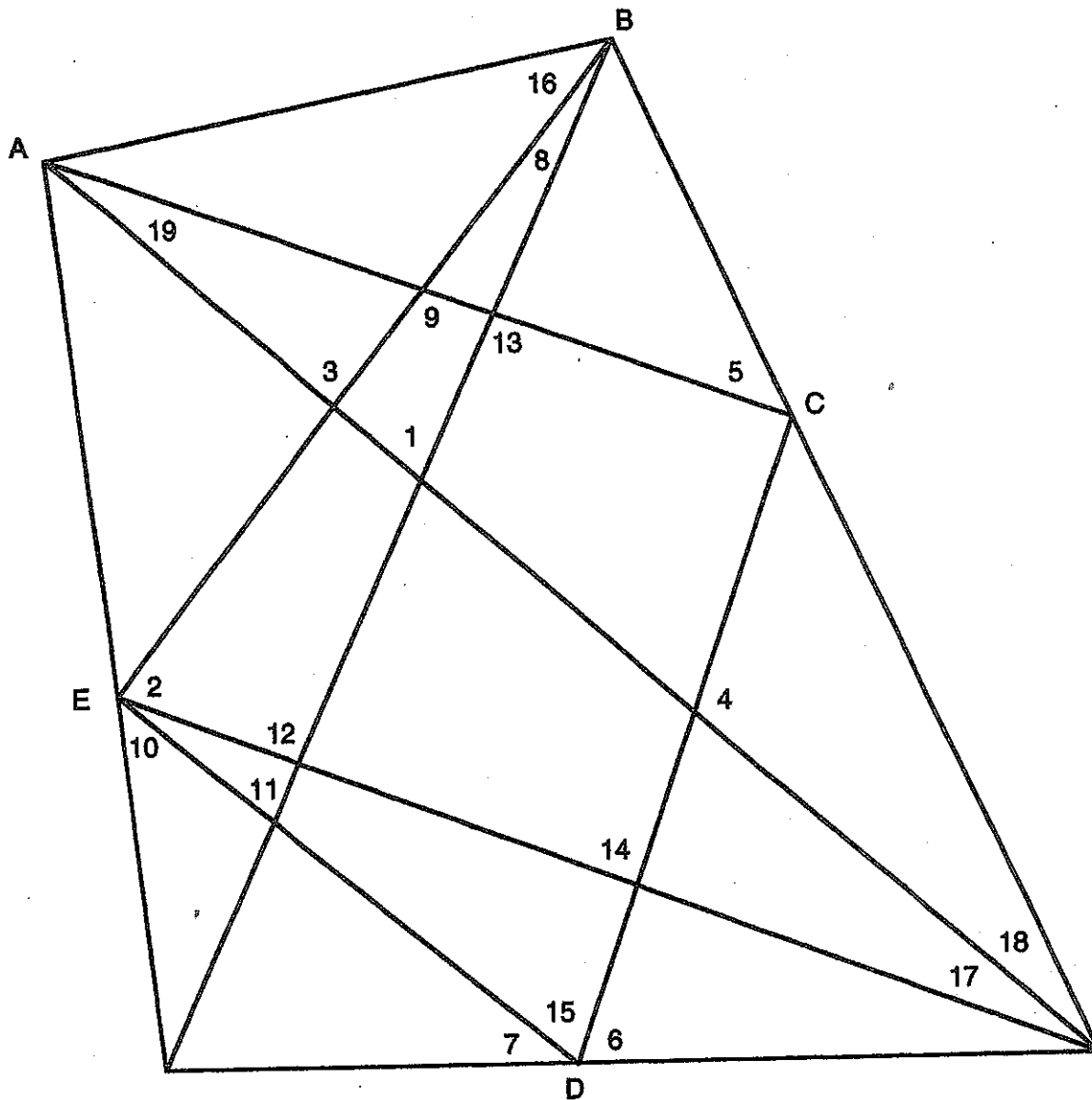


3-20 THE BIG QUADRILATERAL PUZZLE

Use the big quadrilateral below and record the given information on the diagram. Use the diagram and your knowledge of quadrilaterals and triangles to find the measures of the missing angles. Write the measures in their proper place on the diagram, being sure that any measures you record on the diagram are correct. Incorrect answers may lead to more incorrect answers. You may not use protractors or rulers. (*Hint: Record every measure you know, even if you are not asked to find it. It may help you find a missing measure.*)



Given:

- $m\angle EAB = 95$
- $m\angle BED = 80$
- $m\angle 1 = 83$
- $m\angle 3 = 101$
- $m\angle 5 = 46$
- $m\angle 7 = 35$

- $m\angle ABC = 104$
- $\overline{AC} \perp \overline{CD}$
- $m\angle 2 = 62$
- $m\angle 4 = 104$
- $m\angle 6 = 70$

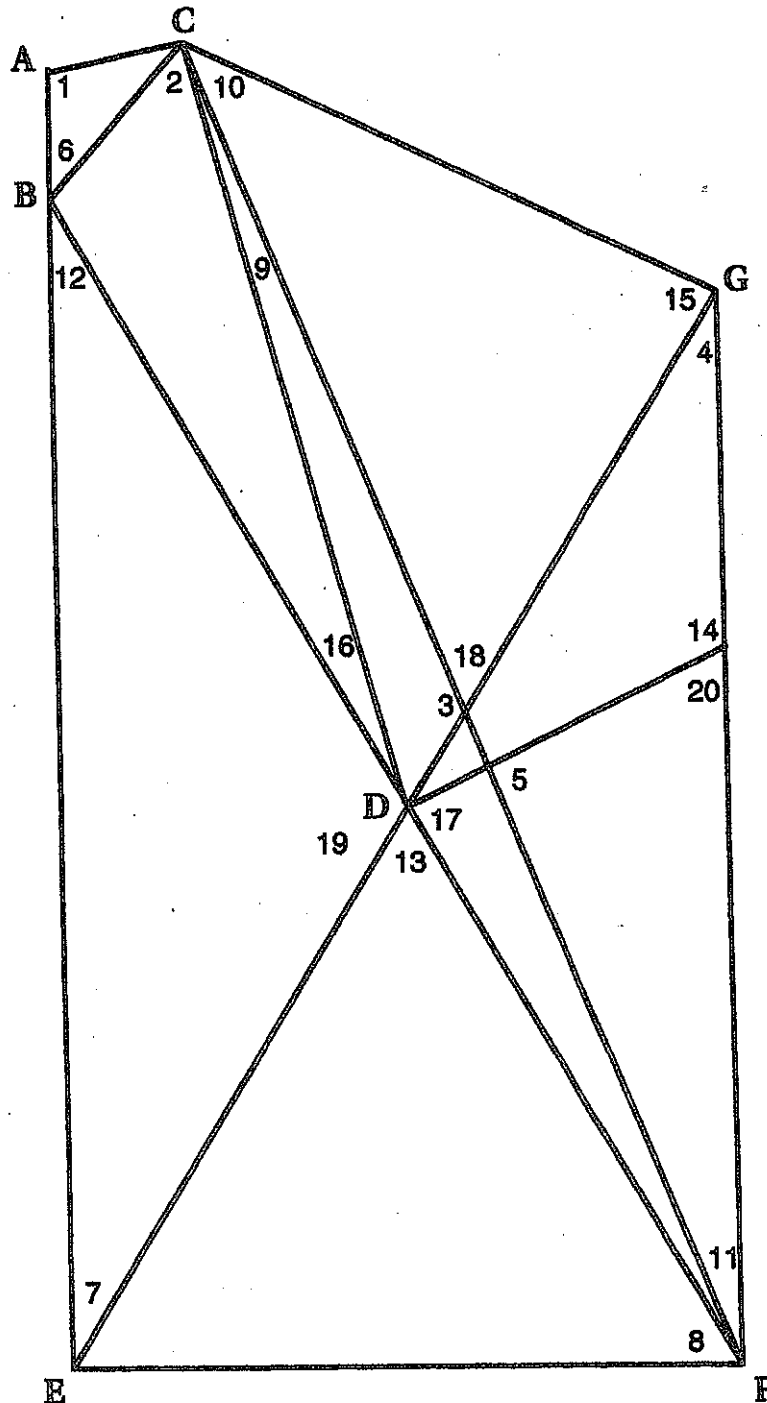
Find:

- $m\angle 8$
- $m\angle 10$
- $m\angle 12$
- $m\angle 14$
- $m\angle 16$
- $m\angle 18$
- $m\angle 9$
- $m\angle 11$
- $m\angle 13$
- $m\angle 15$
- $m\angle 17$
- $m\angle 19$

Below is a figure that contains several triangles. Record the given information on the figure. Using your knowledge of triangles and the measures of their angles, find the measures of the other angles on the figure. (You may not use a protractor. Use your reasoning skills and powers of deduction!) All of the missing measures can be found.

Record this information on the figure, and then find the missing measures.

- ▲ $\triangle ABC$ is isosceles with base \overline{BC} .
- ▲ $\triangle DEF$ is equilateral.
- ▲ \overline{AE} , \overline{EG} , \overline{BF} , and \overline{CF} are line segments.
- ▲ $AE \perp EF$, $CG \perp EG$.
- ▲ $m\angle 1 = 100$, $m\angle 2 = 56$, $m\angle 3 = 128$, $m\angle 4 = 36$, $m\angle 5 = 94$.



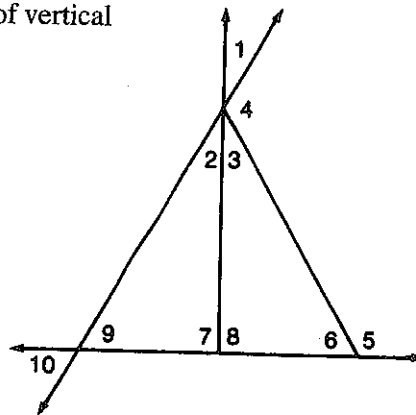
3-9B Attributes of Triangles

Use your ruler, protractor, and unlined paper to draw the triangles listed at the left of the chart and find their attributes. Then complete the chart. Write "must" if a triangle must have the characteristic described below, "may" if a triangle may or may not have the characteristic, or "can't" if a triangle cannot have the characteristic.

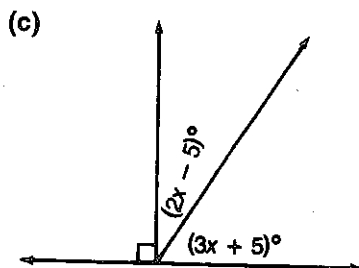
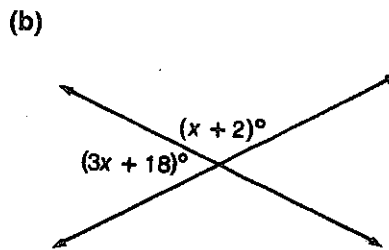
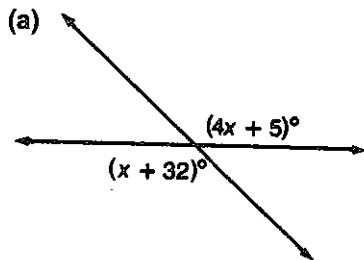
CHARACTERISTICS OF TRIANGLES							
Types of Triangles	1 right angle	1 obtuse angle	2 acute angles	3 acute angles	2 congruent angles	3 congruent angles	2 congruent sides
Right							
Acute							
Obtuse							
Scalene							
Isosceles							
Equilateral							
Right Isosceles							
Right Scalene							

REVIEW EXERCISES FOR CHAPTER 3

1. For the accompanying diagram, list all pairs of vertical and adjacent angles.



2. The measure of an angle is 5 times as great as the measure of its complement. Find the measure of the angle.
3. The measure of an angle exceeds 3 times its supplement by 4. Find the measure of the angle.
4. The measure of the supplement of an angle is 3 times as great as the measure of the angle's complement. Find the measure of the angle.
5. The difference between the measures of an angle and its complement is 14. Find the measure of the angle and its complement.
6. Find the measure of an angle if it is 12 less than twice the measure of its complement.
7. Find the value of x :

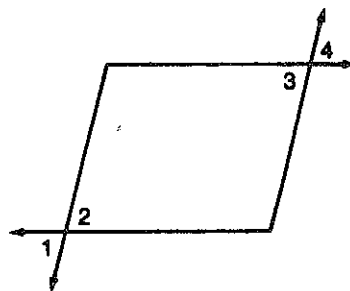


8. \overleftrightarrow{XY} and \overleftrightarrow{AB} intersect at point C . If $m\angle XCB = 4x - 9$ and $m\angle ACY = 3x + 29$, find $m\angle XCB$.

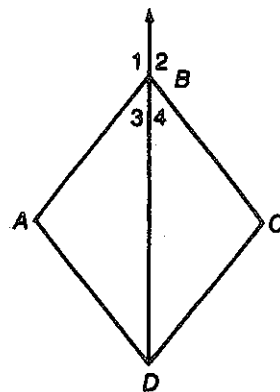
In Exercises 9 to 13, state whether each statement is true or false. Prove a statement is false by providing a counterexample.

9. Complements of vertical angles are congruent.
10. If two lines intersect, then the bisectors of a pair of adjacent angles are perpendicular to each other.
11. If two lines intersect to form congruent angles, then the lines are perpendicular.
12. If an angle is congruent to its supplement, then it is a right angle.
13. If a point C is equidistant from points A and B , then point C is the midpoint of the segment that joins A and B .

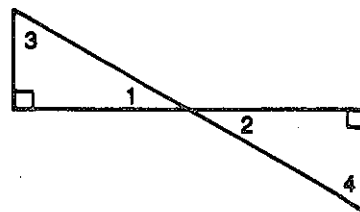
14. GIVEN: $\angle 1 \cong \angle 4$.
 PROVE: $\angle 2 \cong \angle 3$.



15. GIVEN: \overline{BD} bisects $\angle ABC$.
 PROVE: $\angle 1 \cong \angle 2$.



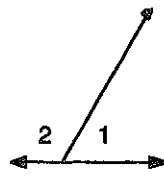
16. GIVEN: $\angle 3$ is complementary to $\angle 1$,
 $\angle 4$ is complementary to $\angle 2$.
 PROVE: $\angle 3 \cong \angle 4$.



1-12 Finding Missing Angles

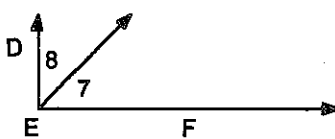
Study the diagrams and the information, then find the measure of each missing angle. A good strategy is to label each diagram with the information you are given. This will help you to "see" possible clues that will help you to find the missing measures. Be careful. In some cases, not enough information is given to find the missing measures. For those problems, write NEI for "not enough information."

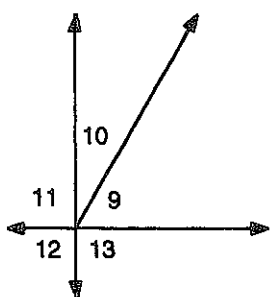
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1.  $m\angle 1 = 60$
 $m\angle 2 = \underline{\hspace{2cm}}$

2.  $\angle 3 \cong \angle 4$
 $m\angle 3 = \underline{\hspace{2cm}}$
 $m\angle 4 = \underline{\hspace{2cm}}$

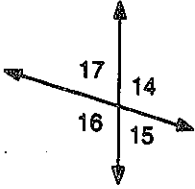
3.  $\angle ABC$ is a right angle
 $m\angle 5 = \underline{\hspace{2cm}}$
 $m\angle 6 = \underline{\hspace{2cm}}$

4.  $\angle DEF$ is a right angle
 $\angle 7 \cong \angle 8$
 $m\angle 7 = \underline{\hspace{2cm}}$
 $m\angle 8 = \underline{\hspace{2cm}}$

5.  $m\angle 10 = 50$
 $m\angle 9 = \underline{\hspace{2cm}}$
 $m\angle 11 = \underline{\hspace{2cm}}$
 $m\angle 12 = \underline{\hspace{2cm}}$
 $m\angle 13 = \underline{\hspace{2cm}}$

1-12 (Cont'd)

6.



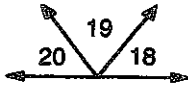
$$m\angle 14 = 110$$

$$m\angle 15 = \underline{\hspace{2cm}}$$

$$m\angle 16 = \underline{\hspace{2cm}}$$

$$m\angle 17 = \underline{\hspace{2cm}}$$

7.



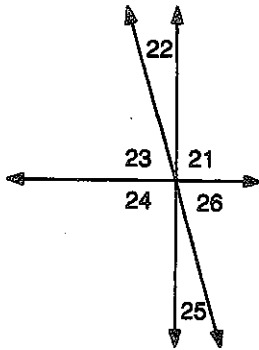
$$m\angle 18 = m\angle 19 = m\angle 20$$

$$m\angle 18 = \underline{\hspace{2cm}}$$

$$m\angle 19 = \underline{\hspace{2cm}}$$

$$m\angle 20 = \underline{\hspace{2cm}}$$

8.



$$m\angle 22 = 15$$

$$m\angle 21 = \underline{\hspace{2cm}}$$

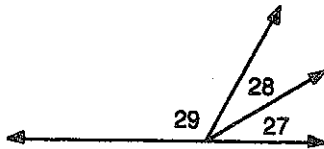
$$m\angle 23 = \underline{\hspace{2cm}}$$

$$m\angle 24 = \underline{\hspace{2cm}}$$

$$m\angle 25 = \underline{\hspace{2cm}}$$

$$m\angle 26 = \underline{\hspace{2cm}}$$

9.



$$m\angle 28 = 2m\angle 27$$

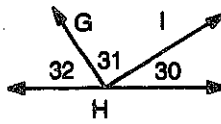
$$m\angle 29 = 3m\angle 28$$

$$m\angle 27 = \underline{\hspace{2cm}}$$

$$m\angle 28 = \underline{\hspace{2cm}}$$

$$m\angle 29 = \underline{\hspace{2cm}}$$

10.

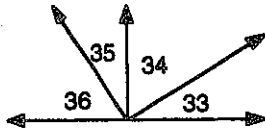


$\angle GHI$ is a right angle

$m\angle 31 = \underline{\hspace{2cm}}$

$m\angle 32 + m\angle 30 = \underline{\hspace{2cm}}$

11.



$m\angle 34 = 62$

$\angle 34$ and $\angle 35$ are complementary

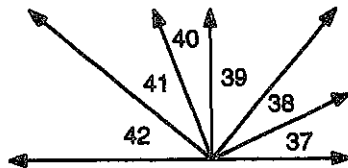
$\angle 33$ and $\angle 34$ are complementary

$m\angle 33 = \underline{\hspace{2cm}}$

$m\angle 35 = \underline{\hspace{2cm}}$

$m\angle 36 = \underline{\hspace{2cm}}$

12.



$m\angle 39 = 40$

$m\angle 37 + m\angle 38 + m\angle 39 = 90$

$m\angle 37 + m\angle 38 + m\angle 39 + m\angle 40 = 110$

$m\angle 40 + m\angle 41 + m\angle 39 = 90$

$m\angle 37 = \underline{\hspace{2cm}}$

$m\angle 38 = \underline{\hspace{2cm}}$

$m\angle 40 = \underline{\hspace{2cm}}$

$m\angle 41 = \underline{\hspace{2cm}}$

$m\angle 42 = \underline{\hspace{2cm}}$