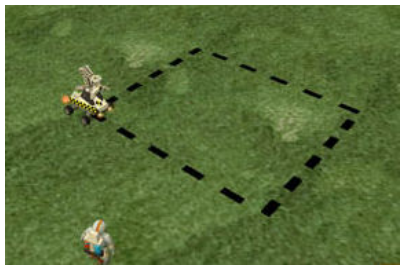
Worksheet 3.1 / Drawing a Dashed Square

Ceebot Environment:
„Chapter 3: Nested Loops“ – „Drawing Board“



Mission:
We want the robot to draw a dashed square with a side length of 10 meters. The dashed sides consist of five solid lines of one meter length each, with one meter gaps in between.

Concept:

The robot draws **one side** by repeating the following steps _____ times: • lowering the pen to the ground, • moving 1 meter forward, • lifting the pen from the ground, • and again moving 1 meter forward.	The robot draws the **whole square** by repeating the following steps ____ times: • drawing **one side** • and turning by _____ degrees.

So, the robot draws the dashed square by drawing _____ times a side, whereby a side is drawn by _____ times drawing a line of one meter length.

Listing 3.1.1 – Drawing a dashed square

Program code	Description
`extern void object::DrawSquare()`	
`{`	
`  repeat(_____)`	Outer loop: Draw _____ times a side of the square
`  {`	
`    repeat(_____)`	Inner loop: Draw a line of one meter length _____ times
`    {`	
`      pendown();`	_____
`      _____`	Move _____ meters forward
`      _____`	Lift pen from ground
`      move(_____);`	_____
`    }`	End of inner loop
`    turn(_____);`	_____
`  }`	End of outer loop
`}`	

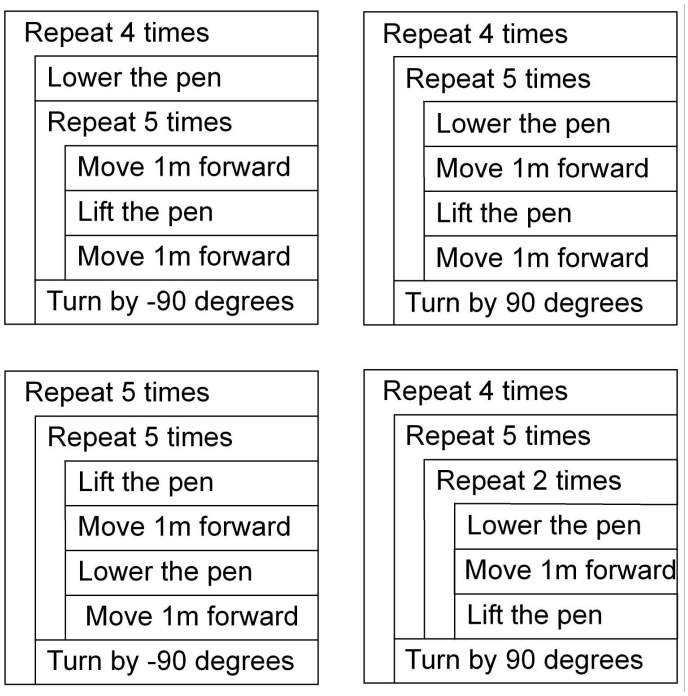
When a loop is used inside another loop,
we talk about **nested loops.**

Fill in the phrases „not at all“, „most often“, „less often“:

- The command lines inside the inner loop are repeated _____.
- Command lines inside the outer loop, but outside the inner loop, are repeated _____.
- Command lines outside the outer loop are repeated _____.

Some questions regarding Listing 3.1.1:

- How many times is the pen lowered to the ground when the program is executed? _____ times
- How many times does the program execute a `move`-command ? _____ times
- Which of the following Nassi-Shneiderman-Diagrams describes the program? What geometric shapes are drawn when the other three Nassi-Shneiderman-Diagrams programmed are used? Sketch the respective shape next to each of the Nassi-Shneiderman-Diagrams and verify your assumptions by programming the robot accordingly.



- What happens when the `turn`-command in Listing 3.1.1 is placed inside the inner loop by moving it one program line up?

_____

_____

_____

Further exercises:

Draw the following geometric shapes by using nested loops: