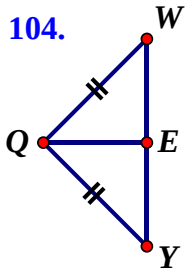


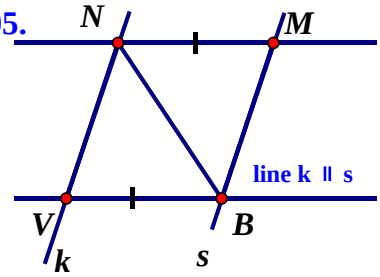
Are the triangles congruent? If so, state the congruence postulate and write a congruence statement.

104.



Point E is the midpoint of $\overline{WY}$

105.



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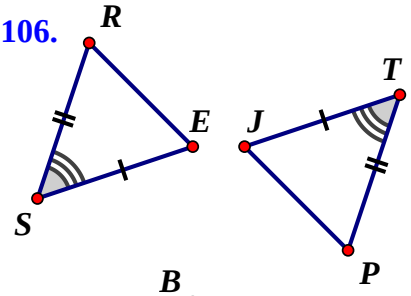

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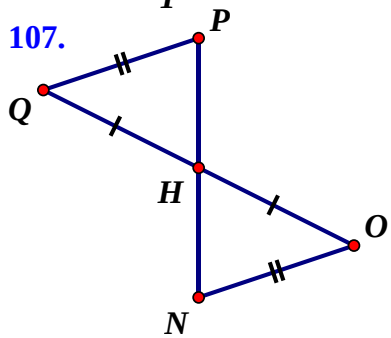

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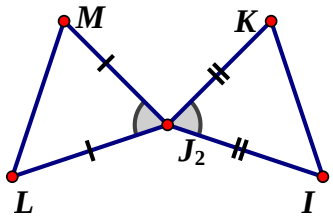

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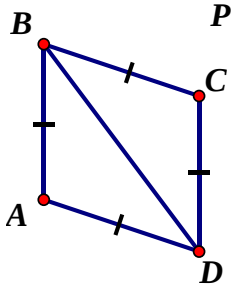

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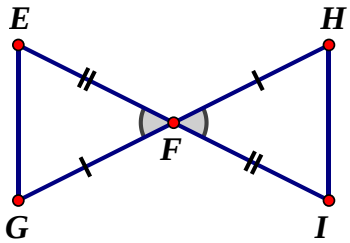

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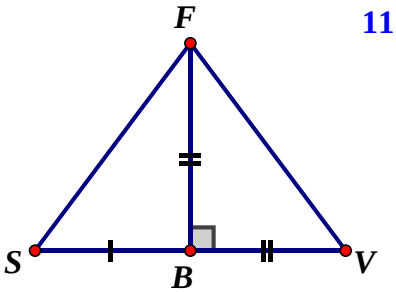

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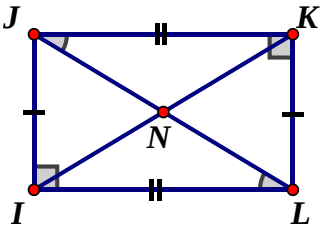


$\triangle LJK, \triangle IJL$

Congruence – Congruent parts: ASA, AAS & HL Triangle Congruence

Class Work

If △ABC ≅ △XYZ by the given congruence, what is the missing congruent part? Draw and mark a diagram.

113. ASA Congruence

$\angle A \cong \angle X$
$\overline{AB} \cong \overline{XY}$

114. AAS Congruence

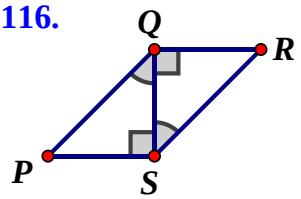
$\overline{ZY} \cong \overline{CB}$
$\angle Y \cong \angle B$

115. ASA Congruence

$\overline{AC} \cong \overline{XZ}$
$\angle C \cong \angle Z$

If the triangles are congruent, state whether SSS, SAS, ASA, AAS, or HL applies and write congruence statement.

116.



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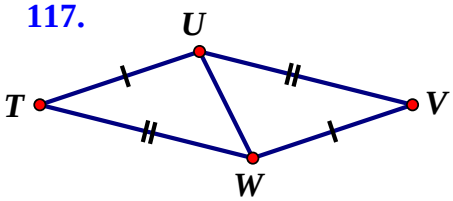

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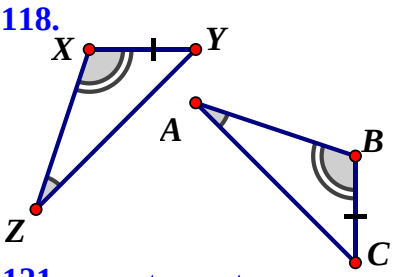

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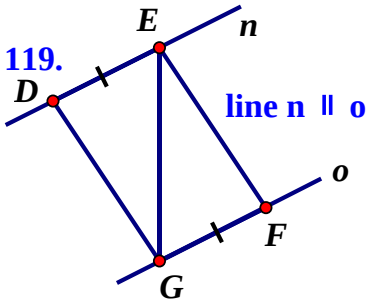

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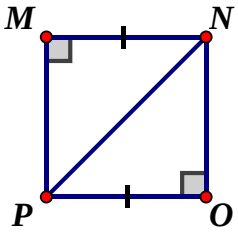

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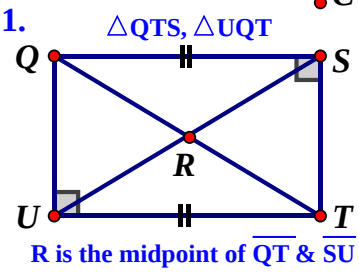

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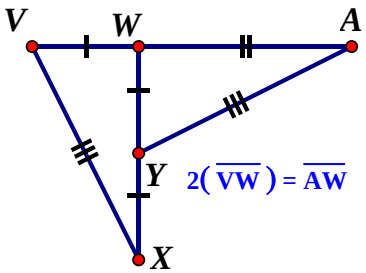

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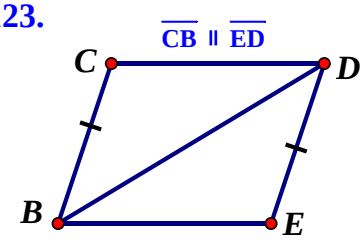

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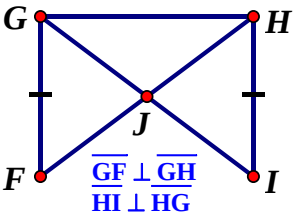

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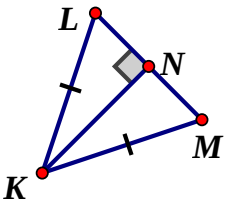

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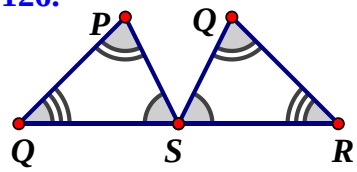

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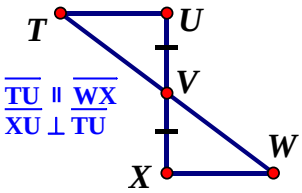


Congruence – Congruent parts: ASA, AAS & HL Triangle Congruence

Home Work

If △PLK ≅ △YUO by the given congruence, what is the missing congruent part? Draw and mark a diagram.

128. ASA Congruence

$\angle K \cong \angle O$
$\overline{PK} \cong \overline{YO}$

129. AAS Congruence

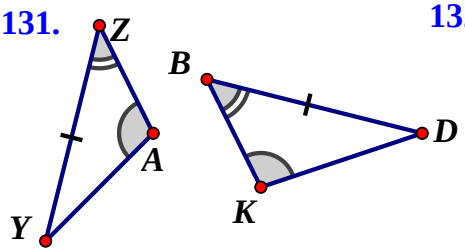
$\overline{LP} \cong \overline{YU}$
$\angle Y \cong \angle P$

130. ASA Congruence

$\angle U \cong \angle L$
$\angle K \cong \angle O$

If the triangles are congruent, state whether SSS, SAS, ASA, AAS, or HL applies and write congruence statement.

131.



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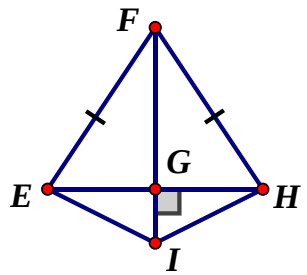

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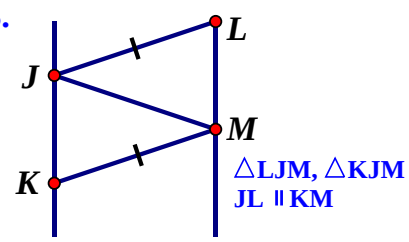

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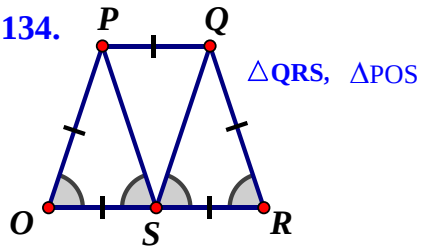

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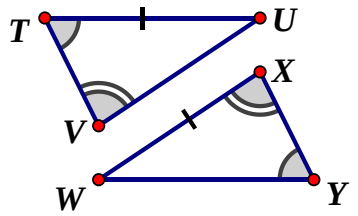

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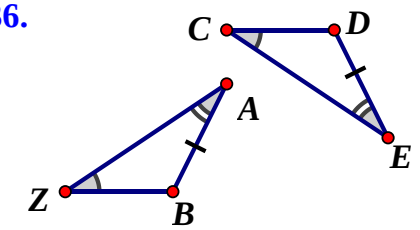
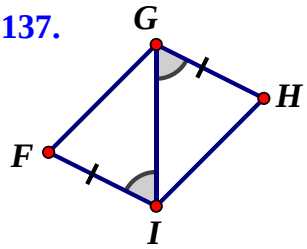


137.



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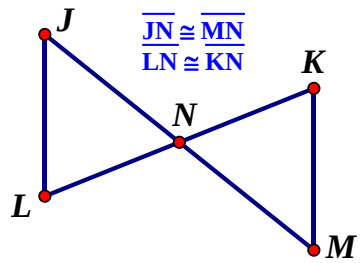

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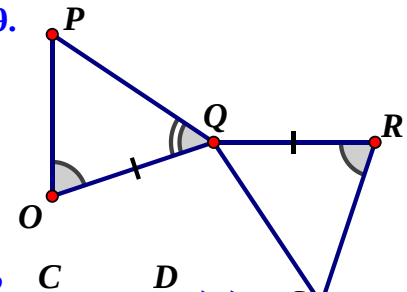

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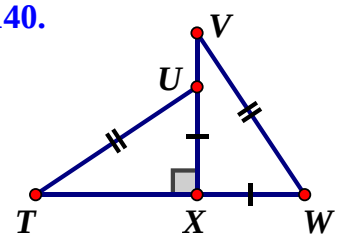

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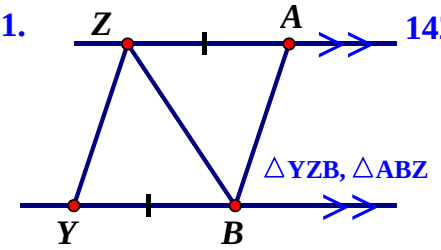

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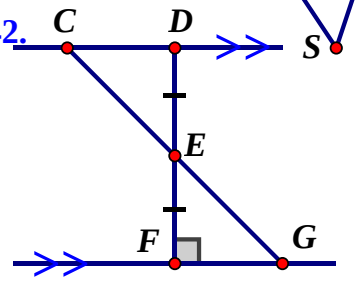


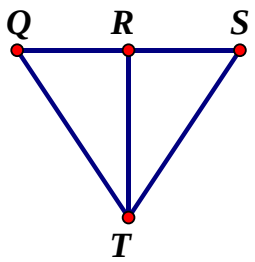
Triangle Congruence Proofs

Class Work

Write a two-column or flow proof.

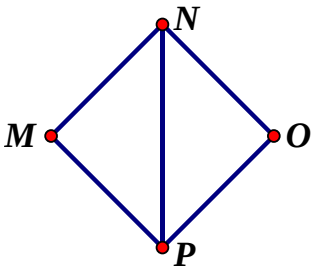
143.

Given:
$\overline{QT} \cong \overline{ST}$
TR bisects $\overline{QS}$
Prove: $\triangle QRT \cong \triangle SRT$



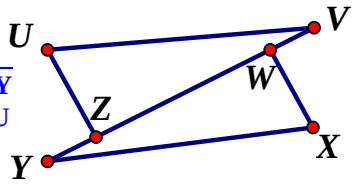
144.

Given:
$\overline{MP} \cong \overline{OP}$
NP bisects $\angle MPO$
Prove: $\triangle PMN \cong \triangle PON$



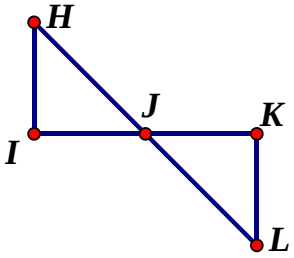
145.

Given:
$\overline{WX} \perp \overline{VY}$, $\overline{ZU} \perp \overline{VY}$
$\overline{UZ} \cong \overline{XW}$, $\angle X \cong \angle U$
Prove: $\angle Y \cong \angle V$



146.

Given:
$\angle I$ & $\angle K$ are right $\angle$'s
J is mid pt. of $\overline{HL}$
Prove: $\triangle IHJ \cong \triangle KLJ$

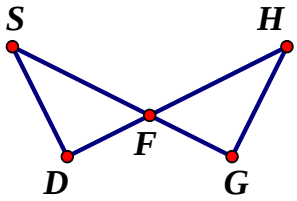


Home Work

Write a two-column or flow proof.

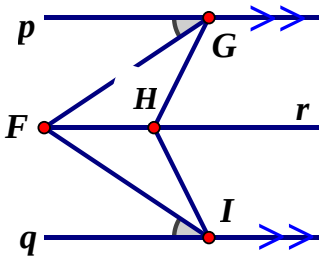
147.

Given:
$\overline{GH} \cong \overline{DS}$
$\overline{HD}$ bisects $\overline{SG}$
SG bisects HD
Prove: $\triangle FDS = \triangle FGH$



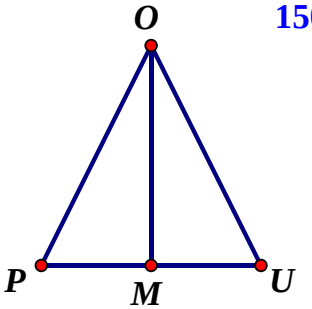
148.

Given:
line r $\parallel$ line p
$\overline{FG} \cong \overline{FI}$
Prove: $\triangle GHF \cong \triangle IHF$



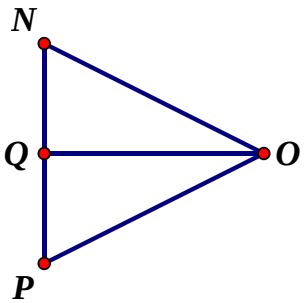
149.

Given:
$\overline{OM} \perp \overline{PU}$
$\overline{OP} \cong \overline{OU}$
Prove: $\triangle PMO \cong \triangle UMO$



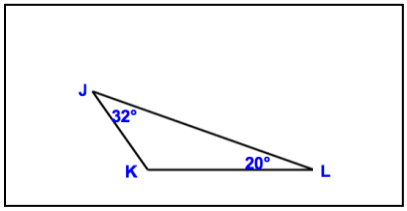
150.

Given:
$\overline{QO} \perp \overline{NP}$
$\overline{NQ} \cong \overline{PQ}$
Prove: $\angle NOQ \cong \angle POQ$



Multiple Choice–

1. Identify the triangles by sides and angles
   a. scalene, acute
   b. isosceles, obtuse
   c. scalene, obtuse
   d. equilateral, equiangular

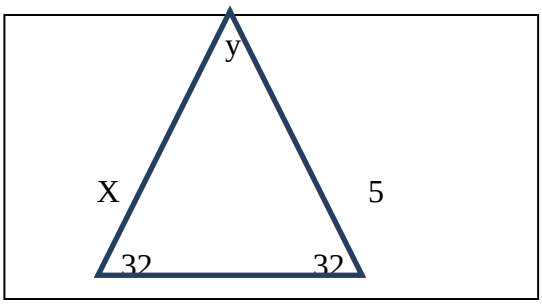


2. Angle measures of a triangle are given, find the value of x.
   a. 24
   b. 28
   c. 32
   d. 30

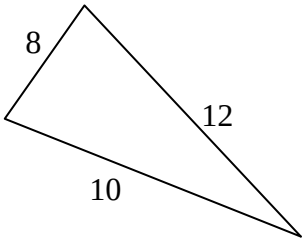
A triangle's angles are:

m$\angle A$ = 2x - 1
m$\angle B$ = x + 9
m$\angle C$ = 3x + 4

3. In the given triangle, find x and y.
   a. x = 32, y = 5
   b. x = 5, y = 116°
   c. x = 5, y = 32°
   d. x = 5, y = 64°

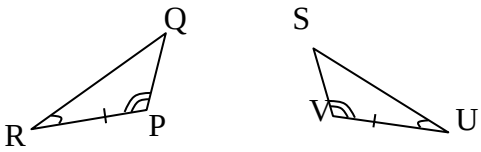


4. Classify the triangle by sides and angles.
   a. scalene, obtuse
   b. isosceles, acute
   c. scalene, acute
   d. isosceles, obtuse



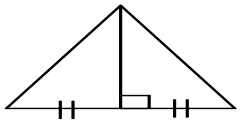
5. If $\Delta DEF \cong \Delta PQR$, one set of corresponding sides are:
   a. $\overline{DE}, \overline{QR}$
   b. $\overline{EF}, \overline{PQ}$
   c. $\overline{DE}, \overline{PQ}$
   d. $\overline{DF}, \overline{RQ}$

6. Are the triangles congruent – if so, by which congruence postulate/theorem?
   a. SAS
   b. ASA
   c. AAS
   d. Not congruent



7. By which postulate/theorem, if any, are the two triangles congruent?

a. ASA
b. AAS
c. SAS
d. Not congruent



8. State the third congruence needed to make $\Delta ABC \cong \Delta DEF$ true by <u>SAS congruence</u>.

a. $\overline{AC} \cong \overline{DF}$
b. $\overline{CB} \cong \overline{EF}$
c. $\angle C \cong \angle F$
d. $\angle A \cong \angle D$

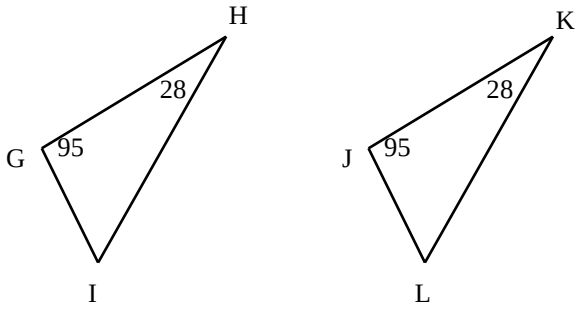
Given:

$\angle B \cong \angle E$

$\overline{AB} \cong \overline{DE}$

9. What information must be true for <u>ASA congruence</u> between the two triangles?

a. $\overline{HI} \cong \overline{KL}$
b. $\overline{GH} \cong \overline{KJ}$
c. $\angle I \cong \angle L$
d. $\overline{GI} \cong \overline{JL}$



10. State the third congruence needed to make $\Delta XYZ \cong \Delta PQR$ true by <u>ASA congruence</u>.

a. $\overline{XY} \cong \overline{QP}$
b. $\overline{PQ} \cong \overline{YZ}$
c. $\angle X \cong \angle P$
d. $\overline{XZ} \cong \overline{PR}$

Given:

$\angle P \cong \angle X$

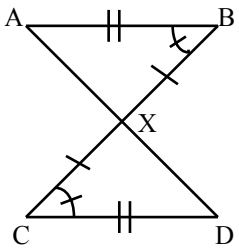
$\angle Y \cong \angle Q$

Short Constructed Response – Write the correct answer for each question.
No partial credit will be given.

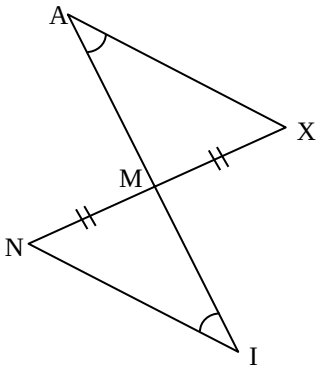
#11- 12 For the triangles in the diagram:

- list the congruence postulate or theorem, if any
- list the corresponding parts
- write a congruence statement, if any

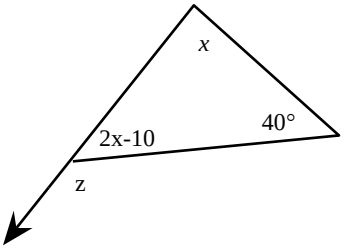
11.



12.

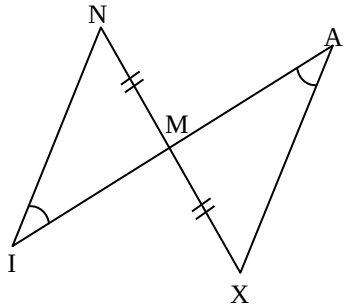


13. Solve for z.



Extended Constructed Response - Solve the problem, showing all work. Partial credit may be given.

14. Write a two-column or flow proof.



Answers

1. Scalene
2. Isosceles
3. Isosceles
4. Equilateral
5. Scalene
6. Right
7. Equiangular & acute
8. Obtuse
9. Acute
10. Obtuse
11. Never
12. Never
13. Sometimes
14. Sometimes
15. Sometimes
16. Sides: Isosceles, Angles: Acute
17. Sides: Scalene, Angles: Obtuse
18. Sides: Isosceles, Angles: Obtuse
19. Sides: Scalene, Angles: Right
20. Sides: Isosceles, Angles: Obtuse
21. Scalene
22. Isosceles
23. Equilateral
24. Isosceles
25. Scalene
26. Equiangular & acute
27. Right
28. Obtuse
29. Obtuse
30. Acute
31. Never
32. Never
33. Sometimes
34. Never
35. Sometimes
36. Sides: Scalene, Angles: Right
37. Sides: Scalene, Angles: Obtuse
38. Sides: Isosceles, Angles: Obtuse
39. Sides: Isosceles, Angles: Acute
40. Sides: Isosceles, Angles: Acute
41. X=58°
42. X=33°
43. X=23°
44. X=30°
45. X=79°, z=144°, y=55°
46. X=12
47. X=27
48. (PROBLEM MISSING)
49. X=76°, y=104°, z=55°
50. X=61°
51. X=31
52. X=37
53. X=27
54. X=32
55. X=96°, z=151°, y=68
56. X=66°, z=88°, y=79°
57. Z=90°, y=43°, x=71°
58. X=95°, y=51°, z=39°
59. X=72°
60. Y=74°, x=5
61. X=3, y=60°
62. X=42°, y=96°, z=21°
63. Y=57°, x=66°
64. U=106°, y=60°, z=60°, m=83°, x=14°
65. X=11
66. Z=4, y=84°, x=48°
67. X=10, y=20
68. $\overline{AB} \cong \overline{PK}, \overline{AC} \cong \overline{PL}, \overline{BC} \cong \overline{KL}$
    $\angle A \cong \angle P, \angle B \cong \angle K, \angle C \cong \angle L$
69. $\overline{FP} \cong \overline{XR}, \overline{FL} \cong \overline{XK}, \overline{PL} \cong \overline{RK}$
    $\angle F \cong \angle X, \angle P \cong \angle R, \angle L \cong \angle K$
70. $\overline{BF} \cong \overline{MN}, \overline{BG} \cong \overline{MT}, \overline{FG} \cong \overline{NT}$
    $\angle B \cong \angle M, \angle F \cong \angle N, \angle G \cong \angle T$

71.

Sides	Angles
LM ≅ OP	**∠L ≅ ∠O**
MN ≅ PQ	**∠M ≅ ∠P**
NL ≅ QO	**∠N ≅ ∠Q**

$\Delta LMN \cong \Delta OPQ$

72.

Sides	Angles
ST ≅ UW	**∠R ≅ ∠V**
TR ≅ WV	**∠T ≅ ∠W**
RS ≅ VU	**∠S ≅ ∠U**

$\Delta RST \cong \Delta VUW$

73.

Sides	Angles
XY ≅ CB	**∠Y ≅ ∠B**
YZ ≅ BA	**∠X ≅ ∠C**
ZX ≅ AC	**∠Z ≅ ∠A**

$\Delta YXZ \cong \Delta BCA$

74. X=108°

75. X=3, y=63°

76. X=2, y=60°, z=60°
77. X=74°, y=148°, z=16°
78. X=9, z=64°, y=64°
79. U=106°, x=37°, y=106°, z=106° m = 37
80. X=7
81. X=45°, y=45°
82. Y=60°, x=10

83. $\overline{CA} \cong \overline{IF}, \overline{CP} \cong \overline{IB}, \overline{PA} \cong \overline{BF}$
$\angle C \cong \angle I, \angle P \cong \angle B, \angle A \cong \angle F$

84. $\overline{IA} \cong \overline{BP}, \overline{IC} \cong \overline{BA}, \overline{AC} \cong \overline{PA}$
$\angle I \cong \angle B, \angle A \cong \angle P, \angle C \cong \angle A$

85. $\overline{TN} \cong \overline{LR}, \overline{TZ} \cong \overline{LK}, NZ \cong \overline{RK}$
$\angle T \cong \angle L, \angle N \cong \angle R, \angle Z \cong \angle K$

86.

Sides	Angles
LS ≅ RZ	∠L ≅ ∠R
SP ≅ ZH	∠S ≅ ∠Z
PL ≅ HR	∠P ≅ ∠H

$\Delta LSP \cong \Delta RZH$

87.

Sides	Angles
BA ≅ DF	∠B ≅ ∠D
AC ≅ FQ	∠A ≅ ∠F
CB ≅ QD	∠C ≅ ∠Q

$\Delta BAC \cong \Delta DFQ$

88.

Sides	Angles
WQ ≅ YT	∠W ≅ ∠Y
QE ≅ TR	∠Q ≅ ∠T
EW ≅ RY	∠E ≅ ∠R

$\Delta WQE \cong \Delta YTR$

89. $\overline{FE}, \overline{DL}, \angle H, \angle D$

90.

Sides	Angles
DG ≅ FE	∠D ≅ ∠F
GE ≅ EG	∠DGE ≅ ∠FEG
ED ≅ GF	∠GED ≅ ∠EGF

91.

Sides	Angles
JI ≅ ML	∠J ≅ ∠M
IH ≅ LK	∠I ≅ ∠L
HJ ≅ KM	∠H ≅ ∠K

92. SSS, △CBA ≅ △EFD
93. SAS, △JHI ≅ △GIH
94. SAS, △MKL ≅ △NPO
95. SAS, △QUR ≅ △TUS
96. Not Congruent
97. SSS, △BAD ≅ △DCB
98. Not Congruent
99. SAS, △JMK ≅ △LMK
100. SAS, △ONQ = △RQN

101. $\overline{HL}, \overline{LF}, \angle B, \angle L$

102.

Sides	Angles
TV ≅ YX	∠T ≅ ∠Y
VU ≅ XW	∠V ≅ ∠X
UT ≅ WY	∠U ≅ ∠W

103.

Sides	Angles
EF ≅ EH	∠F ≅ ∠H
FG ≅ HG	∠FEG ≅ ∠HEG
GE ≅ GE	∠EGF ≅ ∠EGH

104. SSS, △WQE ≅ △YQE
105. Not Congruent
106. SAS, △ESR ≅ △JTP
107. Not congruent
108. Not congruent
109. SSS, △BAD ≅ △BCD or ΔBAD ≅ ΔDCB
110. SAS, △GFE ≅ △HFI
111. Not congruent
112. SAS, △LKJ = △JIL -also SSS, ASA OR HL
113. ∠B ≅ ∠Y
114. ∠X ≅ ∠A
115. ∠A ≅∠X
116. ASA, △PSQ ≅ △RQS
117. SSS, △TWU ≅ △VUW
118. AAS, △ZXY ≅ △ABC
119. SAS, △DEG ≅ △FGE
120. HL, △NMP ≅ △PON
121. HL, △TQS ≅ △QTU
122. SSS, △VWX ≅ △YWA
123. SAS, △CBD ≅ △EDB

124. SAS, $\triangle FGH \cong \triangle IHG$

125. HL, $\triangle MNK \cong \triangle LNK$

126. Not congruent

127. ASA, $\triangle TUV \cong \triangle WXV$ or AAS

128. $\angle P \cong \angle Y$

129. $\angle K \cong \angle O$

130. $\overline{UO} \cong \overline{LK}$

131. AAS, $\triangle AZY \cong \triangle KBD$

132. HL, $\triangle FEG \cong \triangle FHG$

133. SAS, $\triangle LJM \cong \triangle KMJ$

134 SSS, SAS, ASA, or AAS; $\Delta SOP \cong \Delta SRQ$

135. Not congruent

136. AAS, $\triangle ZAB \cong \triangle CED$

137. SAS, $\triangle FIG \cong \triangle HGI$

138. SAS, $\triangle JNL \cong \triangle MNK$

139. Not congruent

140. HL, $\triangle TUX \cong \triangle VWX$

141. SAS, $\triangle YBZ \cong \triangle AZB$

142. ASA, $\triangle CDE \cong \triangle GFE$ or AAS

#143-150: Proof Answers will vary

Unit Review Answer Key

1. c
2. b
3. b
4. c
5. c
6. b
7. c
8. b
9. b
10. a
11. SAS

    $\angle A \cong \angle D$, $\angle B \cong \angle C$, $\angle AXB \cong \angle DXC$

    $\overline{AB} \cong \overline{DC}$, $\overline{AX} \cong \overline{DX}$, $\overline{XB} \cong \overline{XC}$

    $\Delta AXB \cong \Delta DXC$

12. AAS

    $\angle A \cong \angle I$, $\angle X \cong \angle N$, $\angle AMX \cong \angle IMN$

    $\overline{AM} \cong \overline{IM}$, $\overline{AX} \cong \overline{IN}$, $\overline{MX} \cong \overline{MN}$

    $\Delta AMX \cong \Delta IMN$

13. 90

14.

Statement	Reason
$\overline{MX} \cong \overline{MN}$	given
$\angle I \cong \angle A$	given
$\angle NMI \cong \angle XMA$	vertical angles
$\Delta NMI \cong \Delta XMA$	AAS