Algorithms and calculators	Season	01
	Episode	AP08
	Time frame	1 period

Prerequisites : Concept and examples of algorithms

Objectives :
- Discover how algorithms can be implemented with a calculator.

Materials :
- *Calculators.*
- *Slideshow.*
- *Task sheet.*

1 – Programming 55 mins

Pupils work by pairs. They have to implement some algorithms with their calculator and understand how the programming language works.

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Creating, Editing, Executing

Create a new program	[prgm] > NEW > 1 :Create New
Name the program	Alpha mode is automatic.
Edit an existing program	[prgm] > EDIT > Choose the program
Execute a program	[prgm] > EXEC > Choose the program

Programming instructions

Assignment instruction →	Key [sto→]
Input/Output instructions	[prgm] > I/O
Conditional instructions	[prgm] > CTL
Loop instructions	[prgm] > CTL

Relations, logic and lists

Relations (=, <)	[2nde]+[math] > TEST
Logical operators (and, or)	[2nde]+[math] > LOGIC
Lists names	[2nde] + Keys 1 to 6

Creating, Editing, Executing

Create a new program	PRGM Menu > [F3] NEW
Name the program	Alpha mode is automatic.
Edit an existing program	PRGM Menu > Choose the program > [F2] EDIT
Execute a program	PRGM Menu > Choose the program > [F1] EXE

Programming instructions

Assignment instruction →	Key [→]
Input/Output instructions	[SHIFT]+[VARS] > [F4] ? or [F5] ◢
Separator in a line	[SHIFT]+[VARS] > [F6] > [F1] :
Conditional instructions	[SHIFT]+[VARS] > [F1] COM
Loop instructions	[SHIFT]+[VARS] > [F1] COM > [F6] (once or twice)

Relations, logic and lists

Relations (=, <)	[SHIFT]+[VARS] > [F6] > [F6] > [F4] LOGIC
Logical operators (and, or)	fboxOPTN > [F6] > [F3] REL
Lists names	fboxOPTN > [F1] LIST > [F1] List > Number

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Algorithm # 1

Algorithm	Implementation

begin
  Input : A, B
  $A \leftarrow A + B$;
  $B \leftarrow A - B$;
  $A \leftarrow A - B$;
  Output : A,B
end
	?→A↵
	?→B↵
	A+B→A↵
	A-B→B↵
	A-B→A↵
	"A=":A◢
	"B=":B↵

1. Copy the program in your calculator, naming it SWITCHAB.
2. Execute the program and fill out the table below.

Input	$A = 5$, $B = 3$	$A = -2$, $B = 1$	$A = -70$, $B = 42$
Output			

Algorithm # 2

Algorithm	Implementation
	?→A↵ ?→B↵ A+B→C↵ A-B→D↵ "C=":C◢↵ "D=":D↵

1. Copy the program in your calculator, naming it SUMDIFF.
2. Execute the program and fill out the table below.

Input	$A = 5$, $B = 3$	$A = -2$, $B = 1$	$A = 70$, $B = 42$
Output			

3. What seems to be the purpose of this algorithm ?

---

4. In the empty space above, write the algorithm in English with the usual presentation.

Algorithm # 3

Algorithm	Implementation

begin
  Input : x
  if $x > 0$ **then**
  Output : x
  else
  Output : $-x$
  endif
end
	`?→X↵`
	`If X<0 Then -X→X IfEnd↵`
	`X↵`

1. Copy the program in your calculator, naming it ABSVAL.
2. Execute the program and fill out the table below

Input	17	-5	-1.8	$15/7$	$-\pi$
Output					

3. We want to modify the algorithm so that it will compute the square of any positive input and the opposite of the square of any negative input. Write down below the new algorithm and how you would implement it with your calculator.

Algorithm	Implementation

4. Copy the new program in your calculator, naming it ALGSQUARE.
5. Execute the program and fill out the table below

Input	6	-5	-11	$\sqrt{2}$	$-\sqrt{5}$
Output					

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Algorithm # 1

Algorithm	Implementation

begin
  Input : A, B
  $A \leftarrow A + B$;
  $B \leftarrow A - B$;
  $A \leftarrow A - B$;
  Output : A,B
end
	`:Prompt A`
	`:Prompt B`
	`:A+B→A`
	`:A-B→B`
	`:A-B→A`
	`:Disp A,B`

1. Copy the program in your calculator, naming it SWITCHAB.
2. Execute the program and fill out the table below.

Input	$A = 5$, $B = 3$	$A = -2$, $B = 1$	$A = -70$, $B = 42$
Output			

Algorithm # 2

Algorithm	Implementation

	`:Prompt A`
	`:Prompt B`
	`:A+B→C`
	`:A-B→D`
	`:Disp C,D`

1. Copy the program in your calculator, naming it SUMDIFF.
2. Execute the program and fill out the table below.

Input	$A = 5$, $B = 3$	$A = -2$, $B = 1$	$A = 70$, $B = 42$
Output			

3. What seems to be the purpose of this algorithm ?

---

4. In the empty space above, write the algorithm in English with the usual presentation.

Algorithm # 3

Algorithm	Implementation

begin
  Input : x;
  if $x > 0$ **then**
  Output : x
  else
  Output : $-x$
  endif
end
	:Prompt X
	:If X<0
	:Then
	:-X→X
	:End
	:Disp X

1. Copy the program in your calculator, naming it ABSVAL.
2. Execute the program and fill out the table below

Input	17	-5	-1.8	$15/7$	$-\pi$
Output					

3. We want to modify the algorithm so that it will compute the square of any positive input and the opposite of the square of any negative input. Write down below the new algorithm and how you would implement it with your calculator.

Algorithm	Implementation

4. Copy the new program in your calculator, naming it ALGSQUARE.
5. Execute the program and fill out the table below

Input	6	-5	-11	$\sqrt{2}$	$-\sqrt{5}$
Output					