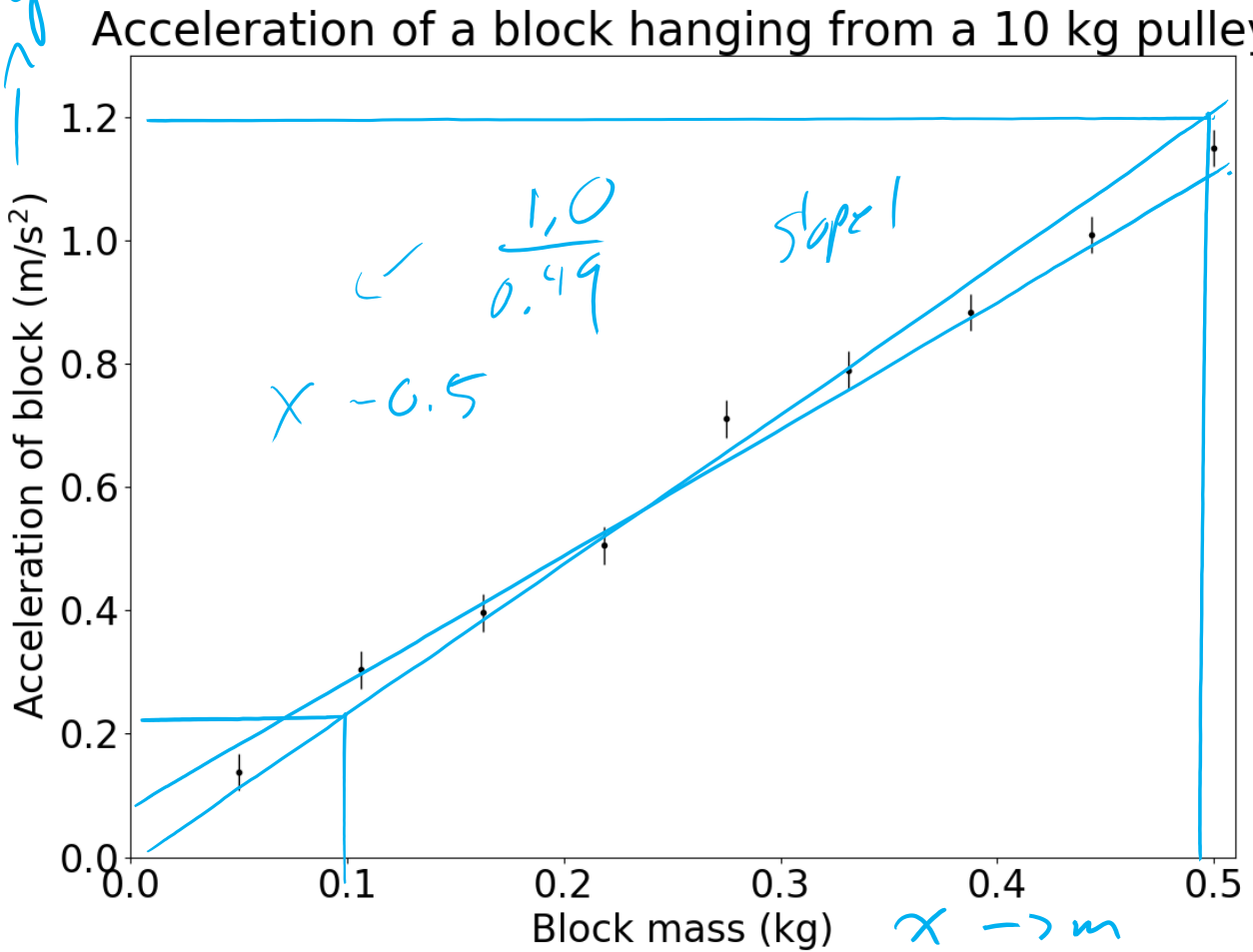
PHY151 Final Exam

- 6 short questions (4 marks each)
- 3 long questions (1 of each type) (12 marks each)
- 3 short questions from chapters 13 and 36 (“test 4”)
- Remaining questions are “equally” from chapters 1 to 12
- One integral question
- At least 1 familiar question (with numbers changed)
- Difficulty closest to test 2 (?)

Exam tips

- Rest. Be hydrated (to avoid headaches) and well-fed (but avoid food-comas). Bring a snack (not sugary) and a water bottle.
- Plan on taking a washroom break. The walk can be helpful.
- Relax your neck, shoulder, and jaw muscles periodically.
- Tell yourself that there is no tiger trying to eat you.
- Start each question in order, but skip a question if you can’t finish it in 5 minutes. Come back later. Manage your time.
- Make an organized aid sheet. If you can’t find things on it, it won’t help.

Data Analysis question



$a = \frac{mg}{m + xM} = \boxed{a(m)}$

$y(x)$

$a \approx \frac{mg}{xM} \sim \frac{m}{x}$

$x \sim \frac{1}{\text{slope}}$

x between 0.4 & 0.5

$\boxed{x = 0.45 \pm 0.5}$

PHY151 in 10 minutes

- Calculus gives you x(t) from a(t) and vice versa
- Things move in 1D if you're lucky, otherwise 2D, rarely 3D
- Energy/work is easier than kinematics 90% of the time
- Forces cause acceleration, if you're unlucky they also cause rotations
- Kinetic friction is easy, other friction forces are difficult
- Ropes and pulleys are only easy if you ignore their mass, etc
- If you move in a circle you must have a radial force of mv^2/R

PHY151 in 10 minutes

- Collisions are very hard to model, but momentum ignores almost all the hard parts, and impulse usually gets the rest
- Torque tells you how much a force tries to cause rotations
- The right-hand-rule makes everything go sideways (literally) from what you expect, but it works if you keep at it
- Use angular momentum and energy whenever you can
- Moment of inertia is the rotational equivalent of mass, but it’s much more confusing
- Planetary orbits conserve energy and angular momentum

PHY151 in 10 minutes

- Relativity is weird
- Everyone measures the same speed of light (but they shouldn't)
- It's because their rulers and clocks are wrong, and they don't measure things properly (they say the same of you, ignore them)
- Figuring it out is easiest if you use "events" and/or define proper lengths and/or times
- Collisions conserve energy and momentum always, but internal energy "becomes mass" somehow

University Advice

- UofT is huge. It's full of interesting people. Meet some of them.
- Make a habit of going outside your comfort zone. This gets harder as you get older. You'll miss this freedom later.
- University is about learning new hobbies, not getting a career.
- You get out of it what you put into it.
- Employers care about your skills, not your marks. Learn skills!
- Cooperate. Learning is social.
- Go to office hours. Ask about research. Profs LOVE to talk.