Drawing pictures

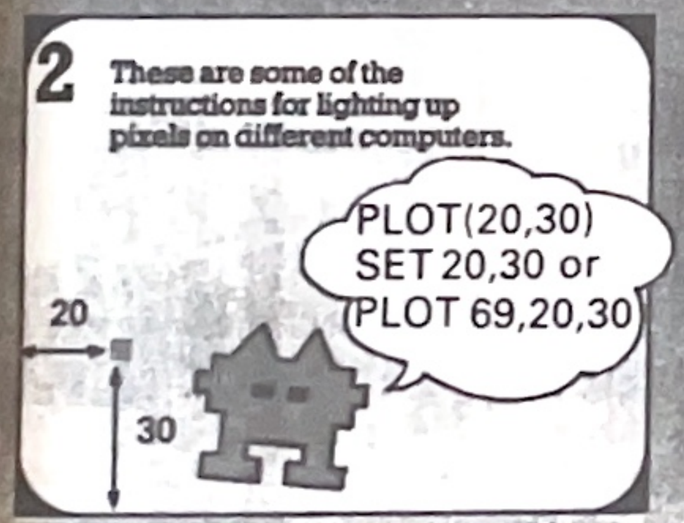
A computer makes pictures by lighting up little rectangles on the screen. Each rectangle is called a pixel and each pixel needs a separate instruction from the computer to switch it on. Most computers can also make the pixels different colours.

On these two pages you can find out how to use BASIC to make simple pictures on the screen. The instructions given here are for single colour pictures only.

1

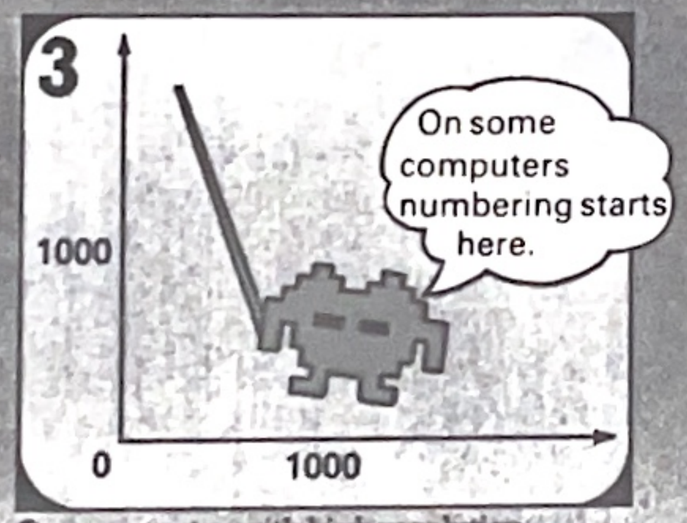
You can usually see the pixels in a computer picture. A computer with a large memory, though, can make pictures with thousands of very small pixels. These pictures are called high resolution graphics.

2 These are some of the instructions for lighting up pixels on different computers.



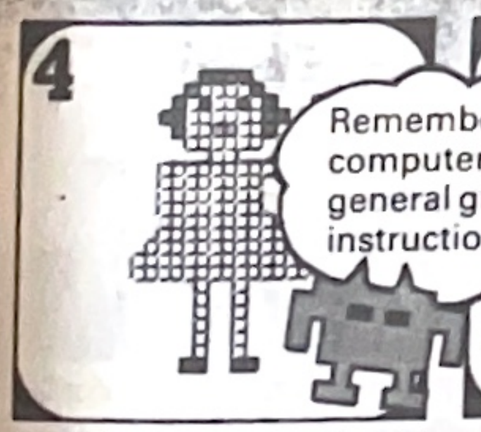
The instruction for lighting up a pixel varies on different computers, but it is usually something like PLOT (X, Y). X and Y are the pixel's co-ordinates and X is the number of pixels along and Y is the number of pixels up.

3

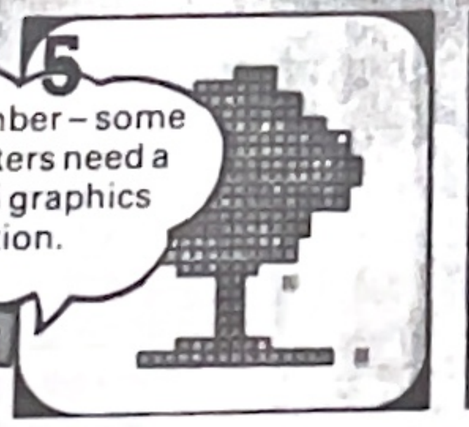


On a computer with high resolution graphics you may be able to plot 1000 points along the screen and 1000 up. A less powerful computer has about 60×40. (If you have a computer, check the size of your screen as you may get a bug if you plot outside its range.)

4



5



6

Pictures made by a computer are usually called graphics. Some computers need a special command before you do graphics. For instance, on the BBC micro you need the word MODE with a number.*

You can also switch a pixel off with a command such as UNPLOT (X, Y). In the programs in this book we use PLOT and UNPLOT. If you have a computer check these commands in your manual.

*For the programs in this book use MODE 5 on the BBC micro with the plot command PLOT 69, X, Y. For unplotting use PLOT 71, X, Y.

Plotting program

1

```
10 PRINT "TYPE IN
   TWO NUMBERS"
20 INPUT X
30 INPUT Y
40 PLOT (X,Y)
50 GOTO 10
```

PLOT command varies on different computers.

You have to press NEWLINE or RETURN after inputting each number

This short program asks you for two numbers, then plots the pixel with those numbers as co-ordinates. If you try this program make sure the numbers you type in are within the range of your computer.

2

```
RUN
TYPE IN TWO NUMBERS
?24
?24
TYPE IN TWO NUMBERS
?30
?15
```

1st pixel

2nd pixel

Line 50 makes the program repeat itself endlessly and the only way to stop it is with BREAK (or the computer's own word). Can you insert a counter (see page 21) to make it run, say, six times.

Plotting a picture

```
10 LET X=10
20 LET Y=10
30 PLOT (X,Y)
40 LET X=X+1
50 LET Y=Y-1
60 IF X<14 THEN GOTO 30
```

This plots a diagonal line going down.

```
100 LET Y=Y+1
110 LET X=X+1
120 PLOT (X,Y)
130 IF X<20 THEN GOTO 100
```

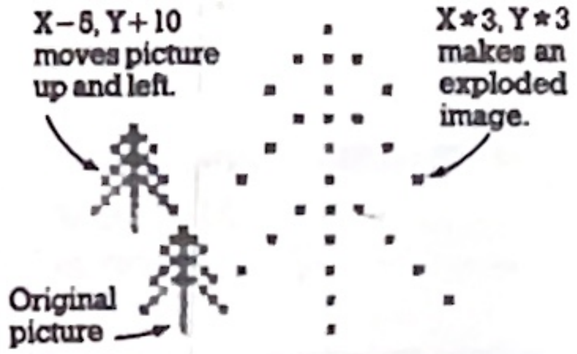
This plots a diagonal line going up.

Adding 1 to X and not to Y plots a horizontal line

Adding 1 to Y and not to X plots a vertical line.

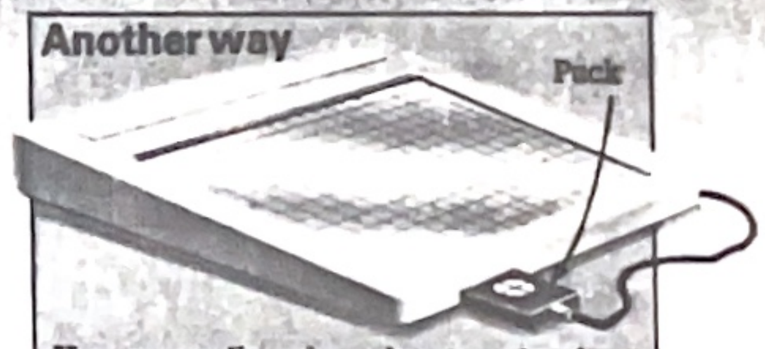
First you need to draw the picture on squared paper and work out the co-ordinates of the squares.

Then you can work out the program to plot all the squares. By giving X and Y starting values, then adding to them or subtracting from them, and repeating parts of the program, you can make the computer plot sequences of pixels as shown above.



After writing the program it is easy to change the picture by altering the numbers. You can move it to a different place on the screen by changing the starting values, or multiply all the numbers by three to make an "exploded image".

Another way



You can really only make very simple pictures with PLOT. To make more complicated ones you need special equipment such as a graphics tablet. You place a drawing on the tablet and trace over it with a special device called a "puck". This automatically reads the co-ordinates into the computer.

Program puzzle – Can you write a program to plot your initial on the screen? There is a sample program on page 44.