

## Suggested Problems

### Test 1

1.2: 1(a), 2(b), 4, 6, 7  
1.4: 1, 3, 6, 9  
12.1: 1, 3  
12.3: 4, 6, 8  
13.1: 1, 2, 6  
13.3: 1, 3, 6, 9  
13.4: 1, 2, 5, 6, 8  
15.1: 1, 2, 3, 4, 5, 8, 14, 22, 25  
15.2: 1, 2, 3

### Test 2

2.1: 3, 4, 7  
2.2: 1, 3, 5, 6, 9  
2.3: 2 – 10, 14, 17, 18, 24  
2.4: 1, 2, 4, 5, 8  
3.1: 2, 3, 7, 10  
3.2: 1, 2, 5, 7, 8, 10  
3.3: 2, 5  
3.4: 1, 3, 4, 9, 11, 13, 15  
3.5: 2, 3, 4, 6, 7, 8, 10  
3.7: 1 – 5  
4.1: 1, 2, 4, 5

### Test 3

5.1: 1 – 5  
5.2: 2, 3, 4, 7, 8  
5.3: 1, 3, 4  
11.1: 1, 3, 4, 7, 9, 10, 11, 13, 19, 21  
11.2: 2, 3, 7, 8, 10, 12, 16  
11.3: 1 – 6, 10, 11, 14, 18, 19, 24  
11.4: 1, 2, 3, 5, 6, 8, 9, 13, 16, 17, 19,  
21, 24

### Test 4

6.1: 1, 2, 4, 9, 10, 13, 14, 16, 18, 20,  
21  
6.2: 1, 5, 6, 7, 8, 9  
6.3: 1 – 5, 8, 10, 12  
6.4: 1, 2, 5, 6, 8, 10, 12, 15, 17, 18  
7.1: 2, 3, 4, 7, 8, 11, 13, 14, 15  
7.2: 1, 2, 4, 5, 9, 10, 11, 17, 18  
7.3: 1, 5, 8, 9, 13, 14, 15, 16  
7.4: 1, 4, 5, 8

### Test 5

8.1: 1, 2, 3  
8.2: 4 – 7, 10  
9.1: 3  
9.2: 2, 5, 7, 10, 12, 14, 18, 20, 22, 24  
9.3: 1, 2, 6, 8, 11, 14, 18, 21  
10.1: 2, 3, 4, 6, 8, 9, 11, 13, 14  
10.2: 1, 2, 4, 5, 6, 9, 12, 13, 14  
10.3: 3, 4, 7, 8, 10, 11

## Math 210A Portfolio

At the end of the class you are to turn in a portfolio which will include:

1. A title page and a table of contents
2. An introduction paper. Write your own mathematics autobiography. Be sure to include what classes you have taken, which ones you liked best and why, and which ones you liked least and why? What are your attitudes towards math, and your attitude towards this class? What skills would you like to work on this semester, as well as what skills do you already bring? This paper should be 1 – 2 pages typed, and grammatically correct. This paper is due on February 9<sup>th</sup>.
3. Each test with a reflection and test corrections (see below).
4. Five problem logs that will be turned in throughout the semester.
5. At least 10 in-class activities. Choose from your best work, the most challenging, and your favorites. With each of these problems there should be a cover page that tells why you chose the problem and what mathematics was used (typed).
6. A personal glossary with “in your own words” definitions and examples for words and expressions on the attached sheet.
7. A closing paper reflecting on the class. What did you learn in the class? Has your attitude about math changed? Do you feel more confident about teaching math in the elementary school? Did you reach your goals for the semester?

The test reflection tells how you did on the test. What were your problems taking the test? How could you do better? Did you make concept errors or computation errors? Did the test cover too much material or not enough? If you had difficulties on the test, what are you going to do to understand the material? Each test reflection is to be turned in the class after you get your test back. It is also to be included in your portfolio. The test corrections should be done on a separate piece of paper. All work must be shown. If you miss a test, be sure to get a copy of it and include a completed copy in your portfolio.

The portfolio should be turned in within a folder. The reflections and cover pages should be typed. Your papers should be free from grammatical errors and well written. The portfolio needs to be well organized, needs to demonstrate growth in mathematical knowledge, and needs to show evidence of reflection for full credit.

## Problem Log Guide Sheet

All responses to problem-log assignments will be collected 2-3 weeks after the assignments are handed out. Problem-log responses must be typed and written using the following format. Include as much detail as possible. Attempt each problem on your own before discussing it with others. An important part of the assignment is for you to reflect on your own problem-solving approaches. If you do subsequently discuss the problem with others, be sure to include that fact in your write-up and describe how the collaboration changed your thinking about the problem. All responses should be typed: equations, pictures, and/or diagrams can be written in.

The most important components of the assignment are your description of how you solved the problem and your reflections along the way. Finding the solution is only part of the problem-solving process. Be creative in your thinking. As a future teacher, you should realize that often more than one way can be used to solve many problems. You will need to encourage this realization whenever possible to promote creative thinking in your classroom.

**A. Understand the Problem.** Rewrite the problem in your own words. Doing so will help you be sure that you know what is being asked and what you need to find. Describe what information is given. What is the problem asking you to find? What information is needed? Identify hidden or important information. Describe your first reaction to the problem.

**B. Strategies to Solve the Problem.** Describe the possible strategies you could use to solve the problem and how you could implement them. You are encouraged to try more than one strategy with each problem. Diagrams and representations should be well organized and detailed. Explain why you selected a particular strategy to use with this problem.

**C. Solving the Problem.** Describe in detail the process and mathematics used to solve the problem. This section is the heart of the assignment. Identify your solution, and justify the mathematics. Also, describe your thought processes while solving the problem, and justify each step with complete thoughts. If you find and use a number pattern, attempt to discover if it exists in general and why. Similarly, if your answer involves a particular set of numbers, try to explain what properties of this set are relevant. Use multiple strategies to solve the problem where possible.

**D. Reflection.** Reflect on the process you used to solve the problem. Was it efficient? Is your mathematics correct? (This includes the thought process, not only the calculations). Could you have used another strategy? Does your solution make sense, and why? Are you confident about your solution?

**E. Extensions.** This step is important and will be valuable to you as a future teacher. How could you create a new problem from this one? Create a new problem using this problem as the basis. The problem should require students to use higher-level thinking and/or require them to explore mathematical connections with the original problem. You do not have to solve the problems.

## Problem Log Scoring Rubric

### Understanding the Problem

	<b>Emerging (1)</b>	<b>Developing (2)</b>	<b>Proficient (3)</b>	<b>Exemplary (4)</b>
Does the student's interpretation of the problem reflect the key issues in the problem?	Your interpretation of the problem was incorrect. You used wrong information to solve the problem.	Your interpretation of the problem was mostly correct. You used some but not all relevant information.	Your mathematical interpretation was correct. You used appropriate information	Your interpretation of the problem was correct. You identified hidden or important information not readily apparent.

### Strategies to Solve the Problem

Does the student identify and use multiple strategies and follow a logical and verifiable process toward a solution?	Your strategies were not appropriate. You did not seem to know where to begin. Your reasoning did not support your work.	You attempted to use an appropriate strategy and/or offered little explanation of your strategy	You used an appropriate, efficient strategy to solve the problem. You justified each step of your work. Your representation(s) fit the task.	You chose innovative and insightful strategies for solving the problem. You justified each step with complete sentences. Your diagrams were well organized and detailed.
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### Solving the Problem

Given the approach taken, is the solution performed in an accurate and complete manner?	Errors in computation were serious enough to flaw your solution. Your mathematical representations were incorrect. You labeled incorrectly. Your solution was incorrect. You gave no evidence of how you arrived at your answer.	You made minor errors in computation. Your representations were essentially correct but not accurately or completely labeled. Your inefficient choice of procedures impeded your success. The evidence for your solution was inconsistent or unclear.	Your computations were essentially accurate. All visual representations were complete and accurate. Your solution was essentially correct. Your work clearly supported your solution. The evidence for your solution was clear and consistent.	Your computations were completely accurate. You used multiple representations for verifying your solution. You showed multiple ways to compute your answer. The evidence for your solution was extremely clear and consistent.
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### Reflection

Does the student show deep reflection into the process used to solve the problem and the solution?	You recorded little reflection. Your reflections were extremely weak and showed no depth of thought.	Your reflection indicated some thinking throughout the problem. Your reflections were somewhat inconsistent or showed little depth of thought.	Your reflection showed serious thought throughout the problem. Consistent ideas and process were evident in your reflections. Your reflections showed depth of thought.	You gave a well-detailed summary of your reflections throughout the problem. You answered questions posed through the reflections and showed consistency. Your reflection shows serious depth of thought.
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**Extensions**

<p>Does the student create a higher-level thinking problem as an extension of the one given?</p>	<p>You gave a poor extension.</p>	<p>Your extension simply replaced numbers or ideas from the given problem. Very little creative and critical thinking was evident.</p>	<p>Your extension showed some creativity in requiring the use of higher-level thinking or requiring connections with previously learned mathematics.</p>	<p>Your extension was creative and required the use of higher-level thinking or connections with previously learned mathematics with more depth.</p>
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Sample Competency test for Math 210A  
All work is to be done on the exam. No calculator.

1. Perform the indicated operation:

$$4000 - 1279$$

2. What is the prime factorization of 182

3. What is the least common multiple of the pair of numbers 42 and 18

Questions 4 – 9: Perform the indicated operation. Answers are to be given in lowest terms.

4.  $3\frac{1}{2} \times 2\frac{8}{15}$

5.  $\frac{4}{7} + \frac{5}{7} + \frac{6}{6}$

6.  $\frac{3}{7} - \frac{1}{3}$

7.  $4\frac{7}{8} \div \frac{11}{3}$

8.  $12 - 9\frac{3}{7}$

9.  $10\frac{1}{3} - 4\frac{5}{6}$

10. Round the number to the place indicated: 4.7961 (hundredths)

Questions 11 – 12: Use the order of operations to simplify each of the following:

11.  $7 + 3 \div 5 \times 6$

12.  $7.06 + 4.85 - 3.9 \times 2.25$

Questions 13 – 15: Perform the indicated operation.

13.  $2.43 \times 0.29$

14.  $56.014 \div 13.632$

15.  $17.6 - 13.632$

16. Change the fraction into an equivalent decimal:  $\frac{15}{8}$

17. Change the fraction into an equivalent decimal:  $\frac{5}{11}$
18. Write 123% as a decimal
19. Write 60.6% as a fraction or mixed number in lowest terms.
20. A chemical is 42% pure. In 800 grams of the chemical, how much (in grams) of the chemical is pure?

### Answers

1. 2721
2.  $2 \times 7 \times 13$
3. 126
4.  $8\frac{13}{15}$
5.  $2\frac{2}{7}$
6.  $\frac{2}{21}$
7.  $1\frac{29}{88}$
8.  $2\frac{4}{7}$
9.  $5\frac{1}{2}$
10. 4.80
11. 10.6
12. 3.235
13. 0.7047
14. 4.109008216...(won't be this ugly)
15. 3.968
16. 1.875
17. 0.454545. . .
18. 1.23
19.  $\frac{303}{500}$
20. 336g

Key

Sample Competency test for Math 210A

All work is to be done on the exam. No calculator.

1. Perform the indicated operation:

4000 - 1279

$$\begin{array}{r}
 399 \\
 \cancel{4000} \\
 - 1279 \\
 \hline
 2721
 \end{array}$$

$$\begin{array}{r}
 91 \\
 \hline
 2 \overline{)182}
 \end{array}$$

2. What is the prime factorization of 182

2 \* 91 = 2 \* 7 \* 13

3. What is the least common multiple of the pair of numbers 42 and 18

42 = 2 \* 3 \* 7      18 = 2 \* 3 \* 3      LCM = 2 \* 3 \* 3 \* 7 = 126

Questions 4 - 9: Perform the indicated operation. Answers are to be given in lowest terms.

4.  $3\frac{1}{2} \times 2\frac{8}{15} = \frac{7}{2} \times \frac{38}{15} = \frac{133}{15} = 8\frac{13}{15}$

5.  $\frac{4}{7} + \frac{5}{7} + \frac{6}{6} = \frac{9}{7} + 1 = 1\frac{2}{7} + 1 = 2\frac{2}{7}$

6.  $\frac{3}{7} - \frac{1}{3} = \frac{9}{21} - \frac{7}{21} = \frac{2}{21}$

7.  $4\frac{7}{8} \div \frac{11}{3} = \frac{39}{8} \cdot \frac{3}{11} = \frac{117}{88} = 1\frac{29}{88}$

8.  $12 - 9\frac{3}{7} = 11\frac{7}{7} - 9\frac{3}{7} = 2\frac{4}{7}$

9.  $10\frac{1}{3} - 4\frac{5}{6} = 10\frac{2}{6} - 4\frac{5}{6} = 9\frac{8}{6} - 4\frac{5}{6} = 5\frac{3}{6} = 5\frac{1}{2}$

10. Round the number to the place indicated: 4.7961 (hundredths)

4.80

Questions 11 - 12: Use the order of operations to simplify each of the following:

11.  $7 + 15 \div 5 \times 6 = 7 + 3 \times 6 = 7 + 18 = 25$

12.  $7.06 + 4.85 - 3.9 \times 2.25 = 7.06 + 4.85 - 8.775 = 3.135$

Questions 13 - 15: Perform the indicated operation.

13.  $2.43 \times 0.29 = .7047$

$$\begin{array}{r}
 2.43 \\
 \times 0.29 \\
 \hline
 2187 \\
 486 \\
 \hline
 .7047
 \end{array}$$

13.  $632 \overline{)411}$

$$\begin{array}{r}
 411 \\
 \hline
 560 \\
 \hline
 545 \\
 \hline
 14 \\
 \hline
 136
 \end{array}$$

14.  $56.014 \div 13.632$

$$\begin{array}{r}
 56.014 \\
 \div 13.632 \\
 \hline
 4.109
 \end{array}$$

15.  $17.6 - 13.632$

$$\begin{array}{r}
 17.600 \\
 - 13.632 \\
 \hline
 3.968
 \end{array}$$

rounded to 3 places after decimal

$$\begin{array}{r}
 .45 \\
 \hline
 11 \overline{) 5.000} \\
 \underline{44} \phantom{00} \\
 60 \\
 \underline{55} \\
 50
 \end{array}$$

$$\begin{array}{r}
 817 \\
 \hline
 8 \overline{) 7.000} \\
 \underline{64} \phantom{00} \\
 60 \\
 \underline{60} \\
 0
 \end{array}$$

16. Change the fraction into an equivalent decimal:

$$\frac{15}{8} = 1\frac{7}{8} = 1.875$$

17. Change the fraction into an equivalent decimal:

$$\frac{5}{11} = .45$$

18. Write 123% as a decimal

$$1.23$$

19. Write 60.6% as a fraction or mixed number in lowest terms.

$$\frac{606}{1000} = \frac{303}{500}$$

20. A chemical is 42% pure. In 800 grams of the chemical, how much (in grams) of the chemical is pure?

336 grams

$$\begin{array}{r}
 800 \\
 \times .42 \\
 \hline
 1600 \\
 3200 \\
 \hline
 336.00
 \end{array}$$