

Order-of-Magnitude Physics – Problem Set 10

Due at the beginning of class.

Do any 1 of the problems + the last question (make up your own question).

You are free to do more if you like; answers will be graded.

“Say ‘Yes’ (not ‘No’ or ‘But’)” — The First Rule of Improv

Problem 1. Walk the Plank

“Yo ho, yo ho, the frisky Plank!
You walks along it so,
Till it goes down, and you goes down
To Davy Jones below ...”

says Captain Hook to the captive children as he forces them to walk the pirate’s plank.

Estimate the minimum thickness that the plank must have not to snap under a child’s weight.

Problem 2. Fastball

Estimate using order-of-magnitude physics the speed of a fastball pitch. The elastic modulus of muscle ranges between 10^6 and 10^7 dyne/cm².

Hint: Not all of the work the pitcher does goes into the ball.

Problem 3. Earth Song

There is a giant tuning fork in the traffic median between Shattuck Avenue and Center Street.¹ Estimate its natural frequency using order-of-magnitude structural physics.²

Problem 4. Ask Your Own Question

Ask an OOM question of your own. You don’t have to answer it.

¹No, really — go take a look.

²The answer is engraved beneath the sculpture.