Geometry

Chapter 4 Review Congruent Triangles

Name: _Key_

Block: _____ Date: _____

Create an equation and solve.

1) One acute angle of a right triangle measure is two more than four times the measure of the other acute angle. Find the measure of each acute angle.
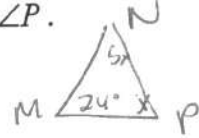
$$90 + 4x + 2 + x = 180$$
$$5x + 92 = 180$$
$$\quad -92 \quad -92$$
$$\frac{5x}{5} = \frac{88}{5} \quad \boxed{x = 17.6°}$$

$$4(17.6) + 2 = \boxed{72.4°}$$

2) In $\triangle MNP$, the measure of $\angle M$ is 24°. The measure of $\angle N$ is five times the measure of $\angle P$. Find $m\angle N$ and $m\angle P$.
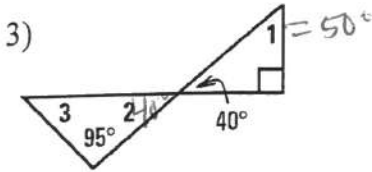
$$6x + 24 = 180$$
$$\quad -24 \quad -24$$
$$\frac{6x}{6} = \frac{156}{6}$$
$$x = 26$$

$$\angle P = 26° \quad \angle N = 130°$$
$$\hookrightarrow 26(5) = 130$$

Find the measure of each numbered angle.

3) ∠1 = 50°

$m\angle 1 = \underline{50°}, m\angle 2 = \underline{40°}, m\angle 3 = \underline{45°}$

4)
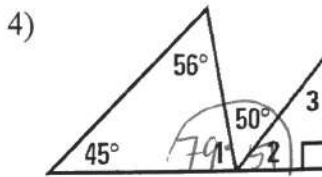
$m\angle 1 = \underline{79°}, m\angle 2 = \underline{51°}, m\angle 3 = \underline{39°}$

Find the value of x.
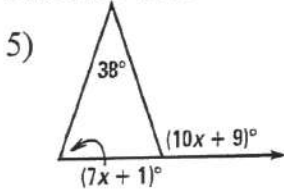
5) 38°, $(10x + 9)°$, $(7x + 1)°$

$$10x + 9 = 7x + 1 + 38$$
$$10x + 9 = 7x + 39$$
$$-7x \quad\quad -7x$$
$$3x + 9 = 39$$
$$\quad -9 \quad -9$$
$$\frac{3x}{3} = \frac{30}{3} \quad x = \underline{10}$$
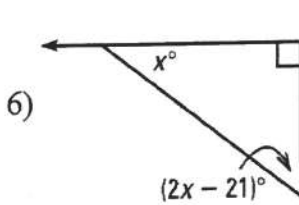
6) $x°$, $(2x - 21)°$

$$x + 2x - 21 + 90 = 180$$
$$3x + 69 = 180$$
$$\quad -69 \quad -69$$
$$\frac{3x}{3} = \frac{111}{3}$$
$$x = \underline{37}$$

Find the value(s) of the variables(s).

7) $x°$, 65°, 65°

$$x = \underline{50°}$$

8) $x+1$, $3x-4$, $2x+1$

$$3x - 4 = 2x + 1$$
$$-2x \quad\quad -2x$$
$$x - 4 = 1$$
$$\quad +4 \quad +4$$

$$x = \underline{5}$$

9) 40°, $4x°$, $3x°$, 40°

$$4x + 3x + 40 = 180$$
$$7x + 40 = 180$$
$$\quad -40 \quad -40$$
$$\frac{7x}{7} = \frac{140}{7}$$

$$x = \underline{20}$$

10) 50°, $2x°$, $3x$, $3y$, 45°, 65°
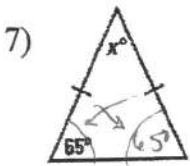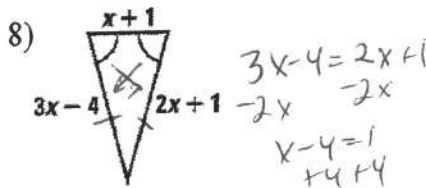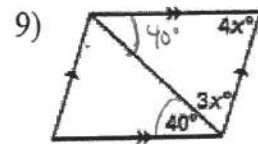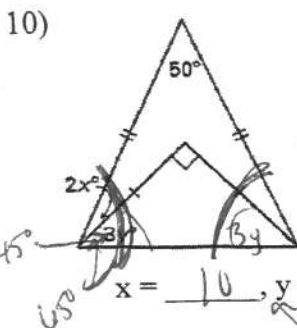
$$3y + 3y + 90 = 180$$
$$6y + 90 = 180$$
$$\quad -90 \quad -90$$
$$\frac{6y}{6} = \frac{90}{6}$$

$$x = \underline{10}, y = \underline{15}$$

$$\frac{2x}{2} = \frac{20}{2}$$

11) $5x°$, $(2x + 5)°$, $(3x - 15)°$
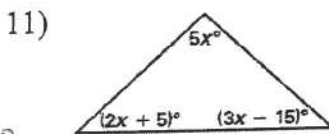
$$2x + 5 + 3x - 15 + 5x = 180$$
$$10x - 10 = 180$$
$$\quad\quad +10 \quad +10$$
$$\frac{10x}{10} = \frac{190}{10}$$
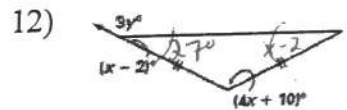
$$x = \underline{19}$$

12) $3y°$, 27°, $x - 2$, $(x - 2)°$, $(4x + 10)°$

$$x - 2 + x - 2 + 4x + 10 = 180$$
$$6x + 6 = 180$$
$$\quad -6 \quad -6$$
$$\frac{6x}{6} = \frac{174}{6}$$
$$x = 29$$

$$x = \underline{29}, y = \underline{51}$$

$$3y + 27 = 180$$
$$\quad -27 \quad -27$$
$$\frac{3y}{3} = \frac{153}{3}$$

Use the given information to find the values of the variables.

13) $ABCD \cong EFGH$

$(4y - 4)°$

$(10x + 65)°$
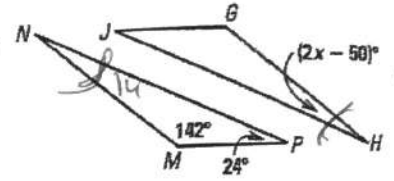
B $135°$ C

A $28°$ D H G F E
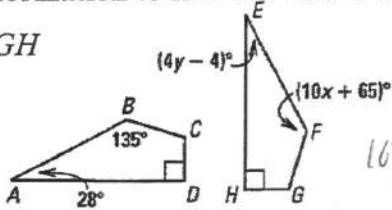
$16x + 65 = 135$
$-65 \quad -65$
$10x = 70$
$\frac{10x}{10} = \frac{70}{10}$

$4y - 4 = 28$
$+4 \quad +4$
$\frac{4y}{4} = \frac{32}{4}$

$x = \underline{7}$, $y = \underline{8}$

14) $\triangle MNP \cong \triangle GHJ$

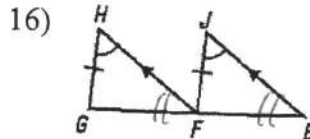
$(2x - 50)°$

$142°$

M $24°$ P H

$2x - 50 = 14$
$+50 \quad +50$
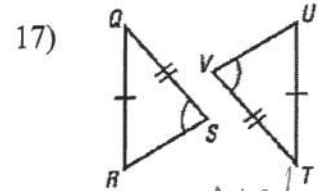$\frac{2x}{2} = \frac{64}{2}$ $x = \underline{32}$

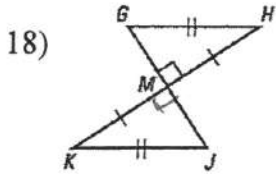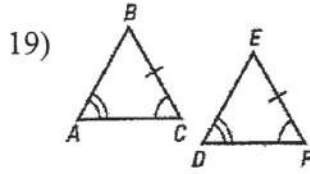**Can you prove that the two triangles are congruent? If possible, state why.**
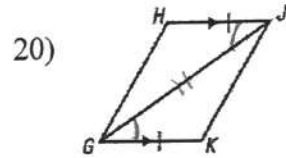
15)

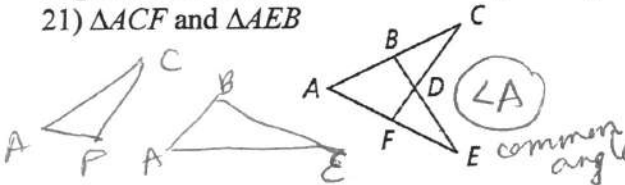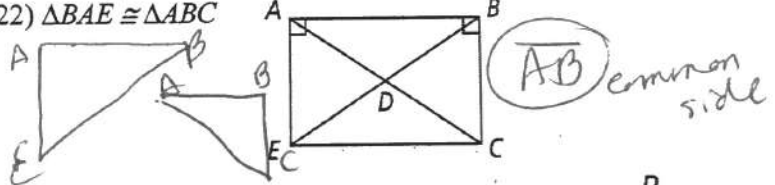yes ASA

16)

yes AAS

17)

No!

18)

yes HL

19)

yes AAS

20)
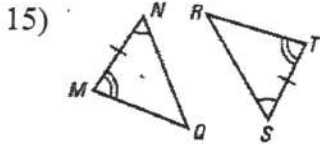
yes SAS

Separate or redraw the following triangles. Identify their common sides or angles

21) $\triangle ACF$ and $\triangle AEB$

$\angle A$ common angle

22) $\triangle BAE \cong \triangle ABC$

$\overline{AB}$ common side

Complete each two-column proof. Each given fact will be a separate step.

23) **Given:** $\overline{PQ}$ bisects $\angle SPT$; $\overline{SP} \cong \overline{TP}$
Prove: $\triangle SPQ \cong \triangle TPQ$

Statements	Reasons
1) $\overline{PQ}$ bisects $\angle SPT$	1) Given
2) $\overline{SP} \cong \overline{TP}$	2) Given
3) $\angle SPQ \cong \angle TPQ$	3) def. of $\angle$ bisector
4) $\overline{PQ} \cong \overline{PQ}$	4) reflexive prop.
5) $\triangle SPQ \cong \triangle TPQ$	5) SAS

7.

24) Given: $\overline{EF} \cong \overline{JH}$; $\overline{EF} \parallel \overline{JH}$

Prove: $\triangle EFG \cong \triangle JHG$
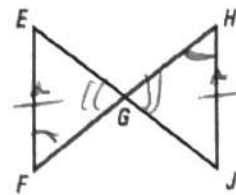
Statements	Reasons
1) $\overline{EF} \cong \overline{JH}$	1) Given
2) $\overline{EF} \parallel \overline{JH}$	2) Given
3) $\angle F \cong \angle H$	3) AIA Thm.
4) $\angle EGF \cong \angle JGH$	4) vertical ∠'s are ≅
5) $\triangle EGF \cong \triangle JGH$	5) AAS

25) Given: $\overline{AR} \perp \overline{TG}$; $\overline{AG} \cong \overline{AT}$

Prove: $\triangle AGR \cong \triangle ATR$

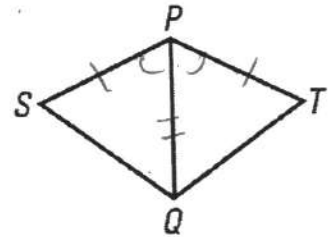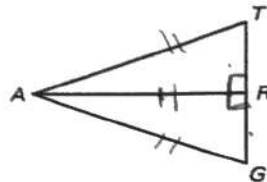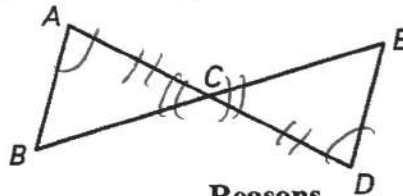| Statements	Reasons
1) $\overline{AR} \perp \overline{TG}$	1) Given
2) $\overline{AG} \cong \overline{AT}$	2) Given
3) $\overline{AR} \cong \overline{AR}$	3) reflexive prop.
4) $\angle GRA = 90°, \angle TRA = 90°$	4) def. of $\perp$
5) $\angle GRA \cong \angle TRA$	5) right ∠'s are ≅
6) $\triangle AGR \cong \triangle ATR$	6) HL

Complete each two-column proof. Each given fact will be a separate step.

26) Given: $\overline{AC} \cong \overline{DC}$; $\angle A \cong \angle D$

Prove: $\angle B \cong \angle E$

Statements	Reasons
1) $\overline{AC} \cong \overline{DC}$	1) Given
2) $\angle A \cong \angle D$	2) Given
3) $\angle ACB \cong \angle ECD$	3) vertical ∠'s are ≅
4) $\triangle ACB \cong \triangle DCE$	4) ASA
5) $\angle B \cong \angle E$	5) CPCTC

27) Given: $\overline{AD} \cong \overline{CB}$; $\overline{AB} \cong \overline{CD}$
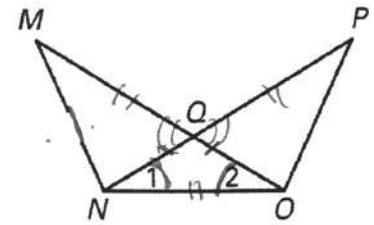Prove: $\overline{AD} \parallel \overline{BC}$
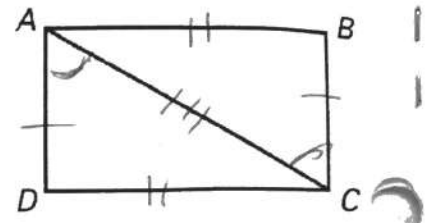
Statements	Reasons
1) $\overline{AD} \cong \overline{CB}$	1) Given
2) $\overline{AB} \cong \overline{CD}$	2) Given
3) $\overline{AC} \cong \overline{AC}$	3) reflexive prop.
4) $\triangle ADC \cong \triangle CBA$	4) SSS
5) $\angle DAC \cong \angle BCA$	5) ...CPCTC ......
6) $\overline{AD} \parallel \overline{BC}$	6) alt. int. ∠'s Converse

28) Given: $\overline{MQ} \cong \overline{PQ}$; $\angle 1 \cong \angle 2$
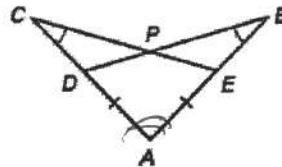Prove: $\overline{MN} \cong \overline{PO}$

Statements	Reasons
1) $\overline{MQ} \cong \overline{PQ}$	1) Given
2) $\angle 1 \cong \angle 2$	2) Given
3) $\angle MQN \cong \angle OQP$	3) vertical ∠'s are ≅
4) $\overline{NQ} \cong \overline{OQ}$	4) Base ∠'s Converse
5) $\triangle MQN \cong \triangle PQ.N$	5) SAS
6) $MN \cong PO$	6) CPCTC

29) Given: $\overline{AD} \cong \overline{AE}$, $\angle B \cong \angle C$
Prove: $\triangle ABD \cong \triangle ACE$

$\overline{AD} \cong \overline{AE}$ Given
$\angle B \cong \angle C$ Given
$\angle A \cong \angle A$ reflexive prop.
$\triangle ABD \cong \triangle ACE$ AAS

30)

Given: $\angle M \cong \angle N$
    $\angle OKL \cong \angle OLK$
Prove: $\overline{MO} \cong \overline{NO}$
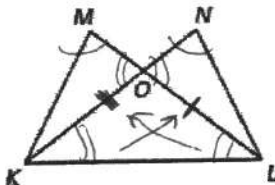
$\angle M \cong \angle N$ Given
$\angle OKL \cong \angle OLK$ Given
$\overline{KO} \cong \overline{LO}$ Base ∠'s Converse
$\angle MOK \cong \angle NOL$ vertical ∠'s are ≅
$\triangle MOK \cong \triangle NOL$ AAS
$\overline{MO} \cong \overline{NO}$ CPCTC