



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 Monday, Feb. 11, 2008. 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
1721 Monaco Drive, Allen, TX 75002

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

titu@awesomemath.org

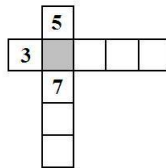
E-mailed solutions may be written and scanned or typed in TeX. They should be sent as an attachment in either .doc or .pdf format. If you write and scan your solutions, insert the scans into a .doc or .pdf file and send just the one file.

Please go to the next page for the problems

Admission Test A

Feb.1 - Feb.11, 2008

1. Dissect a 4×9 rectangle into two pieces which can be assembled to form a square.
2. Find all prime numbers p such that $32p + 1$ is the cube of an integer.
3. Can we arrange the numbers $1, 2, 3, \dots, 16$ on a circle such that the sum of each two adjacent numbers is a perfect square? Same question for a line.
4. Find the least positive integer with more than 120 divisors, at least 12 of which are consecutive positive integers.
5. In each square of the figure below one places a different number from 1 through 9 such that the sum of the five entries in the horizontal row is equal to the sum of the five entries in the vertical column. The positions of 3, 5, and 7 are given. Find all possibilities for the number in the darkened square.



6. Let x, y , and z be real numbers such that $6x - 9y + 7z = 2$ and $7x + 2y - 6z = 9$. Evaluate $x^2 - y^2 + z^2$.
7. Find all pairs (m, n) of integers such that $3m + 4n = 5mn$.
8. Three equal circles have a common point P and intersect again at A, B , and C . Prove that the circle through A, B , and C is equal to the other three.
9. Find the remainder when x^n is divided by $x^2 - x - 1$.
10. An 8×8 board is to be tiled with 2×1 rectangular tiles, each one black or white. What is the least number of black tiles needed so we can arrange them in a way that no 2×2 square on the board is all white?

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