

About one third of the essays contain serious errors either in mathematics or connecting the mathematical formula with the physical situation. Some of these are discussed below. Then I pass to problems with the composition.

Connecting mathematics and English 1. What do pronouns refer to? It is $1 + 1/2 + 1/3 \dots$

In this case ‘it’ CANNOT be a set of blocks – a set of blocks is not a number. The series refers to a height or a volume or an area of some set of blocks.

2. Similarly, some students set ‘the deluxe set is contained in $1 + 1/2 + 1/3 \dots$. Again, a set of blocks is not a number.

Mathematics

1. Be careful to distinguishing when you are discussing the height or the (surface) area or the volume of a set of blocks. What are the units of the various numbers you are computing? What physical feature is actually computed by e.g. the harmonic series?

2. The following kinds of series: harmonic, geometric, p-series, power series were often confused. Check the definitions.

3. It is not enough to show (e.g by quoting a calculus text book) that the volume of the deluxe set is small. You must describe exactly how the blocks are packed in the trunk. I expect you to appeal to the convergence of the geometric series to show that your packing works.

4. A similar packing is necessary to show the amount of paint is finite. In thinking about how much paint is needed to paint one edge of each cube in the Deluxe set, consider the following. What is the area of a line? Does it make any difference how long the line is?

5. A good point for the essay would be to pick a specific object (the moon, the top of Sears Tower, the top of Kilimanjaro ...) and calculate exactly how many blocks from the deluxe set would reach as high as that object.

6. In discussing geometric arguments showing the sum of $(1/2)^n$ is 2, it is not enough to show it is at most 2.

7. Be sure that explanations you give for convergence don’t apply just as well to the harmonic series or that explanations for divergence don’t apply just as well to a geometric series with ratio less than 1.

English

1. Capitalization. Be careful that Bill Gates doesn’t capitalize words you don’t want capitalized. This is likely to happen whenever you center an equation. When it happens, backspace over the offending letter and type it again in lower case. Usually, this is enough.

2. Parallelism: Phrases that play analogous roles should have similar grammatical construction. A very easy example of this is one I did wrong on the

assignment sheet. 'The first block is $1 \times 1 \times 1$; the second has edge length $1/2$.' Either edge-length should be used both times or listing the dimensions should be used both times.

3. Remember: infinitely many; infinite number. Similarly: finitely many; finite number.

4: person: The essays should be mostly written in 3rd person or 1st person (plural - the editorial we). The 2nd person (you) is inappropriate in formal writing. I use it sometimes on this page because I am writing for a specific group of people and I have given you specific assignments.

5. Make the verbs that drive the sentence the main verbs. Don't write. 'It is interesting that the lion gobbled up the mouse.' Write instead: 'The lion gobbled up the mouse.'

6. Never use 3 words when 1 will do.