

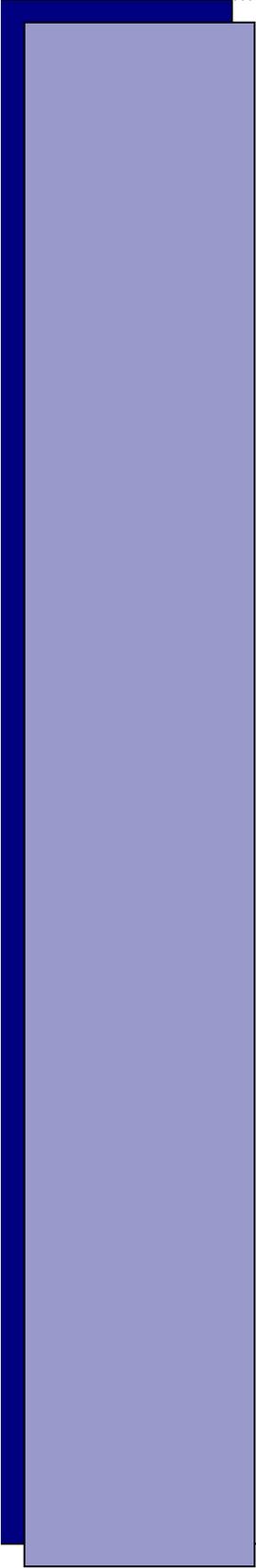
How to Help With Math Homework

When the
Answers
Aren't in the
Book



(A Guide for Students, Families, & Friends)

William Blatner

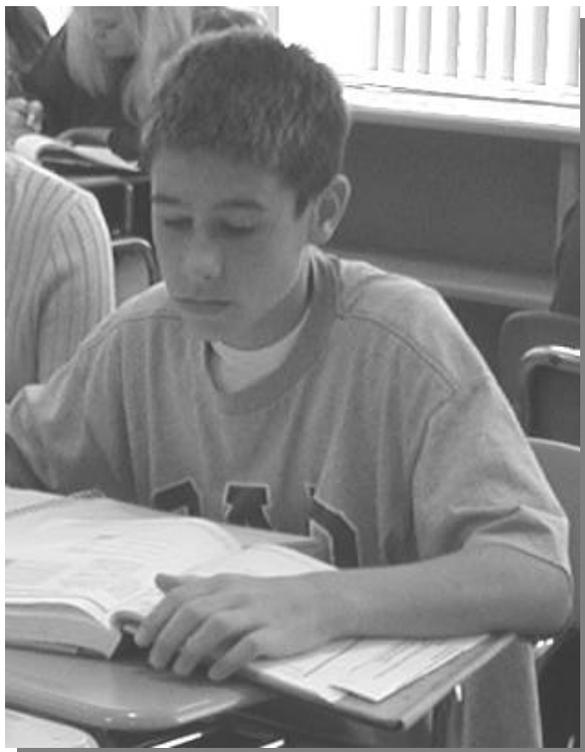


How to Help With Math Homework When The Answers Aren't in the Book, (A
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Many math curricula, such as the Interactive Math Program (IMP) and Connected Math Program (CMP), emphasize problem-solving and do not provide answers in the back of the book or worked out examples. So how are parents supposed to help?



IMP 1 student, Collin Sullivan ponders a new problem.

Two Initial Points to Keep in Mind

- Don't panic! You don't have to know the answer to help. Students need to learn how to be good problem solvers, not how to memorize one way of solving a problem. This pamphlet tells how you can help middle and high school students become good problem solvers.
- Be encouraging! Even if you had a bad experience in math class, don't give a student an excuse to quit. Math is not about memorizing rules and procedures. It is about making sense out of the world. Give a consistent message: "I believe in you! You can do it!"

The Hows and Whys of Homework for Students

Remember ...

It is the teacher's role to guide and frame discussion, lead students to the important mathematical ideas, connect mathematical concepts, ask questions that help students see things in new ways and provide the mathematical terminology that allows us to understand each other. It is the student's job to work hard and try to make sense out of the problems and ideas. Here are the most important points to keep in mind.

Effort is everything! The purpose of homework is to prepare you to discuss the problem and share solutions in small groups and with the whole class. At least 25 minutes of solid effort on each homework assignment will prepare you for the next day's class.



IMP 4 student, Chase St Andre, presents his understanding of the last night's homework.



Kathleen Mulvaney and Becky Cohen-Gorcyka compare solutions to a homework problem.

All in good time... Initially, effort is more important than the answer. Many solutions will be discussed and presented by students in class. If you have a solution to share, that's great. If not, a solid homework effort will prepare you to understand others' solutions and maybe find another of your own.



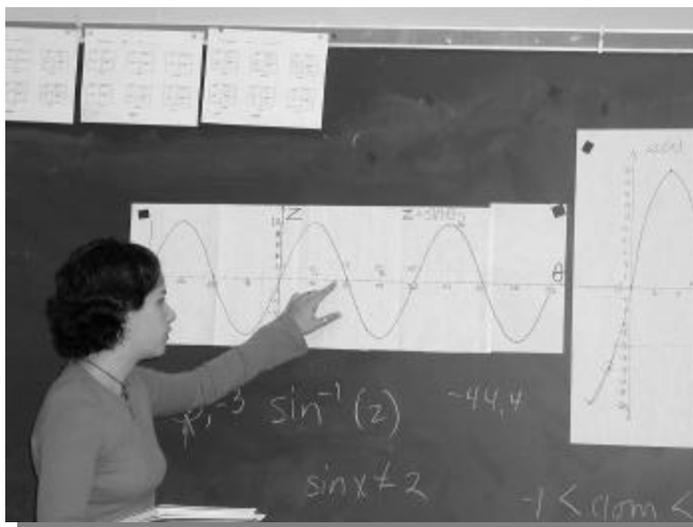
There's more than one way to be right! The correct strategy for solving a problem is the one that makes sense to you. If you can find more than one way, all the better.

Show your work! A record of your work shows effort, and helps the teacher understand your thinking. Good notes also help you participate in class and group discussion.

Students interact as a group to help each other understand the mathematical concepts

Keep your work! Homework assignments may be collected by the teacher to grade your understanding and effort. Keep all homework (as well as class work, problems of the week, etc.) organized in a notebook or binder. You will need them when it is time to hand in a portfolio of your work. You can also use your past homework to help with new assignments.

Make a time and place to do math every day. Spend a minimum of 25 minutes each evening on daily homework assignments. You will need additional time for problems of the week, unit assessments and portfolios. Homework helps you learn the most when it is done on time.



Lauren Richetti, an IMP 4 student, presents a graph

How to Help With Homework

As you may have noticed, your student's math book probably doesn't have the answers in the back or a lot of worked out examples. That's because we want to develop good problem solvers, not good memorizers of someone else's solution. Before we look at a specific example, here are some ways you can help your student become a good problem solver.

Listen to the student read the problem aloud and follow along in the text. In order to understand the question, we have to get the words right.

Ask the student to explain the problem in her own words. Before thinking about a solution, make sure you agree on the question.

Ask, "What have you tried so far?" Focus on the student's thinking, not yours. Ask the student to explain why he took that approach. Explaining the strategy often helps us make connections and see what else we can try.

Ask, "Does this remind you of a problem you've see before or a situation with which you are familiar?" If so, ask how the student would approach the similar problem. How is this problem different? How can we use our approach on the similar problem to attack this one?



IMP 2 teacher Gary Hall checks in with a group of students on their problem-solving strategy.

Suggest using smaller numbers and trying to solve the simpler problem. Then go back and try that approach with the original problem.

Ask if the student can make an estimate of the answer. If the answer is a number, about how big is it? Bigger or smaller than 1? Bigger or smaller than 10? 100? 1000? How do you know? Estimating can help us understand the problem better and suggest other steps we can take.

Suggest the student make a diagram. A picture or diagram of the situation can often clarify the relationships in the problem and suggest a solution.



Mike Poulin diagrams a problem situation in his IMP 3 class.

Ask if the student could guess and check. In many problems, we can try different numbers, check our results and then improve our guess.

Look for patterns. Suggest the student put results in a chart, table or graph to help reveal patterns.

Try working backwards. Sometimes the answer is given and you have to figure out how to get there.

Finally, always check your solution. Try to find a different method to confirm your answer.

A Sample Problem: The Broken Eggs



A farmer is carrying her eggs to market, but she hits a pothole and knocks over all the containers of eggs. Every egg is broken.

She goes to her insurance agent who asks her how many eggs she had. She says she doesn't know but she does remember some things from the various ways she tried packing the eggs.

When she put the eggs in groups of two, she had one egg left over. When she put the eggs in groups of three, she had also had one left over. The same thing happened when she put the eggs in groups of four, five and six. But when she put the eggs in groups of seven, she had complete groups of seven with no eggs left over.

What can the farmer figure out from this information about how many eggs she had? Is there more than one possibility?

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One approach... a sample discussion between a student and parent



Parent: What is this question asking us to find?

Student: I think we're supposed to figure out how many eggs she had.

Parent: That sounds right to me. What have you tried so far?

Student: Seven has to go evenly into the number of eggs. I tried some multiples of seven, but none of them worked.

Parent: Show me what you tried.

Student: Seven doesn't work because four times one is four and that makes three left over, but there has to be only one left over. Fourteen doesn't work because two goes evenly. There has to be one left over when you use two's. Next is 21. That

doesn't work because three goes evenly. This could go on forever.

Parent: Well, let's try a few more and see what happens. What's next after 21?

Student: 28 is next. That won't work because two goes evenly...wait...it has to be an odd number or else two goes evenly.

Parent: Good observation. What's next?

Student: Let's see...28 plus seven is...35. It's odd so two works. What about three?

Parent: How can we tell if three works?

Student: Let's see...three times ten is thirty, three more makes thirty-three - no good. It has two left over. This is impossible.

Parent: Let's not give up yet. What's next?

Student: 35 plus seven is 42. No good -- it's even. See, this could go on forever.

Parent: OK, let's make a list of what we've tried so far and see if that helps.

Student: All right...7, 14, 21, 28, 35, 42...hey, every other one is even. We can skip every other one. OK, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112. I can cross out the even ones.

Parent: Good. What about 49?

Student: I'm going to use the calculator. 49 divided by 3 is...16.3333. I don't get it. Oh, three isn't supposed to go into 49, it's supposed to go into 48. Sixteen times three is...48. It works for three. Let's see...4 times 10 is 40, 44, 48...so 4 works.

Parent: "Does five work?"

Student: Five's...I mean multiples of five, always end in zero or five. So to have one left it has to end in one or six. So the number has to end in one or six. What about 56? Wait...that can't work because it's even. So it has to end in one!

Parent: Wow. You're way ahead of me."

Student: The next one to try is 91. I can check if numbers go evenly into one less -- 90. Two is OK because it's even. Three times thirty is ninety -- that works. What about four? Ninety divided by four is 22.5. No good. What's next? I can use the calculator to add sevens --- 91, 98, 105, 112, 119, 126, 133, 140, 147, 154, 161 -- 160 divided by three is 53.333 -- no good.

Parent: You're going a little fast for me.

Student: What's the next one that ends with a one? ... 231. 230 divided by 3 is...76.66...no good. What's next? ...301. 300 divided by three works. 300 divided by four is 75 - that's OK. Five works because it ends with zero. 300 divided by 6 is...50...is that it? Is that the answer?

Parent: Can you check it?

Student: Two, three, four, five and six all have one left over and seven goes...43 times. That's it! I did it!

Parent: Wow, you really narrowed that down. Let's go back and make sure we answered everything.

Student: Oh no! It asks if there are other possibilities!

Parent: OK. Let's get a snack and then think about that one....



Suggested Materials for Math Students

The following is a list of materials that students should provide for their own use in math class and on homework.

- Three-ring binder or folder to keep homeworks, Problems of the Week, and class notes.
 - Line paper
 - Graph paper
 - Pencils
 - Colored pencils and/or markers
 - Ruler with centimeter and inch scales
 - Protractor
 - Calculator: Minimally, every student should have a scientific calculator with trigonometric functions (sin, cos and tan) for use at home. Graphing calculators are highly recommended, especially for students in upper grades.
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Notes:

