PIECE WORK

We have already seen that the LOGO user can define procedures to carry out sequences of commands. Procedures, once defined, may be used in exactly the same way as LOGO 'primitives' (the basic commands of the language). It follows, therefore, that we can use procedures in the definition of further procedures. We show you how.

As an illustration of this principle, let's consider the tangram puzzle. This is a square that has been divided up into seven geometric pieces, which are combined in various ways to form different shapes. In our example, we will use the seven basic pieces to create a shape that resembles a dog. We start by defining LOGO procedures for each basic piece; these 'piece procedures' are then incorporated into a further procedure, which is given the name DOG. As the turtle must be correctly positioned before each piece is drawn, other procedures — MOVE1 to MOVE7 — must also be used.

It would be just as easy to produce this drawing by simply stringing one command after the other in one long procedure. Our method uses the principles of 'top-down' design. We have covered this subject in some detail (see page 476), but, very roughly, it simply means breaking a problem up into a number of parts and then proceeding to solve each part in turn. The great advantage of this approach is that the LOGO programmer may define a procedure containing subprocedures that have yet to be defined. The main procedure cannot be

Shaping Up

The tangram puzzle is a collection of seven shapes that can be mixed in various combinations to create simple designs. Here we list LOGO procedures to draw the seven basic tangram pieces, as well as a sample program that draws the figure of a dog. The DOG procedure begins drawing with the triangle for the dog's hind leg

Tangram Procedures

```
TO SQUARE
    REPEAT 4 [FD 25 RT 90]
END
TO PAR
    REPEAT 2 [FD 25 RT 45 FD 35 RT 135]
END
TO TRI1
    FD 25 RT 135 FD 35 RT 135 FD 25 RT 90
END
(There are two triangles of this size)
TO TRI2
    FD 35 RT 135 FD 50 RT 135 FD 35 RT 90
END
TO TRI3
    FD 50 RT 135 FD 71 RT 135 FD 50 RT 90
END
(There are two triangles of this size as well)
```
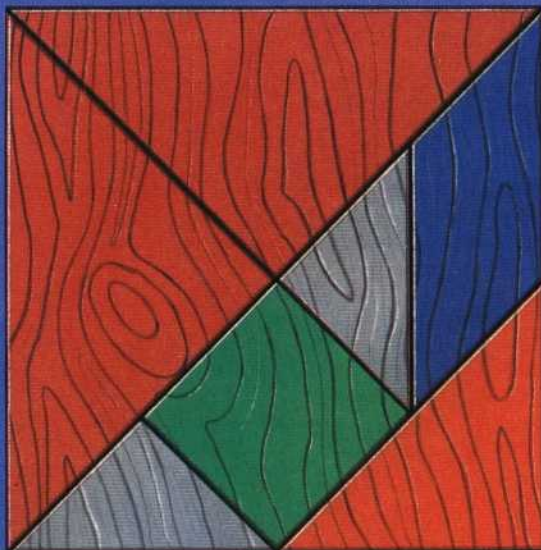
Dog Program

```
TO DOG
    TR13 MOVE1 PAR MOVE2 TRI2 MOVE3
    TRI1 MOVE4 TRI3 MOVE5 TRI1 MOVE 6
    SQUARE MOVE7
END
TO MOVE1
    PU FD 15 LT 45 PD
END
TO MOVE2
    PU RT 45 FD 35 LT 45 BK 35 PD
END
TO MOVE3
    PU LT 45 BK 25 PD
END
TO MOVE4
    PU RT 90 BK 25 PD
END
TO MOVE5
    PU FD 50 RT 45 PD
END
TO MOVE6
    PU FD 25 RT 135 FD 5 LT 90 PD
END
TO MOVE7
    PU LT 90 FD 5 RT 45 BK 25 RT 45
    BK 50 LT 90 BK 50 PD
END
```


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