VCE Circus
Should I do Engineering? A dialogue.

I like engineers, they're can-do people
International aid worker

Caveat: – The author has no formal training in providing career advice.

Introduction

No career path planned? Not altogether surprising, after all, when would you had the leisure time to develop a plan? This dialogue is directed principally to those considering engineering as a possible career, but there is some discussion of more general nature.

Some ways of selecting a career path.

1) "I've always known"

Fortunate are you if you can say "I'm going to be a XXX, in fact I've always wanted to be a XXX". Though have your career already selected, it may be smart to see a career advisor to find the best route to it.

2) Career Advisor

Skilled career advisors are available. A career advisor can provide information on detailed career pathways, income, working conditions, and employment opportunities. However, a careers advisor cannot tell you what *it is like* to be a paramedic, a construction worker or biologist – they can't guarantee you job satisfaction. You need to do your own research in this regard.

3) Looking about

Take every opportunity to chat to other people about their work – family, friends of the family, people you meet, people with interesting hobbies. Don't be reluctant to call in on a relevant business and ask if they would they suggest as a sound pathway to architecture or whatever. Read books or watch videos made by people who tell of their direct experiences in an occupation of interest to you.

Mechanical and civil engineers have an interest in design detail (it's just the way they are) as well as a broad view of a project. Do you find examples of engineering interesting? They can be found in unexpected places – for example, at a hot-rod exhibition. A hot-rod often has readily visible suspension and engine components and the owner (the bloke with beard) will be pleased to chat with you. Park and school playgrounds are subject to safety requirements; it is a challenge for designers to make the playgrounds both interesting and safe. Their success in this regard from concept to detail is impressive.

4) Magazine tick-a-box style checks

Websites such as Career Explorer https://www.careerexplorer.com/ will lead you through a tick a box process and return career recommendations. It is difficult to determine the effectiveness of the process, but at the least it draws attention to critical factors that otherwise you may have overlooked. If you wish to pursue this approach there is no shortage of opportunities – just do a web search for "career test free".

5) Other approaches.

Five items follow; each one is an attempt to nudge you into self-identifying if your latent interests are directed to engineering.

"Should I do Engineering?" I

Investigate the *Star of the South* website, https://www.staroftheSouth.com.au/project-overview, for several minutes and if you don't think "What an absorbing project, I wonder how they'll solve the [one or more of the following] construction/power transmission/generator design/blade design/system control/data transfer/corrosion/storm management/…. problems?" then the definitive answer is **no**. Otherwise the answer could be **yes**, but it might be marine science, earth science, meteorology, environmental science, project management, metallurgy, chemistry, and, bless me, tourism or public relations.

"Should I do Engineering?" I I

6. Two trolleys are moving along an air track as seen in the diagram below:

Since trolley A is moving at a higher speed than trolley B, the two trolleys eventually collide. After the collision, trolley B continues moving to the right but is now moving at a speed of 0.60 m/s,

a. Calculate the speed of trolley A after the collision. **(2 marks)**

The question (source unknown) above was posted on the VCE subreddit in May 2023. The answer is readily obtained by applying the conservation of momentum principle. You might like to check my result that the velocity of A after the collision is 1.3 m/s (condensed working below).

Q1) – Do you see a problem with this answer?

Q2) – Without changing the mass of the objects or their velocities devise a configuration where this problem would not occur.

A potential engineer would be comfortable with both the questions above, but the second is the more difficult.

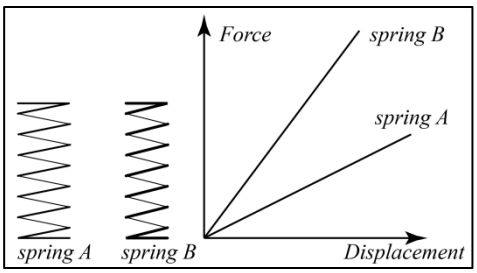
Condensed working establishing post collision conditions

$(m_A \times v_A) + (m_B \times v_B) = (m_A \times v_A') + (m_B \times v_B')$
$(50 \times 1.50) + (100 \times 0.50) = (50 \times v_A') + (100 \times 0.60)$ g m/s
$v_A' = 1.30$ m/s

"Should I do Engineering?" III: or perhaps, how would I go if I did Physics 1/2?

ThIs exercise is not so much about getting the answers right, but <u>how you feel about nutting them out</u>. It's meant to be backstory neutral as it doesn't contain formulae, jargon or even any units and is applicable if you are entering year 11. It will provide some indication about the wisdom of doing subjects directed to a career in engineering and or physics.

The diagram shows two springs; one spring is stiffer (as in "a cricket ball is stiffer than a tennis ball") than the other. The degree of stiffness is shown in the graphs. They show that if an equal force is applied to each spring (perhaps simply by putting a weight on it) one spring with be displaced (squished) more than the other.

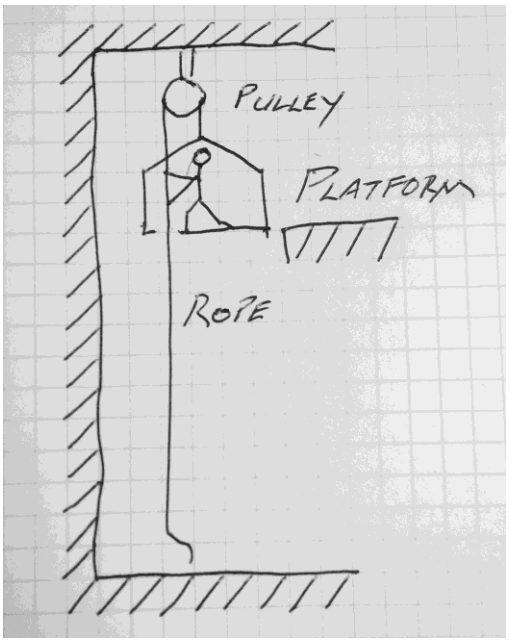


Q1 – Which spring is stiffer than the other?

Q2 – One spring is placed inside the other so the force is shared between them and the displacement is the same for both.[1] Essentially it's another spring, call it *spring C*. (Roughly) where would *spring C* be on the plot?

[1] Do an image search for "dual valve springs" to see some examples of this configuration.

"Should I do Engineering?" IV: selecting between a science or an engineering course.



A workman is testing a new lift cage. The mechanical security of the lift is sound. The diagram shows the workman at the start of the first run. He has stepped off the platform on to the cage and intends to lower himself hand-over-hand to ground level.

About halfway down he shouts "@#$%^&*!" very loudly and then laboriously hauls himself up hand over hand. He is not happy.

Q1 – What went wrong?

Q2 – When you identified the problem did you:
(a) Just shrug your shoulders and move on,
or (b) try to think up a neat solution?

If you selected (a) do science, if (b) do engineering.

Should I do Engineering?" V: a good day for an evening dinning out at a restaurant.

INGPHI is a civil engineering firm based in Switzerland with about fifty employees. Installation of a new footbridge by INGPHI is discussed on their webpage https://ingphi.ch/en/2022/12/22/installation-of-the-new-footbridge-and-culvert/ . How does the idea of having been the design engineer for the project appeal to you?

Appendix – Accessible Engineering

The car on the lower-right has classic beam axle front suspension. If you come across one at a hot-rod show, decide which way the beam axle should move and which way it shouldn't move. How does the suspension design (only partially visible in this image) achieve that?

Park and school playgrounds are subject to safety requirements; it is a challenge for designers to make the playgrounds both interesting and safe. Their success in this regard from concept to detail is impressive.

The images below were taken at Taradale. Lintion (and no doubt other places) has a similar playground.

VCE-Circus website: https://vce-circus.logicfronttoback.nz/
Any errors or comments? Email Harlan: logic@logicfronttoback.nz