I know from geometry in Maths and from learning about forces that a triangle is a strong shape. This is because each side is anchored to the other two sides which makes it rigid. Also the forces are supported by the wide base at the bottom.

I had a look on the internet and I found out that the triangle is the structural shape of choice for structural engineers because of its strength.

I had, from the research that I had done earlier, many ideas in my head of different types of weights racks to develop. To help me chose an idea that I would carry out and produce I used sketching to show the wide range of ideas in my head. This made it easier to understand and also meant that I could show others the extent of my ideas which made it easier to describe to them.

From my sketching I learnt that there were certain racks that had more positives over the others. For example, one of my designs was a low lying rack which was not ideal as I was still required to bend low to the ground to reach the heavy weights. The sketch that my stakeholder thought to be the best and most ideal was a rack that stood self supported vertically and supported the weights at a height and angle that was easy to get at. I decided to take this sketch and further develop it. Also it meant that I was able to decide on the size of the final product. 1500mm high by 1000mm wide by 1000mm deep.

The sketching helped me to make these decisions as it enabled me to visualize the weights rack and made it easier to get feedback from my stakeholders. The main risks that it helped me to identify were the fact that it needed to be fully braced. So I drew it offset leaning backwards with a back bar to brace it strongly. It also helped me see that this product was going to take a long time to construct. This meant that I had to be concentrated and on task for the whole year ahead.
The results of my research made me understand that a triangle shape would be good. It would give the strength I wanted. Research 1 picture gave me the best start to my own design. I modified it so it wasn’t so big and space consuming.

I used the footing idea from Research 2 so that my rack will be stable. I also made sure my bars were angled so the weights won’t fall off. I made the bars shorter after my stakeholder telling me this would make them stronger.

Research 3 gave me the idea to put hooks on the back for my bench press bar. It (as well as Research 1) made me realise I only wanted access from one side—so it could go up against a wall and take up less space. This kept dad happy.

I included the compactness of Research 4. I designed mine so you didn’t have to bend like in Research 4.

Also so that it can be flexible in what weights can be stored.

I wanted to make sure the rack would fit in the area it was intended for. I took it home and placed it in the corner of the shed.

I found that it fits there well and doesn’t stick out so no one will get hurt, it sits stable on the floor, I can reach the top rack ok, I can easily get the weights off. And dad said its OK sitting there in his shed.

I got some polystyrene and used a hot wire to get bits that were the same thickness as my weights. I then cut out circles the same diameter as my weights. I placed these on my model to make sure the bars were spaced out right so that all my weights would fit. They did.