Written Exercises

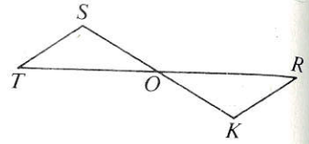
Suppose $\triangle BIG \cong \triangle CAT$. Complete.

A

1. $\angle G \cong$?
2. ? $= m\angle A$
3. $BI =$?
4. ? $\cong \overline{AT}$
5. $\triangle IGB \cong$?
6. ? $\cong \triangle CTA$

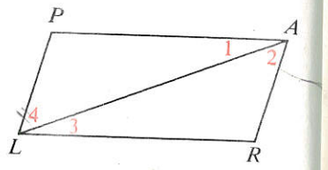
7. If $\triangle BIG \cong \triangle CAT$, $m\angle B = 100$, and $m\angle G = 40$, name four congruent angles.
8. Is the statement "Corresponding parts of congruent triangles are congruent" based on a definition, postulate, or theorem?
9. Suppose $\triangle LXR \cong \triangle FNE$. Write six congruences that follow from this statement and the definition of congruent triangles.

The two triangles shown are congruent. Complete.



10. $\triangle STO \cong$?.
11. $\angle S \cong$? because ?.
12. $\overline{SO} \cong$? because ?. Thus point O is the midpoint of ?.
13. Since ? $= RO$, O is the midpoint of ?.
14. a. $\angle T \cong$? because ?.
    b. $\overline{ST} \parallel \overline{RK}$ because ?.

The two triangles shown are congruent. Complete.



15. $\triangle PAL \cong$?.
16. a. $\angle 1 \cong$? because ?.
    b. $\overline{PA} \parallel$? because ?.
17. a. $\angle 2 \cong$? because ?.
    b. ? $\parallel$? because ?.
18. a. $\overline{PA} \cong$? b. $\overline{PL} \cong$?.

Plot the given points on graph paper. Draw $\triangle FAT$. Locate point C so that $\triangle FAT \cong \triangle CAT$.

19. $F(1, 2)$ $A(4, 7)$ $T(4, 2)$
20. $F(7, 5)$ $A(-2, 2)$ $T(5, 2)$

Plot the given points on graph paper. Draw $\triangle ABC$ and $\triangle DEF$. Copy and complete the statement $\triangle ABC \cong$?.

B

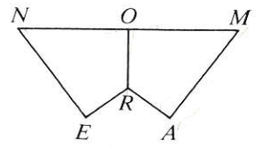
21. $A(-1, 2)$ $B(4, 2)$ $C(2, 4)$ $D(5, -1)$ $E(7, 1)$ $F(10, -1)$
22. $A(-7, -3)$ $B(-2, -3)$ $C(-2, 0)$ $D(0, 1)$ $E(5, 1)$ $F(0, -2)$
23. $A(-3, 1)$ $B(2, 1)$ $C(2, 3)$ $D(4, 3)$ $E(6, 3)$ $F(6, 8)$
24. $A(1, 1)$ $B(8, 1)$ $C(4, 3)$ $D(3, -7)$ $E(5, -3)$ $F(3, 0)$

Plot the given points on graph paper. Draw $\triangle ABC$ and $\overline{DE}$. Find two locations of point F such that $\triangle ABC \cong \triangle DEF$.

25. $A(1, 2)$ $B(4, 2)$ $C(2, 4)$ $D(6, 4)$ $E(6, 7)$
26. $A(-1, 0)$ $B(-5, 4)$ $C(-6, 1)$ $D(1, 0)$ $E(5, 4)$

$\overline{OR}$ is a common side of two congruent quadrilaterals.

27. Complete: quad. $NERO \cong$ quad. ?



Exs. 27, 28

28. In your own words explain why each of the following statements must be true.
    a. O is the midpoint of $\overline{NM}$.
    b. $\angle NOR \cong \angle MOR$
    c. $\overline{RO} \perp \overline{NM}$ d. $\overline{OR} \cong \overline{OR}$

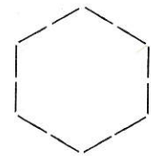
29. a. Use a protractor to draw a triangle whose angles have measure 50, 60, and 70.
    b. Can you draw another triangle whose angles have measure 50, 60, and 70 but which is not congruent to the first triangle?

Accurately draw the pairs of triangles described. Measure all the corresponding parts of each pair. Are the two triangles congruent?

30. In $\triangle ABC$, $AB = 4$ cm, $m\angle B = 45$, and $BC = 6$ cm.
    In $\triangle DEF$, $DE = 4$ cm, $m\angle E = 45$, and $EF = 6$ cm.
31. In $\triangle RST$, $m\angle R = 30$, $RS = 5$ cm, and $m\angle S = 100$.
    In $\triangle XYZ$, $m\angle X = 30$, $XY = 5$ cm, and $m\angle Y = 100$.

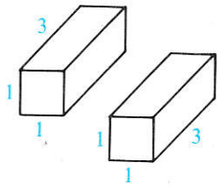
C

32. Does congruence of triangles have the reflexive property? the symmetric property? the transitive property?
33. Suppose twelve toothpicks are arranged as shown to form a regular hexagon.
    a. Copy the figure. Sketch six more toothpicks of the same size inside the hexagon so that it is divided into three congruent regions.
    b. Now "move" only four toothpicks so that the hexagon is divided into two congruent regions.

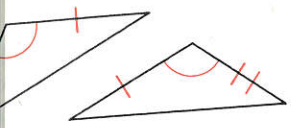


Challenge

The two blocks of wood are congruent. It is possible to cut a hole in one block in such a way that you can pass the other block completely through the hole. How?



t be congruent by the SAS postulate.



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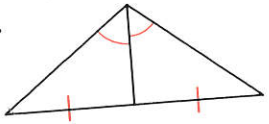
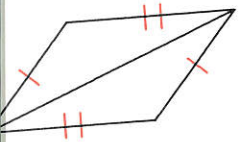


ent? If so, what postulate can be used?



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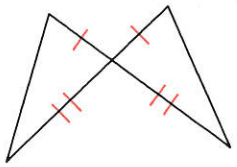

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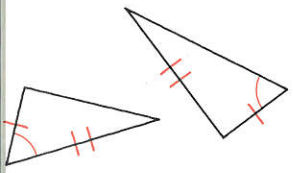
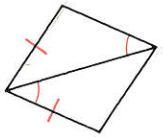
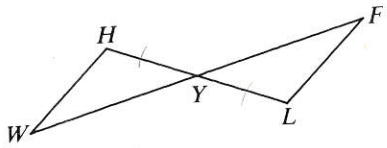




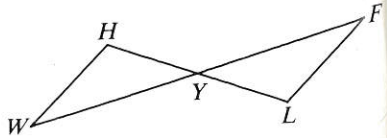
and reasons in the



	Reasons
	1. ?
	2. ?
	3. ?
	4. ?
	5. ?

ove the following.

$\overline{LF}$

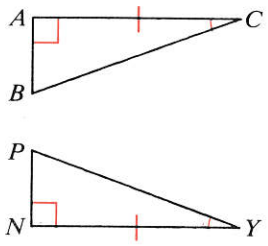


Written Exercises

Decide whether there is a triangle congruent to $\triangle ABC$. If so, write the congruence and name the postulate used. If not, write *no congruence can be deduced.*

A

1.



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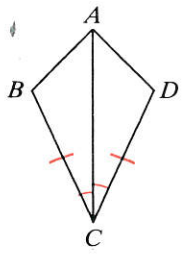

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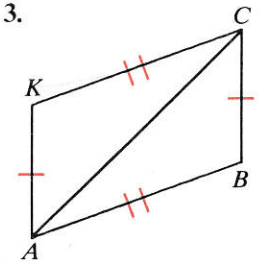

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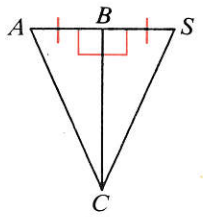

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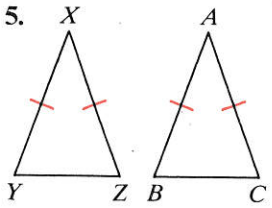

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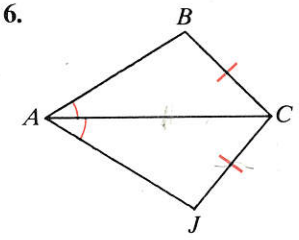

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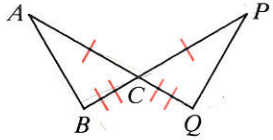

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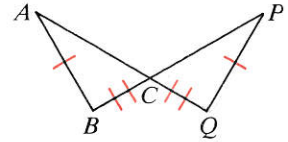

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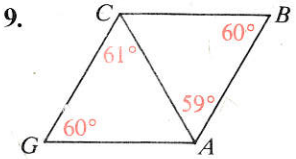

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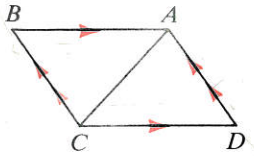

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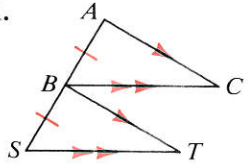

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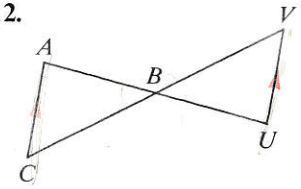

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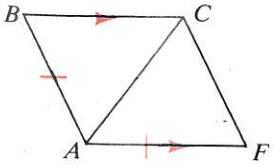

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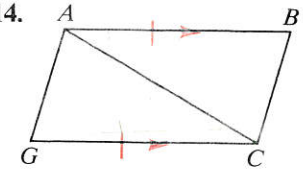

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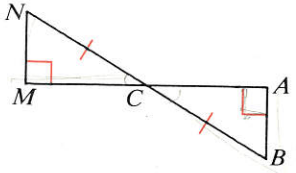


Supply the missing statements and reasons.

16. Given: $\overline{AB} \parallel \overline{DC}$; $\overline{AB} \cong \overline{DC}$

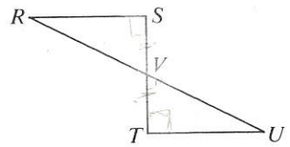
Prove: $\triangle ABC \cong \triangle CDA$

Proof:

Statements	Reasons
1. $\overline{AB} \cong \overline{DC}$	1. ?
2. $\overline{AC} \cong \overline{AC}$	2. ?
3. $\overline{AB} \parallel \overline{DC}$	3. ?
4. $\angle BAC \cong \angle DCA$	4. ?
5. $\triangle ABC \cong \triangle CDA$	5. ?

17. Given: $\overline{RS} \perp \overline{ST}$; $\overline{TU} \perp \overline{ST}$;
V is the midpoint of $\overline{ST}$.

Prove: $\triangle RSV \cong \triangle UTV$

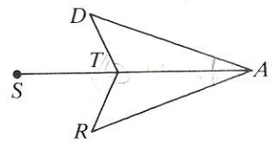


Proof:

Statements	Reasons
1. $\overline{RS} \perp \overline{ST}$; $\overline{TU} \perp \overline{ST}$	1. ?
2. $m\angle S = 90 = m\angle$?	2. Def. of $\perp$ lines and def. of rt. $\angle$
3. V is the midpoint of $\overline{ST}$.	3. ?
4. $\overline{SV} \cong$?	4. ?
5. $\angle RVS \cong \angle$?	5. ?
6. $\triangle$? $\cong \triangle$?	6. ?

18. Given: $\overleftrightarrow{SA}$ bisects $\angle DAR$ and $\angle DTR$.

Prove: $\triangle DAT \cong \triangle RAT$

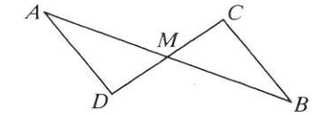


Proof:

Statements	Reasons
1. $\overleftrightarrow{SA}$ bisects $\angle DAR$ and $\angle DTR$.	1. ?
2. $\angle DAT \cong$? ; ? $\cong$?	2. Def. of $\angle$ bisector
3. $\angle DTA$ and $\angle DTS$ are suppl. $\measuredangle$s; $\angle$? and $\angle$? are suppl. $\measuredangle$s.	3. Angle Addition Postulate and def. of suppl. $\measuredangle$s.
4. $\angle$? $\cong$?	4. Supplements of $\cong \measuredangle$s are $\cong$.
5. ? $\cong$?	5. Reflexive Prop.
6. ?	6. ?

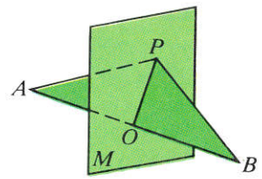
Write proofs in two-column form.

B **19.** Given: M is the midpoint of $\overline{AB}$;
M is the midpoint of $\overline{CD}$.
Prove: $\triangle MAD \cong \triangle MBC$



20. Given: Plane M bisects $\overline{AB}$; $\overline{PA} \cong \overline{PB}$
Prove: $\triangle POA \cong \triangle POB$

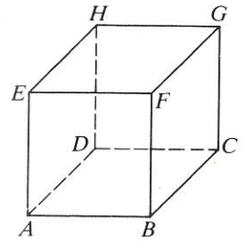
21. Given: Plane M bisects $\overline{AB}$; $\overline{PO} \perp \overline{AB}$
Prove: $\triangle POA \cong \triangle POB$



22. **a.** Draw an isosceles $\triangle ABC$ with $\overline{AC} \cong \overline{BC}$. Let D be any point on $\overrightarrow{AB}$ such that B is between A and D. Draw $\overline{CD}$.
b. Name the pairs of congruent parts of $\triangle ACD$ and $\triangle BCD$.
c. Do you think that SSA is enough to guarantee that two triangles are congruent?

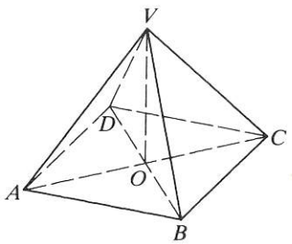
The following diagrams represent three-dimensional figures. Copy each figure and with colored pencils outline the pair of triangles listed. Tell which postulate guarantees that these triangles are congruent.

C **23.**



Given: Cube whose faces are congruent squares
Show: $\triangle ABF$, $\triangle BCG$

24.



Given: Pyramid with square base; $VA = VB = VC = VD$
Show: $\triangle VAB$, $\triangle VBC$

Challenge

You can cut a cubical block into 8 cubes by using a slicer 3 times, as shown. To cut a cube into 27 cubes, you need 6 slicings even though you are permitted to rearrange parts in any way you choose after each cutting. To cut a cube into 216 cubes requires only 9 slicings.

How many slicings does it take to divide a cube into 64 cubes? into 125 cubes?