### San Diego Math Circle F=ma Physics 2025

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### what is the F=ma Exam?

- The F=ma Exam is offered annually by the American Association of Physics Teachers (AAPT).
- F=ma Exam results are used to invite participants to the United States Physics Olympiad (USAPhO).
- The USAPhO results are used to create the US team for the International Physics Olympiad (IPhO).

### who can take the F=ma Exam?

- Students taking the F=ma exam must be either U.S. Citizens, U.S. Permanent Residents (Green Card holders), or currently attending a U.S. school. Students must also be located within the U.S. to take the F=ma exam.
- Students must be either U.S. Citizens, or U.S. Permanent Residents (Green Card holders) to take the USAPhO exam. Students must also be located within the U.S. to take the USAPhO exam.
- Students must be eligible to compete at the International Physics Olympiad to be invited to U.S. Physics Team training camp. This requires that they are U.S. citizens, or hold a green card. Students also must not exceed age 20 by June 30 of the competition year.

#### who can take the F=ma Exam?

 In short, anyone high school age and younger may take the F=ma Exam.

### who should take the F=ma Exam?

- The F=ma Exam is best approached by students who will have taken a full mechanics course by the exam date.
- A full-year physics course is more than sufficient, IF it covers mechanics in the first semester.
- A full-year physics course which covers ONLY mechanics will require getting ahead of the course material in time for the exam.

### who should take the F=ma Exam?

- However, it also helps if you have previous experience with the F=ma Exam.
- So, if you are interested in the F=ma Exam but don't think you're quite ready, I encourage you to study a bit, take it, and see how it goes.
- It is much easier to qualify if you've taken one F=ma Exam and have some idea of what it takes before you "really try".

#### who does take the F=ma Exam?

- Several thousand students each year. Last year, more than 6,000.
- Approximately 400 students "pass" the F=ma Exam. These students qualify to participate in the USAPhO.

### what makes the F=ma Exam different from math competitions?

- Experience.
- Consider the AMC 10. A typical AMC 10 entrant has studied mathematics for 10 years.
- In contrast, a typical F=ma entrant has studied physics for 1 semester.
- A typical F=ma qualifier will have studied physics for 1.5 years, and taken the F=ma once before.

#### what content does the F=ma Exam cover?

- Mostly mechanics, with some fluids.
- Knowing some trigonometry is useful.
- Basic calculus concepts make some topics easier, but are certainly not required.

#### what content does the F=ma Exam cover?

 More specifically, refer to *Physics*, *Principles with Applications, Seventh Edition* by Giancoli, ch. 1-8, 10-11.

## who should join this course?

- If you have the intention to take the F=ma Exam in 2025 as your first or second attempt, you are the target demographic of this course and should join us!
- If you are currently taking a class which covers these physics topics, you may find this course helpful anyway even if you're not sure about the F=ma Exam.
- I do not recommend this course if you have not taken any physics and are not taking any concurrently, but you are still welcome to join and participate.

# what will you get out of participating in this course?

- This course is designed as a support for students who want to take the F=ma Exam and already have some physics knowledge.
- Most of the course will focus on applying physics knowledge you already have to problems in the F=ma style, problem solving techniques, and practice exams.

# what content will be covered in this course?

- Besides practice problems and full practice exams, I deliver several mini-lectures about specific topics throughout the season.
- As of last year, these have been written up into
  *F=ma Physics*

A Review of Concepts and Techniques for the F=ma Exam which is available on my website: <u>saret.co/teaching</u>



#### $\Sigma \vec{F} = m\vec{a}$ Physics

A Review of Concepts and Techniques for the  $\Sigma\vec{F}\text{=}m\vec{a}$  Exam



J. Saret

# if you're interested in joining the course, let me know!

https://docs.google.com/forms/d/e/ 1FAIpQLSc1DRxaXxOd264vktoVaBJYo6tA5W3BLSM76OeY hlscixJBxA/viewform?usp=sf\_link

### questions?