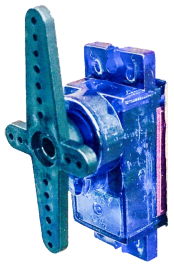
Name _____ Class _____

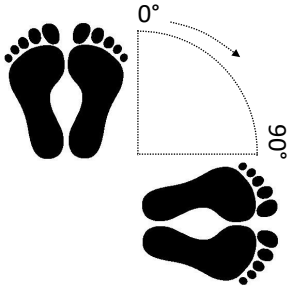
Thinking about programming an animated character AC1 (no input)



Servo Motors

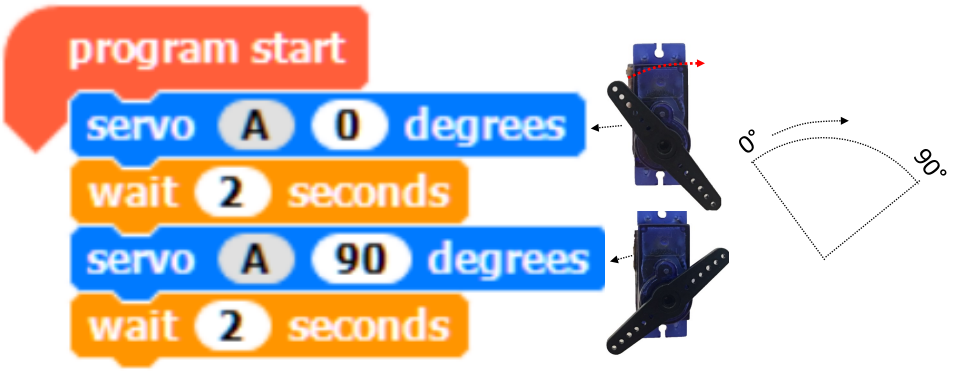
This servo motors has been programmed to turn no more than a quarter turn.

Can you turn a quarter turn?



Look at the programs and answer the questions

Tick the program that turns the most.

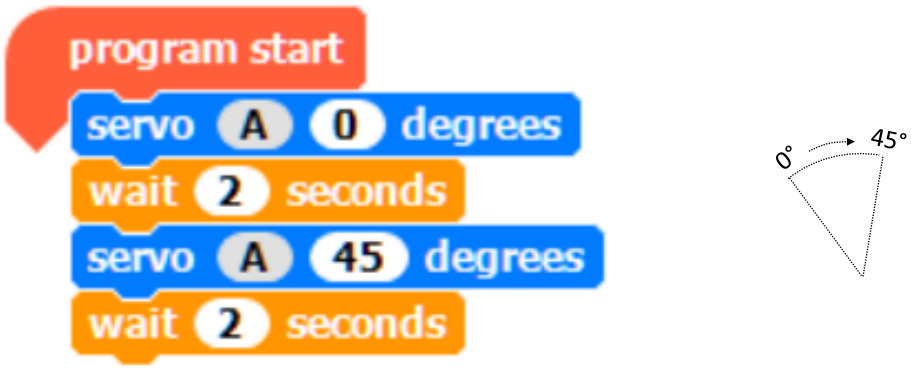


How many seconds are there between moving from 0 to 45 degrees?

A, 1 second

B, 2 seconds

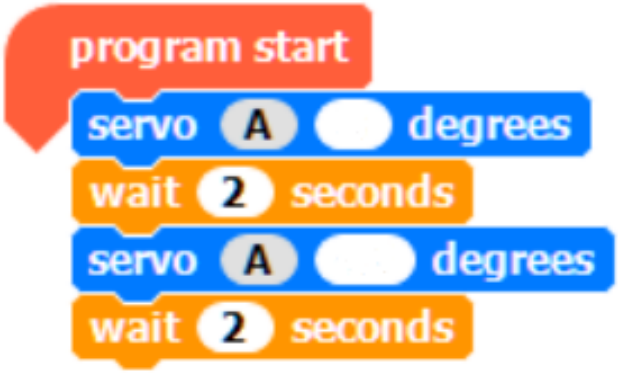
C, 3 seconds



You can make it turn any number between 0 and 90 degrees.

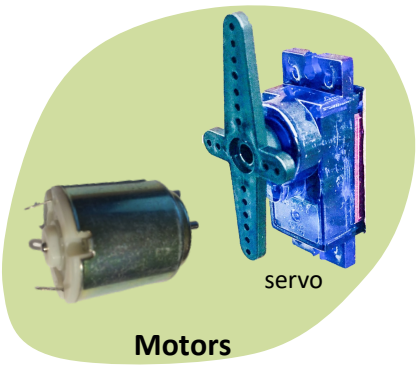
What number will you try first?

Write it on the program



Name _____ Class _____

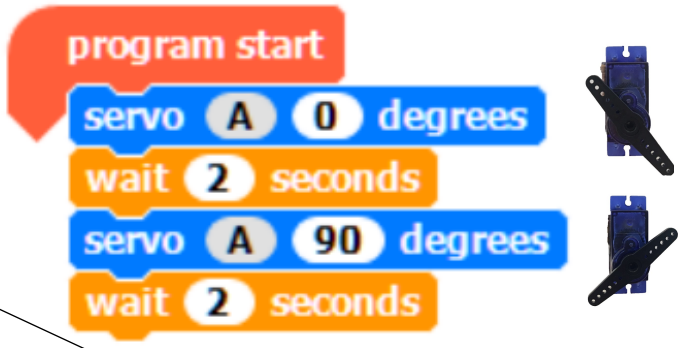
Thinking about programming an animated character AC2 (no input)



Motors

Motors are **outputs** because they **put out** information from the Crumble. The basic motor outputs spinning motion. The servo motor only turns part way through a circle.
Both motors can run forward or backwards. Our animated character uses a servo motor.

Look at the program and answer the questions



1, Which output is the servo plugged into (A, B, C or D)? ☐

2, Fill in the next four blocks to continue the waving motion

3, What would you change to make a smaller wave? ☐

4, Is the servo motor an input or output? ☐

5, Can you think of anything else you could use a servo motor for?

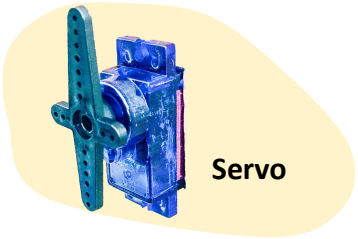
☐

6, Tick the block that you would use to repeat the wave six times

7, Put a cross in the block you would use to repeat the wave forever

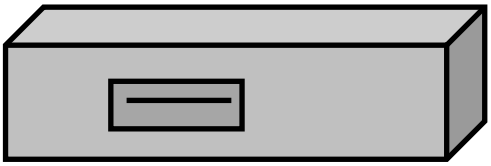
Name _____ Class/Form _____

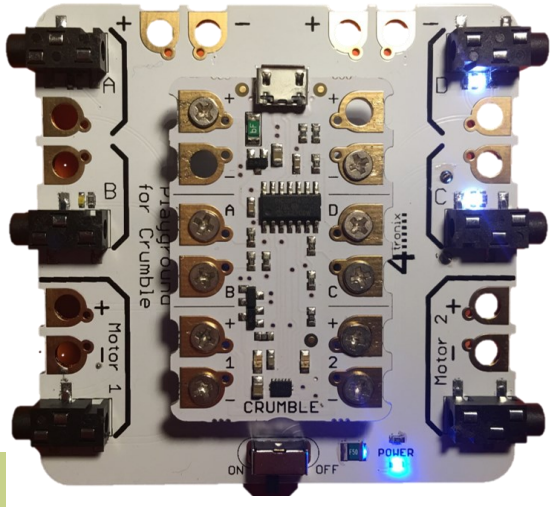
Thinking about wiring an animated character **AC3**



Draw in the wires. Use the maker card to help you.

Computer



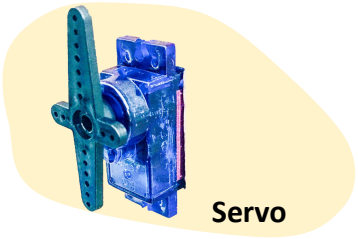


Fill in the chart to show your wires.

Letter	Name of the device

Name _____ Class _____

Thinking about wiring an animated character AC4



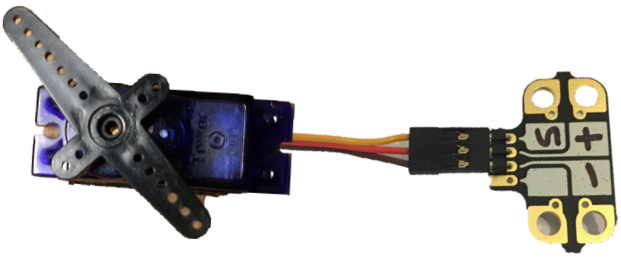
Servo

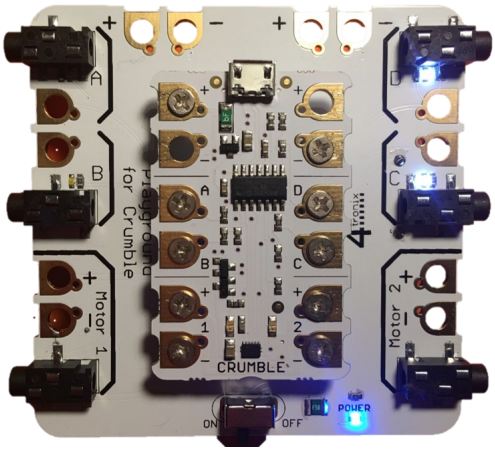
Buttons are **inputs** because they **put in** information into the Crumble. They can do two things; one when they are pressed and one when they are not pressed.

Push Buttons

Servos are **outputs** because they **put out** information from the Crumble. These can output movement up to 90 degrees.

Draw the wires to show what connections you will use.



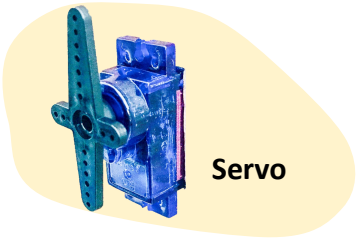


Fill in the chart to show your wires

Letter	Name of the device	Input or Output

Name _____ Class _____

Thinking about wiring an animated character AC5



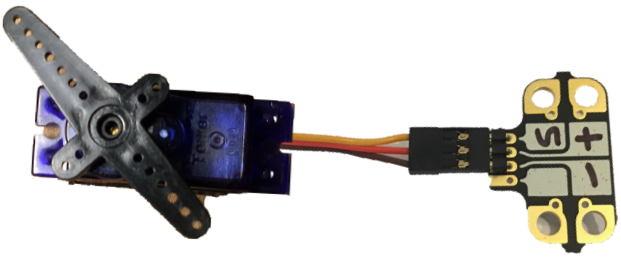
Servo

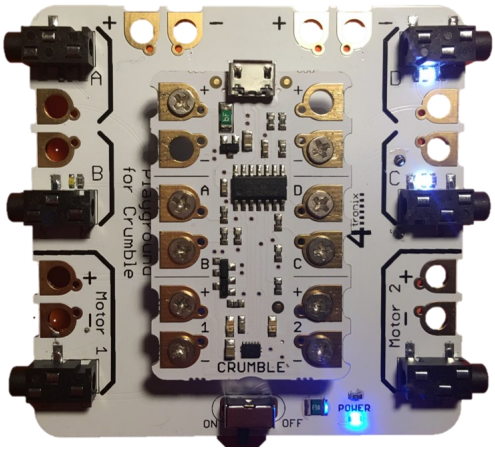
Buttons are **inputs** because they **put in** information into the program. They can do two things; one when they are pressed and one when they are not pressed.

Push Buttons

Servos are **outputs** because they **put out** information from the Crumble. These can output movement up to 90 degrees.

Draw the wires to show what connections you will use.



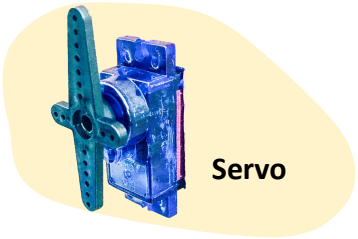


Fill in the chart to show your wires.

Letter	Name of the device	Input or Output

Name _____ Class _____

Thinking about wiring an animated character AC6



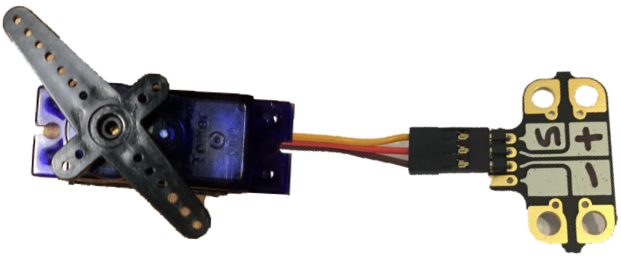
Servo

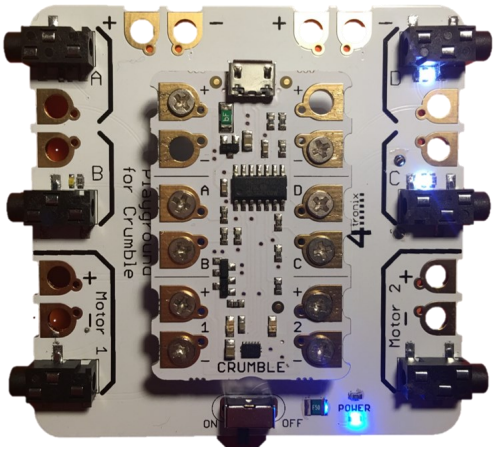
Buttons are **inputs** because they **put in** information into the Crumble. They can do two things; one when they are pressed and one when they are not pressed.

Push Buttons

Servos are **outputs** because they **put out** information from the Crumble. These can output movement up to 90 degrees.

Draw the wires to show what connections you will use.



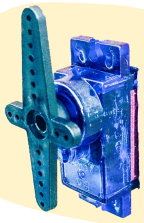


Fill in the chart to show your wires.

Letter	Name of the device	Input or Output

Name _____ Class _____

Thinking about wiring an animated character AC7



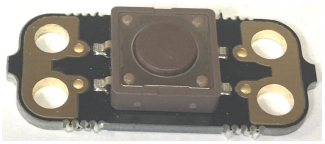
Servo

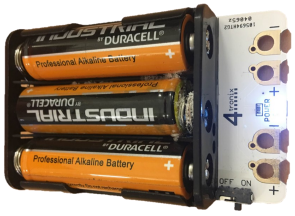
Buttons are **inputs** because they **put in** information into the Crumble. They can do two things; one when they are pressed and one when they are not pressed.

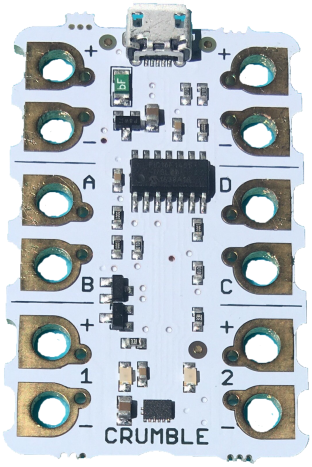
Push Buttons

Servos are **outputs** because they **put out** information from the Crumble. These can output movement up to 90 degrees.

Draw the wires to show what connections you will use.





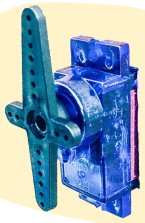


Fill in the chart to show your wires.

Letter	Name of the device	Input or Output

Name _____ Class _____

Thinking about wiring an animated character AC7



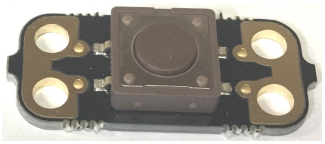
Servo

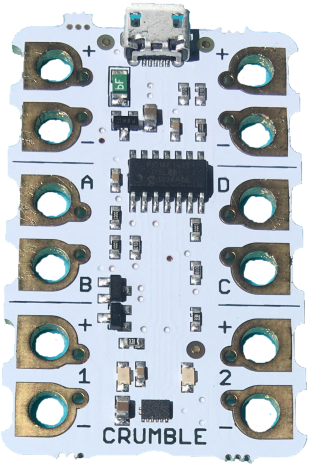
Buttons are **inputs** because they **put in** information into the Crumble. They can do two things; one when they are pressed and one when they are not pressed.

Push Buttons

Servos are **outputs** because they **put out** information from the Crumble. These can output movement up to 90 degrees.

Draw the wires to show what connections you will use.



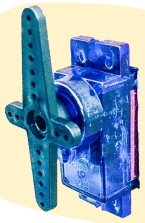


Fill in the chart to show your wires.

Letter	Name of the device	Input or Output

Name _____ Class _____

Thinking about wiring an animated character AC8



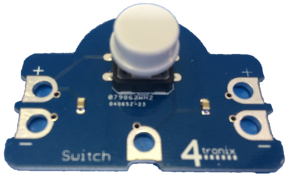
Servo

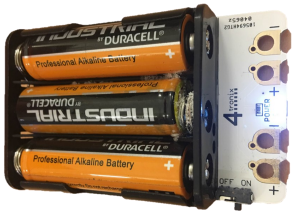
Buttons are **inputs** because they **put in** information into the Crumble. They can do two things; one when they are pressed and one when they are not pressed.

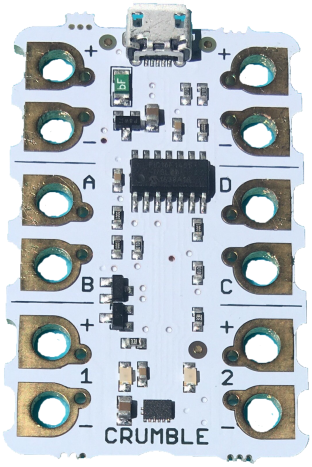
Push Buttons

Servos are **outputs** because they **put out** information from the Crumble. These can output movement up to 90 degrees.

Draw the wires to show what connections you will use.





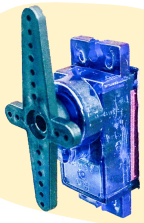


Fill in the chart to show your wires.

Letter	Name of the device	Input or Output

Name _____ Class _____

Thinking about wiring an animated character AC8



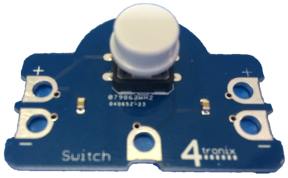
Servo

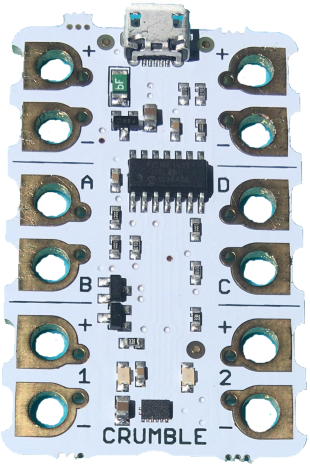
Buttons are **inputs** because they **put in** information into the Crumble. They can do two things; one when they are pressed and one when they are not pressed.

Push Buttons

Servos are **outputs** because they **put out** information from the Crumble. These can output movement up to 90 degrees.

Draw the wires to show what connections you will use.





Fill in the chart to show your wires.

Letter	Name of the device	Input or Output

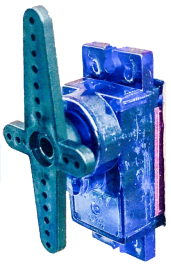
Name _____ Class _____ AC9

Thinking about programming an animated character started by a button

Marissa's Programming Example

Marissa created her program like this

I want my servo motor to move back and forwards first. I plugged the servo into output A but the maker card said it could go into A, B, C or D. I tried it without the waits first but there was not enough time for the motor to turn so it didn't work well.



Servo Motor

```
program start
servo A 0 degrees
wait 1 seconds
servo A 40 degrees
wait 1 seconds
servo A 0 degrees
wait 1 seconds
servo A 40 degrees
wait 1 seconds
```

Push Buttons

I want my servo motor to work if you press a button. I wired up my button and attached it to input C. I set the condition to start when the button is pressed (HI). The button only works once if you are pressing it down when the battery pack is turned on.

```
program start
if C is HI then
servo A 0 degrees
wait 1 seconds
servo A 40 degrees
wait 1 seconds
servo A 0 degrees
wait 1 seconds
servo A 40 degrees
wait 1 seconds
end if
```

I want the button to work all of the time so I put the conditional selection if then block inside a forever loop. It checks over and over again to see if the button is pressed or not.

```
program start
do forever
if C is HI then
servo A 0 degrees
wait 1 seconds
servo A 40 degrees
wait 1 seconds
servo A 0 degrees
wait 1 seconds
servo A 40 degrees
wait 1 seconds
end if
loop
```

Use this sheet to answer the questions

Name _____ Class _____ AC9Q

Thinking about programming an animated character started by a button

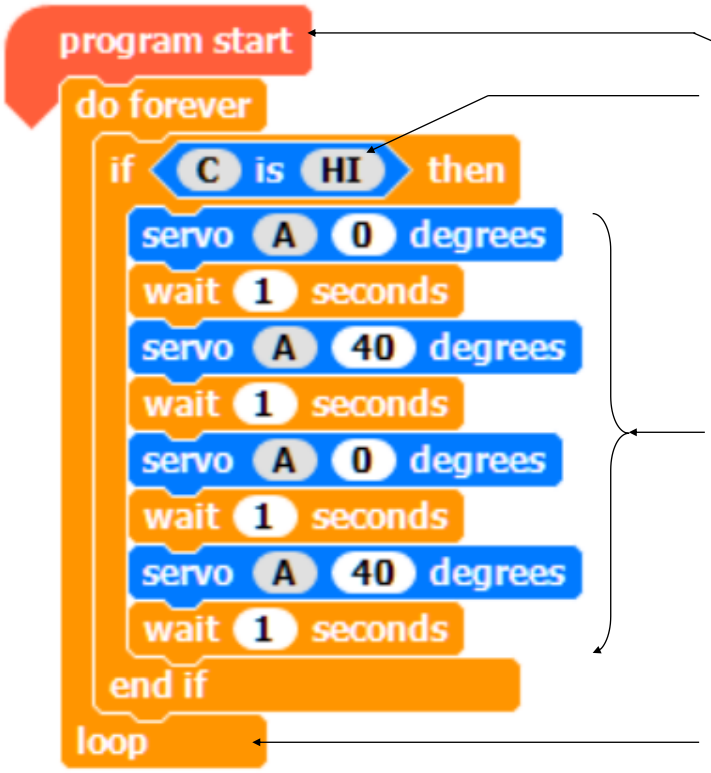
Read **Marissa's Programming Example** then answer these questions

1, What did Marissa want to make work first? [ ]

2, Which outputs **could** Marissa plug the servo into? [ ]

3, How many degrees has Marissa programmed her servo to turn? [ ]

4, Draw lines to match the code description to the correct block.
The first one has been done for you.



Starts the program. There can be only one of these in a Crumble program

Sequence of code

Repeats code inside it continuously

A condition that might or might not be met

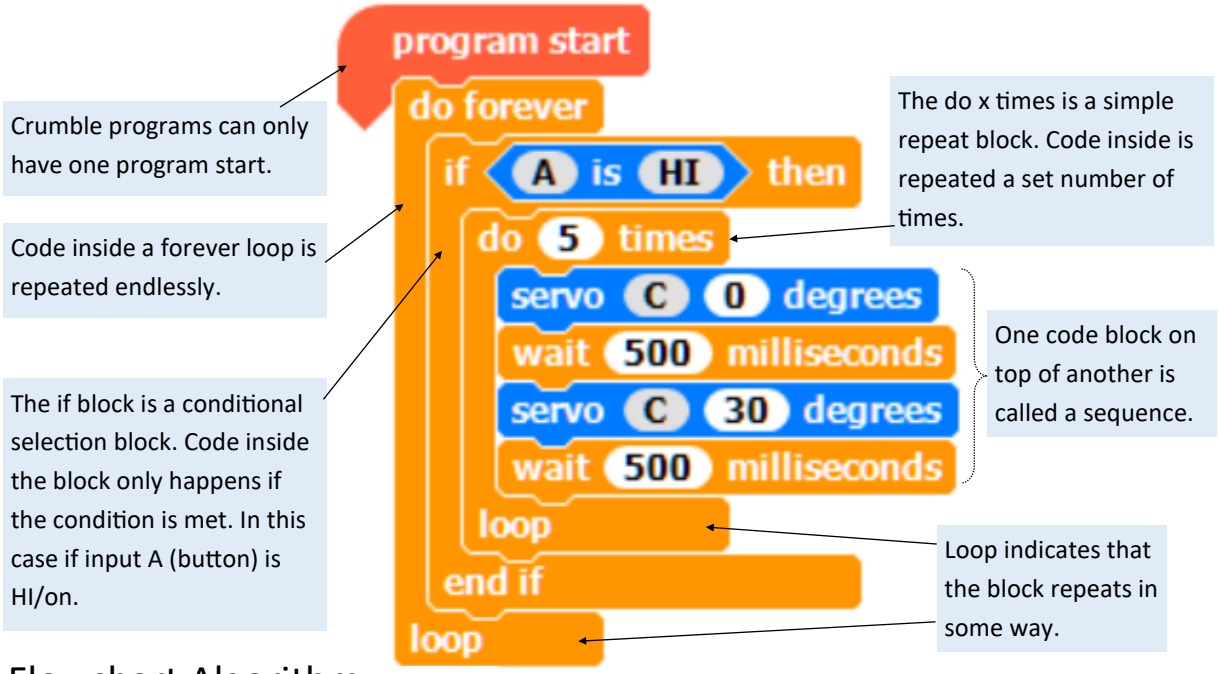
5, Marissa used twelve blocks of code to make her servo motor move four times. Her teacher challenged her to make it move many more times using less blocks.

Write or draw how you think she did it.

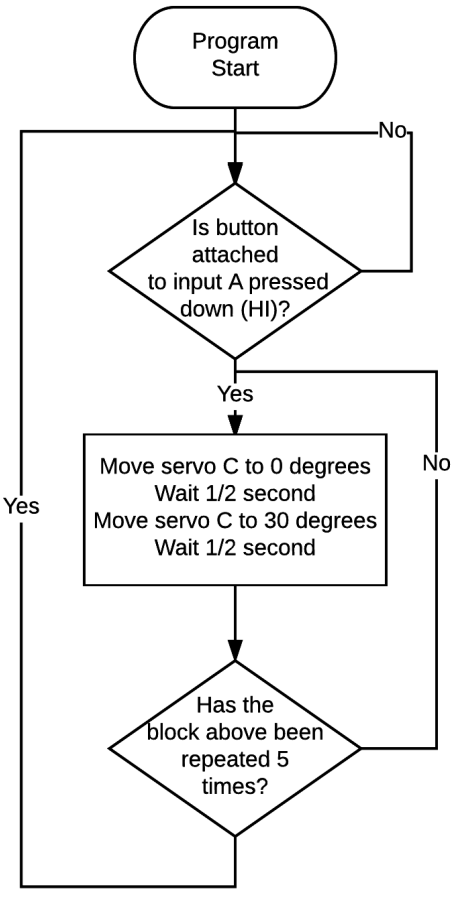
Name _____ Class _____ AC10

Thinking about programming an animated character started by a button

Programming Example in Detail



Flowchart Algorithm



Written Algorithm

Repeat the program forever
If button A pressed down
    Repeat 5 times
        Servo C move to 0 degrees
        Wait half a second
        Servo C move to 30 degrees
        Wait half a second

Read this sheet carefully.

If possible discuss it with a partner.

Then answer the questions on the sheet.

Name _____ Class _____ AC10Q

Thinking about programming an animated character started by a button

Read **Programming Example in Detail** then answer these questions

1, What is one code block on top of another called?

2, Conditional selection blocks often start with a short word. What is it?

3, What type of loop repeats endlessly?

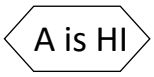
4, What input/output is the servo connected to?

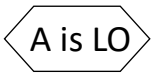
5, If a button is LO does it mean it is pressed or de-pressed?

6, What is 500 milliseconds in seconds?

7, In the flowchart algorithm which shape indicates a question?
(oval, rectangle, diamond)

8, How would the program change if the forever loop was removed?

9, If the 

block was changed to 

1, What would the servo do when the program is started and the button in not pressed? 2, What would happen when the button is pressed?

10, What do you think might happen if the wait 500 millisecond blocks are removed?

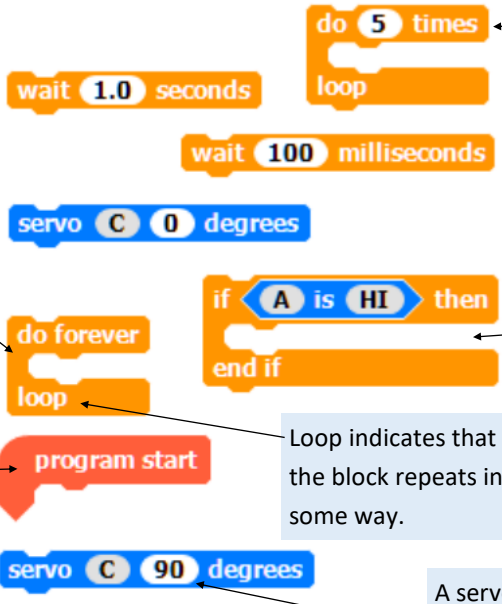
11, Which type of device (blocks, flowchart algorithm or written algorithm) did you find most useful? Explain your answer.

Name _____ Class/Form _____ AC11

Thinking about programming an animated character started by a button

Programming Example in Detail

One code block on top of another is called a sequence.



The do x times is a simple repeat block. Code inside is repeated a set number of times.

Code inside a forever loop is repeated endlessly.

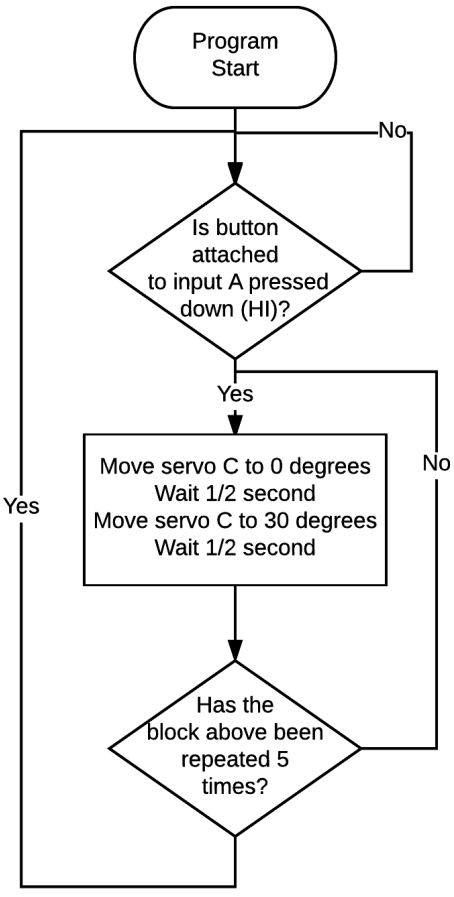
The if block is a conditional selection block. Code inside the block only happens if the condition is met. In this case if input A (button) is HI/on.

Crumble programs can only have one program start.

Loop indicates that the block repeats in some way.

A servo motor attached to C would move 90 degrees

Flowchart Algorithm



Written Algorithm

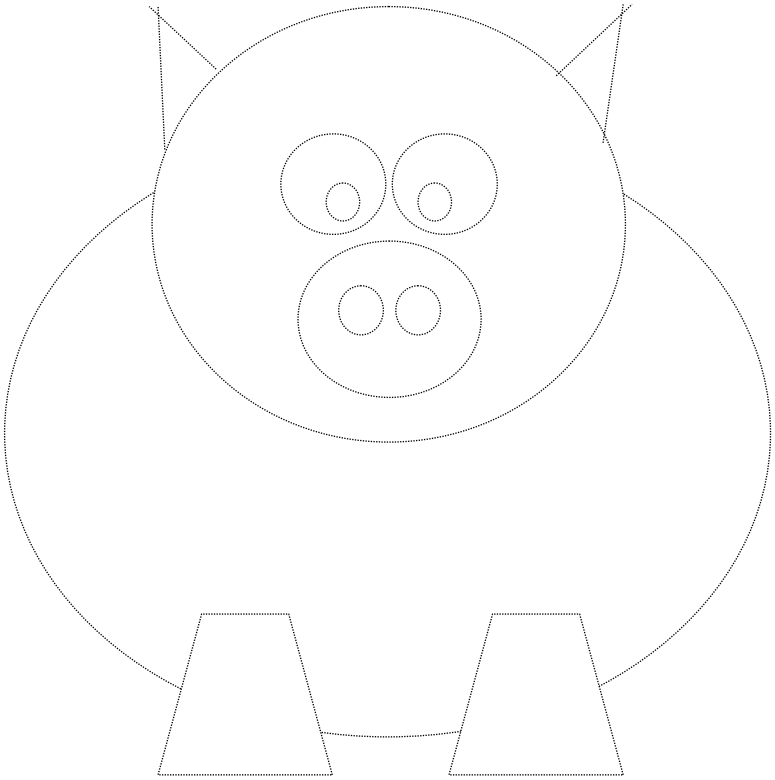
Repeat the program forever
If button A pressed down
    Repeat 5 times
        Servo C move to 0 degrees
        Wait half a second
        Servo C move to 30 degrees
        Wait half a second

Read the flowchart and written algorithm

Can you convert these into working Crumble code using the blocks above?

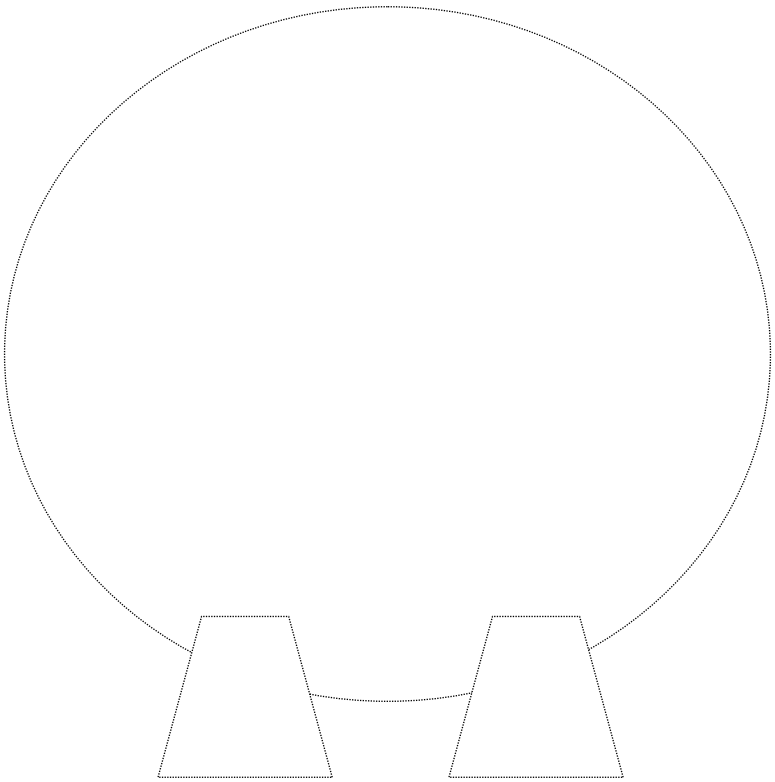
You may need more than one of each block

Pig Template

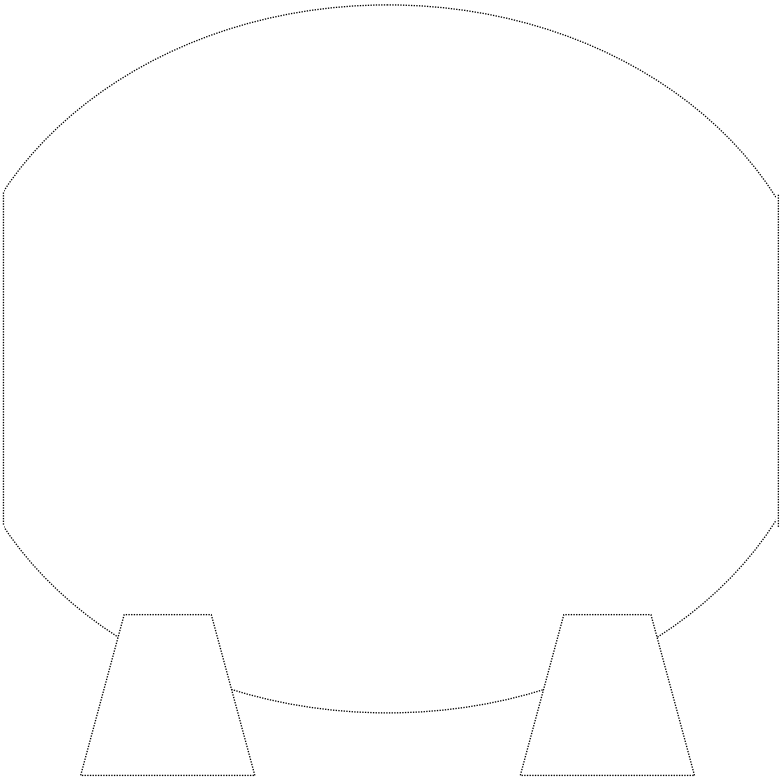


Head

Bottom

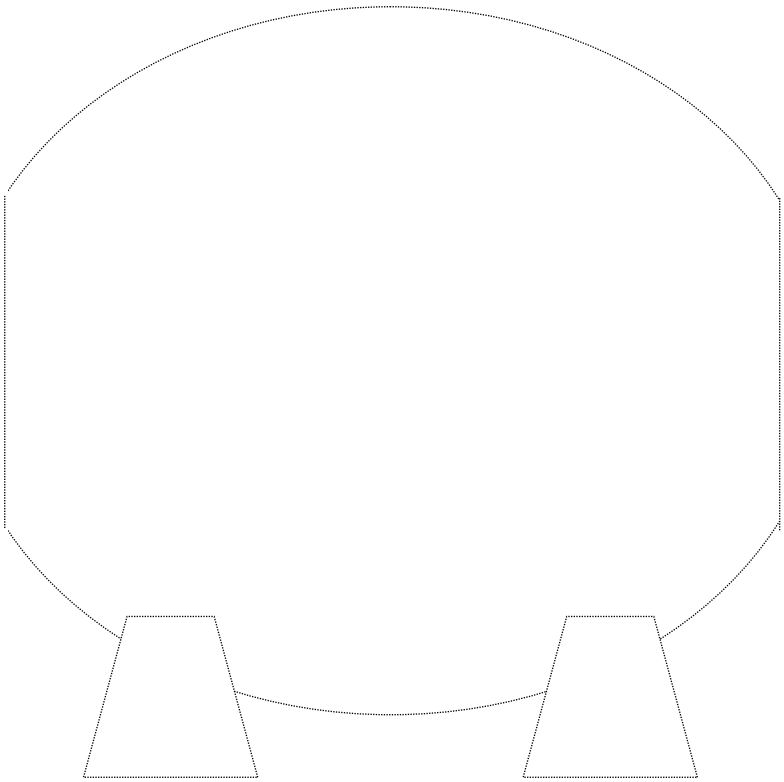


Pig Template

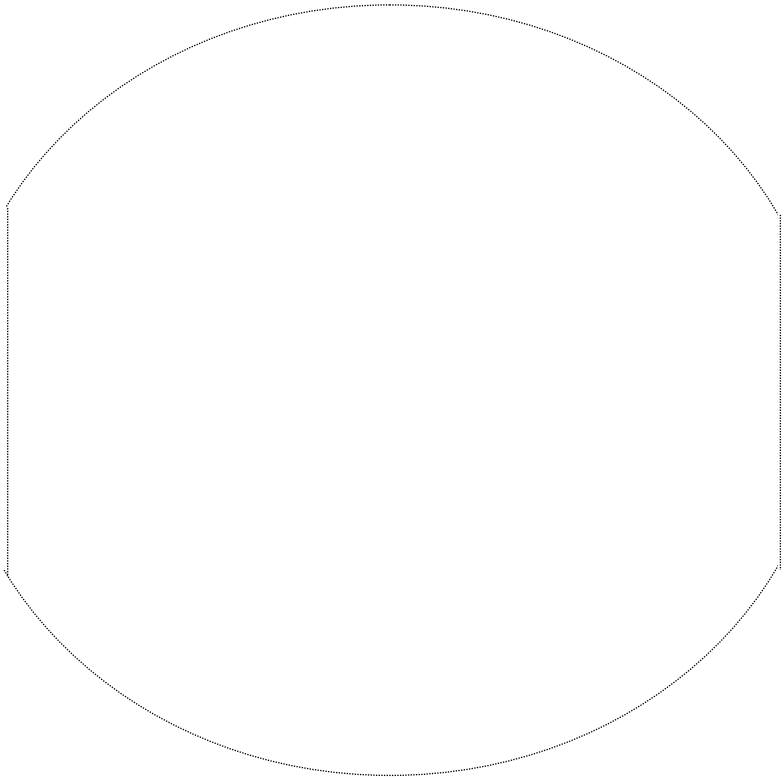


Side

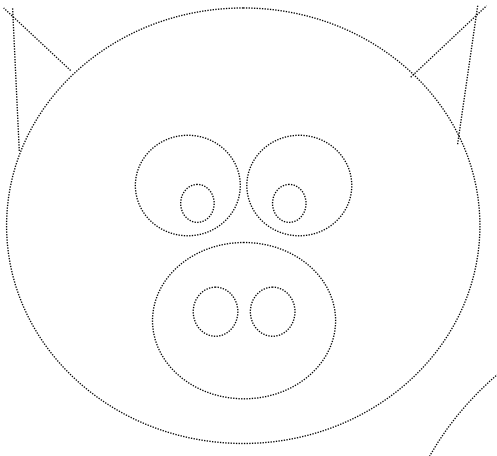
Side



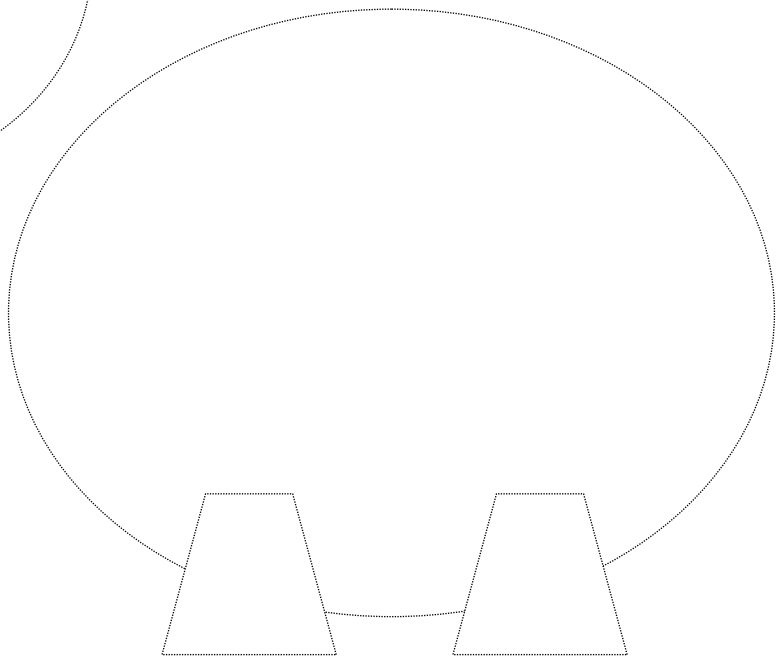
Pig Template



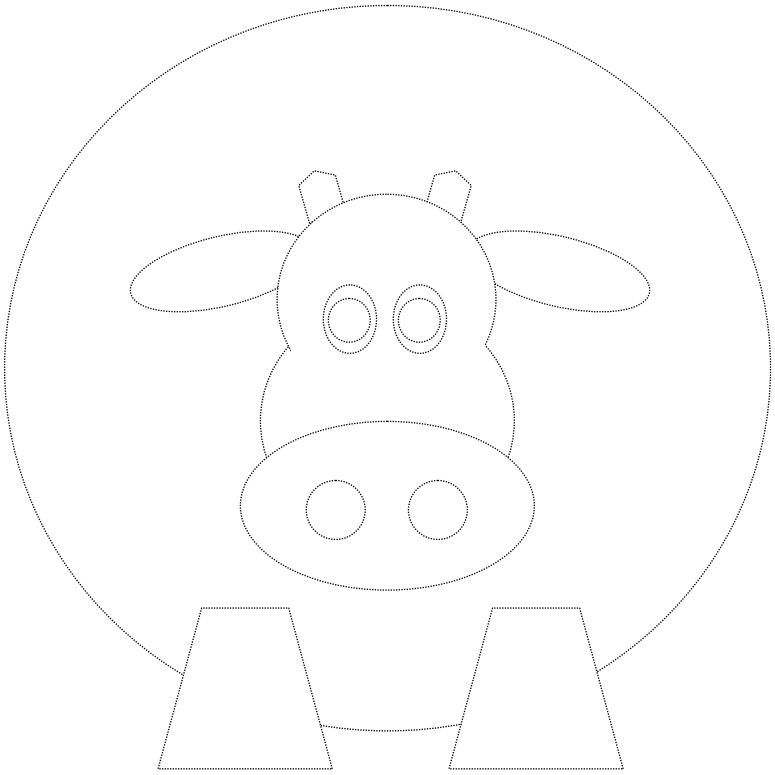
Top



Head and front separate, use if animating head

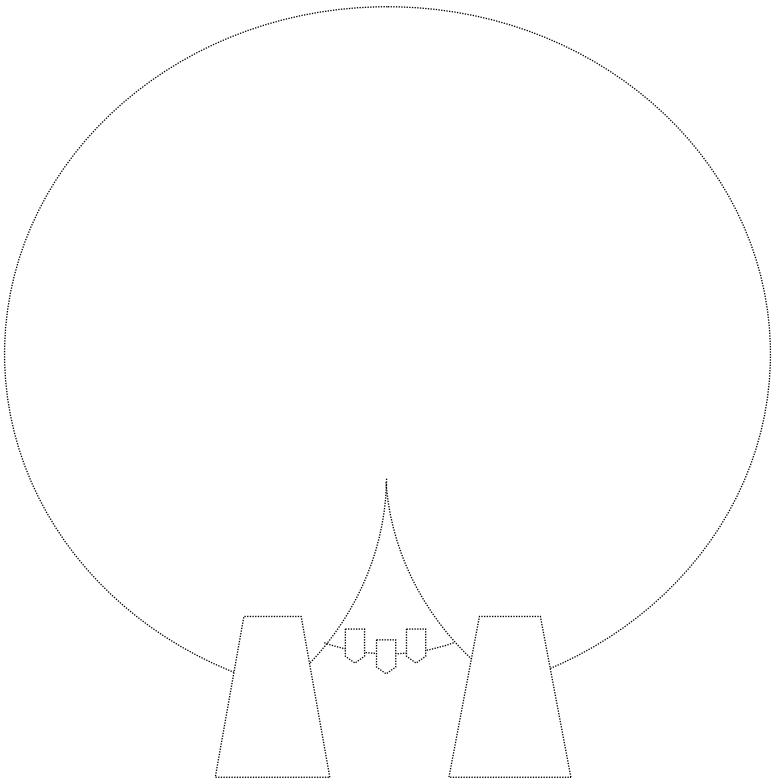


Cow Template

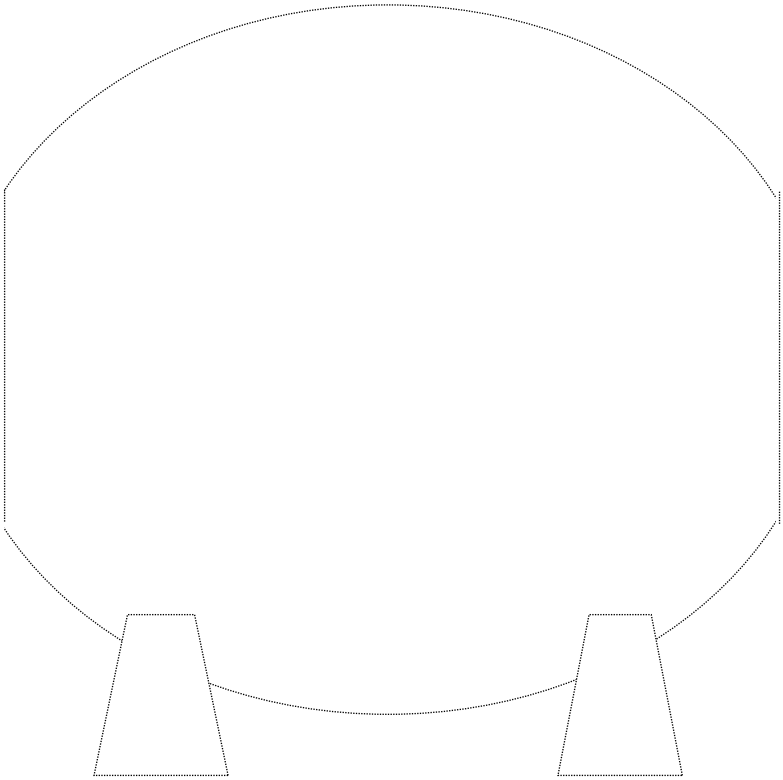


Head with face use if animating tail or legs

Bottom

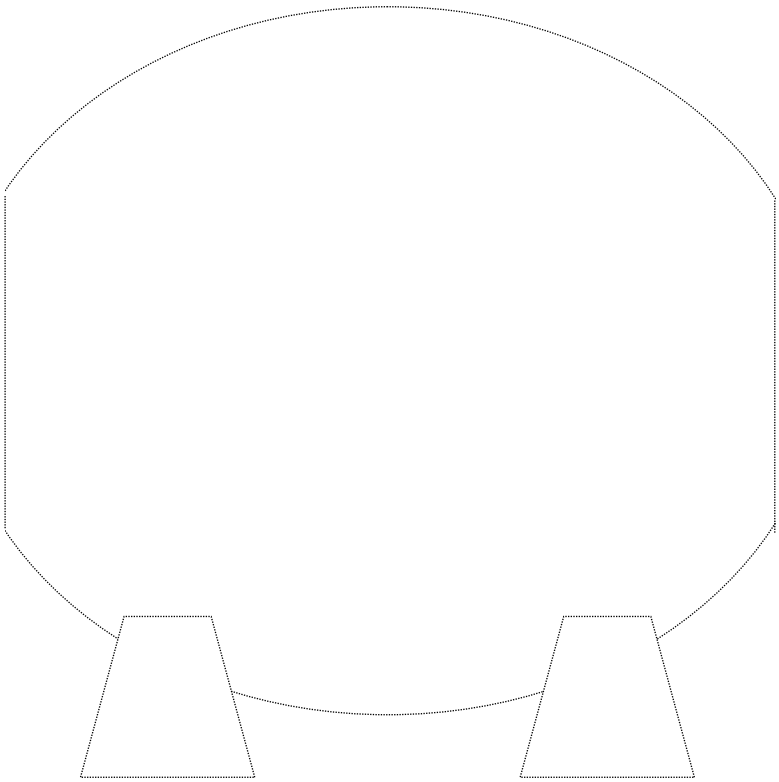


Cow Template

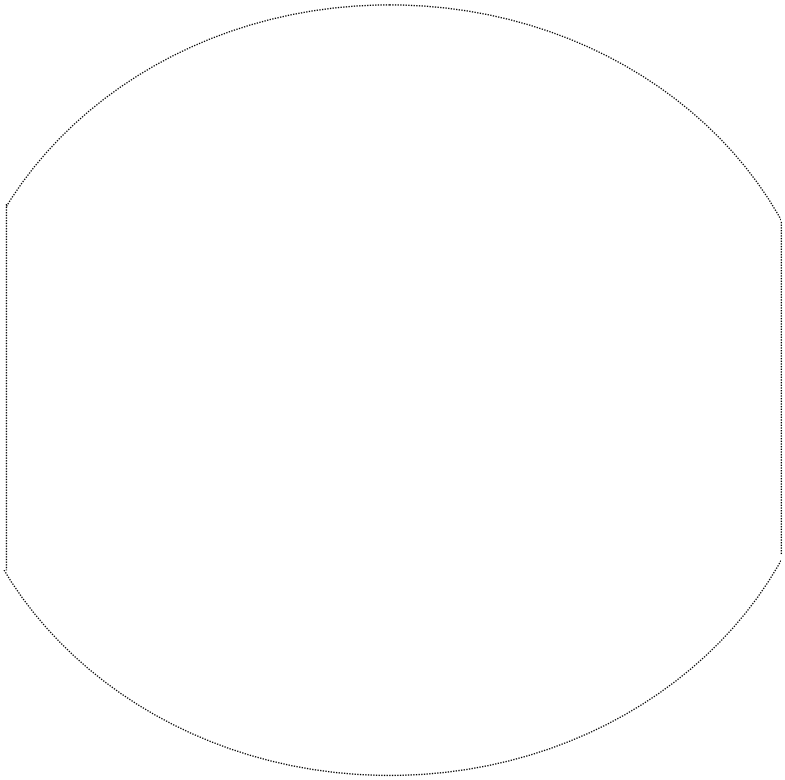


Side

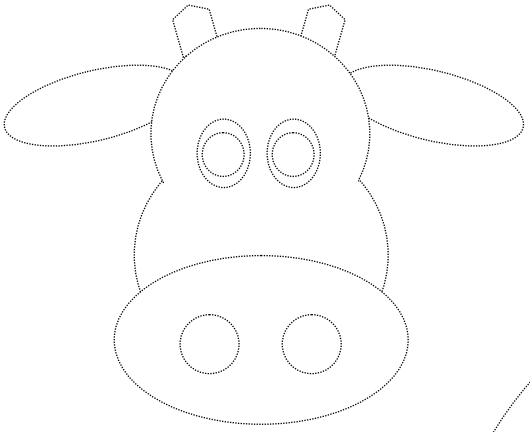
Side



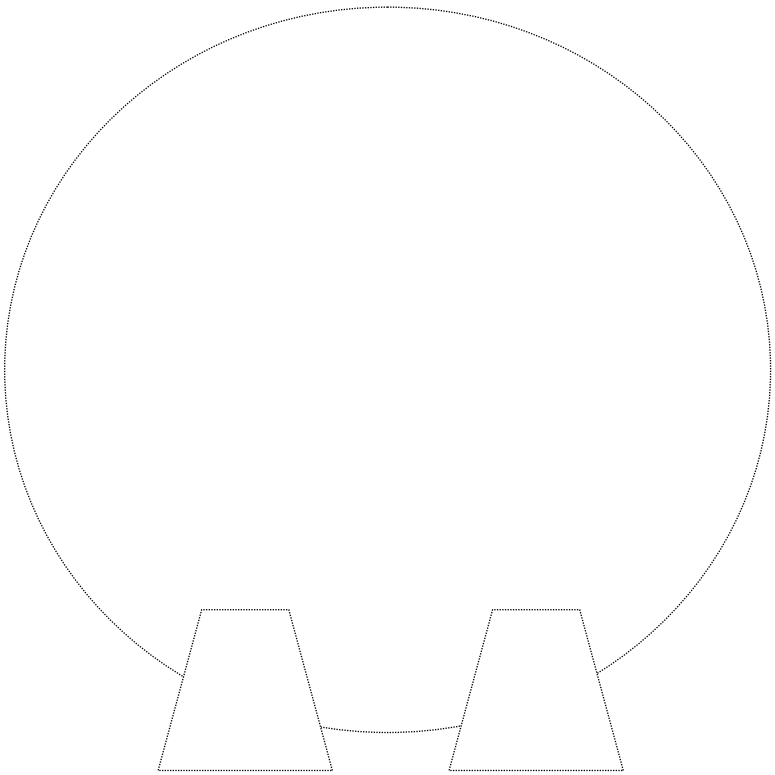
Cow Template

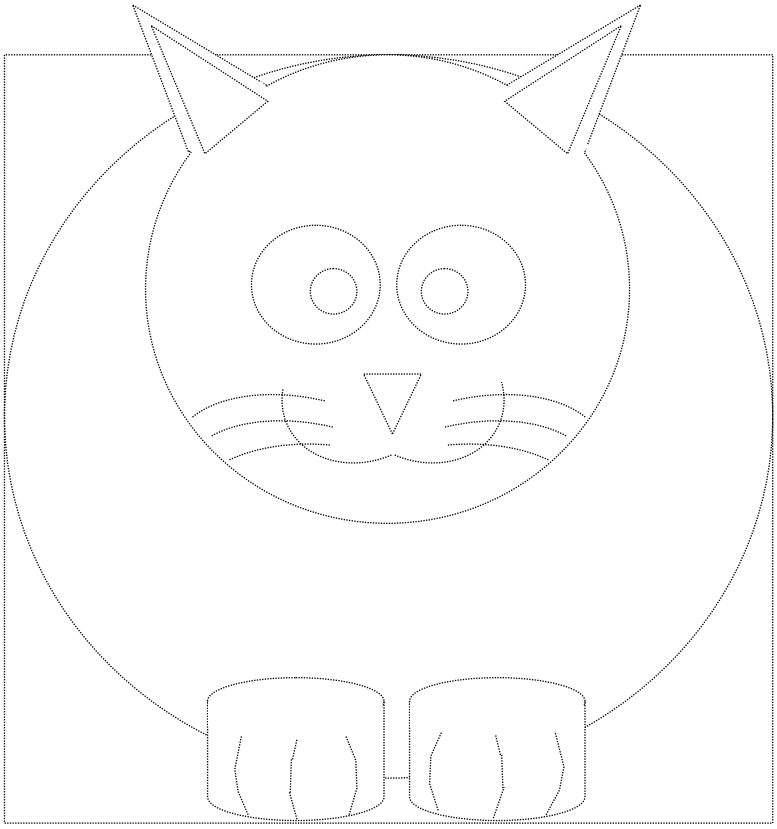


Top

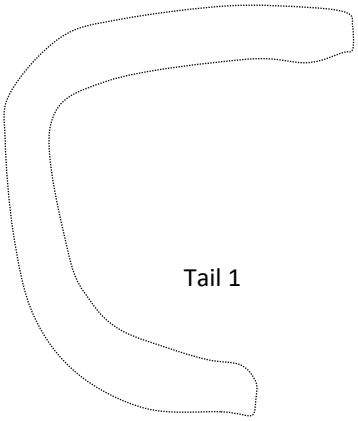


Head and front separate, use if animating head

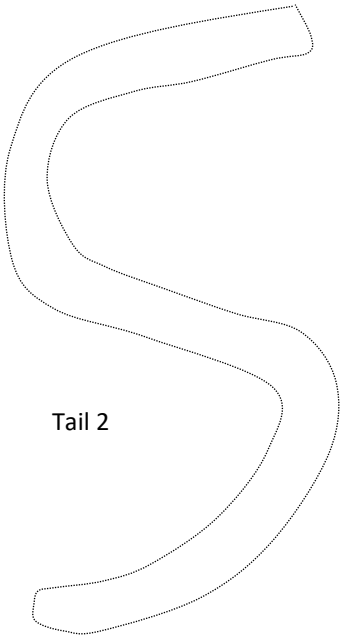




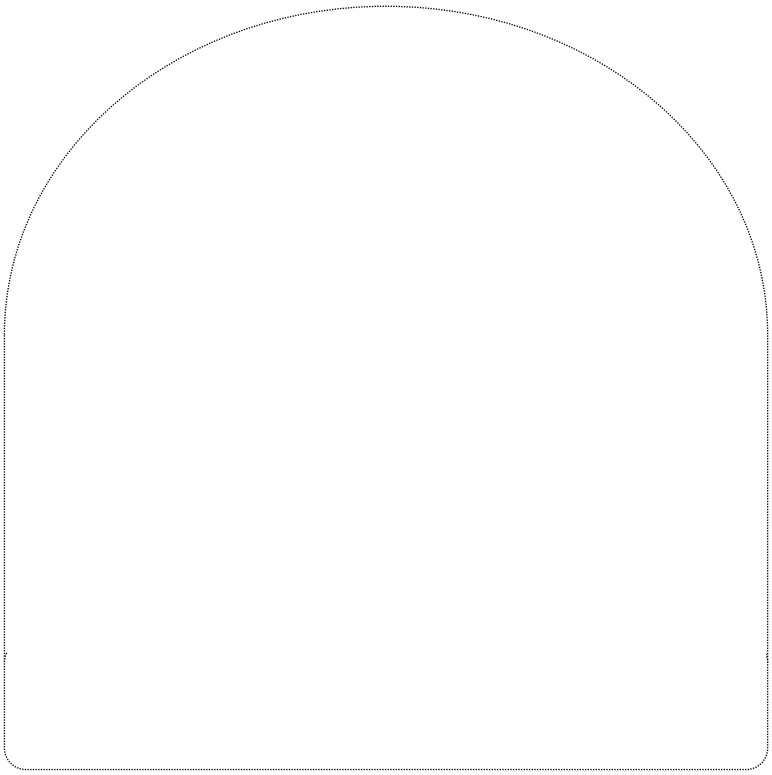
Front with face



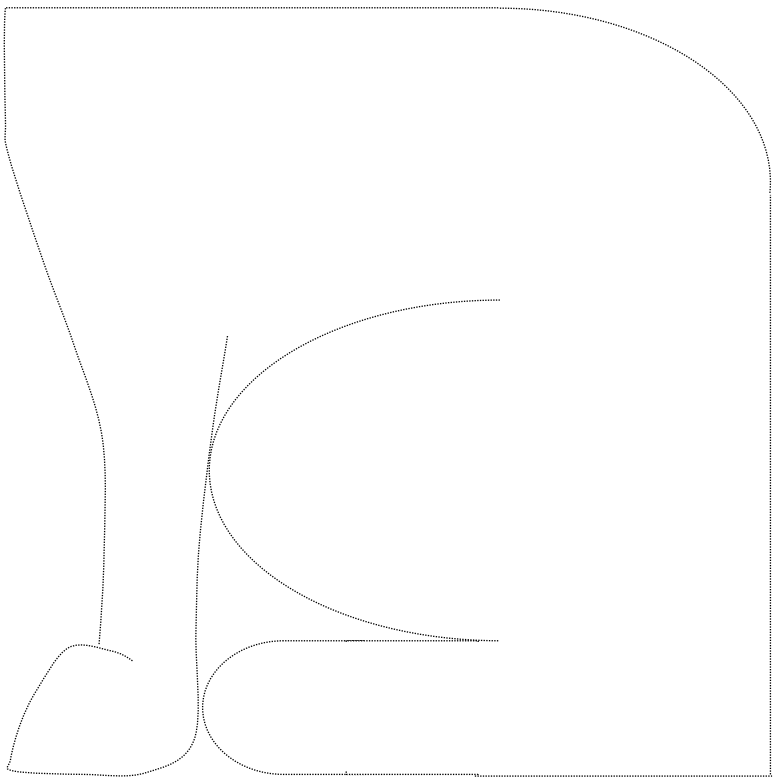
Tail 1



Tail 2

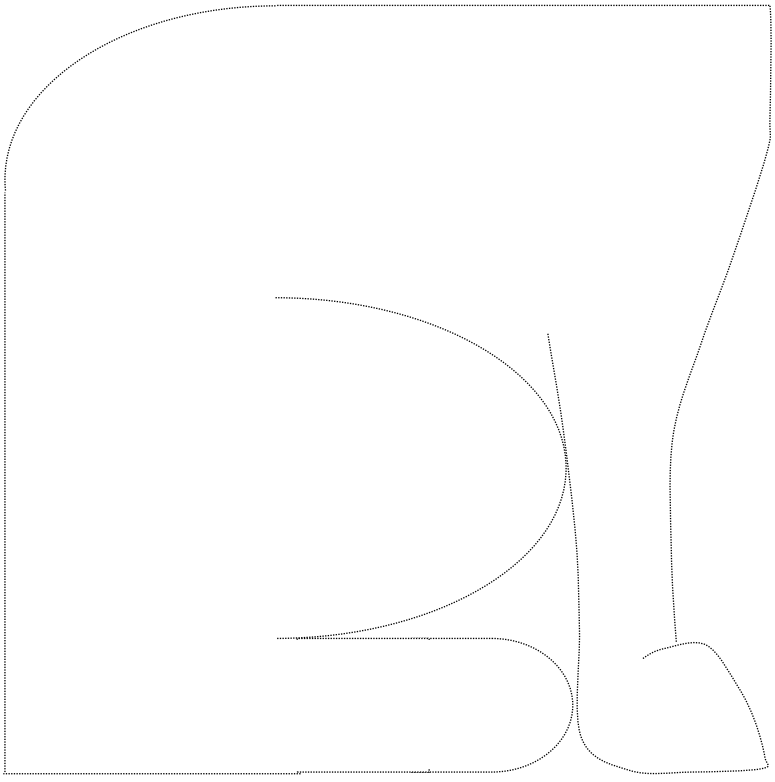


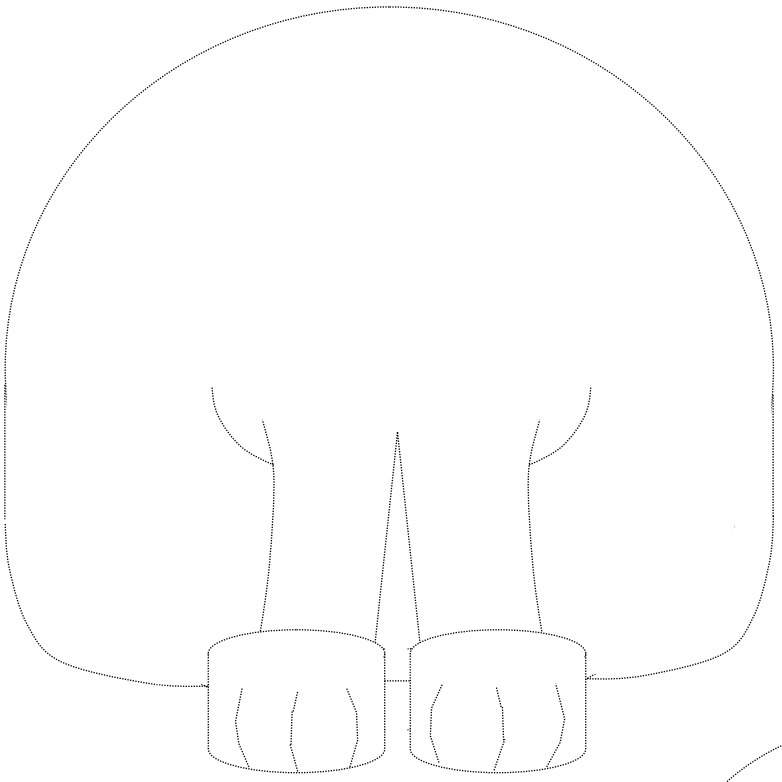
Rear



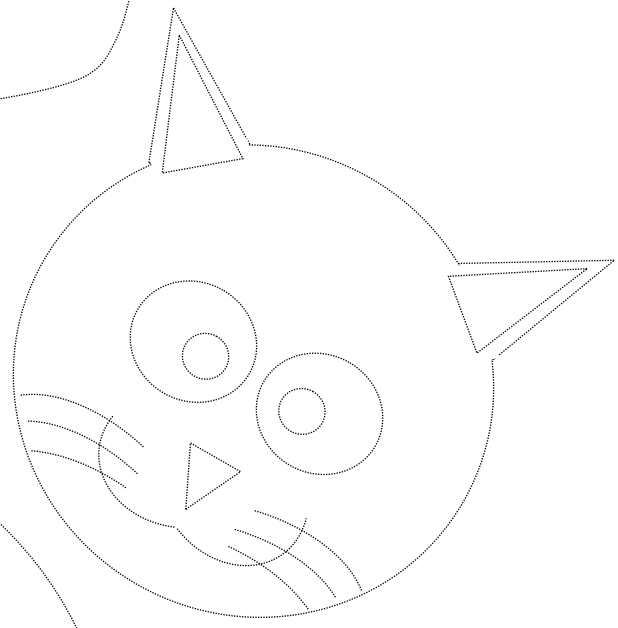
Side

Side





Head and front separate.
Use if animating head.



Top

Animated Animal Assessment Sheet AC12 Name _____ Class ____

(no button)

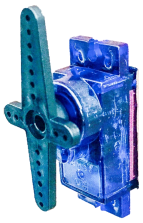
I did this well.

I did this ok or I did this a little.

I tried this but it didn't work or I didn't do this at all.

I wired my servo to the Crumble.	
I programmed my animal (head/tail/paw/hoof) to move backwards and forward.	
I listened to my partners ideas.	
I contributed good idea to my partner.	
I persevered when the wiring or programming didn't work.	

Draw what you would like to make next using a servo



Servo

Sticker	I got this sticker for
Sticker	I got this sticker for
Sticker	I got this sticker for

Animated Animal Assessment Sheet AC13 Name _____ Class ____

With a button

I did this well.

I did this ok or I did this a little.

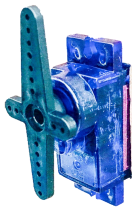
I tried this but it didn't work or I didn't do this at all.

I created an accurate wiring diagram using the maker cards.	
I followed my wiring diagram to connect my button and servo to the Crumble.	
I programmed my animal (head/tail/paw/hoof) to move backwards and forward.	
I programmed my animal to respond to a button input.	
I adapted my programming by…. (Say what you did).	
I listened to my partner's ideas.	
I contributed a good idea to my partner.	
I persevered when the wiring or programming didn't work.	

Sticker	I got this sticker for
Sticker	I got this sticker for
Sticker	I got this sticker for

Name _____ Class _____ AC14

Thinking about designing my own project that uses servo motors

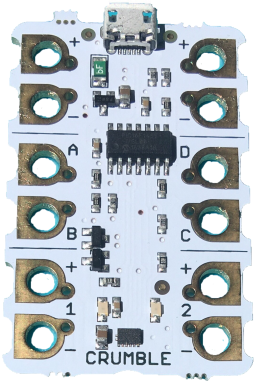


My program will

by

What will your user see and do?

Input/ Output	Name of device attached	What the device does (include as much detail as possible)
A output	A Servo Motor	Is attached to an axe to chop off Anne Boleyn's head.
A		
B		
C		
D		
Motor 1		
Motor 2		

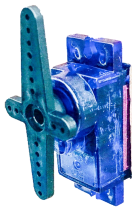


Fill in your idea and add your inputs and outputs to the chart.

Draw your devices and the wires that connect them.

Name _____ Class _____ AC14

Thinking about designing my own project that uses servo motors



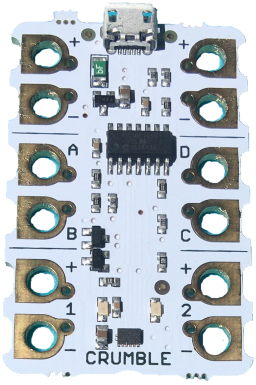
My program will

by

What will your user see and do?

Input/ Output	Name of device attached	What the device does (include as much detail as possible)
A output	A Servo Motor	Is attached to an axe to chop off Anne Boleyn's head.
A		
B		
C		
D		
Motor 1		
Motor 2		

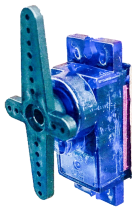
Fill in your idea and add your inputs and outputs to the chart.



Draw your devices and the wires that connect them.

Name _____ Class _____ AC15

Thinking about designing my own project that uses servo motors



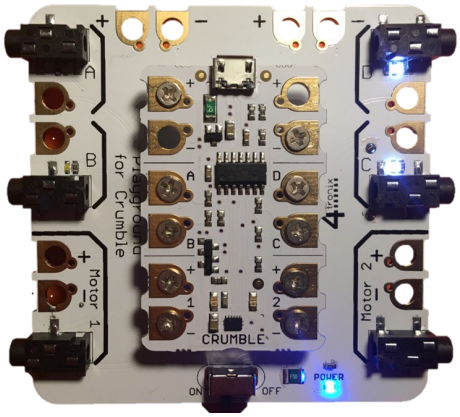
My program will

by

What will your user see and do?

Input/ Output	Name of device attached	What the device does (include as much detail as possible)
A output	A Servo Motor	Is attached to an axe to chop off Anne Boleyn's head.
A		
B		
C		
D		
Motor 1		
Motor 2		

Fill in your idea and add your inputs and outputs to the chart.



Draw your devices and the wires that connect them.