

Study Guide: Elementary Mathematics Competency Exam for Prospective Master in Teaching Students - K-8 Certification Option

NOTES REGARDING THE COMPETENCY EXAM:

- To meet the minimum competency level, you must achieve a score of 80% or higher. As the exam can only be taken once, individuals scoring less than 80% must enroll in and successfully complete EPDMA2 9120 or Math 2080 or an approved equivalent course before entering the program. (Note: If you are entering the program in the Spring, you may take EPDMA2 9120 (or its approved equivalent) during the Summer quarter between block I and block II of the MIT program but you cannot proceed in the program until this requirement is met.)
- If you have successfully completed either of these courses or their approved equivalent elsewhere, you need not take the exam.
- The exam is offered multiple times each year. Contact the MIT program's administrative assistant for the exact dates and times.
- Within approximately two weeks of your completion of the exam, the MIT program administrative assistant will contact you to inform you of your score.
- Although there will be a good deal of calculation necessary during this test, **we cannot allow the use of books, notes, or a calculator.** This is because we will be trying to evaluate your understanding of and ability to clarify and demonstrate as well as to use some of the basic operations and concepts in elementary and middle school mathematics.
- Because the *process* is so important in teaching mathematics, you will need to show all of your work.

The topics that are addressed in the Mathematics Competency Exam come from the Washington State K-8 Mathematics Learning Standards (Common Core State Standards). You can find these topics further developed at <http://www.k12.wa.us/mathematics/Standards.aspx> Click on: [Washington State K-12 Learning Standards \(Common Core State Standards\)](#) (93 pages).

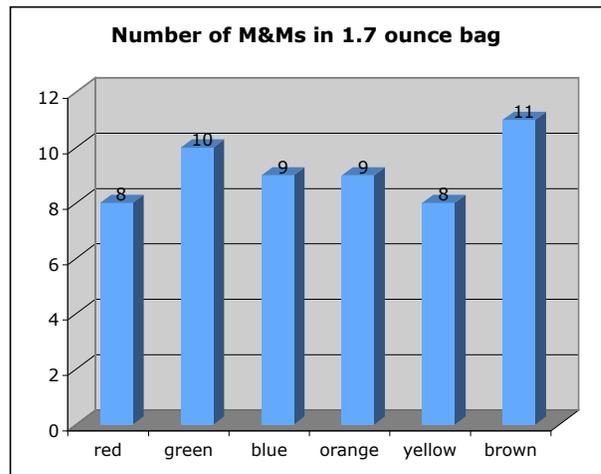
Sample Problems - MIT Mathematics Competency Exam for K-8 Teachers

Here is a selection of problems and exercises that may be useful to you as you prepare for the MIT Mathematics Competency Exam. These problems are meant to give you a feeling for the difficulty of the test. They are not meant to represent the length of the test nor the full range of skills or concepts addressed by the test.

1.) A Moped gets $62\frac{2}{3}$ miles per gallon. To the nearest mile, how far can you get with \$10 if the price of gas is \$3.20/gallon?

2.) A turkey takes 20 minutes per pound to cook at 350°F. It's a 15 lb turkey and it's been cooking for $1\frac{3}{4}$ hours. How much longer does it have to go?

3.) In a 7th grade class each student was given a bag of M&Ms for a class investigation. Each bag weighed 1.7 ounces. Each student counted the number of M&S of each color and recorded the results. The chart at right shows the means for each color.



a.) Which color was found most frequently?

b.) On average, how many M&Ms, regardless of color, were there in each of the 1.7 ounce bags?

c.) Assume that a 5.95 ounce bag of M&Ms has the same six colors in the same proportions as in the smaller bags. How many green M&Ms would you expect to find in the 5.95 ounce bag?

4.) a. What is the Least Common Multiple (LCM) of 7 & 12?

b. What is the Greatest Common Factor (GCF) of 72 and 54?

c. What is the prime factorization of 520?

5.) The 620 children at Scholar Elementary School are to be transported by bus to the zoo. Each bus can take 35 children.

a.) How many busses will be needed to take all 620 children to the zoo?

b.) Assuming that all of the busses are loaded to their capacity (35 children) except for the final bus, how many empty seats will there be on that final bus?

c.) If admission to the zoo costs \$3.50 per student, how much will it cost to get all 620 children into the zoo?

Here are a couple of exercises. Please fill in the blanks. Show any work!

6.) a.) $\left(\frac{2}{5}\right)^3 + \frac{3}{4} = \underline{\hspace{2cm}}$ b.) $75.03 \times (-4.5) = \underline{\hspace{2cm}}$

7.) A person who weighs 160 lbs needs 2000 calories per day. Assuming that caloric need is a function of weight, how many calories does a 28 pound child need?

8a.) There are roughly 200 million cars in the US... If each of them has an average of 2000 inches of wiring, how many inches of wiring are there altogether?

b.) If 20% of the cars suddenly become eligible to be upgraded with 400 more inches of wiring, and 60% of those owners choose to do so, how much wire should be produced?

9.) The members of a 12th grade class are sitting in a circle, holding hands, and meditating. They are evenly spaced and are numbered in order. Student number 7 is sitting directly across from student number 17. How many students are there?

26. Melinda has just been given a new music player that can hold 2,400 average length songs. She has had it for 12 weeks and has already acquired 450 songs.

a.) If she continues to acquire songs at this rate how many weeks will it take her to reach the music player's capacity (2,400 songs)?

b.) If she paid 99 cents for each of her 450 songs, how much money has she spent on them?

c.) If the average length for her 450 songs is $3\frac{1}{2}$ minutes, how long would it take her to listen to all of the songs?

12.) Joe has:

1 pair of brown and 1 pair of orange pants;

1 brown, 1 orange and 1 teal shirt, and

1 silver, 1 green, 1 tan, and 1 red sweater.

How many different combinations can he wear?

13.) Please list the terms that complete a possible pattern in each of the following. Classify each as an arithmetic or geometric sequence or neither.

a.) 0, 1, 3, 6, 10, __, __, __,

b.) 1, 8, 27, 64, __, __, __,

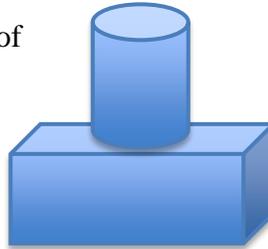
Give an expression for the n th term in this sequence.

14.) Audrey's salary this year is \$38,500. She received a whopping 4% raise from last year to this year. What was her last year's salary to the nearest dollar?

15.) What is the volume and surface area of the figure shown below which consists of a rectangular box with a cylinder attached to the top?

The box has a length of 8 cm, a depth of 2 cm and a height of 2 cm.

The cylinder had a height of 3 cm and a radius of 1 cm.



These and other important concepts and skills needed by elementary mathematics educators are addressed in the text used in EDPMA2 9120 - Mathematics for K-8 Teachers. The current text is by Tom Bassarear, (2005). Mathematics for Elementary School Teachers. (3rd Edition) Houghton Mifflin Company.

Another useful text is Elementary and Middle School Mathematics: Teaching Developmentally (any edition), by Van De Walle, et. al..

Either text should be adequate. The important thing is to examine the topics listed below and to brush up as needed on those concepts and skills.

Math 2080, offered in the Mathematics department at Seattle University, is considered an equivalent to EDPMA2 9120. If you successfully complete either of these courses, you need not take the test. These courses are highly recommended for all MIT students intending to teach mathematics at the elementary or middle school level.