OVERCOMING MATH ANXIETY

Workshop Materials
St Louis Community College
Forest Park
2014 - 2015
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MY MATHEMATICAL AUTOBIOGRAPHY

We all arrive to a math class by different paths. Each of us has had many experiences that have shaped how we think about math and how we do math.

What previous math courses/experiences have you had? Please include experiences before you arrived at StLCC, including elementary school, middle school, & high school.

Which math courses were positive experiences?

What made them positive experiences for you? Was it the grade you got? Was it the teacher you had? Was it your classmates around you? What things made it a good experience for you at the time?

Which math courses were negative experiences?
What made them negative experiences for you? Was it the grade you got? Was it the teacher you had? Was it your classmates around you? What things made it a bad experience for you at the time?

Describe your strengths in math. This can be challenging, but please try!

Describe your fears and concerns about math, especially about the math course you are now in (if you are taking math at this time).
**MATH ATTITUDES/BELIEFS INVENTORY**

- If you strongly agree with the statement on the left, record a 1.
- If you agree with the statement on the left, record a 2.
- If you agree with the statement on the right, record a 3.
- If you strongly agree with the statement on the right, record a 4.

<table>
<thead>
<tr>
<th>Statement 1</th>
<th>Statement 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>There will be many problems in a math class that I won't be able to solve, even if I try really hard.</td>
<td>I believe that if I try really hard, I can solve any problem in my math class.</td>
</tr>
<tr>
<td>There is only one way to solve most math problems</td>
<td>There is usually more than one way to solve most problems.</td>
</tr>
<tr>
<td>The best way to learn is to memorize the different kinds of problems and then memorize how to solve each type</td>
<td>The best way to learn is to make sure that I understand the big ideas in the class.</td>
</tr>
<tr>
<td>Some people have mathematical minds and some don’t. There isn’t any way to overcome that.</td>
<td>Some students may have more aptitude for mathematics than others, but everyone can become competent in math.</td>
</tr>
<tr>
<td>The teacher’s job is to show me how to do problems and then give me similar problems to practice.</td>
<td>The teacher’s job is more like that of a coach or guide—to help me develop the tools I need to solve problems.</td>
</tr>
<tr>
<td>A good math test consists of problems that are just like the ones we have done in class.</td>
<td>A good math test has problems at a variety of levels of difficulty, including some that are not just like those from the book or class.</td>
</tr>
<tr>
<td>If I listen to how my classmates solve a problem, I will get confused.</td>
<td>I want to hear what my classmates do to solve problems so that I can learn new ways of thinking about math.</td>
</tr>
</tbody>
</table>

A FABLE ABOUT MATHEMATICS

Once upon a time two young ladies, Maluva and Alissi came to the town called Math. People had warned them that this was a particularly confusing town. Many people who had arrived enthusiastically could not find their way around and, frustrated, finally gave up and left.

Maluva was strongly determined to succeed. She was going to learn her way through the town. For example, in order to learn how to go from her home to the nearest drug store, she concentrated on memorizing the clearly essential information. She had to walk 325 steps south, then 253 steps west, then 129 steps in a diagonal direction (southwest), and finally 86 steps north. It was not easy to remember all of that, but after getting help to walk the same path 50 times, she began to get the hang of it. In order to stick to the strictly necessary information and avoid overburdening her memory with additional unnecessary information (like the color of the adjacent buildings or the sizes of nearby bushes and trees) she always walked blindfolded.

After repeated exercising, she succeeded in learning her way to the drug store and also to the library. But there were too many routes to memorize: to the grocery store, the bus station, to a nice restaurant, to the bookstore, and so on. It was overwhelming! A lot of times she ended in a wrong place, which could be quite embarrassing on occasions. Finally she gave up; Math was too complicated for her.

Alissi on the other hand, had a different approach to learning the town of Math. To the shock of many, she did not even intend to memorize the number of steps of her walks. Neither did she use the standard blindfold that most citizens used for learning their way around, and she was always curious, looking at the different buildings, trees and bushes nearby, and everything else not directly related to her walk. Sometimes she walked dead-end alleys in order to find out where they led, even if it was clearly unnecessary.

Curiously, Alissi succeeded in learning how to get from one place to another. She even found it easy and amusing. She was particularly gifted. She must have had some very special genes; how else could she have succeeded while so many others failed?

**Adapted from: A Fable: Maluva and Alissi: The Story of Two Newcomers to the Town of Calculus, Emilio O. Roxin, University of Rhode Island, UME Trends, January 1991**
In what ways are you like Maluva when it comes to math class?

In what ways are you like Alissi when it comes to math?

Think of something that you are very good at (everyone is good at something). When you first started at this, were you as good then as you are now? What kinds of things did you do that made you as good at that thing as you are?

What do you think the moral of this story is? What—specifically—can you do to become more like the more successful student in this story?
PLANNING FOR SUCCESS

Time management is an important aspect of preparation that many students overlook.

Below, write down all of your commitments (including work, class meetings, sleeping, traveling, AND studying). Anything that is important to you should go in the list below; make an estimate of how long you need to each day/week to accomplish these things.

One good recommendation for successful studying is to budget at least 45-60 minutes EVERY DAY to work on math.

Another common rule that math teachers use is to recommend that you spend at least 60-90 minutes for every hour you are in class. That means if you are in class three hours every week, you should make plans to study math at least 3 – 5 hours every week. Many students need MORE work than this, while some need less.

On the next page is a weekly schedule that will help you to manage your time. Answer—honestly—some questions before filling out your schedule. What things are most important to you? Is your job more important than school? It’s ok if it is, but make sure that your schedule shows what’s important! If school is more important than work, or if your family is more important than school, make sure that your schedule shows it.

Make a schedule that is realistic: remember that you need to sleep, you need time to eat, and you need time to travel (to school, to work, etc.). Build in down time, time for breaks, and time to relax with family or friends. If you are too stressed out to work or study, you are less likely to succeed!
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<thead>
<tr>
<th>Time</th>
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REFLECT ON YOUR PLAN

Look at your schedule on the previous page, and answer the following questions:

1. Are you happy with the schedule you’ve mapped out? Why or why not?

2. Does it give you enough time to study for each class? Remember that you should plan on working on math for about 9 – 12 hours EVERY WEEK, including class time.

3. Do you have any spare time for other things, or are you overscheduled?

4. Will you be able to meet your commitments, or will they leave you feeling overstressed, overworked, or too tired?

5. Are there any changes you can make so that the schedule becomes a better one for you?
HOMEWORK VISUALIZATION

Write down what you see in your “mind’s eye,” based on the prompts given to you by the group leader.
STUDY VISUALIZATION

Write down what you see in your “mind’s eye,” based on the prompts given to you by the group leader.
TIPS FOR GOOD TEST PREPARATION

1. **Attend EVERY class meeting**
   Everyone gets sick from time to time, or has car trouble, or sleeps through an alarm. But if you want to succeed in math, you have to make sure that this doesn’t happen more than a couple times for the entire semester. When you have to miss a lot of classes, your chances for success go down.

2. **Take notes during class**
   Write down some things that the teacher says or does, but it’s usually not a great idea just to copy what the teacher does on the board. Instead, make actual notes to yourself that help you to understand and remember the ideas that are part of that day’s class. Things like: “This is important!” or “Watch out for this mistake,” or “This is just like what we did last week except for this one small change…” are more helpful than simply copying examples off of the board.

3. **Make sure you can do the homework without help**
   It’s okay to get help every now and then on your homework. That’s what homework is for! But if you need help on every item, or if you need to ask a friend, tutor, or your teacher before you can get anything done, that is a sign that you need more serious, in-depth help. There is an old saying: “Give a man a fish, and he eats for a day; teach a man to fish and he eats for a lifetime.” You should work really hard to “learn to fish;” don’t be satisfied with having someone else give it to you! If you need help on every item, that means someone is giving you their work. When you can do most of the work correctly without help (or looking at your notes), then you know you are making real progress toward learning.

4. **Study backward**
   Often, math concepts build on one another, so when you study the material at the end of a unit, you have to use skills and ideas from earlier in the unit. Sometimes students get stuck trying to catch up or cram a huge amount of material into a short time frame. Instead, start with the most recent material, and you’ll often find yourself studying the earlier material too!

5. **Make a cheat sheet**
   Most instructors do not let you bring a note-card or cheat sheet to an exam. But even if your instructor does not allow this, the process of making a cheat sheet that you would want to use is a great way to study! On a small sheet of paper (or a notecard), write everything that you think is most important to know and remember. That might include formulas, terminology, some of your notes from class, and examples that help you remember certain topics. Make sure that you’ve covered everything that is going to be on the exam, and then use the cheat sheet as your study guide.
6. **Go through the exercises WITHOUT writing anything down. Say to yourself HOW to do them.**
   The items on the exam are probably not going to have the same numbers as the problems you did for homework. BUT, you should be ready to use the same processes as you did on the homework. PROCESSES are usually the more important thing to concentrate on instead of the numbers or the specific correct answer to one item. Besides, your teacher is usually trying to see how well you understand processes and ideas, and is less concerned about whether you get the correct answer.

7. **Look for items in the book that ask you to “explain” or “describe”**
   Pretend that you aren’t allowed to use formulas or numbers on your exam. What kinds of questions might your teacher ask then? How would you answer them without “math?” Usually textbooks have special exercises at the end of each section that ask these kinds of questions. Look for them, try to answer them, and ask your instructor if your answers are on the right track.

8. **Try to come up with your own examples of concepts**
   Imagine that your teacher is going to ask you to make the test for the class. What kinds of examples and ideas should be on it? What examples were most common during class and on homework assignments? Those are the things that you want to make sure you are ready for!

9. **Review your notes and homework and make special note of topics/exercises that you had trouble with in the past**
   Then, ask your instructor about these items BEFORE the exam, preferably a couple days prior.

10. **Make a list of topics/exercises that you KNOW you are good at.**
    Those are the exercises you need to start with during the exam. Knowing what you are good at also helps give you confidence for the exam, not the kind of confidence that is false and leads to bad test grades, but confidence in your actual abilities that you have shown over time.

11. **Make a list of topics/exercises that you struggle with—hopefully it is a short list.**
    Visit your instructor during his/her office hours to talk about these topics.

12. **Take a chapter test and see how well you do.**
    Most textbooks and online math systems have practice exams at the end of each chapter. Make special note of items you can’t do, and ones you get wrong. Ask your instructor about them outside of class. Consider writing some of these items down and take them to the room where your class is held. Practice taking a test in the classroom!
## TEST PREPARATION CHECKLIST

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have attended every class since the last test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have completed every assignment since the last test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have taken notes during class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>My notes are clear and I can use them to look up ideas and answers when I need to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I began studying at least three days before the exam.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most of the ideas and exercises from my notes I can do on my own, <strong>without assistance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most of the ideas and exercises from the assignments I can do on my own <strong>without assistance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have reviewed my class notes</td>
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<tr>
<td>I have reviewed any Chapter Summaries related to the test</td>
<td></td>
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<tr>
<td>I have attempted the Chapter Test(s) in the textbook (or online)</td>
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<td></td>
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<tr>
<td>I have asked my instructor or tutor about questions that I still cannot answer on my own</td>
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<td></td>
</tr>
<tr>
<td>After asking my instructor or tutor about my questions, I retried those items and did them <strong>without assistance</strong></td>
<td></td>
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</tr>
<tr>
<td>I have made a note card for ideas/formulas/exercises that are the most important for this test and I have used that note card to study</td>
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<tr>
<td>I know which topics/ideas/exercises I can do easily</td>
<td></td>
<td></td>
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<tr>
<td>I know which topics/exercises that I will skip and come back to later if they appear on the test</td>
<td></td>
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</tr>
<tr>
<td>There are more topics/exercises that I can do easily on my own than ones that I would need to skip on the test</td>
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TIPS FOR GOOD TEST TAKING

Before the Exam:
1. Stop by the restroom BEFORE the exam. Some instructors do not allow you to leave class and return in the middle of an exam.
2. Arrive at least 5 minutes early to class. That way you have time to get yourself settled before the instructor hands out the test.
3. Put any required/allowed materials on your desk before the exam begins. That might include a calculator, something to write with, and maybe some scrap paper.
4. Some instructors allow students to use a notecard with formulas or some kind of “cheat sheet.” Make sure you understand your instructor’s policy on this before bringing one!
5. Thinking positively is important, but it does not mean deluding yourself! If you aren’t prepared, do not expect to do well! BUT, if you have done the work you need to do, you know which topics you are good at and which ones you are not. Give yourself credit for the things you DO know, and use your knowledge to help build some momentum on the test that can help carry you through the things you have trouble with.

During the Exam:
1. When you receive the test, write any formulas that you needed to memorize at the top so that you no longer have to keep them in your memory. Make sure to write them carefully so that you can count on them later.
2. Scan the entire exam before getting to work. Look for items that you know you can do well on, and pay attention to which items might give you some trouble.
3. START with the items that you know you can do correctly. That will help you get moving in the right direction and helps you build confidence in your work.
4. When you arrive at an item that causes you to struggle, write down ANYTHING that is related to the problem. The idea here is that doing something is always better on an exam than doing nothing.
5. Show as much work as possible. Your instructor wants to see how you arrive at your answers…even if your answer is wrong, you might receive partial credit if some of your work is correct.
6. Ask questions during the exam. If your instructor is able to help you by answering the question, then you are much better off than before you asked. If your instructor does not answer your question, you are no worse off than before you asked! Asking questions never hurts, but not asking questions usually does!

7. Do not worry about others who turn in their exams early. Sometimes they are finished with everything and got everything right, but often students turn in their tests early because they have given up. That’s not you!

8. DON’T GIVE UP! If you have worked hard to prepare for the exam, make sure that your hard work pays off! Use all your time. If you are finished early, use the extra time to check over your work.

9. Check your work. Make sure that your answers make sense and that you have supported your answers with ideas and sentences that make sense. If you aren’t sure, try writing your answer in a different way below your original answer, or talk to your instructor about what you have written so far.

10. If you feel yourself starting to lose control (panic/choke/develop anxiety), turn the test over, take some slow, quiet, deep breaths. You can also “tense up” your arms and legs and then relax them to release some pressure. Wait at least a minute or so before resuming your work. If that doesn’t help, ask your instructor if you can take a minute or two to get a drink of water. Sometimes, people are better able to calm down when they are moving.

11. Do NOT leave anything blank! Your instructor is trying to evaluate what it is that you know. If you can show that you know some things, even when you don’t get the right answer(s), you might earn partial credit.

12. If time is running out, make sure that you have an answer for EVERY item. If there are any that are blank, write whatever you can that is almost/possibly/sort of related to the question.

After the Exam:

1. Take a deep breath and relax…the exam is over!

2. If you have a chance, write a few of your thoughts down using the Post-Exam analysis sheet on the next page.
3. Make a list of some things you will do differently the next time around, using the Post-Test Analysis on Page - 25 -. 

4. When your instructor hands back the exam, use the two-column Test Item Analysis on page - 27 - to review your work and make sure that you know how to fix your mistakes—to avoid them in the future.
THE DIFFERENCE BETWEEN PANICKING AND CHOKING

Have you ever gotten to an exam you’ve worked really hard for and the moment the teacher hands you the exam, it feels like all your knowledge and studying flies out of your brain and into the air?

Lots of people experience this feeling, but it can happen for different reasons. Read more to find out:

The main difference lies in the experience of the people in the situation.

PANICKING:
People who find themselves in a “panic” situation are usually inexperienced at the task they are doing. They have practiced the task, but it is not “second nature” yet. That means that they still have to concentrate very hard to do the task correctly. But, if circumstances expose their inexperience, or point out holes in their expertise several things can occur. Usually, instinctual, involuntary responses arise, like sweating, nausea, increased heart-rate, or even bloody noses. Sometimes, people refer to this reaction as going into “fight or flight” mode. When this happens, concentration is impossible, which just makes things worse because the person needs focus and concentration to do the task in the first place.

CHOKING:
People who “choke” are experts at the task. They have worked so hard at improving their skills that it feels like second nature, almost as if they don’t have to think about what they’re doing, it just happens. But, if something occurs that’s out of the ordinary (or they encounter a small, unexpected failure), sometimes the expert second-guesses himself, and starts trying hard to avoid mistakes. That makes things worse, because what makes the expert good at the task is not trying! This extra concentration actually causes the person to make more mistakes, which just spirals downward quickly.
Some tips for avoiding a “panic”

1. Remember, panicking happens to students who aren’t very well prepared, and who have to concentrate very hard—often with someone helping them every step of the way—in order to do a task correctly.
2. Become as much of an expert about math as possible. Panic only happens to people who don’t have much experience! The more you practice and the better you prepare, the less likely you will panic!
3. That means you must prepare yourself for the exam as often and as early as possible! Study your math every day, practice your work by doing homework and extra exercises while brushing your teeth, or sitting in traffic. The more you carry math with you every day, the more comfortable you will be with it when it comes to exam day.
4. If you are nervous about how you are going to do on an exam, remember that making mistakes is ok, not knowing how to do something is alright! When you make mistakes in school, think of it as an opportunity to learn more and get more out of your college experience. Giving yourself permission to mess up makes it easier to avoid the instinctual responses that cause panic to set in.
5. Make sure you know what you are good at, and what you aren’t good at. That way, you are less likely to get flustered if you see something you don’t know on the exam.
6. If you can tell during an exam that you are starting to react negatively, turn the test over, and close your eyes. Tense your muscles and then relax them a few times. Take a few slow, deep, (quiet) breaths. This will help settle your heart rate, and help you stop the responses that lead to panic.

Some tips for avoiding a “choke”

1. Remember, choking happens to students who are already experts at something. Choking involves messing up on lots of things that usually would be extremely easy for them, things that they almost wouldn’t even think about.
2. Before the exam, visualize yourself doing the problems that you know how to do so well. Picture the equations and formulas in your mind, and how you will approach them. See yourself doing well on those items and how you will double check your work—not second guessing (which assumes you are wrong) but double checking (which assumes you are right, and you are just making sure).
3. If you find yourself starting to “choke” on an exam, quickly change the item you are working on keep going. Stopping and concentrating makes a choking situation even worse. You want to keep your brain “moving” and get back on track toward doing math without thinking “too hard.”

** For more information, see Malcolm Gladwell’s article about this in the New York Times: http://tinyurl.com/2fjyoup
POST-TEST ANALYSIS

Look at your graded test and analyze what kinds of issues caused you to lose points. Note the different kinds of errors that are common on exams:

Being **unprepared** for an item means you didn’t know how to do it because you hadn’t done the homework related to it, or hadn’t studied it before the test. It wouldn’t have mattered if you had been given all day and an open book for these items because you still wouldn’t have been able to do it correctly.

A **concept error** occurs on items that you thought you had studied and understood—maybe you even thought you did the item correctly—but you were missing something important that caused you to get it wrong.

A **careless mistake** is one where you did know how to complete the item and you used the correct process, but you made an easily avoidable mistake, like forgetting to write a number or sign, or made a simple arithmetic mistake that you don’t usually make. Keep in mind, if you make the same “careless” mistakes over and over again, they aren’t actually careless, they are concept errors!

On a separate sheet of paper make a chart like the one below and fill it in to determine where you lost the most points:

<table>
<thead>
<tr>
<th>Item</th>
<th>Unprepared</th>
<th>Concept Error</th>
<th>Careless Mistake</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Points</td>
<td>Total Points</td>
<td>Total Points</td>
<td></td>
</tr>
</tbody>
</table>

Which kind of error caused you to miss the most points?

What does this tell you about how you might prepare for the next exam differently?
What study skills and strategies worked for you while studying for this exam?

What strategies worked for you during this exam?

Looking back, what would you have done differently to prepare for the exam?

Looking back, what would you have done differently during the exam itself?

Make sure you go back and re-work EVERY item on the exam. It is a good idea to try this immediately after you get your score, but also about a week later, to make sure that the lessons you learned have stuck. Use the Test Item Analysis on the next page to help you with this task.

TEST-ITEM ANALYSIS

On a separate sheet of paper, make two columns like those shown below. List your mistakes and incorrect answers in the column on the left. Then, on the right side, do the following: Name the mistake and label it using the categories from the Post-Test Analysis (on page 25). If the mistake was careless, make the correction and write what would have happened differently as a result. If the mistake was a more serious one, write a few notes to yourself about what you need to understand differently. In ANY case, retry every item you answered wrong until you are confident you can get it right in the future—without assistance!

<table>
<thead>
<tr>
<th>Write down the Original Item and Name the Mistake</th>
<th>Correct the Mistake</th>
</tr>
</thead>
</table>

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USEFUL WEBSITES

LEARN MORE ABOUT MANAGING MATH ANXIETY:

Overcoming Math Anxiety WebShop:
http://bridge2success.aacc.edu
This site offers a “webshop” which contains some of the resources in this workbook, as well as some additional resources. You can work through the questions, and read about other students’ struggles. In addition, there are online “coaches” who give each person in the webshop advice which is tailored specifically to their situation.

A Math Museum!
This article describes the how we often inherit our math anxiety from others and how we can avoid passing it on!

ASSISTANCE WITH MATH:

Ask Dr. Math:
http://mathforum.org/dr.math/
This site offers a list of questions asked by students all over the world about just about any kind of math topic. Search the archive of questions or ask one of your own!

Free Practice:
www.interactmath.com
This site offers practice items from dozens of math books at all levels. You can practice your skills, and get help with buttons that say “Help Me Solve This,” or “View an Example.”

Free Math Help:
http://www.freemathhelp.com/math-lessons.html
This site has web-based lessons to help you with a variety of topics.

Geogebra:
www.geogebra.org
This website offers a free download of graphing software that also allows you to make and manipulate shapes. It’s a very powerful package offered for free!
ONLINE MATH GAMES/PRACTICE

Smart Phone & Tablet Games:  http://motionmathgames.com/
Motion math offers cheap games through the “App Store” or “Android Market” that can help you learn important ideas about fractions and decimals.

Catch-Up Math Games:  http://catchupmath.com/math-games/
These games are also for helping you to work through ideas from arithmetic and fractions

Online Flash Cards:  http://www.thatquiz.org/
This website is called “That Quiz” and it operates like a quiz, but you can also use it like flashcards. There are topics from basic arithmetic all the way up to calculus and statistics. Give it a try!

Online Math Activities/Applets:  http://illuminations.nctm.org
This website has a huge number of games based on topic.
HELPFUL MATH VIDEOS ONLINE

Just Math Tutoring
http://justmathtutoring.com/

Math TV:
http://www.mathtv.com/videos_by_topic#

Bright Storm:
http://www.brightstorm.com/math/

Education Portal Academy:
http://education-portal.com/academy/course/index.html

Khan Academy:
http://www.khanacademy.org/

Math Antics
http://www.mathantics.com/