

3.8 LOGO Tasks

- Although LOGO is quick to get the hang of, some pupils will find it much easier than others, perhaps because of spatial awareness and confidence with angles, or just because of general familiarity with computers.
- The best approach to “debugging” is to get a blank sheet of scrap paper and follow the instructions you’ve given the turtle yourself (or get someone else to). Do it carefully and you will often see where you’ve gone wrong.

3.8.1 People maths.

If pupils are not familiar with the principle of LOGO, choose someone to be “the turtle” and give them oral instructions; e.g., “Go forward 3 paces; turn 90° to your left”; etc., and so introduce the commands **FD**, **LT**, **BK**, **RT**.

PU, **PD** and **CS** can also be explained.

3.8.2 On the computers, easy tasks to begin with are to draw a square, then an equilateral triangle, then fill the screen with parallel lines.

*Note the importance of a space in a command like **FD 100**.)*

*As soon as possible, pupils need to know about the **REPEAT** command (there’s no abbreviation for this one) so that they can progress to more complicated tasks without laborious work.*

3.8.3 Polygons and Circles.

Once **REPEAT** is understood, harder tasks are to draw other regular polygons.

Draw me a polygon with 360 sides.
What does it look like.

Draw a circle with half the diameter of that one.

Draw a circle that fits exactly *inside* a square, just touching each side.

Draw a circle that fits exactly *outside* a square, just touching each side.

This is much harder. One way is to draw the square and use Pythagoras’ Theorem to calculate the length of its diagonal. Then use this as the diameter of the circle, using $c = \pi d$ to find the circumference and dividing by 360.

3.8.4 Procedures.

The other important technique to use is procedures; e.g., if you enter

TO SQUARE

See sheet for the LOGO commands.

*For a closed polygon, you need to keep turning the same way; e.g., **LT** (or **RT**) four times for a square. A common difficulty is not seeing that left and right get switched round when the turtle is coming down the screen.*

In drawing the equilateral triangle, some pupils are likely to use 60° instead of 120° as the angle and to end up with half a regular hexagon.

Imagining being the turtle yourself helps with seeing that it’s the exterior angle, not the interior angle, that the turtle turns through.

*The **PENERASE** mode soon comes in handy (rub-out-mode!). You get out of it by entering **PD**.*

A pretty decent-looking circle is produced by the command

```
REPEAT 360 [FD 1 LT 1]
```

```
REPEAT 360 [FD 0.5 LT 1]
```

The circumference of the first circle was about 360 units, and the second one 180 units.

So using $c = \pi d$, the diameter of the first must be about $\frac{360}{\pi} = 115$ units, so a square with sides this much will just enclose the circle.

*Alternatively, decide that the circle has to have twice the area of the previous one and scale up the steps round the outside in the ratio $1:\sqrt{2}$; i.e., **REPEAT 360 [FD 1.41 LT 1]**.*

This is very much easier if pupils have some experience of computer programming in whatever language.

```
REPEAT 4 [FD 40 RT 90]
END
```

from then on, typing **SQUARE** will draw a square.

If you enter

```
TO SQUARE :SIDE
REPEAT 4 [FD :SIDE RT 90]
END
```

then typing **SQUARE 100** will draw a square with sides 100 units long.

Notice the colon before the word **SIDE** to indicate that it is a variable.

- 3.8.5** From this point on, you can have a range of challenges for pupils to attempt. One system is to draw them on an A3 sheet and stick it onto the wall. Can you make this? How “elegantly” can you program it?

See sheet for ideas.

*Pupils should certainly aim to use procedures or **REPEAT** for anything repetitive.*

- 3.8.6** Wallpaper.
An interesting project.

You can make beautiful designs this way.

Pupils begin by making a procedure for their design, which could be a cross or a pentagram. Then they make a tessellation of a simple shape; e.g., a parallelogram. Finally, the challenge is to put these together, so that the turtle moves (pen up) along the sides of the tessellating shapes, drawing the design (pen down) at each vertex before pen-upping and moving on to the next vertex.

- 3.8.7** Animations.

The idea here is to make a procedure for, say, a stick-person. The turtle draws this a certain number of times (so it lasts long enough for us to see it) before going **PENERASE** and drawing it once more. Then the turtle moves forward (or back or whatever) and goes **PD** and starts again.

The effect is that the object (with a bit of a flicker) moves across the screen.

Pupils can be highly ingenious with this technique, but it does take a reasonable amount of time.

LOGO Tasks

FD *forward* BK *backward*
LT *left* RT *right*
PU *pen up* PD *pen down*
HT *hide turtle* ST *show turtle*
CS *clear screen* CT *clear text*
PENERASE *rub-out mode* (PD *cancels this mode*)

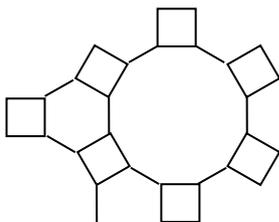
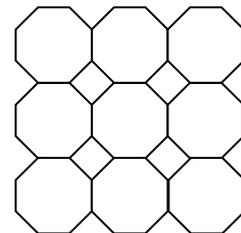
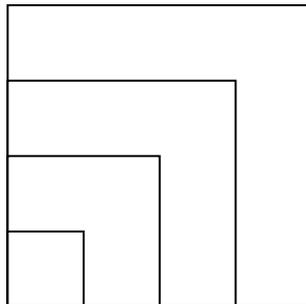
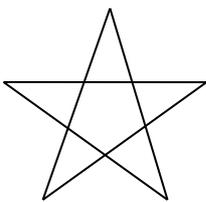
Use the REPEAT command with square brackets like this; e.g., REPEAT 4 [FD 40 RT 90]

Use TO followed by a name to make a procedure, and finish with END.

If you want to make a variable, remember to put a colon (:) in front of it whenever you use it.

Here are some tasks to try:

- 1 Draw a straight road with a dashed white line down the middle.
Can you make it into a dual carriageway?
Add some houses along one side.
- 2 Draw a brick wall. Make sure that the vertical sides of each brick line up with the *middle* of the bricks above and below it.
- 3 Can you make a tessellation of hexagons, like in a bee-hive?
- 4 Can you draw a cube so that it looks 3-dimensional?
- 5 Choose a design from below and see if you can draw it using LOGO.



try continuing this tessellation

