



# Online Monmouth Math Competition

Participant Guidebook

Friday, February 26th to Monday, March 1st

[ommcofficial.org](http://ommcofficial.org)



# Welcome to the Online Monmouth Math Competition!

We are extremely excited to welcome you to the first **Online Monmouth Math Competition**, which gives talented high school and middle school students an exciting and engaging way to **develop their skills** in mathematics.

**In this brief participant guidebook, we will go over the basics of the event and introduce you to our competition!**

$z^n = |z|^n (\cos n\phi + i \sin n\phi)$   
 $P(A) = \sum p(\omega)$   
 $z = a + bi$   
 $\sum_{k=0}^n \binom{n}{k} a^{n-k} b^k$   
 $\omega = 2\pi f$   
 $E = \frac{1}{2} \hbar / k/m$   
 $\vec{S} = \frac{1}{\mu_0} (\vec{E} \times \vec{B})$   
 $\vec{F}_v = \int \frac{F_n}{R}$   
 $E = mc^2$   
 $\sigma = \frac{Q}{S}$   
 $I_m^2 = U_m^2 [ \frac{1}{R^2} + ( \frac{1}{X_c} )^2 ]$   
 $\vec{B} = \mu_0 \frac{NI}{l}$   
 $T = \frac{4n_1 n_2}{(n_2 + n_1)^2}$   
 $F_h = S h$   
 $F_x = \frac{1}{2} C_x \rho S \bar{v}^2$   
 $m = N \cdot m_0 = \frac{Q}{ve} \frac{M_m}{N_A}$   
 $\oint \vec{D} \cdot d\vec{S} = Q^*$   
 $P(A|B) = \frac{P(A \cap B)}{P(B)}$   
 $P(A \cap B) = P(A) \cdot P(B)$   
 $\lim_{n \rightarrow \infty} \frac{a_n}{b_n} = \frac{\lim_{n \rightarrow \infty} a_n}{\lim_{n \rightarrow \infty} b_n} = \frac{a}{b}$   
 $\lim_{n \rightarrow \infty} \frac{a_n}{b_n} = \lim_{n \rightarrow \infty} \log a \sqrt[n]{r} = \frac{1}{S} \log a^r$   
 $y = x^2$   
 $y = \cos x$   
 $g = ax^2 + bx + c$   
 $x_{1,2} = \frac{-b \pm \sqrt{D}}{2a}$   
 $\int f(\varphi(x)) \varphi'(x) dx = \int f(u) du$   
 $\vec{a} + \vec{b}$   
 $\vec{a} \cdot \vec{b} = |\vec{a}| |\vec{b}| \cos \alpha$   
 $\vec{a} \times \vec{b} = |\vec{a}| |\vec{b}| \sin \alpha \vec{n}$   
 $\vec{a} \cdot (\vec{b} \times \vec{c}) = \det \begin{pmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{pmatrix}$   
 $\vec{a} \cdot \vec{a} = |\vec{a}|^2$   
 $\vec{a} \cdot \vec{b} = a_1 b_1 + a_2 b_2 + a_3 b_3$   
 $\vec{a} \times \vec{a} = \vec{0}$   
 $\vec{a} \times \vec{b} = -\vec{b} \times \vec{a}$   
 $\vec{a} \times (\vec{b} \times \vec{c}) = \vec{b}(\vec{a} \cdot \vec{c}) - \vec{c}(\vec{a} \cdot \vec{b})$   
 $(\vec{a} \times \vec{b}) \times \vec{c} = \vec{b}(\vec{a} \cdot \vec{c}) - \vec{a}(\vec{b} \cdot \vec{c})$   
 $\vec{a} \times (\vec{a} \times \vec{b}) = \vec{a}(\vec{a} \cdot \vec{b}) - \vec{b}(\vec{a} \cdot \vec{a})$   
 $(\vec{a} \times \vec{b}) \cdot (\vec{c} \times \vec{d}) = (\vec{a} \cdot \vec{d})(\vec{b} \cdot \vec{c}) - (\vec{a} \cdot \vec{c})(\vec{b} \cdot \vec{d})$   
 $\vec{a} \cdot (\vec{b} \times \vec{c}) = \vec{b} \cdot (\vec{c} \times \vec{a}) = \vec{c} \cdot (\vec{a} \times \vec{b})$   
 $\vec{a} \cdot (\vec{a} \times \vec{b}) = 0$   
 $(\vec{a} \times \vec{b}) \cdot \vec{a} = 0$   
 $(\vec{a} \times \vec{b}) \cdot \vec{b} = 0$   
 $(\vec{a} \times \vec{b}) \cdot (\vec{a} \times \vec{b}) = |\vec{a}|^2 |\vec{b}|^2 \sin^2 \alpha$   
 $|\vec{a} \times \vec{b}| = |\vec{a}| |\vec{b}| \sin \alpha$   
 $|\vec{a} \cdot \vec{b}| = |\vec{a}| |\vec{b}| \cos \alpha$   
 $\cos \alpha = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}| |\vec{b}|}$   
 $\sin \alpha = \frac{|\vec{a} \times \vec{b}|}{|\vec{a}| |\vec{b}|}$   
 $\vec{a} \cdot \vec{b} = |\vec{a}| |\vec{b}| \cos \alpha$   
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 $|\vec{a} \times \vec{b}| = |\vec{a}| |\vec{b}| \sin \alpha$   
 $|\vec{a} \cdot \vec{b}| = |\vec{a}| |\vec{b}| \cos \alpha$   
 $\cos \alpha = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}| |\vec{b}|}$   
 $\sin \alpha = \frac{|\vec{a} \times \vec{b}|}{|\vec{a}| |\vec{b}|}$   
 $\vec{a} \cdot \vec{b} = |\vec{a}| |\vec{b}| \cos \alpha$   
 $|\vec{a} \times \vec{b}| = |\vec{a}| |\vec{b}| \sin \alpha$



# Overview and Purpose

Students will have the opportunity to compete in **teams**, developing **valuable teamwork and collaboration skills**. In the competition, they will solve **thought-provoking** challenging mathematics questions. The competition consists of **2 individual rounds** and **1 team round** administered over the span of **4 whole days**, consisting of questions with similar difficulty as those posed on the well-established **AMC 10/12** and **AIME** math competitions.

**For more information on contest format and types of questions, visit this page to learn more!**

[ommcofficial.org](http://ommcofficial.org)



# Topics on Contest

The problems posed on the OMMC cover a **wide and diverse** variety of topics in mathematics. These include topics such as **number theory, algebra, combinatorics, and geometry**. To solve these problems, competitors must not only have a deep understanding of math, but also **intuition and insight**. The difficulty of these questions changes from round to round.

- **Round 1** consists of a larger number of easier questions that must be solved within a comparatively short timeframe of 50 minutes.
- **Round 2** consists of a smaller number of more difficult questions that must be done in 120 minutes.
- Teams of students (up to 4) will be able to collaborate on the **Team Round (Round 3)** and in addition to Individual Scores, will be given one cumulative Team Score (based on Team Round and Individual Rounds scores for members of the team). The Team Round will be slightly more difficult than Round 2. Each team must take The Team Round at the same time and will be given 60 minutes to complete all questions.



# Logistics & Eligibility

Students **must** fill out **paperwork**. Sign-ups open on **January 10th** and close on **February 20th**.

## **To be eligible, students must have:**

- Not yet received a high school diploma
- Sent in their sign-up sheet prior to Feb. 20<sup>th</sup>
- Submit all consent forms with parent or guardian signature

**The actual event will begin on February 26th, and all participants will be given four days to complete all rounds. However, each round will also have a time limit corresponding to it.**



# Rules & Code of Conduct

As a math competition, we have a commitment to uphold the **highest standards** of **academic integrity**, and we expect all competitors to do the same. Cheating in this contest, including using code, WolframAlpha, Desmos, etc., is **extremely frowned upon**. If any competitor and/or team is found cheating, their scores will be **invalidated** and they will be **barred** from future OMMC events. Refer to the **OMMC rulebook** for further details on eligibility rules and competition rules.

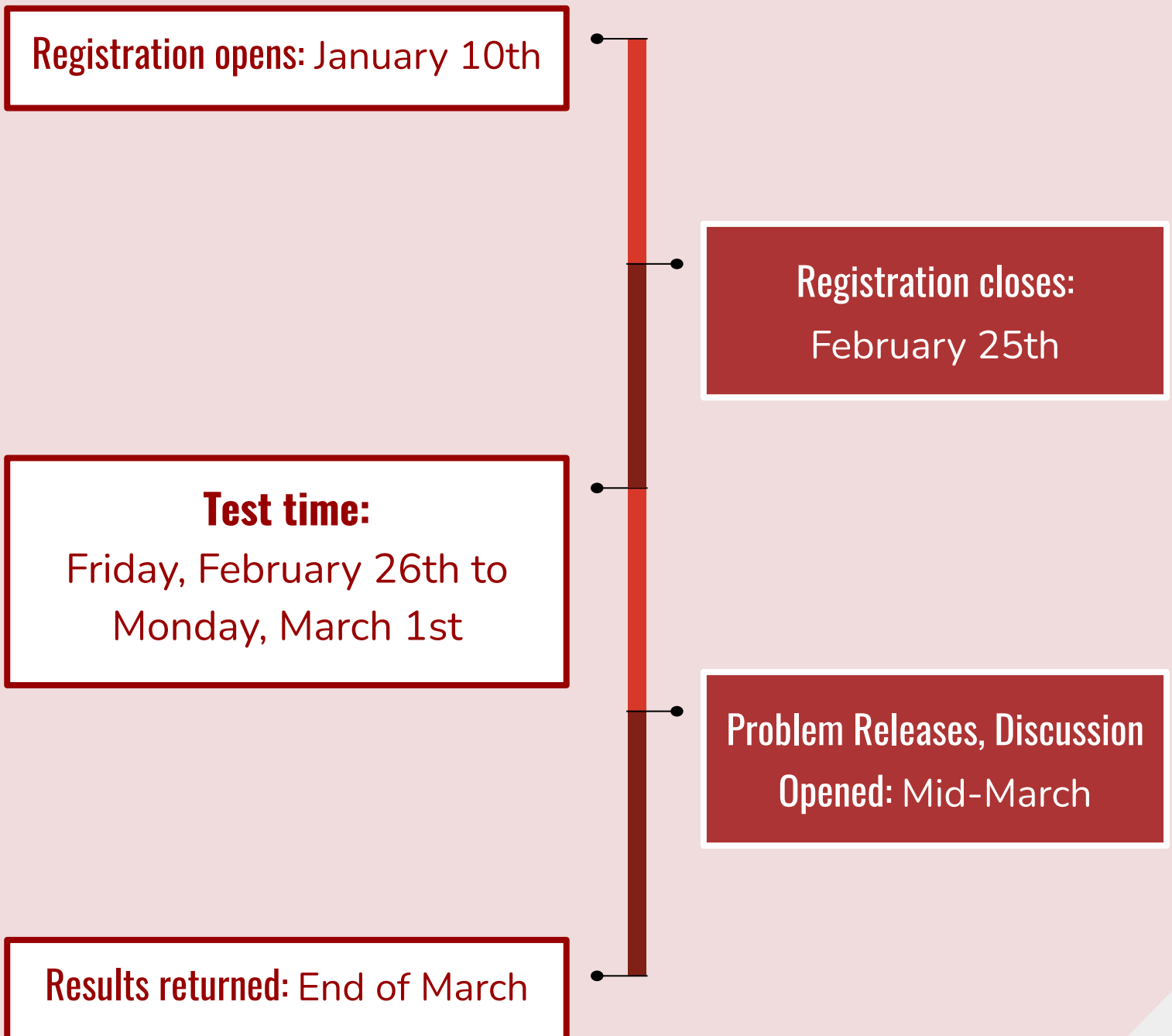
**For more information on OMMC rules, refer to the official OMMC rulebook below!**

**[OMMC Rulebook](#)**



# Schedule

Below is the **official** schedule for **OMMC**.





# Our Sponsors & Partners

OMMC would not have been possible without our generous **sponsors** and **partners**!

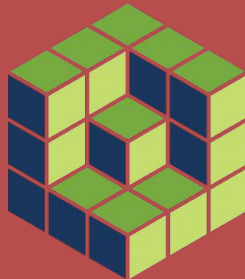
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# Contact Us!

We recommend the majority of questions surrounding the competition be sent to the **Official OMMC email**. Send an email to one of the administrators only in the event that you want to address one of them individually.

## Follow us to stay updated!



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