

We're going to go over some tips that I have for math exams. I think these are pretty standard tips, but they're based on my experience as a teaching assistant and as a course instructor who has graded lots and lots and lots of exams and talked to lots and lots of students about exams and have seen things where I think students can improve on how they prepare for a test.

Students prepare for exams in lots of different ways. I think most students do take exams seriously. Most students do care about how they do on a test. I've seen lots of different strategies that students use. I also have seen things that I think work well and things that I think don't work very well. And so that's what I want to talk about. I have 11 tips and I'm going to go in order of what to do before a test and then during a test and then after.

Number one, do any available practice exams. A lot of the time, not all the time, but many classes will have old exams or practice exams posted on the course website or web page. And I would recommend that you do them prior to the test. Now, don't do them the day before the test. Do them like a week before the test. That way you have time to go over and ask about any questions that you didn't get. Try to time yourself. Don't use it as a study guide. Make a study guide review for the test beforehand and then take the practice test and see how you do. Don't just look at it as a source of more questions to study with. Time yourself. Give yourself the same amount of time as you would for the actual test. And then after you take the practice exam, go over the answers and make sure that you know how to do them.

My second tip is more important. Don't just do practice exams. And this is a common mistake that students make. What a lot of students do is they find out that a test is coming up. Then they find these practice exams and they say, "Okay, I'll just look at them." And then a lot of the time they don't time themselves. They just kind of look at the questions and say, "I know how to do it. or okay, I'll do a few of them and then check with the answer key if there's an answer key." And then what happens? They show up to the actual test. They did the practice test and they did okay. So, they're thinking, "Okay, I'll probably do fine on the actual test." And then the questions they get are different from the questions on the practice test. And then they don't do as well as they would like, or they don't do as well as they thought they would do. That's a common mistake that I've seen and it's because they only did the practice tests. So don't just do the practice test. You also should study everything – the worksheets if there are worksheets, homework assignments, problems that are done in class. If your instructor does some examples in class, make sure you can do questions like that, that are similar. And also textbook problems.

One thing that a lot of instructors do is they will just look at the kinds of problems you had to do in class. So, worksheet problems that you had to do, homework problems you had to do, questions that they did in class, and just copy a question, just take that question and change the numbers a little and put that on the test. That's something that a lot of instructors do because it's hard to be creative and come up with interesting, creative test questions. Most questions for a

timed test are going to be fairly generic problems, questions that you see in any math class that's comparable. So make sure that you can do the questions on the worksheet and the homework and slightly different problems. That will probably help a lot and you can expect similar questions on the exam. I'm not saying that the whole exam is going to be similar to problems you've done, but a lot of it will be similar. I can't say for certain, but in my experience, that's how a lot of exams are written. You take a question that the professor went over in class or a question that you had to do for homework and then change things up a little bit and then put that on the test. That's a good thing - that's not a bad thing. It means that you can study for this. But – I'm emphasizing this again – don't just look at last year's exam and think that the questions are going to be similar to last year's exam. No, they might not.

I've seen exams where there was a homework question and they literally just copied and pasted the homework question and changed the 12 to a 5 and that was the problem. And there would be students who wouldn't get it. Students aren't necessarily going to study everything, but when you have a question like that, all students had to do to be able to get full points was to know how to do that homework problem and be prepared to do something very very similar. Don't pass up that opportunity. They can be challenging homework problems, but they're problems that you should be expected to know how to do for the test, and that are easy to prepare for. So, go over as much as you can on all the types of questions you've seen before.

One thing that instructors sometimes do is they'll just take a textbook, maybe not the textbook that was used in class, but it could be the textbook that was used in class, find a problem in the exercises, pick maybe an even one so the answer isn't in the back of the book, and then put it on the test. They didn't even change the number. They copied number 20 or whatever from section 6.5 and put that on the test. Most professors, when they're writing tests, aren't going to be spending tons and tons of time agonizing over what questions to put on the test, because there's not much of a point in doing that. Imagine a professor waking up one day and saying, Oh, I have to write a test. I want to get this done as soon as possible. So, I'm going to look at the worksheets. Scroll down if it's online homework, just see what questions there are. Okay, students had to do that. Let's look at the textbook and see some questions. Look at maybe some old exams, but you shouldn't count on just old exams. And then they'll put together a test and say, "There you go. I'm done." That's how a lot of instructors make exams. But don't say, "Well, this question that was similar to the homework didn't show up on the exam last year." Well, who cares? Nobody cares about what was on the test last year. That was *last year*. That was the final or midterm *last year*. So, don't just look at practice exams. Do them, but keep in mind that's only one source of practice problems. Don't only study that.

Number three. Focus on getting things out, not getting things in. What do I mean by that? Sometimes students will prepare by trying to jam in a ton of information into their brain. So, they're going to read over their notes. They're going to review the lecture notes, maybe flip

through the book, and then say, "Okay, that makes sense. I'm ready." That's what I mean by trying to get things in. But think about what you have to do on a test. You're going to be asked questions and you have to give answers. That's the kind of thing you should be practicing, giving answers to questions, not trying to get all the information into your head. So, when I say focus on getting things out, I mean focus on answering questions, responding to a prompt. And you can do that by looking at practice tests. That's a good source of problems. You can look at textbook problems and try to do those. If you have notes and a professor does an example in class, you can cover up the answer and see if you can do it yourself. That's a way to turn your notes into something that you can practice out of instead of just something that you look at.

Sometimes students, if they don't do well on a test, will say, "Well, I understand the concept. I'm going to class. I'm paying attention. I'm doing this and I'm doing that." But think about what they had to do on a test. Doing well on a test is not about going to class and understanding what the instructor was saying. It's about: here are some problems. You have an hour or so to do it. Get as many points as you can. And the more points you get, the better you'll do on the test. The fewer points you get, the worse you'll do on the test. That's really what it boils down to. So, don't forget that that's how you're going to be graded. Not how good your notes are or how much you are paying attention or anything like that. That matters, but it's not what's directly resulting in your score.

Number four, space out studying time. Of course studying matters. You can't just wake up before the test and then expect to do well on it. It takes time. And I would encourage you to actually do things with the intention of studying for the test. Don't just say, "Okay, I understand the material. I don't need to study." Not only the amount of time you spend matters, but how you space out your time matters. You shouldn't cram. Cramming is not an effective way to study for a test. Studying five hours a day or five hours the day before the test is not going to be as effective as one hour a day for 5 days. Now, if you think about that, that's 5 hours still, but you're going to get more out of spacing the five hours over a longer period of time than you would in the 5 hours leading up to the test.

One of the things about math is that you can't force yourself to learn math fast. You'll end up learning at whatever pace you learn. I would encourage you to take that into account as you're preparing. Most of the time, people learn things slowly. We learn a little bit each day and then it builds up over a long period of time, not just learning tons of information the day before. So think about that as you're planning how you're going to study for the test. And hopefully you do plan how to study for a test. Try to block out time in your schedule so that things are spaced out and not all at the last minute.

Number five, mix up the order that you practice problems. If you look at how homework is done and presented, it's lots of homework problems on one section then a bunch of homework

problems on a different section then a bunch of homework problems on a different section but they're all kind of the same topic. Once I saw a student who was doing problems, but all the problems were organized by section. So it's like, section 6.2 and then practice problems from 6.2 and practice problems from 6.3. And the student would go down the list and do them.

But on a test, it's not going to be like that. When a question shows up on a test, it's not going to say section 6.2, and it might not be next to questions from section 6.2, and that might throw you off. You might have one question that has several parts and then one part is on one section and then a different part is on a different section. You're not getting that kind of mixed up practice when you're just going in order. So don't just do review problems. Try to make it a mixed review and that'll be closer to what the test will be like. So, those are five tips about how you can practice and prepare for the test. Now, let's talk about actually taking the test.

Number six, show up on time. Most students are going to try to show up on time. So, that's not really a big tip. Know where the exam room will be in advance. Depending on the way your class does things, the room where you take the test might not be the same as the room where you are taking the class. Make sure you find out where the room is and what time the test is and try to show up early. Try to show up like 10 minutes early. Don't wait until 20 minutes before the test and then say, "Oh, I have to figure out where the test room is." Prepare for this in advance if you can. It just helps you stay calm when you kind of know what to expect.

And along those lines, feel free to bring anything to help you stay calm. Stuffed animal, whatever helps you feel calm. Good luck charm. That's fine. As long as you're not breaking any rules, like you might have to keep it in your bag, but if it helps you stay calm, then I think that'll be helpful. Bring extra pencils in case one of them breaks. There might not be a pencil sharpener in the room. And if you do only bring one pencil, then, of course, you're going to ask the instructor if they have a pencil, but they might not have any pencils with them. They might only have a pen, and then you have to do your test in pen, which you might not want to do. So bring extra pencils, erasers, that sort of thing. It just helps you feel that you are prepared.

Okay. So, now you get the test. Try to breathe deeply. Take a deep breath and tip seven, read the questions carefully. That's really important. Let's say this is a calculus class and you're asked to do an integral. Well, one of the things that you know from integrals is that if you change one of the numbers from a three to a four, it can turn the problem from a question that you can do to a question that's impossible. So if you're going to copy the numbers down, make sure that it's correct. Don't rush, make sure that you're doing the problem that they're asking you to do basically because the way these things are graded is if you do a different problem than the problem that was asked, it's hard to get any points, because these things are graded on a rubric. There are guidelines for how these things are scored. So if you do by accident the wrong question, you might be spending 10 minutes on that and what score are you going to get? Zero.

Because you didn't actually answer the question that was asked. You know that's not what you want. You want to make sure that if you're spending time, you're actually going to get points.

Number eight, don't skip steps. Make your solution understandable. Let me say something about how exams are graded. After you take the test, the professor collects all of them and makes a rubric and they might have made the rubric before even giving the test out. So there's a rubric, there's scoring guidelines for, if a student did this, give them this many points. If a student wrote that, give them that many points. And so a 10-point problem might be split up like that. And so, there are certain things that your instructor or your TA or whoever's grading test are looking for. It's important to make sure that what you wrote down actually has those things. Also, if you skip steps and then you write something that's incorrect, we can't give you credit for that. But if you showed the step of how you got it and you messed up the arithmetic, maybe you said that  $3 * 2$  was, you know, five instead of six, then we can say, "Oh, well, the student did the step correctly. They just messed up at the end." And then you can still get some points for that. So, don't skip steps unless they're very obvious. The rubric is written, at least in my experience, as something like three points for this step, three points for that big step, four points finishing the rest. So, if you don't show those big steps, then you can't get the points in between.

With that said, you probably will end up showing your steps because you're doing the problem. But I'm just saying, be mindful that you show your work and also that you make your solution understandable because whoever is grading this isn't going to be a mind reader. They have to grade what they see on the page and they are not supposed to say, well, this student probably meant to do this or they probably knew how to do it, but they just wrote down the wrong thing. No, your exam is graded based on what's written. If, in your head, you were thinking the right thing, but then you wrote down the incorrect thing, well, what's going to be graded? The incorrect thing because that's what you wrote down. Make your solution so that the person giving the score can see that yes you have the components and so you're going to get the score that you want. It's not a personal thing. It's just that the person needs to be able to check off the box, so to speak, and give you the points. And they can only do that if they actually see the things on your paper.

Number nine, feel free to answer questions out of order. Depending on past tests you've seen, especially if there were tests that were administered online, there might have been tests where you can't go on to the next question before answering the one that you have. But on a timed test, chances are you will be able to go back and forth between the questions. During the test, it's really all about getting as many points as you can get. The test is going to be out of a certain number of points. Each question is out of a certain number of points. Your goal during the test is to rack up as many points as you can get. And it may be that you know how to do number six on the test, but maybe not how to do number two. Well, don't spend all your time on number two not getting anywhere if you can be getting points on number six. You don't want to realize at the last

minute, the last question is actually really easy. I could have been getting full credit for that last question and then you didn't because you were spending all your time on the hard question. Get the easy points first and then focus more on the harder questions that you're not sure about. Put a little question mark on some of the questions if you're stuck and then go back to it later.

Number 10. Review your test after you get it back. Maybe you were embarrassed by how you did and it's very easy to get the test back and not look at your score. Kind of like, your professor hands you the test and you fold it over and put it in your backpack. Don't do that. Looking at it can be embarrassing. It can be difficult. It's okay. Take a deep breath and go through the test. Look at the feedback that you got. See which questions you got right, see which questions you didn't get right.

Make sure that you add the points and that you actually got the correct score. This is not really an issue when it's online grading. If your test is graded online, then it's automatic. But if your test is graded on paper and someone, your instructor or TA, whoever grades the test, adds up the scores themselves, they might have accidentally made an arithmetic mistake. They might have added the numbers and got 70 when it should have been 80 or 76 or something. Or maybe a question is out of 10 points and they took off two points, so it says minus two, but then in their head they did the wrong thing and they added two points instead of eight points. These things do happen, especially if you have one person grading lots of exams. It's easy to make an arithmetic mistake. It's not on purpose, it's just something that happens when you're trying to add up lots of different scores.

Hopefully the professor will go over the exam, or you will get an answer key, but they might not. That's okay. If you have any questions whatsoever about where you lost points or what you should have written or something like that, ask about it. Don't do it in a hostile way, like, "Hey, you gave me this bad score." Instructors do care about being fair and giving you an accurate score. They're not going to be like, "Well, I don't like you, so I'm going to give you a bad score." They're not going to be like that. They're going to have a rubric and they're going to grade based on the rubric. So, for math, it's actually pretty objective. The more progress you make on a problem, the more points you'll get. Don't ask for more points, because the professor graded on a rubric and had to follow the rubric.

The last tip is to reflect a little about what you could do to improve. This is always a good practice. If the test went well, think about, "What did I do that led to this result?" And if you didn't do well, then ask the same thing. "Could I have done anything differently?" If you think that you're going to do well on the test, but then you don't, it can be hard to know what you could have done differently. If you're in that situation then you should consider asking a TA or going up and talking to your professor and say, "Hey, I want to discuss my exam. Can we talk about it? I'm concerned about how I'm doing." And see what they say.

If you're not doing as well as you would like, but you kind of know the reason, like maybe you have multiple classes going on and there's a lot going on and it's hard for you to study and be as prepared as you would like, that's one thing. But if you're really trying, you're putting in lots of time and effort and you're still bombing the test and you're following the tips that I'm giving you, then that's a more serious thing. I would definitely encourage you to talk to a TA or a professor and see what they say.

It may be that the class you're taking is not at the right level. I understand that when it comes to math, a lot of students want to get through the classes, but if you're going to sign up for a class, you want to make sure that you have decent odds of doing well in the class. Make sure that you're signing up for classes that are an appropriate level for you, and you're going to learn more and do better that way. That's something that I have seen where students are not as prepared as they could be and it bites them later and they have to drop the class and then they're in a difficult spot. If that's happening to you, consider withdrawing from the class and spending time to rebuild your fundamental knowledge and skills, the prerequisite material, so that when you do take the test or when you do take the class again, you're going to be much better prepared for the class.

Those are my 11 tips for taking an exam. I can't make any promises, but I think that if you do follow these tips and you haven't, then you'll end up doing much better. If you're doing all these things and you're still not doing well on the test, then I'm sorry. I'm sorry that this is what's happening. In that case, I would really encourage you to see someone in person. Talk to your TA, talk to your instructor, and see what personalized tips they can give you. Show them what you've been doing to prepare. Show them your test and try to have that conversation with them. Best of luck.