Design Matrix

Design Criteria	Design One - Jungle Gym	Design Two - The Box	Design 3 - Rubber Hose
Ability to Accurately Measure MVC (30)	5/5 30	4/5 24	2/ 5 12
Quickness of data collection after fatiguing task (25)	4/ 5 20	4/ 5 20	5/5 25
User Comfort (15)	4/ 5 12	4/ 5 12	4/5 12
Ease of Fabrication/Assembly (15)	3/ 5 9	3/ 5 9	5/5 15
Aesthetics (5)	5/5 5	4/ 5 4	1/ 5 1
Cost (5)	3/ 5 3	3/ 5 3	5/5 5
Safety (5)	5/5 5	5/5 5	3/ 5 3
Total (100)	84	77	73

Justification of Criteria and Weight

Ability to accurately measure MVC-

Accuracy received the highest weight because the effective functioning of the design is of the utmost importance. This design will be used in actual research that will be published by university faculty, so it must have a high degree of accuracy to ensure the validity of the results of the research.

Quickness of Data Collection After Fatiguing Task-

It is imperative that the MVC of the subject is able to be recorded quickly after completing the fatiguing task to prevent their muscles from recovering and skewing the data. Additionally, the patient should easily be able to place their legs within the device without struggle. For these reasons

User Comfort-

As a patients MVC is being measured, they should not endure any pain that could affect their results. This would likely be encountered between the surface that comes into contact with the ankles, where the MVC is measured. This surface should not be so hard that it causes

discomfort, but should also not be so soft that it absorbs the force of the MVC and skews the data.

Ease of Fabrication/Assembly-
Fabrication of the design should be completely within our ability. Also, the device needs to easily attach to the force plate in a manner that any administrator of the task can accomplish be easily removable for transport to different facilities.

Aesthetics-
Aesthetics received one of the lowest weighted criterias due to it not having any impact on the patient's well-being or the results from the device. However, the final design should still look professional, as it will be used in professional research.

Cost-
The client offered a budget of 1000$ and this will be extremely sufficient for any design. For this reason, the cost weight was lower.

Safety-
The safety of the client and the test subject is an important aspect of any design. It is assumed that any design considered will meet a certain standard of safety. The design will likely be stationary and will not in any way alter the subject, so there are not many safety concerns involved.

Explanation of Highest Scoring Design

Ability to Accurately Measure MVC-
The Jungle Gym design scored highest (5/5) because it is fixed vertically to the force plate. The Box, in contrast, was fixed with bars connecting flush with the force plate. These bars could transfer non-vertical force from one support to another or torque into the force plate. The Rubber Hose design allowed for a multitude of horizontal forces. The client is interested in only vertical forces from the hip flexor and knee extensor muscles.

Quickness of data collection after fatiguing task-
The Rubber Hose scored the highest in this category because it will be fixed to the subject during the duration of the test, whereas the subject will have to move their leg into contact with some surface of the other two designs to initiate data recording.

User Comfort-
Each of the designs received the same score in comfort because each design incorporated padding to allow the subjects to be comfortable while performing the straight leg lift.

Ease of Fabrication/Assembly-
The Rubber Hose scored the highest because for fabrication it didn't require a lot of material,

and nothing that needed to be built together. As for assembly, the only assembly required would be to screw into the holes on the plates and a velcro strap for the patient's ankle.

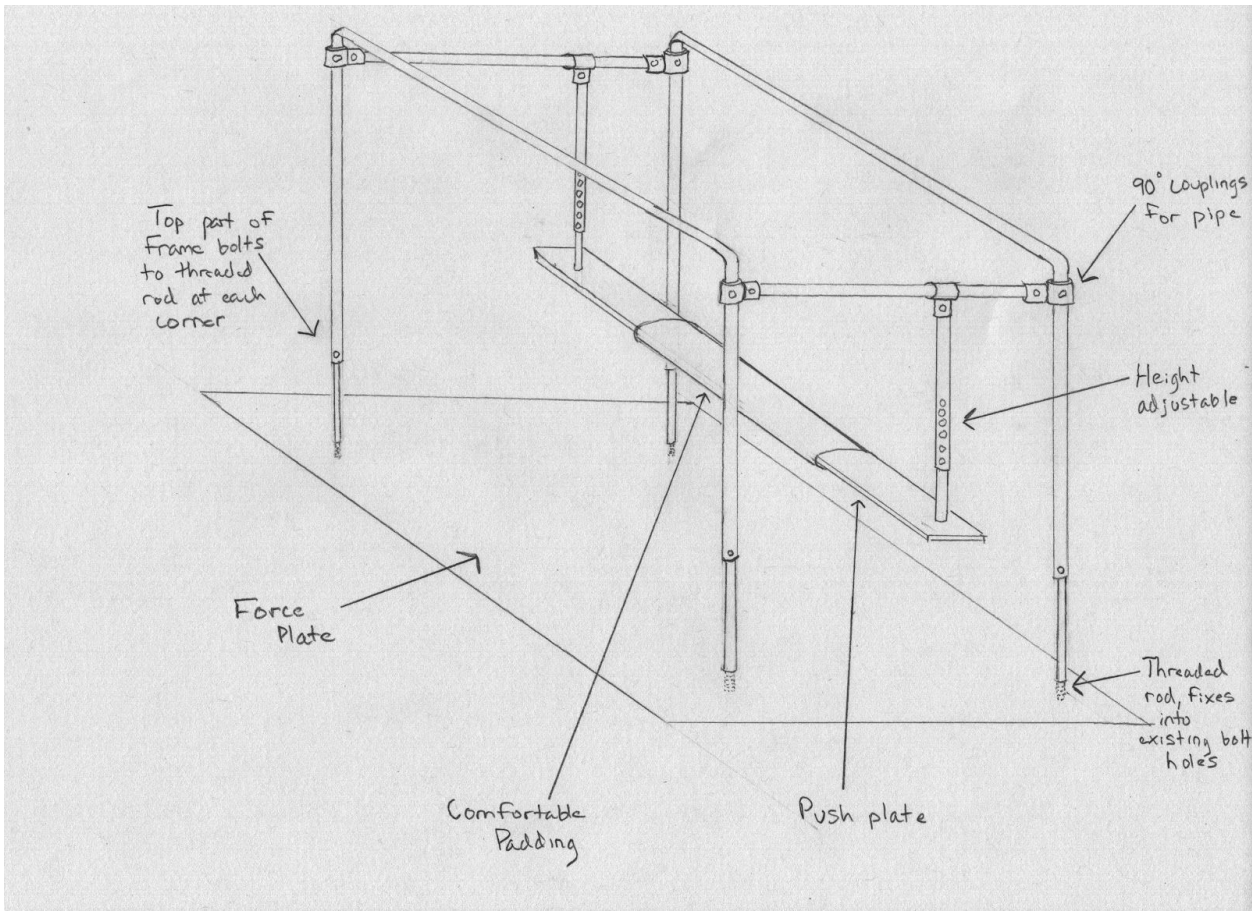
Aesthetics-
The jungle gym was scored the highest in this category because it is not as bulky as The Box design did not look as professional as the other designs.

Cost-
The Rubber Hose design scored the highest because it did not require as much material and the material used would be least costly compared to the other designs.

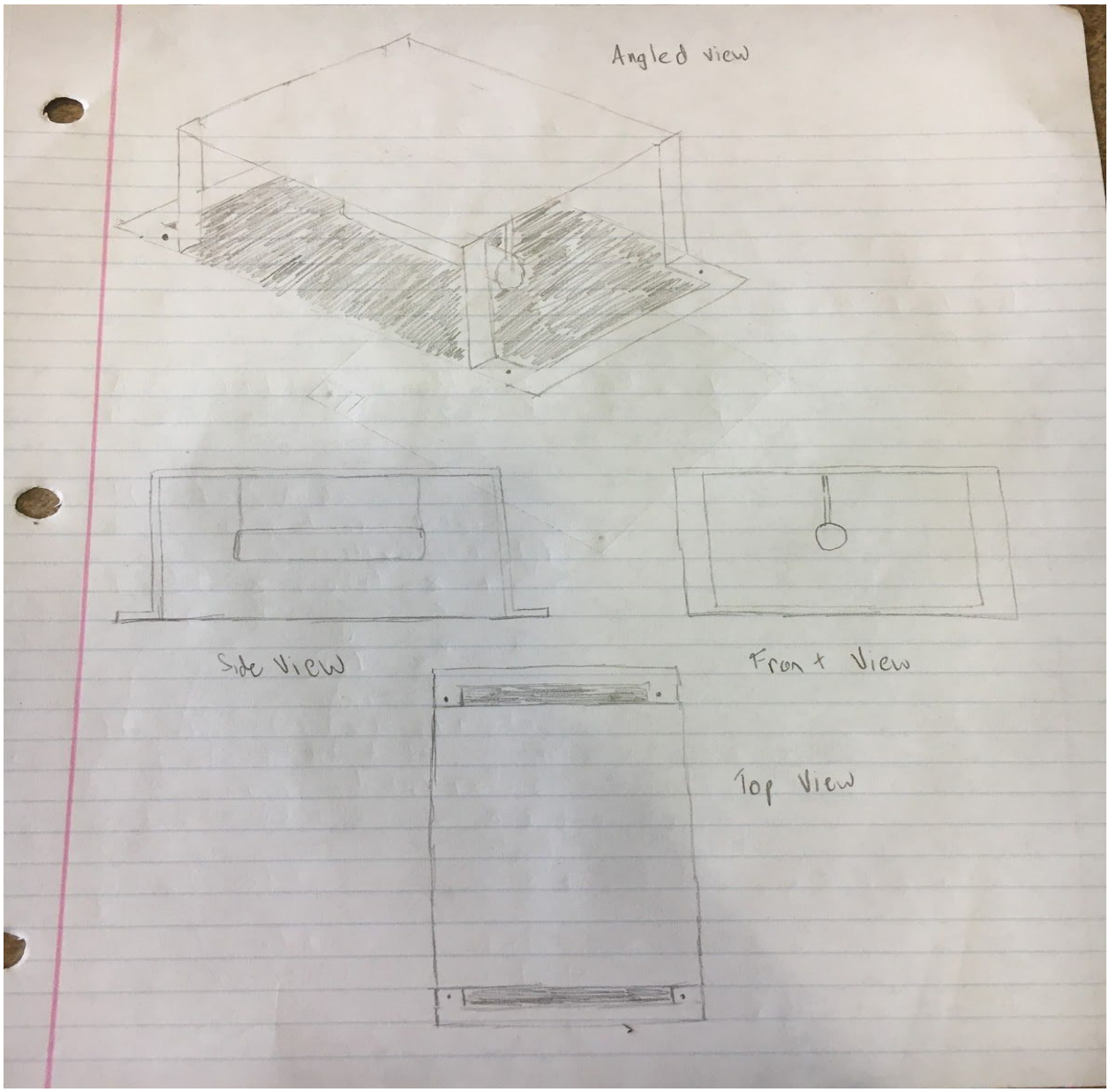
Safety-
The Box and the Jungle Gym design scored the highest because the positions are fixed whereas the Rubber Hose design would allow moved and different angles that could affect the muscles of the patient.

Overall Score- The jungle gym received the highest score overall. Its accuracy and speed of data collection, aesthetics, and patient comfort were some of the highlights of the design. Some considerations to keep in mind about the design include simplifying the design for portability purposes and creating a rest for one leg while it is not in use during the testing.

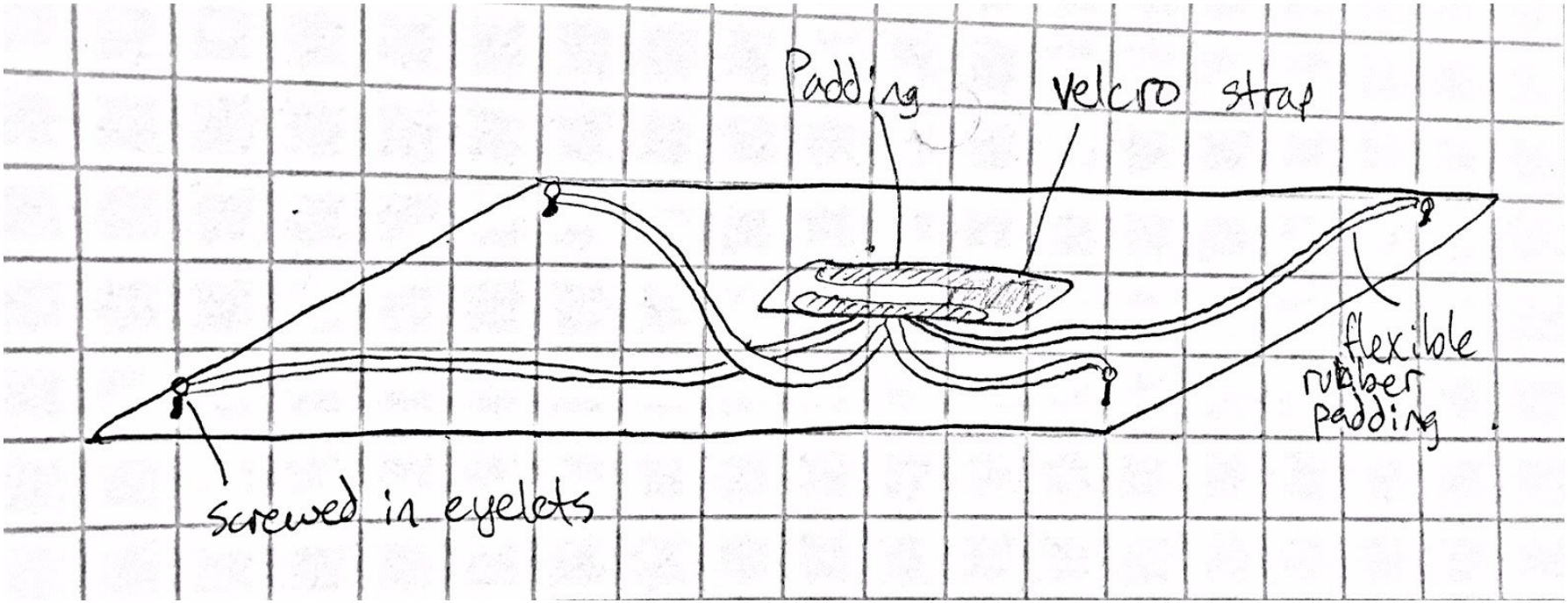
The Jungle Gym



The Box



The Rubber Hose


Padding
Velcro strap
flexible rubber padding
screwed in eyelets