

ONTARIO MATH CIRCLES ANNUAL ARML TEAM SELECTION TEST

Front Page Instructions

1. Do not open this competition package until you are told to do so.
2. This competition contains 40 problems to be answered in 120 minutes. This is open to all high school and middle school students.
3. Print your name clearly on your answer sheet. Phone number and e-mail addresses are requested to contact top finishers about being on the Ontario Math Circles ARML team. If you do not wish to be considered for this team, you may leave those blank. Please print these, especially e-mail address, legibly.
4. Print clearly and legibly on the answer sheet. You must leave all answers in exact form. For example, π would be correct while 3.1415 would not. You must simplify your answers as much as possible. For example, $\frac{6}{4}$ must be simplified to $\frac{3}{2}$ and all denominators must be rationalized. Perfect squares must be removed from radicals. For example, $\sqrt{99}$ must be written as $3\sqrt{11}$. Trig functions of standard arguments must be evaluated. Frequently, several equivalent expressions will be considered correct. For example, $\frac{3}{2}$, $1\frac{1}{2}$, and 1.5 will all be considered correct.
5. Each correct answer is worth 1 point. A blank and an incorrect answer are both worth 0 points. There are no fractional points.
6. Only pencil, eraser, and pen are allowed. Electronic devices are not allowed. Everything else must be approved by the proctor.
7. You may keep your question sheet and scratch work.
8. The full results of this competition will be posted on the Toronto Math Circles' website. It will only display your name, school, grade, and score.
9. The prize for top scorers will be a numerical amount to be deducted from one of their future ARML trip fees. This amount is not transferable nor redeemable for cash.
10. *Do not discuss the problems or solutions from this contest for the next 7 days.*
11. GOOD LUCK!

How To Prepare

The problems in this competition are designed to model problems from the actual ARML competition. The following is a list of competitions which has similar problems to ARML. You can find past problems on the internet. They are roughly sorted according to difficulty.

1. American Mathematics Competition 10 (AMC 10)
2. American Mathematics Competition 12 (AMC 12)
3. American Regions Mathematics League (ARML)
4. American Invitational Mathematics Examination (AIME)
5. Harvard-MIT Mathematics Tournament (HMMT)

Topics Covered

The following is a list of the main topics covered in the competition.

1. Euclidean and analytic geometry
2. Trigonometry
3. Exponential and logarithmic functions
4. System of equations
5. Polynomials
6. Sequence and series
7. Combinatorics and probability
8. Elementary number theory
9. Complex numbers