



AwesomeMath
making x,y,z as easy as a,b,c

AwesomeMath Admission Test Cover Sheet

Your Name

Last Name

First Name

Admission Test

☐

A

☐

B

☐

C

Check one

Contact Information

Phone Number

Please Print

Email

Number of pages (not including this cover sheet)

- Do not be discouraged if you cannot solve all of the questions: the test is not made to be easy. We want to see the solutions you come up with no matter how many problems you solve.
- Include all significant steps in your reasoning and computation. We are interested in your ability to present your work, so unsupported answers will receive much less credit than well-reasoned progress towards a solution without a correct answer.
- In this document , you will find a cover sheet and an answer sheet. Print out each one and make several copies of the blank answer sheet. Fill out the top of each answer sheet as you go, and then fill out the cover sheet when you are finished. Start each problem on a new answer sheet.
- All the work you present must be your own.
- Do not be intimidated! Some of the problems involve complex mathematical ideas, but all can be solved using only elementary techniques, admittedly combined in clever ways.
- Be patient and persistent. Learning comes more from struggling with problems than from solving them. Problem-solving becomes easier with experience. Success is not a function of cleverness alone.
- Postmark or submit your solutions by e-mail by May 28, 2010.
- Make sure that the cover sheet is the first page of your submission, and that it is completely filled out. Solutions are to be mailed to the following address:

Dr. Titu Andreescu
3425 Neiman Rd., Plano, TX 75025

If you e-mail your solutions, please send them to

tandreescu@gmail.com

E-mailed solutions may be written and scanned or typed in TeX. They should be sent as an attachment in either .doc or .pdf format. If you write and scan your solutions, insert the scans into a .doc or .pdf file and send just the one file.

Please go to the next page for the problems

Admission Test C

May 7 - May 28, 2010

- Using each of the ten digits exactly once, form two 5-digit numbers such that their difference is as small as possible.
- Evaluate the sum

$$1 + 2 + 3 - 4 - 5 + 6 + 7 + 8 - 9 - 10 + \cdots - 2010,$$

where each three consecutive signs $+$ are followed by two signs $-$.

- In the addition

$$\begin{array}{r} A \\ B \\ CD \\ EF \\ + GH \\ \hline XY \end{array}$$

each letter represents a different digit and no leading zero is allowed. Find X and Y .

- Find all four-digit numbers n whose sum of digits is equal to $2010 - n$.
- Set A consists of 7 consecutive positive integers less than 2010, while set B consists of 11 consecutive positive integers. If the sum of the numbers in A is equal to the sum of the numbers in B , what is the maximum possible number that set A could contain?
- Let n be an integer such that $2n^2$ has exactly 28 distinct positive divisors and $3n^2$ has exactly 24 distinct positive divisors. How many distinct positive divisors does $6n^2$ have?
- In a right triangle, prove that the bisector of the right angle also bisects the angle between the altitude to the hypotenuse and the median to the hypotenuse.
- Find all integers n for which $9n + 16$ and $16n + 9$ are both perfect squares.
- Is there an integer n such that exactly two of the numbers $n+8$, $8n-27$, $27n-1$ are perfect cubes?
- In quadrilateral $ABCD$, $\angle B = \angle C = 120^\circ$ and $AD^2 = AB^2 + BC^2 + CD^2$. Prove that $ABCD$ has an inscribed circle.

AwesomeMath Answer Sheet

Your Name

Problem Number

Page

of

Write neatly! Write all work inside the box. Do NOT write on the back of the page