```
TO CYCLOID :OFFSET
  SETSCREEN
  MAKE "ANGLESTEP 6
  MAKE "PI 3.14
  MAKE "RADIUS 15
  MAKE "CIRCUMFERENCE 2 * :PI * :RADIUS
  MAKE "STEP :CIRCUMFERENCE / ( 360 /
  :ANGLESTEP )
  MAKE "XCENT ( — 150 )
  MAKE "DISTANCE :RADIUS — :OFFSET
  CYC 0
END

TO CYC :ANG
  MOVECENTRE
  SETXY :XCENT 0
  SETH :ANG
  FORWARD :DISTANCE
  DOT
  CYC :ANG + :ANGLESTEP
END
```

JOINING POINTS

Marking the points with dots — as we have done so far — gives us an easy way of visualising what is going on, but we would get more attractive diagrams if we could join the points together to give a curve. The procedure JOIN draws a line between two points:

```
TO JOIN :A :B
  SETPOS :A
  PD
  SETPOS :B
  PU
END

TO SETPOS :POS
  SETXY FIRST :POS LAST :POS
END
```

The procedure is used with the co-ordinates of the two points given in the call. For example, a possible call is JOIN [12 34][67 89]. In our cycloid program, we will need to keep a record of the old position of the point, and then join it to the present position. The final result of our improved cycloid drawing program is:

```
TO CYCLOID :OFFSET
  SETSCREEN
  MAKE "ANGLESTEP 6
  MAKE "PI 3.14
  MAKE "RADIUS 15
  MAKE "CIRCUMFERENCE 2 * :PI * :RADIUS
  MAKE "STEP :CIRCUMFERENCE / ( 360 /
  :ANGLESTEP )
  MAKE "XCENT ( — 150 )
  MAKE "DISTANCE :RADIUS — :OFFSET
  MAKE "OLDPOS LIST :XCENT :DISTANCE
  CYC 0
END

TO CYC :ANG
  MOVECENTRE
  SETXY :XCENT 0
  SETH :ANG
  FORWARD :DISTANCE
  MAKE "NEWPOS POS
  JOIN :OLDPOS :NEWPOS
  MAKE "OLDPOS :NEWPOS
  CYC :ANG + :ANGLESTEP
END

TO POS
  OUTPUT LIST XCOR YCOR
END
```

You may like to try some experiments with these procedures. For example, maths text books claim that the length of one arc of a cycloid is equal to the perimeter of a square circumscribed about the generating circle! Try modifying the cycloid-drawing procedures to test this theorem.

If you have a LOGO that incorporates sprites, a different (and better) way to write the program would be to set up the drawing point as a sprite. One advantage of this method is that you could always find out where the point is by using TELL and then XCOR and YCOR.

The Circumscribing Square

The Cycloid Arc

Logo Flavours

For all LCSI versions:

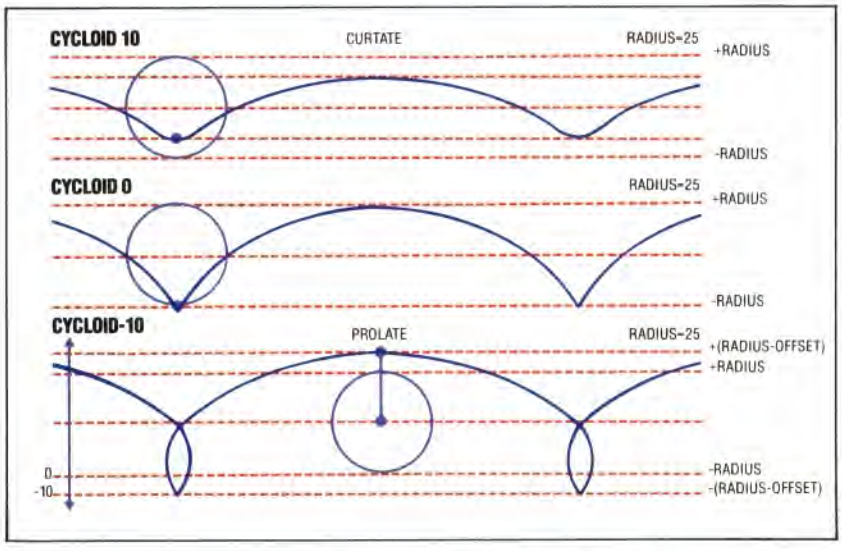
The IF syntax is different, for example: IF :A = 120 [STOP].
SETPOS and POS exist as primitives.
SETXY will have to be replaced by SETPOS (which requires a list as its input).
For DRAW use CS.
For NOWRAP use FENCE (FENCE does not exist in Atari Logo so use WINDOW and then use <BREAK> to stop the procedure).

To set the aspect ratio use:

.SETSCR on the Atari;
SETSCRUNCH on the Apple;
SETSCRUNCH, followed by a list, on the Spectrum

Rolling Along

A cycloid is the curve traced by the movement of a point on a fixed radius of a circle rolling along a straight line. The nature of the curve differs according to whether the point is inside, outside, or on the perimeter of, the circle



LIZ DIXON