Are Students Abusing Mathematics Online Help?

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Mathematics Online Help Sites

- Help provided by expert or peer tutors.
- Communication is asynchronous and text-based.
- Participants can remain anonymous, while there exists permanent record of communication.
- Service is provided without charge.

Example of a Bulletin Board

Discrete Math
- permutations/ combinations

Exponents
- Logarithms

Fibonacci Sequence/ Golden Ratio

Fractals

Functions

Geometry
- Euclidean/plane
  - conic sections/ circles
  - constructions
  - coordinate plane
  - triangles/polygons
- higher-dimensional
  - polyhedra
- non-Euclidean
- practical geometry
- symmetry/tessellations

History/Biography

Interest

Logic

Negative Numbers

Given the equation 2x+5y=8, with the coefficients increasing by 3 each time, create linear systems that are similar using equations such as 3x+4y=5 or 4x+6y=8.

Substituting in Linear Equations [11/14/2001]

I am given two equations, 2y = 5x + 8x and 3y = 4x + 9x, and told to substitute something. What should I do?

10% Sodium + 30% Sodium [07/09/2003]

A group of chemists are conducting an experiment to produce a new liquid material. One chemical contains 15% sodium (Na) and the other chemical contains 30% sodium (Na). Once they mix the two samples the resulting chemical contains 22% sodium (Na). How many milliliters (ml) of each sample must be mixed to obtain 600 ml of the new chemical?

Algebra as a Metaphor for Life [06/11/2002]

I've been given 'proofs' that -1 = 1, and that 2 > 4. Can you show me why they aren't true?

All Possible Solutions: Diophantine Equations [12/06/2002]

Lance and Mario were working in the snack bar at the Turbulent Tunas Concert. They sold hot dogs for $1.65, hamburgers for $2.35, sodas for $.85, and the combo plate with fries, salad, a hamburger, and soda for $3.89. They sold 80 items in an hour for $163.24. How many of each kind of food did they sell, and how much did

Different Ways of Solving Systems of Linear Equations

Date: 10/28/2002 at 10:31:31
From: Kelley
Subject: Systems of equations

I have a problem solving systems of equations in a time-efficient manner. I know there is a substitution method and another one that I can't remember. For example:

$$2x - y = 1$$
$$3x - 2y = 5$$

Is there a good way to solve these types of equations?

Date: 10/28/2002 at 15:37:05
From: Doctor Ian
Subject: Re: Systems of equations

Hi Kelley,

There are several good ways to solve systems of linear equations, and the best method to use in any given situation is the one that requires

Why Do Students Ask Questions?

- In classroom and during tutoring:
  - Students may be expected to do so.
  - They want to please the teacher ("didactic contract," Brousseau, 1997)

Why Do Students Ask Questions?

- In online math help students may:
  - Have recognized bottlenecks in learning
  - Have genuine interest
  - Use convenience of getting homework done.

When is There a Likely Abuse?

- In a classroom environment:
  - If they [*students*] do not exhibit need, will, or desire to learn from the response they receive (Van Der Meij, 1994, italics added).
  - They may be impatient to rid themselves from the state of ignorance.

When is There a Likely Abuse?

- In CAI environments:
  - Students may be using help feature too often (Aleven & Koedinger, 2001)
  - Ask for a hint when in fact they know enough to proceed successfully without help.

When is There a Likely Abuse?

- In Online Help:
  - Posting questions online instead of putting enough effort into doing homework themselves.

Example of a Question

Topic: Word Problem Using the Distributive Property (1 of 2), Read 84 times **Topic**

From:

Date: Wednesday, October 17, 2001 11:01 PM **Problem**

Word problem: A baseball team buys 15 bat for $405. Aluminum bats cost $25 and wooden bats cost $30. How many of each did they buy?

I came up with the equation of:

25(15-a)+30(15-b)=405 **Question**

but I can't solve it. where did I mess up?

Questions Were Categorized As:

1. *Incomplete questions* (Fragments)

2. *Complete questions:*

   i) *Multiple Questions*–messages with more than one mathematics problem.

   ii) *Implicit Questions–questions without a context.*

   iii) *Questions with some context*–question(s) of the type "How?"; "Wh…?" and so on.

   iv) *Partially solved problems.*

   v) *Fully solved problems.*

Categorizing Tutorial Discourse

- The questions can be more or less clear, more or less detailed, and on various cognitive levels and forms.

- The answers can differ in what the tutors teach; how they teach; how helpful they are, and if they show insecurity or not.

Expert Tutor's Beliefs

[*I was*] surprised how many times repeatedly are blatantly asked questions directly from the textbook that are assigned for the homework.
[*Asked to explain how she knows that the question is from the textbook, she explained*]

Because the students when phrasing his or her stuff would never bother to go through half a page of a story behind it. The question just uses the textbook language and the textbook ideas. You know—what would make it interesting. (Anna, interview, June 9, 2003, italics added)

However,

there is a difference between the homework question where “the student is paralyzed, partly by the fact that the assignment is over her head, partly by the way the question was assigned” (Morgan, Log 4), and

the question where “the student expects to receive” (Elena, Log 2) which alerts a tutor as a likely abuse case.

Most Likely Abuse Cases in Online Help

- The questions that are both *implicit* and *multiple*.
- There were less than 10% of such questions on three sites (7%, 6%, 0%)

How Are Such Questions Treated?

On the site where expert tutors select questions for archiving:

None of such questions was archived.

On the sites that archive all the questions:

"dont [*sic*] expect somebody just to do those 20 simple questions for you. That is not really the purpose of this board in my opinion"

(Peer tutor, Site B).

"We are not doing homework for you"

From time to time the topic of the question would say: "Not a homework question," probably hoping that it will not be rejected by the tutors.

One drastic example was a message with a title "NOT HOMEWORK REVIEW QUASTIONS [*sic*] FOR A TEST ASAP" (site B) that consisted of an *Implicit Question* with 15 mathematics problems.

Such Obvious Cases of Abuse Are Not Widespread

There are more questions:

- Where students want to verify (11%) something, or
- Where they state that they lack the knowledge or they do not get the idea (25%).

Expert Tutor Anna (interview):

"There are some cases when they want us to do the homework for them. But there is a fair amount of cases when they ask questions because they get stuck.

In Calc there is a fair amount of questions that students ask because they don't remember his or her geometry, and what to do with a conical sink out of which the water is pouring out."

Other Evidence of Abuse

Students can:

- Start more threads at different times and use different email addresses.
- Pass the tutors' answers as their own questions.

  (Less likely, since that requires lot of effort, time, and sophistication from students.)

Bibliography

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