# Computing KS3 Programming Constructs

Questions

1. Name the three main programming constructs.
2. Look at the following pseudocode, which of the programming constructs are used?

   ```
   1. input mark
   3. result= (mark / 50) * 100
   4. if result => 50 then
   5.       print "Congratulations you have passed"
   6. else
   7.       print "Sorry you have failed"
   8. endif
   ```

3. Write an algorithm which allows the user to types in two numbers. The program should output which of the numbers is higher or states they are equal.
4. "Indentation is something which is important when using selection or iteration"
   Explain this statement.
5. How many times will the following code repeat?

   ```
   1.  for i = 0 to 9
   2.        print i
   3.  next i
   ```

6. Describe the difference between condition controlled and count controlled iteration.
   Give an example where each would be used.
7. Write an algorithm which allows the user to guess a password. The user has 10 attempts to correctly guess the password.
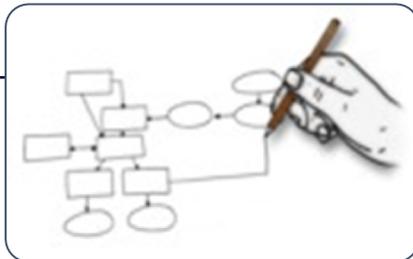
Key Vocabulary

Sequence - list of instructions carried out one after each other.
Selection - condition determines which if any statements are executed.
Iteration - group of instructions are repeated.
Condition - a statement which is either true or false.
Count - method of tracking how many times a process has been carried out.
Variable - a memory location which holds a value which can change while the program is running.

Example 1

```
1. input number
2. for i = 0 to 11
3.    answer = i * number
4.    print answer
```
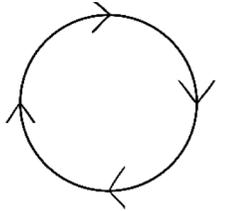
Questions

1. What is the function of the above program?
2. List variables used in the program
3. What type of iteration has been used?

Example 2

```
1.  attempts = 0
2.  while attempts < 3
3.       input password
4.       attempts = attempts + 1
5.       if password = "pixl"
6.            print "Successful login"
7.            attempts = 3
8.       else
9.            print "Try again"
10.      endif
11. endwhile
```

Questions

1. What is the function of the above program?
2. Explain how sequence, selection and iteration are used in the algorithm.
3. What type of iteration has been used?
4. Rewrite the code using a count controlled loop.

KS3 Spine
Programming Constructs

Sequence
- In programming instructions are executed once in the order which they are given.
- This is known as sequence.
- The order in which they are given is important to ensure the functionality of the program.

Example:
```
input price
input quantity
total = price * quantity
output price
```

If Statements
- If statements are a type of selection which check if a condition is met and will carry out an action based on the outcome.
- If statements do not need else if there is nothing the program needs to do if other conditions are not met.

Example:
```
if <condition> then
    <statement>
elseif <condition> then
    <statement>
else <condition>
    <statement>
endif
```

Switch-Case statements
- Switch-Case statements are a type of selection which work by checking the value of a variable.
- This is different to an if statement which checks if something is true or false.

Example:
```
switch <variable>
    case <condition>
        <statement>
    case <condition>
        <statement>
    case <condition>
        <statement>
endswitch
```

Selection
- Selection is used in programming when a condition determines which of the statements should be executed.
- If none of the conditions are met none of the statement will be executed.
- Examples are:
  - If/Else
  - Switch/Case

Condition controlled iteration
- Condition controlled loops are used to repeat a set of instructions until a certain condition is met.
- This should be used when the number of times the instruction is to be repeated is unknown.
- Example:
```
while password != "secret"
    password = input("Guess again")
endwhile
```

Iteration
- Iteration is when a set of instructions are repeated within a program. This could be a particular number of times (count controlled) or until a condition is met (condition controlled).
- Examples:
  - For
  - While
  - Repeat

Iteration benefits
- Avoid repetition of code . Using iteration will ensure unnecessary steps do not need to be included.
- To save time for the programmer as unnecessary steps are not needed so fewer lines of code to write.
- To reduce error in the code.

Count controlled iteration
- Count controlled loops are used to repeat a set of instructions a given number of times.
- This should be used when the number of times the instruction is to be repeated is known.
- Example:
```
for i = 0 to 9
    print i
next i
```