



Four Bugs

In this classic geometric demonstration each bug moves in turn directly towards the present position of the bug on its right. This algorithm inevitably produces an inward spiral, any arm of which describes the 'curve of pursuit' familiar to fighter pilots and arcade games players alike

```

TO BUGS
  SETUP
  MOVE.BUGS
END

TO SETUP
  DRAW
  FULLSCREEN
  TELL 0
  HT
  PU
  SETXY (-100) (-100)
  SQUARE 200
  POSITION 1 (-100) (-100)
  POSITION 2 (-100) 100
  POSITION 3 100 100
  POSITION 4 100 (-100)
END

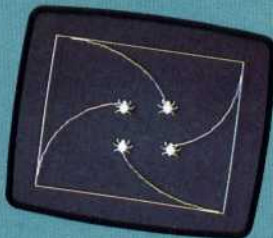
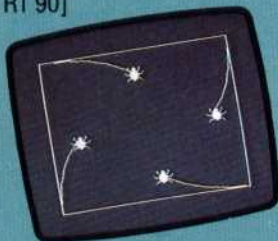
TO SQUARE :SIDE
  PD
  REPEAT 4 [FD :SIDE RT 90]
  PU
END

TO POSITION :NO :X :Y
  TELL :NO
  SETSHAPE 3
  PU
  SETXY :X :Y
  PD
  ST
END

TO MOVE.BUGS
  FOLLOW 1 2
  FOLLOW 2 3
  FOLLOW 3 4
  FOLLOW 4 1
  MOVE.BUGS
END

TO FOLLOW :A :B
  TELL :B
  MAKE "X XCOR
  MAKE "Y YCOR
  TELL :A
  SETH TOWARDS :X :Y
  FD 10
END

```



Lunar Lander Project

This is a program that we have developed as one solution to the project set in the last instalment (see page 655). Type LAND to play this simple version of the game:

```

TO LAND
  SETUP PLAY
END

TO SETUP
  DRAW DRAW.PLATFORM SET.ROCKET
END

TO DRAW.PLATFORM
  PU SETXY (-20) (-60) PD SETXY 20 (-60)
  PU
END

TO SET.ROCKET
  SETXY 0 120 MAKE "VEL 0 MAKE "FUEL 50
END

TO PLAY
  COMMAND MOVE
  IF YCOR < -53 THEN BOOM STOP
  GRAVITY FUEL.REPORT PLAY
END

TO COMMAND
  IF READKEY = "F THEN BURN
END

TO READKEY
  IF RC? THEN OUTPUT RC
  OUTPUT "
END

TO BURN
  IF :FUEL > 0 THEN MAKE "VEL :VEL + 0.5 MAKE
    "FUEL :FUEL - 1
END

TO MOVE
  SETY YCOR + :VEL
END

TO BOOM
  IF :VEL > (-1) THEN PRINT [YOU LANDED
    SAFELY. CONGRATULATIONS] STOP
  PRINT [THE IMPACT KILLED ALL THE CREW!]
END

TO GRAVITY
  MAKE "VEL :VEL - 0.2
END

TO FUEL.REPORT
  (PRINT "FUEL :FUEL)
END

```

Three Bugs Exercise

Write a LOGO program for another bugs problem, this time with three bugs at the corners of a triangle