

Letter to Instructors of Math 016 Spring 2010

Dear instructor of Math 016,

In the fall 2009 a revision of Math 016 was approved. As a result significant changes in curriculum and policies adopted in Math 016 were introduced. This document is to inform you about the changes. Please read it carefully

Margaret Wojcicka-Hitczenko
Math 016 Committee Chair

Dan Jacobson
Head of the Mathematics Department

Beginning in spring 2010:

- I. There is a mandatory standard departmental final exam that ALL students of Math 016 must take. A student's score on the exam must be counted as at least 25% of his grade.**
- II. A different set of topics is taught in Math 016.**
- III. Calculators are NOT allowed on the final exam and are discouraged from being used in the class at all.**

Below, please find detailed information about the changes. For additional information, contact djacobson@ccp.edu.

I. Mandatory standard departmental final exam:

ALL students must take the final exam. If a student does not take the exam, his final grade must be either I or F. Please, notice that since such student did not satisfy the requirements of the course, even a grade MP cannot be given to him (see Appendix A, page 6).

The score on the final exam must count for at least 25% of student's grade in Math 016.

Calculators will not be allowed during the final exam.

Make-up exams:

If a student, for a legitimate reason, does not take the final exam, his make-up exam should be scheduled with the Math Department Head, Dan Jacobson.

What will Math 016 exam look like?

The Departmental Final Exam is a 2 hour exam. It will consist of 50 non-multiple choice questions. The list of categories of questions (together with some examples of exercises) can be found in “Topics and sample problems for Math 016 Final Exam (short version)”, Appendix D, page 12. A long list of exercises for each category can be found at <http://faculty.ccp.edu/dept/math/devmath.html>.

Grading: no partial credit will be given; the description of accepted format of answers is given in Appendix B, page 7. The grading rubric is necessary for consistent grading across sections.

How is the exam created?

50 different categories of questions have been defined (see, Appendix D, page 12). Each category contains a certain number of questions. Different versions of exams will be created by randomly selecting a question from each category. The pool of questions in each category will be constantly growing. Additional problems will be added to the list. The new problems do not need to be of the same format as the ones that are already there. They will be added as long as they fit the description of a category. If you have an exercise that you would like to add, or comment on an existing one, please send it to wluy@ccp.edu, gschulz@ccp.edu, or mwojcicka@ccp.edu.

How will the requirement of the common final exam for all Math 016 students be implemented?

The ultimate goal is to create a computerized (but not a multiple choice) form of the exam that will be graded instantaneously by computers. Until the computerized version is available a paper and pencil version will be the temporary solution. For the time being, the final exam will be created by the Department but administered and graded by each instructor individually. Starting in fall 2010, the exam will be given and graded independently from the instructors (i.e. instructors will no longer proctor or grade their sections), which will insure uniform standards until the computerized final is available.

What do you, as an instructor of Math 016, need to do in spring 2010 semester?

Before the semester starts:

- Sign and return to the Math Department Head the form **DEVELOPMENTAL MATH REVISION ACKNOWLEDGEMENT AND TEACHING ASSIGNMENT ACCEPTANCE**. You should have received this form with notification of your Spring 2010 teaching assignment, or it can be downloaded at <http://faculty.ccp.edu/dept/math/devmath.html>

At the beginning of the semester:

- Inform the students about the new policies in Math 016 i.e. required common final exam, no calculators, no partial credit, format of the final exam. Please, include this information on the syllabus (you might want to consider using the recommended syllabus, see Appendix C, page 8).

During the semester:

- Distribute among your students “Topics and sample problems for Math 016 Final Exam (short version)” (Appendix D, page 12) ; Copies of the document will be available (starting December 10th, 2009) at
 - Main Campus, W2-7, M-F 8am- 6pm
 - Northeast Campus, room 125, M-F 8am-9:30pm, S 8am-4pm
 - Northwest Campus, room115, M-F 8am-9:30pm, S 8am-4pm
 - West Campus, front desk, M-F 8am-9:30pm

If you are teaching at any other location, please contact your site supervisor or the Math Department Head.

Also, direct your students to <http://faculty.ccp.edu/dept/math/devmath.html> where a full copy of the document (with many exercises to practice) can be found.

- Make sure that students understand the formatting of the acceptable answers on the final exam. To this end, please get yourself acquainted with “Grading rubric for Math 016 Final Exam”, Appendix B, page 7.

At the end of the semester:

- Pick up copies of the exam for your sections together with the rubric for grading of the exam. They will be available for you starting on “study day” (April 30th). You can pick them up at:
 - Main Campus, W2-7, M-F 8am- 6pm
 - Northeast Campus, room 125, M-F 8am-9:30pm, S 8am-4pm
 - Northwest Campus, room115, M-F 8am-9:30pm, S 8am-4pm
 - West Campus, front desk, M-F 8am-9:30pm

If you are teaching at any other location, please contact your site supervisor or the Math Department Head.

- Administer the exam in your sections. The exam is a 2 hour exam. The use of calculators (or any other devices that could be used as “substitutes” for calculators) is forbidden.
- Grade the exam according to the rubric given to you (“Grading rubric for Math 016 Final Exam”, Appendix B, page) and use the score of your students to determine their final grade in the course counting the score on the exam as at least 25% of the grade. Neither MP nor P grade can be given to a student who did not take the exam.
- Enter the final exam’s score for each student on a new form under the faculty menu available through MyCCP. You must fill in this form by May 11 (the same day as grades are due).
- As usual, enter the final grade for each student through MyCCP (due day is May 11).
- **Return the exams** of your students to the same office you used to pick up your exams no later than a week from the day the exam was given.

II. Topics taught in Math 016

Topics of new Math 016

Natural numbers:

- Addition, subtraction, multiplication and division of natural numbers
- Multiplication by powers of ten
- Exponential notation with positive integer exponents
- Order of operations and use of grouping symbols

Integers:

- Integers as an extension of natural numbers
- Introduction to the number line and the concept of positive and negative integers
- Comparison of integers (ordering)
- Addition and subtraction of integers
- Multiplication and division of integers
- Exponential notation with positive integers exponents
- Evaluation of expressions involving more than one operation

Rational numbers:

- Meaning of fractions
- Rational numbers as extension of integers
- Equivalent fractions; reducing and expanding fractions
- Plotting fractions on a number line
- Comparison of fractions
- Addition and subtraction of rational numbers (positive and negative)
- Multiplication and division of rational numbers (positive and negative)
- Exponentiation of rational numbers.
- Evaluation of expressions involving more than one operation
- Mixed numbers and improper fractions
- Operations on mixed numbers

Decimal notation:

- Decimal notation
- Converting to and from decimal and fractional notation
- Ordering of decimals
- Addition and subtraction of decimals (positive and negative)
- Multiplication and division of decimals (positive and negative)
- Exponentiation of decimals

Percents:

- Meaning of percent
- Solving basic percent problems.

A recommended (but not required!) syllabus for Math 016 can be found in Appendix C, page 8.

Topics no longer covered in Math 016

The revised course of Math 016 eliminates the subject of estimation, approximation, proportion equations, and a majority of the applications (like: conversion of units, American and metric system, problem solving involving distance, areas and volumes).

New emphases in teaching Math 016

1. Proper use of mathematical language is emphasized. Students are expected to understand that solving problems not only consists of finding the correct answer but also of the ability to present the solution in the right format, using proper mathematical language. Students should know the meaning of the “=” sign and be able to correctly use parentheses
2. The new curriculum presents rational numbers as an extension of integers and integers as an extension of natural numbers. It covers operations on not only positive, but also negative fractions and decimals and introduces more than one step operations (requiring the knowledge of presumed order of operations) using all number types.
3. Students are expected to recognize equivalent forms of numerical expressions, like $-\frac{a}{b} = \frac{-a}{b} = \frac{a}{-b}$ or $a - b = -b + a$. For more examples, please read the description of the category 31 and 49, in Appendix D.

Textbooks used in Math 016

There is no required text for this course. The old customized versions of textbooks are available but in order to cover the current material of Math 016 you might have to reorganize and supplement the material of a text. The essential core of Math 016 will need to be covered first (which is likely to take the entire semester). Some sections are no longer covered and some will need to be supplemented with additional materials. Free materials that could be used to supplement are found at <http://faculty.ccp.edu/dept/math/devmath.html> (hardcopies of the materials are also available at the Main Campus in W2-7). There are two sets of materials and both match exactly the curriculum of Math 016. They include explanations, examples and many exercises (many of them with answers). They could be used in addition or instead of a textbook (each set can be used independently from the other one). The materials are free of charge to instructors and students.

Appendix A

The grading scheme below was adopted as part of the Math 016 revision document:

- Grades: **P** **Pass.** To receive a **P** grade a student must take the Mathematics Departmental Exam **and** meet all other course requirements as **determined by the instructor.** Requirements may include attendance, punctuality, class participation, completing all assignments, doing homework, taking all tests and quizzes, and achieving a passing average on tests, quizzes and assignments.
The Departmental Exam must count for at least 25% of each student's final grade.
- MP** **Making Progress.** To receive an **MP** grade, students must **complete all requirements** for the course as determined by the instructor and **take the Mathematics Departmental Exam.** Requirements may include attendance, punctuality, class participation, completing all assignments, doing homework, taking all tests and quizzes, etc. Students should be truly making progress: showing improvement and demonstrating the ability to pass the course given more time to do so.
An **MP** grade is not a **D**. A student can get an **MP** grade with a lower average than a student who gets an **F**.
- F** **Fail.** A grade of **F** is given if a student does not complete all requirements for the course as determined by the instructor or shows little progress during the semester.

Note:

A student who does not take the Department Final Exam may not be given a grade **P** or **MP**. If eligible, a student may be assigned a grade of **I**. If the Final Exam is not made up within 6 weeks of the end of the semester, then the **I** grade is automatically converted to an **F**.

Appendix B

Grading rubric for Math 016 Final Exam

I. No partial credit will be given in any case.

II. Any numerical value (unless specified otherwise) must follow the below formatting to be accepted as a correct answer:

- Unless specified otherwise, the answer can be given in any form (fraction, decimal) as long as it is exactly equal to the answer (for example, $\frac{1}{3} \neq 0.33$).
- Fractions must be reduced to lowest terms.
- If a fraction represents an integer, the integer should be given as the final answer ($\frac{2}{1}$ will not be accepted).
- Number answers with a plus sign in front of any number different from zero are acceptable (+2 is a correct answer) but zero should be written as 0 (not as +0, or -0).
- A negative fraction can have a minus sign placed in front, in the numerator, or in the denominator: all are accepted ($-\frac{1}{2}$, $\frac{-1}{2}$, $\frac{1}{-2}$).
- In the final answer, numbers should be given as either positive or a negative ($\frac{-5}{-6}$ will not be accepted).
- A decimal can be written with or without zero in front of the decimal point, (for example, both 0.5 and .5 will be accepted).
- Not more than 1 zero should appear before the decimal point (000.5 will not be accepted).
- The answer should not include redundant zeros at the end of a decimal (for example 0.900 will not be accepted).
- An integer should not be written in the form of a decimal (5.0 =5; only the answer 5 will be accepted).

Appendix C

The electronic version of the below syllabus can be found at <http://faculty.ccp.edu/dept/math/devmath.html>

Math 016 - Syllabus

Instructor:

Office:

Phone:

E-mail:

Website:

Office Hours:

The Course: This basic Arithmetic course will cover operations on natural numbers, integers, rational numbers (fractions) and decimals. Multi-step problems utilizing the correct order of arithmetic operations will be stressed. No calculators will be used in this course. Correct mathematical format will be stressed and expected when working all problems, both in class work/homework and exams. Topics will be studied with correct language and notation emphasized.

No calculators will be used in this class: The use of calculators on tests and quizzes will not be permitted. It is recommended that you do not use calculators outside of classroom when working on assignments. The purpose of assignments outside of class is to prepare you for the tests and quizzes, and this goal can be best achieved if you do not use a calculator.

Materials/Textbook:

Contacting Instructor: The telephone number listed has voice mail. Please call when absent or when making an appointment. If you contact the instructor by e-mail, please include "Math 016" in the subject line and sign your e-mail (with your first and last name) so the instructor will know who has written the e-mail.

MyCCP/MyCourses: As a student in this class, you have access to a website area devoted to this class. Go to MyCCP and select the MyCourses tab to find it. Select this particular course and you will see links to, among other things, a list of members of this class and an easy way to e-mail them along with your instructor. You will also see a link where files can be stored for your use such as homework assignments, supplementary materials, etc. – anything your instructor chooses to download to this space.

Help available: You can find help in the Math Learning Lab in room B2-36 weekdays and in room B1-28 Monday- Thursday evenings and Saturdays. Free, peer tutoring is available beginning with the second week of classes for all current CCP students. The peer tutors are experienced CCP students who have taken many of the courses in which they tutor. Free,

weekly workshops, which begin in the third week of classes are also available to all CCP students.

Attendance: Each student is required to attend every class meeting on time. Students are responsible for all work missed due to absence. Attendance will be taken at the beginning of each class. Students who arrive after taking roll or leave the class early are considered to be late. If you are late three times it will be counted as one absence. If a student misses class more than once during the first 3 weeks or more than twice during the first 7 weeks, the attendance will be reported to the college as unsatisfactory. Students who must miss class more than once during the first 3 weeks or more than twice during the first 7 weeks should discuss their situation with me. Any student who is absent for the equivalent of two weeks may be dropped.

Inclement weather: In the event of inclement weather there are several ways of determining whether CCP is open. You may listen for CCP's school closing number 238 (for day classes) and 2238 (for evening classes) on KYW radio at 1060 on the AM dial or check KYW's school closing web page at <http://www2.kyw1060.com/schools/> or for a price you may call KYW's school closing phone number at 1-900-737-1060.

Homework/Quizzes: Homework will be assigned at the end of almost every class meeting. Students are responsible for keeping track of the assignments. Please remember, that you will not get full credit if you do not display your solution in the correct way, or do not use the correct language or notation (for example, one common mistake students make is to use the '=' sign incorrectly or not to use it at all).

Homework will be collected in class and graded or given to you in a form of a quiz (you will be asked to solve in class problems similar to those in the assigned homework).

You are encouraged to cooperate with other students and ask questions about homework, but at the end you are expected to write your answer independently from the others.

Homework will be collected at the beginning of the class. It will not be accepted after its due date. The lowest three homework grades will not be counted towards your final grade.

Tests: There will be four in-class tests along with the final exam. No in-class test will be dropped.

Missed tests: Missed tests can be made up only if a student has a justifiable excuse (as listed in the Students' Handbook). If you know beforehand that you will have to miss an exam, please contact me, so you can take the exam in advance of the rest of the class. In case of emergencies impossible to foresee, to be 'eligible' for a make-up exam, please contact me as soon as possible (e-mail or voice-mail). Once it is determined that you indeed have a legitimate excuse, you will be given a make-up exam during the Final Exams Week.

Final Exam will be comprehensive (all topics covered) and given by the department. The requirements along with many examples will be provided prior to the exam.

Grading system. This course is a three credit course that does not apply towards graduation credits with three grades possible:

- P:** representing a pass grade allowing you to register for the next course in the sequence
- MP:** representing a making progress grade requiring you to repeat this class
- F:** a failure grade requiring you to repeat this class.

The grades will be assigned according to the following rules:

- P:** 65% or above overall average for the semester. Student must take a final in order receive a P. The average in the class will be determined based on the following factors:
- Homework/Quizzes: 15%
 - Tests: each out of four tests will count for 15%; thus, overall 60%
 - Final Exam: 25%
- MP:** To receive an **MP** grade, students must **complete all requirements** for the course. Requirements include attendance (not missing more than equivalent of 2 weeks of study), punctuality (being late no more than 3 times), completing all assignments, doing homework, taking all tests, quizzes, and a final exam. Students should be truly making progress: showing improvement and demonstrating the ability to pass the course given more time to do so. A student can get an **MP** grade with a lower average than a student who gets an **F**.
- F:** A grade of F is given if a student does not complete all requirements for the course or shows little progress during the semester.

Appropriate Classroom Behavior:

1. Please be on time for class. It is distracting to other students when people arrive late.
2. Please switch off pagers and cell phones before entering the classroom. Please do not send text messages and do not use headphones during class time.
3. Please be courteous and considerate to your other classmates and to me.
4. Please do not eat in the classroom.
5. Please do not talk (even about math issues) during the class, unless we are doing group work. If you have a question, please raise your hand and wait for me to recognize you.
6. Please do not walk in and out of the classroom. In case of an emergency, please leave quietly.
7. If you have any personal questions (for example: 'I was absent last time, can I get my test back'), please come and discuss it with me during a break, after a class, or during my office hours, NOT during the instruction time.
8. Please pay as much attention to your instructor as you can.
9. Do not bring children to the classroom.

Note: If you break one of these rules, I will first remind you of it. But if you break the rule again, unfortunately, I will have to ask you to leave the classroom. If I ask you to leave, please leave. You may return the next class, and I will not penalize you further for the earlier infraction.

Math 016 (NO CALCULATORS PERMITTED)

Week 1	Natural numbers: '=' sign, order of all operations (including exponentiation)
Week 2	Test 1 Integers: comparison of integers, number line, addition, subtraction
Week 3	Integers: multiplication, division, exponentiation
Week 4	Integers: all operations together: first with only one operation at a time, then more than one
Week 5	Test 2 Rational numbers: exercises to develop a sense of such numbers, number line, equivalent fractions
Week 6	Comparing fractions, multiplication
Week 7	Division, exponentiation, all three operations together
Week 8	Test 3 Addition, subtraction of fractions; all operations together
Week 9	Mixed numbers
Week 10	Test 4 Decimals: converting to fractions, comparing, adding, subtracting
Week 11	Decimals: Multiplication, division
Week 12	Percents;
Week 13	Test 5 Review of the material
Week 14	Review of the material -continuation
Week 15	Departmental Exam

Appendix D

Topics and sample problems for Math 016 Final Exam (short version)

Below (on the following pages) there are 50 categories. Each version of the exam will be created as follows:

One question out of each category will be selected at random. Thus, the test will consist of 50 questions.

More examples for each category, can be found in “Topics and sample problems for Math 016 Final Exam (long version)” at <http://faculty.ccp.edu/dept/math/devmath.html>.

NAME

MATH 016 FINAL EXAM

The final exam would consist of 50 questions. One question would be randomly selected from each of the following categories.

1. ***Addition and subtraction of two integers (without parentheses :***

$-a + b$ or $b - a$.

Compute if possible or write 'undefined'. Make sure that you use the '=' sign correctly.

(a) $-5 + 7$

(b) $-9 + 6$

(c) $4 - 9$

(d) $6 - 11$

2. ***Addition and subtraction of two integers (without parentheses :***

$-a - b$.

Compute if possible or write 'undefined'.

(a) $-4 - 6$

(b) $-1 - 1$

(c) $-5 - 3$

3. ***Addition and subtraction of more than two integers without the use of parentheses.***

Compute if possible or write 'undefined'.

(a) $-2 + 3 - 4 - 5$

(b) $9 - 5 - 1 - 3 + 4$

4. ***Addition and subtraction of two or more integers with the use of parentheses at most twice.***

Compute if possible or write 'undefined'.

(a) $3 - 9 - (-4)$

(b) $4 + (-6) - (-5)$

(c) $-5 - (-2)$

(d) $-5 + (-3) + 6$

(e) $-(-4) - 3 + (-3)$

(f) $-(-9) - 6 - (-1)$

(g) $-(-3) + (-5)$

5. ***Multiplication of two integers.***

Compute if possible or write 'undefined'.

(a) $-5(-3)$

(b) $4(-6)$

(c) -6×7

6. ***Multiplication of more than two integers.***

Compute if possible or write 'undefined'.

(a) $-2 \times (-1) \times 5$

(b) $4 \times 6 \times (-1)$

(c) $-4(-1)(-5)$

(d) $4 \times (-9) \times 0 \times 8$

(e) $-1 \times 4 \times (-2) \times (-1)$

7. ***Division of integers using fraction notation.***

Compute if possible or write 'undefined'.

(a) $\frac{15}{3}$

(b) $\frac{-6}{-2}$

(c) $\frac{-16}{4}$

(d) $\frac{0}{7}$

(e) $\frac{-16}{0}$

8. ***Division of integers using " \div ".***

Compute if possible or write 'undefined'.

(a) $10 \div (-5)$

(b) $-4 \div (-2)$

(c) $(-20) \div 4$

(d) $0 \div (-6)$

(e) $(-3) \div 0$

9. **Addition of two fractions (positive and negative). Numerators could be positive or negative integers.**

Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $-\frac{2}{3} + \frac{3}{5}$

(b) $-(-\frac{3}{8}) + \frac{3}{2}$

(c) $-\frac{4}{9} + \frac{-5}{12}$

10. **Subtraction of two fractions (positive and negative). Numerators could be positive or negative integers.**

Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $\frac{5}{3} - \frac{3}{4}$

(b) $\frac{3}{2} - (-\frac{5}{6})$

(c) $-\frac{3}{4} - \frac{4}{5}$

(d) $\frac{-4}{5} - \frac{13}{15}$

(e) $-\frac{5}{3} - \frac{-3}{4}$

11. **Additions and subtractions of more than two fractions (positive and negative). Numerators could be positive or negative integers.**

Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $-\frac{1}{2} - \left(-\frac{3}{4}\right) + \frac{5}{3}$

(b) $-\frac{5}{3} - \left(-\frac{3}{4}\right) + \frac{1}{2}$

(c) $-\frac{1}{2} - \left(\frac{-3}{4}\right) + \frac{7}{4}$

(d) $\frac{-1}{2} - \left(\frac{1}{4}\right) + \frac{1}{8} + \frac{-3}{4}$

12. **Addition of fractions and integers. Numerators could be positive or negative integers.**

Compute if possible or write 'undefined'. Simplify as much as possible.

- (a) $\frac{5}{4} + 2$
- (b) $-1 + \frac{3}{5}$
- (c) $\frac{-5}{3} + 3$
- (d) $-2 + \frac{-7}{5}$

13. ***Subtraction of fractions and integers. Numerators could be positive or negative integers.***

Compute if possible or write 'undefined'. Simplify as much as possible.

- (a) $\frac{1}{3} - 1$
- (b) $1 - \frac{5}{3}$
- (c) $-2 - \frac{4}{7}$
- (d) $-1 - \left(-\frac{5}{3}\right)$
- (e) $\frac{-7}{3} - (-3)$

14. ***Multiplication of fractions and integers using two factors either both positive or both negative. Numerators could be positive or negative integers.***

Compute if possible or write 'undefined'. Simplify as much as possible.

- (a) $-3 \times \left(-\frac{4}{3}\right)$
- (b) $\left(-\frac{2}{5}\right) (-10)$
- (c) $-12 \times \left(\frac{-4}{9}\right)$
- (d) $15 \times \frac{4}{21}$

15. ***Multiplication of fractions and integers using two factors with different signs. Numerators could be positive or negative integers.***

Compute if possible or write 'undefined'. Simplify as much as possible.

- (a) $3 \left(-\frac{4}{5}\right)$
- (b) $\left(-\frac{2}{3}\right) \times 4$
- (c) $5 \left(\frac{-3}{10}\right)$

16. *Multiplication of fractions and integers using more than two factors and with the presence of parentheses once. Numerators could be positive or negative integers.*

Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $\frac{79}{3} \times \left(-\frac{2}{5}\right) \times \frac{6}{79}$

(b) $\frac{91}{4} \times \left(-\frac{2}{5}\right) \times \frac{10}{91}$

(c) $4 \times \frac{3}{7} \times \left(-\frac{3}{2}\right)$

(d) $\frac{35}{16} \times \left(\frac{-1}{7}\right) \times 8$

17. *Multiplication of fractions and integers using more than two factors and with the presence of parentheses twice. Numerators could be positive or negative integers.*

Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $-\frac{20}{3} \left(-\frac{2}{5}\right) \left(-\frac{3}{4}\right)$

(b) $-\frac{7}{3} \left(-\frac{2}{21}\right) \left(-\frac{3}{4}\right)$

(c) $10 \left(\frac{-2}{5}\right) \left(-\frac{3}{2}\right)$

18. *Division of fractions (positive and negative) using fraction notation. Numerators could be positive or negative integers.*

Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $\frac{-\frac{9}{2}}{-\frac{2}{3}}$

(b) $\frac{-\frac{15}{4}}{\frac{6}{5}}$

(c) $\frac{\frac{7}{5}}{\frac{-2}{15}}$

19. *Division of fractions (positive and negative) using "÷". Numerators could be positive or negative integers.*

Compute if possible or write 'undefined'. Simplify as much as possible.

$$(a) -\frac{10}{9} \div \left(-\frac{2}{3}\right)$$

$$(b) \frac{7}{3} \div \left(-\frac{5}{14}\right)$$

$$(c) \frac{-9}{10} \div \left(\frac{-3}{4}\right)$$

20. ***Division of fractions and integers (positive and negative) using fraction notation. Numerators could be positive or negative integers.***

Compute if possible or write 'undefined'. Simplify as much as possible.

$$(a) \frac{\frac{9}{4}}{-2}$$

$$(b) \frac{-4}{\frac{2}{5}}$$

$$(c) \frac{-4}{\frac{-3}{4}}$$

21. ***Division of fractions and integers (positive and negative) using "÷" . Numerators could be positive or negative integers.***

Compute if possible or write 'undefined'. Simplify as much as possible.

$$(a) \left(-\frac{5}{4}\right) \div (-10)$$

$$(b) 10 \div \left(-\frac{5}{4}\right)$$

$$(c) \left(\frac{-7}{9}\right) \div (-14)$$

$$(d) -10 \div \left(\frac{0}{4}\right)$$

22. ***"Zero-add" category (addition of opposite numbers).***

Compute if possible or write 'undefined'. Simplify as much as possible.

$$(a) -15 + 15$$

$$(b) -38 - (-38)$$

$$(c) -(-54) - 54$$

23. ***"Zero-div" category (division equal to zero or undefined).***

Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $0 \div (-10)$

(b) $\frac{0}{-3}$

(c) $-6 \div 0$

(d) $\frac{4}{0}$

(e) $\frac{0}{6}$

24. ***"Ten" category (multiplication of decimals and integers by positive powers of ten .***

Compute if possible or write 'undefined'.Simplify as much as possible.

(a) 1.2×100

(b) 2.1×10

(c) 12×100

(d) $1000 \times (-1.1)$

25. ***"Ten" category (division of integers by positive powers of ten .***

Compute if possible or write 'undefined'.Simplify as much as possible.

(a) $7 \div (-100)$

(b) $-2 \div 10$

26. ***"Ten" category (division of decimals by positive powers of ten .***

Compute if possible or write 'undefined'.Simplify as much as possible.

(a) $2.31 \div 10$

(b) $2.3 \div 100$

27. ***Order of operation involving only two operations and integers :multiplications,divisions (only integers as an answer).***

Compute if possible or write 'undefined'.Simplify as much as possible.

(a) $16 \div (-4) \div 4$

(b) $4 \div 2 \times (-2)$

(c) $8 \div (-2) \div (-2)$

28. **Order of operation involving only two operations and integers :additions or subtractions, multiplications (only integers as an answer).**

Compute if possible or write 'undefined'.Simplify as much as possible.

(a) $5 - 2 \times (-2)$

(b) $-1 - 1 \times (-1)$

(c) $3 + 2 \times (-2)$

29. **Order of operation involving only two operations and integers :additions or subtractions, divisions including fraction notation (only integers as an answer).**

Compute if possible or write 'undefined'.Simplify as much as possible.

(a) $\frac{3 - 6}{3}$

(b) $-2 - 2 \div 2$

30. **Order of operation involving more than two operations with integers :additions ,subtractions, multiplications divisions (only integers as an answer).**

Compute if possible or write 'undefined'.Simplify as much as possible.

(a) $3 + \frac{14 \times 4}{8}$

(b) $3(-1) + 4 \div 2$

31. **Number matching. (Equivalent fractions, mixed numbers as fractions, minus sign in fractions, fractions or decimals as division, integers as fractions, decimals as fractions).**

Fill in the blank between the numbers using either '=' or '≠' to make a true statement.

(a) $\frac{-1}{5}$ $\frac{1}{-5}$

(b) $1 \div -5$ $\frac{-1}{5}$

(c) $3\frac{1}{2}$ $\frac{3}{2}$

(d) $0.2 \div 10$ $2 \div 100$

(e) $\frac{-2}{-3}$ $-\frac{2}{3}$

32. ***Subtraction of decimals and integers.***

Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $0.89 - 1$

(b) $0.78 - 1$

(c) $-3.7 - 0.4$

(d) $4.32 - 5.1$

33. ***Addition of decimals and integers.*** Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $-2.5 + 2.43$

(b) $-3.2 + 3.12$

(c) $-2 + 0.3$

(d) $-0.2 + (-0.3)$

34. ***Multiplication of decimals and integers.***

Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $35 \times (-0.001)$

(b) -3×0.11

(c) $-2 \times (-0.9)$

35. ***Multiplication of decimals.***

Compute if possible or write 'undefined'. Simplify as much as possible.

(a) 0.01×2.3

(b) 0.09×0.3

36. ***Division of decimals and integers using fraction notation.***

Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $\frac{-0.32}{0.2}$

(b) $\frac{0.33}{-0.3}$

37. ***Division of decimals and integers using "÷".***

Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $-0.25 \div (-0.005)$

(b) $0.33 \div (-0.011)$

38. ***Exponential notation (decimals).***

Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $-(-0.1)^2$

(b) -0.1^2

39. ***Exponential notation (integers).*** Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $-(-2)^4$

(b) -2^4

(c) $(-1)^{14}$

(d) $(-1)^{25}$

(e) $(-100)^3$

40. ***Exponential notation (fractions).***

Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $\left(-\frac{3}{2}\right)^3$

(b) $\left(-\frac{2}{3}\right)^3$

41. ***Addition using mixed numbers (fractions or integers could be present).***

Compute if possible or write 'undefined'. Simplify as much as possible.

(a) $3\frac{2}{3} + 2\frac{1}{5}$

(b) $-1\frac{4}{5} + 2\frac{2}{3}$

(c) $2\frac{3}{5} + \frac{3}{10}$

42. ***Subtraction using mixed numbers (fractions or integers could be present).***

Compute if possible or write 'undefined'. Simplify as much as possible.

- (a) $2\frac{1}{3} - 1\frac{5}{6}$
- (b) $3\frac{1}{5} - 2\frac{7}{10}$
- (c) $-2\frac{1}{3} - 1\frac{5}{6}$
- (d) $2\frac{4}{5} - 10$

43. **Multiplication using mixed numbers (fractions or integers could be present).**

Compute if possible or write 'undefined'. Simplify as much as possible.

- (a) $2\frac{2}{3} \times \left(-1\frac{1}{2}\right)$
- (b) $2\frac{1}{2} \times 3\frac{1}{3}$
- (c) $3\frac{4}{5} \times \frac{1}{4}$
- (d) $3\frac{1}{3} \times 7$

44. **Division using mixed numbers (fractions or integers could be present).** Compute if possible or write 'undefined'. Simplify as much as possible.

- (a) $2\frac{2}{3} \div 3\frac{1}{3}$
- (b) $3\frac{1}{5} \div \left(-1\frac{1}{2}\right)$
- (c) $2\frac{2}{9} \div \frac{4}{3}$
- (d) $3\frac{2}{3} \div 3$

45. **Order of operations with the presence of exponentiation.** Compute if possible or write 'undefined'. Simplify as much as possible.

- (a) $2 - 2(2 - 3)^9$
- (b) $-2^3 + 0 \div 2$
- (c) $3 + 3(4 - 5)^7$
- (d) $(-10)^3 \div 10^2 \times 10$

46. **Order of operations with the presence of grouping symbols at least twice.** Compute if possible or write 'undefined'. Simplify as much as possible.

- (a) $(3 + 2)(-1 - 1)$
- (b) $(3 - 4) \div (-2 + 2)$
- (c) $[2 + 2(-2)] \div (3 - 5)$

47. **Order of operations with the presence of fractions.** Compute if possible or write 'undefined'. Simplify as much as possible.

- (a) $2 - \left(-\frac{1}{3} + \frac{1}{2}\right)^2$
- (b) $2 + 3\left(-\frac{1}{3} + \frac{1}{2}\right)$

48. **Order of operations involving decimals or fractions in the computation.** Compute if possible or write 'undefined'. Simplify as much as possible.

- (a) $9 - 5 \div 10 \times 3$
- (b) $-2 + 2 \div 4 \div 4$

49. **Computation matching.**

Fill in the blank between the numbers using either '=' or '≠' to make a true statement.

- (a) $-5 + 67 - 39$ $67 - 39 - 5$
- (b) $35(-9) + 8$ $35 - 9 + 8$
- (c) 4^3 $4 + 4 + 4$
- (d) $\frac{12}{25} \times \frac{12}{25} \times \frac{12}{25}$ $\frac{12^3}{25^3}$
- (e) $\frac{12}{25} \times \frac{12}{25} \times \frac{12}{25}$ $\frac{12^3}{25}$

50. **Percents.**

- (a) What is 8% of 42?
- (b) What is 3% of 32?
- (c) What is 110% of 25?
- (d) What is 0.2% of 25?