

Term	Definition
Algorithm	In programming, an algorithm is a set of instructions that can be used to solve a given problem.
Dry run	A dry run is the process of a programmer manually working through their code to trace the value of variables.

A **dry run** involves a programmer working through the code of a program to trace the value of variables to see that it is used and updated as expected.

A programmer will usually use a **trace table** to record the value of the variables as they work through the program. The table will have a column for each variable and each row will represent a line of the programming code.

Example question 1

```
1  outValue is integer
2  set outValue = 0
3
4  Declare Subroutine Multi
5
6    for i = 1 to 3
7      for j = 1 to 3
8        outValue = i * j
9        output outValue
10     next j
11  next i
12
13 End Subroutine
```

Complete the table in the electronic answer document to show all the outputs of this algorithm. [9]

Trace table for solution

i	j	Output value
1	1	1
1	2	2
1	3	3
2	1	2
2	2	4
2	3	6
3	1	3
3	2	6
3	3	9

Amending algorithms

In some exam questions candidates will be asked to amend an algorithm that contains an error or to insert missing lines.

Example question 2

An algorithm is intended to calculate the area of a circle. The algorithm accepts a single input; the radius, and outputs the area. The area is calculated by multiplying Pi by the radius squared.

```
1  set Pi = 3.142
2  radius is real
3  . . .
4
5  Declare FindArea
6    {procedure to calculate the area of a circle}
7
8  . . .
9
10 End Subroutine
11
12 startMainProg
13  output "Type in the radius"
14  . . .
15
16  call FindArea
17
18  output "The area is:"
19  . . .
20 endMainProg
```

Lines 3, 8, 14 and 19 are missing.
Using four of the lines of code below complete the algorithm.

- else is TRUE
- output area
- input radius
- input flag
- area = Pi * radius * radius
- End Subroutine
- area is real

Writing algorithms

Sometimes a question will ask for an algorithm to be written for a given situation.

Example question 3

An algorithm is required to help scientists monitor the level of a pollutant in a river. They take four readings of the level of pollutant in the river then use a computer to analyse the data. The value of each reading will be an integer in a range from 1-10.

The algorithm should:

- accept the input of each reading
- output the total of all the numbers entered
- output the mean of all the numbers entered
- output the largest number entered
- output the smallest number entered

An example of the **input** and output required is shown below.

```
Enter reading: 6
Enter reading: 3
Enter reading: 2
Enter reading: 4

Total: 15
Mean: 3.75
Largest: 6
Smallest: 2
```

Write an algorithm to meet these requirements. Enter your algorithm into the electronic answer document. [6]