*ESSEX COUNTY COLLEGE*

**STUDENT LEARNING OUTCOMES ASSESSMENT REPORT**

(SLO)

MTH 092 – Elementary Algebra

FALL 2010

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# INTRODUCTION

According to Linda Suskie in her book *Assessing Student Learning: a common sense guide*, 2nd edition, assessment is the ongoing process of: (1) establishing clear, measurable expected student learning outcomes; (2) ensuring that students have sufficient opportunities to achieve those outcomes; (3) systematically gathering, analyzing, and interpreting evidence to determine how well students’ learning matches our expectations; and (4) using the results to understand and improve student learning. Assessment can be achieved in a variety of diverse processes.

This report focuses mainly on student learning outcomes assessment of the course MTH 092, an Elementary Algebra course offered by the Mathematics and Physics Department at ECC. In addition, social factors governing students’ perceptions of their performance were also investigated. The types of assessment used, as well as the methodology and administration of the assessment tools used, are all described. The results and findings are presented and explained. Finally, in order to “close the loop”, feedback based on the findings is suggested in an effort to initiate positive change and improve student learning.

## 1.1 PURPOSE

MTH 092, Elementary Algebra, is one of the most important courses at ECC. It is the second level in a remedial math sequence that is a prerequisite for 100-level (i.e., college-level) mathematics courses. Furthermore, it is a prerequisite for many other majors and courses available at ECC. These include Nursing, Biology, Chemistry, Engineering, Computer Science, Radiography, in addition to many social science majors. Therefore, the importance of assessing student learning outcomes and correlating them to measurable course performance objectives cannot be underestimated. As co-course coordinators of MTH 092, we are aware that there are many factors that contribute to student success, i.e., student learning. As members of SLOAT in Fall 2010, we endeavored, by choosing three forms of assessment, to investigate some of these factors. These forms of assessment will be discussed in detail in the following sections. Our goal is to use our findings to provide insight into some of the factors that affect student success thereby suggesting possible improvements for future semesters. Furthermore, we hope that by sharing our results and suggestions, we will jumpstart a discourse that will include the exchange of ideas, initiation of other assessment tasks, and is overall focused on the improvement of our MTH 092 course.

# METHODOLOGY

## 2.1 POPULATION

Based on our initial assessment plan, we decided to assess ten sections of MTH 092 with an approximate average of 30 students in each section. This gave us a sample size of approximately 300 students. We hoped to ensure at least a 5% margin error (278 out of 1000 corresponds to a 5% margin error) (Suskie). We attempted to sample a variety of sections. However, based on the response we received from professors willing to participate, the breakdown was as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Professor** | **Section** | **Campus** | **Daytime/Evening** | **Full-time/Adjunct** |
| Eman Aboelnaga | 006 and 028 | Main Campus | Daytime | Full-time |
| Barbara Satterwhite | 009 and 012 | Main Campus | Daytime | Full-time |
| Susan Gaulden | 011 and 019 | Main Campus | Daytime | Full-time |
| Nasser Moheb | 003 and 014 | Main Campus | Daytime | Full-time |
| Shohreh Andresky | CW2 | West Essex | Daytime | Full-time |
| Gordon Nanton | 3WC | West Essex | Evening | Adjunct |

As is evident from the table, 80% of the sections were day time courses taught at the Main Campus by full-time professors.

## 2.2 ADMINISTRATION

As co-course coordinators of MTH 092, we chose to assess the following student learning outcomes (SLOs):

* SLO #1: Course Goal 1: Demonstrate knowledge of the fundamental concepts and theories from algebra and geometry.
* SLO #2: Course Goal 2: Utilize various problem-solving and critical-thinking techniques to set up and solve real-world applications.

These correspond to the following measurable course performance objectives (MPOs):

1. Demonstrate knowledge of the fundamental concepts and theories from algebra and geometry.
   1. *simplify and evaluate variable expressions;*
   2. *translate verbal expressions into variable expressions;*
   3. *perform basic operations on polynomial, rational, and exponential expressions;*
   4. *factor polynomial expressions;*
   5. *solve linear, literal, and factorable quadratic equations;*
   6. *graph a line in the Rectangular Coordinate System;*
   7. *identify and find the slope and intercepts of a line;* and
   8. *find the equation of a line based on given geometric properties*
2. Utilize problem-solving and critical-thinking techniques to set up and solve real-world applications.
   1. *apply algebraic methods to solve varied real-world applications (such as integer problems, uniform motion problems, and perimeter and area problems) that can be modeled by a linear equation or a quadratic equation*

We chose three forms of assessment. The first was an anonymous survey designed to investigate students’ attitudes towards math, their classmates, and their professor, as well as their perception of their progress and standing in the class. This is an indirect, summative, and subjective type of assessment based on the input of the students. The second form of assessment was an indirect, process, and objective type of assessment designed to investigate the correlation, if any, between the number of absences and the final grade and between use/completion of online homework and the final grade. Our last form of assessment was direct, summative, and objective, and was designed to measure the student learning outcomes mentioned earlier.

Regarding the first form of assessment: the attitudinal survey, we developed several drafts before finally choosing one that best expressed the issues we were investigating. We initially intended to have it ready to administer by late October after Midterms or early November. We then sent it to Dr. Alvin Williams who then modified the form of questioning in order to make it easier to calibrate. He then provided us with ScanTron-like answer sheets that corresponded to our questionnaire. The next step was to deliver the questionnaires to the participating instructors along with detailed instructions regarding their administration. This process took more time than anticipated so that the questionnaire was actually administered in late November. Students were asked to keep them anonymous and were given about 15 minutes of class time to complete them. We then assembled all the questionnaire answer sheets and delivered them to Dr. Williams. He calibrated the results and provided us with a breakdown of the percentages of students’ answers for each question. We then analyzed the results and formed conclusions and suggestions for future change. These will be discussed further in the Results section.

In order to gather information for our second form of assessment, we prepared an Excel spreadsheet template requesting information from each participating instructor as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Instructor: Eman Aboelnaga |  |  | SLOAT Coordinators: | |
| Section: 006 |  |  | Eman Aboelnaga | |
| Total # of Students: 25 |  |  | Barbara Satterwhite | |
|  |  |  |  |  |
| Student | ID# | Absences | Online HW | Final Grade |
| [Agunanna, Princess O.](https://webservices.essex.edu:4443/PROD6_DAD/bwlkosad.P_FacSelectAtypView?xyz=MTEzNTUx) | 9000- | 0 | yes | B |
| [Bryant Jr., Aniko](https://webservices.essex.edu:4443/PROD6_DAD/bwlkosad.P_FacSelectAtypView?xyz=MTAzMTQ0) | 9000- | 31 | no | F |
| [Chung, Claudia R.](https://webservices.essex.edu:4443/PROD6_DAD/bwlkosad.P_FacSelectAtypView?xyz=OTk5MTE=) | 9000- | 8 | yes | D |
| [Coley, Tyler C.](https://webservices.essex.edu:4443/PROD6_DAD/bwlkosad.P_FacSelectAtypView?xyz=OTc1ODc=) | 9000- | 7 | no | D |
| [Desilhomme, Jean H](https://webservices.essex.edu:4443/PROD6_DAD/bwlkosad.P_FacSelectAtypView?xyz=MTAyNjkz) | 9000- | 1 | yes | B |

This information was sent to Dr. Williams, where he proceeded to statistically analyze it. He sent the results back to us and we formed conclusions and suggestions for future change.

Finally, since our third form of assessment was designed to measure student learning outcomes, we decided to blueprint the MTH 092 cumulative final exam to all of the MPOs from the entire set of course goals stated earlier. However, for the purpose of this study, the original plan was to increase the number of multiple choice questions so that every MPO corresponding to SLOs 1 and 2 were addressed within the multiple choice section of the final exam. This means that every specific MPO under Course goals 1 and 2 (CG 1 and CG 2) was mapped to a multiple choice question. This allows us to use ScanTron-like sheets in order to collect the data. When preparing the final exam, we found that it was going to be confusing to make application problems (i.e., word problems) multiple choice when neither the students nor the instructors were used to such a situation. We decided to map the MPOs from the first goal to ten multiple choice questions (a reasonable amount of multiple choice questions for a MTH 092 final exam) and hold off on assessing the second course goal. On the day of the final exam, participating professors were provided with a ScanTron-like answer sheet for each of their students. They were requested to have their students answer the multiple choice questions on the actual exam as well as on the ScanTron-like answer sheets. Repeated instructions were given to the students to bubble in their answers carefully and completely and to include the version of the exam that they completed. Despite that, some submitted answer sheets were still found to be incorrectly filled out. After final exams were completed, participating professors were asked to submit their ScanTron-like answer sheets to us. We delivered them to Dr. Williams who calibrated the results, providing us with a spreadsheet with the percentages of students who had answered each question correctly, thereby “mastering” that corresponding MPO. Details and results are discussed in the results section of this report.

### 2.2.1 INSTRUMENTATION

#### 2.2.1.1 ATTITUDINAL SURVEY

An anonymous questionnaire was administered to ten sections of MTH 092 within the last week of November and the first week of December. The questions as well as the calibrated results performed by Dr. Alvin Williams are included in Appendix A.

#### 2.2.1.2 RUBRICS

In order to gather information on attendance and use of online homework, we formed an Excel spreadsheet template that professors involved in the study could use to input the students’ information. A sample was shown in section 2.2 of this report. Regarding the grading rubric for the final exam, the ten questions assessed were all multiple choice. The following table illustrates the question along with the MPO it is being mapped to.

|  |  |
| --- | --- |
| **MPO # - Topic/Skill** | **Sample Final Exam question(s) used to determine MPO acquisition** |
| * 1. *simplify and evaluate variable expressions* | Evaluate the variable expression when b = -2 and c = -1: |
| * 1. *translate verbal expressions into variable expressions* | Translate the following into a variable expression, then simplify: a number added to the difference between twice the number and twenty |
| * 1. *perform basic operations on polynomial, rational, and exponential expressions* | * Simplify: * Simplify: * Simplify: |
| * 1. *factor polynomial expressions* | Factor *bz* + 3*b* – 2*z* – 6 |
| * 1. *solve linear, literal, and factorable quadratic equations* | Solve: |
| * 1. *graph a line in the Rectangular Coordinate System* | Graph: 2*x* – 3*y* = -6 |
| * 1. *identify and find the slope and intercepts of a line* | Find the slope and y-intercept of the line |
| * 1. *find the equation of a line based on given geometric properties* | Find the equation of the line that contains the point (4, -8) and has slope -3. |

Each question assessed an MPO of the course and a correct answer was taken as the student having mastered the objective. If the student answered incorrectly, then that MPO was considered not mastered. The results by exam version as well as mean results are referenced in the Results section. The multiple-choice portion of the MTH 092 final exam – Fall 2010, version 1 used in this assessment can be found in Appendix B.

# RESULTS

## 3.1 FINDINGS

### 3.1.1 ATTITUDINAL SURVEY

We developed the SLOAT Student Questionnaire for MTH 092 Elementary Algebra to determine how influential social factors are over MTH 092 students' academic performance or if social factors influence their performance at all. We considered two possible social factors which could influence students: the instructor of the class and the other students in the class. Thus we wanted to determine whether the professor or classmates had the more dominant influence on a student. Furthermore, we looked at whether social factors influence which section of MTH 092 a student registers for, and if so, which is the more powerful social factor. Additionally, we asked questions investigating students' attitudes towards the discipline of mathematics, their confidence level in math, and their knowledge of studying math. Finally, we wanted to see how a student's attitude towards their instructor and fellow classmates does (or does not) affect their performance in MTH 092.

Questions 1, 7, and 12 were designed to investigate the importance of social factors in MTH 092 enrollment, and the results indicated that social factors are not very influential in students' decision to register for a particular section of MTH 092. Only 5% of students registered for their section of MTH 092 because they wanted to take the course with a classmate enrolled in that section, while 29% of students registered because they wanted to take a course with the Professor who instructs their section. Yet question 1's results show that 60% of students chose to take MTH 092 to fulfill a math requirement, and another 30% were repeating the course. The questionnaire responses indicate that students are more likely motivated by the need to fulfill graduation requirements than by the desire to take a certain instructor's course or to take MTH 092 with a friend. However students are more likely to register for a section because they like the instructor instead of registering because they like another student in that section.

Questions 2 and 5 show that many students have negative feelings about the discipline of mathematics and low confidence in their math skills before coming to ECC. It was found that almost half (46%) of students disliked math or were anxious about math and roughly the same percentage of students were not very confident or not confident at all in their ability to study math. MTH 092 instructors should be mindful of the prevalence of negative feelings towards math among new students, so that they can better help them to build their confidence level in math. However, questions 3 and 6 reveal that 52% of students feel that they now know how to study math, and approximately 75% of students are either somewhat confident in math or very confident in math at present. The results convey that students' confidence level in math increases dramatically at ECC, as well as their ability to study mathematics.

In examining what might cause the change in students’ ability to study math, question 4 asked where students would go for help if they did not know how to study math. The student responses show that the majority (59%) of students would ask their professor for help. Thus, if we can attribute the rise in confidence level of the students to any social factor, it would be the instructor since they are the ones whom students ask for help from the most.

In analyzing students' attitudes towards their MTH 092 instructor and towards the other students, we found that the overwhelming majority (76%) of students surveyed consider it important that they like their Professor. Comparatively, approximately 16% of students consider it important that they like their classmates. Therefore, the students surveyed indicated that they care significantly more about who is instructing their class, than who is taking the class with them. The importance of one's professor over one's classmates was reflected in the responses to questions 10 and 15 as well. Almost half of the students surveyed indicated that their like or dislike of their professor affects their performance in the course. The vast majority (73%) of students did not agree that their like or dislike of their classmates affects their performance in the course. The responses to questions 10 and 15 emphasize the fact that many students feel that it is important to like their professor, and that their attitude towards their professor will directly affect their performance. Few students consider their like or dislike of their classmates important, and even fewer agree that their like or dislike of their classmates has an effect on their academic performance. Interestingly, an overwhelming majority of students (86%) like their professor for MTH 092, while a lesser but still strong majority (63%) like their classmates, and 78% of students were passing MTH 092 with a grade of C or better.

Thus, in analyzing these responses, one can see the importance of the professor, not just pedagogically, but as the most important social factor influencing a student's academic performance. Consequently, MTH 092 instructors may be able to use their prominent social position in the classroom to help improve their students' academic performance. Professors are in a position to exercise their social influence upon their students' in a positive way, so as to build a rapport with their students which not only makes the students more comfortable with the professor, but also makes the professor more comfortable with the students. This attitudinal survey should serve as another means of learning more about our students and their mindset. If we can become more familiar with our students and maintain our professionalism at the same time, we can then hope to reach them in ways we may have never considered or have underutilized up until now.

### 3.1.2 ATTENDANCE AND HOMEWORK

The belief that lack of attendance and homework completion adversely affects a student’s grade tends to be widely held by many faculty members. As course coordinators and faculty members, we also hold this belief; particularly in a mathematics course where topics, for the most part, are sequential. In other words, the following class is dependent on mastery of the previous class’s content. Furthermore, a thorough understanding of mathematics includes a conceptual understanding of the topics, the ability to apply this conceptual understanding to a problem, and the necessary skills to solve it. Homework is a tool that is used to develop and harness these attributes.

Therefore, as part of our student learning outcomes assessment plan, we decided to assess the correlation, if any, between attendance, homework, and final grade. The MTH 092 sample contained the following data: Student Name, ID#, Number of Absences, Use of Online Homework (yes/no), and Final Grade. This sample included 210 students from nine sections that completed the course for the Fall 2010 semester. Two forms of analysis were conducted.

First, a regression analysis was performed that looked at the group of investigated variables specified above. In this case, the MTH 092 final grade was considered to be a dependent variable while the number of absences and use of online homework were each considered independent variables. Regression analysis reflected how the typical value of the dependent variable (the MTH 092 final grade) changed when any one of the independent variables (absences or online homework use) were varied, while the other independent variables were fixed. It was found that the only variable that affected the MTH 092 grade in a statistically significant way was the number of absences. The independent variable, online homework use, did not affect the variability in MTH 092 grades in a statistically significant way for this particular sample.

Second, the variables were investigated further using an Independent Samples T-Test to discover which variables were significantly different statistically between the group of students that passed with a MTH 092 grade of “C” or higher and the group of students that did not pass. The analysis showed that the number of absences variable was significantly different between the two groups. The online homework variable was found to not be significantly different between the group of students that passed and the group that did not pass.

As a result, one can conclude that for this sample size, students that received passing grades in MTH 092 were found to have excellent attendance. Regarding the lack of statistical significance for the online homework variable, several factors could account for this. Only three out of the nine sections used online homework. That does not mean that the other sections did not do homework; they just did not do homework online. Furthermore, within the three sections in which online homework was used, some of the students simply did not participate in it, claiming a shortage of funds in order to purchase the book or purchase a webaccess number (a requirement for online homework use). These factors, as well as other issues, need to be addressed further.

### 3.1.3 FINAL EXAM

As a third form of assessment, the MTH 092 final exam was blueprinted to the measurable course performance objectives. This is the process by which each of the questions on a test is mapped to a measurable course performance objective (MPO). This allows the creator of the exam to ensure that the exam focuses on the most important course content, helping to determine what should be covered on the exam, and to document the extent to which students have achieved each MPO.

The sample size corresponding to the Fall 2010 ten sections of MTH 092 included 148 students that took the final exam. By the time of the final exam, some of the students had stopped attending although they were still registered for the course. There were ten different versions of the MTH 092 final exam. In order to facilitate assessment of ten sections, it was decided to formally assess the first course goal (CG): *Demonstrate knowledge of the fundamental concepts and theories from algebra and geometry*. This CG is the most comprehensive and includes the important topics covered in a MTH 092 course. These fundamental concepts and theories are stated as MPOs below.

* 1. *simplify and evaluate variable expressions;*
  2. *translate verbal expressions into variable expressions;*
  3. *perform basic operations on polynomial, rational, and exponential expressions;*
  4. *factor polynomial expressions;*
  5. *solve linear, literal, and factorable quadratic equations;*
  6. *graph a line in the Rectangular Coordinate System;*
  7. *identify and find the slope and intercepts of a line;* and
  8. *find the equation of a line based on given geometric properties*

Each of these MPOs was mapped to one of ten multiple choice questions in the first part of the final exam. A ScanTron-like answer sheet was used to collect data from the ten sections on these first ten multiple-choice questions of the final exam. The non-multiple choice parts of the exam addressed the remaining MPOS, as well as the first one, but since they were open ended were not included in the ScanTron-like results.

The results were calibrated separately by version, and then a comprehensive score was found using the data from all ten versions. These results are summarized in the following table:

One can see that the highest percentage of students, (88.52%), mastered MPO 1.4: Factor polynomial expressions. One reason for this is that the MTH 092 curriculum allots a reasonable amount of time for this topic. Furthermore, it is a skill that is frequently required within other topics in 092, so students become very familiar with it. The MPOs with the smallest percentages of students that mastered them were the following:

|  |  |  |
| --- | --- | --- |
| MPO | Description | % mastered |
| 1.5 | Solve linear, literal, and quadratic equations that are factorable | 58.11 |
| 1.6 | Graph a line in the Rectangular Coordinate System | 51.35 |
| 1.8 | Find the equation of a line based on given geometric properties | 62.84 |

One can attribute these results to several, potential factors. MPO 1.6 and 1.8 topics are both covered in the last two weeks of the semester. Usually by then, attendance has dwindled. Therefore, some of the students taking the final exam have barely been exposed to these topics. Furthermore, it is the only chapter that students have not been tested on prior to the final exam. As for MPO 1.5, the question has to do with solving a linear equation, usually a concept that the majority of students master. However, this question included fractions, a topic that many students coming into MTH 092 have difficulty with. It would be interesting in future semester final exams to modify this question to include a linear equation without fractions and to compare the results.

These results can be accessed by clicking on the following file link: [**MTH 092 MPO Summary Report\_Fall2010.xls**](file:///C:\Documents%20and%20Settings\eaboelnag\My%20Documents\My%20Dropbox\SLOAT%20%20Assessment\MTH%20092%20MPO%20Summary%20Report_Fall2010.xls)**.**

## 3.2 DISSEMINATION OF FINDINGS

Benefit from this assessment can only be gained by sharing the results with other MTH 092 professors and discussing ways that change can be implemented. As course coordinators of MTH 092, we hope that this report will be made available to all full-time as well as adjunct professors of MTH 092. We will make this report available online and perhaps the MAP division can provide hard copies for those that require them. Furthermore, this final report will be accessible on the ECC SLO Assessment website, http://sloat.mathography.org, and we can also establish a folder within Dropbox that can be accessible to all MAP faculty, where other professors can add files where they have conducted assessment studies. The next step is to share these results at a forum where ideas, thoughts, etc. can be exchanged in order to effect positive change.

## 3.3 CLOSING THE LOOP – Suggestions for Change

### 3.3.1 ATTITUDINAL SURVEY

As the results of the questionnaire suggest, if professors are better liked by their students, this factor may have an effect on students’ academic performance. The following are suggestions whereby instructors can improve their rapport and interaction with the students.

First of all, simply learning the students’ names is one fundamental mean of establishing a personal connection with each student. Most students realize that it is not easy to remember as many names as instructors have students, so when a professor takes the time to remember a student’s name, it communicates that the professor cares about the student as an individual. Second, an instructor should attempt or take the time to recognize a student’s special gifts or academic strengths. By acknowledging their academic strengths, the instructor not only communicates that he/she is interested in the student as an individual, but also that the instructor would like the student to use his/her strengths to succeed. Another way of showing concern may be if the student seems out of character on a particular day. It may be that the student is dealing with an overwhelming situation that does not allow him/her to focus. While instructors are not expected to be social workers or counselors, a helpful action could be to send the student to the appropriate areas in the College that can help the student with his/her particular problem. There are many avenues to explore when considering ways to reach our students in order to help them succeed. Knowing that instructors are one of the instrumental figures in the classroom whom the students have high regard for should motivate us to try these, as well as other methods in order to better impact our students.

### 3.3.2 ATTENDANCE/ONLINE HOMEWORK

As previously mentioned in this report, attendance had a strong correlation to final grade. The better the grade was, the lower the number of absences that a student had. As MTH 092 instructors, we should share these results with our students. Furthermore, we can assign a grade value to number of absences, and even to number of late arrivals to class. When a student consistently walks in to class fifteen minutes late, he/she has usually missed the introduction or basis for a concept and so will most likely be weak in conceptual understanding. I, personally, have assigned 5% of the overall course grade to attendance and participation in the past, and have found that it is a good motivator. I also counted three late arrivals to class as an absence.

Regarding online homework, this study showed that it did not have a statistical significance on the overall course grade. As mentioned before, only one-third of the sections analyzed used online homework. Therefore, it is difficult to make any conclusive results from this study. For next semester, perhaps it would be beneficial to assess more sections that use online homework regularly. Furthermore, a survey could be administered before the end of the semester to investigate student’s attitudes towards online homework. After several semesters of using it, one of the factors that I have informally discovered is that many of the students who didn’t use it claimed financial reasons. If a student does not purchase a new book package from the ECC bookstore, then he/she would have to purchase a webaccess number online costing anywhere from $35 to $50. The MAP division should work with the publishers to keep these costs down so that students are not turned away from using online homework due to financial constraints. Furthermore, students have mentioned in the past that some of them do not have frequent, convenient access to a computer. These issues warrant further investigation that can be conducted within future assessment studies for MTH 092.

### 3.3.3 FINAL EXAM

As previously mentioned, MPOs 1.5, 1.6, and 1.8 showed the lowest level of student mastery. MPO 1.6 and 1.8 are covered during the last two weeks of the semester when some students stop coming or have “given up.” Professors could administrate a quiz towards the end of the chapter before the final exam leaving time to return and review the quiz before finals. That way, students receive an opportunity to be assessed on the topic before the final exam. As for MPO 1.5, as mentioned previously, future final exams could assess the topic of linear equations with fractions and without fractions. Results can then be compared. This will provide insight regarding whether the issue is with respect to weakness dealing with fractions or solving linear equations. Furthermore, the Spring 2011 MTH 092 Final Exam could include assessment of non-multiple choice questions in order to assess student mastery of application problems.

# APPENDIX A





# APPENDIX B

**ESSEX COUNTY COLLEGE**

**DIVISION OF MATHEMATICS AND PHYSICS**

**MTH 092 - FINAL EXAM - Fall 2010**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_ Section: \_\_\_\_\_**

**Telephone #\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ID # \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Part I MULTIPLE CHOICE. Problems (1-10) are each worth THREE (3) points.**

**Place the letter of the correct answer in the blank provided to the left of the question.**

**Write out the solution to the problem in the space provided. No partial credit.**

|  |  |
| --- | --- |
| \_\_\_ 1. | Evaluate the variable expression when *b* = –16 and *c* = 4. |
|  | A) 52 B) 160 C) 88 D) 153 E) 17 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| \_\_\_ 2. | Translate the following into a variable expression, then simplify:  a number added to the difference between twice the number and three | | | |
| A) |  | D) |  |
| B) |  | E) |  |
| C) |  |  |  |

|  |  |
| --- | --- |
| \_\_\_ 3. | Solve: *y +* *=* |
|  | A)  B)  C)  D) |

|  |  |
| --- | --- |
| \_\_\_ 4. | Simplify: |
|  | A)  B)  C)  D)  E) |

|  |  |
| --- | --- |
| \_\_\_ 5. | Simplify: |
|  | A)  B)  C)  D) |

|  |  |
| --- | --- |
| \_\_\_ 6. | Simplify |
|  | A)  B)  C)  D) |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| \_\_\_ 7. | Find the equation of the line that contains the point (1, –1) and has slope –4. | | | |
| A) |  | D) |  |
| B) |  | E) |  |
| C) |  |  |  |

|  |  |  |
| --- | --- | --- |
| \_\_\_ 8. | Find the slope and *y*-intercept of the line 1 | |
| A) | Slope  y-intercept (1, 0) |
| B) | Slope  y-intercept (0, –1) |
| C) | Slope  y-intercept (0, 1) |
| D) | Slope  y-intercept (- 1, 0) |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| \_\_\_ 9. | Factor: | | | |
| A) |  | D) |  |
| B) |  | E) |  |
| C) |  |  |  |

|  |  |  |
| --- | --- | --- |
| \_\_\_ 10. | Graph: | |
| A) |  |
| B) |  |
| C) |  |
| D) |  |
| E) |  |