



PUSH IT, PULL IT

LYRICS AND CHORDS



Verse 1:

G7

Jonny: If you're an engineer, designing cars or planes,
How do you know that when they're used, they're gonna be safe?
Engineer: You can make a prediction that's so precise, it's insane,
With equations, calculations and imagination.

Verse 2:

Jonny: What will you need to know?
Engineer: Speed, distance, mass and time,
Jonny: What are they?
Engineer: Scalar quantities, that only have size,
But some quantities are vectors with direction besides.
That's how velocity, acceleration, and force are defined,
Jonny: What's a force?
Engineer: Push or pull.
Jonny: Like magnetism and weight?
Engineer: They are the ones that still can pull, when the objects separate,
But compression and tension, and air resistance relate,
They're contact forces,
Jonny: Like a normal force.
Engineer: Oh yeah.

Both: And friction

C7

Engineer: Add them together to treat them like there's one,
D7
I use resultant forces to predict the outcome.

Chorus

All: Forces
Engineer: Change your shape, your speed or your direction,
Engineer: When forces balance you won't change momentum,
Engineer: Force is mass times acceleration,
Jonny: I will pull or push you back in every situation.

Verse 3:

Jonny: Tell me what you know about gravity,
Engineer: Bigger, closer, things pull more attractively,
To find the weight, multiply the mass by g,
The field strength on Earth, it's roughly 10 newtons per kilo
If I'm stretching a spring?
Engineer: Use Hooke's law to see,
That the tension and extension grow proportionally,
Jonny: What's a moment?
Engineer: A turning force, like spanners need,
Force times distance from the pivot perpendicularly,
Jonny: Ok. But how do forces link to something's energy?
Engineer: Force times the distance moved is work that's done mechanically,
It's the energy shifted between stores. An example could be,
Shifting by lifting, to be stored in things gravitationally,
So, what's momentum?
Jonny: Mass times velocity,
Engineer: And if it's low, then something's motion changes easily with...

Chorus

Verse 4:

Jonny: Is it safe to drive fast?
Engineer: How fast?
Jonny: How fast can I go?
Engineer: That depends if you've enough stopping distance to slow
Jonny: Why?
Engineer: You need time to react, which may take longer you know,
If you are tired or if you're drinking alcohol.
Jonny: I can stop really fast,
Engineer: But then the forces felt,
Can cause internal damage.
Jonny: Even with a safety belt?
Engineer: And since brakes will dissipate energy, that's half $m v^2$ squared,
It takes much longer to stop, when driving fast, beware.

Chorus

