Introduction to Problem Solving (I)

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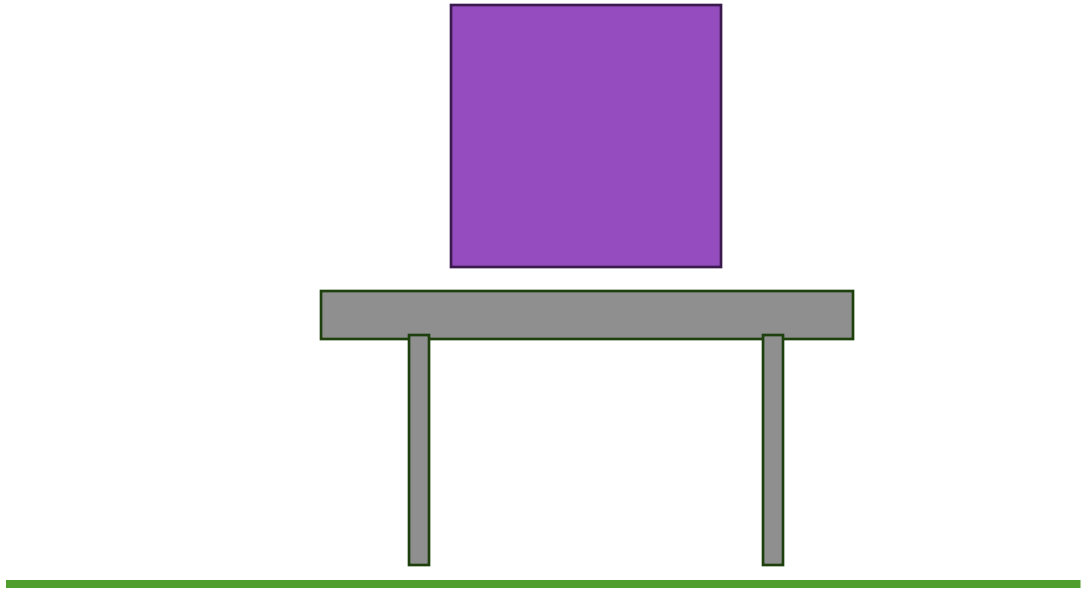
Why is problem solving challenging and valuable?

- Identifying or remembering a fact or equation has its place BUT this doesn't mean that we understand that concept or idea.
- Answering problems identifies misconceptions and assumptions in our understanding that may be valid in special cases but not generally.
- For example: **Newton's third law**
  - For every action (force) there is an equal and opposite reaction (force) of the same type on a different object.

Why is problem solving challenging and valuable?



Definitions – a physicists' best friends…

- Along with dimensions!
- Learning a definition with clarity and precision makes problem solving easier.
- For example: **Random journey of a fly.**
  - distance, displacement, speed, velocity, acceleration.

Good Isaac Physics question for practice:

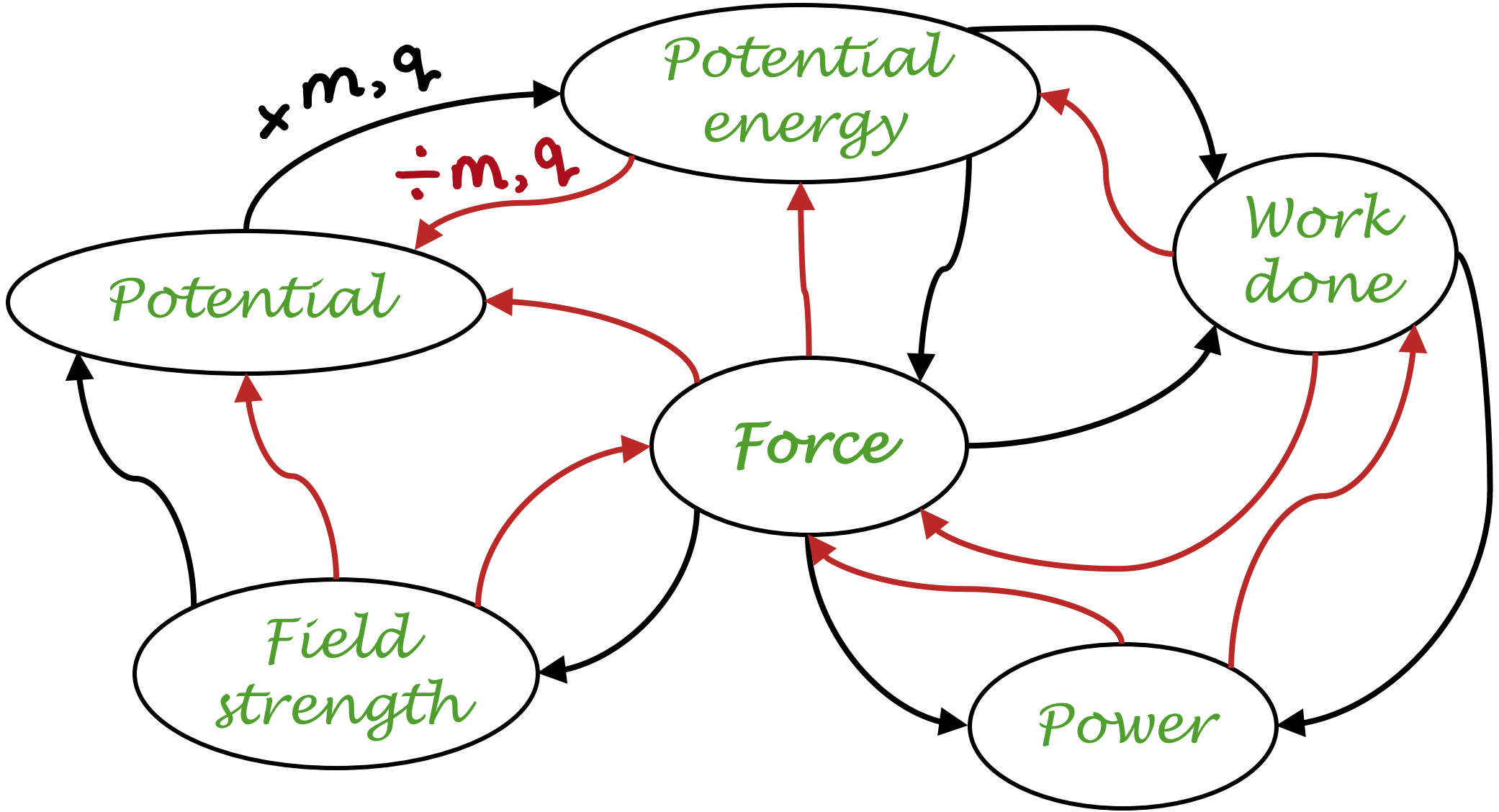
The Half Hour

Random journey of a fly

Definitions – deducing connections

- Help clear confusion between similar but different ideas.
- E.g. force, power, work done, energy, potential, potential energy…
  - Mind maps

Definitions – deducing connections



5 steps to problem solving.

1. Identify key words in the question
   - This may provide extra information to add to the **diagram** e.g **rough** surface means there will be a friction force.
2. Draw a **diagram** and include all information given **and** all information you can deduce.
3. Think about the physics that may be relevant to the problem
   - Write down everything that may be relevant – some many not be needed.
4. Stay in symbols
   - Different from common practice in schools but makes finding mistakes much easier.
5. Check dimensions, put in numbers and check if reasonable.

Dimensions (or units)

- Students rarely have to remember equations at school but understanding dimensions and units is still valuable for checking algebra.
  - Won't give dimensionless constants of proportionality.
- For example: **speed=distance/time**, **period of a pendulum**

Period of a pendulum

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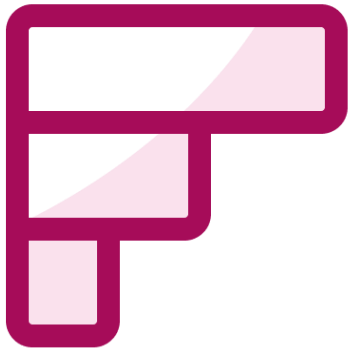

(I) Please rank the top 3 questions that you would most like to discuss.

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