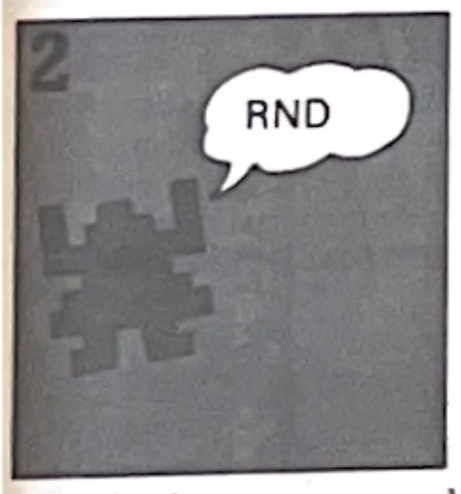
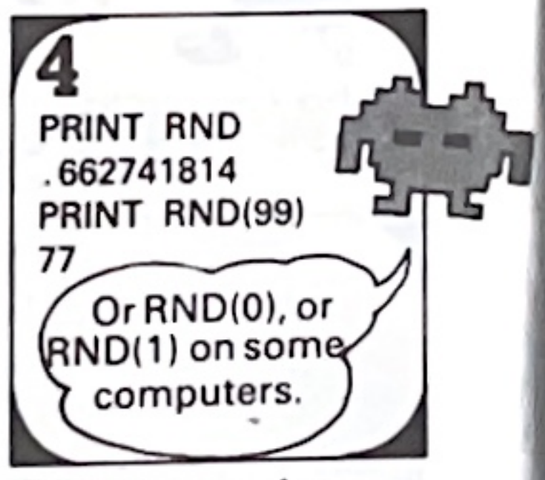
Playing games

When you throw a pair of dice you cannot predict what the numbers will be. The chances are equal that the numbers will be anything from one to six. You can produce unpredictable numbers on a computer. They are called random numbers.

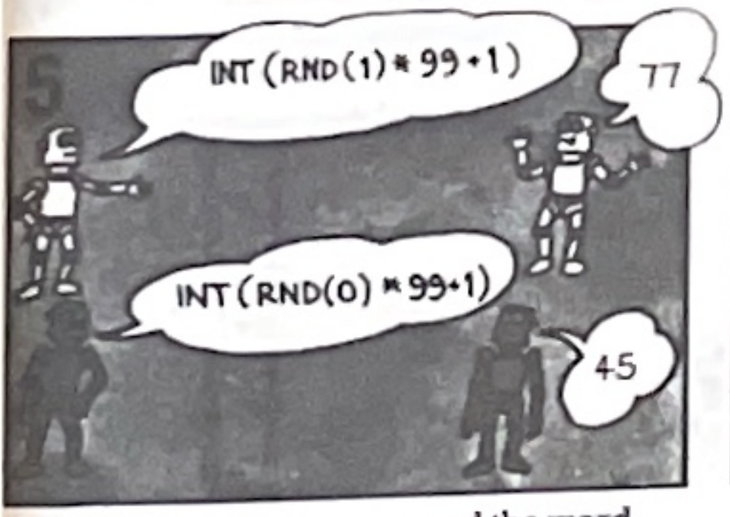
The computer contains a special program for producing random numbers. Sometimes it repeats the same number several times, but in sequences of lots of random numbers, the number of times each number is picked is about even.

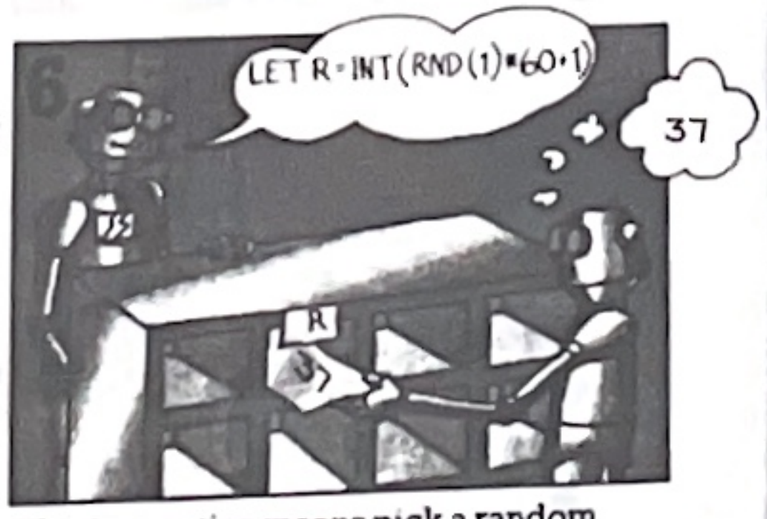




To make the computer produce a random number you use the word RND. Some computers need a 1 or 0 in brackets after the word. If you have a computer, check your manual for the correct command.

The RND instruction always produces a number below one. On some computers you can put a number in brackets after RND, e.g. RND(99). This makes it produce a whole number between 1 and the number in brackets.





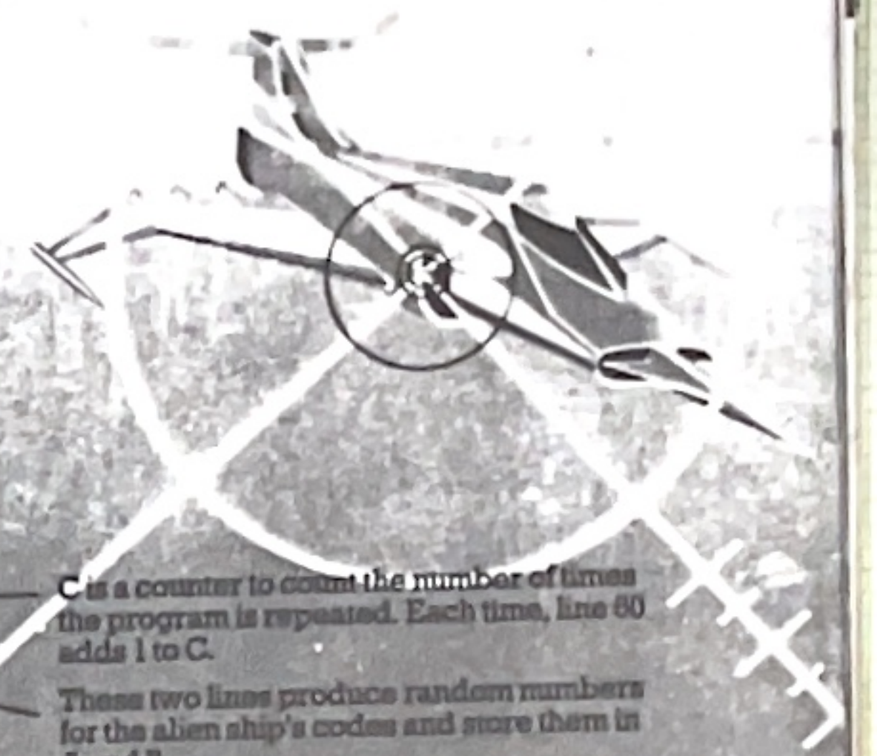
On other computers you need the word INT (short for integer, meaning whole number) followed by the RND instruction (either RND(1) or RND(0) on different computers). Then you multiply by the highest number you want and add one so the number is above one.

This instruction means pick a random number and store it in variable R. In the programs in this book we use INT(RND(1)*60+1) to mean pick a random number between 1 and 60. You may need to convert this instruction for some computers.

Program puzzle – Can you work out how to make the computer pick a random number between 10 and 20?

Space attack

This is a program for a game using random numbers. In the game you are on a star ship being attacked by a wave of alien fighters. Your ship's computer locates the aliens and gives you their coded positions. To hit each alien you have to work out the firing range by multiplying the codes and typing in the answer.



```
10 LET C=0
20 LET A=INT(RND(1)*20+1)
30 LET B=INT(RND(1)*20+1)
40 PRINT "ALIEN SHIP'S CODES"
45 PRINT "ARE ";A,B;" FIRE"
50 INPUT X
60 LET C=C+1
70 IF X=A*B THEN PRINT "ALIEN SHIP
   DESTROYED"
80 IF X<>A*B THEN PRINT "MISSED"
90 IF C<6 THEN GOTO 20
100 END
```

C is a counter to count the number of times the program is repeated. Each time, line 60 adds 1 to C.

These two lines produce random numbers for the alien ship's codes and store them in A and B.

Your number is stored in X.

In lines 70 and 80 the computer checks to see if you got the right answer.

This line repeats the program if C is less than 6.

Running the program

The picture on the right shows what happens when you run the program. If you type in the correct answer for the two numbers multiplied together the computer will print "alien ship destroyed" if your answer does not equal A x B the computer prints "missed".

```
RUN
ALIEN SHIP'S CODES
ARE 17      3 FIRE
?41
MISSED
ALIEN SHIP'S CODES
ARE 11      5 FIRE
?55
ALIEN SHIP DESTROYED
ALIEN SHIP'S CODES
ARE 13      6 FIRE
```

The comma in line 45 spaced out the numbers like this.

Program puzzle

Can you add another counter to the program to count your correct hits and print out your score at the end of the game? You need to set up a variable called S and give it a value of 0 at the start with, then add 1 for each hit.

Random pattern program

```
5 CLS
10 LET X=INT(RND(1)*30+1)
20 LET Y=INT(RND(1)*30+1)
30 PLOT (X,Y)
40 GOTO 10
```

This clears the program off the screen before the pixels are plotted.

The random numbers must fit on the computer's screen.

This line makes the program repeat endlessly.

Computers' commands for CLS, RND and PLOT may vary and some will need a graphics line.

This program uses random numbers to plot spots of light on the screen. Lines 10 and 20 produce random numbers between 1 and 30 and store them in X and Y. Line 30 then plots the pixel with co-ordinates X,Y. As the screen fills up you see less pixels appearing as many of them are already plotted. To stop the program you have to type BREAK or ESCAPE, or another word on different computers.