Concept before Coding

Supported by

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code-it.co.uk
How to use this resource

Develop one concept at a time.

Start with the everyday understanding of the concept using everyday computing concepts resource

Then learn about the structure and limitations of the concepts using this resource

Finally create a programming project that uses the concept
Menu

• Sequence
  • Simple sequence
  • Does the order matter?

• Repetition
  • Count controlled loops
  • Continuous loops
  • Nested loops

• Conditional Selection
  • Condition stops a loop (could go in previous section)
  • Condition starts an action
  • Condition switches between actions
  • Conditions within a continuous loop

• Variables
  • Variables like whiteboards
  • Variables with text or numbers
  • Variables with numbers
    • Using a variable in place of a number
    • Changing a variable
    • Changing a variable in a loop

• Procedures
  • Simple procedures

• Theory behind this methodology
Simple Sequence

Start
Stand
Wave
Bow
Jump
Smile
Sit

Can you act out this sequence starting at the top?
Simple Sequence

Start
Stand
Wave
Bow
Jump
Smile
Sit

Start
Stand
Wave once
Bow once
Jump once
Smile for 2 seconds
Sit

Can you act out the second sequence starting at the top?
Simple Sequence

Start
Stand
Wave
Bow
Jump
Smile
Sit

Start
Stand
Wave once
Bow once
Jump once
Smile for 2 seconds
Sit

What is different about these sequences?
Simple Sequence

<table>
<thead>
<tr>
<th>Command</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start</td>
<td>Start</td>
</tr>
<tr>
<td>Stand</td>
<td>Stand</td>
</tr>
<tr>
<td>Wave</td>
<td>Wave once</td>
</tr>
<tr>
<td>Bow</td>
<td>Bow once</td>
</tr>
<tr>
<td>Jump</td>
<td>Jump once</td>
</tr>
<tr>
<td>Smile</td>
<td>Smile for 2 seconds</td>
</tr>
<tr>
<td>Sit</td>
<td>Sit</td>
</tr>
</tbody>
</table>

What is different about these commands?
Simple Sequence

Start  Start
Stand  Stand
Wave  Wave once
Bow  Bow once
Jump  Jump once
Smile  Smile for 2 seconds
Sit  Sit

What is different about these commands?

More precise
Simple Sequence

Start
Stand
Wave
Bow
Jump
Smile
Sit

Start
Stand
Wave once
Bow once
Jump once
Smile for 2 seconds
Sit

Can you write your own everyday sequence algorithm?

Can your neighbour act it out?

One mark if it makes sense
One mark if each action is on a new line
One mark if you are precise
Design a dance move using sequence

**Possible Dance Moves**

Stamp _______ foot/feet
Quarter turn to the _______
Half turn to the _______
Wave _______ arm
Slide to the _______ one step
Wave _______ hand(s)

Words you could use in the spaces (up, down, right, left, back, forwards, both)

_______ hand(s) on hips
Stand up
Sit down
Bow
Look _______
Look to the _______

(you can also write your own)

These are available as a printed list or to cut up and laminate for re-use
Code sequences

say What is your name? for 3 secs
wait 5 secs
say My name is Alice for 4 secs
play sound trumpet until done

Scratch 2.0
Code sequences

- move 20 steps
- turn 90 degrees
- wait 5 secs
- move 20 steps
- turn 90 degrees
- say I am lost for 3 secs
Code sequences

Crumble

Sparkles are programmable lights
Does the order matter?

Place the pencil on the floor
Pick it up in your right hand
Pass the pencil to your left hand
Wave with your right hand
Place the pencil on the floor
Bow once

You will need a pencil for this
Does the order matter?

Place the pencil on the floor
Pick it up in your right hand
Pass the pencil to your left hand
Wave with your right hand
Place the pencil on the floor
Bow once

Act out the sequence
Does the order matter?

Place the pencil on the floor
Pick it up in your right hand
Pass the pencil to your left hand
Wave with your right hand
Place the pencil on the floor
Bow once

Place the pencil on the floor
Place the pencil on the floor
Pass the pencil to your left hand
Pick it up in your right hand
Wave with your right hand

Same instructions
different order
Does the order matter?

Place the pencil on the floor
Pick it up in your right hand
Pass the pencil to your left hand
Wave with your right hand
Place the pencil on the floor
Bow once

Bow once
Place the pencil on the floor
Place the pencil on the floor
Pass the pencil to your left hand
Pick it up in your right hand
Wave with your right hand

Act out the instructions in the second column
Does the order matter?

Place the pencil on the floor  Bow once
Pick it up in your right hand  Place the pencil on the floor
Pass the pencil to your left hand  Place the pencil on the floor
Wave with your right hand  Pass the pencil to your left hand
Place the pencil on the floor  Pick it up in your right hand
Bow once  Wave with your right hand

Was there anything wrong with the second sequence?
Does the order matter?

Place the pencil on the floor
Pick it up in your right hand
Pass the pencil to your left hand
Wave with your right hand
Place the pencil on the floor
Bow once

Repeated instruction to do the same thing

Place the pencil on the floor
Place the pencil on the floor
Pass the pencil to your left hand
Pick it up in your right hand
Wave with your right hand
Does the order matter?

Place the pencil on the floor
Pick it up in your right hand
Pass the pencil to your left hand
Wave with your right hand
Place the pencil on the floor
Bow once

Bow once
Place the pencil on the floor
Place the pencil on the floor
Pass the pencil to your left hand
Pick it up in your right hand
Wave with your right hand

You haven’t picked the pencil up yet
Does the order matter?

Place the pencil on the floor
Pick it up in your right hand
Pass the pencil to your left hand
Wave with your right hand
Place the pencil on the floor
Bow once

Bow once
Place the pencil on the floor
Place the pencil on the floor
Pass the pencil to your left hand
Pick it up in your right hand

Wave with your right hand

The pencil is in your hand, is that safe?
Count controlled Loops

do 4 times

bow

Can you roleplay this everyday algorithm?
Count controlled Loops

do 4 times

bow

Did you carry out these actions?

bow

bow

bow
Count controlled Loops

loop 3 times
  stand
  sit

Can you roleplay this everyday algorithm?
Count controlled Loops

loop 3 times

stand
sit

stand
sit
stand
sit

Did you carry out these actions?
Count controlled Loops

loop 3 times
stand
sit
do 4 times
bow

Now write your own everyday algorithm that uses a count controlled loop

Can your neighbour act it out?

One mark if it makes sense
One mark if each action is on a new line
One mark if you indent the actions
Count controlled Loops

bow
jump
bow
jump
bow
jump

Can you turn this sequence into a count controlled loop?
Count controlled Loops

bow
jump
bow
jump

Did you turn this into this?

bow
jump

or

loop 3 times
bow
jump
Count controlled Loops

You will need three classmates
Stand next to each other
Each act out one count controlled loop
Make sure you all start at the same time
Can you write your own version together?
Improve a dance move using counted loops

Stamp right foot
Stamp left foot
Stamp right foot
Stamp left foot
Slide to the right one step
Slide to the left one step
Slide to the right one step
Slide to the left one step
Spin all the way round

Improve this dance sequence by using counted loops where you can spot repetition
Improve a dance move using counted loops

Stamp right foot
Stamp left foot
Stamp right foot
Stamp left foot
Slide to the right one step
Slide to the left one step
Slide to the right one step
Slide to the left one step
Spin all the way round

Loop twice
Stamp right foot
Stamp left foot
Loop twice
Slide to the right one step
Slide to the left one step
Spin all the way round
Code count controlled loop

- Pen down
- Repeat 4
  - Move 100 steps
  - Turn 90 degrees
- Pen up

Scratch 3.0
Code count controlled loop

Scratch 2.0
Continuous Loop

Loop always
stand
sit

Can you roleplay this everyday algorithm?
Continuous Loop

Loop always
stand
sit

What stops this loop?
Continuous Loop

Loop always stand sit

What stops this loop?

Nothing (when you get bored)
Continuous Loop

Loop always
move forward 1 step
Turn quarter turn to right

Can you roleplay this everyday algorithm?
Continuous Loops

Loop always
stand
sit

Loop always
wave

Now write your own everyday algorithm that uses a continuous loop

Can your neighbour act it out?

One mark if it makes sense
One mark if each action is on a new line
One mark if you indent the actions
Code continuous loops

```
forever

play sound music until done

wait 1 secs
```

Scratch 3.0
Nested Loops (loops inside loops)

Loop twice
  bow
  wave
  loop twice
  clap
  say hi

Can you roleplay this everyday algorithm?
Nested Loops (loops inside loops)

Loop twice
bow
wave
loop twice
clap
say hi

Bow
Wave
Clap
Hi
Clap
Hi
Bow
Wave
Clap
Hi
Clap
hi

Did you do this?
Nested Loops (loops inside loops)

Loop twice
  smile
  bow
loop twice
  jump
  sway

Loop twice
  smile
  bow
loop twice
  jump
  sway

Which algorithm has a nested loops?
Nested Loops (loops inside loops)

- Loop twice
  - smile
  - bow
- Loop twice
  - loop twice
  - jump
  - sway
- Loop twice
  - smile
  - bow
- Loop twice
  - loop twice
  - jump
  - sway

This one
Nested Loops (loops inside loops)

Loop twice
smile
bow
loop twice
jump
sway

Loop twice
Smile
Bow
Jump
Sway
Jump
Smile
Bow
Jump
Sway
Jump
Sway

Smile
Bow
Jump
Sway
Jump
Sway
Smile
Bow
Jump
Sway
Jump
Sway
Extend a dance move using a nested loop

Loop twice
  Stamp right foot
  Stamp left foot
Loop twice
  Slide to the right one step
  Slide to the left one step
Spin all the way round

Extend this dance move so that the dance shown repeats three times using a nested loop
Extend a dance move using a nested loop

Loop 3x

Loop twice
Stamp right foot
Stamp left foot
Loop twice
Slide to the right one step
Slide to the left one step
Spin all the way round

Loop twice
Stamp right foot
Stamp left foot
Loop twice
Slide to the right one step
Slide to the left one step
Spin all the way round
Code nested loops

```plaintext
repeat 3

play sound fresh mix until done

repeat 2

play sound crazy until done

play sound fun mix until done
```

Scratch 3.0
Code nested loops

```plaintext
repeat 3
  play sound "fresh mix" until done
repeat 2
  play sound "crazy" until done
  play sound "fun mix" until done
```

Scratch 2.0
Condition starts action

If you are hungry
put your hand up

Can you roleplay this everyday algorithm?
Condition starts action

If you are hungry
put your hand up

Which part is the condition and which is the action?
Condition starts action

If you are hungry
put your hand up

You can see which part is the condition and which is the action
Condition starts action

If you are hungry
put your hand up

The action is indented to show that it only happens if the condition is met
Condition starts action

If you are hungry
put your hand up

What would you do if you were not hungry?
Condition starts action

If you are hungry → put your hand up

What would you do if you were **not** hungry?

Nothing
Condition starts action

If you are hungry
   put your hand up

If you like computing
   smile

Can you roleplay this everyday algorithm?
Condition starts action

If you are hungry
put your hand up

If you like computing
smile

Which part is the condition and which is the action?
Condition starts action

If you are hungry

put your hand up

If you like computing

smile

You can see which part is the condition and which is the action.
Condition starts action

If you are hungry
put your hand up

If you like computing
smile

What would you do if you didn’t like computing?
Condition starts action

If you are hungry
   put your hand up

If you like computing
   smile

What would you do if you didn’t like computing?

Nothing, well done
Condition starts action

If you are hungry
put your hand up

If you like computing
smile

If you are 8 or older
Stand
Sit

Can you roleplay this everyday algorithm?
Condition starts action

If you are hungry
    put your hand up

If you like computing
    smile

If you are 8 or older
    Stand
    Sit

Which part is the condition and which are the actions?
Condition starts actions

If you are hungry
   put your hand up

If you like computing
   smile

If you are 8 or older
   Stand
   Sit

You can see which part is the condition and which are the actions
Condition starts action

If you are hungry
put your hand up

If you like computing
smile

If you are 8 or older
Stand
Sit

How many times would you check the condition to see if it is met?
Condition starts action

- If you are hungry, put your hand up.
- If you like computing, smile.
- If you are 8 or older, Stand or Sit.

Once only

All of these conditions would only be checked once to see if they are met.
Condition starts actions

If you are hungry
  put your hand up

If you like computing
  smile

If you are 8 or older
  Stand
  Sit

Now write your own everyday algorithm that uses condition starts action

Can your neighbour act it out?

One mark if it makes sense
One mark if each section is on a new line
One mark if you indent the actions
Code condition starts actions

If the block is touching a specific color, then the block will say "I love the colour" for 3 seconds.
Code condition starts actions

if touching color then

say I love the colour for 3 secs

Scratch 2.0
Condition switches between actions

If you are a girl

Stand

Else

Bow

You see which part is the condition and which are the actions.
Condition switches between actions

If you are a girl

Stand

The top action is acted out if the condition is met

Else

Bow

The bottom action is acted out if the condition is NOT met
Condition switches between actions

If you are a girl
   Stand
Else
   Bow

Can you roleplay this everyday algorithm?
Condition switches between actions

If you are a girl
  Stand
Else
  Bow

Did all the girls stand and did everyone else bow?
Condition switches between actions

If you are a girl

Stand

Else

Bow

The actions are indented to show that they only happen if the condition is met or not met.
Condition switches between actions

If you are a girl
   Stand
Else
   Bow

What would you do if you were not a girl?
Condition switches between actions

If you are a girl
   Stand
Else
   Bow

What would you do if you were not a girl?

Answer
Bow
Condition switches between actions

If you are a girl
   Stand
Else
   Bow

If you like marmite
   Wave
Else
   Frown

Can you roleplay this everyday algorithm?
Condition switches between actions

If you are a girl
    Stand
Else
    Bow

If you like Marmite
    Wave
Else
    Frown

What should you do if you don’t like Marmite?
Condition switches between actions

If you are a girl
    Stand
Else
    Bow

If you like Marmite
    Wave
Else
    Frown

What should you do if you don’t like Marmite?

Answer: Frown
Condition switches between actions

If you are a girl
Stand
Else
Bow

If you like Marmite
Wave
Else
Frown

What should you do if you **do** like Marmite?
Condition switches between actions

If you are a girl
    Stand
Else
    Bow

If you like Marmite
    Wave
Else
    Frown

What should you do if you do like Marmite?

Answer Wave
Condition switches between actions

If you are a girl
    Stand
Else
    Bow

If you like marmite
    Wave
Else
    Frown

Which part is the condition and which are the actions?
Condition switches between actions

If you are a girl
   Stand
Else
   Bow

If you like marmite
   Wave
Else
   Frown

You can see which part is the condition and which are the actions
Condition switches between actions

If you are a girl
   Stand
Else
   Bow

If you like marmite
   Wave
Else
   Frown

Now write your own everyday algorithm that uses condition switches between actions.

Can your neighbour act it out?

One mark if it makes sense
One mark if each section is on a new line
One mark if you indent the actions
Code condition switches between actions

if 7 < 10 then
say 7 is a smaller number than 10 for 3 secs
else
say This will never appear on screen! for 3 secs
Code condition switches between actions

if 7 < 10 then
  say 7 is a smaller number than 10 for 3 secs
else
  say This will never appear on screen! for 3 secs
Condition stops repeated action

Loop until shout stop
  Stand
  Sit

Which part is the condition?

Which part is the continuous loop?

Which part are the actions?
Condition stops repeated action

Loop until shout stop
- Stand
- Sit

continous loop?

condition?

actions?
Condition stops repeated action

Loop until shout stop
  Stand
  Sit

Can you roleplay this everyday algorithm?
Condition stops repeated action

Loop until shout stop
  Stand
  Sit

Repeat until teacher raises arm
  Smile
  Frown
  Wave once

Can you roleplay this everyday algorithm?
Condition stops repeated action

Loop until shout stop
  Stand
  Sit

Repeat until teacher raises arm
  Smile
  Frown
  Wave once

Now write your own everyday algorithm that uses condition stops repeated action

Can your neighbour act it out?

One mark if it makes sense
One mark if each section is on a new line
One mark if you indent the actions
Code condition stops repeated action

repeat until touching edge

move 1 steps
Code condition stops repeated action

repeat until touching edge

move 1 steps
Continual loops meets selection

- Loop always action
- If condition action

What do you think might happen if we combine these?
Continual loops meet selection

Loop always
If condition
action

What do you think might happen now they are combined?

Loop always
If condition
action
else
other action
Continual loops meets selection

Loop always
If condition
action

The condition gets checked over and over again!

Loop always
If condition
action
else
other action
Continual loops meets selection

Loop always
If partner touches shoulder
wave

The condition gets checked over and over again!

Work with a partner one person triggers the condition. The other roleplays the action.
Continual loops meets selection

Loop always

If partner touches shoulder

wave

What do you do if your partner is NOT touching your shoulder?
Continual loops meets selection

Loop always
If partner touches shoulder
wave
nothing

What do you do if your partner is NOT touching your shoulder?
Continual loops meets selection

Loop always

If partner touches head gently

stand
wave
sit

The condition gets checked over and over again!

Work with a partner one person triggers the condition. The other roleplays the action.
Continual loops meets selection

Loop always

If partner taps head
dance for 1 second

Now write your own everyday algorithm that uses condition starts action within a loop

Can your neighbour act it out?

One mark if it makes sense
One mark if each section is on a new line
One mark if you indent the actions
Continual loops meets selection

Loop always

If partner touches foot
    turn right slowly
else
    turn left slowly

Work with a partner one
person triggers the
condition. The other
roleplays the action.
Continual loops meets selection

Loop always

If partner touches foot
turn right slowly
else
turn left slowly

Work with a partner one person triggers the condition. The other roleplays the action.
Continual loops meets selection

Loop always
  If partner touches foot
    turn right slowly
  else
    turn left slowly

What do you do if your partner is NOT touching your foot?
Continual loops meets selection

Loop always

If partner touches foot
  turn right slowly
else
  turn left slowly

What do you do if your partner is NOT touching your foot?

turn left slowly
Continual loops meets selection

Loop always

If partner touches taps head
dance for 1 second

else
wave

Can your neighbour act it out?

Now write your own everyday algorithm that uses condition switches between actions within a loop

One mark if it makes sense
One mark if each section is on a new line
One mark if you indent the actions
Choose a dance move using selection

Loop always

if dance conductor claps hands once

Stamp right foot
Stamp left foot
Spin around 360 degrees
Wave right arm
Wave left arm

Can you act out this dance algorithm?
Choose a dance move using selection

Loop always
  if dance conductor claps hands once
    Stamp right foot
    Stamp left foot
    Spin around 360 degrees
    Wave right arm
    Wave left arm

Write your own everyday dance algorithm that uses a condition in a continuous loop

Can your neighbour act it out?
Choose a dance move using selection

Loop always

  if dance conductor raises right hand
  Turn 360 degrees to the right

  if dance conductor raises left hand
  Step to the right
  Step to the left

  if dance conductor raises both hands
  March on the spot

In a group of four or five choose one person to conduct and the rest to follow this algorithm
Choose a dance move using selection

Loop always

if dance conductor raises right hand
    Turn 360 degrees to the right
if dance conductor raises left hand
    Step to the right
    Step to the left
if dance conductor raises both hands
    March on the spot

How many condition are there in this algorithm?
Choose a dance move using selection

Loop always

if dance conductor raises right hand
   Turn 360 degrees to the right
if dance conductor raises left hand
   Step to the right
   Step to the left
if dance conductor raises both hands
   March on the spot

How many condition are there in this algorithm?

3
Choose a dance move using selection

Loop always
  if dance conductor raises right hand
    Turn 360 degrees to the right
  if dance conductor raises left hand
    Step to the right
    Step to the left
  if dance conductor raises both hands
    March on the spot

Why is there a continuous loop?
Choose a dance move using selection

Loop always

if dance conductor raises right hand
   Turn 360 degrees to the right
if dance conductor raises left hand
   Step to the right
   Step to the left
if dance conductor raises both hands
   March on the spot

Why is there a continuous loop?

The conditions would only be checked once from top to bottom otherwise. The loop means they get checked over and over again in 1, 2, 3 order.
Code condition stops repeated action

```scratch
forever
  if key right arrow pressed? then
    turn 15 degrees

Scratch 3.0
```
Code condition stops repeated action

```plaintext
forever
if key right arrow pressed? then
  turn 15 degrees
```

Scratch 2.0
Variables like whiteboards

my_num

value

name

4
Variables like whiteboards

When we write a value onto a variable we call it assigning a value

my_friend

Lisa

name

value
Read the name get the value

I am my_num years old.

Becomes

I am 10 years old

I have my_num friends.

Becomes I have 10 friends.
Variables can have text or numbers assigned

Assign the values for these three variables on your white board
Two will be a word and one will be a number

<table>
<thead>
<tr>
<th>friend_name</th>
<th>fav_team</th>
<th>fav_number</th>
</tr>
</thead>
</table>
Variables can have text or numbers assigned

Read the paragraph out loud
Read the name but say the value

Last night I ate fav_number pies.
I hate watching fav_team on TV as they always lose by fav_number goals.
I am thinking of changing my name to friend_name because it sounds much better than my name.
Variables can have text or numbers assigned

<table>
<thead>
<tr>
<th>friend_name</th>
<th>fav_team</th>
<th>fav_number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Last night I ate \texttt{fav_number} pies.
I hate watching \texttt{fav_team} on TV as they always lose by \texttt{fav_number} goals.
I am thinking of changing my name to \texttt{friend_name} because it sounds much better than my name.
Variables can replace numbers

Assign 3 to variable called `my_num`
Stand up
Bow `my_num` times
Sit down
Wave `my_num` times
Say `my_num`

Act out the algorithm. Read the name but use the value
Variables can replace numbers

Assign 4 to `fav_num`
Hum for `fav_num` seconds
Do `fav_num` times
    stand
    sit
stand
Jump `fav_num` times

Act out the algorithm.
Read the name but use the value
Variables can replace numbers

Assign 4 to `fav_num`
Hum for `fav_num` seconds
Do `fav_num` times
    stand
    sit
stand
Jump `fav_num` times

Now write your own everyday algorithm that uses the variable `fav_num`

Can your neighbour act it out?
We can change the value assigned to a variable

Assign 5 to variable called `my_num`
Stand up
Bow `my_num` times
Subtract 2 from `my_num`
Say `my_num`
Sit down
Wave `my_num` times
Add 1 to `my_num`
Say `my_num`

Act out the algorithm.
Read the name but use the value
Don’t forget to add or subtract from the value when instructed
We can change the value assigned to a variable

Assign 2 to `fav_num`
Add 3 to `fav_num`
Hum for `fav_num` seconds
Subtract 2 from `fav_num`
Do `fav_num` times
  stand
  sit
Say `fav_num`

Act out the algorithm.
Read the name but use the value

Don’t forget to add or subtract from the value when instructed
We can change the value assigned to a variable

Assign 2 to `fav_num`  
Add 3 to `fav_num`  
Hum for `fav_num` seconds  
Subtract 2 from `fav_num`  
Do `fav_num` times
  stand  
sit  
Say `fav_num`

Now write your own everyday algorithm that uses and changes the value of the `fav_num` variable

Can your neighbour act it out?
We can change the value assigned to a variable within a loop

Assign 0 to count
Loop 6 times
  Say count
  Add 1 to count

Act out the algorithm.
Read the name but use the value

Don’t forget to add or subtract from the value when instructed
We can change the value assigned to a variable within a loop

Assign 10 to count
Loop 10 times
    Say count
    Subtract 1 from count

Act out the algorithm.
Read the name but use the value

Don’t forget to add or subtract from the value when instructed
We can change the value assigned to a variable within a loop.

Assign 10 to `count`.
Loop 10 times.
Say `count`.
Subtract 1 from `count`.

Now write your own everyday algorithm that uses and changes the value of the `count` variable within a loop.

Can your neighbour act it out?
Adjust a dance move using variables

Loop 3 times
  Loop 2 times
    Spin to right 360 degrees
    Spin to left 360 degrees
  Loop 2 times
    Slide to the right one step
    Slide to the left one step

Create a variable and use it so you can change the number or times spinning and sliding are repeated.

Don’t forget to initialise the variable and use it place of some of the numbers.
Adjust a dance move using variables

Assign 4 to `dance_loops`
Loop 3 times
  Loop `dance_loops` times
    Spin to right 360 degrees
    Spin to left 360 degrees
  Loop `dance_loops` times
    Slide to the right one step
    Slide to the left one step

Create a variable and use it so you can change the number or times spinning and sliding are repeated.
Follow this dance that uses procedures

Define stamping
Loop 3 times
  Stamp right foot
  Stamp left foot

Define Jumping
Loop 2 times
  Jump
  Bow

Define punching
Punch right arm
Punch left arm

stamping
jumping
stamping
Twist 360 degrees right
jumping
punching
sit down
Improve this dance that uses procedures

Define stamping
Loop 3 times
  Stamp right foot
  Stamp left foot

Define jumping
Loop 2 times
  Jump
  Bow

Define punching
Punch right arm
Punch left arm

stamping
jumping
stamping
Twist 360 degrees right
jumping
punching
sit down

Add a new dance procedure into this algorithm
Improve this dance that uses procedures

Define stamping
Loop 3 times
  Stamp right foot
  Stamp left foot

Define jumping
Loop 2 times
  Jump
  Bow

Define punching
Punch right arm
Punch left arm

stamping
Jumping
swaying
stamping
Twist 360 degrees right
jumping
punching
sit down

Define swaying
Sway to the right
Sway to the left

There are lots of ways this could be done.
Write a dance using procedures

Define stamping
Loop 3 times
  Stamp right foot
  Stamp left foot

Define Jumping
Loop 2 times
  jump
  bow

Define punching
Punch right arm
Punch left arm

Write an algorithm that uses stamping, jumping and punching procedures in a dance.
Write a dance using procedures

Define stamping
Loop 3 times
Stamp right foot
Stamp left foot

Define Jumping
Loop 2 times
Jump
Bow

Define punching
Punch right arm
Punch left arm

Your algorithm could be as simple as this or much more complex as long as it uses the procedures by referring to them by name.
Computing Theory

- Developing key concepts before coding reduces cognitive load and develops an understanding separate from code making an idea more portable between algorithm and different programming languages.
- This resource has been developed for block based programming and you will notice that it often uses slightly different language from Scratch which helps pupils to develop an idea separate from code.
- Supporting Articles with research links
  - Review of cognitive load theory for computing
  - Difference between algorithm and programming
  - Does writing algorithms improve pupils understanding of concepts?
  - Introducing variables to novice programmers