

# Character assignment 2 - skeleton and block model

UW CSE490j summer 2023

Instructor: Dave Hunt

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# Introduction

In this assignment we will be building the character's skeleton so that it can be animated. On top of the skeleton we will build simple polygon geometry (block models) to represent our character's main forms and proportions. Finally, we will set up the character with a basic player controller in Unity.

## Installing the Character Design Shelf

The Character Design shelf is a set of custom tools for Maya built by the UW to assist with the character development process. In order to use this shelf first download this zip package:

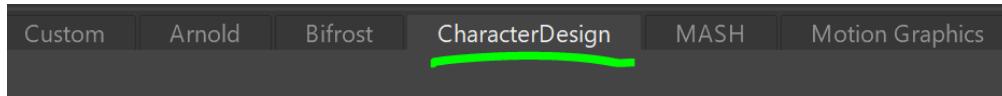
[Character Design Shelf](#) and extract to a local folder. Copy the contents to your Documents/Maya folders:

On Windows: C:\Users\<username>\Documents

On Mac: <username>/Library/Preferences/Autodesk/Maya

- Files in **shelves** → Documents/maya/2020/prefs/shelves/
- Files in **icons** → Documents/maya/2020/prefs/icons/
- Files in **scripts** → Documents/maya/2020/scripts/

Restart Maya and you should now see the Character Design shelf tab:



These new tools are now available and will be used in the class assignments:



The transparency fader is useful to add to your reference images

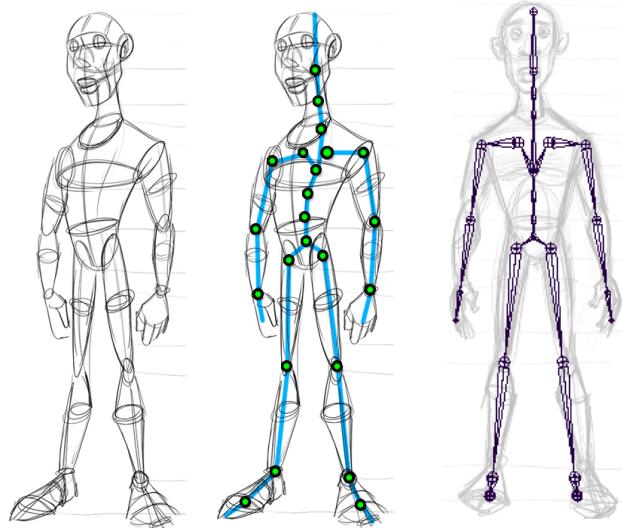


## Part 1, Building the skeleton

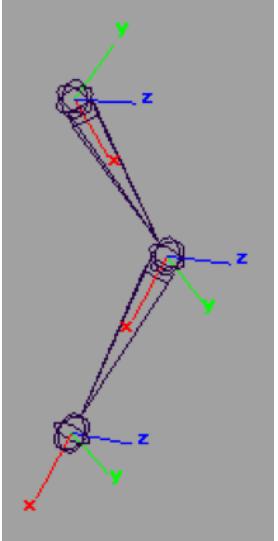
The **skeleton** is a hierarchy of transforms (called **joints** in Maya or “bones” in many other programs) that enables the character to animate. The **skeleton hierarchy** is an ordered list where each joint has a single **parent** transform and can also have multiple **child** transforms. We will create our character’s skeleton by individually building joint chains for each major part of the body based on our orthographic sketches. We will then parent the bone chains together into a single complete skeleton. Finally, we will set up the joint orientations to work well for character animation.

### Joint placement reference

Here are approximate joint placement locations for the example character, Sam.



## Conventions for joint orientation

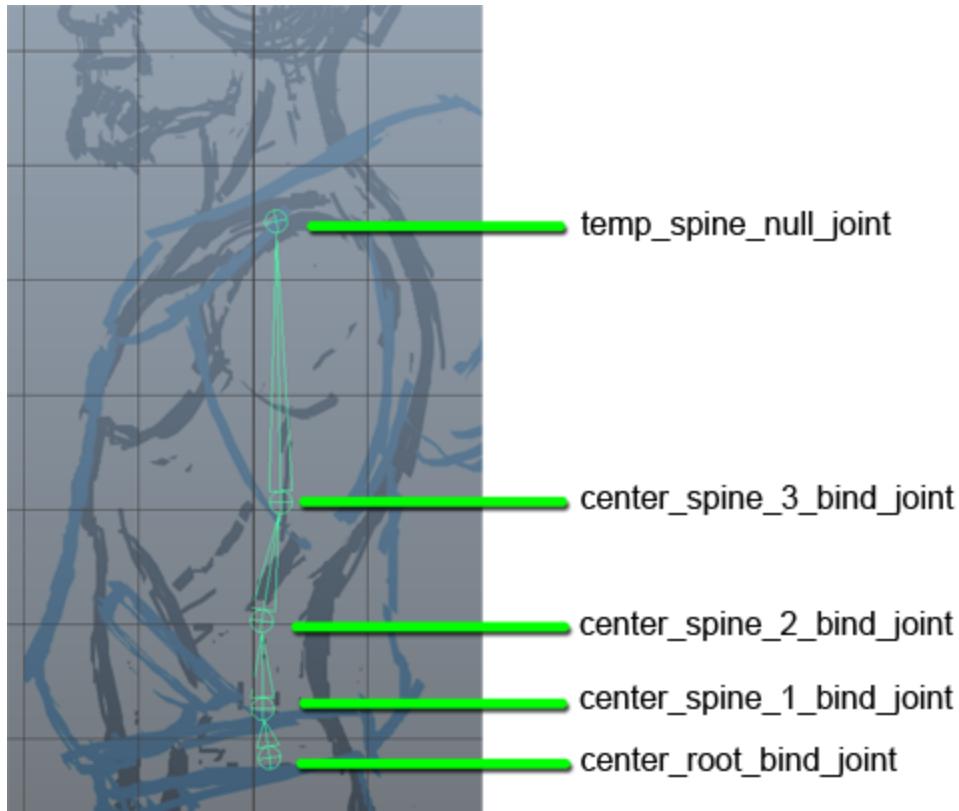
	Axis	Orientation	Description (for default rotate order: xyz)
<b>X</b>	Points toward the child		Maya auto-oriens joints this way as a convention whenever a new joint chain is created. In most cases this will minimize gimbal lock problems when animating. There are a few special cases where joints in character rigs should be oriented differently as noted below.
<b>Z</b>	Primary axis of rotation		Using Z as the primary axis of rotation reduces the risk of gimbal lock and helps IK work more reliably.
<b>Y</b>	Gimbal axis		Rotating Y 90 degrees causes gimbal lock. We try to minimize this by setting it up so that Y is the least used axis for our character's motion.

**Remember to save** your scene as the first thing you do right after opening Maya. That way you can use ctrl-s while working to regularly save and avoid losing work if the program crashes. Auto-save is also recommended and this can be configured in the program settings.

## 1.1, The back

Click and draw the back joint chain using the [Create Joints](#) tool. Use the front or side view panels in Maya with reference to your orthographic character sketches.

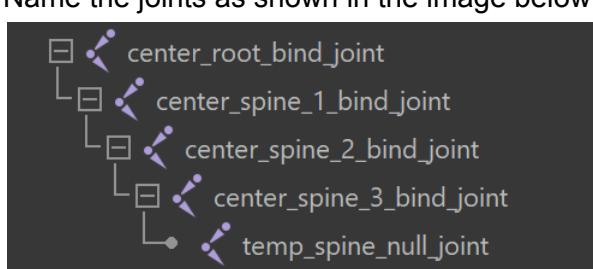
Most human character designs work well with four joints in the spine (excluding null joints). Having four joints makes it possible to create an s-curve and this will work well for animation. Note: in advanced rigs there may be a deformation skeleton with many more joints in the spine.



### 1.1a, Creating the back joint chain

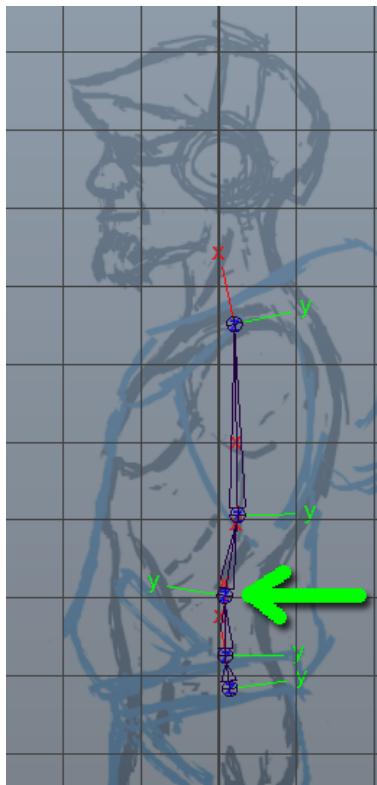
1. Switch to the side camera view
  - o In the viewport menu go to [Panels](#) → [Orthographic](#) → [Side](#)
2. Activate the Create Joints tool - [Skeleton](#) → [Create Joints](#)
  - o **Note:** if the Skeleton menu is not visible check to make sure the Maya menu is set to [Rigging](#) in the top left of the Maya UI.
3. Start with the **pelvis**. Place the pelvis joint slightly below where the belt would be worn.
4. Next, place the **spine 1 through 3**. There should be a slight curve to these joints in a relaxed posture. Horizontally, they should be slightly more toward the back of the torso.
5. Finally, place the **end null joint** directly above spine 3. Press “enter” when finished to complete the joint chain.

6. In the Outliner, click the “+” next to joint1 to expand the hierarchy.
  - To expand the entire hierarchy hold Shift while clicking the plus
  - Tip: Joint size can be globally adjusted in [Display → Animation → Joint Size](#). Individual joints can be set with the [Radius](#) attribute.
7. Name the joints as shown in the image below



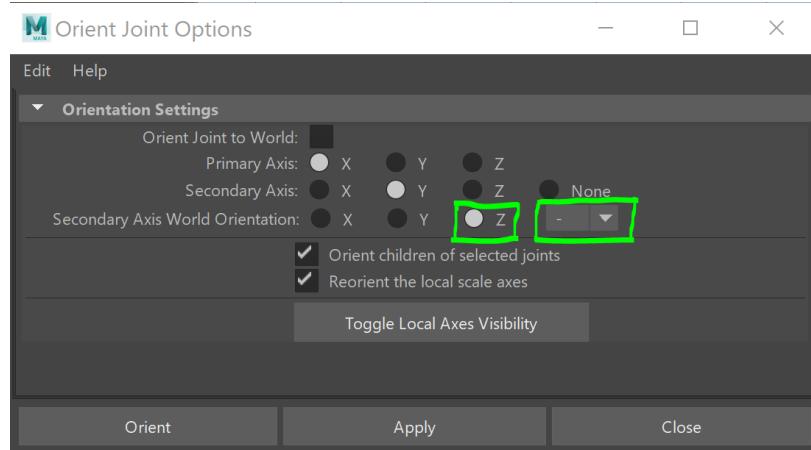
### 1.1b, Orienting the back joints

1. Check for flipping on the Y axis
  - a. Turn on **local rotation axes** display for the back joints
    - i. shift-select all of the back joints
    - ii. On the main menu: [Display → Transform Display → Local Rotation Axes](#)
  - b. The Y axis should be aiming in the same direction for all joints. When looking through the side view all of the Y axes should point backward. In the image below the indicated joint is flipped so it will need to be re-oriented.



2. Re-orient the flipped joints

a. [Skeleton → Orient Joint](#) (option window)



- b. Select the joint and with the settings above click Apply. Change the axis to negative or positive as needed.
- c. Repeat this down the joint chain until all of the Y axes are pointing the same way.
3. When finished you can turn off the local rotation axes via either the Display menu or the Character Design shelf

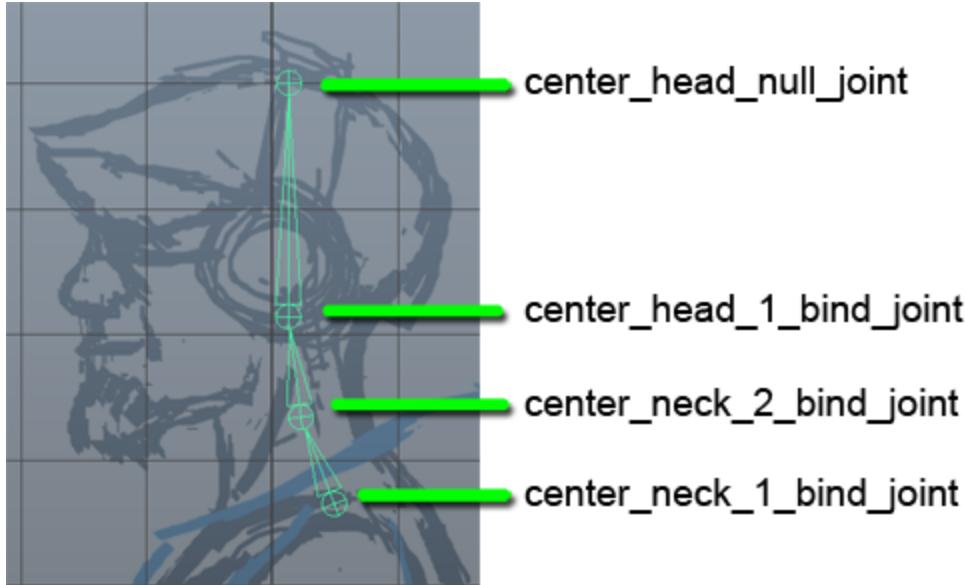


To finish the spine, delete the temporary null joint. It is generally a good idea to create an end joint while building a chain so that the previous one will be automatically oriented. Sometimes the end joint is not needed and can be deleted, such as here in the spine.

1. Select *temp\_spine\_null\_joint*
2. Press “delete” on the keyboard

## 1.2, The neck

Click and draw the neck joint chain using the Create Joints tool. Most human character designs work well with three neck joints (including the head, but not the end null joint) so that it can bend into a c-curve.



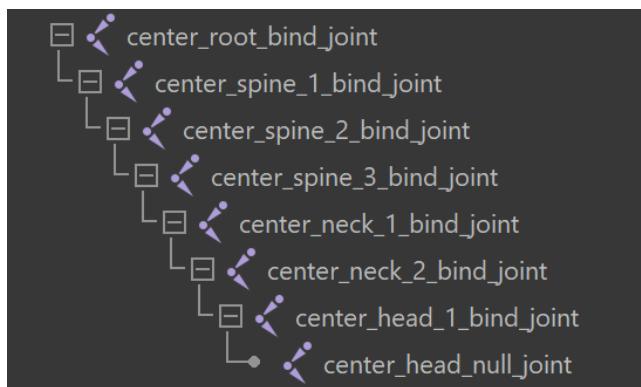
### 1.2a, Creating the neck joint chain

1. Switch to the side view camera
2. Activate the joint tool - **Skeleton → Create Joints**
3. Place the neck 2 joint slightly below the collar line.
4. Place the Neck 2 joint in the middle of the neck. Horizontally, it should be slightly more toward the back of the neck.
5. Place the head end null joint directly above the head and press “enter”.
6. Name the joints as shown in the image

### 1.2b, Parent the neck to the back

1. Select center\_neck\_1\_bind\_joint
2. Shift-click center\_spine\_3\_bind\_joint to add it to your selection
3. Press “p” to parent

The skeleton should now look like this in the Outliner

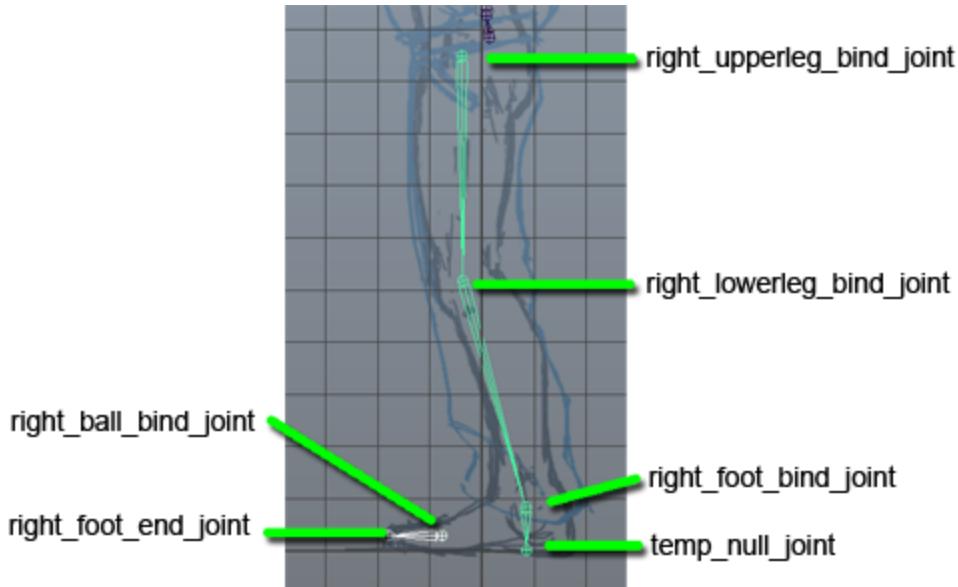


### 1.2c, Orienting the neck joints

1. Check for flipping on the Y axis. If necessary, re-orient joints following step 1.1b above

## 1.3, The legs

Click and draw the leg joint chain using Create Joints. The leg skeleton shouldn't be straight, it needs to be bent in the direction the knee will rotate. Even if the reference image shows straight legs be sure to add at least a slight bend in the leg skeleton.



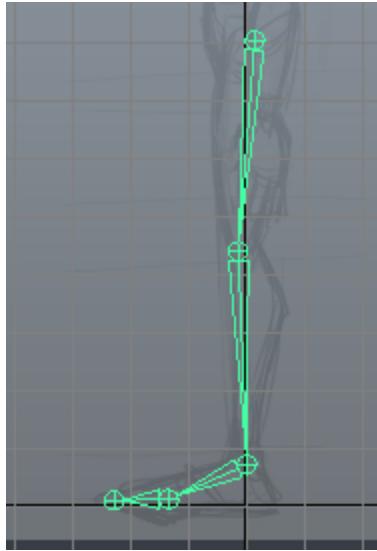
### 1.3a, Creating the leg and toe joint chains

1. Switch to the side view camera
2. Activate the joint tool - [Skeleton → Create Joints](#)
3. Place the hip joint first
4. Place the knee and ankle joints (knee should be bent, not straight or hyper-extended)
5. Place the final foot null joint where the heel touches the ground. Press "enter" when finished.
6. Create a second joint chain for the toe. Start by placing the *right\_ball\_bind\_joint*
7. Place the foot end null joint and press "enter" when finished
8. Name the joints as shown in the image
9. Delete the temporary foot null joint

### 1.3b, Parent the toe to the foot

1. Select *right\_ball\_bind\_joint*
2. Shift-select *right\_foot\_bind\_joint*
3. Press "p" to parent

The leg joint chain should now look something like this:



### 1.3c, Align the right leg in the front view

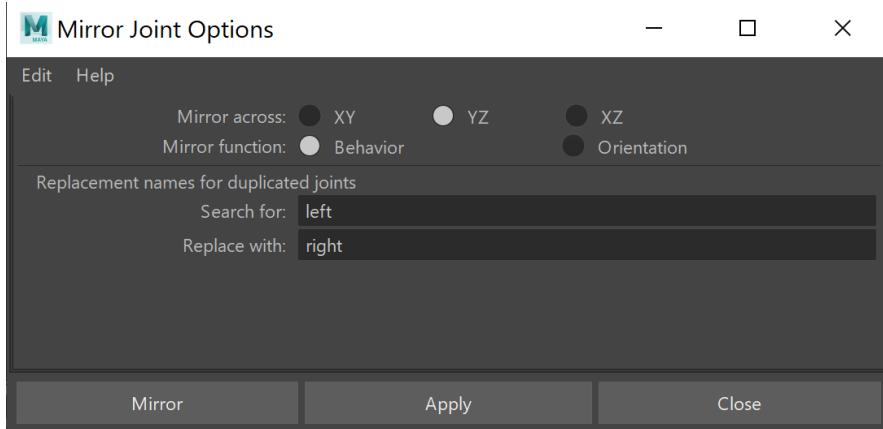
1. Switch to the front camera view
2. Select *right\_upperleg\_bind\_joint*
3. Press "w" to activate the [Move Tool](#)
4. Move the joint over on the X axis to align with the reference image. Note that right/left on the skeleton is always relative to the character's direction. From the front view you should line up the upper leg joint screen left, but it would be on the character's right side.
5. Press "e" to activate the [Rotate Tool](#)
6. Rotate the Y axis to align with the image

### 1.3d, Parent the upper leg joint to the hips

1. Select *right\_upperleg\_bind\_joint*
2. Ctrl-select (in the Outliner) or Shift-select in the viewport *center\_root\_joint*
3. Press "p" to parent

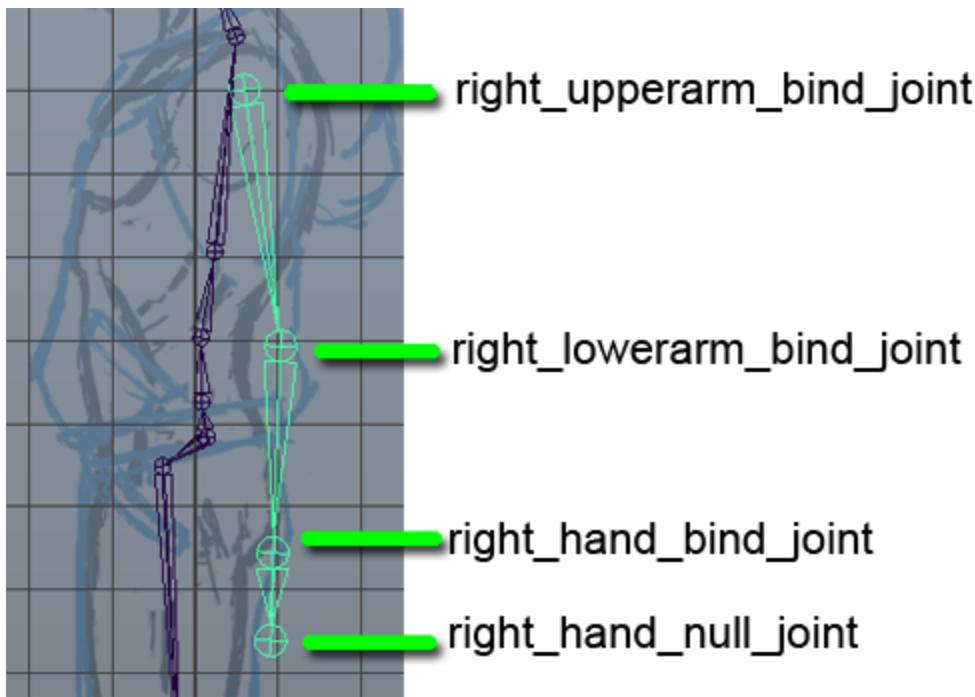
### 1.3e, Mirror the right leg to the left side

1. Skeleton → Mirror Joint (option window)
2. Change the settings to match the screenshot below
  - a. Mirror across: YZ
  - b. Mirror function: Behavior
  - c. Search for: right\_
  - d. Replace with: left\_
3. Select *right\_upperleg\_bind\_joint* and press Apply



## 1.4, The arms

Click and draw the arm joint chain using the Create Joints tool. Same as the legs there should be a bend in the arm. Even if the concept art has straight arms be sure to add a slight bend to the elbow in the direction it will bend.



### 1.4a, Creating the arm joint chain

1. Switch to side camera view
2. Activate the joint tool - [Skeleton → Create Joints](#)
3. First, place the upper arm shoulder joint
4. Next, place the lower arm elbow joint (elbow should be bent, not straight)

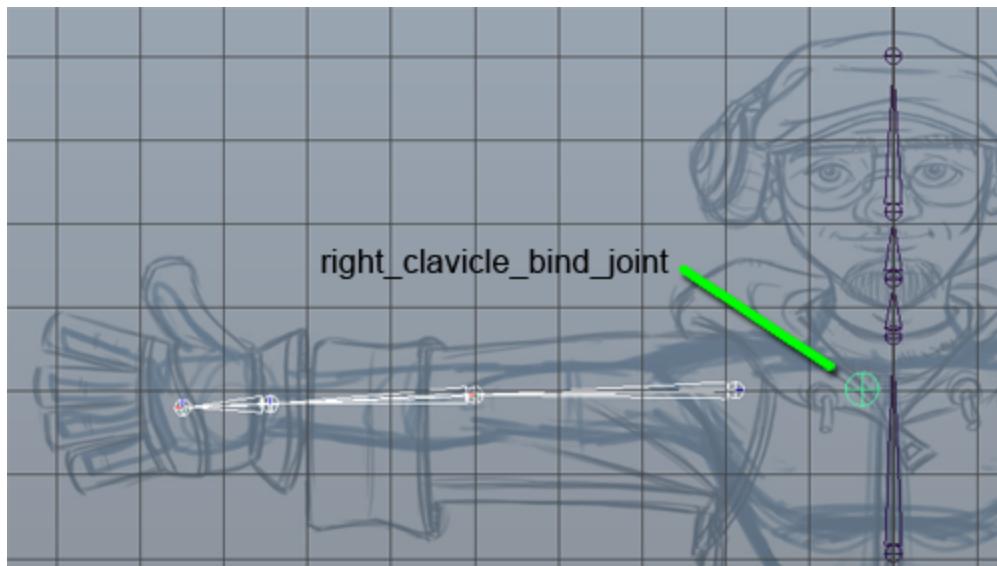
5. Place the hand joint
6. Place the temp hand null joint and press “enter” when finished
7. Name the arm joints the same as the image above

#### **1.4b, Align the arm joint chain in the front view**

1. Switch to front camera view
2. Move and rotate the *right\_upperarm\_bind\_joint* to align with the drawing

#### **1.4c, Creating the clavicle joint**

1. Switch to front camera view
2. Activate the joint tool - [Skeleton → Create Joints](#)
3. Click and draw the clavicle as shown in the image. Press “enter when finished.
4. Switch to side view and align the clavicle joint to the drawing
5. Name it *right\_clavicle\_bind\_joint*



#### **1.4d, Parent the clavicle to the chest**

1. Select *right\_clavicle\_bind\_joint*
2. Shift-select *center\_spine\_3\_bind\_joint*
3. Press “p” to parent

#### **1.4e, Parent the arm to the clavicle**

1. Select *right\_upperarm\_bind\_joint*
2. Shift-select *right\_clavicle\_bind\_joint*
3. Press “p” to parent

#### **1.4f, Mirror the arm from right to left**

1. [Skeleton → Mirror Joint](#) (option window)

2. The settings should match the screenshot in step 1.3e above
3. Select *right\_clavicle\_bind\_joint* and press Apply

#### 1.4g, Freeze Transformations on the skeleton

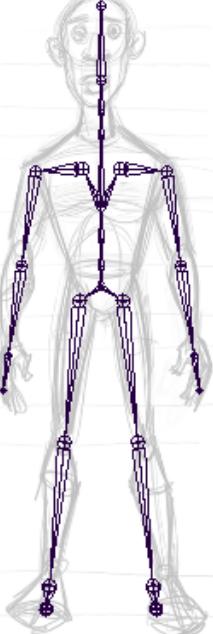
This will zero-out the rotation channels to make it easier to animate.

1. Select the skeleton's root joint
2. Press **Modify → Freeze Transformations**

## 1.5, Orienting the skeleton for animation

The following joint orientations will make it easier to work with when creating animation.

(sections marked in purple below are optional)

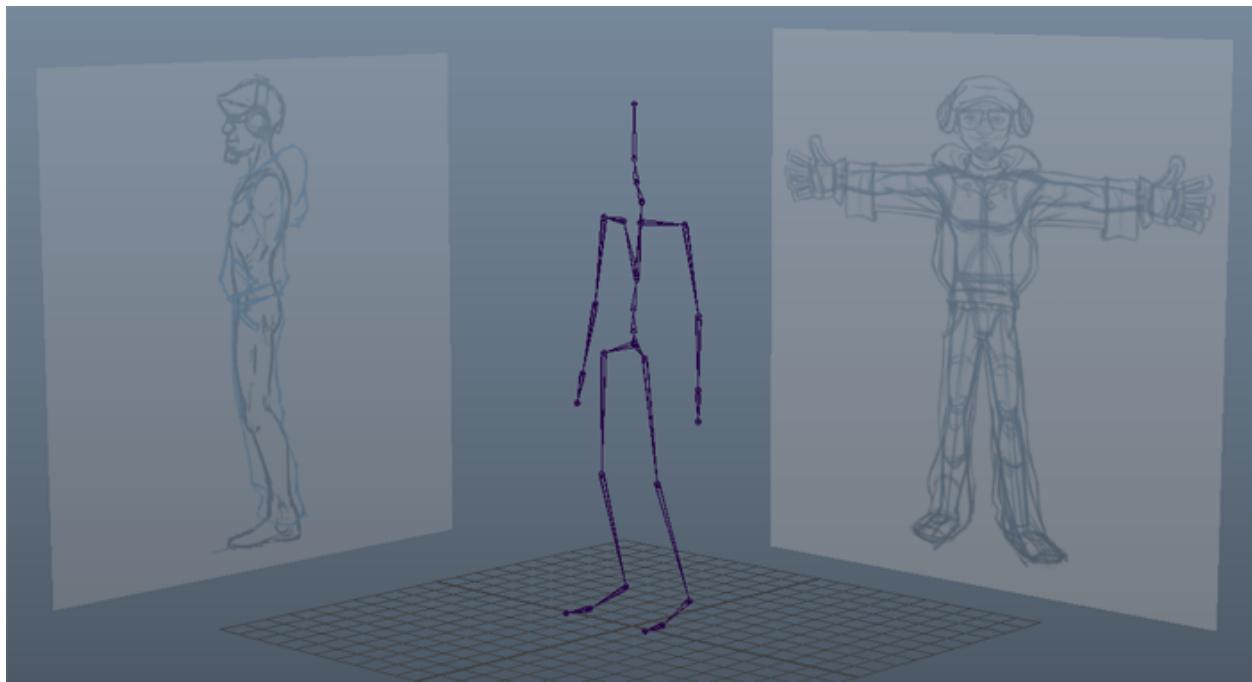
	<b>Joint</b>	<b>Orientation</b>	<b>Instructions</b>
	Pelvis joint <i>center_root_bind_joint</i>	Orthogonal to world space	Unparent the joint from the skeleton and unparent its children. In the Attribute Editor: rotate should be 0, 0, 0 and Joint Orient should be zero or multiples of 90. When finished, re-parent the skeleton.
	Chest joint <i>center_spine_3_bind_joint</i>	Orthogonal to world space	[same as above]
	Head joint <i>center_head_1_bind_joint</i>	Orthogonal to world space	[same as above]
	Elbows and knees <i>right_lowerarm_bind_joint</i> <i>right_lowerleg_bind_joint</i>	Rotationally coplanar with arm/leg joint chain	In the Attribute Editor: Translate should be 0 on Y and Z, but X can be non-zero. Rotate and Joint Orient should be 0 on X and Y, but Z can be non-zero
	Hand joints <i>right_hand_bind_joint</i>	Inline with lower arm	Unparent the children of the joint you are orienting. In the Attribute Editor: Translate should be 0 on Y and Z, but X can be non-zero. Rotate and Joint Orient should be all zeros.
	Feet joints <i>right_foot_bind_joint</i>	World space	After unparenting the foot, all Rotate and Joint Orient channels should be 0.

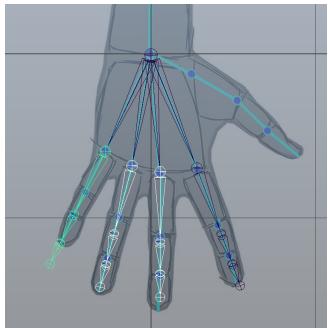
1. Orient the pelvis **orthogonal to world space**
  - a. Select *center\_root\_bind\_joint* and unparent all of its children joints.
  - b. With the joint still selected press “ctrl-a” to bring up the Attribute Editor
  - c. In the Joint Orient field, round off all values to multiples of 90
  - d. Re-parent the children joints to the root (this includes the spine and legs)
2. Orient the chest **orthogonal to world space** (optional)

- a. follow the same steps above for *center\_spine\_3\_bind\_joint*
3. Orient the head **orthogonal to world space** (optional)
  - a. follow the same steps above for *center\_head\_1\_bind\_joint*
4. Orient the clavicles **relative to the chest** (optional)
  - a. Select *right\_clavicle\_bind\_joint*
  - b. Unparent the arm from the clavicle
    - i. Select *right\_upperarm\_bind\_joint* and press shift-p to unparent
  - c. Press “ctrl-a” to bring up the Attribute Editor
  - d. Zero out all joint orient values
  - e. Re-parent the arm to the clavicle

### 1.5b, Finalize the skeleton

1. Mirror the skeleton. (If you have made changes to the arm joint orientations they need to be the same on both sides)
  - a. **Skeleton → Mirror Joints** for arms and legs  
(use the same options as step 1.3e above)
2. Freeze transformations
  - a. **Modify → Freeze Transformations**





### **Adding fingers is optional**

If you want to add fingers:

- follow [this tutorial](#) or
- download this [hand skeleton maya file](#) to import into your scene

End of part 1.

**Save your Maya scene** as assignment\_2\_skeleton.ma and turn it in with your assignment.

Take screenshots of your skeleton and add them to your Miro board to turn in with your assignment.

## Part 2, Block modeling

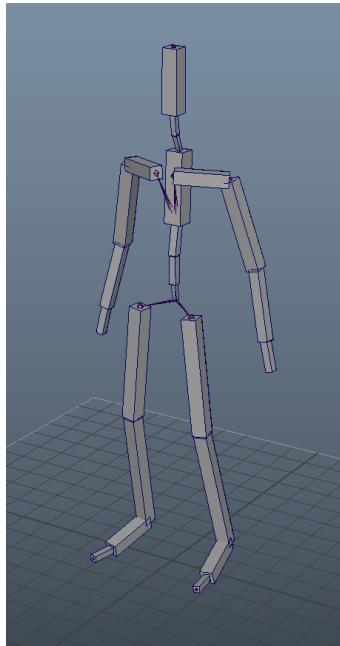
Block modeling is the process of setting up basic 3d geometry on the skeleton to represent the character's main forms and silhouette. This makes it possible to test how the character proportions are looking in poses and motion very quickly. It is easy to make adjustments to the skeleton because there are no skin weights or control rigs added yet.



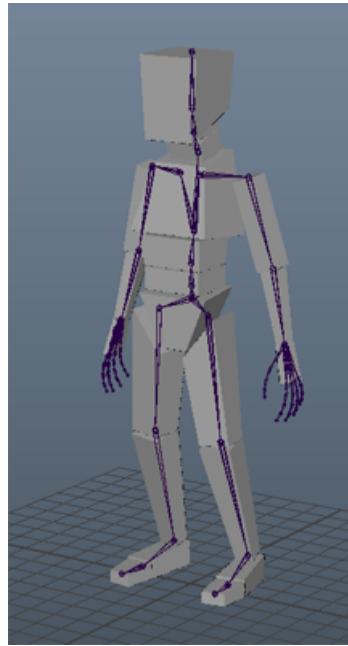
The [Block Model](#) tool on the Character Design shelf creates a polygon cube parented to the selected joint(s) and scales it to the length of the first child joint. It's a good idea to work in complete overall passes for your block models as shown in the images below (instead of going into detail one at a time) because that way you can keep a global view of how your character will look and make more informed adjustments along the way.

1. After adding block models to the skeleton, first start by adjusting the [transform](#) (translate, rotate and scale) of each block to approximate the shape of your orthographic drawings in front and side views. Try to match your character's body without costume (the costume will be added in a later assignment.)
2. Next, we can further refine the shape by moving each block's [components](#) (vertices, edges and faces.)
3. Finally we can add a few more [subdivisions](#) to approximate the silhouette of our character. Please avoid adding too many subdivisions because that will add complications - we will be able to add more detail later.

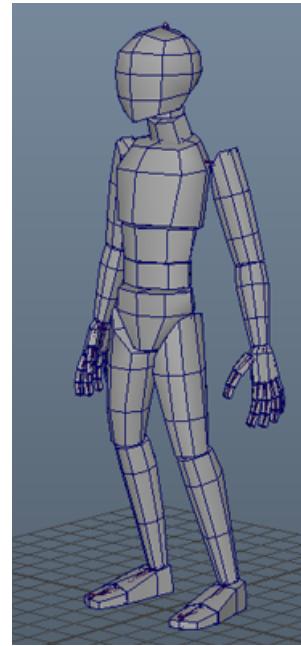
1 - add block models to skeleton



2 - edit the block transforms and components

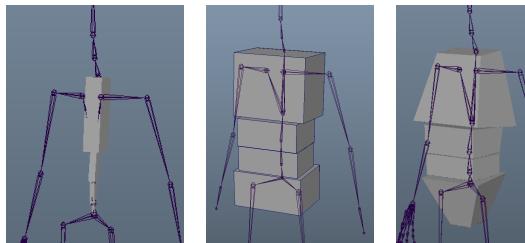


3 - refine the silhouette by adding subdivisions

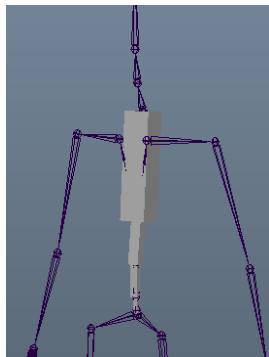


## 2.1, Adding block models to the skeleton

### 2.1a, Block modeling the body

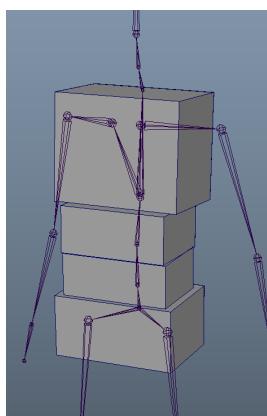


Note: we will add subdivisions to refine the silhouette in a later step after completing a first pass of block modeling for the whole body.



#### 1. Add block models to the body

- Select the root and spine joints
  - Select `center_root_bind_joint`
  - Shift select spine 1 through spine 3 (or ctrl-select in the Outliner)
- Press **Block Model**  on the Character Design shelf

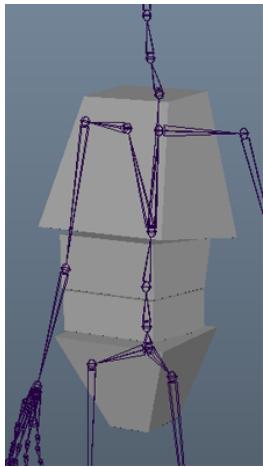


#### 2. Adjust the transform of each block using the Move, Rotate and Scale tools to match the drawings in front and side view.

**Tip:** It might help to turn off joint selection so the skeleton doesn't get in the way of selecting the polygon block models. To do this press the **joint selection mask** button on the toolbar at the top of the Maya interface:

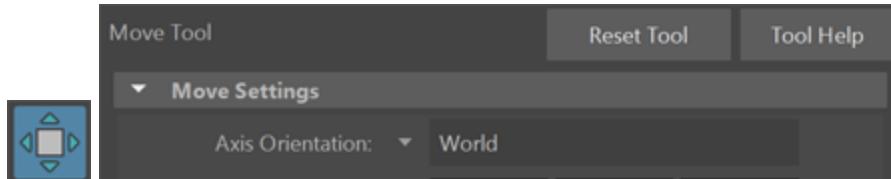


(remember to turn joint selection back on when finished)

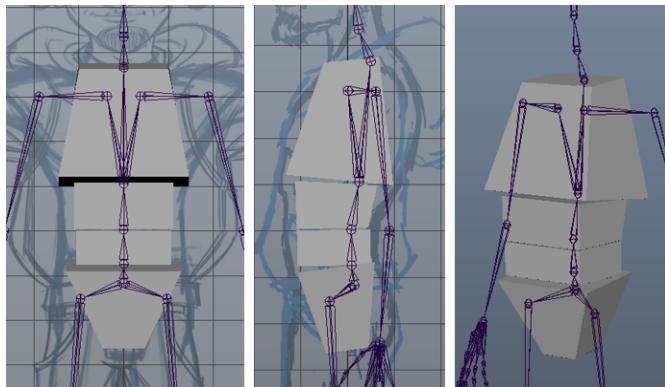


3. **Model components** by moving the [vertices](#), [edges](#) and [faces](#)
- Right-click the chest block and choose [Vertex](#)
  - Select vertices and move them out to match the chest in front and side view

**Tip:** In the [Move](#) tool settings you can switch between world, object and parent. Access the settings by double-clicking the Move tool icon.



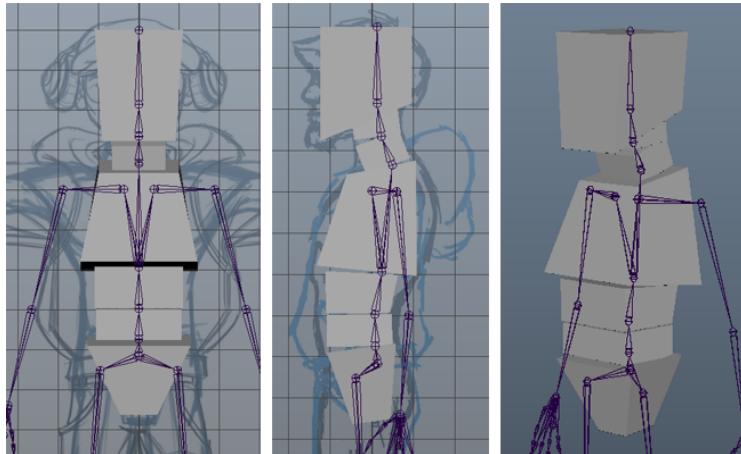
The block model for the back should now look something like this:



## 2.1b, Block modeling the neck and head

Repeat steps 2.1a for the neck joint chain.

Your model should now look something like this:



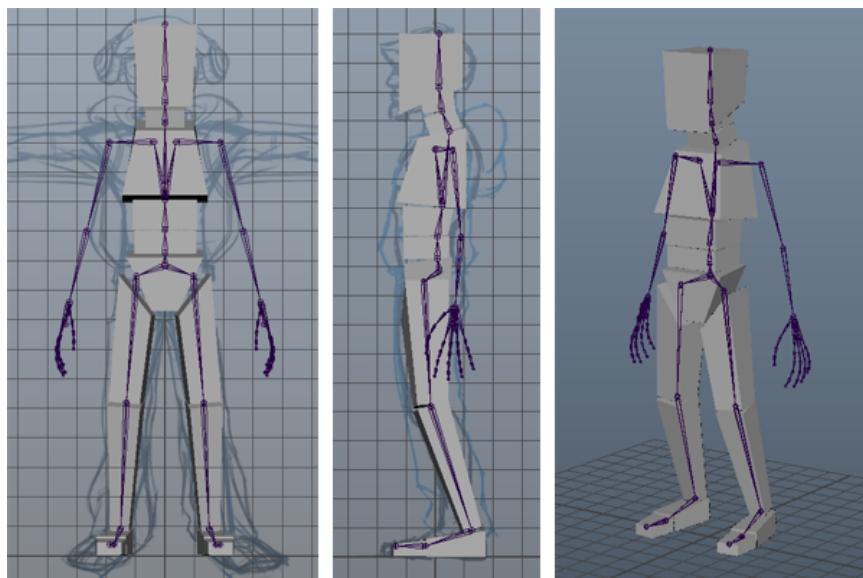
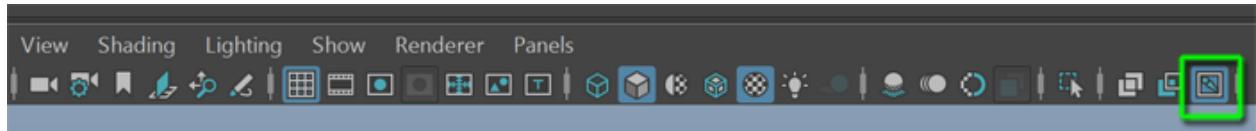
## 2.1c, Block modeling the legs

Repeat steps 2.1a for the right leg and foot joint chain.

### Mirror the right leg blocks to the left side:

1. Select all of the block for the right leg and foot
2. Press **shift-p** to **unparent** them from the skeleton
3. Press **ctrl-g** to **group** the blocks
4. Press **ctrl-d** to **duplicate** the group
5. In the Channel Box set **Scale X** to -1 on the duplicate group
6. **Parent** the right and left side block models to the skeleton
  - a. Select a block model
  - b. Shift-select the corresponding bone (or ctrl-select in Outliner)
  - c. Press **p** to **parent** the block to the bone
  - d. Repeat this for all blocks on the legs and feet
7. Delete the unused groups when finished

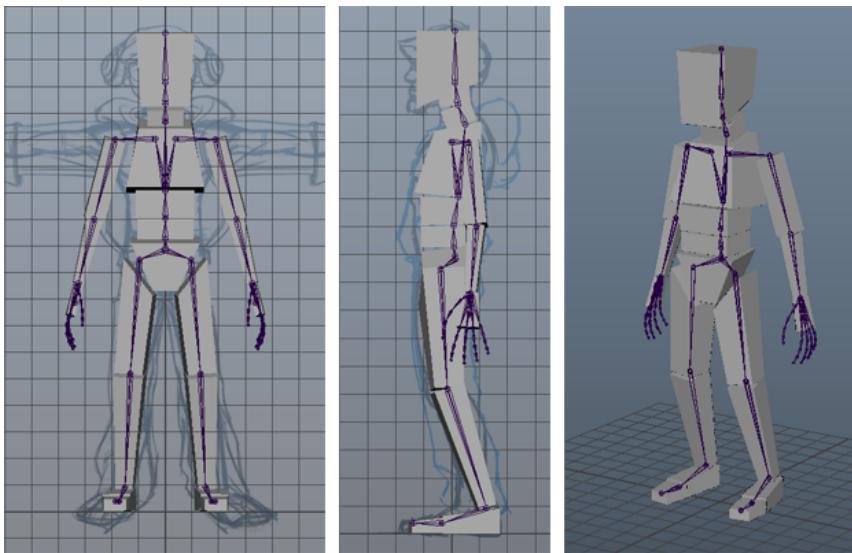
Tip: It might help when selecting bones to turn on **x-ray joints** on the panel toolbar:



## 2.1d, Block modeling the arms and hands

1. Repeat steps 2.1a for the right arm joint chain.

2. If your character has fingers add block models for them too.
3. Mirror the blocks to the left side following steps 2.1c.

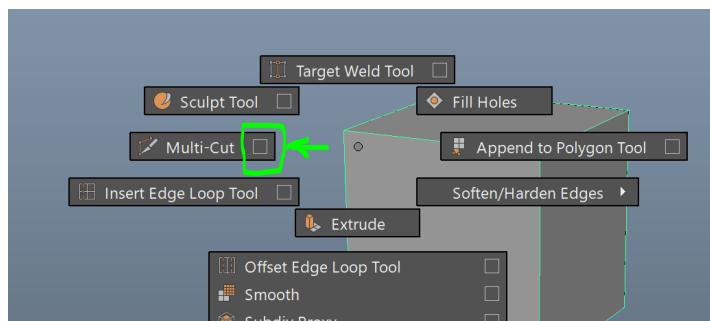


Be sure to **save** your scene as you are working.

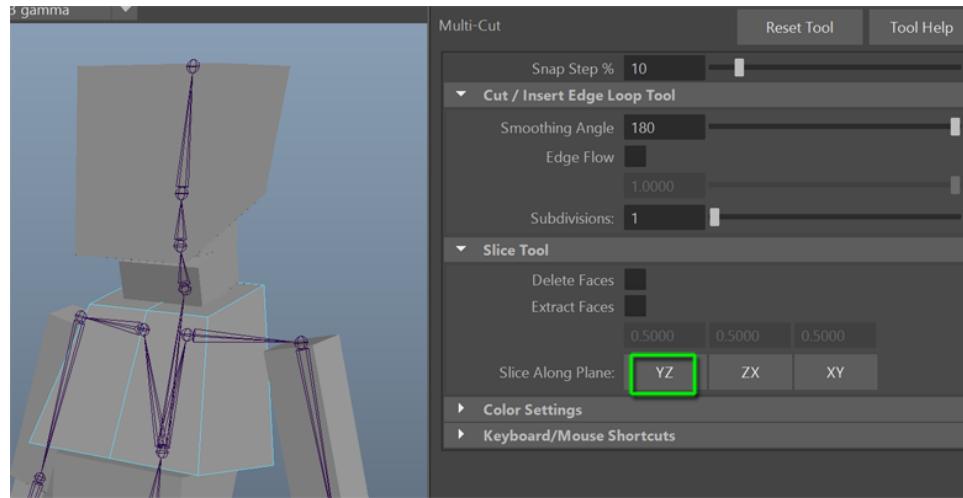
## 2.2, Refining the block model silhouette

### 2.2a, Refine the shape of the chest

1. Add a vertical center edge loop to the chest
  - a. Shift-right-click the chest polygon to bring up the polygon modeling marking menu. Choose **Multi-Cut** tool and open the option window.

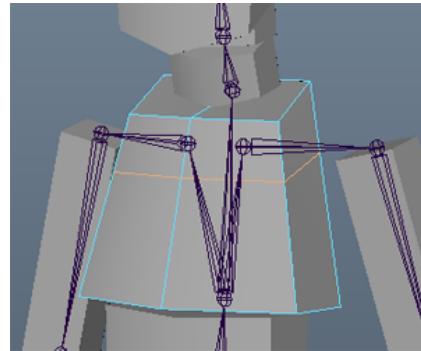


- b. In the **Slice Tool** section press **Slice Along Plane: YZ**

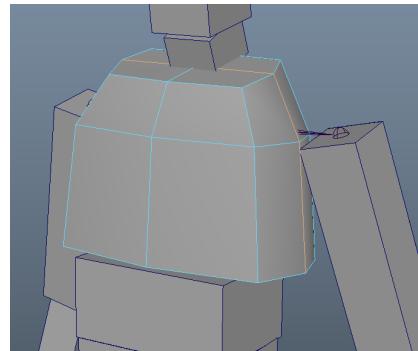


2. Add a horizontal subdivision to the chest

- Shift-right-click the chest (in object mode) and choose [Insert Edge Loop Tool](#)
- Click on the center edge loop in order to add the new edge loop horizontally



- Add a vertical edge loop on the side of the chest using the [Insert Edge Loop Tool](#)

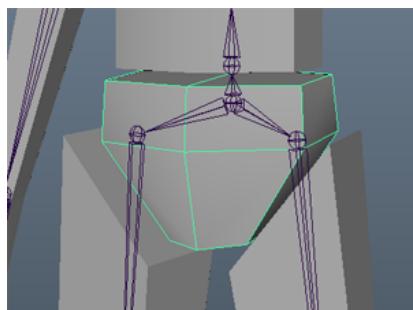


- Move and scale the new edge loops to match the silhouette of the drawing. You can also select and move vertices individually or whole faces together. Look through both front and side view cameras to make sure it lines up with the drawings from all angles.

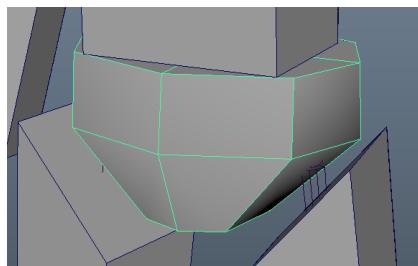
## 2.2b, Refine the shape of the hips

- Add a vertical edge loop using the [Multi-Cut](#) tool on the YZ plane (same as above)

2. Add a horizontal edge loop using the [Insert Edge Loop Tool](#) and match it to the drawings in front and side views

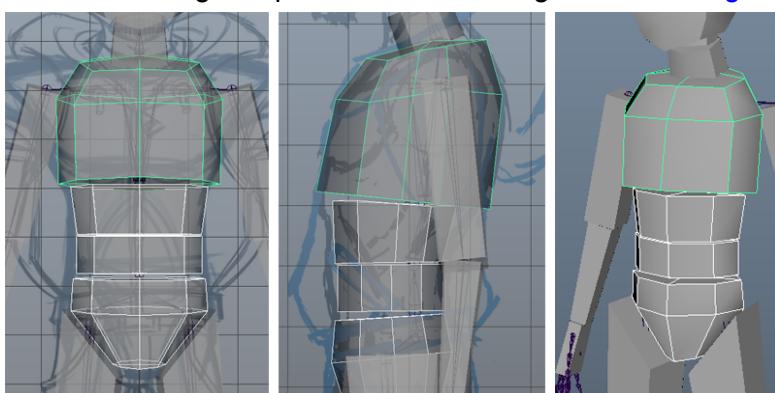


3. Add a vertical edge loop on the sides of the pelvis using the [Insert Edge Loop Tool](#)



### 2.2c, Refine the shape of the abdomen

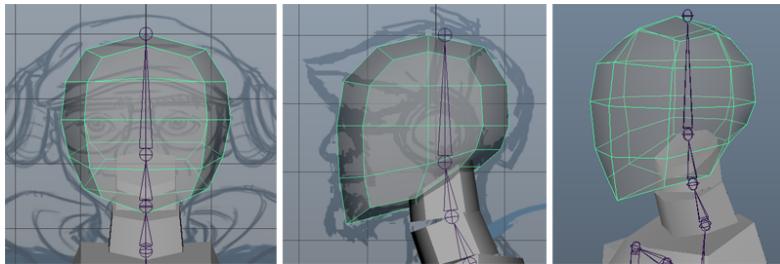
1. Add vertical edge loops using the [Multi-Cut](#) tool on the YZ plane
2. Add vertical edge loops on the sides using the [Insert Edge Loop Tool](#)



### 2.2d, Refine the shape of the neck and head

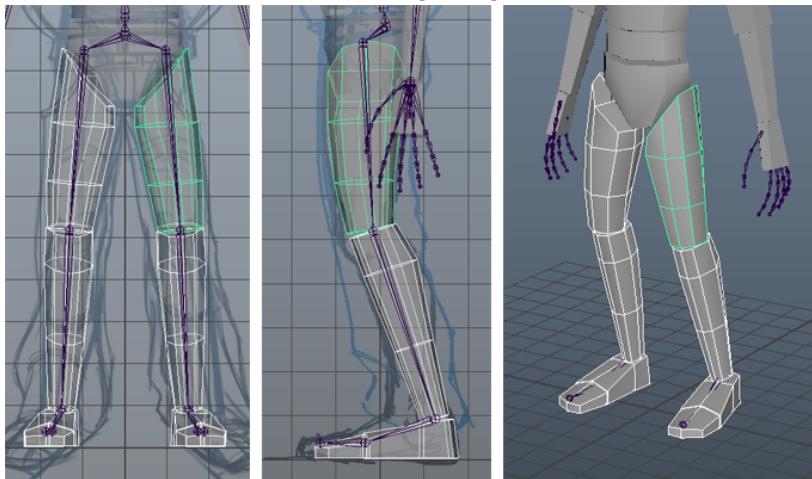
1. Add a vertical edge loop to the front using the [Multi-Cut](#) tool on the YZ plane
2. Add a vertical edge loop to the side using the [Insert Edge Loop Tool](#)
3. Add two or three horizontal edge loops using the [Insert Edge Loop Tool](#)
4. Add vertical edge loops to the front and side of the neck blocks

5. Model all of the vertices on the head to match the drawings in front and side views



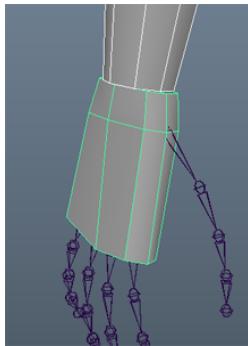
## 2.2e, Refine the shape of the legs and feet

1. Delete the left leg blocks. We will work on the right side and mirror it when finished
2. Add two horizontal edge loops to the right side upper and lower leg blocks
  - a. Model the vertices to match front and side view drawings
3. Add vertical edge loops to the front and side of the leg blocks
  - a. Model the vertices to match front and side view drawings
4. Add edge loops to the foot and toe as shown in the screenshot below
5. Repeat step 2.1c to mirror the right leg block models to the left side

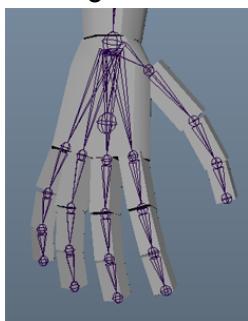


## 2.2f, Refine the shape of the arms

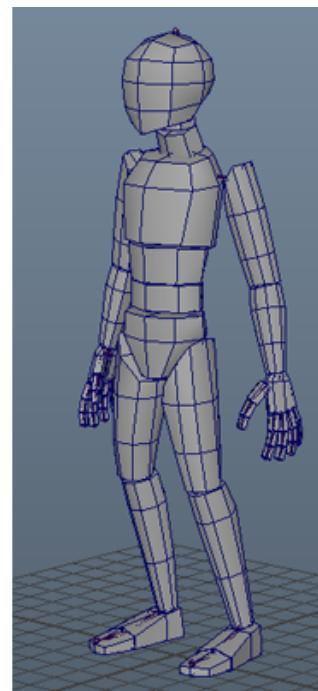
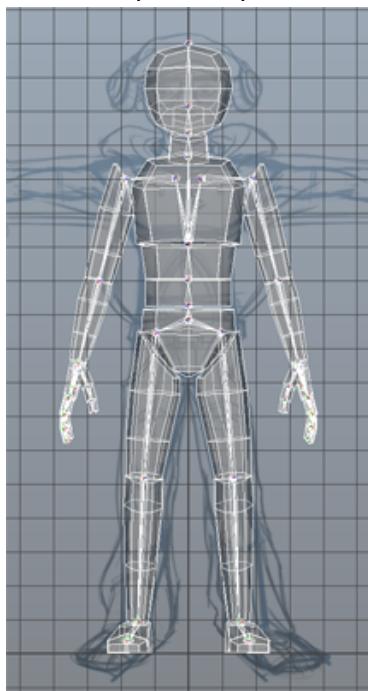
1. Delete the left arm blocks. We will work on the right side and mirror it when finished
2. Add two horizontal edge loops to the right upper and lower arm blocks
  - a. Model the vertices to match front and side view drawings
3. Add vertical edge loops to the front and side of the leg blocks
  - a. Model the vertices to match front and side view drawings
4. Add edge loops to the hand block as shown in the screenshot below



5. If your skeleton has fingers add block models to them. Scale the blocks to match your drawings.



6. Repeat step 2.1c to mirror the right arm blocks to the left side



**Save your Maya scene** as assignment\_2\_block\_model.ma and turn it in with your assignment.

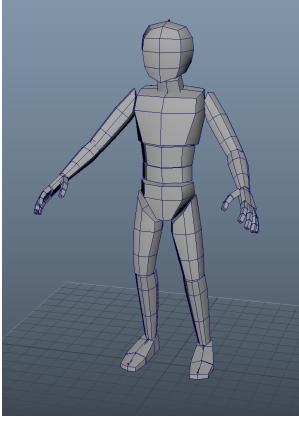
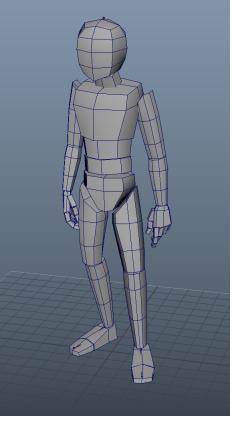
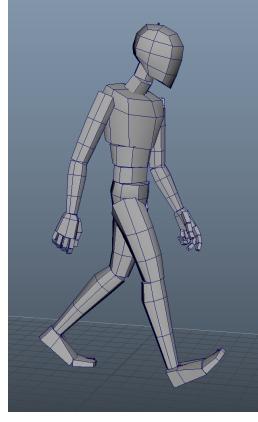
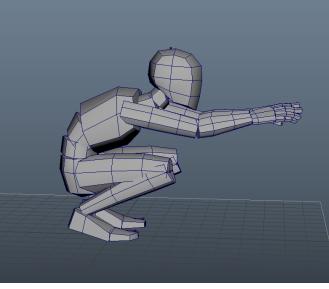
Take screenshots of your block model and add them to your Miro board to turn in with your assignment.

## 2.3, Block model pose test

Now that we have a complete skeleton and block model we can check the functionality of our character's proportions in poses.



1. Use the **select skeleton** button on the character design shelf.
2. Set the time slider to frame 1 and press “s” to set a keyframe
3. Create the following poses on the frame numbers shown below

bind pose	idle	walk	crouch
			
frame 1	frame 2	frame 3	frame 4

**Save your Maya scene** as assignment\_2\_poses.ma and turn it in with your assignment.

Take screenshots of the character poses and add them to your Miro board to turn in with your assignment.

End of part 2.

# Part 3, Player control setup in Unity

We can now set up our block model in Unity as a playable character so we can walk around the world that we are building.

## 1. Prepare your scene for export

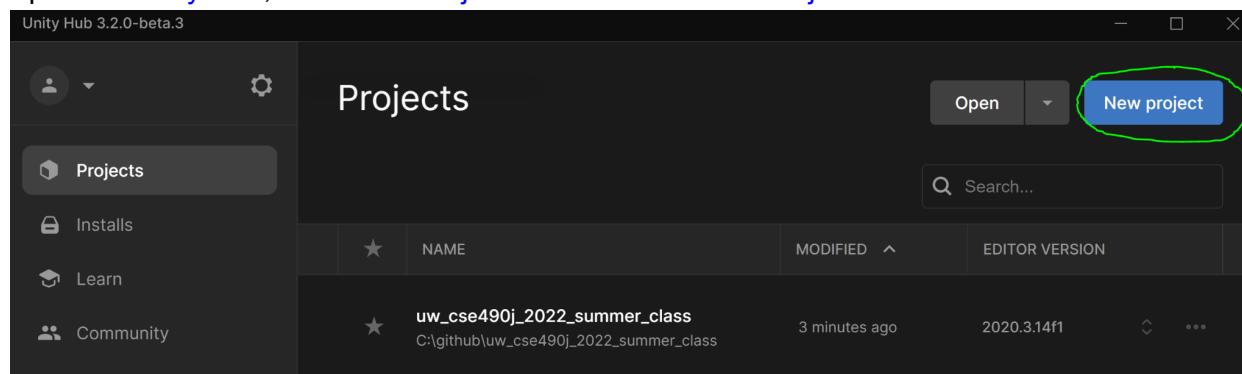
- a. Save a new copy of your Maya scene with block model poses and name it "assignment\_2\_export.ma"
- b. Go to frame 1 where the character is in the bind pose
- c. Delete all animation curves
  - i. [Delete → All by type → Channels](#)
- d. Delete *reference\_grp* and anything in the outliner that is not part of the skeleton

## 2. Export an FBX file

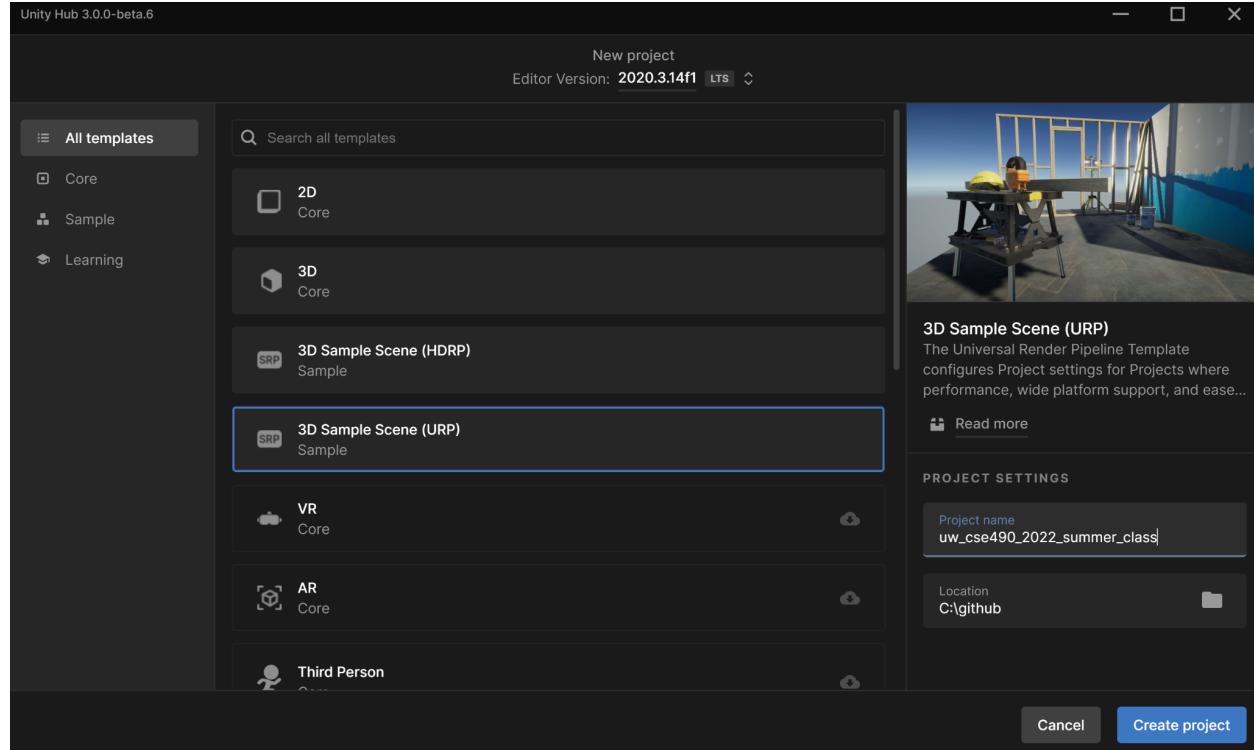
- a. [File → Export all](#) (file type: FBX) and name it *assignment\_2\_block\_model*

## 3. Create a new Unity project from the Unity Hub

- a. Open the [Unity Hub](#), and in the Projects section click [New Project](#)



- b. Select the [3D Sample Scene \(URP\)](#) project template
- c. Enter a project name and location, then click [Create project](#)



#### 4. Make a new scene

- Open the SampleScene in the Scenes folder
- Save it as a new scene. Save it in a new sub-folder under Assets called Assignments/CharacterAssignment2. Name the new scene "CharacterAssignment2"
- Delete the Example Assets
- Create a ground plane [Game Object → 3D Object → Plane](#) and set the plane's position to [0,0,0] and name it *GroundPlane*
- Assign the ground material to the plane. It can be found in:
  - ExampleAssets/Materials/Ground\_Mat

#### 5. Import your block model to Unity

- In Windows Explorer or Mac Finder open the folder where you exported the block model FBX
- Drag and drop the assignment\_2\_block\_model.fbx into the Unity project folder: Assets/Assignments/CharacterAssignment2
- Add your block model to the scene by dragging it from the Project folder into your Scene view. Set the position to [0,0,0]



## 6. Set up basic player control for your character

- a. Add a [Rigidbody](#) component to your character
  - i. With your *assignment\_2\_block\_model* selected in the Hierarchy view click [Add Component](#) in the Inspector. In the search field type [Rigidbody](#)
  - ii. In the Rigidbody component expand Constraints and check [Freeze Rotation X](#) and [Z](#).
- b. Add a [CapsuleCollider](#) component and fit it to your character model
  - i. Set [Center Y](#) to the midpoint of your model. For my character it is 0.9
  - ii. Set the [Height](#) to fit your character. For my character it is 1.8
  - iii. Set the [Radius](#) to fit your character. For my character it is 0.3
- c. Create a new player controller C# script
  - i. Right-click in the CharacterAssignment2 folder in your Project view and choose [Create → C# Script](#) and name it *BasicThirdPersonController*
  - ii. Double-click the new script to open it in Visual Studio
  - iii. Paste the following code into the script and save it with ctrl-s.

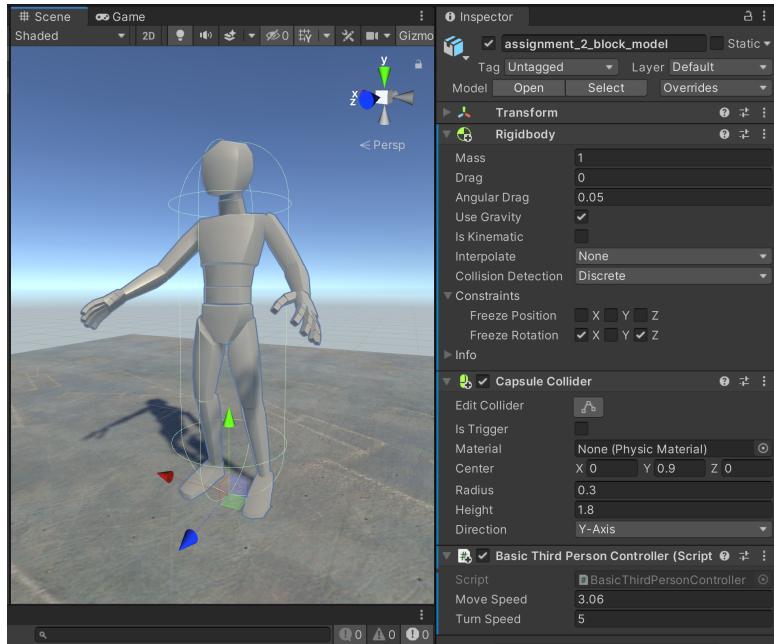
```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class BasicThirdPersonController : MonoBehaviour
{
    public float moveSpeed = 3.06f;
    public float turnSpeed = 5f;
    private float speed = 0.0f;
    private float moveInput = 0.0f;

    void Update()
    {
        moveInput = Input.GetAxis("Vertical");
        if (moveInput > 0.01f || moveInput < -0.01f )
        {
            speed = moveSpeed * moveInput;
        }
        else
        {
            speed = 0.0f;
        }

        transform.Translate(0, 0, speed * Time.deltaTime);
        transform.Rotate(0, Input.GetAxis("Horizontal") * turnSpeed * 50f * Time.deltaTime,
0);
    }
}
```

- d. Go back to Unity and assign the BasicThirdPersonController script to your block model by dragging it onto the inspector (while the character is selected)



7. Make a prefab of your character
  - a. Drag your assignment\_2\_block\_model from the Scene Hierarchy into your project assignment folder.
  - b. In the Create Prefab pop up window choose **Prefab Variant** and name it **assignment\_2\_block\_model\_prefab**. Notice that the one in your Scene Hierarchy has turned blue, this is because it is now a prefab and can easily be added to other scenes.
8. Press **Play** and use the arrow keys or WASD keys to walk around
  - a. Don't fall off the edge!
  - b. Note: the **Main Camera** might have a script that also uses WASD to navigate. If this happens you should disable that script so only the character moves.

**Save your Unity scene as CharacterAssignment2.**

Take a screenshot of the scene and add it to your Miro board to turn in with your assignment. In order to receive full credit the screenshot must show the inspector with components added for player control as seen in the example at the end of this assignment.

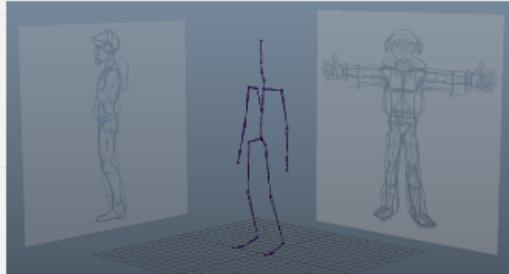
End of part 3.

# Grading rubric

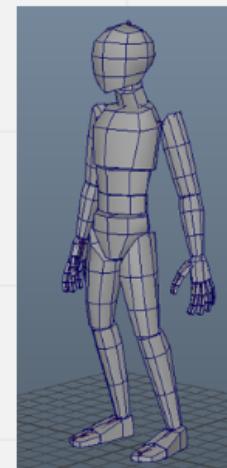
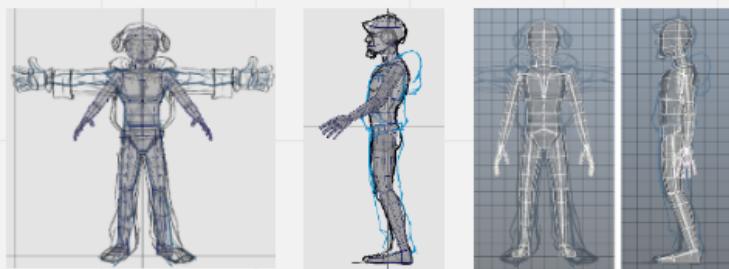
Criteria	Achievement levels			
	level 1	level 2	level3	level4
<b>Skeleton</b> format: Maya (.ma)	20 points: (0 - 1 incorrect) Skeleton matches orthos. Naming, hierarchy and joint orientations are correct.	18 points: (2 - 4 incorrect) Skeleton matches orthos. Naming, hierarchy and joint orientations are correct.	16 points: (5+ incorrect) Skeleton matches orthos. Naming, hierarchy and joint orientations are correct.	0 points: files were missing
<b>Block Model</b> format: Maya (.ma)	20 points: (0 incorrect) Block models match orthos and are parented to the skeleton. Models are subdivided correctly.	18 points: (1 - 2 incorrect) Block models match orthos and are parented to the skeleton. Models are subdivided correctly.	16 points: (3+ incorrect) Block models match orthos and are parented to the skeleton. Models are subdivided correctly.	0 points: files were missing
<b>Pose Test</b> format: Maya (.ma)	20 points: (0 incorrect) Contains poses for: bindpose, idle, walk and crouch	18 points: (1 incorrect) Contains poses for: bindpose, idle, walk and crouch	16 points: (2+ incorrect) Contains poses for: bindpose, idle, walk and crouch	0 points: files were missing
<b>Player Control</b> format: images [Miro]	20 points: (0-1 incorrect) Scene has block model with RigidBody, CapsuleCollider and player control script. Player moves with keyboard input in play mode.	18 points: (2-3 incorrect) Scene has block model with RigidBody, CapsuleCollider and player control script. Player moves with keyboard input in play mode.	16 points: (4+ incorrect) Scene has block model with RigidBody, CapsuleCollider and player control script. Player moves with keyboard input in play mode.	0 points: files were missing
<b>Miro Board</b> format: images [Miro]	20 points: (0 incorrect) Miro board has screenshots for skeleton, block model, pose test and player control	18 points: (1-2 incorrect) Miro board has screenshots for skeleton, block model, pose test and player control	16 points: (3+ incorrect) Miro board has screenshots for skeleton, block model, pose test and player control	0 points: files were missing

## Character class 2 - skeleton and block model

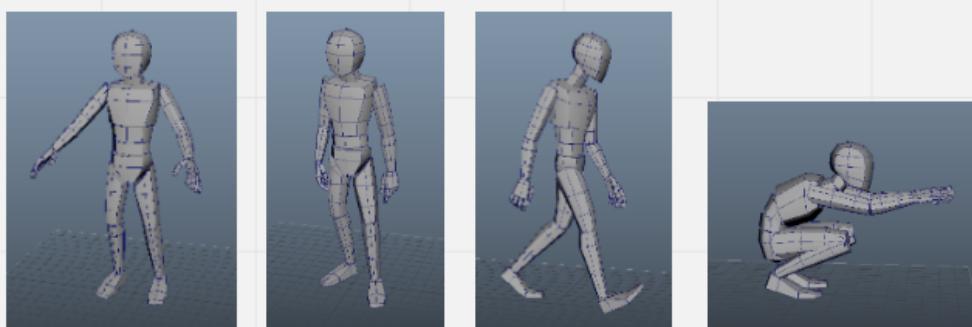
**Skeleton**



**Block model**



**Pose test**



**Player control**

