

Math Mistakes

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To keep the site going we need lots of interesting mistakes. To submit a picture of mathematical work, email mathmistakes@gmail.com

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Rate of change of a volume of a growing sphere

Posted on August 29, 2012 by [mpershan](#) | [Leave a reply](#)

There were two parts to this calculus problem, and both parts are below. Time to sharpen your Calc skills, folks:

VIII. Do **BOTH** of the problems below.

22. The volume of a growing spherical cell is $V = \frac{4}{3}\pi r^3$ where the radius r is measured in micrometers.

(A) Find the average rate of change of V with respect to r when r changes from 5 μm to 8 μm . (2 points.) **Leave your answer to the nearest 100th.**

$$\frac{1}{b-a} \int_a^b f'(x) dx$$
$$\frac{1}{8-5} \int_5^8 4\pi r^2 dr$$
$$\frac{1}{3} \left[\frac{4}{3}\pi r^3 \right]_5^8$$
$$\frac{4}{9} \pi (8^3 - 5^3)$$
$$\frac{4}{9} \pi (512 - 125)$$
$$\frac{4}{9} \pi (387)$$
$$172 \pi$$
$$\frac{172 \pi}{3}$$
$$1211.61 \mu\text{m}/\text{sec}$$

(B) Find the instantaneous rate of change of V with respect to r when $r = 5 \mu\text{m}$. (4 points) **Round your answer to the nearest 100th.**

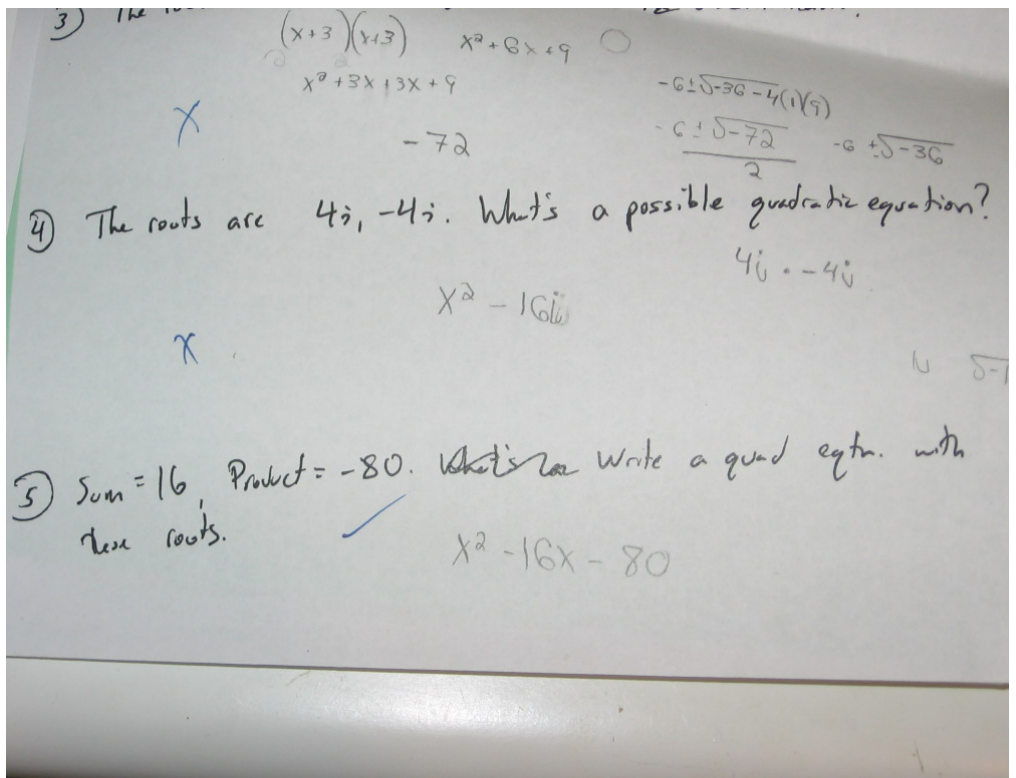
$$\frac{dV}{dr} = 4\pi r^2$$
$$4\pi (5)^2$$
$$100\pi$$
$$208.33 \mu\text{m}/\text{sec}$$

Calculus pros: what's going on here? Where did the student go right? Where did she go wrong? How would you help?

Posted in [Calculus](#), [Rates of change](#).

From complex roots to a quadratic equation

Posted on August 28, 2012 by [mpershan](#) | [Leave a reply](#)



How did this student end up with the answer he did? What does it seem that he knows about complex numbers?

Posted in [Complex Numbers](#), [Quadratic Functions](#), [The Complex Number System](#), [Uncategorized](#).

Khan Academy Potpourri

Posted on August 27, 2012 by [mpershan](#) | 3 Replies

I'm sitting on a bunch of Khan Academy questions from users that I marked as very interesting. I never posted them, and I feel a li cheap giving them all their own posts. So I figured I'd just dump the whole lot on you all. These questions reveal interesting things about the way these students are thinking. If you think that you've got something interesting to add, either on the diagnosis or prescription side of things, dig into the comments below.

The first is a nice probability puzzler. How did this student get 3/8?

Q. 1

there was a question on this website "A fair coin is flipped four times. What is the probability of getting tails at least twice? Write your answer as a simplified fraction". I did it like the one said here...but it said the answer is 11/16(which I can get by counting) but my answer was 3/8 using this exact method, i was going along ????. Please tell me what i'm doing wrong?it took my red bar to blue bar...it was gonna make me cry. HELP

[ShehaRyaR Khan](#) asked 8 months ago

4 answers

I love this conceptual question.

Q. 18

why do they use x and y or do they use more then x and y?

[hsd332189](#) asked about a month ago

45 answers

Not sure exactly why I clipped the first question here, but the second question is great. "Why do they call it a limit?"

Q. 6 Help! I'm not sure that I completely understand one point in this video. Starting at 6:15 Sal says, quote: "In this case the limit as x approaches 2 is also equal to 4, this is interesting because in this case the limit as x approaches 2 of f(x) does not equal f(2). Does this mean that when stating the limits of this function we must state BOTH that: $\lim_{x \rightarrow 2} f(x) = 4$ and $\lim_{x \rightarrow 2} f(x) \neq f(2)$? Everything else is clear.

Graham Simmons asked about a year ago

5 answers

Q. 3 Why did mathematicians decide to name it a "limit"?

Luke Daniel Johnson asked 2 months ago

3 answers

A good reminder: some vocab is tricky. Why are these two vocabulary words the one that this student confused?

Q. 1 @ 2:13, is transversal the same as perpendicular? thanks for answering :) :D

ekonadu asked 5 months ago

1 answer

This is a great point from a kid about variable use.

Q. 18 why do they use x and y or do they use more than x and y?

hsd332189 asked about a month ago

45 answers

A little bit of context for this next one: we're talking about protractors here.

Q. 13 How do you know which side to measure? I always seem to measure the wrong side which ever one I do.

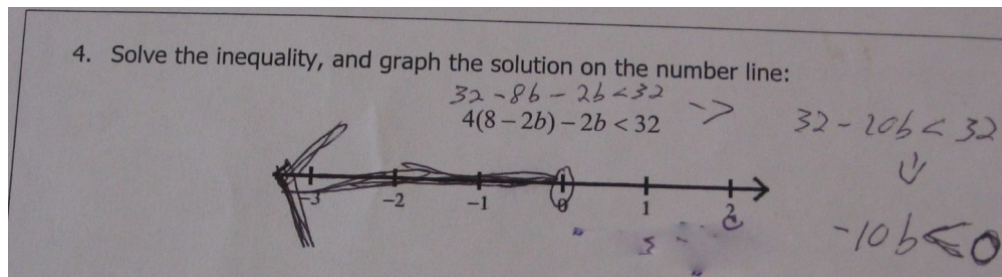
aishabashir9 asked 5 months ago

15 answers

Posted in [Conditional Probability and the Rules of Probability, Expressions and Equations, Limits.](#)

Solving an Inequality

Posted on August 24, 2012 by mpershan | 1 Reply



What's the mistake, and how would you move this student forward to a complete understanding of how to solve inequalities?

Posted in [Reasoning with Equations and Inequalities.](#)

4 cents short of a dollar

Posted on August 23, 2012 by mpershan | 7 Replies

I usually try to at least come up with an idea of what the student was thinking before I post these mistakes on the site. Sometimes though, I'm totally stumped. Here's one that got me:

15 Lamar had \$1.00 for a snack. He spent \$0.65 on an apple.

a. How much money does Lamar have now? Use a dollar sign (\$) and a decimal point (.) to write your answer.

\$0.31

b. Show or name a set of coins Lamar could have now.



How did the kid get that answer? Anybody?

Also, how would you help the student move forward?

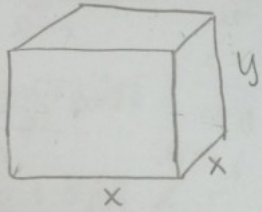
Posted in [Elementary School](#), [Measurement & Data](#), [Subtraction](#).

Santa's getting cheap: Minimizing the area of a box

Posted on August 22, 2012 by mpershan | 3 Replies

18. A box with a square base and open top must have volume of $32,000 \text{ cm}^3$. Find the dimensions of the box that minimize the amount of material used. (Only an algebraic, calculus-based solution will be accepted.) Please draw and label a diagram of your box. (10 points.)

$V = 32,000$



$V = lwh$
 $V = x^2y$

$32000 = x^2y$
 $\frac{32000}{x^2} = y$

$y' = \frac{0 - 32000(2x)}{x^4}$

$x^2y = V$
 $V' = 2x \cdot y + x^2 \cdot y'$

$0 = \frac{-64000}{x^3}$
 $x = 0$

This student knows stuff. What does the student know? Where did they go wrong, and why do you think they went wrong? How might you help?

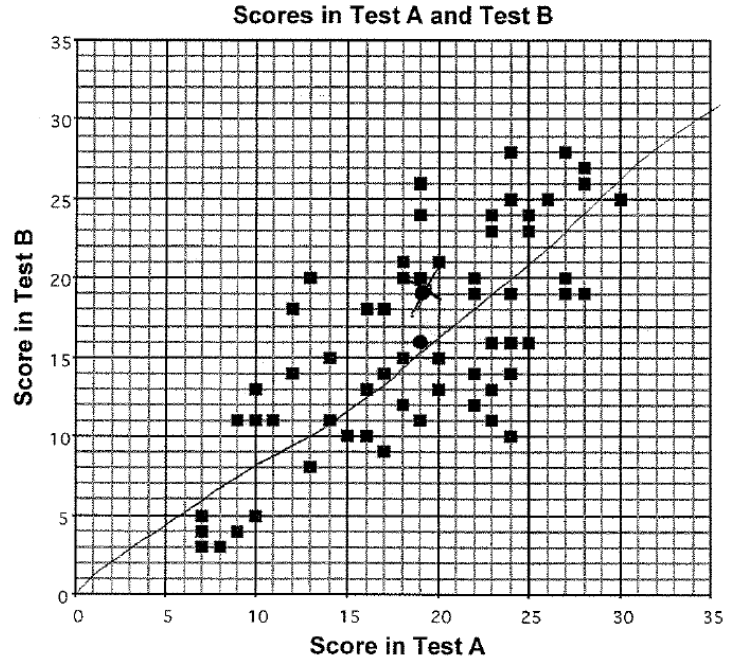
Posted in [Calculus](#), [Max/Min Problems](#).

Conceptual Understanding of Line of Best Fit

Posted on August 21, 2012 by mpershan | 5 Replies

Here's a conceptual question (taken from the [Shell Centre](#)) that provoked some solid responses from students:

A group of 66 students took two tests; Test A and Test B. In the scatter diagram, each square represents one student and shows the scores that student got in the two tests.



2. Draw a line of best fit on the scatter diagram.
How can a line of best fit be used?

Here are a few of the responses:

To find the average score
on test B when you know the
score for test A or to find
the score for test A when
you know the score
for test B.

To find an estimate of unknown test ^{score}
when you know the other.

2. Draw a line of best fit on the scatter diagram.

How can a line of best fit be used?

To show the average test scores

2. Draw a line of best fit on the scatter diagram.

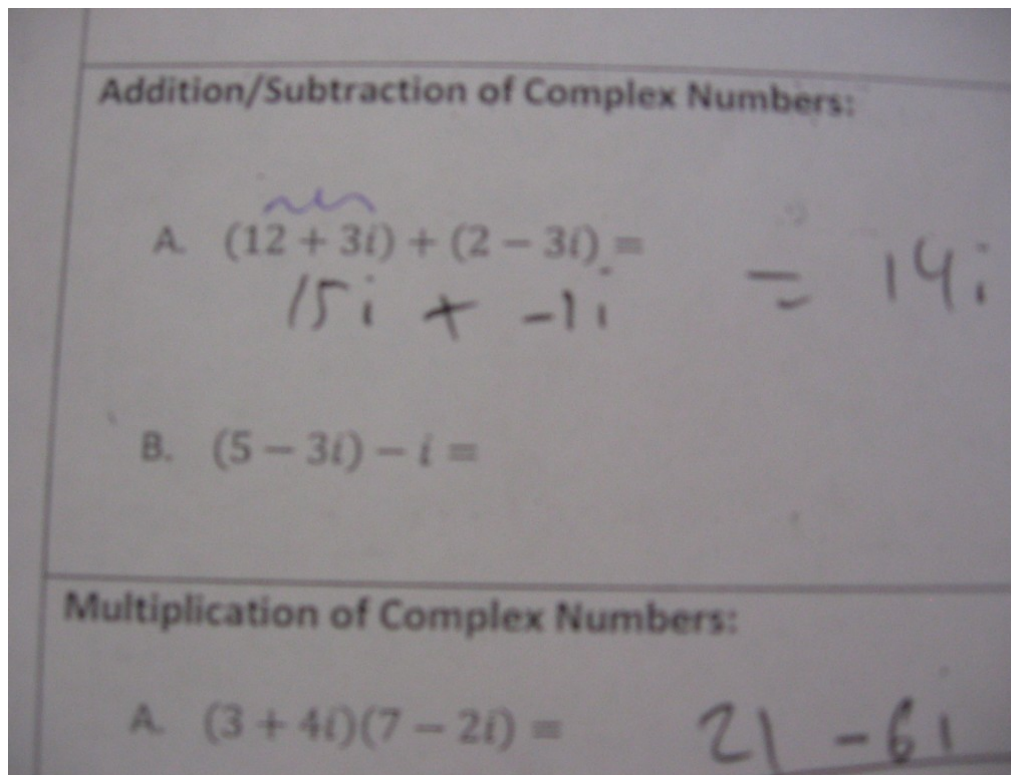
How can a line of best fit be used?

To see how close a person was to the
average

Posted in [Interpreting Categorical and Quantitative Data](#).

Adding Complex Numbers

Posted on August 20, 2012 by mpershan | 2 Replies



What is it about complex numbers that this student finds confusing? Do you think he would make an identical mistake on $(12 + 3x) + (2 - 3i)$? Why or why not?

Posted in [Complex Numbers, N.CN.2](#).

Call for feedback: Categories

Posted on August 18, 2012 by [mpershan](#) | [4 Replies](#)

Hey everyone. The way that I'm categorizing mistakes isn't really working for me, and I'm curious what all you users of the site think about what we've been doing.

Here are my questions:

1. Suppose that I stopped categorizing posts by CCSS standard (i.e. "A.REI.3") and instead used the CCSS categories (i.e. "High School – Algebra – Reasoning about equations and inequalities"). Would that bug you? Anybody out there really like the categorizing by standard?
2. Right now I categorize posts in two different ways. First, by topic and course (i.e. "Algebra 1, Inequalities") and also by CCSS. Let's say that I told you that I was going to just do the CCSS stuff. Would that make you happy/sad/morose/nonplussed, or would that have no impact in your life?

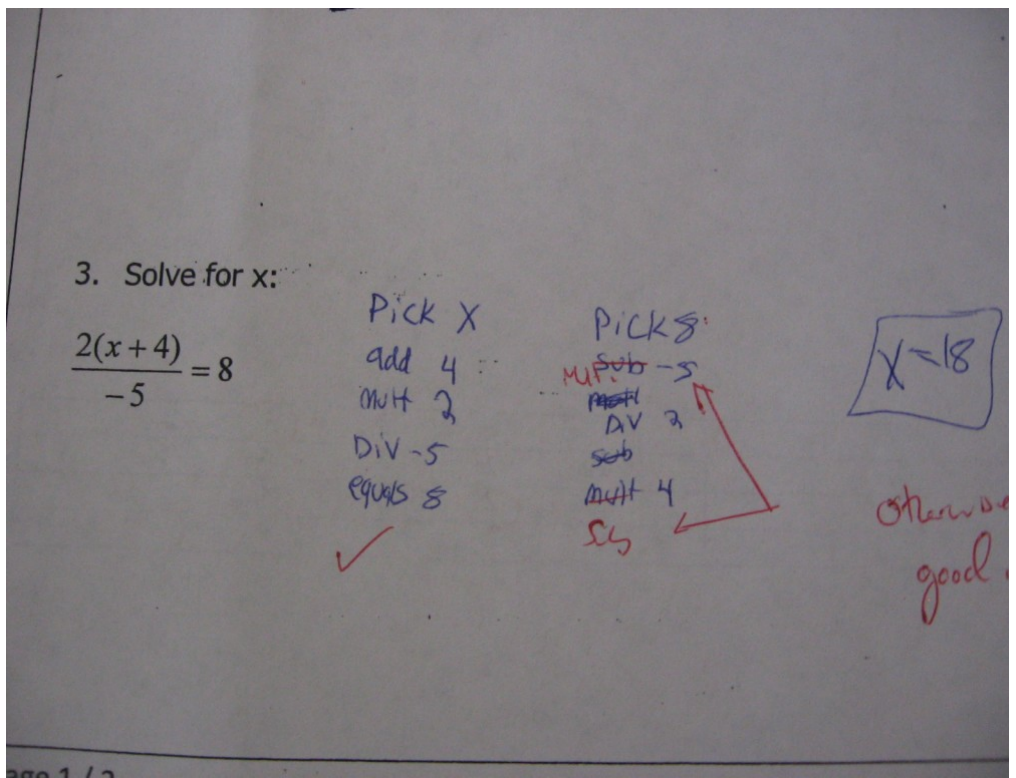
I'm looking for feedback. Please leave a few quick thoughts in the comments of this post.

(Also, feel free to start a more general conversation about features of the site.)

Posted in [Site Business](#).

Backtracking

Posted on August 17, 2012 by [mpershan](#) | [5 Replies](#)



What does the student understand, and what does she not? How would you help?

Posted in [8.EE.7, Solving Linear Equations](#).