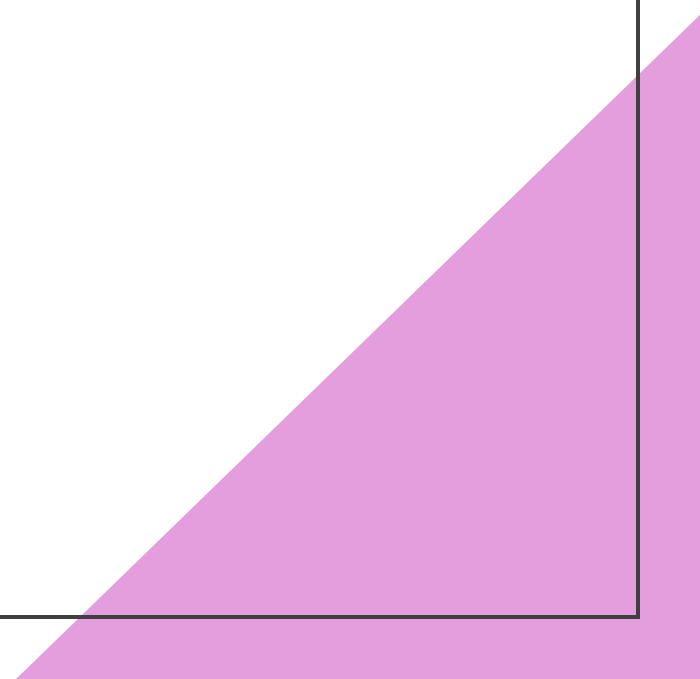




OUTSPIKE



OUTRUN

OUTPERFORM

Did you know?

Shoes. Do we realize just how important they are? The average person walks around 120,000km-177,027km in their lifetime. That's the equivalent of walking around the world 5 times! Can you imagine walking that distance in the shoes you have on now?



HOW WILL IT WORK?



adjustable to
your needs



detachable
shoe soles



slide-in
soles



WHY WE CHOSE OUTSPIKE...

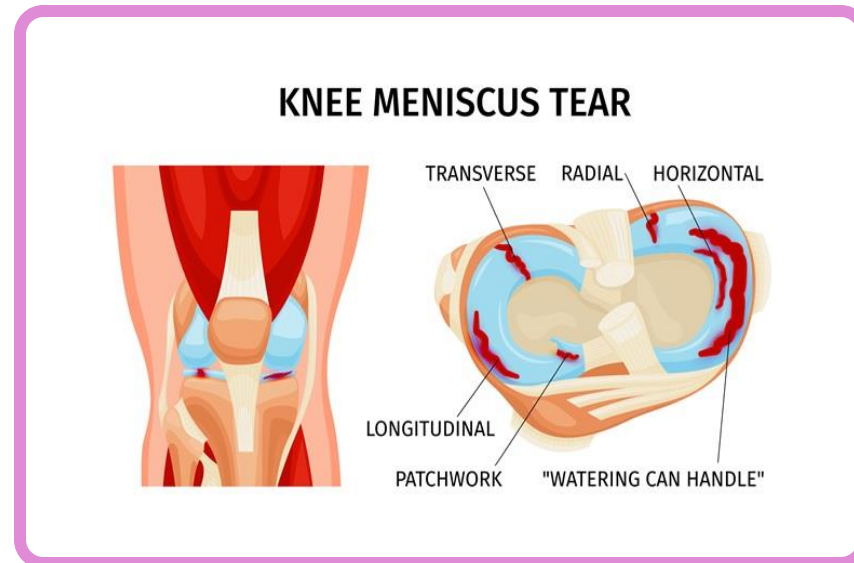
PHASE 1.0: Common injuries

- We want to prevent injuries, so we looked into it: what's most common, what causes it, and how can we stop it? Here's what we found...

THE SCIENCE BEHIND SPORTS INJURIES:

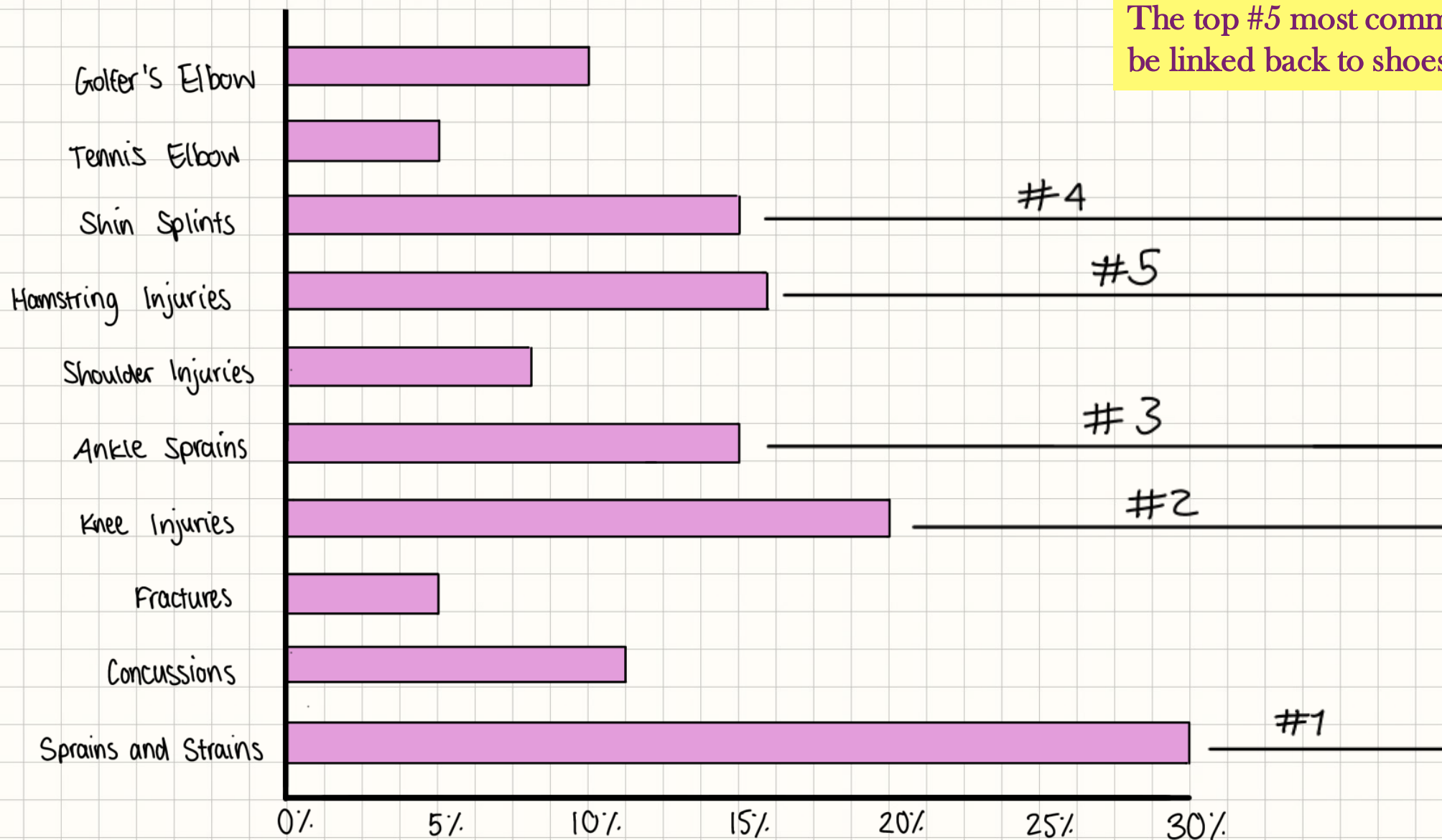
Sports injuries happen because of **forces** between your body and the ground, explained by **Newton's Third Law of Motion**, which send impact through areas like the Achilles **tendon**, **quadriceps**, and **hamstrings**.

Good shoe soles help control friction and absorb impact, reducing pain, long-term damage, and injuries like a torn meniscus.



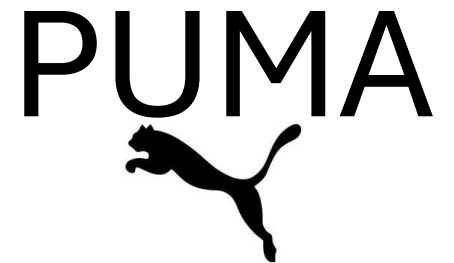
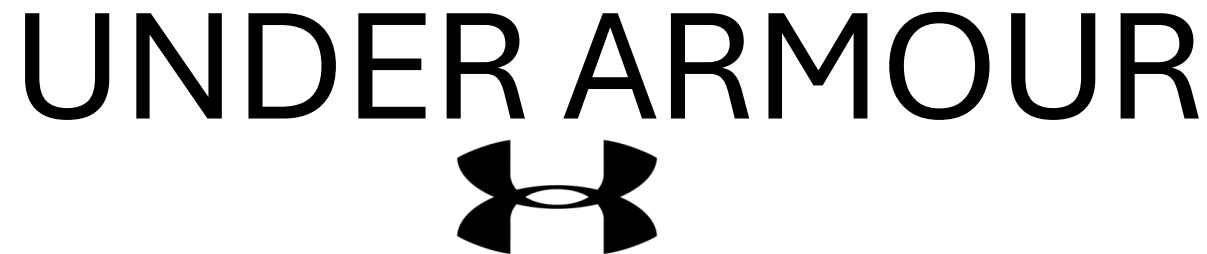
SPORTS PERSONS INJURIES BY TYPE

The top #5 most common sports injuries can be linked back to shoes!



PHASE 1.5: A look at the market.

- The shoe business is extremely competitive and constantly growing. Valued at approximately **\$495.46 billion** in **2025**, it is expected to reach over **\$912 billion by 2030**. So, we looked into our competitors...



([fortunebusinessinsights.com](https://www.fortunebusinessinsights.com))

Footwear Market Size, Share & Industry Analysis, By Type (Casual, Athletic/Sports, Formal, and Others), By End User (Men, Women, and Kids), By Distribution Channel (Supermarket/Hypermarket, Specialty Store, Online/E-Commerce, and Others), and Regional Forecast, 2026-2034
Source: <https://www.fortunebusinessinsights.com/footwear-market-112088>



Children (studs)

Highest Price: £125

Lowest Price: £38

Mode Price: £60

Children's trainers (road running)

Highest Price: £90

Lowest Price: £33

Mode Price: £35

Children's trainers (long distance)

Highest Price: N/A

Lowest Price: N/A

Mode Price: N/A

Children's trainers (sprinting)

Highest Price: N/A

Lowest Price: N/A

Mode Price: N/A

Adult (studs)

Highest Price: £285

Lowest Price: £50

Mode Price: £80

Adult's trainers (road running)

Highest Price: £210

Lowest Price: £130

Mode Price: £130

Adult's trainers (long distance)

Highest Price: £200

Lowest Price: £80

Mode Price: £160

Adult's trainers (sprinting)

Highest Price: £450

Lowest Price: £55

Mode Price: £130



Children (studs)

Highest Price: £120

Lowest Price: £35

Mode Price: £50

Adult (studs)

Highest Price: £250

Lowest : £45

Mode Price:£8

Children's trainers (road running)

Highest Price: £90

Lowest Price: £33

Mode Price: £35

Adult's trainers (road running)

Highest Price: £250

Lowest Price: £40

Mode Price:£130

Children's trainers (long distance)

Highest Price: N/A

Lowest Price: N/A

Mode Price: N/A

Adult's trainers (long distance)

Highest Price: £200

Lowest Price: £80

Mode Price:£160

Children's trainers (sprinting)

Highest Price: N/A

Lowest Price: N/A

Mode Price: N/A

Adult's trainers (sprinting)

Highest Price: £450

Lowest Price: £55

Mode Price:£130



Children (studs)

Highest Price: £90
Lowest Price: £32
Mode Price: £35

Adult (studs)

Highest Price: £260
Lowest Price: £45
Mode Price: £75

Children's trainers (road running)

Highest Price: N/A
Lowest Price: N/A
Mode Price: N/A

Adult's trainers (road running)

Highest Price: £230
Lowest Price: £40
Mode Price: £150

Children's trainers (long distance)

Highest Price: £60
Lowest Price: £60
Mode Price: £60

Adult's trainers (long distance)

Highest Price: £220
Lowest Price: £170
Mode Price: £140

Children's trainers (sprinting)

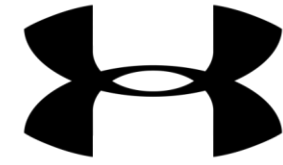
Highest Price: £60
Lowest Price: £60
Mode Price: £60

Adult's trainers (sprinting)

Highest Price: £220
Lowest Price: £70
Mode Price: £140

(From Puma's official UK website)

UNDER ARMOUR



Children (studs)

Highest Price: £45
Lowest Price: £45
Mode Price: £45

Children's trainers (road running)

Highest Price: £45
Lowest Price: £20
Mode Price: £37

Children's trainers (long distance)

Highest Price: £45
Lowest Price: £20
Mode Price: £37

Children's trainers (sprinting)

Highest Price: £45
Lowest Price: £20
Mode Price: £37

Adult (studs)

Highest Price: £270
Lowest Price: £75
Mode Price: £210

Adult's trainers (road running)

Highest Price: £225
Lowest Price: £38
Mode Price: £135

Adult's trainers (long distance)

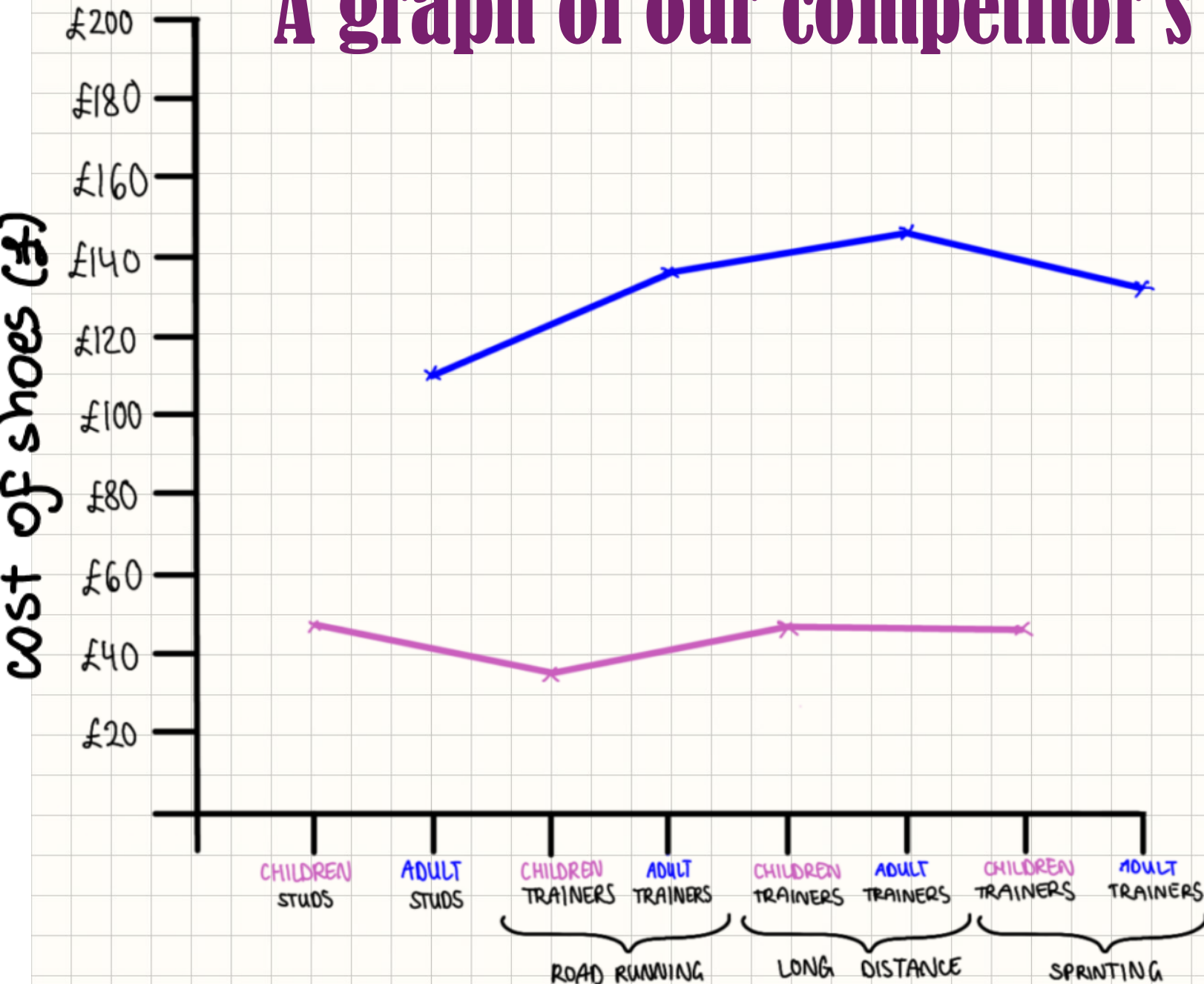
Highest Price: £225
Lowest Price: £38
Mode Price: £135

Adult's trainers (sprinting)

Highest Price: £225
Lowest Price: £38
Mode Price: £135

(From Under Armour's official UK website)

A graph of our competitor's prices:



According to the data, a reasonable price for adult shoes would be between **£130 - £145**.

A reasonable price for children's shoes would be between **£35 - £45**.

Our aim: Affordable shoes, with minimal materials wasted!

OUTRUN

PHASE 2.0: Primary research

- We experimented on our own shoes and gathered results on which of them was the least slippery on different surfaces.

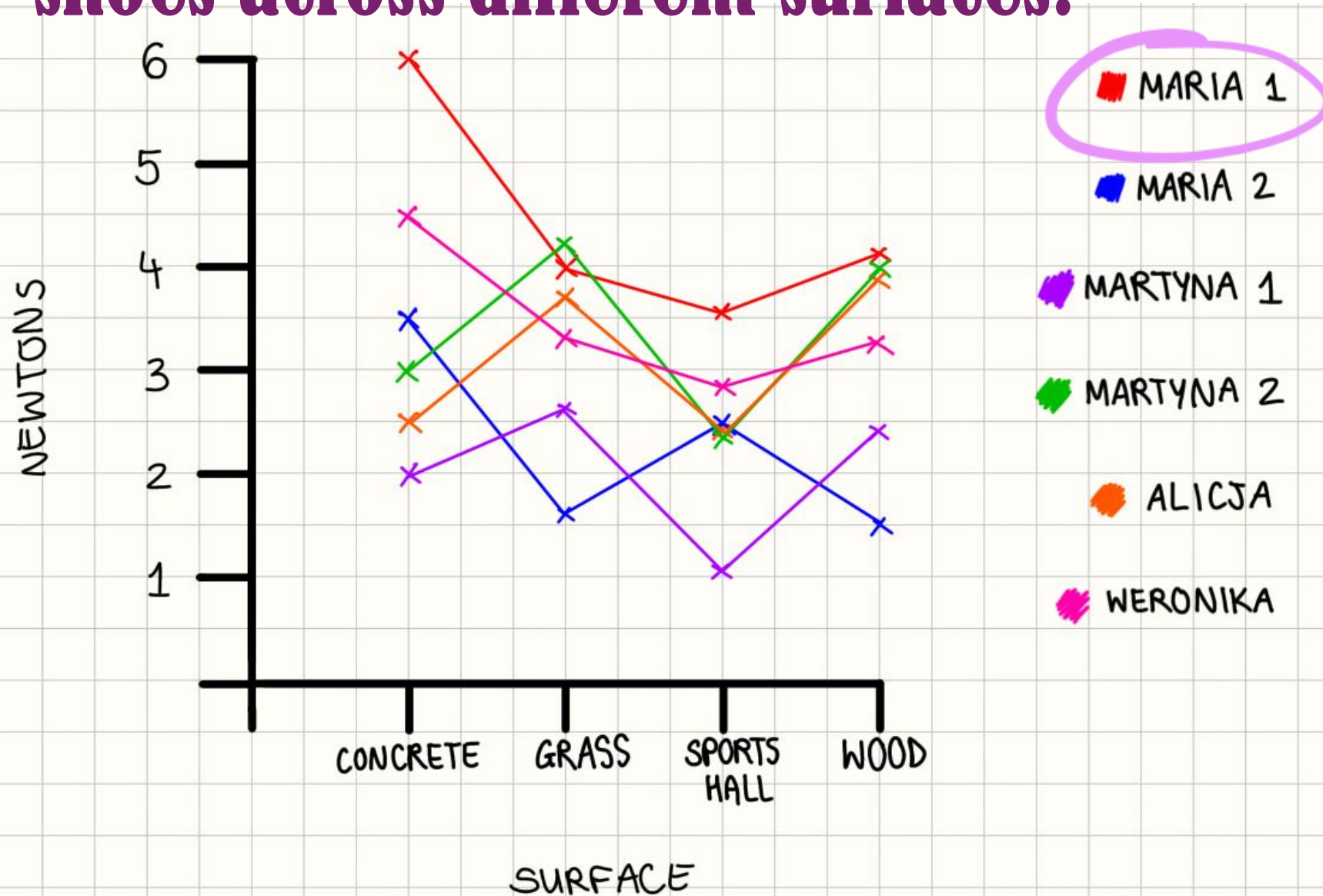
Person's shoe	Shoe Brand	Original Mass (g)	Added Mass (g)	End Mass (g)
Weronika	New Balance	216	280	497
Alicja	Puma	289.2	210	499
Maria	Nike Air	420	110	502
Martyna (school shoe)	Geox	383	120	504
Martyna	Puma	188	310	498
Maria (school shoe)	Kickers	480	20	500

tolerance rate ± 5



+Newton Metre
+Weights
+Scale

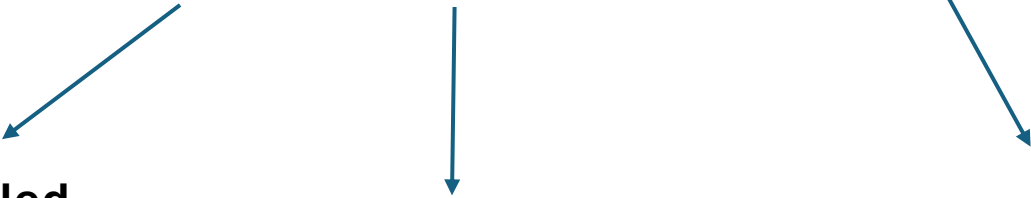
Graph comparing the force required to pull different shoes across different surfaces:



Challenges in our research and how we overcame them

- **We faced several challenges, including:**
 - A small sample size
 - Limited research time
 - Restriction in use of materials and equipment to make wearable shoes.
- However, we overcame these issues by maintaining high research standards and ensuring all our tests were:

fair, accurate, and consistent.



Many controlled variables

Recording to 3 significant figures

Repeating our experiments, removing anomalies and calculating averages

PHASE 2.5: Secondary research

- To create a functional shoe we also had to consider materials. What are good shoes made out of and why? Can we match market prices considering the cost of these materials? Here's what we found...



• SOLES:

- **Carbon rubber** ^[1] is optimal for outdoor sports
- **Hardened gum** ^[1] rubber is optimal for indoor sports

• MAIN BODY:

- **Synthetic overlay, PVC, or polyester** is 30-60% cheaper than leather ^[2].

• Does it work?

- Many modern training shoes, such as the **Under Armour Charged Edge** or **Nike Free Metcon 6** use these material **combinations** to transition smoothly between indoor gym work and outdoor exercise.

[1] https://racketsandrunners.ca/blogs/tips-and-tricks/indoor-vs-outdoor-court-shoes?srltid=AfmBOoq5L2MBSXDq6VJLe6_c31y8DsV40dWfQUj38PAwcpMAdegHxzD#:~:text=Clay%20court%20shoes%20have%20a,and%20stable%20outsole%20is%20required.

[2] <https://blog.v12footwear.com/what-is-the-difference-between-the-materials-you-use-in-your-uppers#:~:text=Why%20choose%20a%20safety%20boot%20with%20synthetic%20uppers?,Things%20to%20consider:>

OUTPERFORM

PHASE 3.0: DESIGNING THE SHOE

As part of this project we planned to create a prototype shoe by modifying a spare trainer to test our sole design.

The initial idea was that the sole would be sanded down, and a new design would be created on the bottom using simple, accessible materials such as cardboard, sandpaper, and hot glue.

A removable sole would be created out of cardboard that could simply be fitted onto the actual shoe, and a design added to the bottom using the hot glue. This would allow us to evaluate how effective our own design was across different surfaces.

Thank you for listening!

Project idea : Martyna, Maria

Presentation : Martyna, Alicja B, Maria, Weronika

Data collection : Alicja B, Maria, Martyna, Weronika

Graphs : Maria

Project participants : Martyna, Alicja B, Weronika, Maria,
Zofia, Alicja J