

## The "Memorization" Project

*My middle schoolers don't know their multiplication facts. Should I make them memorize them for homework?*

If students understand the concept of multiplication and "know" most of their facts, memorizing those they don't know is in order since fluency is important in mathematics. One teacher handled this situation in the following way. Terry introduced her class to the three-week "Memorization Project." To begin, she wrote the facts (without answers) from  $0 \times 0$  to  $12 \times 12$  randomly on a sheet of paper. She photocopied it and distributed it to students, instructing them to write the answers to as many as they could in five or six minutes, without using a calculator. When the time was up, she collected the papers and circled those the students had missed. This was photocopied to use later as a reference for Terry. The next day, Terry told her class that during the next three weeks, they were all going to participate in a memorization project, and that students would be memorizing different things. Those who had some multiplication facts to learn would memorize them. Those who knew all of their multiplication facts would memorize other things- such as common measurement equivalents, the first ten prime numbers, common percent-decimal-fraction equivalents, the first ten square or triangular numbers, or so on. (Note: it is important that students have direct experience with those concepts before memorizing them since there is a cost in memorizing without understanding.) Those in the second category (who knew all their facts) had to tell Terry what they were going to memorize. Next, Terry taught the class how to study and provided them with three or four techniques for committing something to memory. She finally told the class that they would spend five minutes in class studying each day for the next three weeks, and on each Friday, students would have five minutes in which to record every fact that they had agreed to memorize. This paper would be graded each week for three consecutive weeks.

Every Friday, Terry had students record from memory what they were to memorize, and she collected and graded the papers according to what the student had agreed to memorize. She told me that she made the project three weeks long so students had enough repetition for the facts to become automatic. She also said that the first year she tried the project, she had made it only a week long, but it wasn't long enough for students to remember what they had agreed to learn. Furthermore, for those students who, at the end of the week demonstrated that they needed further practice didn't get the practice because the project was over! So the following year Terry lengthened the project to two weeks, and that still seemed too short. She finally extended the project to three weeks, which seemed about right. Most students managed to memorize the multiplication facts they didn't know yet in that time.

For those who hadn't, Terry took a careful look at which facts they were missing, and tried to determine was if the student had a studying issue or if the student didn't understand conceptually what was going on with multiplication. For those students, Terry provided additional support. She gave them a multiplication table and asked them several questions in an interview format. Terry asked the students to tell her about the table and how it worked. She asked them if they knew what happened if you multiply a number by zero what the resulting product would be. If the student could tell her that it was zero, Terry said, "So you know your zeros multiplication facts. Let's cross them off the table." She proceeded to draw a line through the zero row and column. "What about the ones multiplication facts? What happens when you multiply a number times one?" If the student answered correctly, she told him or her to draw a line through the ones row and column.

Illus. 11-6

<b>X</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>0</b>	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>1</b>	0	1	2	3	4	5	6	7	8	9	10	11	12
<b>2</b>	0	2	4	6	8	10	12	14	16	18	20	22	24
<b>3</b>	0	3	6	9	12	15	18	21	24	27	30	33	36
<b>4</b>	0	4	8	12	16	20	24	28	32	36	40	44	48
<b>5</b>	0	5	10	15	20	25	30	35	40	45	50	55	60
<b>6</b>	0	6	12	18	24	30	36	42	48	54	60	66	72
<b>7</b>	0	7	14	21	28	35	42	49	56	63	70	77	84
<b>8</b>	0	8	16	24	32	40	48	56	64	72	80	88	96
<b>9</b>	0	9	18	27	36	45	54	63	72	81	90	99	108
<b>10</b>	0	10	20	30	40	50	60	70	80	90	100	110	120
<b>11</b>	0	11	22	33	44	55	66	77	88	99	110	121	132
<b>12</b>	0	12	24	36	48	60	72	84	96	108	120	132	144

They continued this way with the fives, tens, twos, fours, sixes, threes, doubles and so on. Her reasoning for asking about the facts in this order was because she wanted the students to see that if you knew your twos, you could use that information to figure out the fours, and so on. By the time they had finished crossing out the fact the student knew, there were only a few facts left to memorize.

<b>X</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>0</b>	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>1</b>	0	1	2	3	4	5	6	7	8	9	10	11	12
<b>2</b>	0	2	4	6	8	10	12	14	16	18	20	22	24
<b>3</b>	0	3	6	9	12	15	18	21	24	27	30	33	36
<b>4</b>	0	4	8	12	16	20	24	28	32	36	40	44	48
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# Studying Techniques

by  
Roger Gallagher

There are five areas of studying which, if you practice them diligently, should help you raise your grade in every subject. With effort and motivation, you can do anything.

## I. CONCENTRATION

You have to concentrate if you are to study successfully. Here's what to do:

**a.) Get rid of distractions.** Some things are visually distracting, such as people, television, and what's going on outside the window. Face a blank wall when possible.

Sometimes you're distracted by what you hear. Don't listen to the radio because commercials are often loud, and when songs you like come on, you pay attention to them instead of to what you should be paying attention to.

**b.) Study in the same place at the same time each day.** Try to work at a table or desk. If you work on the couch, you'll want to do the other things you prefer to do on the couch, such as watching television. Don't study on your bed- you'll want to sleep. Study at the same time each day.

**c.) Quiet Hour.** Study quietly for an hour each day, regardless of how little homework you have. If you don't have much homework and have completed studying for the day, read or write quietly. Quiet is key.

**d.) Tackle your hardest subjects first.** Do those subjects you find hardest first. Finish with the subjects you like the most. That way you'll finish studying feeling good about what you've accomplished.

**e.) Take short breaks between subjects, or when you start fidgeting.** For five minutes, get up and stretch and move around when you finish each subject or when you notice yourself beginning to fidget.

## II. MEMORY

You are capable of remembering anything you set your mind to. A key idea is to associate- ask yourself, what does this remind me of? It will help you remember it. To do:

**a.) Count things.** How many are there? Nine planets, twelve state capitals, three steps in solving the math problem. That way, if you know there are three things you need to remember and you've thought of two, you know exactly what you need to remember, just one more thing.

**b.) Write it.** Saying answers to things aloud is not enough. You may be able to spell words aloud when someone gives you the word, but you know that all that means nothing if you can't write it on the test or correctly in daily writing. So once you think you know something, write it down. You'll know exactly what you know and what you don't know and need to learn.

Answer the questions that the teacher has asked in class, at home, in writing. You'll be amazed at how many of them show up on tests and quizzes, and how much better you'll do if you've answered it at home well.

**c.) Use index cards.** On one side write the new word or concept. On the other, write the definition or explanation. Do this for every new thing you learn.

**d.) Get the new word or concept three times.** Once in class, once that night, and again two nights later. For example, learn something new on Monday. Write the index cards on Monday night. Tuesday, write Tuesday's new words or ideas. Wednesday, write what you learned Wednesday on index cards, and review what you learned on Monday. Thursday, make index cards for all the things you learned Thursday and review what you learned Tuesday. Friday, write Friday's new words and ideas and review Wednesday's, and so on.

**e.) Use mnemonic devices.** Take the first letter of the things you're trying to learn. Arrange them in some sentence or way that you can remember. For example, the Great Lakes are Erie, Ontario, Michigan, Huron, and Superior. Take the first letter of each lake, E, O, M, H, and S. They can be mixed up to spell the word HOMES. Think- there are homes around the Great Lakes. Now you have a nifty device to help you remember the names of the lakes: H for Huron, O for Ontario, etc.

### **III. HOW TO READ FOR INFORMATION**

This one is simple. Read the introduction and conclusion of your text. Read the questions at the end of each section, or at the beginning if that's where they're listed. Now you know what you're reading for - the answers to those questions and the information in the intro and conclusion. Read the bold headings and things written in *italics* to find the answers. This is called skimming. Then read the required section. Write the questions down, and answer them in writing.

### **IV. HOW TO LISTEN FOR INFORMATION**

Write the teacher's questions down. When she asks you a question in class, you know you'll see it later on a test. Listen carefully to what is said, and don't write anything down until you understand it. When you are confused by what the teacher or someone else has said, ask them, "Can you say that another way?" or "Can you give an example?"

### **V. TEST TAKING AND TEST ANXIETY**

Test anxiety is easy to deal with. Breathe deeply, inhaling while you say "It's only a test, I'll do my best." When you take a test, should you guess? For teacher-made tests, yes. For computerized tests- ASK THE TEACHER. For some computerized tests you may actually get a better grade if you leave some questions blank. A general rule of thumb is, if you can eliminate 2 out of 5 guesses you should guess.

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