Climate Change:
Can We Really Make a Difference?

Role as individuals

Look at meat industry, energy uses/demands from household items,

Solar panels on every house, analysis of different forms of sustainable and non sustainable energies

Cars – why don't people buy more efficient cars
(designing a more appealing/more efficient car)

https://www.virgin.com/virgin-unite/8-ways-you-can-actually-make-difference-climate-change

https://climate.nasa.gov/making-a-difference/

http://www.un.org/en/sections/issues-depth/global-issues-overview/

https://preciousplastic.com/en/
plastic recycling at home

http://www.adidas.com/us/parley
Adidas sea plastic shoes

https://www.studioroosegaarde.net/projects/#smog-free-project

http://www.witt-energy.com/#
harvesting motion into energy

how would you design a city from the ground up to be sustainable?

History of spiderman

History of silks

Why is spider silk lucrative?

How do spiders make silk

How have we tried to make silk

Look into other synthetic threads

Potential for adapted types of spider silk

Physics of spiderman
How does he stick to walls etc

Lit. Review

51mins in
'10x stronger'
Single pellet can safely store several hundred metres of the lightweight cable

Two finger handstand

Nerds talking: 54 minsWeight of the bob on pendulum has no effect on swing speed

Web stops a falling car

How strong is he

https://skyscraperpage.com/cities/?buildingID=4562
height of bridge is 41m above high water mark
14th aug
say car is 2 tonnes including guy

Using the film, determine the properties of the silk and what the implications of that would be – how would we manufacture and utilise it

Compare that to genuine materials at the moment
See how big it would actually be to store it / how many pellets he would need to bring on his belt or how often he would need to replace them

$$v_{car}^2 = u^2 + 2as$$

$$v_{car}^2 = 0^2 + 2 \cdot 9.8 \cdot 35$$

$$v_{car}^2 = 686$$

$$v_{car} = 7\sqrt{14}\ ms^{-1}\ (approx\ 26\ ms^{-1})$$

$$m_{car} = 2400\ kg$$

$$p_{car} = m_{car} \cdot v_{car}$$

$$p_{car} = 2400 \cdot 7\sqrt{14}$$

$$p_{car} = 16800\sqrt{14}\ kgms^{-1}$$

$$T_{web} = \frac{\Delta p_{car}}{\Delta t}$$

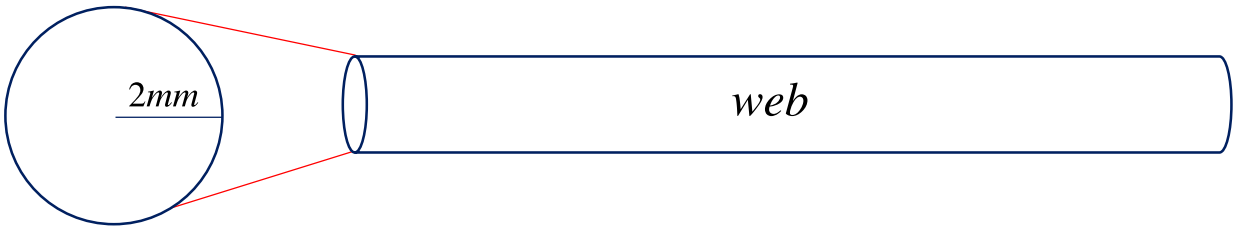
$$F = \frac{\Delta p}{\Delta t}$$

$$F = T_{web}$$

Assume stopping time is one second

$$T_{web} = 16800\sqrt{14}\ N$$

$$T_{web} = 6.3 \times 10^4\ N$$



$$A_{cross\text{-}section} = \pi r^2$$

$$A_{cross\text{-}section} = \pi\,(2\times10^{-3})^2\ m^2$$

$$UTS = \frac{T_{web}\times10^{-6}}{A_{cross\text{-}section}}\,MPa$$

$$UTS = 5000\ MPa\ (3sf)$$

in film it says ‘ten times stronger’ with no reference. About 5 times stronger than average spider silk using Wikipedia reference

http://www.imcdb.org/movie_948470-The-Amazing-Spider-Man.html
15th Aug
shows which car

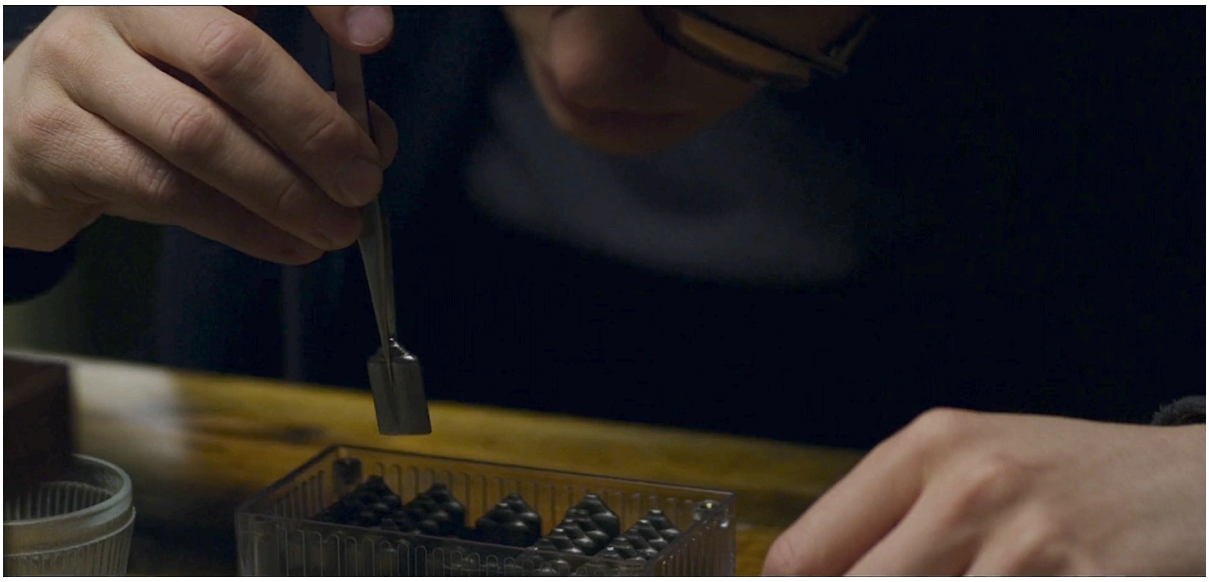
based off 2017 Mercedes-Maybach S600
https://www.mbusa.com/mercedes/vehicles/model/class-S/model-S600X#!layout=/vehicles/model/specs&class=S&model=S600X&waypoint=model-specs
214.7 in
5,296 lbs
2400 kg
5.5m

This project, entitled ‘What can engineers learn from Spiderman?’ is my submission for the 2017 High Master’s Prize. In terms of personal goals, I first hope that it will serve as a light-hearted and accessible yet challenging subject matter with which I can practice and further develop my maths/physics abilities. I will then hope to utilise my initial findings from the fictional realm and see how they may have real life applications for engineers around the world.

Due to the nature of my project having to constantly reference digital formats such as film/video, animations and pictures, I felt that housing the project in a web format would be a more intuitive and convenient way to present my work. Over the course of the project I will write this website from scratch, which will help me hone another skillset as I go along.

I finally hope that beyond my own personal goals, this website could serve as an educational resource for other students and the wider community – I hope that linking the trivial and the real world will provide an interesting link to science and engineering that people may not have had the opportunity to experience before.

Pendulums



Density:
3x2x1 cm

$$APF = \frac{N_{particle} V_{particle}}{V_{unit\ cell}}$$

$$APF_1 = \frac{15\pi (0.2)^2}{2 \cdot 1.2}$$

$$APF_1 = 78.5\%\ (3sf)$$

$$APF_2 = \frac{14\pi (0.2)^2}{2 \cdot 1.1}$$

$$APF_2 = 80\%\ (3sf)$$

think about what I actually want this section and the next section to say: does this belong entirely in the next section or with a bit here?
http://onthesetofnewyork.com/theamazingspiderman.html

$$T = 2\pi\sqrt{\frac{L}{g}}$$

$$sin\theta \approx \theta$$

$$500 \cdot 4\pi \cdot 10^{-6} = \frac{\pi}{500} m^3$$

$$2\pi\ dm^3 \approx 6.28\ dm^3$$

$$\frac{6.28}{0.8} = 7.85\ dm^3$$