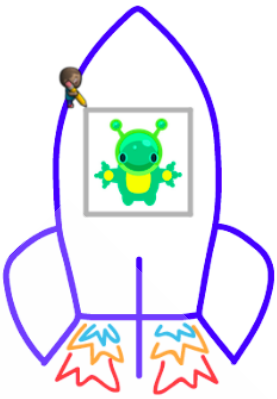
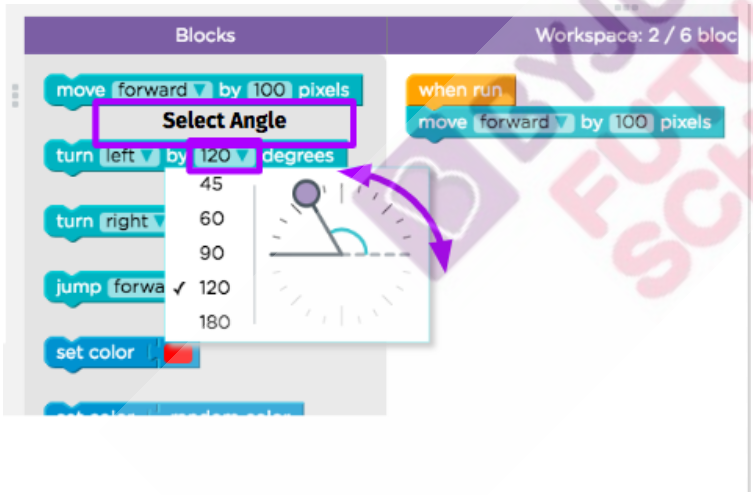
Topic	CREATING ALGORITHMS	
Class Description	**Introduction to Algorithmic thinking to solve abstract challenges. Kids balance logic & abstraction to create inventive computer art.**	
Class	**ADV-C2**	
Class time	**50 mins**	
Goal	• Construct Algorithms to complete a task	

Resources Required	• Teacher Resources:
	  ○ Use your Code.org login credentials
	  ○ Earphone with mic
	  ○ Notepad and Pen
	• Student Resources:
	  ○ Use your Code.org login credentials
	  ○ Earphone with mic(optional)
	  ○ Notepad and Pen	

Class structure	**Warm Up** **Teacher-Led Activity** **Student-Led Activity** **Wrap-Up** **Project pointers and cues**	**2 Mins** **8 Mins** **30 Mins** **5 Mins** **5 Mins**
From next class we will start working with MIT App inventor so just to be well prepared refer to Teacher Reference Activity 1 before class. The reason we are asking to get well versed with MIT App inventor is because in this class you have to call the parent and inform them about the same to them, the information of this is mentioned in this lesson plan.		
WARM UP SESSION - 2 mins		
Teacher starts slideshow  **from slides 1 to 27.** Refer to speaker notes and follow the instructions on each slide.		

TEACHER ACTIVITY - 8 mins	
Screen Share initiated by Teacher	
Let me show you how we can draw. I am going to do a few coding activities for you and then you will do the rest. In this activity **Pixels** indicate the **length** of the line drawn on screen. If we change the value of a pixel, the length of the line on the screen will change accordingly. Let us now mentally make an **algorithm** for drawing a cage for this monster. So for a cage now, we need to complete the partly drawn picture 1. draw a horizontal line 2. turn right/90 degrees 3. draw a vertical line Translating this **algorithm** into code will draw the cage for the monster. So you see how we first made an **algorithm** or set of instructions in our mind and then it was so easy to find the right blocks to write a computer program or code. You should always have an algorithm in your mind to solve a problem and then code your **algorithm.**	Explain these steps to students while you do these activities. Teacher Activity 1-CREATING ART  1.**Drag** the following blocks one by one, adjust the angle and connect as shown. Solution 1  2. Click **Run**
	Teacher Activity 2-CREATING ART

Make sure you read the angle correctly, Here I am setting the outer angle and not the inner one, you will see the outer angle is highlighted with color. also choose the outer angle.	 adjust angle in degrees and connect as shown. see Below
	
	Solution 2

Let us now draw the alphabet **'T'**, Watch closely how I do it with code.

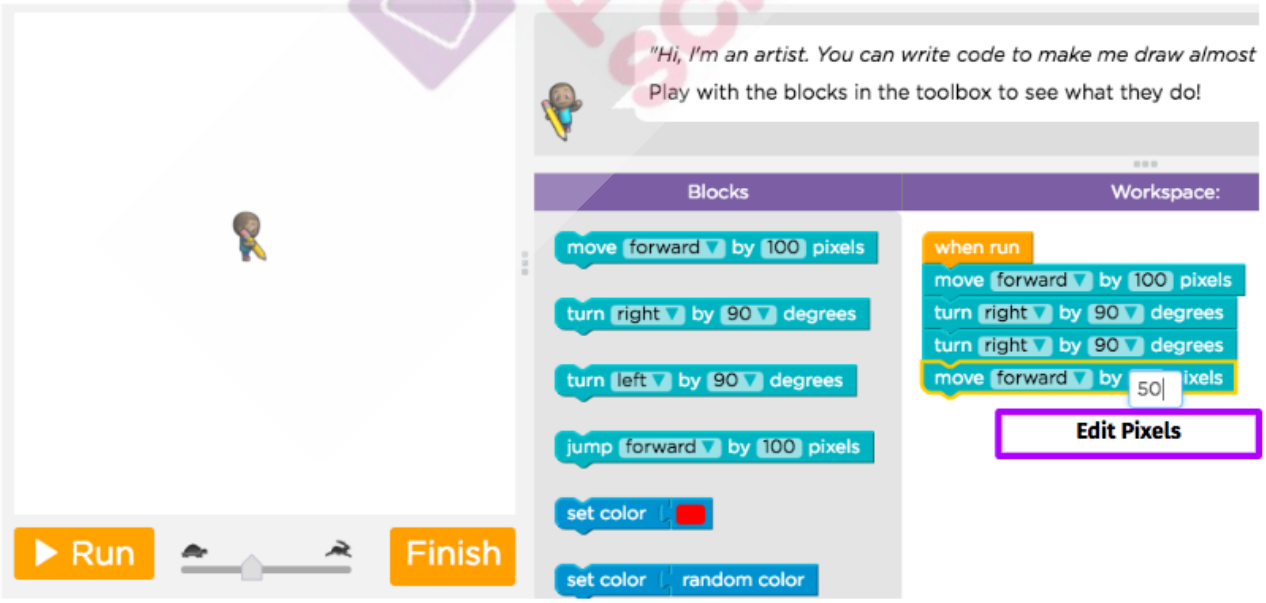
Before that I need to think of an **algorithm** to do it so this is the **algorithm** I am thinking-

Step 1 draw a line upward
Step 2 draw horizontal line leftward
Step 3 draw horizontal line rightward

Now let's code accordingly.

[Teacher Activity 3-CREATING ART]

Edit the pixels as shown below:



Solution 3

	
Teacher Stops Screen Share	
Teacher starts slideshow from slides 28 to 30. Refer to speaker notes and follow the instructions on each slide.	
STUDENT ACTIVITY - 30 mins	
Now it's your turn.	
• **Ask Student to press ESC key to come back to panel** • **Guide Student to start Screen Share** • **Teacher gets into Fullscreen**	
Student Initiates Screen Share	
Remember Algorithms are a set of instructions you create in your mind to solve a problem. It is very important to always have an **algorithm** in mind before writing the code.	

Use your code.org id and password to login

So when you are solving these activities in your mind you are basically thinking **ALGORITHMS** but you are writing it in computer language.

and what is that computer language?

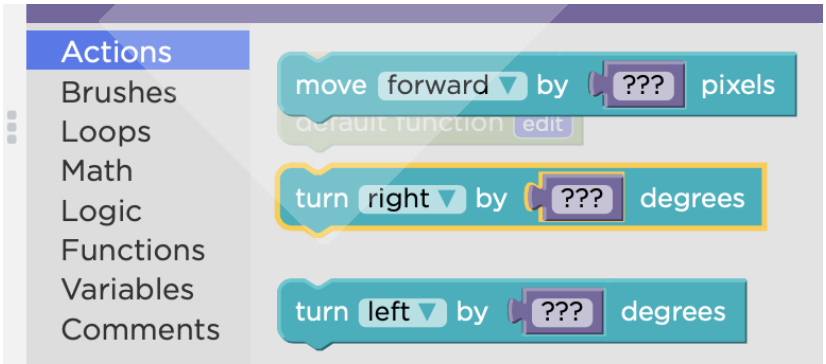
Great! It's the **BLOCKLY** Language.

Okay so what is the algorithm to solve this?

Great!
Now write code according to the algorithm you have in mind.

You can write down the algorithm on a paper for the first few activities. But remember, as you start coding more and more, you should be able to have the algorithm in your mind.

In actions



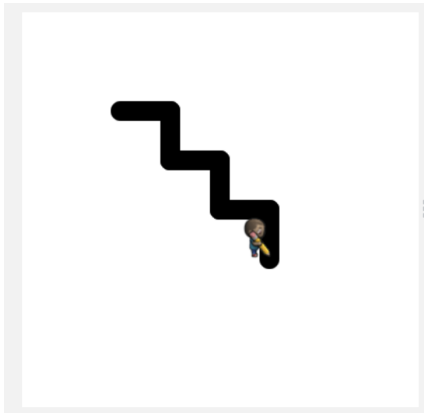
you will find move, left, and right code block

Student Activity
1-CREATING ART

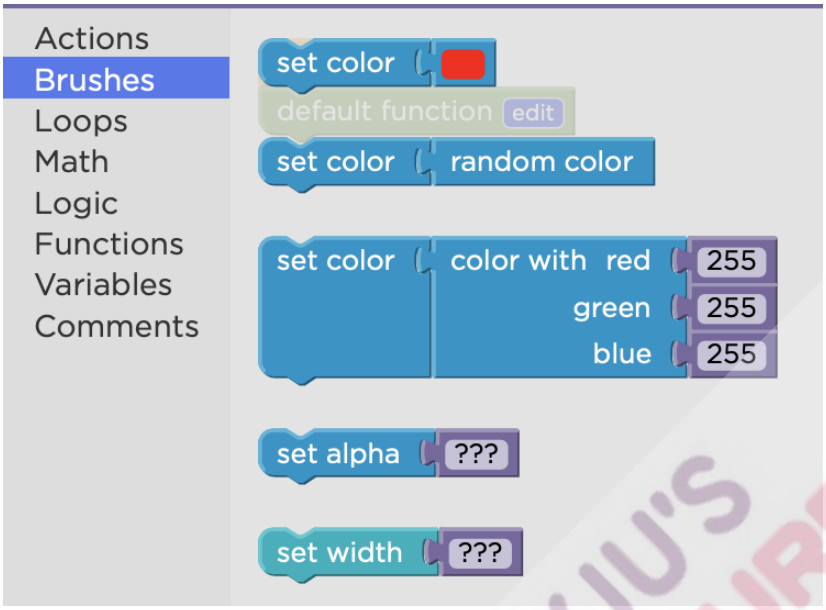
Click on 

Then click on

Expected output



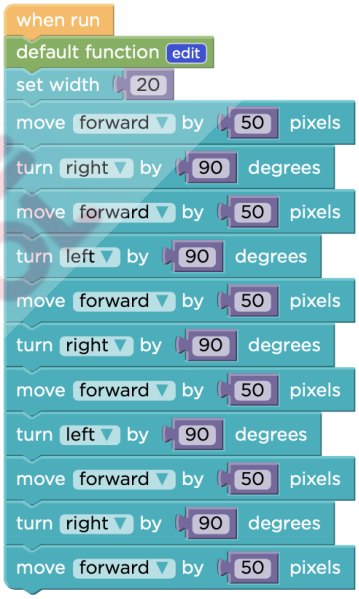
In Brushes you will find 



Great! Now that you know how to draw a staircase, we can use the repeat block to make the artist do something repeatedly. Using the repeat block will also shorten the code.

Solution 1 **WITHOUT REPEAT**

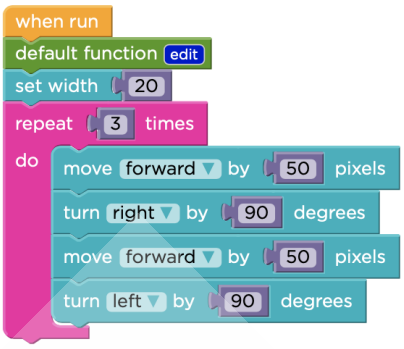
(Students should **not** use REPEAT blocks in the first attempt though the activity demands it here. We are building student's algorithmic thinking by intentionally writing longer code blocks.)



Don't open the default function, it is just to add the traces.

Solution 1 **WITH REPEAT**

Q - What is a repeat loop ?
A - A repeat loop tells the computer how many times a particular task should be repeated.
Just like in the morning when we brush, it's a loop. You have to move your tooth brush back and forth, back and forth.
So if you were a robot, a repeat loop must be written to brush your teeth.
So this means when we want to perform the same task again and again, we use the repeat the loop.
Another advantage of the repeat loop is that we don't have to write the same code again and again, we just need to write the code once and put this code inside the repeat loop block.



You just have to specify how many times you want to repeat the code inside the block.
eg.Here

Repeat 3 Times as we have 3 staircases

1. 

2. 

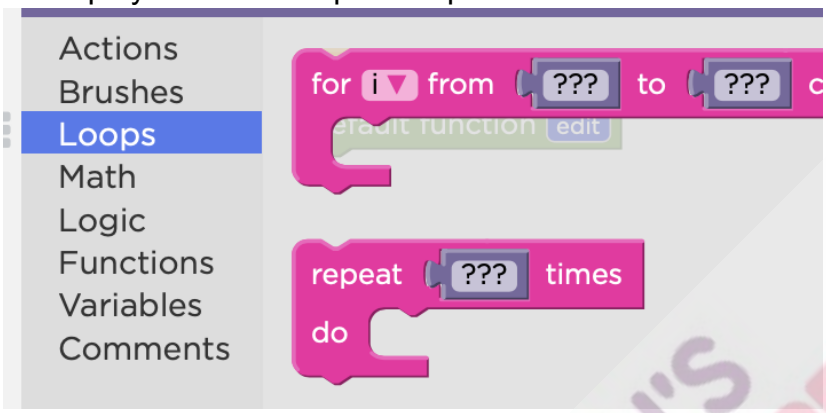
3. 

Always remember, A computer reads the code line by

[Student Activity 2-CREATING ART]

line in sequence and hence the lesser the number of code lines, the lesser the instructions for the computer to read and execute the program. We can save writing similar line of code using repeat blocks

In Loops you will find repeat loop

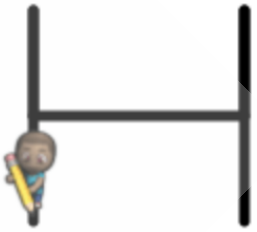


Again, if you want, you can write down the algorithm on the paper first.

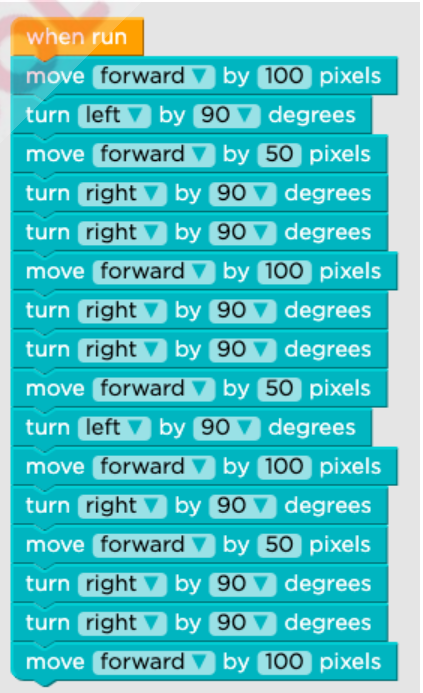
Encourage the student to answer.

Solution

Student Activity
3-CREATING ART



Solution 3

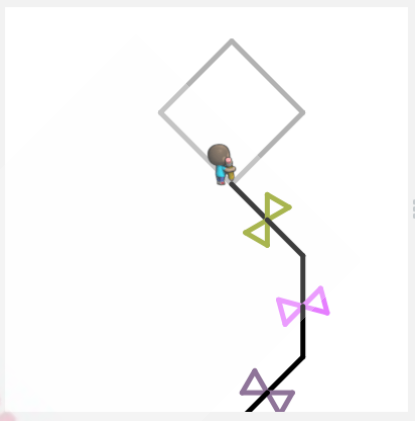


Now this time, try not to write the algorithm, but just have it in your mind and then write the code for it

Can you think about an **algorithm** to draw the alphabet **'H'?**
Great, now that you have an algorithm in your mind let's write a code according to your **algorithm**.

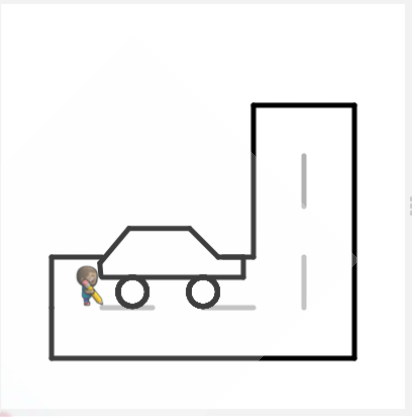
Now let's try to complete this kite you will have to guess the right algorithm and then code.

Student Activity
4-CREATING ART

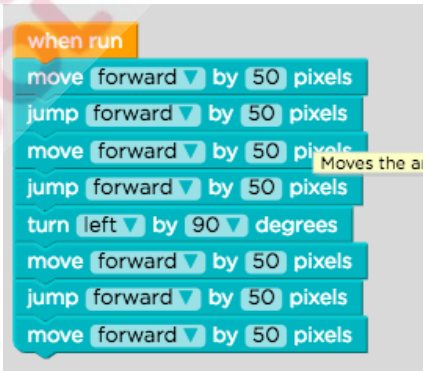


Solution 4

Student Activity
5-CREATING ART



Solution 5

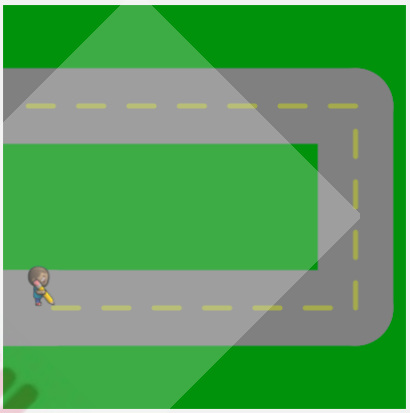


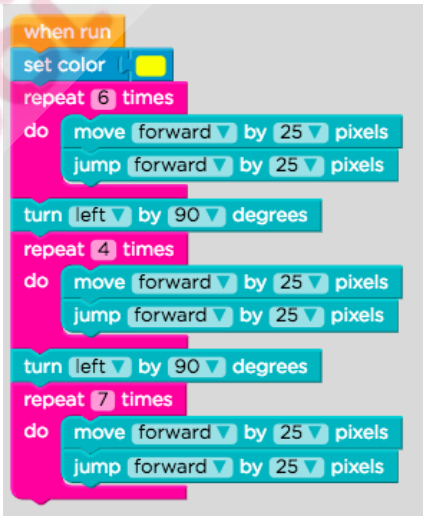
Can you see that there are gaps between the lines that need to be drawn

The **jump block** moves the artist without drawing or leaving a trail. Let's learn how to use the jump block to draw a dashed line on this road. Remember to think algorithmically before coding.

Wow! You are so good at thinking in algorithms .

Student Activity
6-CREATING ART
Solution 6



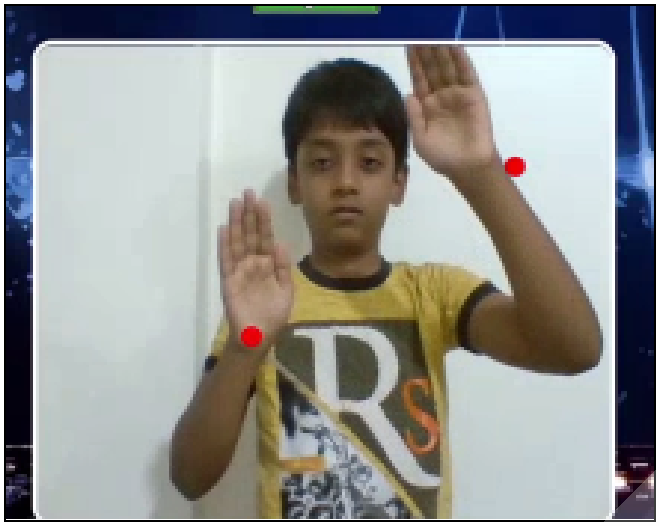


NOTE: Call the parent to inform them about My profile application creation starting from the next class. Script and context for the same is mentioned below:

<Begin by greeting the parent> I have called you, to inform you that from next class onwards *<student name>* will start creating mobile applications using the MIT platform. MIT (Massachusetts Institute of Technology) platform is a visual programming environment originally provided by Google and now maintained by Massachusetts Institute of Technology. This platform allows users to build fully functional apps for smartphones and tablets. In the upcoming classes *<student name>* will be making this beautiful My Profile App using some coding knowledge *<student name>* will be building this application. So for testing this application *<student name>* will require an android phone. If possible **please arrange one for *<student name>*** and download MIT AI2 companion application(Link has been provided in **Student-Reference-Activity-1**). If not possible then please install the NOX emulator which is a 3rd party emulator testing MIT applications on *<student name>* system. The process is very simple the required videos are given in **Student-Reference-Activity-2**	Teacher asks the student to go back to **Panel** **Run** Student Module Activity 1 and showcase My Profile App that they will be building in the next few classes. If the parent asks that they have only an IOS device and why can't they test on it. So ask them to arrange android phone is possible, and also inform them MIT is not yet completely compatible with

NOTE: If the parent is not able to join then: - **Inform the student about the same** - **Ask the student to call their parents in the next class.** - **If you can connect to the parent personally then drop a message about the same to them.**	IOS once it is completely compatible, the apps which *<student name>* will create will work on both android and IOS devices
Teacher Guides Student to Stop Screen Share	
WRAP UP SESSION - 5 Mins	
Teacher starts slideshow  **from slides 31 to 35.** Refer to speaker notes and follow the instructions on each slide.	
FUN STUDENT ACTIVITY 	
• **Ask the student to press the ESC key to come back to the panel.** • **Guide the student to start Screen Share.** • **Teacher gets into Fullscreen.**	
Student Initiates Screen Share	
Shall we begin?	Student Activity 7-AI DJ WEBAPP *Before opening this website, close the webcam from all other websites where the camera is used, and then open this*

When you open the website, it will ask you to give permission to access the webcam. Please allow it. **Step 1:** Start the DJ. ● Click on the **Play** button.  **Q Did you recognize this music? Which movie's theme song is it?** **A** Let the student respond. Indeed! It is a Harry Potter theme. You seem to be enjoying this! **Step 2:** Control the volume of the music. ● Move your left hand down/up to increase/decrease the volume of the music. ● Move your right hand down/up to decrease/increase the speed of the music.	*website.* *Ask the student to open the link for student activity 7.*



You see, in this application, left and right hand wrist locations are detected.

These detected locations are highlighted using red dots on the screen.

These locations on the canvas are used to adjust the volume and speed of the music respectively.

Isn't it amazing?

Are you wondering how this happens?

Well, the DJ application is capturing our hand movements using the Artificial Intelligence (AI) techniques in order to adjust the volume and speed of sound. Just like an intelligent human can sense the up/down movement, so can this Artificial Intelligent DJ App.

Great!

Let's move ahead.

Student Stops Screen Share	
DID YOU KNOW, UPCOMING CLASS, AND PROJECT POINTERS - 5 Mins	
Teacher starts slideshow  **from slide 36 to 38.** Refer to speaker notes and follow the instructions on each slide.	
Project Name: RULED PAGES **Goal of the Project:** Today, you learned about algorithms and also understood how following a specific order is very helpful in successfully running a program. In this project, you have to practice and apply what you have learned in the class and draw horizontal lines and a single vertical margin on a blank canvas to create a ruled page. **Story:** You have accidentally bought blank A4 papers, but your school assignment requires ruled pages. The lines you draw by hand may be uneven or slanted. You cannot go out to buy ruled papers now. But your computer coding skills may save you this time! You create an app that is designed to create a ruled page so that you can take a printout and use it for your assignment. Can you create this app? **The project will take only 30 minutes to finish. You can try and finish it immediately after this class.**	**Note: You can assign the project to the student in class itself by clicking on the Assign Project button which is available under the projects tab.** Open the **Project Solution** link and demo the project to the student

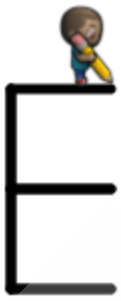
I am very excited to see your project solution and I know you both will do really well. Bye Bye!	
NOTE: If the teacher has time like 3-4 minutes, the teacher should quickly help the student to download NOX emulator.	
Revision and upcoming classes	
Teacher starts slideshow  **from slides 39 - 45.** Refer to speaker notes and follow the instructions on each slide.	
Teacher Clicks 	
Additional Activities	
Teacher starts slideshow  **from slides 46 - 51.** Refer to speaker notes and follow the instructions on each slide.	
STUDENT ADDITIONAL ACTIVITY 	
Student Initiates Screen Share	
You can try some more challenging activities. Can you think about an algorithm to draw alphabet **'E',** Great now that you have algorithm in your mind lets write	Additional Activity 1-CREATING ART

a code according to your algorithm

Can you think about an **algorithm** to draw alphabet **'P',**

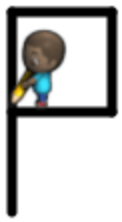
Great now that you have **algorithm** in your mind lets write a code according to your **algorithm**

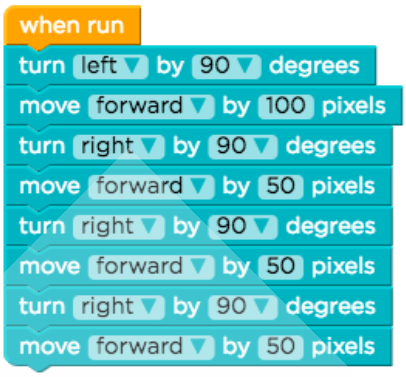
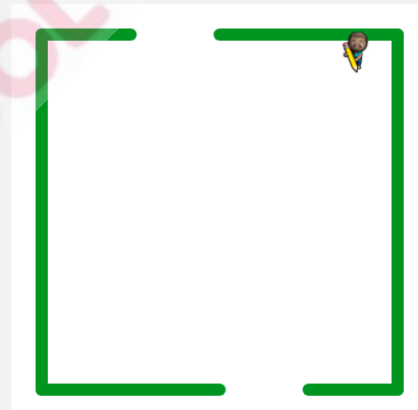
Help the artist to complete the square. Click on remix and start

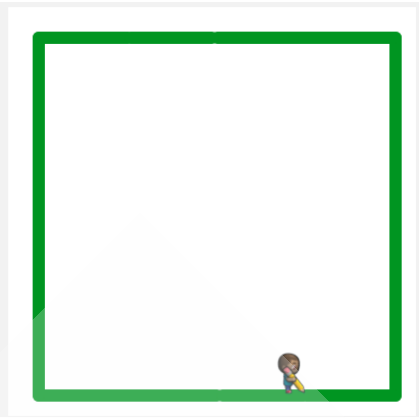


Solution A1

Additional Activity
2-CREATING ART



	Solution A2  Additional Activity 3- COMPLETE SQUARE 1  Required output -

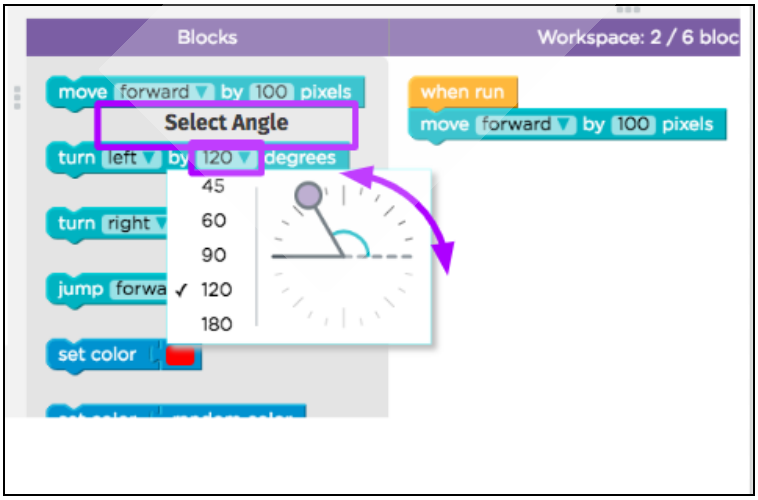


While coding, to turn left or right, we use angle to move.

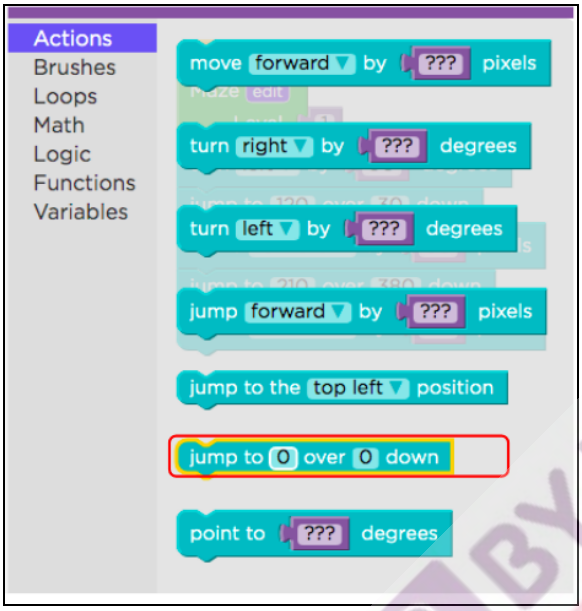
Degrees are the amount you want to turn.
For example: You are facing east to enjoy the sunrise and your friend is coming from North direction and says “Hi”, you will have to turn 90 degrees to see your friend and shake his hand.

East (E), West (W), North (N), South (S) these 4 directions are exactly 90 degrees apart from each other.

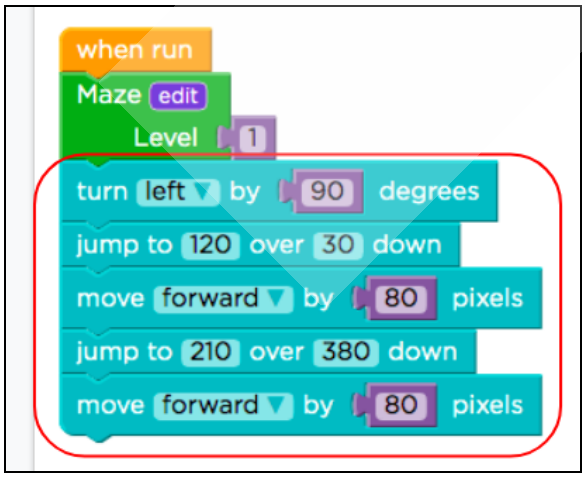
When you turn one complete circle we say you have turned 360 degrees. like the earth rotates one complete rotation in 24 hours so we say the earth turns 360 degrees in 24 hours.

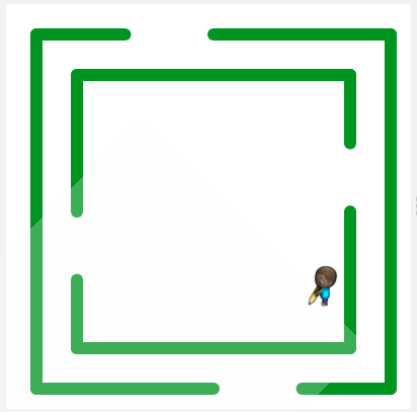
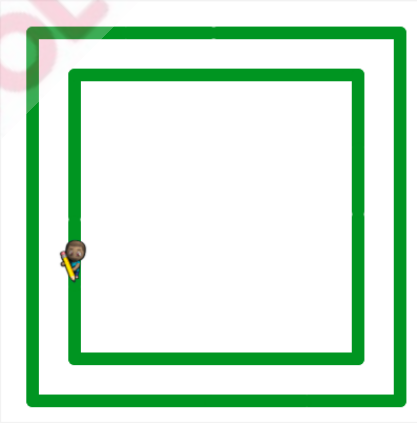


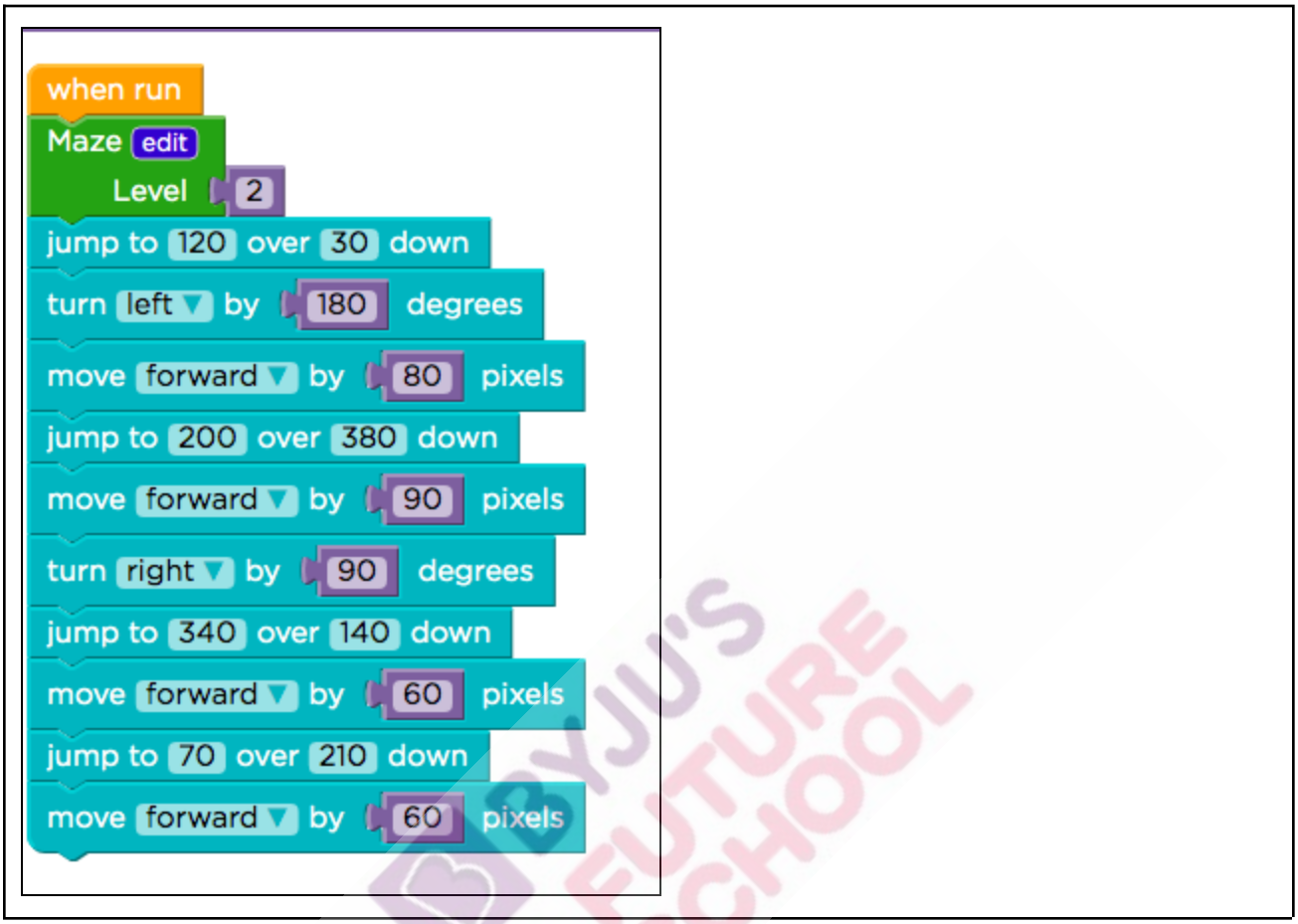
Jump block: This block lets you jump to any position on the screen without drawing anything. Jump to **horizontal** position over **vertical** position. As you know this screen has 400 pixels width and 400 pixels height. We will use the jump block to check the position of the artist on screen. **You can try changing the number until you get the artist to the exact position.**



Solution AA 3:



	Help the artist to complete the square	Additional Activity 4- COMPLETE SQUARE 2  Required output: 
Solution for AA 4		



Activity No.	Name of the Activity	Link
Teacher Activity 1	CREATING ART	https://studio.code.org/s/express-2023/lessons/4/levels/3?redirect_warning=true
Teacher Activity 2	CREATING ART	https://studio.code.org/s/express-2023/lessons/4/levels/4?redirect_warning=true
Teacher Activity 3	CREATING ART	https://studio.code.org/s/express-2023/lessons/4/levels/2
Teacher Reference	MIT TEACHER	https://docs.google.com/document/d/e/2PACX-1vTSVSo

Activity 1	GUIDE	oc99svDx4SinvfenhP7QjytqupcivM-XuY-WwOshBUp6WaeQJvDCtyKFit7EeMRS2Lax9Ztsr/pub
Student Activity 1	CREATING ART	https://studio.code.org/projects/artist/rRYNQEBvcaEeVzWA5SgqMX-txf6fGT4-3yz1hQ8DkjY
Student Activity 2	CREATING ART	https://studio.code.org/s/express-2023/lessons/4/levels/8?redirect_warning=true
Student Activity 3	CREATING ART	https://studio.code.org/s/express-2023/lessons/4/levels/2
Student Activity 4	CREATING ART	https://studio.code.org/s/course2/stage/4/puzzle/7?id=73933
Student Activity 5	CREATING ART	https://studio.code.org/s/course2/stage/4/puzzle/4
Student Activity 6	CREATING ART	https://studio.code.org/s/course2/lessons/4/extras?id=173490
Student Activity 7	AI DJ WEBAPP	https://mahdihat791.github.io/Ai-DJ/
Student Module Activity 1	MY PROFILE APP DEMO	https://drive.google.com/file/d/1uvHbXZaqoVKgPetLNR1xozJ1W4MOHNNv/view?usp=sharing
Student Reference Activity 1	MIT AI2 Companion App DOWNLOAD	https://play.google.com/store/apps/details?id=edu.mit.appinventor.aicompanion3&hl=en_IN&gl=US
Student Reference Activity 2	NOX STUDENT GUIDE	https://docs.google.com/document/d/e/2PACX-1vQ99Fa-L4Fy-j5apoqW82zj4ZvVWOXvAgjX4e3lWpZFHEaHqLx9b3kUqNuIKavG1CK4KCm5mT098Oyl/pub
Additional Activity 1	CREATING ART	https://studio.code.org/s/express-2023/lessons/4/levels/2
Additional Activity 2	CREATING ART	https://studio.code.org/s/express-2023/lessons/4/levels/2
Additional Activity 3	COMPLETE SQUARE 1	https://studio.code.org/projects/artist/cNrxKp1Wc63Y5EOukBQQ6M0PsmW1SRF8J0PT1ZJ7wWs/view
Additional Activity 4	COMPLETE	https://studio.code.org/projects/artist/DCZUV5sZdRBa8H

	SQUARE 2	KJVNGwDoKhjsia2wmiIWU6nyY4g74/view
PRACTICE ACTIVITY 1	PRACTICE	https://studio.code.org/s/frozen/stage/1/puzzle/1
PRACTICE ACTIVITY 2	PRACTICE	https://studio.code.org/s/frozen/stage/1/puzzle/2
PRACTICE ACTIVITY 3	PRACTICE	https://studio.code.org/s/frozen/stage/1/puzzle/3
REFERENCE VIDEO 1	REFERENCE	https://www.youtube.com/watch?v=H1-paxNG4kw
Project Solution	Ruled Pages	https://studio.code.org/projects/artist/MT5Lvu_GLYDYTHbm8eqYLSJ0snhpP8EfMku_p7XkWP8
Teacher Reference Visual aid link	Visual aid link	https://s3-whjr-curriculum-uploads.whjr.online/5a481f99-bca3-4acd-8ee9-12093a3474eb.html
Teacher Reference In-class quiz	In-class quiz	https://s3-whjr-curriculum-uploads.whjr.online/b43938ed-a1d3-4d53-8a5f-3ff0c8d86a9e.pdf