◆ Computer Key-In

The BASIC computer program below will calculate the lengths of sides and diagonals of a quadrilateral. (Line 200 uses the distance formula, which you will study in Chapter 13.) Do the exercises to see what you can discover before studying special quadrilaterals in the next two sections.

```
10   DIM X(4), Y(4), A$(4)
15   A$(1) = "A":A$(2) = "B":A$(3) = "C":A$(4) = "D"
20   FOR I = 1 TO 4
30   PRINT "VERTEX ";A$(I);" ";
40   INPUT X(I), Y(I)
50   NEXT I
60   PRINT "SIDES"
70   FOR I = 1 TO 4
80   LET J = I + 1 - 4 * INT(I/4)
90   GOSUB 200
95   NEXT I
100  PRINT "DIAGONALS"
110  LET I = 1:LET J = 3
120  GOSUB 200
130  LET I = 2:LET J = 4
140  GOSUB 200
150  END
200  LET D = SQR((X(I)-X(J))↑2 + (Y(I)-Y(J))↑2)
210  LET D = INT(100 * D + .5)/100
220  PRINT A$(I);A$(J);" = ";D
230  RETURN
```

Exercises

Plot the given points and draw quad. *ABCD* and its diagonals. Also RUN the program above, inputting the given coordinates for the vertices. Then tell which of the following statements are true for quad. *ABCD*.

   I. Quad. *ABCD* is a parallelogram.
  II. Both pairs of opposite sides are congruent.
 III. All sides are congruent.

  IV. The diagonals are congruent.
   V. The diagonals are perpendicular.
 VI. The sides form four right angles.

1. **a.** $A(1, 1)$, $B(3, 4)$, $C(10, 4)$, $D(8, 1)$
   b. $A(0, -3)$, $B(-4, -1)$, $C(-2, 1)$, $D(2, -1)$
2. **a.** $A(1, 2)$, $B(-3, -1)$, $C(-7, 2)$, $D(-3, 5)$
   b. $A(1, 1)$, $B(3, -3)$, $C(-1, -1)$, $D(-3, 3)$
3. **a.** $A(4, -1)$, $B(-2, -1)$, $C(-2, 2)$, $D(4, 2)$
   b. $A(-5, 0)$, $B(-3, 4)$, $C(5, 0)$, $D(3, -4)$
4. **a.** $A(2, 2)$, $B(2, -2)$, $C(-2, -2)$, $D(-2, 2)$
   b. $A(0, 3)$, $B(3, 0)$, $C(0, -3)$, $D(-3, 0)$
5. **a.** $A(-7, 0)$, $B(-4, 4)$, $C(-1, 4)$, $D(-1, 0)$
   b. $A(4, 6)$, $B(10, 3)$, $C(4, -3)$, $D(1, 3)$
6. **a.** $A(0, 0)$, $B(2, 4)$, $C(4, 0)$, $D(2, -2)$
   b. $A(6, 0)$, $B(3, -5)$, $C(-4, 0)$, $D(3, 5)$