Topic	DATA VARIABLES	
Class Description	**Applying the concept of variables to create the first independent computer game. Kids learn controlling game outcomes by varying input/output parameters, thus cementing their growing creator-confidence.**	
Class	**ADV-C6**	
Class time	**50 mins**	
Goal	• Understand the concept of Variables and how they are used to store information • Develop a Game using variables	

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**
The Teacher should install an NOX Player emulator if it's not installed before the class for demoing the app to the student. Steps for installing the NOX Player emulator are mentioned in Teacher Reference Activity 3		
WARM UP SESSION - 2 mins		
Teacher starts slideshow  **from slides 1 to 21.** Refer to speaker notes and follow the instructions on each slide.		

TEACHER ACTIVITY - 8 mins	
Teacher Initiates Screen Share	
Say	**Do**
You can watch while I do a few coding activities and then you can continue to do the rest. In our exercises today, we will be using the Playlab to change the values of variables extensively for creating games. We will change the values of Variables such as "**Speed**", "**Height**", "**Score**", and so on, and see how the game works. You don't have to change the algorithm of the game with respect to how it plays, just the Variables. This game is a contest between Dog (Our candidate) and Cat (Computer) to collect flags. The first to collect 10 flags wins. So what's happening here? The dog is moving very slowly compared to the cat. Let us look at the code. **Actor1 is the dog** and it moves up and down when the up arrow and down arrow keys are pressed. The value of the variable **dog_speed** is set to **1** and value	Teacher Activity 1 -PLAYLAB Close the Video as it is not to be shown.

of the variable **cat_speed** is set to **3.**
That's why, the dog moves slower than the cat and the cat always wins the game.

What should we do to make our candidate - Dog, collect more flags and win the game?

We can change the value of **dog_speed** variable to a number higher than **cat_speed** variable so that the dog moves faster.

Let us now assign variable **dog_speed = 4**
Now, when we run the game we see that Dog is winning.

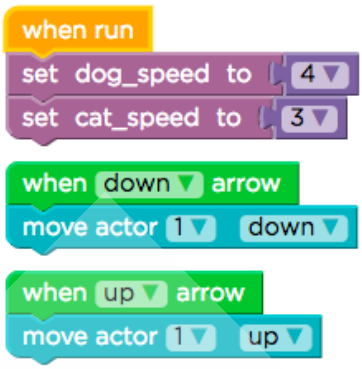
Do you see how we changed the variable speed's value to change the game and have our candidate win?

Solution 1

Press **Run** and then **Down Arrow Key** on your keyboard or  on the screen to move the dog to collect flags.

Explain the code to the student.

Events - Green blocks in the workspace area "when Up/Down arrow" are not of focus here. We have a full chapter for it in the next class.

	Solution 1  Press **Run** and then **Down Arrow Key** on your keyboard to move the dog to collect flags.
Teacher Stops Screen Share	
Teacher starts slideshow from slides 22 to 24. Refer to speaker notes and follow the instructions on each slide.	
STUDENT ACTIVITY - 30 mins	
Now that you have a clear understanding of what we mean by a Variable and how to change its value, you should do the next activities.	
• **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	
Say	**Do**

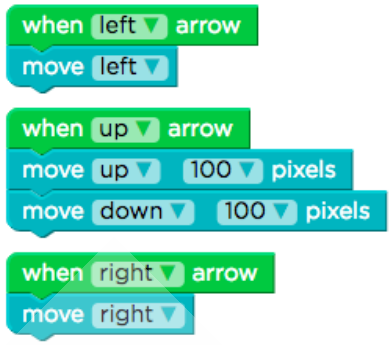
In this exercise, Dog has to collect all the 3 flags by moving Left, Right, and Up. You don't have to change anything. Just read and understand the code to predict how the game will pan out. Before you press **Run**, look at the code and tell me what will happen when you press **Up Arrow Key?** and how should I solve this puzzle? Here pixels indicate the distance or length on the screen. When you press **Up Arrow Key,** the dog will move up by **value** 100 pixels and come down **by value** 100 pixels. Something like a Jump to get the Flags. Now, Press **Run** and play the game to collect all the flags.	Student Activity 1-PLAY LAB Explain this activity in detail and what needs to be done to solve.  Solution 1: Explain the code to the student.

Great!

What would you do if the flags are placed further away from the dog? How would you collect them?

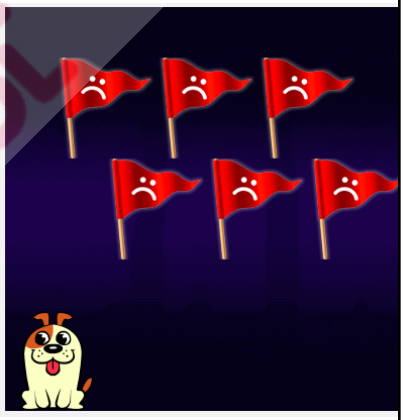
Let us find out in the next activity.

Here let us change and increase the value of variable **height** to **200** so that the dog can cover more distance on screen and collect all flags.
Here, we used the **Height** variable to control how high Dog can jump.

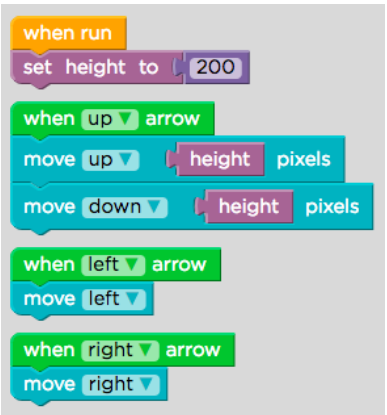


Wait for the students to give you the answer.

[Student Activity 2-PLAY LAB]



Solution 2



Great! Now you know how to change the values of the variables to win a game.

Now let's move from just being a player of the game to the creator of the game by applying the concept of the variables.

Are you both excited to build a game?

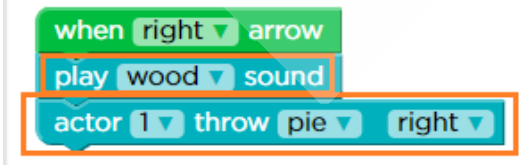
Great!

In any game, we need to keep score to know who's winning or losing
So, let's learn to set the score.

Edit and set the Variable Point to 10. This means our score starts from 10. This score can either increase or decrease from 10 depending on the code and game requirement.
Great!

Now that we have established 10 as the maximum score for winning, let us look into how we will control and calculate scoring points.

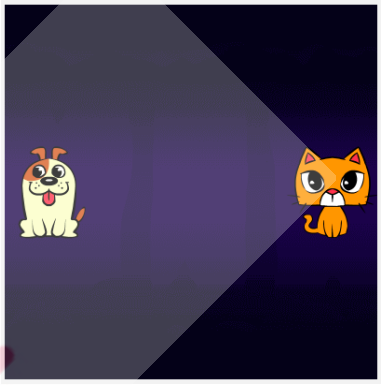
Instructions on the screen tell us that on the Right **arrow** key press, Dog will throw a pie at the Cat. The throw is accompanied by a "wood" sound.



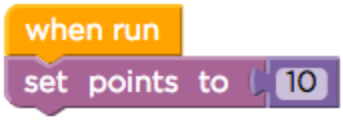
You can click on the dropdown and change the Sound and set it to any value you like:

Press **Run** and move the dog to collect flags.

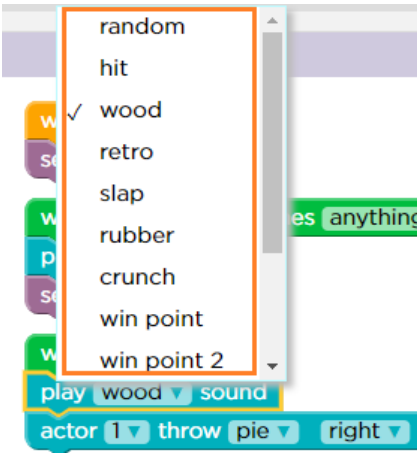
[Student Activity 3-PLAY LAB]



Solution 3



[Student Activity 4-PLAY LAB]



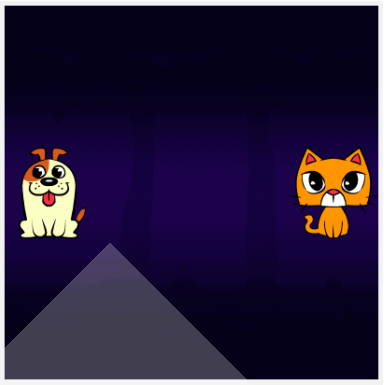
But the main focus is the **points** variable that stores the number of points.

When actor 2 (cat) touches anything, in this case, a pie, which the dog throws at the cat, a hit sound is played by the computer and here the dog should score one point on every successful hit.

It is here that we have to manage the score counter. Score should increase by 1 at every successful hit. For the same, the **value of the variable point must be incremented by 1.**

We drag the respective blocks to complete the code to read as
set point to points+1

It means, on every successful hit to the cat, the dog's score increases the value of the variable point by 1.



Solution 4

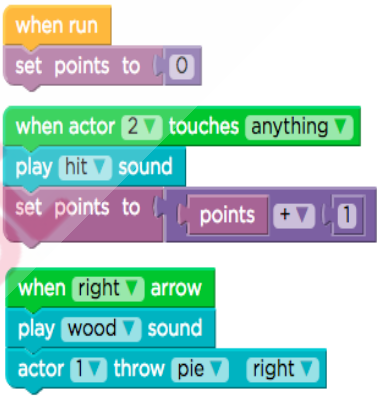
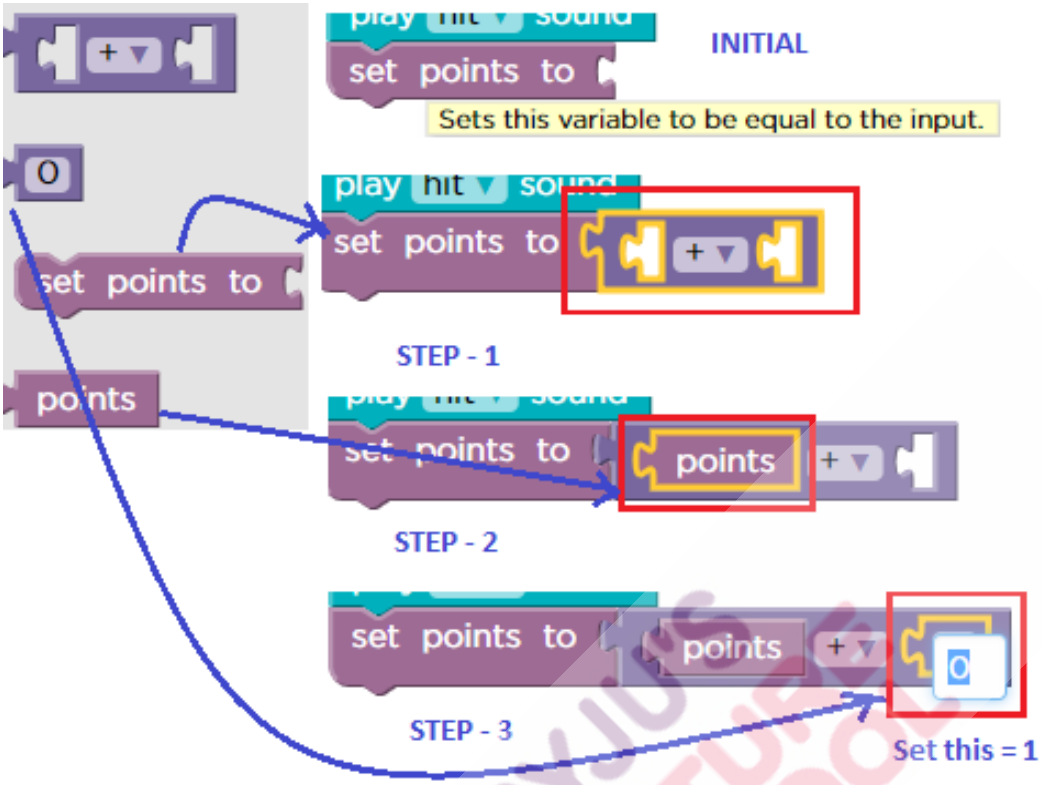


Image below is for the teacher to understand.



Now, Press **Run** and **Press Right Arrow Key** to throw the pie at the cat.

Notice how the score in the centre of the game canvas increments every time the Cat is hit by the pie.

Great!

Wow! It is working! Isn't that great?

But isn't this game very one-sided? In any game the opponent should also try to win.

Q So what should happen if the cat also throws something back at the dog? What should happen to the dog

score?

A It should reduce.

Yes, very good!

Let us do this in the next activity

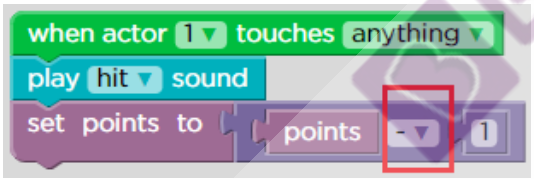
Let's edit and **set points to 10**.

So that if actor 1 (dog) gets hit/touches anything, the dog's **points decrease by 1**.

Q What should be the code for that?

A **set points to points-1**

This means that we are changing the value of variable Point by 1.

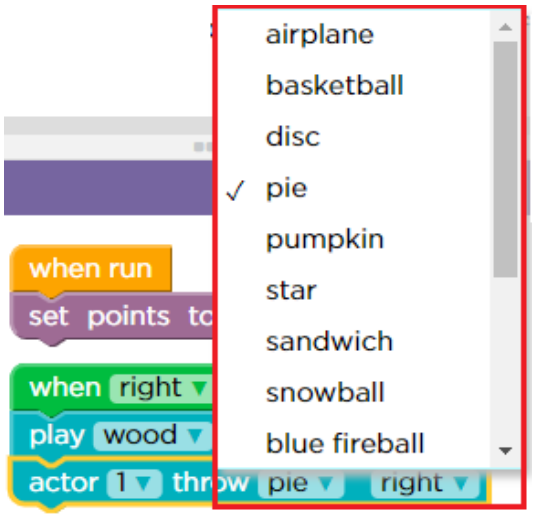


Excellent!

Our earlier code for; if anything hits the Cat stays the same.

Notice where and how the code executes when the dog is hit and when the cat is hit.

Of course you can change what to throw with values of your choice:



Great!

[Student Activity 5-PLAY LAB]

Solution 5

In the next activity, we are adding a new character called Penguin in the game.

First “when run” block is clicked, we set the score to 0 as the game has just begun.

Then we see how to move the actor 1 that is dog. That is we will need event blocks as we want to move the actor 1 (dog) when some arrow is pressed.

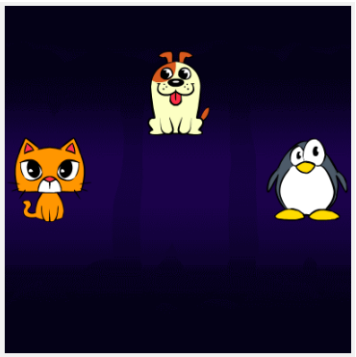
When you press the **Up Arrow Key,** the dog will move up by 25 pixels.

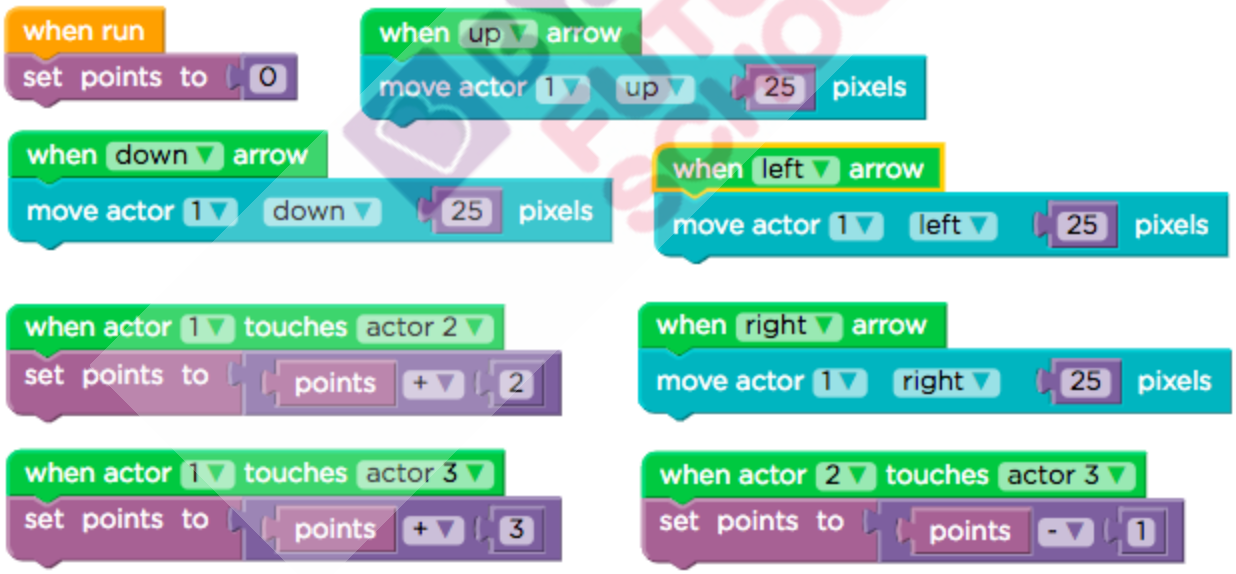
When you press the **Down Arrow Key,** the dog will move down by 25 pixels.

When you press the **Left Arrow Key,** the dog will move to left by 25 pixels.

Student Activity 6-PLAY LAB

Keep prompting the student to think aloud while coding.



When you press the **Right Arrow Key,** the dog will move to right by 25 pixels. Then we will create events, which if occurred actor should score points When you **actor1(dog) touches actor2(cat),** the score points will increase by 2. Therefore we add points by 2, and store in **points** variable again. When you **actor1(dog) touches actor3(penguin),** the score points will increase by 3. Therefore, we add points by 3, and store in **points** variable again. When you **actor2(cat) touches actor3(penguin),** the score points will decrease by 1. Therefore we subtract points by 1 and store in **points** variable again.	Solution 6
	

Okay Great! Good Job.

Before we start with your profile app. Let's see the flow:

1. A gmail account is required to login in MIT Platform to create the app, which you have already created.
2. After you login, I will give the link of the app, in which you have to make changes as per my instruction.

So let's start -
First, upload your picture into the design of the app.

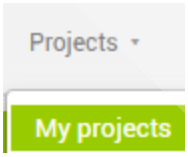
I have started the app for you. You need to upload your picture, your bio and your icon.

Good Job!

Now let's work on My Profile App and write your bio.

1. Visit the site: https://appinventor.mit.edu/ and login by clicking on the "Create Apps!" button:

2. Click on the **My projects** option under the **Projects** section to see your projects. Open the previous project in which you uploaded your profile picture:

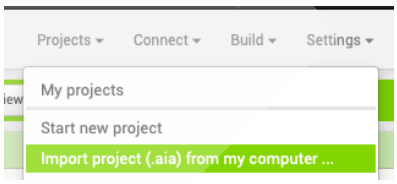


3. Now change the name, by clicking on **My_Name**:

Download aia file from Student Module Activity 5

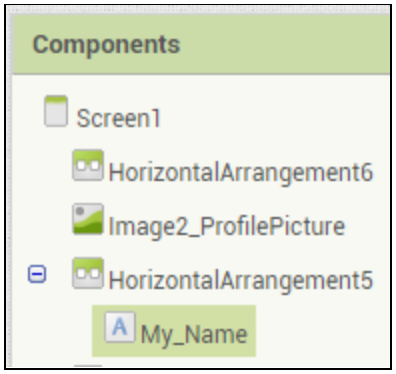
Open MIT INVENTOR and login.

Then click on the **Project** and select **Import project (aia)**:

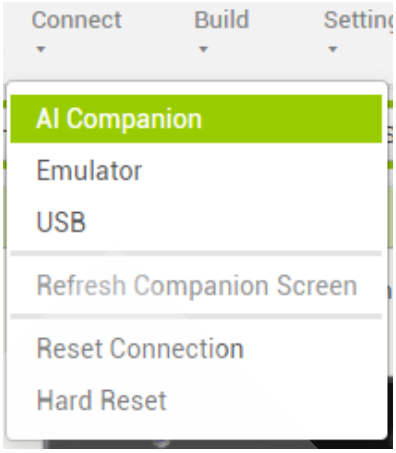


Import the downloaded aia file.

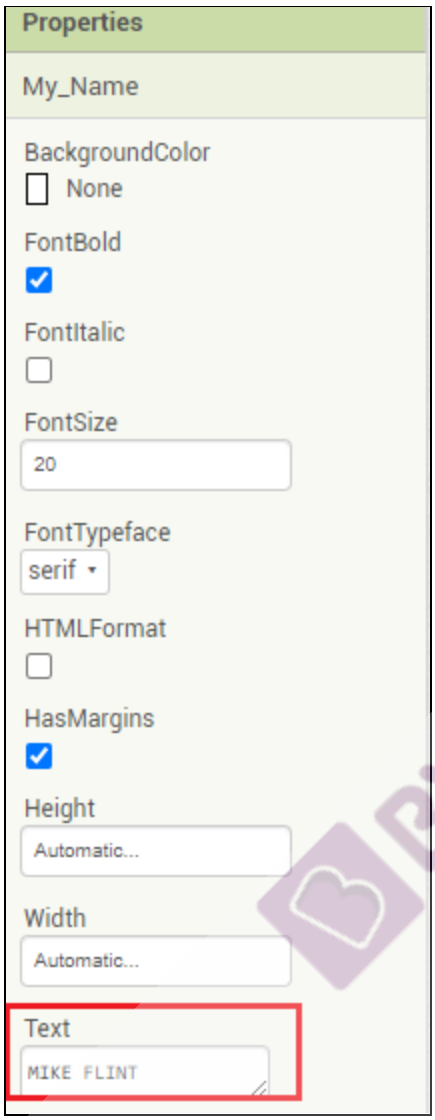
Live testing:
Keep your NOX emulator open and open the MIT AI2 Companion application in it.
For Live Testing the app click on the **Connect** option and then selecting **AI Companion**:



4. On the right hand side write your name:



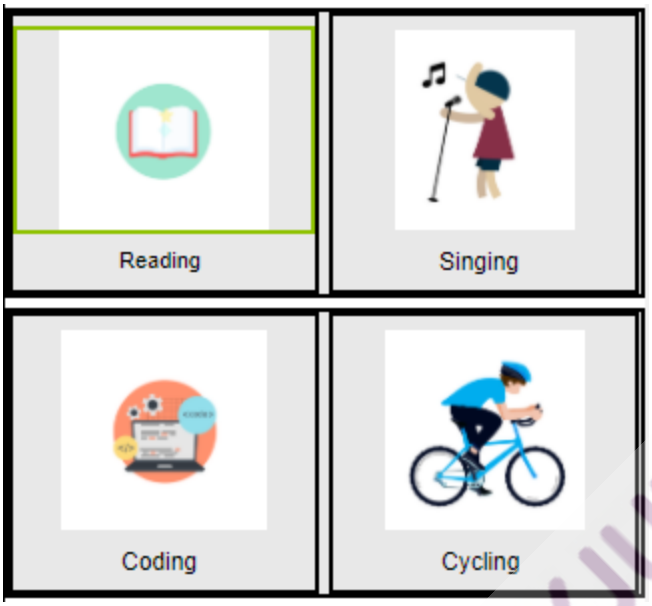
A QR code and 6 digit code for testing the application will come.
In the emulator write this 6 digit code and click on 'connect with code' button



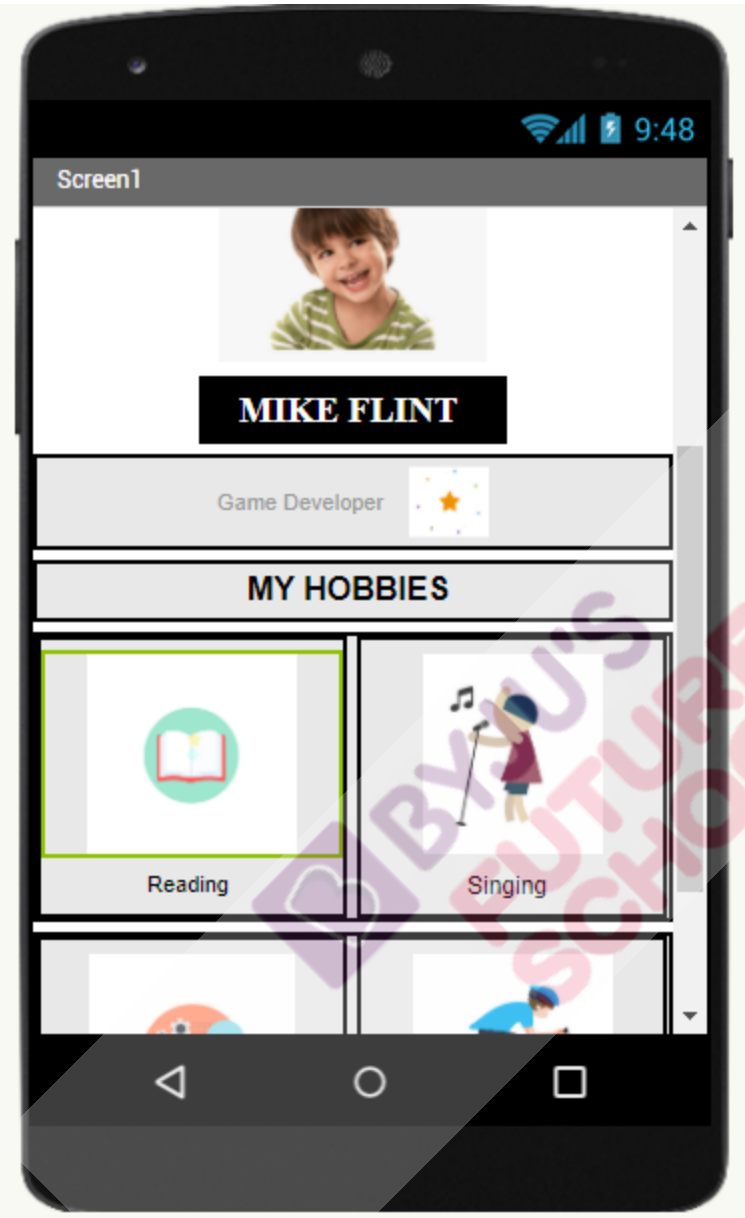
NOTE - If the student has different hobbies then only change the images and text of hobbies.

Note for the teacher: Guide the student to Change the image if required.

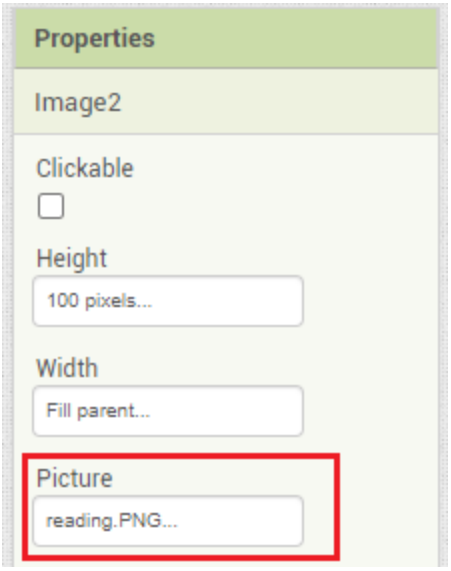
Follow these steps if you want to change any hobby image from the app shown here:



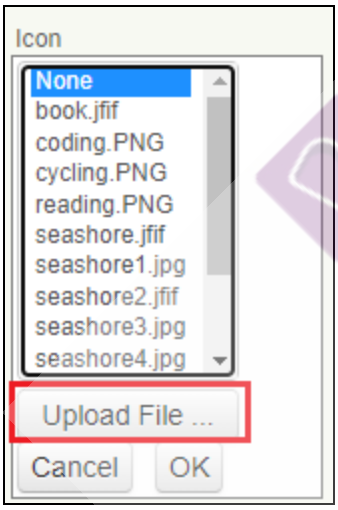
1. Click on the image that you want to change.



2. On the right hand side on the property tab, click on the input box of the picture:

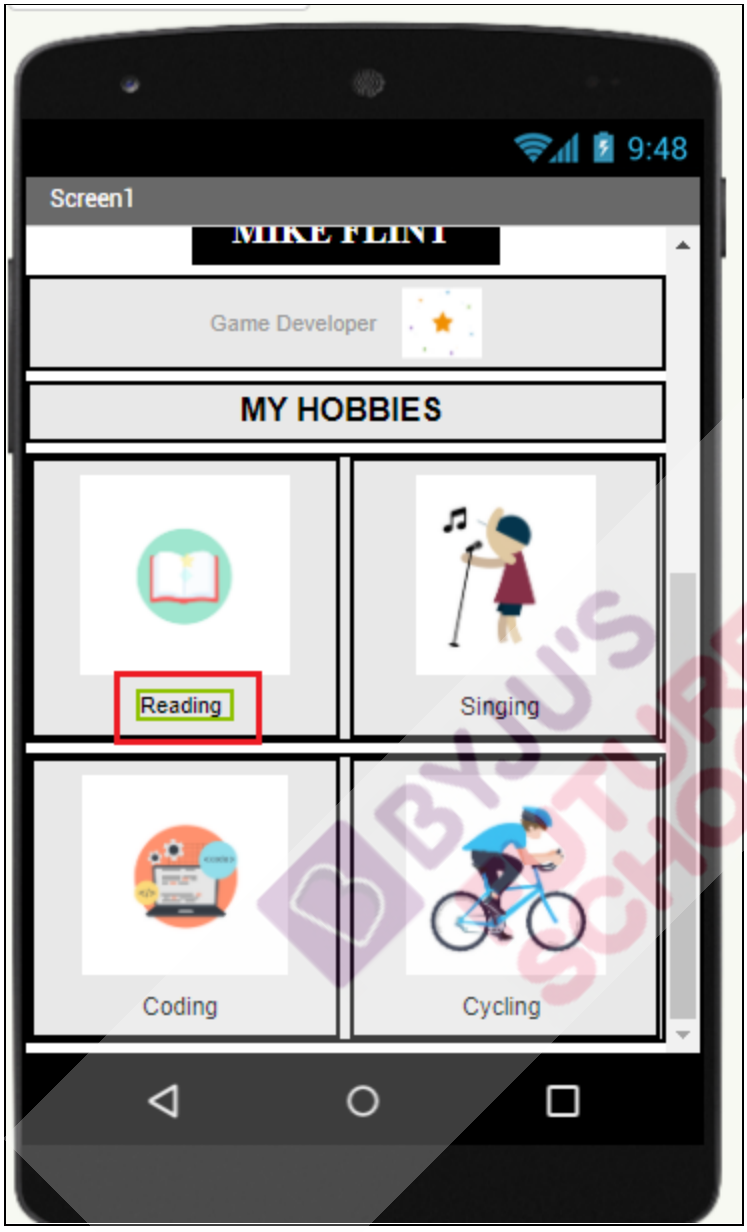


3. As you click the input box, a drop down will appear. At the end of the dropdown you can see a **Upload File…** button:

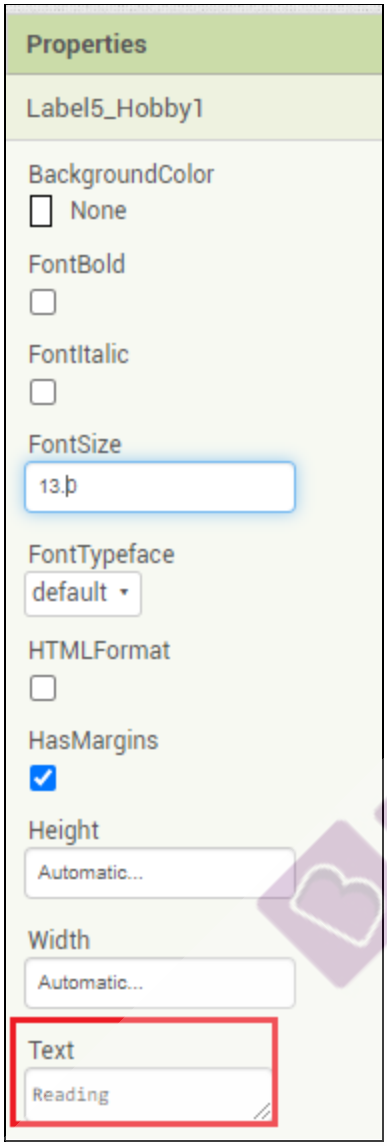


4. Click on the upload file. Select the file from the system, which you have downloaded. (For teacher: Refer to the steps to download the image mentioned below and guide the student.)

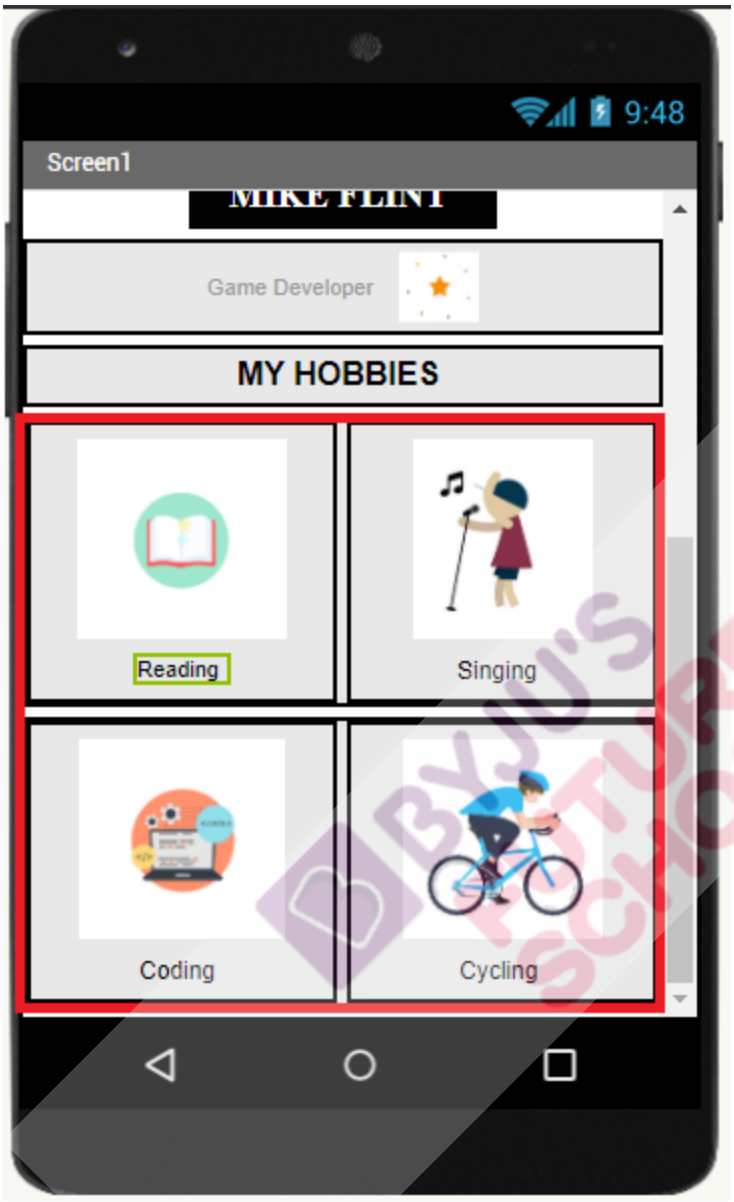
5. After changing the hobby image, click on its text:



6. Change the text to reflect your own hobby. To change the text, click on the input box and write the hobby name:



Here is how the updates will look after you have changed the image as well as text:



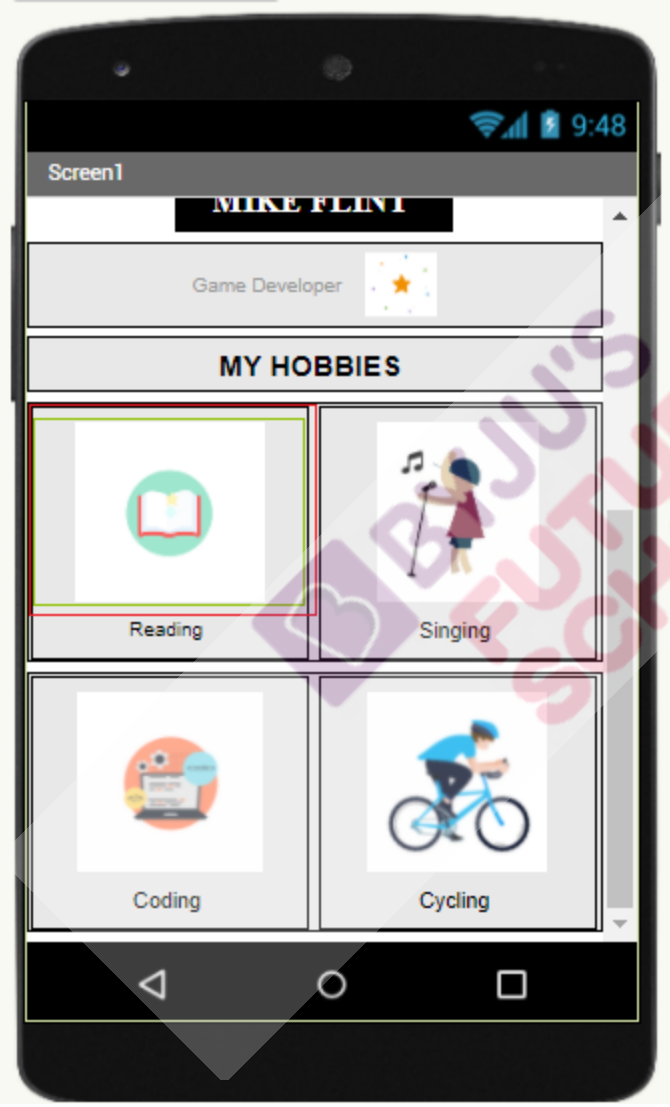
Note: Below are the attributions for the above images (of Reading, Singing, Coding, and Cycling) used in the application.

Issey on LottieFiles: https://lottiefiles.com/4887-book
Patchpo on LottieFiles: https://lottiefiles.com/15307-karaoke
Aexr Infotech on LottieFiles: https://lottiefiles.com/55290-coding
Fazal Shah on LottieFiles: https://lottiefiles.com/9817-delivery-on-bicycle-or-cycling

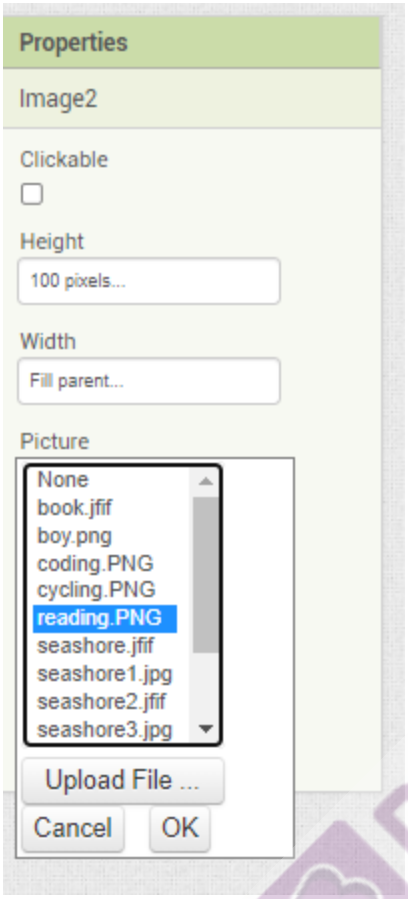
Steps to download hobbie image:

1. Open **Student-Module-Activity-5.1** download the images that match your hobbies.
   Note: Student-Module-Activity-5.1 will have images of limited hobbies, if a student is looking for some other hobby image then ask them to upload it from their system or look up on google for the same.

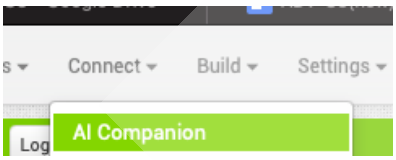
2. Select the image that you would like to change.



3. You'll be able to see the properties on the right hand side. Upload another hobby image from your system.



For testing the app, Click on the **Connect** and select **AI Companion** option:



A barcode will appear. Scan this barcode in the app, which you downloaded on your android phone.

Then do a live test and showcase the app.

NOTE -
In the worst case, seniors if the student doesn't have an android phone to test the MIT app then guide the student on how to download and test MIT apps on the NOX

Player emulator.
Teacher Should go through Teacher-Reference-Activity-3 before class so that she can guide the student on how to download and test the MIT apps on the NOX Player emulator.

Teacher Guides Student to Stop Screen Share

WRAP UP SESSION - 5 mins

Teacher starts slideshow  **from slides 25 to 30.**
Refer to speaker notes and follow the instructions on each slide.

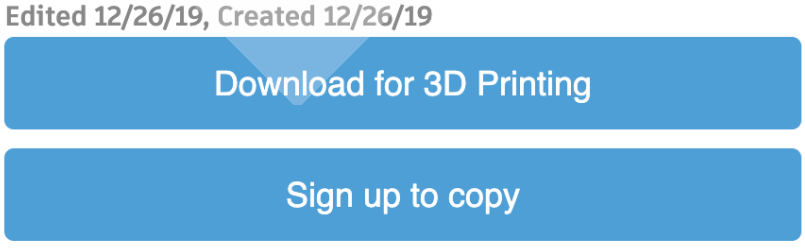
FUN STUDENT ACTIVITY 

- **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 with today's fun activity where we can see a 3D design of a rocket and play around it?

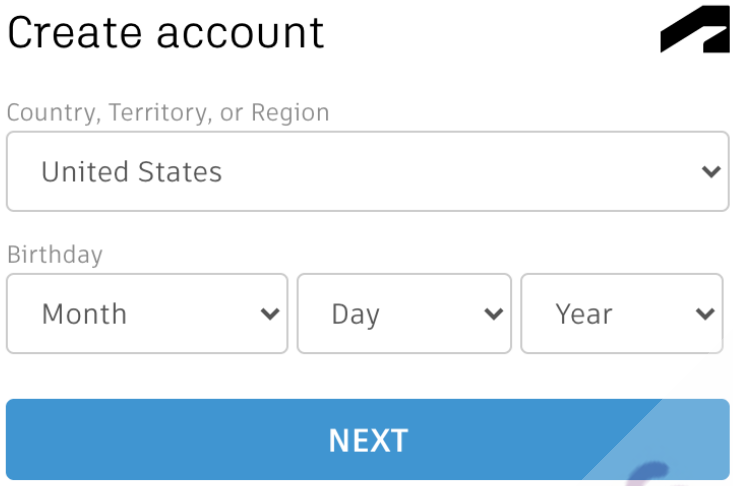
1. Once you open the website, you will see the Tinkercad page. Click on the '**Sign up to copy**' button.



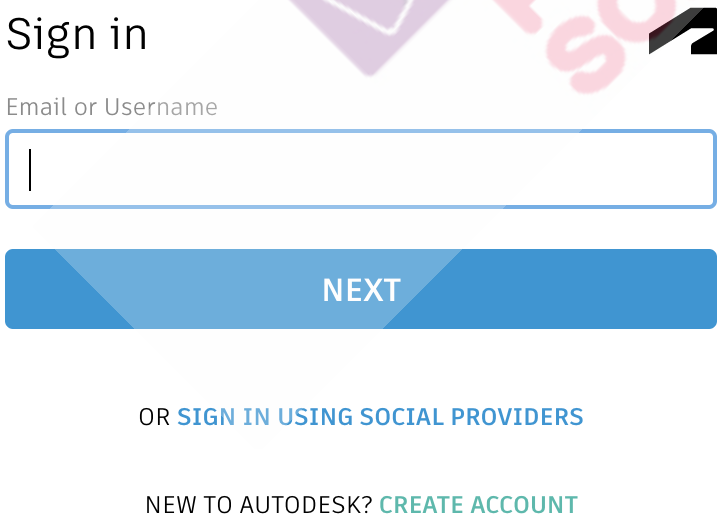
Student Activity 7-3D ROCKET DESIGNING

Ask the student to open the link for student activity 7.

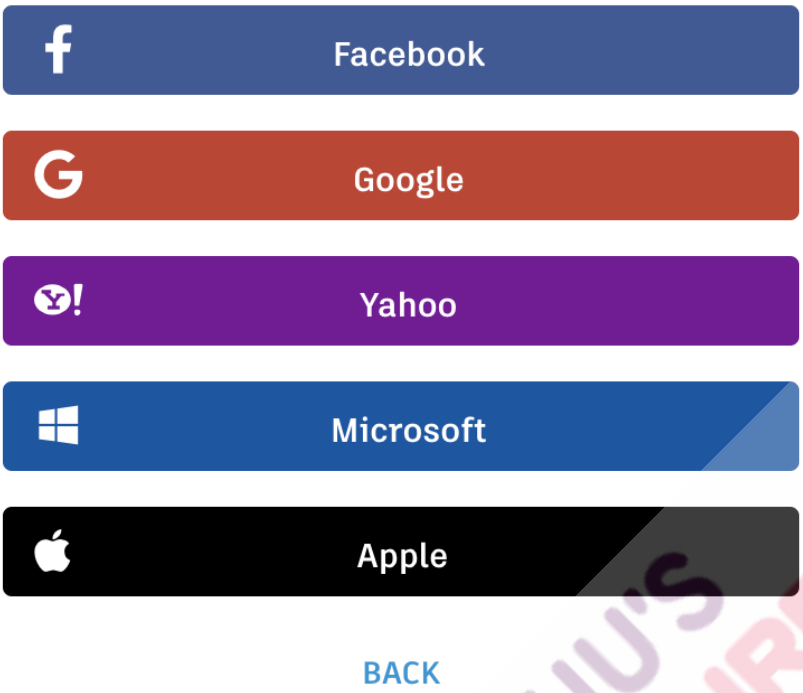
2. Then, click on the SIGN IN link.



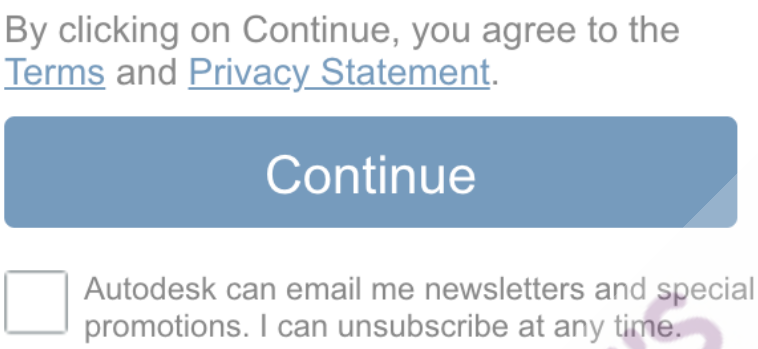
3. Then, click on the SIGN IN USING SOCIAL PROVIDERS link.



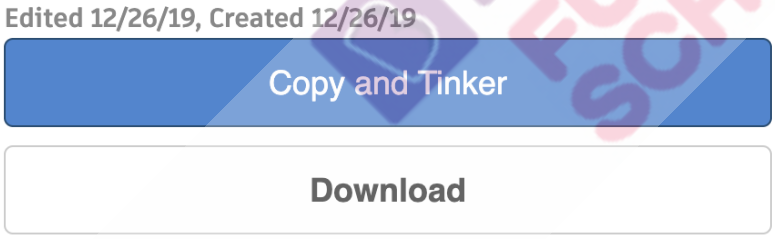
4. Then, click **Google** and select your Gmail account.



5. After logging in via Gmail, you will see a window like this:



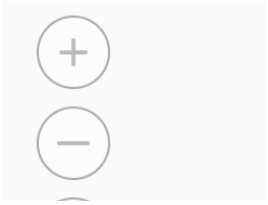
6. Click on the **Continue** button. It will take you to the Tinkercad design page. Click on the '**Copy and Tinker'** button.



This will copy this 3D design to your account.

7. Now, let me help you in customizing this rocket.
   NOTE: The Teacher should just guide the student on how to use these buttons for changing the view:

- 

- 

And help the student:

- **Change the color of the components of the rocket.**
- **Add student name (IF TIME PERMITS)**
- **Download the 3D design as a 2D image.**

*For achieving the above mentioned objective, there is a video tutorial attached in Teacher-Reference-Activity-4 which the teacher has to check **BEFORE THE CLASS** and be ready to guide the student.*

Further in the course, we will properly explore 3D designing and create some amazing designs and space assets.
There is **Student-Reference-Activity-1** on how to change colors of the rocket, add name/text, and download 3D design as 2D image. You can refer to it after the class to explore more.

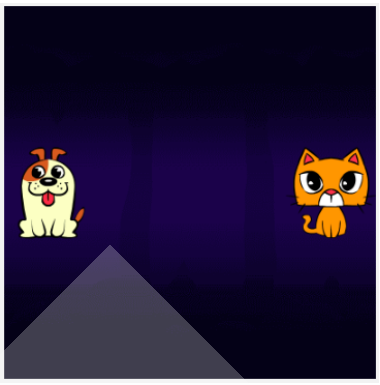
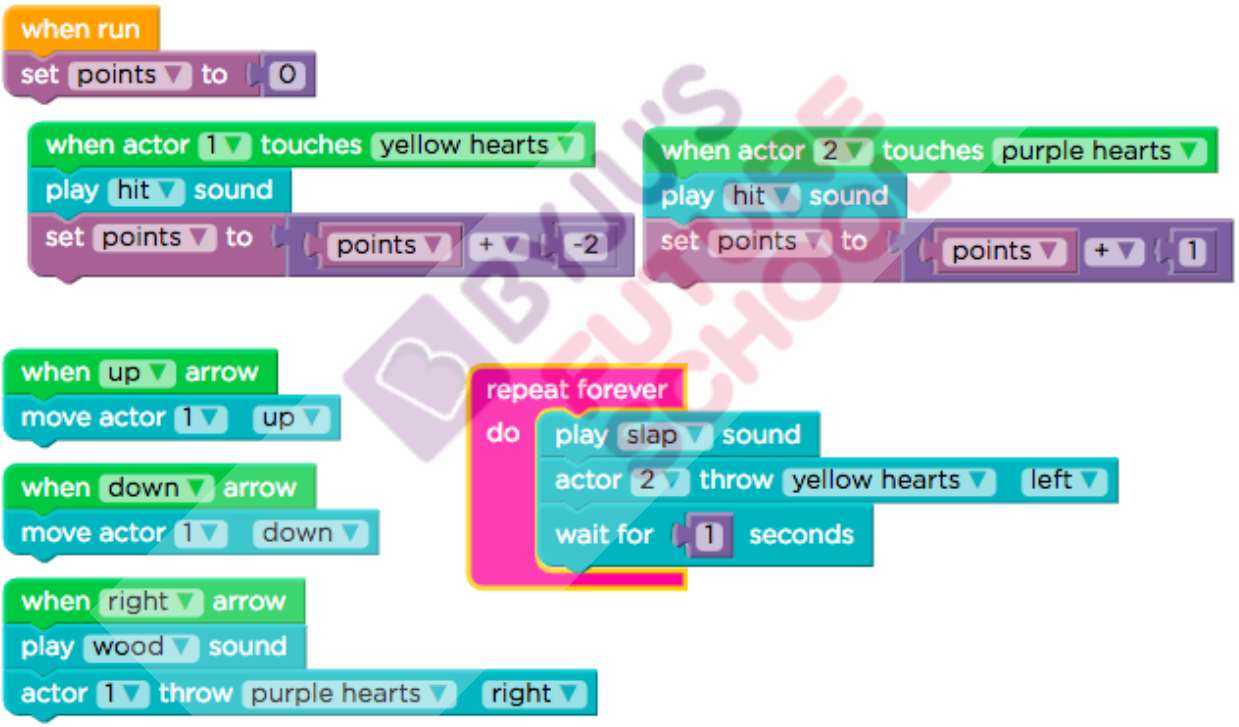
Now let's move ahead.

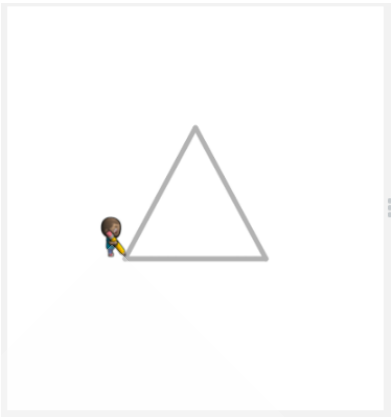
Student Stops Screen Share

DID YOU KNOW, UPCOMING CLASS, AND PROJECT POINTERS AND CUES - 5 MINS

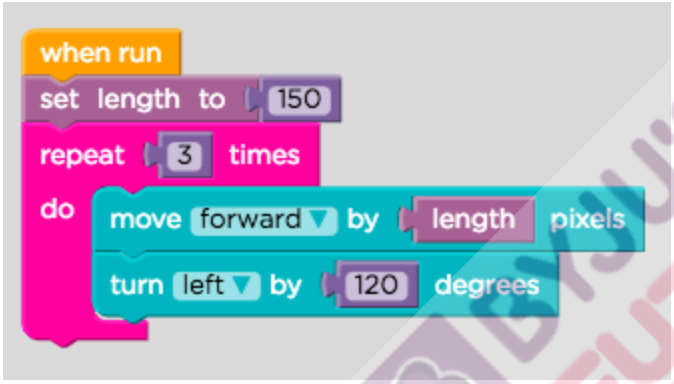
Teacher starts slideshow  from slides 31 to 33. Refer to speaker notes and follow the instructions on each slide.	
Teacher Initiates Screen Share	
Say	**Do**
Project Name: BIRD HUNTING FOR PIE **Goal of the Project:** Today, you learned about the variables and applied the concept of variables to create the first independent computer game. In this project, you will have to practice and apply what you have learned in the class and help the bird pick up the pie. **Story:** A hungry bird was flying in search of food. It came across a magical meadow where a lot of food was strewn across a huge green field. It came down to pick up a pie... But alas!! It was a trap! A wizard started throwing fireballs at the bird… This bird now needs your help. You have to save the bird and collect as many pies as possible. But be careful, don't touch the fireball thrown by the wizard! **The project will take only 30 minutes to finish. You can try and finish it immediately after this class.** I am very excited to see your project solution and I know you will do really well.	**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

Bye Bye!	
Teacher Stops Screen Share	
Teacher Clicks ✖ End Class	
Additional Activities	
Teacher starts slideshow  **from slides 34 to 38.** Refer to speaker notes and follow the instructions on each slide.	
STUDENT ADDITIONAL ACTIVITY 	
Student Initiates Screen Share	
Say	**Do**
Additional Activities You can try some more challenging activities.	 Additional Activity 1-SUPER CHALLENGE

<table>
<tr><td></td><td> 
Solution</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td>We will be doing some revision on the artist lab.</td><td>Additional Activity 2- ARTIST LAB</td></tr>
</table>

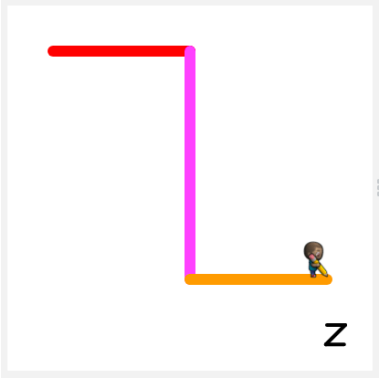


Solution 2



In this activity, code is given. You need to add some degrees to turn the drawing line and make it look like Z.

Additional Activity
3-TRACE LETTER 1

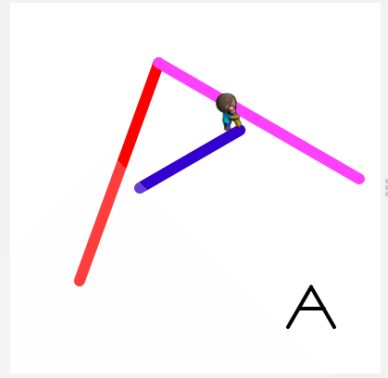
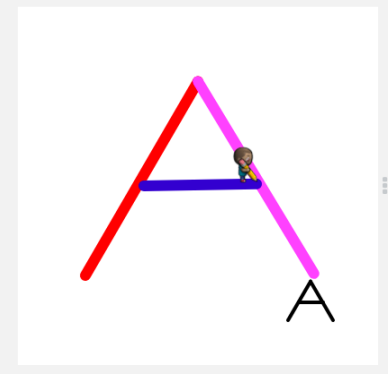


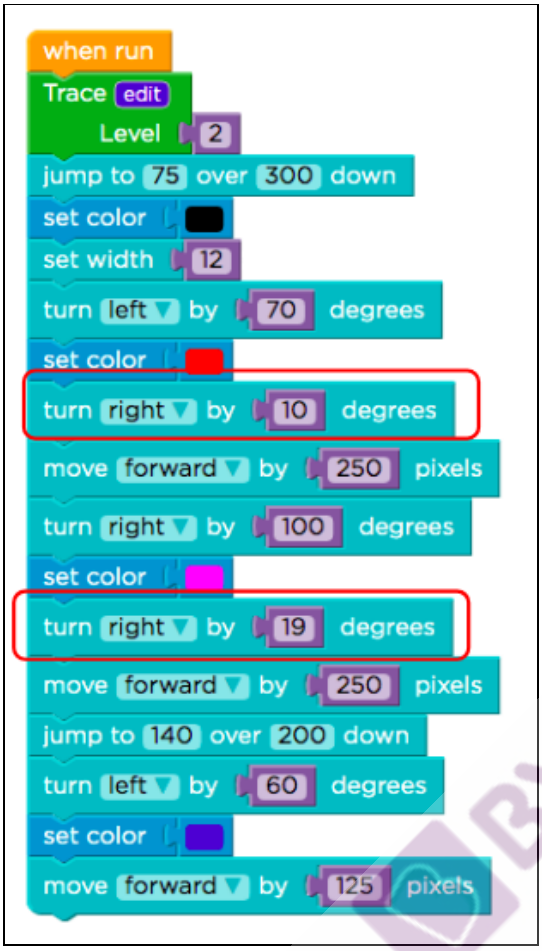
Expected output:

Solution for AA 3:

1. Add turn right with 30 degrees for the second line of Z which is in pink color.
2. Add turn right with 330 degrees for the third line of Z which is in orange color.

	In this activity, code is given. You need	Additional Activity

	to add some degrees to turn the drawing line, and make it look like A. Play around with the degrees for making the red and pink line straight, which will result in A.	4-TRACE LETTER 1  Expected output: 
Solution for AA 4:		



Activity No	Activity Name	Activity Link
Teacher Activity 1	PLAY LAB	https://studio.code.org/s/course4/stage/7/puzzle/2
Teacher 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
Teacher Reference Activity 2	HOW TO TEST MIT ON ANDROID PHONE	https://drive.google.com/file/d/1n4b_5fuNLIu7xOHVnl90yshWa6Nxfb98/view?usp=sharing
Teacher Reference Activity 3	MIT TEACHER GUIDE	https://docs.google.com/document/d/e/2PACX-1vTSVSooc99svDx4SinvfenhP7QjytqupcivM-XuY-WwOshBUp6WaeQJvDCtyKFit7EeMRS2Lax9Ztsr/pub
Teacher Reference Activity 4	TUTORIAL FOR UPDATING ROCKET DESIGN	https://drive.google.com/file/d/1E-9zb7xcGLqHxyGI1QfEFQfCav-e7_xs/view
Student Activity 1	PLAY LAB	https://studio.code.org/s/course4/stage/7/puzzle/3
Student Activity 2	PLAY LAB	https://studio.code.org/s/course4/stage/7/puzzle/4
Student Activity 3	PLAY LAB	https://studio.code.org/s/course4/stage/7/puzzle/5
Student Activity 4	PLAY LAB	https://studio.code.org/s/course4/stage/7/puzzle/6
Student Activity 5	PLAY LAB	https://studio.code.org/s/course4/stage/7/puzzle/7
Student Activity 6	PLAY LAB	https://studio.code.org/s/course4/stage/19/puzzle/1

Student Activity 7	3D ROCKET DESIGNING	https://www.tinkercad.com/things/63oIMR8CMzB
Student Module Activity 5	PROFILE BIO	https://drive.google.com/file/d/1P6uFyL7xKbj1wzME97v7RJNf2sPhTZHE/view?usp=sharing
Student Module Activity 5.1	ASSETS	https://drive.google.com/drive/folders/1cRzw7bHMAxoC-oeMWlgs0ZnI9ffq-H10?usp=sharing
Student Module Activity 5.2	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 1	TUTORIAL FOR UPDATING ROCKET DESIGN	https://drive.google.com/file/d/1E-9zb7xcGLqHxyGI1QfEFQfCav-e7_xs/view
Additional Activity 1	SUPER CHALLENGE	https://studio.code.org/s/course4/stage/7/puzzle/8
Additional Activity 2	ARTIST LAB	https://studio.code.org/s/course4/stage/6/puzzle/2
Additional Activity 3	TRACE LETTER 1	https://studio.code.org/projects/artist/PWAckbwSwnpOyX_ASI_ocY6v9uUcTMekOYHU16gw9zE/view
Additional Activity 4	TRACE LETTER 2	https://studio.code.org/projects/artist/w8IDWsUNEQZUmE498ftQxM43MmCi_kmwQhwqZuf9zvw/view
PRACTICE ACTIVITY 1	PRACTICE	https://studio.code.org/s/iceage/stage/1/puzzle/1
PRACTICE ACTIVITY 2	PRACTICE	https://studio.code.org/s/iceage/stage/1/puzzle/2
Project Solution	BIRD HUNTING FOR PIE	https://studio.code.org/projects/playlab/Rt0I3joBI0U51qBv_4fgi7PJdW0_GuwrQGijiZFpVd0

Teacher Reference Visual aid link	Visual aid link	https://s3-whjr-curriculum-uploads.whjr.online/05636fff-6d2b-43ce-8719-59c132792e2a.html
Teacher Reference In-class quiz	In-class quiz	https://s3-whjr-curriculum-uploads.whjr.online/5a202be2-a31d-4546-a5ca-c02fcf870382.pdf