



Using a Computer

See page T77 for three experiments involving measuring segments and angles.

This is the first of the "Using a Computer" paragraphs that occur periodically throughout the side columns of this Teacher's Edition. Designed to help teachers wishing to emphasize technology, these paragraphs typically offer teaching commentary on computer material in the student textbook, point out Written Exercises that may be studied profitably using a computer, or refer teachers to additional computer material that appears in the "Using Technology" paragraphs at the front of this Teacher's Edition. In most cases, access to geometric construction software, such as the *Geometric Supposer* or *GeoDraw*, is required. (See "Getting Started with Computers" on pages T72-T73.) Exceptions to the software requirement are "Using a Computer" paragraphs referring to "Computer Key-Ins," where students work with simple BASIC programs.

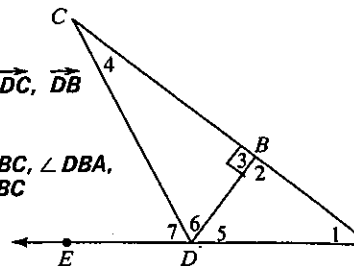
Using a Model

For Ex. 27, the use of a large sheet of wrapping paper can provide an effective demonstration. Have an angle cut out in advance. Then, in class, put bold labels O , A , and B on the paper.

Classroom Exercises

Name the vertex and the sides of the given angle.

1. $\angle 4$ C ; \vec{CD} , \vec{CB}
2. $\angle 1$ A ; \vec{AD} , \vec{AB}
3. $\angle 6$ D ; \vec{DC} , \vec{DB}
4. Name all angles adjacent to $\angle 6$. $\angle 7$, $\angle 5$
5. Name three angles that have B as the vertex. $\angle ABC$, $\angle DBA$, $\angle DBC$
6. How many angles have D as the vertex? 6



State whether the angle appears to be acute, right, obtuse, or straight. Then estimate its measure. Accept reasonable estimates. Exs. 1-16

7. $\angle 1$ acute; about 35
8. $\angle 2$ right; 90
9. $\angle EDB$ obtuse; about 125
10. $\angle CDB$ acute; about 65
11. $\angle ADC$ obtuse; about 120
12. $\angle ADE$ straight; 180

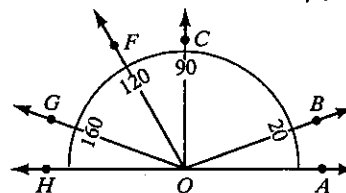
Complete.

13. $m\angle 7 + m\angle 6 = m\angle ?$ EDB
14. $m\angle 6 + m\angle 5 = m\angle ?$ ADC
15. $m\angle 2 + m\angle 3 = ?$ 180
16. If \vec{DB} bisects $\angle CDA$, then $\angle ? \cong \angle ?$. 5, 6

23. $\angle GOH$, $\angle COF$, $\angle FOB$, and $\angle FOA$

State the measure of each angle.

17. $\angle BOC$ 70
18. $\angle GOH$ 20
19. $\angle FOG$ 40
20. $\angle COF$ 30
21. $\angle GOB$ 140
22. $\angle HOA$ 180



See above.

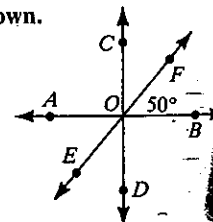
23. Name four angles that are adjacent to $\angle FOG$.
24. What ray bisects which two angles? \vec{OC} bisects $\angle HOA$ and $\angle GOB$.
25. Name a pair of congruent: a. acute angles b. right angles c. obtuse angles

Exs. 17-25

26. Study a corner of your classroom where two walls and the ceiling meet. How many right angles can you see at the corner? 3
27. Draw an angle, $\angle AOB$, on a sheet of paper. Fold the paper so that \vec{OA} falls on \vec{OB} . Lay the paper flat and call the fold line \vec{OK} . How is \vec{OK} related to $\angle AOB$? Explain. \vec{OK} bisects $\angle AOB$.

Given the diagram, state whether you can reach the conclusion shown.

28. $m\angle FOB = 50$ Yes
29. $m\angle AOC = 90$ No
30. $m\angle DOC = 180$ Yes
31. $AO = OB$ No
32. $\angle AOC \cong \angle BOC$ No
33. $m\angle AOF = 130$ Yes
34. Points E , O , and F are collinear. Yes
35. Point C is in the interior of $\angle AOF$. Yes
36. $\angle AOE$ and $\angle AOD$ are adjacent angles. No
37. $\angle AOB$ is a straight angle. Yes
38. \vec{OA} and \vec{OB} are opposite rays. Yes
- a. $\angle GOH$ and $\angle BOA$, or $\angle GOC$ and $\angle COB$
- b. $\angle HOC$ and $\angle COA$
- c. $\angle HOB$ and $\angle GOA$



Exs. 28-38

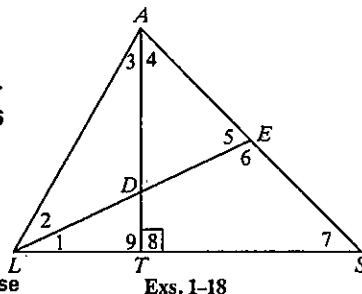
Written Exercises

- A 1. Name the vertex and the sides of $\angle 5$. E ; \vec{EL} , \vec{EA}
 2. Name all angles adjacent to $\angle ADE$. $\angle ADL$, $\angle EDT$
 Answers may vary in Exs. 3-8.
 State another name for the angle.

3. $\angle 1$ $\angle DLT$ 4. $\angle 3$ $\angle LAT$ 5. $\angle 5$ $\angle AEL$
 6. $\angle ALD$ $\angle 2$ 7. $\angle AST$ $\angle 7$ 8. $\angle LES$ $\angle 6$

State whether the angle appears to be acute, right, obtuse, or straight.

9. $\angle 2$ acute 10. $\angle LAS$ acute 11. $\angle ATL$ right
 12. $\angle S$ acute 13. $\angle LTS$ straight 14. $\angle EDT$ obtuse



Complete.

15. $m\angle 3 + m\angle 4 = m\angle \frac{?}{?}$ $\angle LAS$ 16. $m\angle ALS - m\angle 2 = m\angle \frac{?}{?}$ 1
 17. If $m\angle 1 = m\angle 2$, then $\frac{?}{?}$ bisects $\frac{?}{?}$. 18. $m\angle LDA + m\angle ADE = \frac{?}{?}$ 180
 \vec{LE} $\angle ALS$

Without measuring, sketch each angle. Then use a protractor to check your accuracy. Check students' drawings.

19. 90° angle 20. 45° angle 21. 150° angle 22. 10° angle

Draw a line, \vec{AB} . Choose a point O between A and B . Use a protractor to investigate the following questions.

23. In the plane represented by your paper, how many lines can you draw through O that will form a 30° angle with \vec{OB} ? 2
 24. In the plane represented by your paper, how many lines can you draw through O that will form a 90° angle with \vec{OB} ? 1
 B 25. Using a ruler, draw a large triangle. Then use a protractor to find the approximate measure of each angle and compute the sum of the three measures. Repeat this exercise for a triangle with a different shape. Did you get the same result? Yes

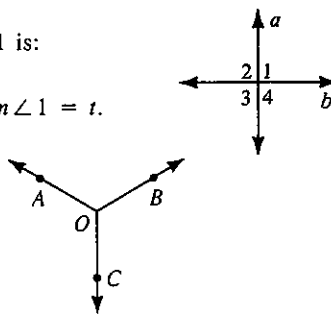
26. Find $m\angle 2$, $m\angle 3$, and $m\angle 4$ when the measure of $\angle 1$ is:
 a. 90 90 , 90 , 90 b. 93 87 , 93 , 87
 27. Express $m\angle 2$, $m\angle 3$, and $m\angle 4$ in terms of t when $m\angle 1 = t$.
 $180 - t$, t , $180 - t$

28. A careless person wrote, using the figure shown,

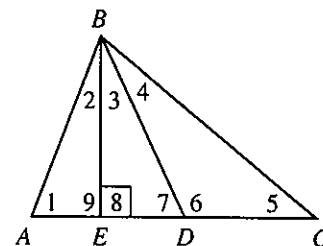
$$m\angle AOB + m\angle BOC = m\angle AOC.$$

What part of the Angle Addition Postulate did that person overlook?

B must be in the interior of $\angle AOC$.



Guided Practice



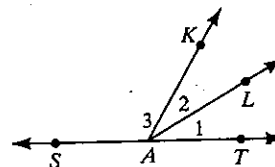
1. Name the vertex of $\angle 3$. B
 2. Name the right angle. $\angle 8$

State another name for each angle.

3. $\angle 1$ $\angle A$
 4. $\angle 6$ $\angle BDC$
 5. $\angle 3$ $\angle EBD$
 6. $\angle 4$ $\angle DBC$
 7. $\angle 7$ $\angle EDB$
 8. $\angle 2$ $\angle ABE$
 9. $\angle 5$ $\angle C$
 10. $\angle 9$ $\angle AEB$

\vec{AL} bisects $\angle KAT$. Find the value of x .

- 29. $m\angle 3 = 6x$, $m\angle KAT = 90 - x$ $x = 18$
- 30. $m\angle 1 = 7x + 3$, $m\angle 2 = 6x + 7$ $x = 4$
- 31. $m\angle 1 = 5x - 12$, $m\angle 2 = 3x + 6$ $x = 9$
- 32. $m\angle 1 = x$, $m\angle 3 = 4x$ $x = 30$
- 33. $m\angle 1 = 2x - 8$, $m\angle 3 = 116$ $x = 20$
- 34. $m\angle 2 = x + 12$, $m\angle 3 = 6x - 20$ $x = 22$

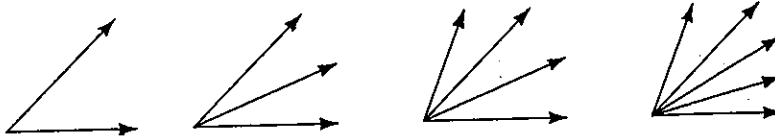


Exs. 29-34

Exercise Note

Some students may observe that all the figures drawn in Ex. 35 show rays in a half-plane. This restriction, however, does not affect the answer.

C 35. a. Complete.



2 rays → 1 angle 3 rays → 3 angles 4 rays → 6 $\frac{?}{2}$ angles 5 rays → 10 $\frac{?}{2}$ angles

b. Study the pattern in the four cases shown, and predict the number of angles formed by six noncollinear rays that have the same endpoint. **15**

c. Which of the expressions below gives the number of angles formed by n noncollinear rays that have the same endpoint?

- $n - 1$ $2n - 3$ $n^2 - 3$ $\frac{n(n-1)}{2}$

36. \vec{OC} bisects $\angle AOB$, \vec{OD} bisects $\angle AOC$, \vec{OE} bisects $\angle AOD$, \vec{OF} bisects $\angle AOE$, and \vec{OG} bisects $\angle FOC$.

- a. If $m\angle BOF = 120$, then $m\angle DOE = \frac{?}{?}$. **16**
- b. If $m\angle COG = 35$, then $m\angle EOG = \frac{?}{?}$. **25**

$$x + \frac{1}{2}x + \frac{1}{4}x + \frac{1}{8}x = 120$$

Teaching Suggestions,
pp. T77-T78

- Objectives
- Presenting the Lesson
- Problem Solving
- Extension

Cooperative Learning,
p. T78

Exploring Activity, p. c

1-5 Postulates and Theorems Relating Points, Lines, and Planes

Recall that we have accepted, without proof, the following four basic assumptions.

- The Ruler Postulate The Segment Addition Postulate
- The Protractor Postulate The Angle Addition Postulate

These postulates deal with segments, lengths, angles, and measures. The following five basic assumptions deal with the way points, lines, and planes are related.