# Arukay - Coding 5

Session 1

Teaching Guide

# Contents Session 1

In this section you will learn how to implement the class properly. I recommend you to go step by step, but you can visualize your point of interest using the navigation options.

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  - VC. Exercise 3
- Video tutorial
  - VT. Motion Blocks p1
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  - VT. Pencil  Blocks
- STEM Challenge
- Assessment

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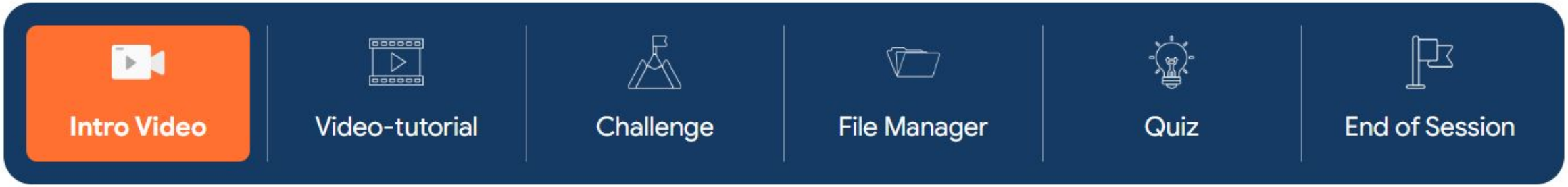
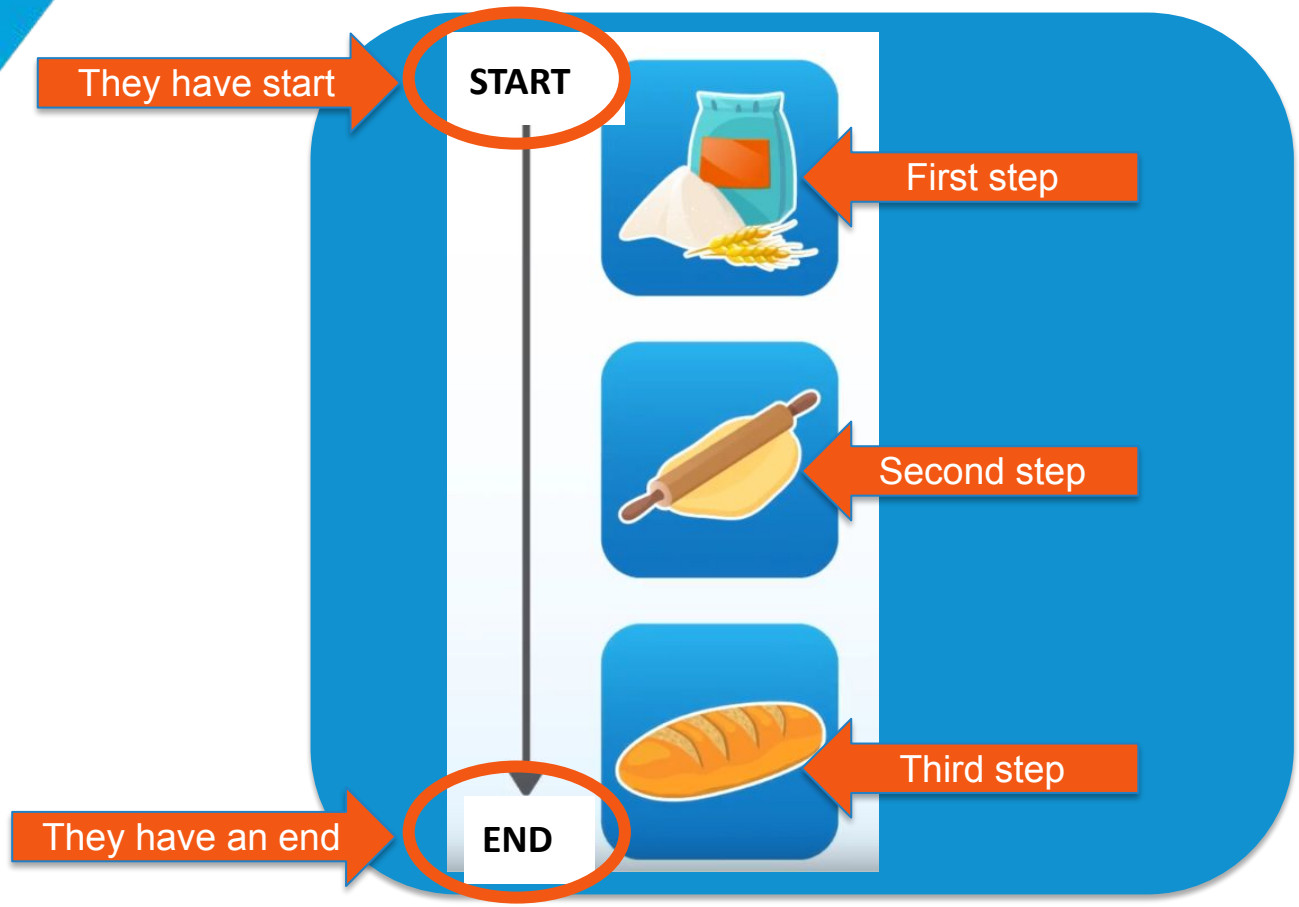
## Conceptual Video

The class begins by viewing the 'concept video'. This is focused on teaching programming concepts in an interactive way.



# Conceptual Video: Sequencing

Algorithm:
An algorithm is a sequence composed of ordered steps used to give a solution to a problem.

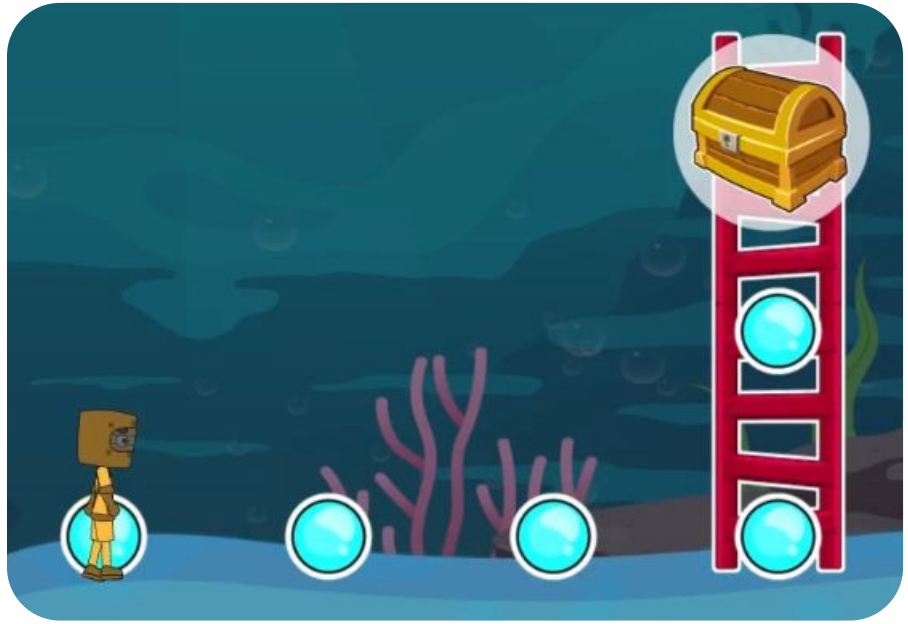


Algorithms are abstract, that is, they are models or guidelines for ordering processes.

For example, to represent the path that Alex must follow to get to the treasure, blocks are used to represent the steps that he will execute, that is an abstraction, modeling something real through a representation.

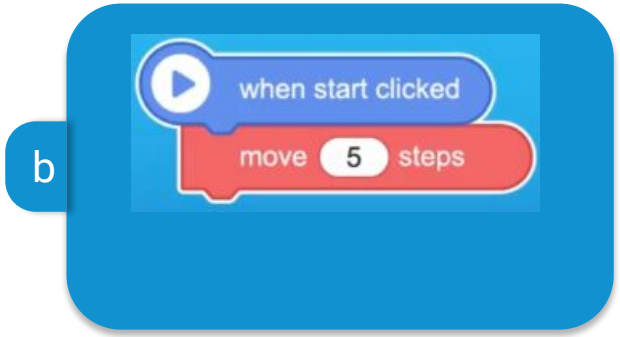
# Conceptual Video: Sequencing (Exercise 1)

What algorithm or sequence of orderly steps should I follow to get to the treasure?



a

b

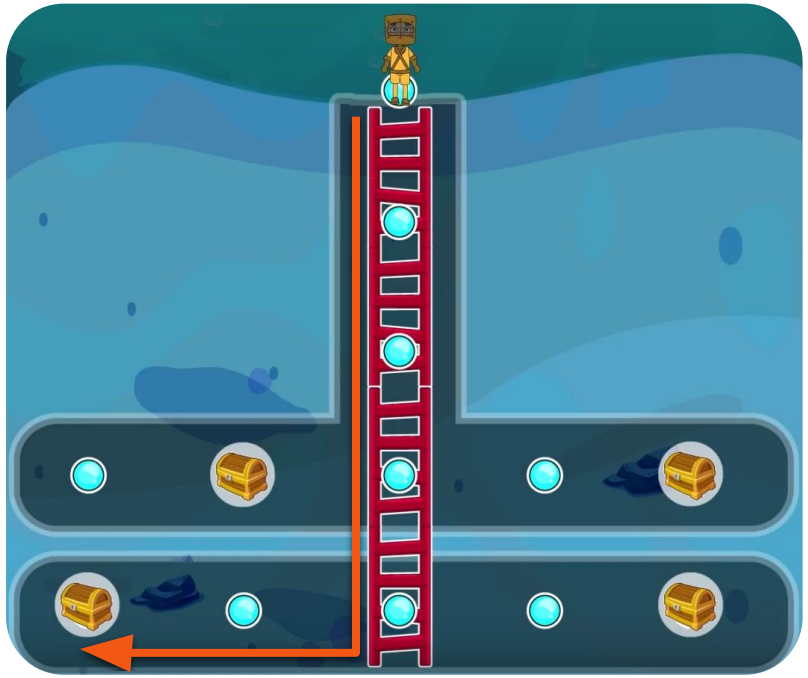



c

The correct answer is (a) because you must first move forward 3 times, turn left 90° at this point and then move forward twice.

# Conceptual Video: Sequencing (Exercise 2)

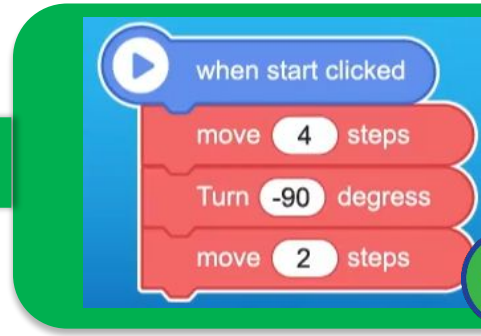
Which algorithm should I follow to get to the treasure that is further south and further west?



a

b

c

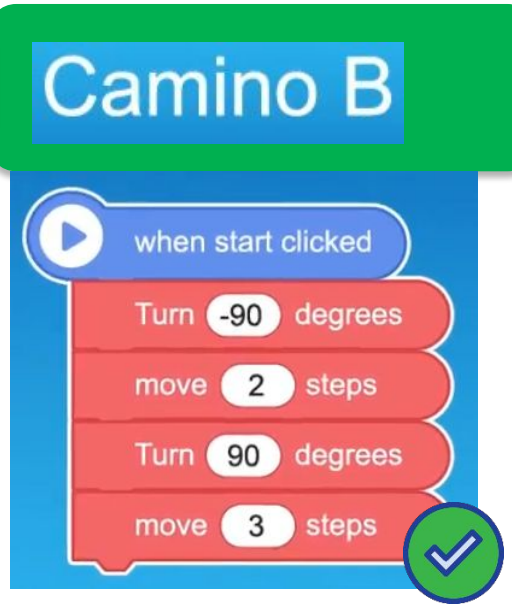


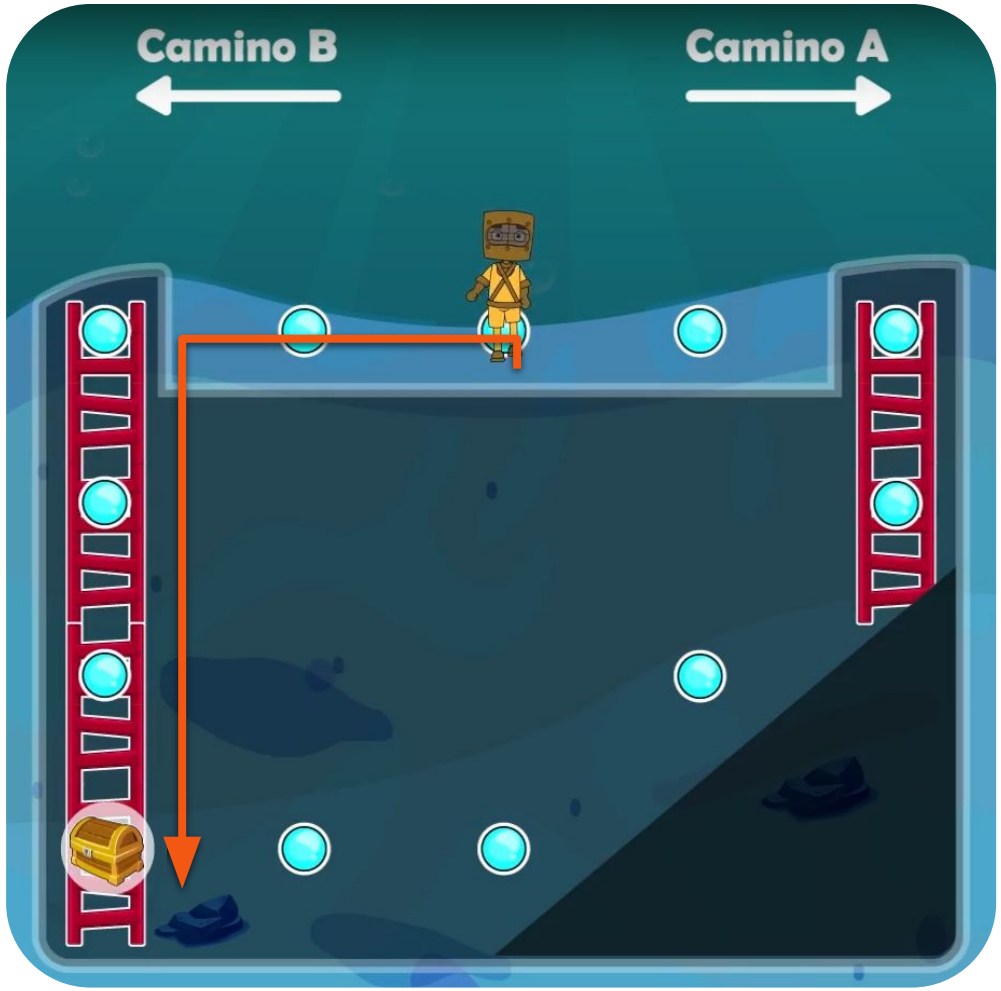

The correct answer is c, then the algorithm to follow is to move forward 4 times, then turn to the right of the character and finally move forward two more times.

# Conceptual Video: Sequencing (Exercise 3)

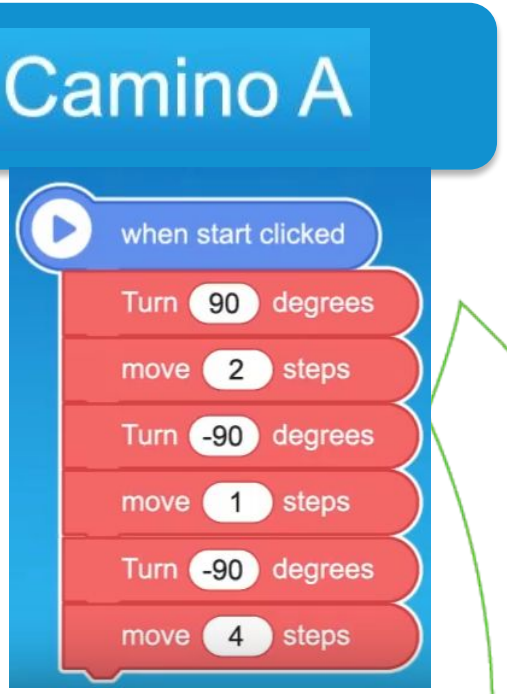
By which path is the shortest algorithm built to reach the treasure?

b



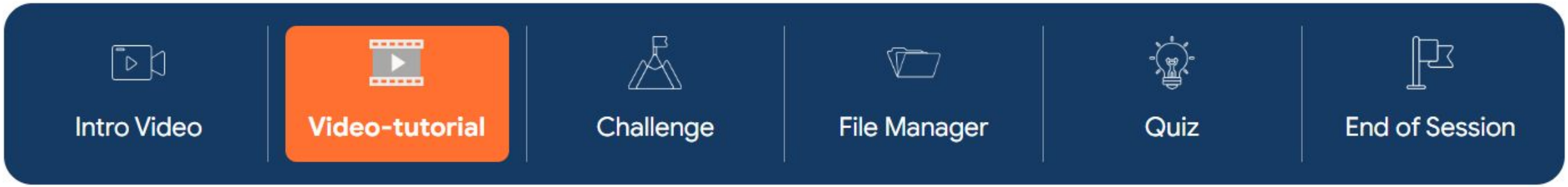

a




The shortest algorithm is constructed along path (b).

# Video Tutorial

The second part of the content corresponds to the 'Video tutorial'. In this section the student will learn how to use the sequencing concept in a code editor.

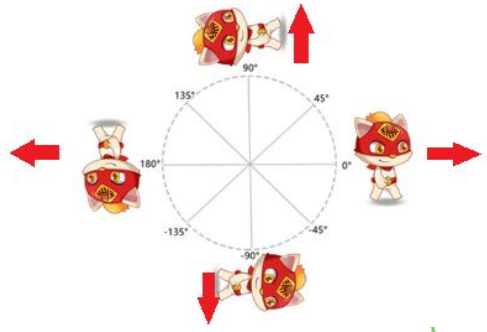


# Video Tutorial: Motion Blocks Part 1

For this session we will learn how to use some movement blocks such as:

This block allows the character to move around the stage by varying the number of steps.

With this block you can change the direction of the character, negative sign clockwise and positive sign counterclockwise.

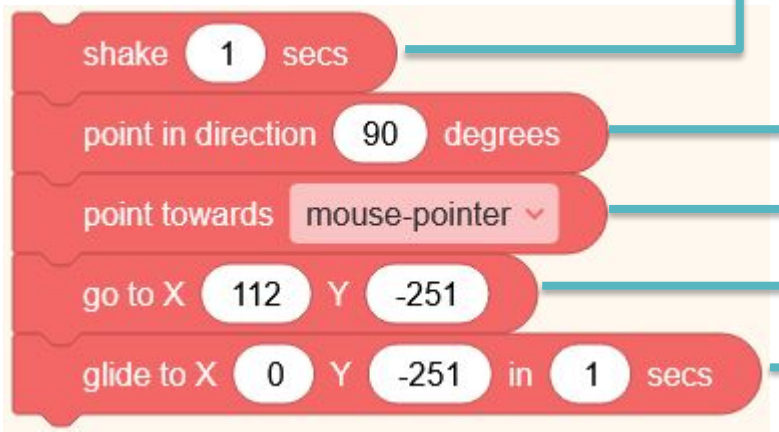


This block makes your character revolve around another character.

If your character touches an edge, it bounces in the opposite direction.

## Video Tutorial: Motion Blocks Part 2

Here we have additional movement blocks:




This block can be used to make your character shake for a few seconds.

If you want the character to point in a specific direction you can use this block.

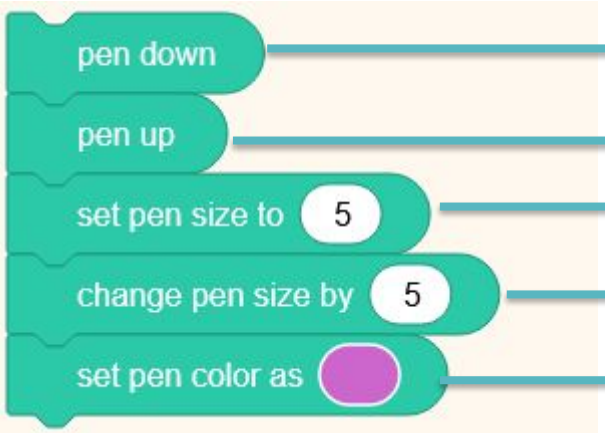
You can also tell it to point to where the mouse pointer or another character is located.

With this block you can tell your character to teleport to specific X and Y coordinates.

With this block you can tell it to slide to X and Y coordinates for a few seconds.

# Video Tutorial: Sequencing

The blocks needed to draw are these:




This block tells the character to start leaving a trace with the pencil.

This block tells the character to lift the pencil, i.e. no longer leave a trace.

With this block you assign a specific thickness to the pencil.

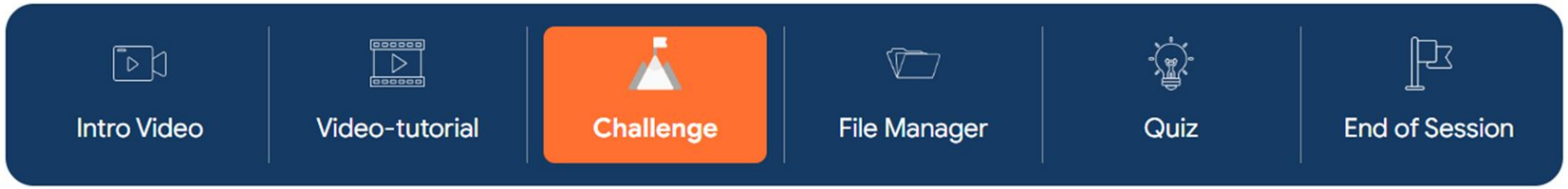
With this block you can increase the thickness of the pencil (with positive values) or decrease the thickness (with negative values).

With this block you can assign a color to the stroke that your pencil will leave.

## STEAM Challenge

The third part of the content corresponds to the STEAM challenge. In this section the student must perform practical exercises to strengthen the concepts learned.

You can use the navigation buttons to go to a particular exercise.




Step: 1 2 3 4 5 6

- STEAM Challenge Exercise 1
- STEAM Challenge Exercise 2
- STEAM Challenge Exercise 3
- STEAM Challenge Exercise 4
- STEAM Challenge Exercise 5
- STEAM Challenge Exercise 6

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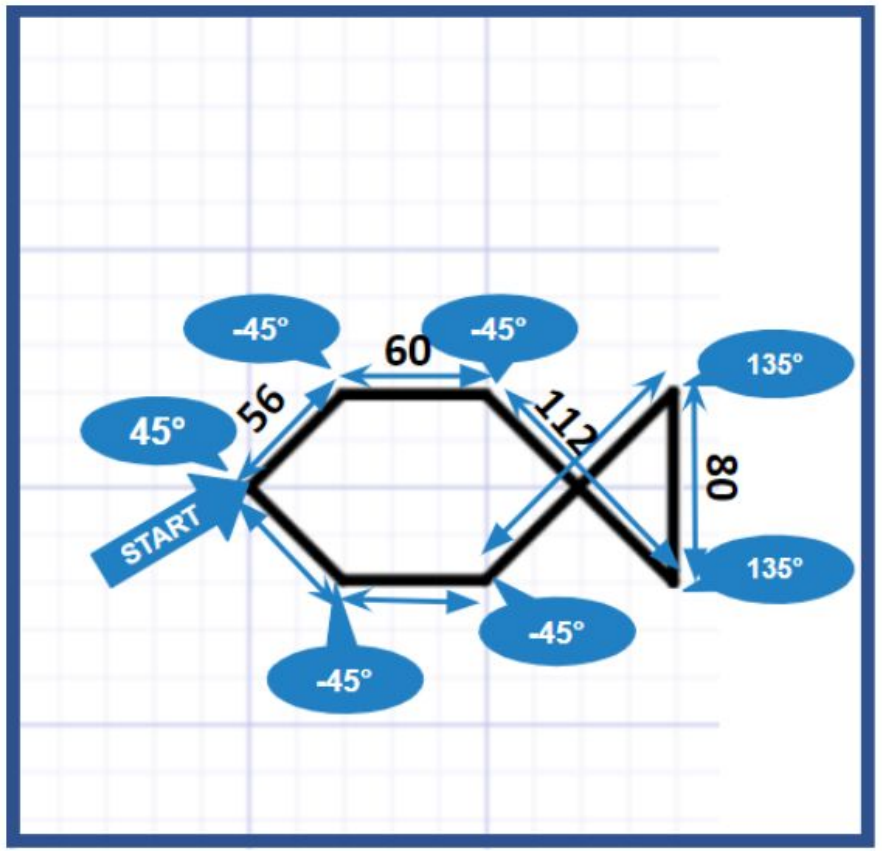
# STEAM Challenge: Exercise 1

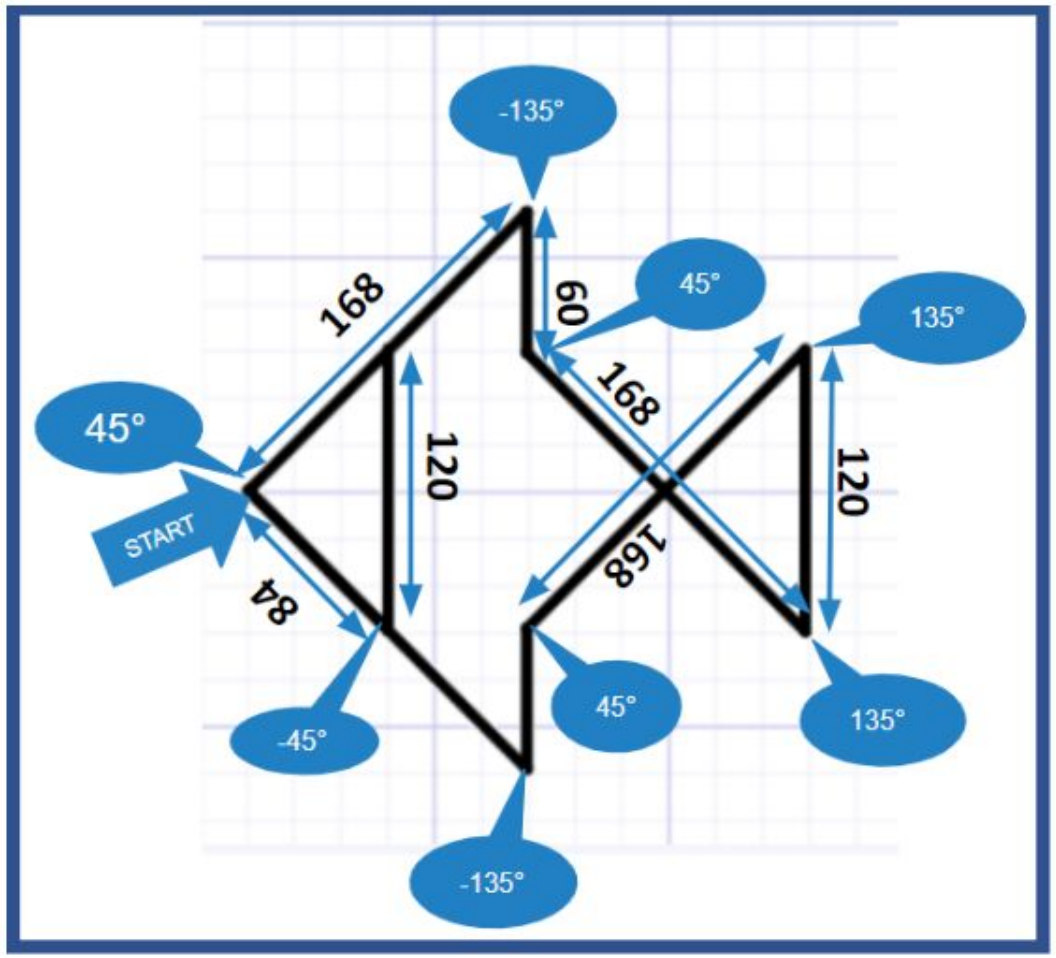
Build an algorithm or sequence that draws a fish like the one in the picture *(each grid line is 20 steps, each diagonal is 28 steps)*.



To start drawing the figure shown, place your character in the position X = 0 and Y = 0, keep in mind that the turns of this figure are made at 45° angles

# STEAM Challenge: Exercise 2

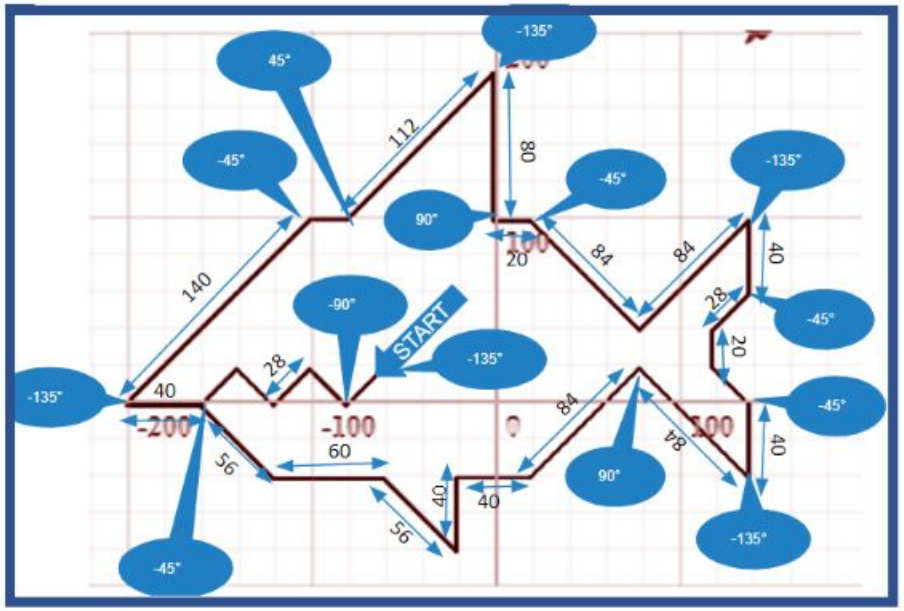
Build an algorithm or sequence that draws a fish like the one in the picture (each grid line is 20 steps, each diagonal is 28 steps).

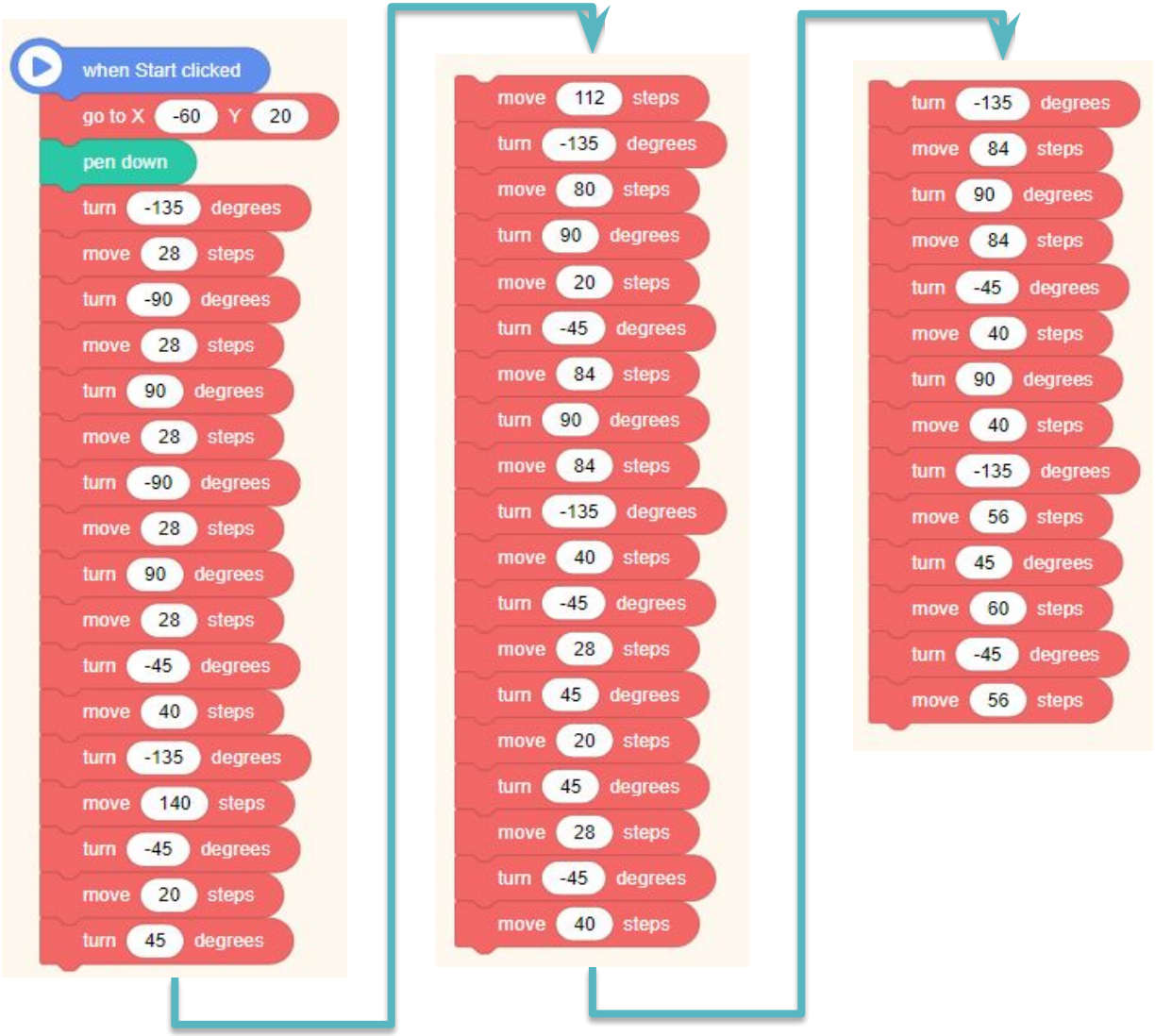


Keep in mind that the algorithm to solve this challenge must at one point raise the pencil to stop writing and then make the line that draws the part of the fish's head.

# STEAM Challenge: Exercise 3

Build an algorithm or sequence that draws a shark like the one in the image (each grid line is 20 steps, each diagonal is 28 steps).

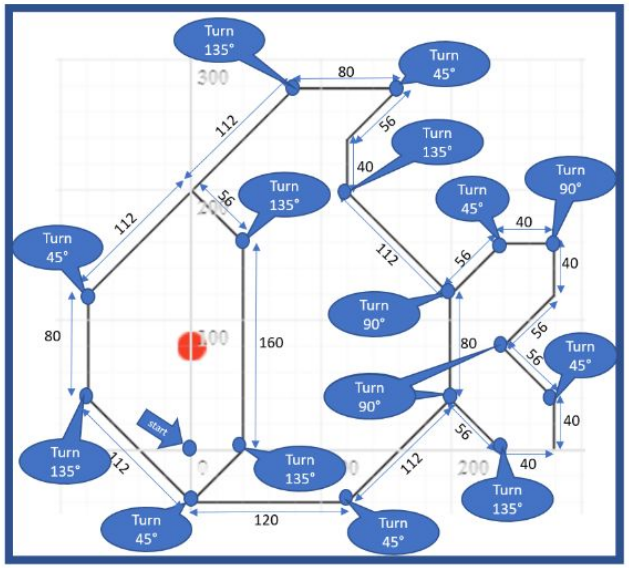


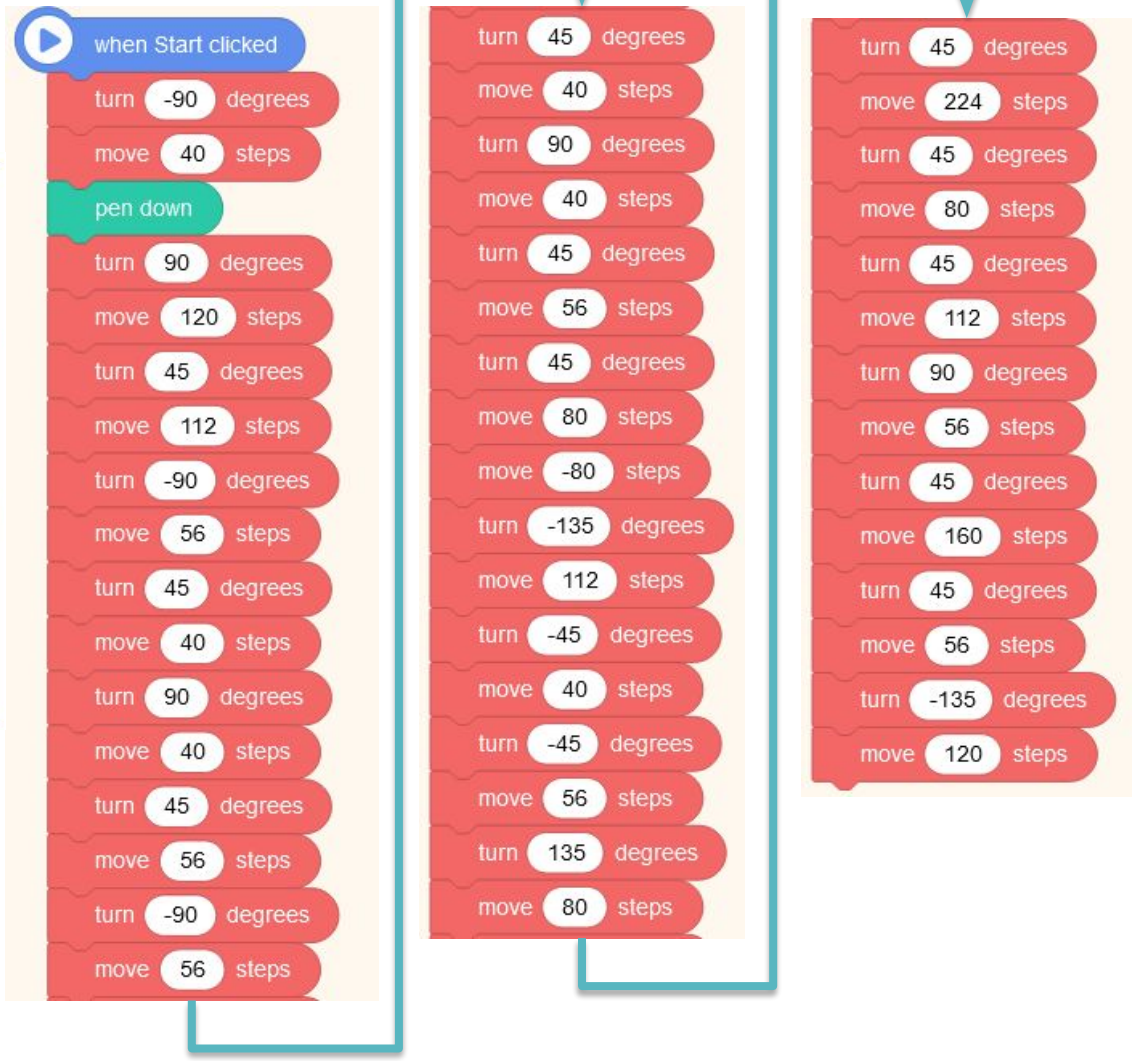




It is suggested to start at point X=-60 and Y=20 to use as few blocks as possible.

# STEAM Challenge: Exercise 4

Build an algorithm or sequence that draws a fish like the one in the picture (each grid line is 20 steps, each diagonal is 28 steps).

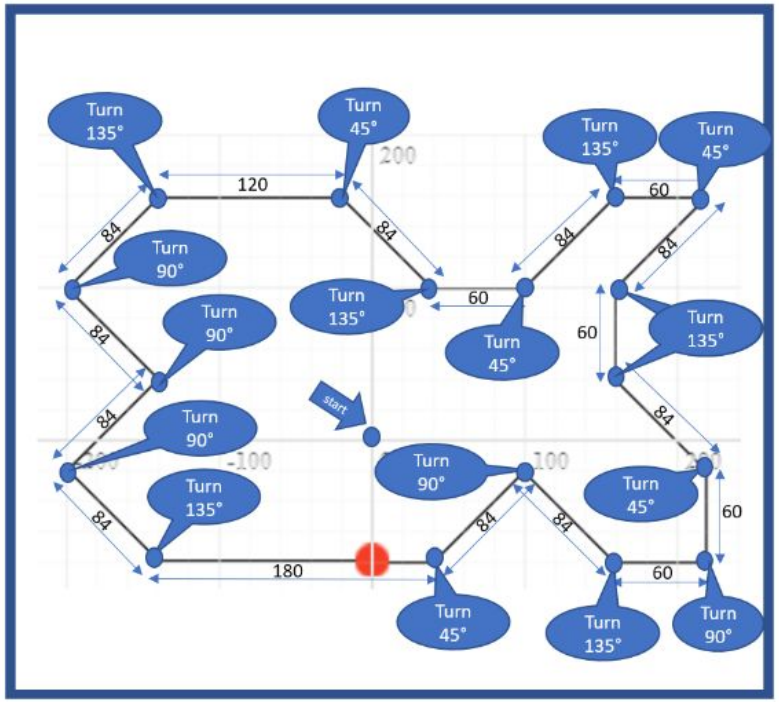


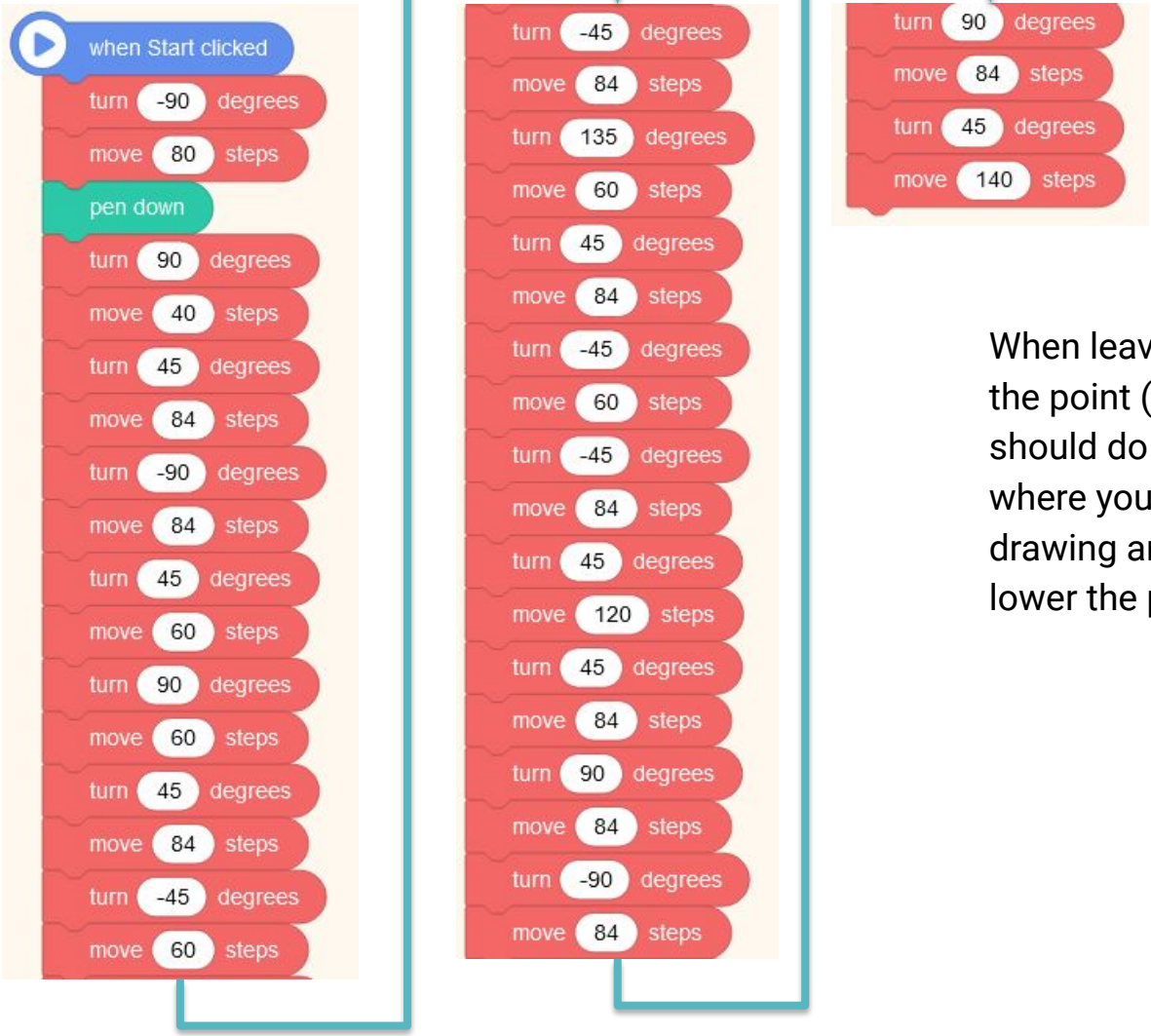




When leaving your character at the point (0,0) the first thing you should do is locate yourself where you are going to start your drawing and then use the block to lower the pencil.

# STEAM Challenge: Exercise 5

Build an algorithm or sequence that draws a fish like the one in the picture (each grid line is 20 steps, each diagonal is 28 steps).

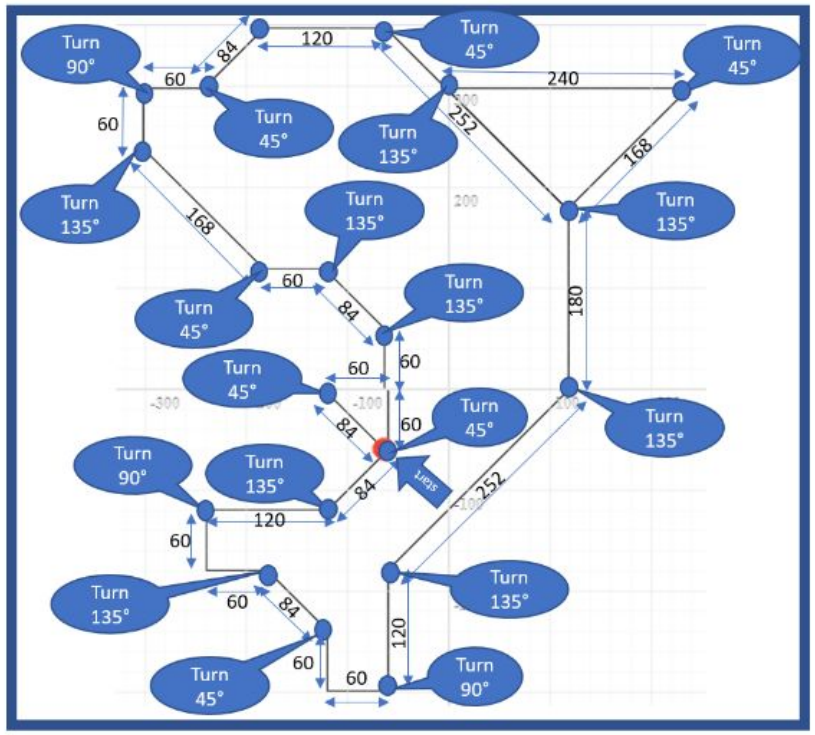



When leaving your character at the point (0,0) the first thing you should do is locate yourself where you are going to start your drawing and then use the block to lower the pencil.

# STEAM Challenge: Exercise 6

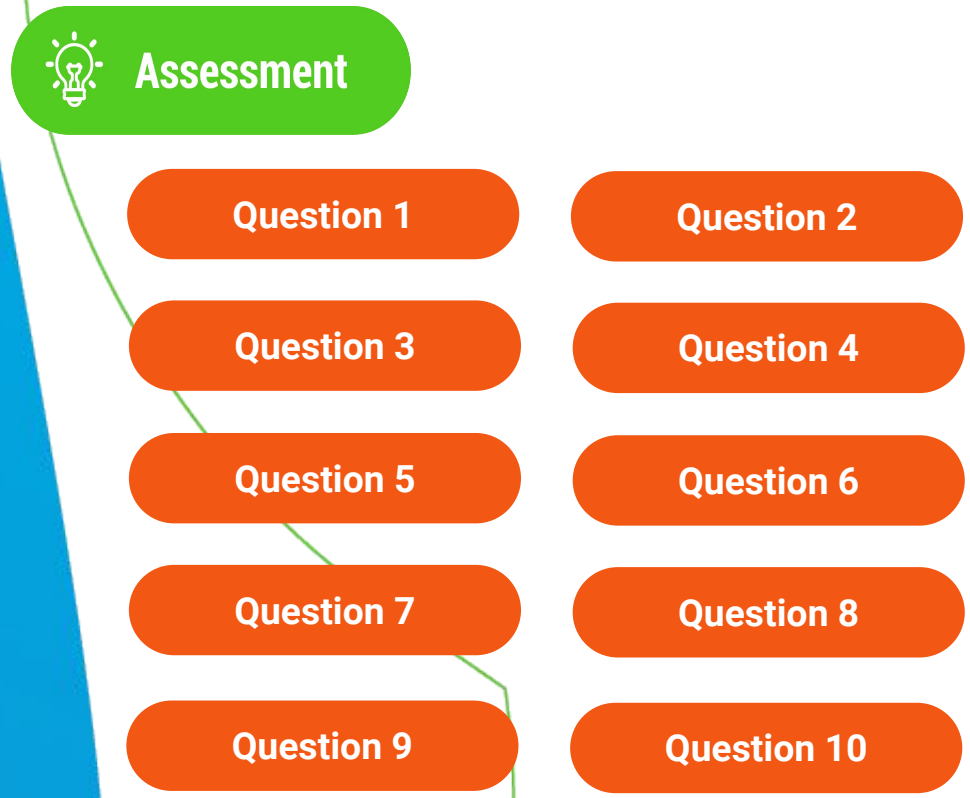
Build an algorithm or sequence that draws a dolphin like the one in the image (each grid line is 20 steps, each diagonal is 28 steps).

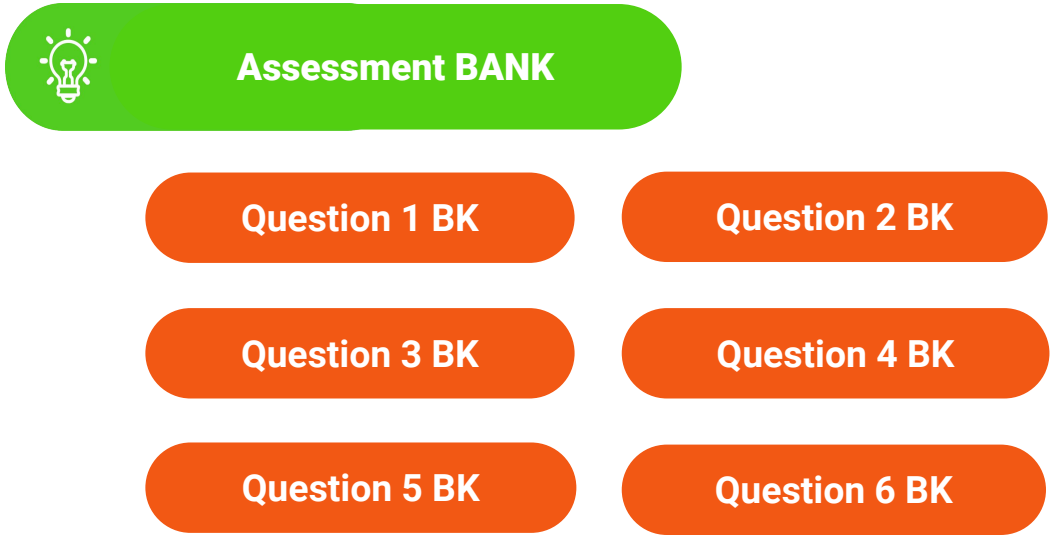


When leaving your character at the point (0,0) the first thing you should do is locate yourself where you are going to start your drawing and then use the block to lower the pencil.

# Assessment

- The last section of the content pertains to assessments. These are a form of evaluation that helps to analyze the weaknesses and strengths of the students in the concepts taught in the session.
- The student will have a reinforcement on the topics that are required in case he/she wants it.
- BANK questions are reinforcement questions.

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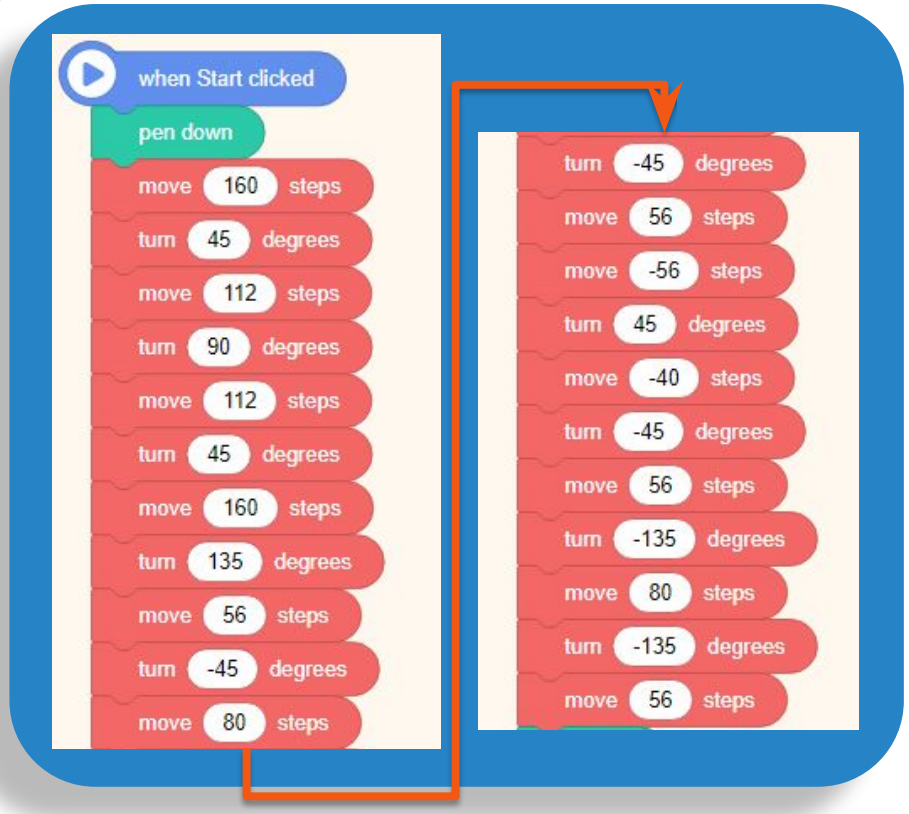
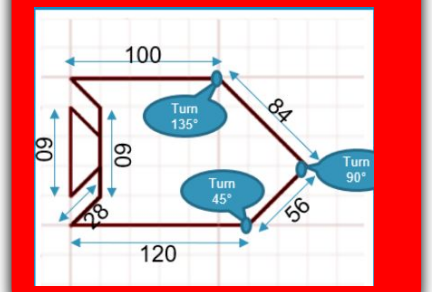
# Question #1

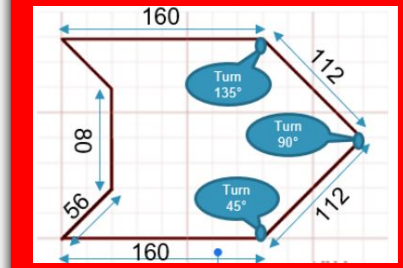
Which of the following pictures results from running this algorithm? (each grid line is 20 steps, each diagonal is 28 steps).



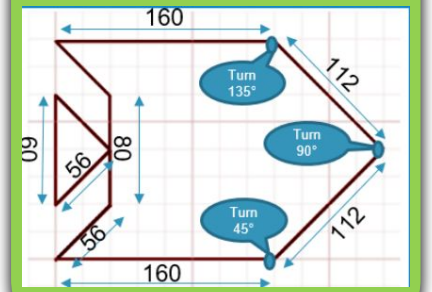

A




B




C

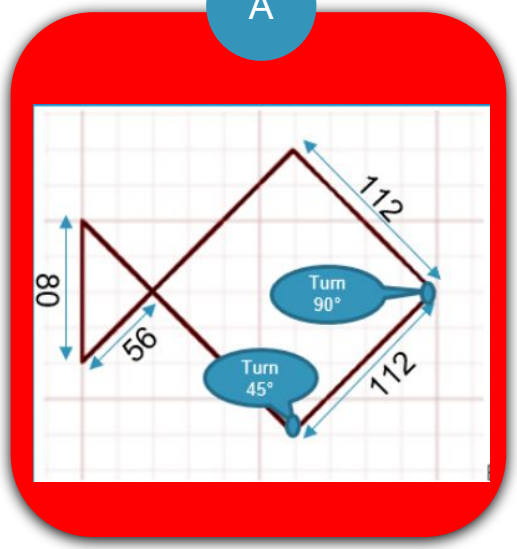



FEEDBACK: The correct answer is C, because the drawing starts in the upper left corner and from there the amounts in steps and turns correspond to this drawing.

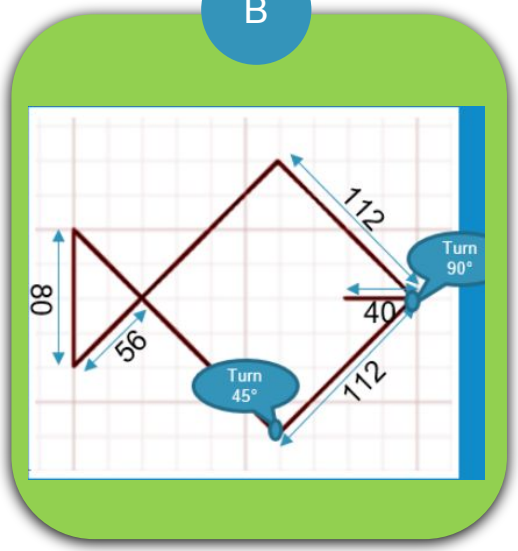
# Question #2

Which of the following pictures results from running this algorithm? (each grid line is 20 steps, each diagonal is 28 steps).

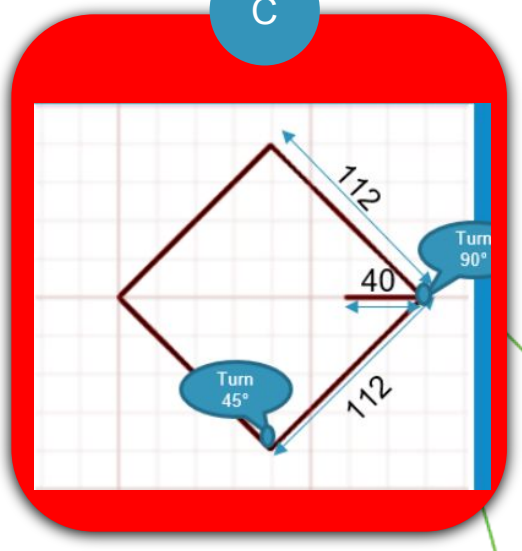
A




B




C

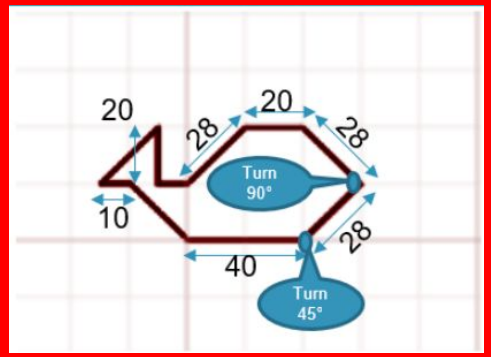



FEEDBACK: The correct answer is B, because the drawing starts at the top corner of the queue and from there the amounts in steps and turns correspond to this drawing.

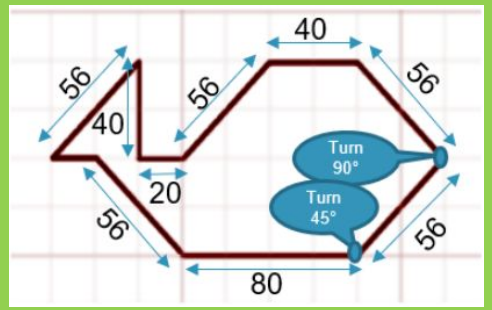
# Question #3

Which of the following pictures results from running this algorithm? (each grid line is 20 steps, each diagonal is 28 steps).

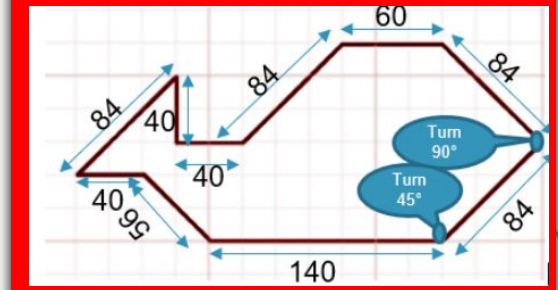
A




B



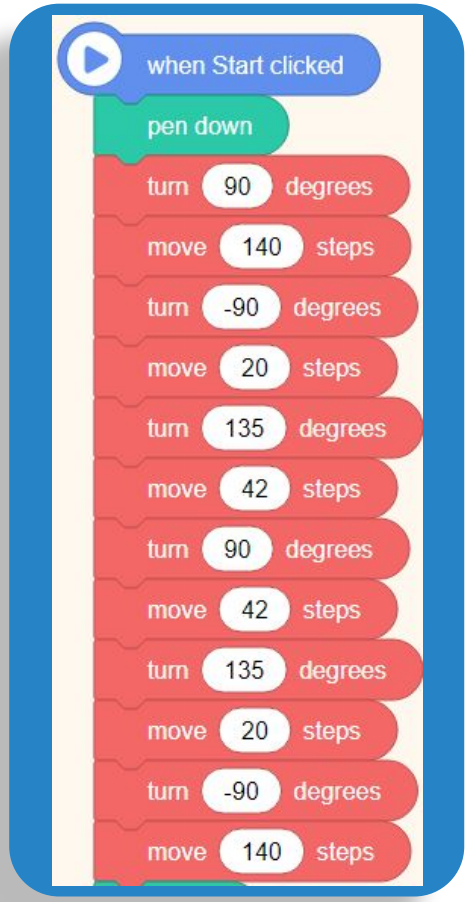

C



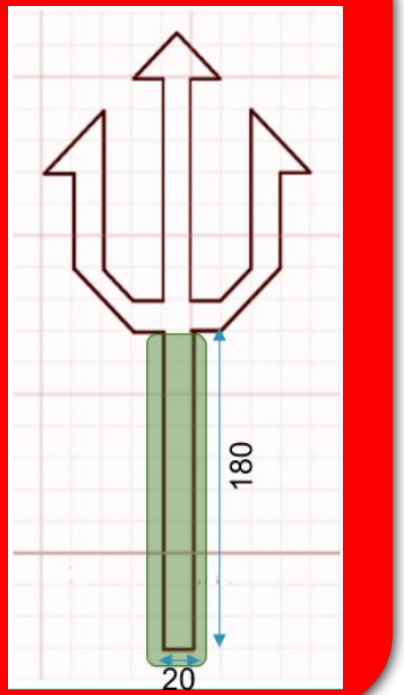

FEEDBACK: The correct answer is B, because the drawing starts in the lower left corner and from there the amounts in steps and turns correspond to this drawing.

# Question #4

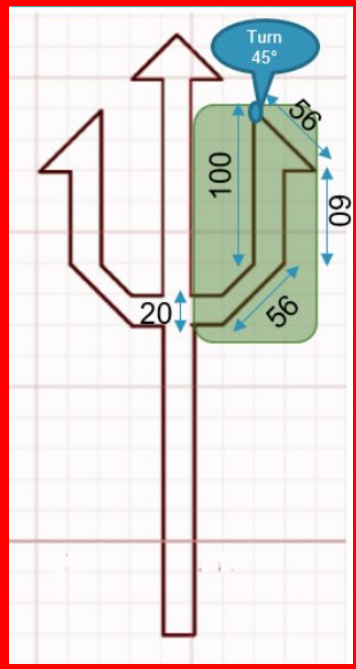
Which part of the trident is drawn when running this algorithm? (each grid line is 20 steps, each diagonal is 28 steps).



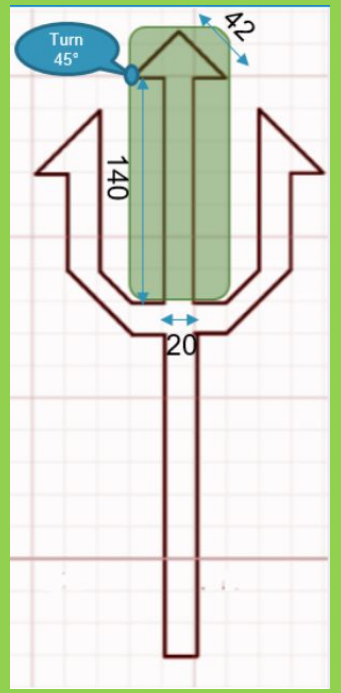

A




B



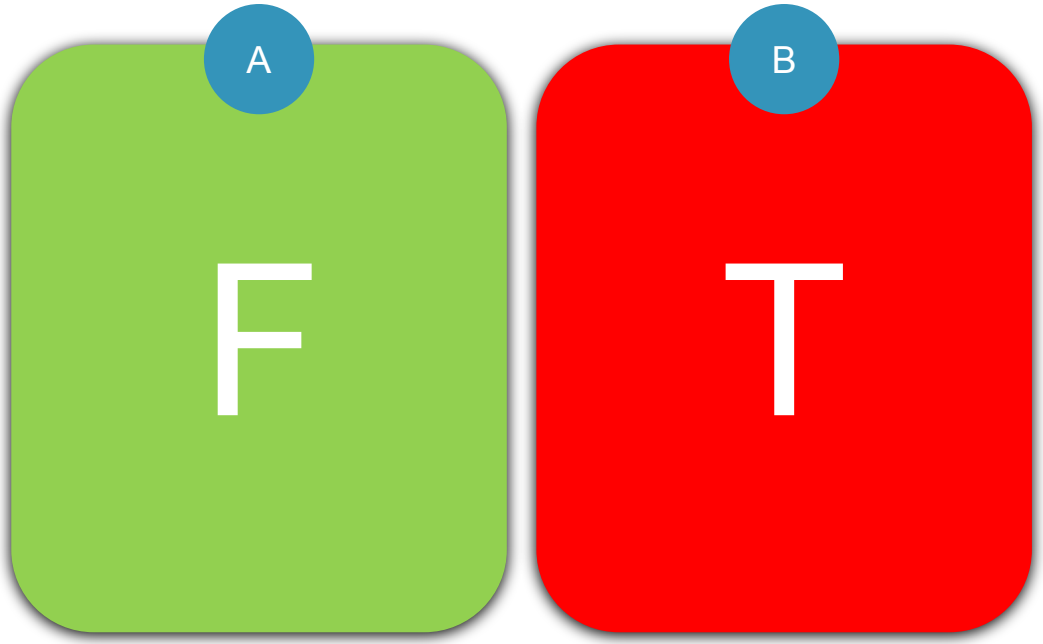

C




FEEDBACK: The correct answer is C, because the drawing starts in the lower right corner of the central leg and from there the amounts in steps and turns correspond to this part of the drawing that is highlighted.

## Question #5

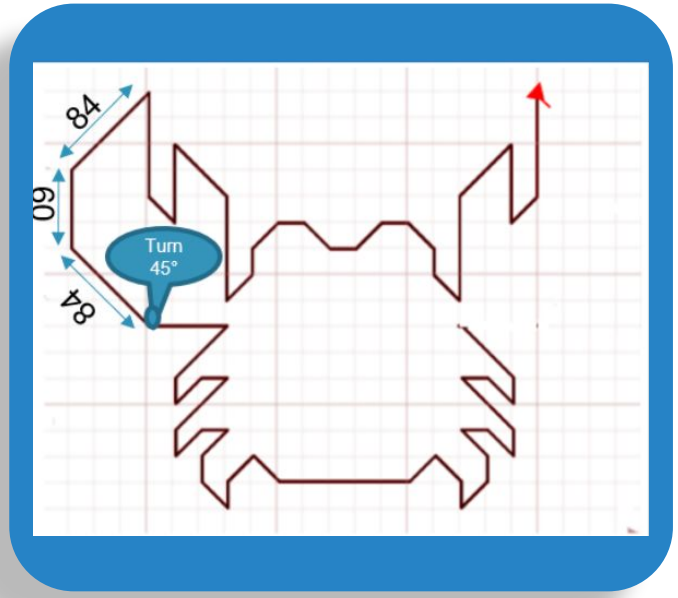
Starting from the gif shown, it can be concluded that this algorithm is the one that is being executed to finish the part that the whale lacks. (each grid line is 20 steps, each diagonal is 28 steps).
https://firebasestorage.googleapis.com/v0/b/arukay-ls-admin.appspot.com/o/files%2F4WSeA0VQxwbP0cQi0tiM-1638476633029-4?alt=media&token=6b1ee804-4aa4-4925-a4c6-220fb8e26c72




FEEDBACK: The correct answer is (A) False, because in the gif 5 steps are executed to finish the missing part of the whale and in the algorithm there are only 3 steps. It can also be shown that it is false because the first step that is executed in the gif to finish the whale is to move 56 steps (2 diagonals) and the first step of the image algorithm says "move 120 steps".

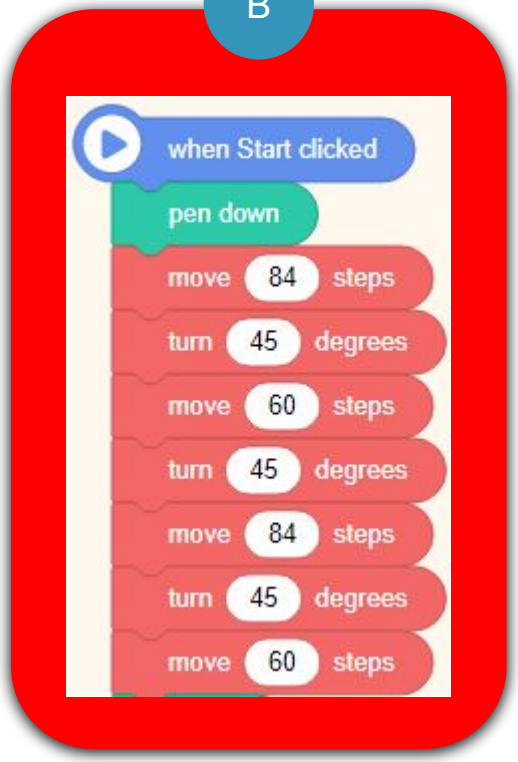
## Question #6

From the red arrow, which algorithm should be run to complete the crab's missing claw? (each grid line is 20 steps, each diagonal is 28 steps).

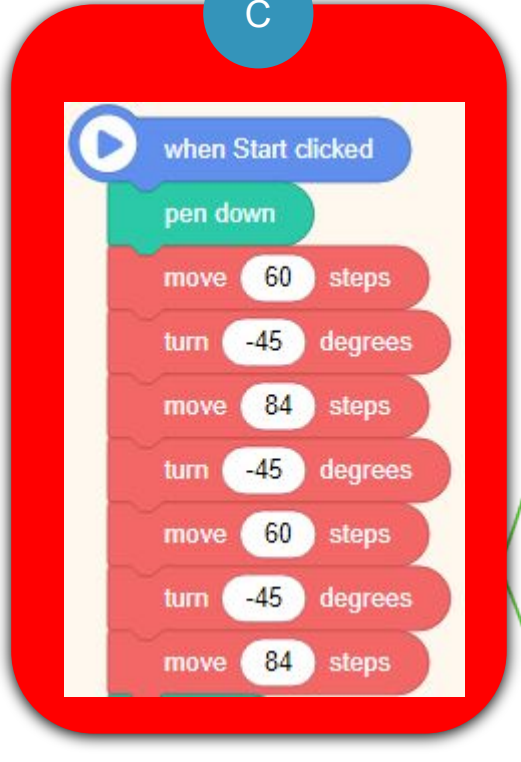



A

B



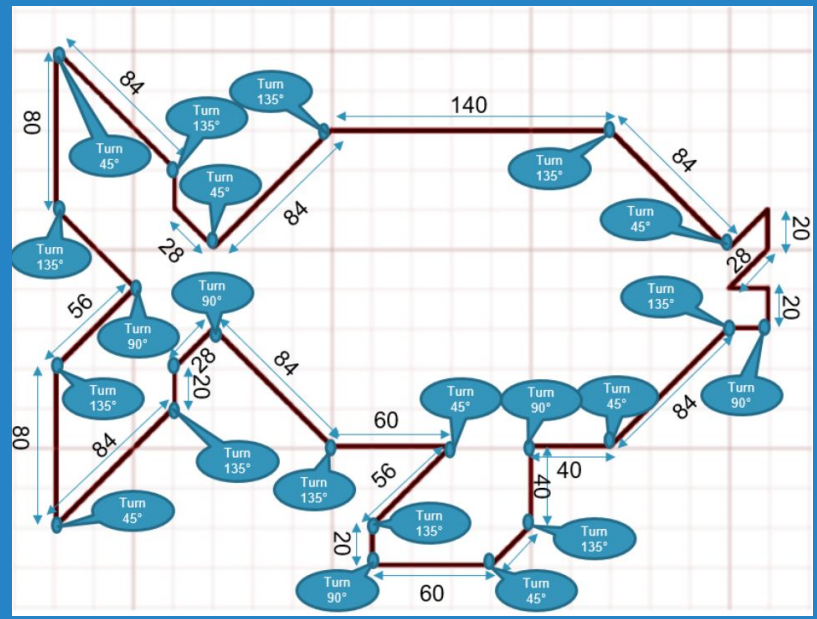

C




FEEDBACK: The correct answer is A, because from the red arrow the number of steps and the direction of the turns are the ones that correspond to draw the missing pincer.

# Question #7

The number of motion blocks and turns to use in the algorithm to draw this fish is _____ (each grid line is 20 steps, each diagonal is 28 steps).




A
55

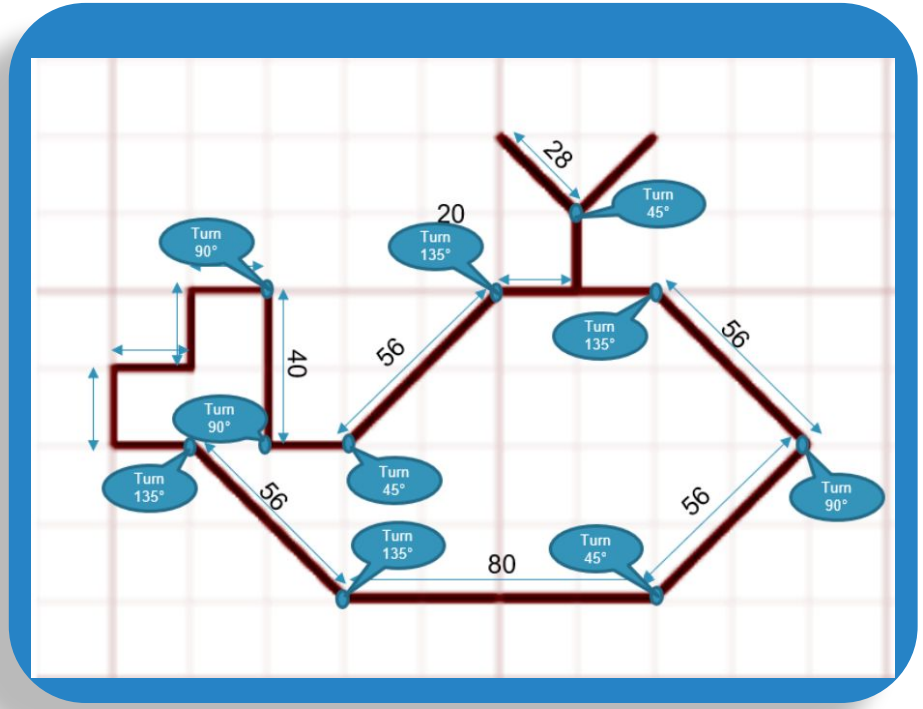
B
60

C
45

FEEDBACK: The correct answer is A (55), because each line represents a move block and each turn point represents a turn block.

## Question #8

The fewest number of movement blocks and turns to use in the algorithm to draw this fish is _____ (each grid line is 20 steps, each diagonal is 28 steps).




A

30

B

34

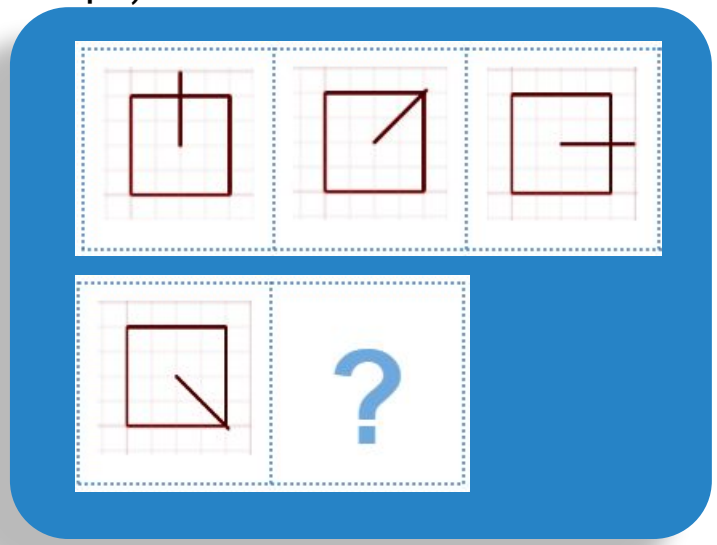
C

25

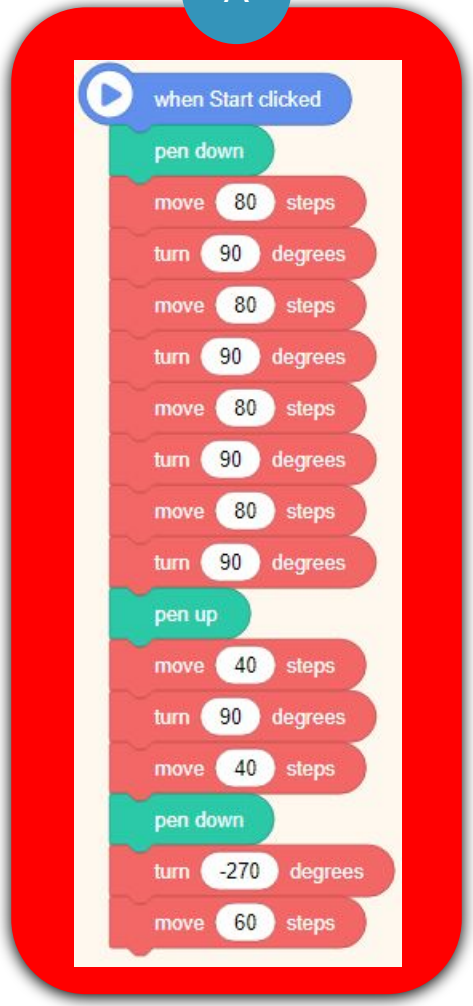
FEEDBACK: The correct answer is B (34), because each line represents a move block and each turn point represents a turn block; also at the top should be returned once the next line is started.

# Question #9

Which of the following algorithms draws the next figure in the sequence? (each grid line is 20 steps, each diagonal is 28 steps)




A



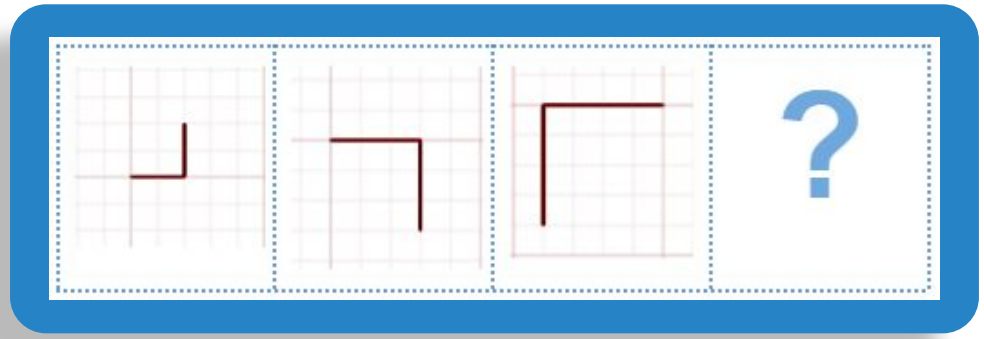

B

C

FEEDBACK: The correct answer is C, because the rule of succession is that the internal line is rotating 45° counterclockwise. And the number of steps that the lines measure corresponds to the size of all the figures.

# Question #10

Which of the following algorithms draws the next figure in the sequence? (each grid line is 20 steps, each diagonal is 28 steps)




A

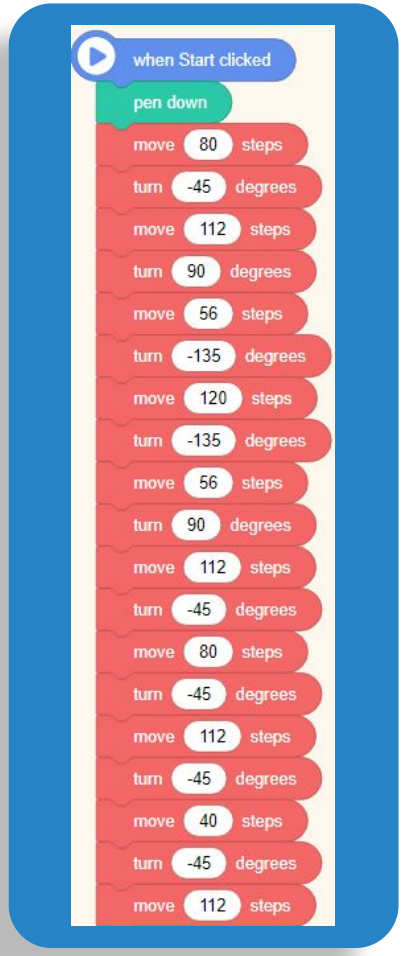
B

C

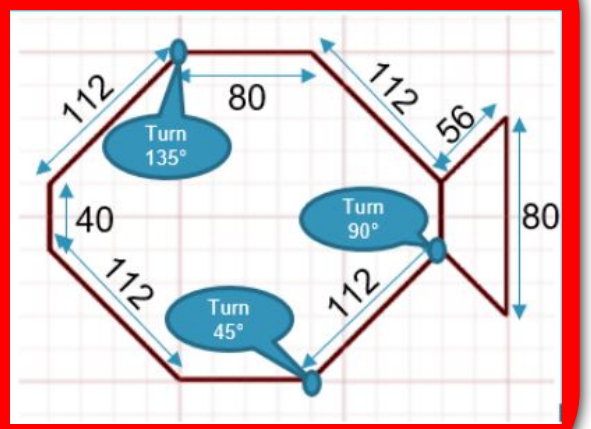
FEEDBACK: The correct answer is B, because the figure is increasing the horizontal and vertical length in a square and the figure rotates 90° counterclockwise, remaining as an L with 100 steps of both horizontal and vertical length.

# Question #1 BANK

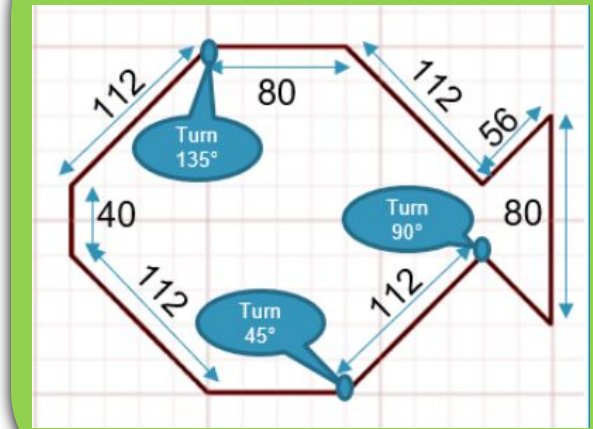
Which of the following pictures results from running this algorithm? (each grid line is 20 steps, each diagonal is 28 steps)



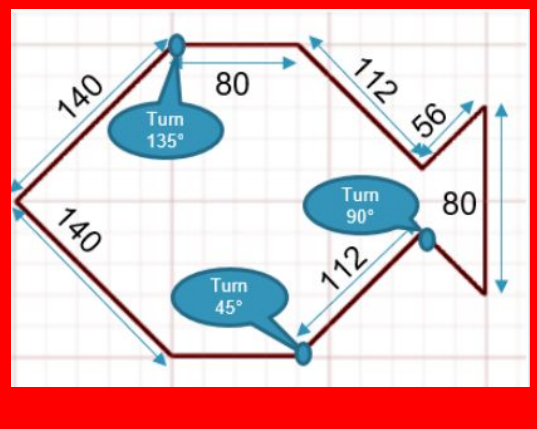

A




B



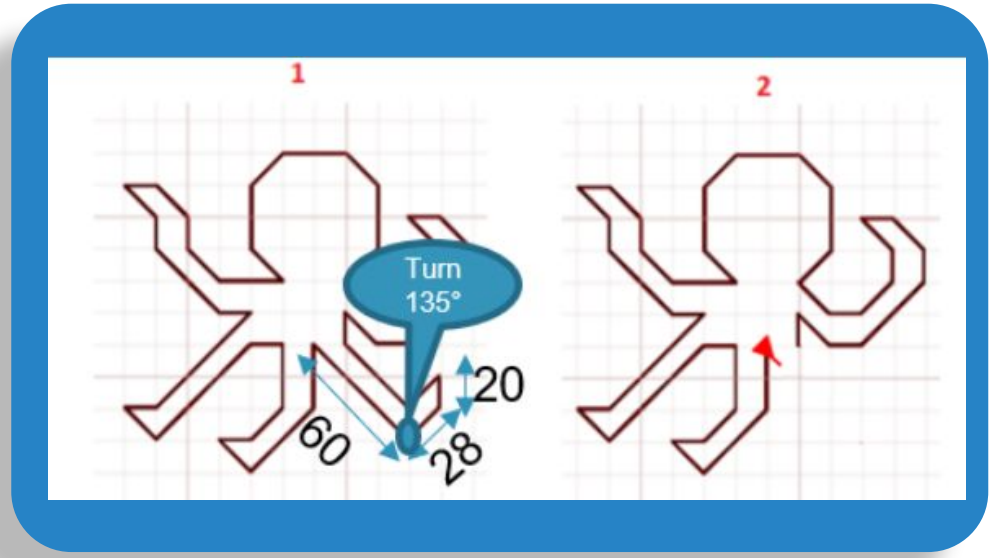

C



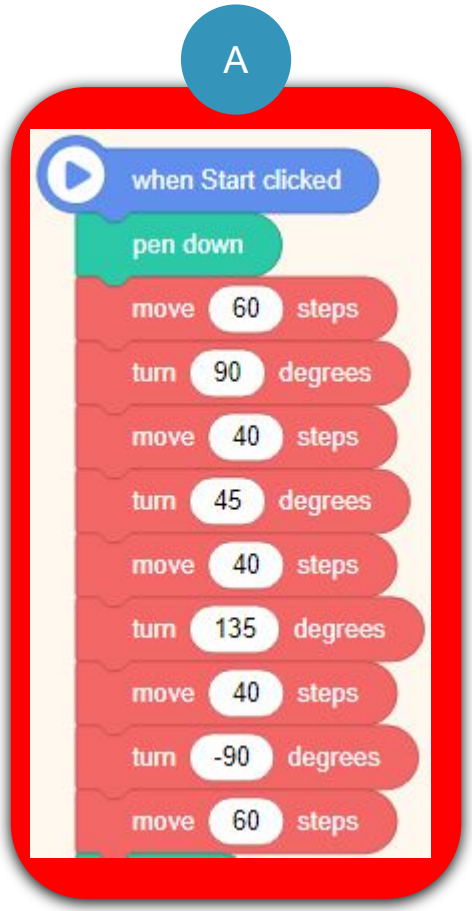

FEEDBACK: The correct answer is B, because the drawing starts in the upper left corner and from there the amounts in steps and turns correspond to this drawing.

# Question #2 BANK

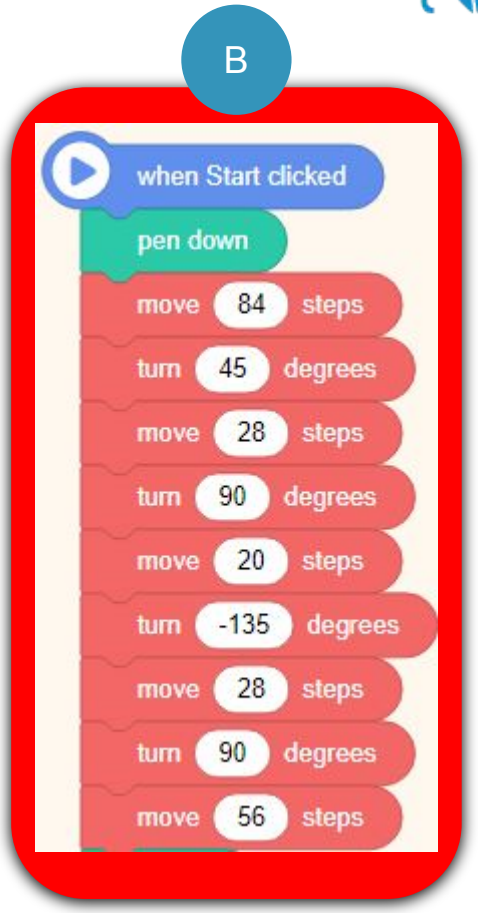
From the red arrow, which algorithm should be run to complete the second octopus's missing arm? (each grid line is 20 steps, each diagonal is 28 steps)



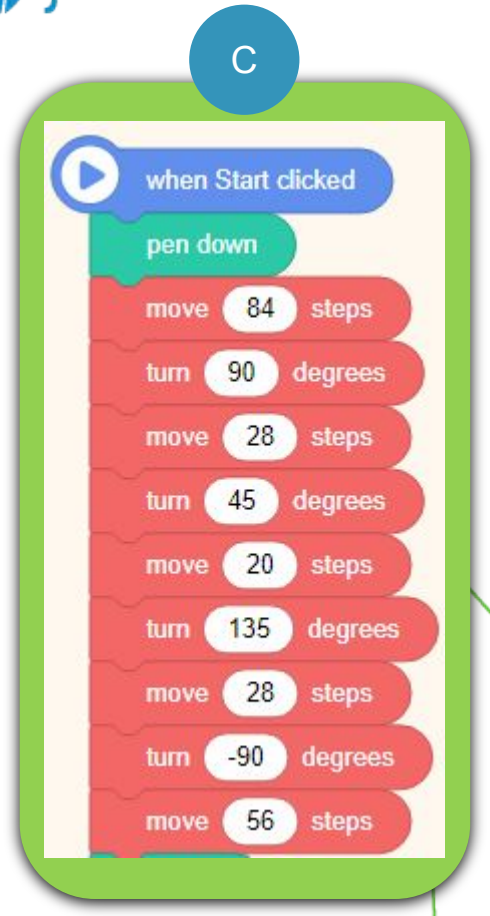

A




B



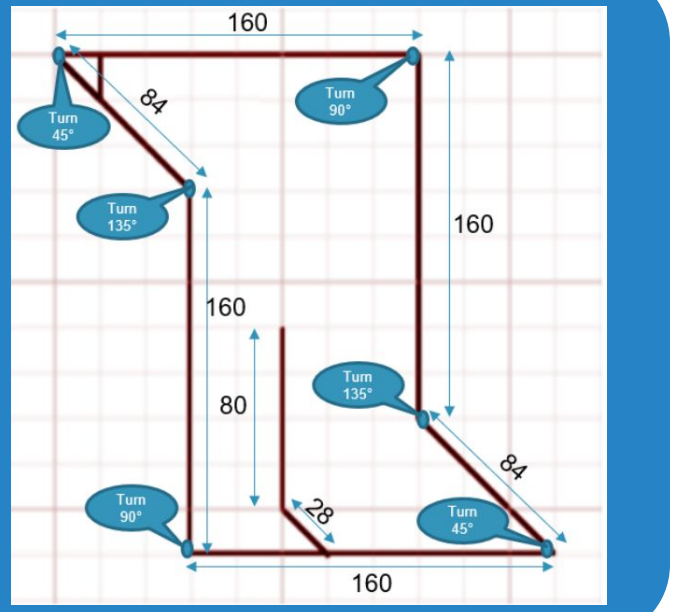

C




FEEDBACK: The correct answer is C, because from the red arrow the number of steps and the direction of the turns are the ones that correspond to draw the arm that the second octopus is missing.

# Question #3 BANK

The fewest number of movement blocks and turns to use in the algorithm to draw this fish is _____ (each grid line is 20 steps, each diagonal is 28 steps)




A

25

B

22

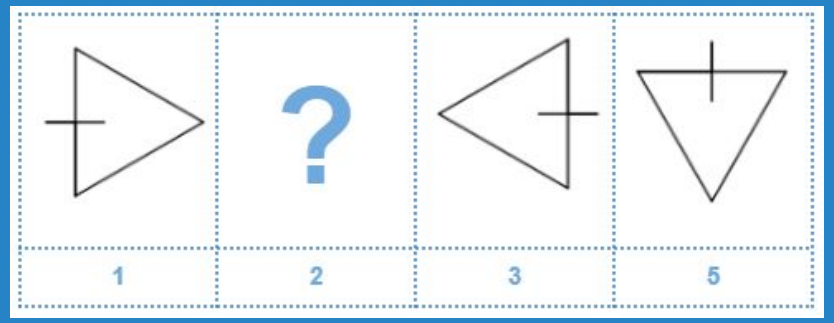
C

23

FEEDBACK: The correct answer is B (22), because each line represents a move block and each turn point represents a turn block. The drawing must start at the bottom where the fin begins to reduce the number of times it passes through the same side, in the part of the nose it returns once and continues bordering the drawing.

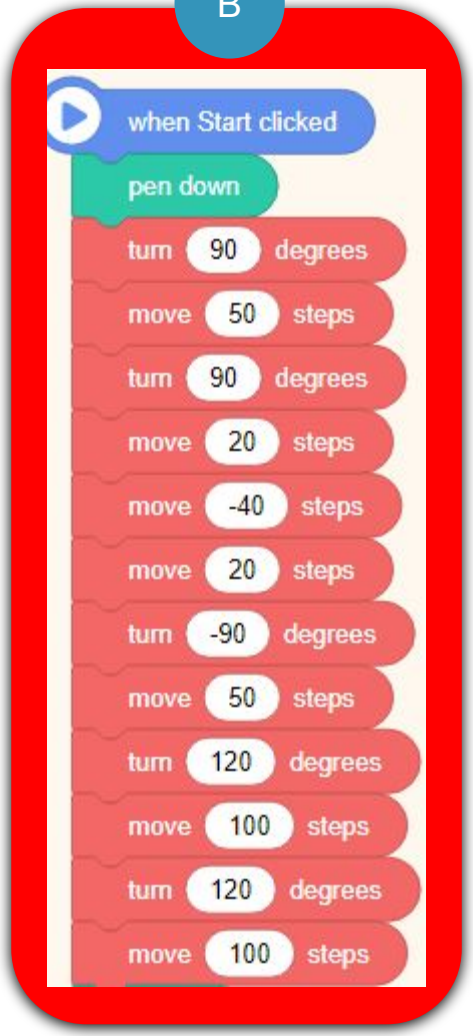
# Question #4 BANK

Which of the following algorithms draws the missing figure in the sequence?




A

B

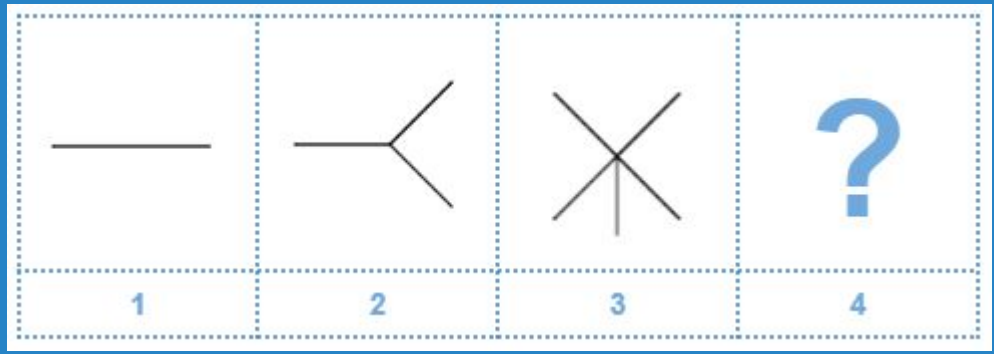



C

FEEDBACK: The correct answer is A, because the rule of the sequence is that they make 90° turns counterclockwise, so the missing figure is the triangle with the line in the middle at the base.

# Question #5 BANK

Which of the following algorithms draws the next figure in the sequence? (each grid line is 20 steps, each diagonal is 28 steps)




FEEDBACK: The correct answer is C, because the rule of succession is that the number of lines increases by two. In the first there is 1 line, in the second image there are 3 lines, in the third image there are 5 lines, so in the fourth image there should be 7 lines.

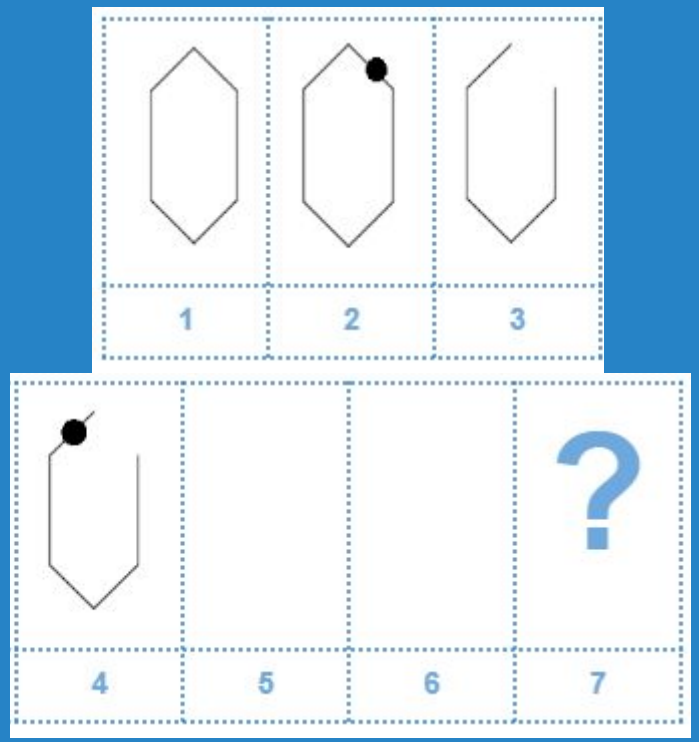
A

B

C

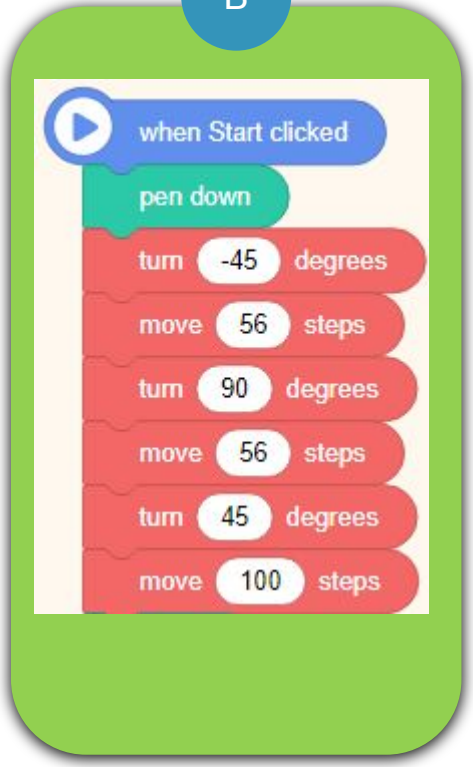
# Question #6 BANK

Which of the following algorithms draws the figure that should go in the seventh position? (each grid line is 20 steps, each diagonal is 28 steps)




A

B




C

FEEDBACK: The correct answer is B, because the rule of succession is that the point moves counterclockwise and each line it touches is erased; so in the seventh position there should only be 3 lines, the two from the bottom and the one from the right side.

## Glossary

- Sequencing: Sequencing is a series of ordered events that perform or specify a task or activity.
E.g. A cooking recipe, programming code.

- Programming Blocks: Programming blocks are internal functions that perform a specific task, i.e., within a block is a function performed in a scripting language such as (Java, Python, etc).

- Movement blocks: Functions designed to move the character in the console, either linearly (horizontally and vertically) or diagonally.

- Pencil blocks: Functions intended to allow the user to draw on the screen using the character.

- Work area: Special place to drag the programming blocks and perform various sequences according to the requirement or activity to be performed.

- Testing: Evaluating the operation of a programming sequence in order to find possible bugs or errors.

- Bug: Term used in programming to refer to an error in the operation of a technological product that was developed with programming code.

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# Bibliography


- Editor Kitten

  https://kitten.code.game/

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