Math 13700 Mathematics for Elementary Education I Spring 2018

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Welcome to Mathematics for Elementary Education courses at Purdue!
Course goals are to prepare you to:

- Be a knowledgeable and confident math teacher in the elementary classroom
- Have a deep understanding of the reasoning behind math processes
- Be able to clearly articulate math ideas with correct vocabulary

Your future students will need to know more than how to find a number answer. You will often be asked to explain your thinking or describe the process you use to solve a problem. Be prepared to show step-by-step math work and to explain your thinking clearly. Homework, quizzes, and exams will be graded accordingly.

I. Learning Objectives:

1. To model and perform arithmetic operations in bases other than base ten.
2. To convert numbers to scientific notation and perform arithmetic operations in scientific notation.
3. To perform operations with signed numbers.
4. To use properties of addition and multiplication to facilitate arithmetic.
5. To determine when two fractions are equivalent and to convert to decimals and percentages.
6. To use divisibility rules to determine greatest common factors to decide whether numbers are prime.

II. Textbook:

Textbook: Reconceptualizing Mathematics **3rd Edition** by Sowder, Sowder, and Nickerson, W.H. Freeman, 2017.

- This book provides activities, discussion ideas, and questions that stimulate a deep level of thinking. We will use this workbook daily in class, and reading the section in the text before class is recommended to assist in achieving a high grade in the course.
- We will also use manipulatives to help us understand or demonstrate concepts. These manipulatives will appeal to different learning styles, and you may find them useful in clarifying ideas. Because it will be important to use them in your teaching for the benefit of your students, you will gain valuable experience using manipulatives in this course.

III. Grading:

Grading: Grades consists of three (3) evening exams (100 points each), quizzes (100 points total), homework (50 points), and a comprehensive final exam (150 points). An instruction sheet for determining your grade is available on the web page. Note that a point on homework or quiz is not equivalent to a point for the course. The following will note the grading scale, description of graded assignments, and academic integrity expectations:

Course grades are based on the following scale:

%	Grade
98 – 100	A+
90 – 97%	A

%	Grade
80 – 89	B
70 – 79	C

%	Grade
60 – 69	D
Below 60	F

A minimum of 360 points is required to earn a D or better in the course.

- **Homework:** You will turn in homework every class period. *Late homework is not accepted.* Occasions arise to prevent students from attending class. Therefore, your 4 lowest homework scores will be dropped. Homework should be done neatly and with care, all steps must be shown, and multiple pages should be stapled (one point will be deducted from each homework assignment not stapled). Correct answers without work or with incorrect work may not receive credit. The instructor will decide which problems or parts of problems the grader will grade. Only a few problems on each assignment are graded. This means that sometimes the problems selected are the ones you have incorrect or they might be ones that you have correct. Students are encouraged to attend office hours as a way of getting help with assignments or checking answers.

- **Quizzes:** Quizzes will be given frequently. It is wise to review recent lessons as a way of studying for quizzes. Two quiz scores will be dropped to allow for absences. No make-up quizzes are given. Class participation will count towards one quiz grade. Be prepared to volunteer your ideas during class discussions.

- **Exams:** Exams are intended to cover the ideas from the text but not to mimic the homework questions. Questions may require thinking or problem solving not represented by the homework questions.
    - Exam 1: Monday, February 5, 2018 from 6:30-7:30pm in BRNG 2280.
    - Exam 2: Wednesday, March 7, 2018 from 6:30-7:30pm in BRNG 2280.
    - Exam 3: Wednesday, April 11, 2018 from 6:30-7:30pm in BRNG 2280.

    - Put these dates and times on your calendar. Make-up exams will be given only if you have a valid excuse *with documentation* and Brooke Max has been notified prior to the exam. If you are unable to notify her prior to the exam, *a valid explanation with documentation for the missed exam must be provided*. Unexcused absence from an exam may result in a grade penalty.
- **Academic honesty** is expected at all times. Academic dishonesty could result in a 0 for the assignment or exam or an F in the course. Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breeches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

Purdue Honor Pledge:

As a Boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together – we are Purdue.

Link to video description: https://www.purdue.edu/provost/teachinglearning/honor-pledge.html

IV. Logistical Information

- **Attendance:** Please discuss illnesses or circumstances that lead to excessive absences privately with the instructor to make appropriate accommodations. With 4 homework scores and 2 quiz scores dropped, most absences should be accounted for.
- **Cell Phone Use:** Checking for messages and sending text messages is not appropriate during class time. Be polite and leave your cell phone alone during these 50 minutes.
- **Calculators:** Another goal of the Mathematics for Elementary Education courses is to be competent doing arithmetic of whole numbers, decimals, fractions, and percentages by hand. Because of this, **No calculators are allowed on quizzes and exams.** Occasionally, a calculator will be useful for homework problems or in-class work. There will also be three quizzes given during the semester called "Arithmetic Skills Quizzes." To be prepared for those, a study guide is available on the course web page.
- **Course Evaluation:** During the last two weeks of the semester, you will be provided an opportunity to evaluate this course and your instructor. At that time, you will receive an official email from evaluation administrators with a link to the online evaluation site. Your feedback is vital to improving education at Purdue. I strongly urge you to participate in the evaluation system.
- **Campus Emergencies:** In the event of a major campus emergency, course requirements, deadlines, and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Information will be available at www.math.purdue.edu/MA13700. If a fire alarm sounds, leave the building immediately and collect by the fountain outside. You may dial 911 for a campus emergency.
- **Last Day to Drop a Course:** Friday, March 9, 2018 @ 5:00 pm

V. Resources

- **CAPS**: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 and http://www.purdue.edu/caps/ during and after hours, on weekends and holidays, or through its counselors physically located in the Purdue University Student Health Center (PUSH) during business hours.
- **For students certified by ODOS adaptive services**
    - If you have been certified by the Disability Resource Center (DRC) as eligible for academic adjustments on exams or quizzes, see http://www.math.purdue.edu/ada for exam and quiz procedures for your mathematics course or go to MATH 202 for paper copies.
    - In the event that you want to be certified by the DRC, we encourage you to review the procedures prior to being certified.
    - For all in-class accommodations, please see your instructor outside class hours – before or after class or during office hours – to share your Accommodation Memorandum for the current semester and discuss your accommodations as soon as possible.

MA 13700 Calendar Spring 2018

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1 01/08-01/12	Lesson 1		Lesson 2		Lesson 3
Week 2 01/15-01/19	No Class – MLK Day		Lesson 4		Lesson 5
Week 3 01/22-01/26	Lesson 6		Lesson 7		Lesson 8
Week 4 01/29-02/02	Lesson 9		Lesson 10		Lesson 11
Week 5 02/05-02/9	Review Exam I BRNG 2280		No Class		Lesson 12
Week 6 02/12-02/16	Lesson 13		Lesson 14		Lesson 15
Week 7 02/19-02/23	Lesson 16		Lesson 17		Lesson 18
Week 8 02/26-03/02	Lesson 19		Lesson 20		No Class (IMERS)
Week 9 03/05-03/9	Lesson 21		Review Exam II BRNG 2280		No Class
Week 10 03/12-03/16	Spring Break No Classes				
Week 11 03/19-03/23	Lesson 22		Lesson 23		Lesson 24
Week 12 03/26-03/30	Lesson 25		Lesson 26		Lesson 27
Week 13 04/02-04/06	Lesson 28		Lesson 29		Lesson 30
Week 14 04/9-04/13	Lesson 31		Review Exam III BRNG 2280		No Class
Week 15 04/16-04/20	Lesson 32		Lesson 33		Lesson 34
Week 16 04/23-04/27	Lesson 35		Review		Review
Final Exam Week 04/30-05/04					

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Math 13700 Assignment Sheet Spring 2018

Text: Reconceptualizing Mathematics, 3rd Edition by Sowder, Sowder, & Nickerson. W.H. Freeman, 2017.

Follow instructions written here in addition to instructions in the text.

Lesson	Section	Page	*Section Title/Topic*	Problems
1	1.1/1.2	p. 10	*Ways of Thinking About Solving Story problems; Quantitative Analysis*	Write out all relevant quantities and values as well as the solution. 2b (You can purchase a fraction of a meter of wire mesh.), 3, 5, 8 *See assignment 1 examples on the website for help.*
2	1.3	p. 16	*Problem Solving*	#1 – 7, Also, list Polya's problem solving model
3	1.4	p. 21	*Issues for Learning: Ways of Illustrating Story Problems*	#5 – 9, Also, make up your own problem that is similar to these and show your diagram and solution.
4	2.1/2.2	p. 24 & p. 28	*Ways of Expressing Values of Quantities; Place Value*	p. 24 → #3 – 7 p. 28 → 1: bfjkl, 5, 8
5	2.3	p. 35	*Bases Other than Ten*	2c, 3, 4 (use base 5), 5c, 6def, 7, 8, 9def, 15de, 16fgh, 17e, 18ef *See Lesson 5 Recap on the website for help.*
6	2.4	p. 41	*Operations in Different Bases*	1, 2, 4cd, 5ac, 7c, 8d, 9 (Use base seven only.); Draw pictures of pieces for all but problems 4 and 5. Read pp. 43-44, section 2.5. Rename 6400 in four distinct ways.
7	3.1	p. 49	*Ways of Thinking About Addition and Subtraction*	2bc, 3 (Write out the incorrect work a students might do for each example and also the correct work needed.), 4b, 6bcd, 7, 8a
8	3.2	p. 55	*Children's Ways of Adding and Subtracting*	2 (For Cases A, B, C you do 26 + 57. For Case E you do 86 – 9 using both methods. For Case G: you do 700 – 359.), 5 (Do two different number lines for each problem. Start with a different first jump each time.), 7, 8
9	3.3	p. 62	*Ways of Thinking About Multiplication*	2, 4, 6bcf, 8, 12ab (NO, they are not the same.), 14
10	3.4	p. 69	*Ways of Thinking About Division*	2, 3, 4, 5acd, 7 (Write two different types of division problems. Solve.), 8 (Indicate which division concept is used, make a diagram, and solve.)

11	3.5/3.6	p. 75	*Children Find Products and Quotients; Issues for Learning: Developing Number Sense*	p. 75: #2, 3, 4 (Use $2973 \div 14$), 5 (Use $56 \div 8$) p. 78: #2, 4cd, 6ef, 7b
Exam 1: Monday, February 5, 2018 from 6:30-7:30pm in BRNG 2280.				
12	4.1	p. 88	*Operating on Whole Numbers and Decimal Numbers*	1ab, 2, 5, 6, 8a. Read pp. 91-92. Describe MP5 and list three ways you expect students to demonstrate it.
13	4.1/4.2	p. 88 & p. 92	*Operating on Whole Numbers and Decimal Numbers; Issues for Learning: The Role of Algorithms*	p. 88: 1cd, 3, 7, 8b, 11, 13 p. 92: 1, 2
14	5.1	p. 96	*Mental Computation*	1ac, 2bcef, 3bcef, 4bd, 5, 6 – Make a photocopy of the bottom of p. 96, 7ce
15	5.2	p. 100	*Computational Estimation*	#1 – 5, 6acde, 7bcd, 8bcdefg
16	5.3	p. 103	*Estimating Values of Quantities*	1, 2(Assume a constant speed of 50 mph.), 3, 4(Determine the cost per person to pay for AIDS research – round to the nearest penny.), 5 (NO minimum number of words – any number will do.)
17	5.4	p. 105	*Using Scientific Notation for Estimating Values of Very Large and Very Small Quantities*	1 (Express your answers in scientific notation.),2, 3 (Write the problem and answer in sci. notation.),4, 5, 9, 11: Change 13 ft/sec into yds/hr. Use sci. notation for your answer. 12: Describe (in words) the steps needed to change 564.1×10^{-4} to sci. notation. Explain how you know what steps to use. Read pp. 106-107 section 5.5.
18	6.1	p. 112	*Understanding the Meanings of* $\frac{a}{b}$	2abcd (Use rectangular regions.), 3, 4, 5, 8, 9abde, 10ab, 12, 13, 14, 15b, 18, 22cd
19	6.2	p. 120	*Comparing Fractions*	1, 2, 6, 8bcd (Don't use common denominators. Use your number sense.), 9, 10, 11a, 14
20	6.3	p. 125	*Equivalent Fractions*	1ab, 2c, 3ab, 5bc, 6abe (Tell how you know.), 7bc, 8bc, 9, 10, 11cde, 12a, 13
21	6.4/6.5	p. 131	*Relating Fractions, Decimals, and %; Issues for Learning Fractions and Decimals*	1ab (Show how you know.), 2bf, 4bd, 6, 8 (Make a neat list,), 9, 10, 12 Read p. 135 #1-4

Exam 2: Wednesday, March 7, 2018 from 6:30-7:30pm in BRNG 2280.				
22	7.1	p. 139	*Adding and Subtracting Fractions*	2, 3ab, 4bcd, 5a, 7, 8, 10, 13, 15bdg, 16c
23	7.2	p. 145	*Multiplying by a Fraction*	1, 2, 3, 4, 5efgh, 9, 10, 11ad (Use pattern block pieces.), 12abc, 13ab, 15abc, 19
24	7.3	p. 153	*Dividing by a Fraction*	2, 4, 5, 6, 8df (Use pattern block pieces.), 9, 11, 14acf, 16 (Use fractions in part c.), 18
25	8.1/8.2	p. 162 & p. 166	*Quantitative Analysis of Multiplicative Situations; Fractions in Multiplicative Comparisons*	p. 162: 1, 3, 4, 5a; p. 166: 1, 3, 6, 7ae, 9a; Read pp. 169-171, section 8.3. What is NCTM? Name two publications.
26	9.1/9.2	p. 174 & 181	*Ratio as a Measure; Comparing Ratios*	p. 174: #1, 6, 7 p. 181: #2, 4, 5, 7 (Answer questions A and B as well as the question in the text.), 11, 18, 21
27	9.3	p. 189	*Percents in Comparisons and Changes*	1, 3, 4, 5, 6, 8, 9, 11, 13, 16, 21, 27 ; Read pp. 194-195, section 9.4. #1 – 8. *Print off worksheet for L28 and bring with you to class.*
28	10.1-10.3	p. 200-205	*Big Ideas About Signed Numbers; Children's Ways of Reasoning About Signed Numbers; Other Models for Signed Numbers*	p. 200: #1a, 2, 4abc, 5 p. 204: #1, 2 p. 205 #1, 2, 3def, 4cd, 5
29	10.4	p. 211	*Operations with Signed Numbers*	1efgh, 2cdefgh, 3, 4defgh, 5, 6, 7(3 problems), 9bc, 10b
30	10.5	p. 216	*Multiplying and Dividing by Signed Numbers*	2abcdefghijk, 3cd, 4, 5, 6 (Write a word sentence to answer the question.), 9bcdefgh *Print off and bring worksheet for Lesson 31 to class.*
31	10.6	p. 221	*Number Systems*	1, 2, 3, 4a, 6 (Use 7 numbers: create an add table and a mult table and also list all 11 prop with examples.), 9a, 10defg, 11defgh
Exam 3: Wednesday, April 11, 2018 from 6:30-7:30pm in BRNG 2280.				

32	11.1	p. 228	*Factors and Multiples, Primes and Composites*	2, 3b, 7ace, 10, 11cfij, 12, 14, 16bc, 17, 18, 19, 20, 21 (Show arithmetic for each number until you find the next perfect number.)
33	11.2	p. 234	*Prime Factorization*	1, 3cf, 4, 7bdf, 8de, 9, 10abdg, 11cd, 12cd, 13, 14bcd
34	11.3	p. 241	*Divisibility Tests to Determine Whether a Number is Prime*	1bd, 2bc, 4, 6de, 10, 11, 13ce, 14ce, 16, 20, 24
35	11.4 & 11.5	p. 248	*Greatest Common Factor, Least Common Multiple; Issues for Learning: Understanding the Unique Factorization Theorem*	p. 248: #1ab, 2ab, 3, 4, 7c, 8cd, 11, 13, 17, 19, 23cd p. 252: #1, 2, 3

Course webpage: www.math.purdue.edu/ma13700