

Course Student Learning Outcomes Assessment

MATH 060 Elementary Algebra

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Table of Contents

General Information	1
Standing Requirements	2
Course Description.....	2
Course Student Learning Outcomes.....	2
2014-2015 Assessment Cycle	3
Measurements.....	3
Findings.....	3
Plans of Action.....	5
Status Reports.....	6
2013-2014 Assessment Cycle	8
Measurements.....	8
Findings.....	8
Plans of Action.....	10
Status Reports.....	11
2012-2013 Assessment Cycle	12
Measurements.....	12
Findings.....	12
Plans of Action.....	13
Status Reports.....	14
Appendix	15

General Information (Course Student Learning Outcomes Assessment)

Standing Requirements

📖 Course Description

A first course in algebra which includes solutions and applications of first and second degree equations geometric concepts graphs inequalities exponents polynomials and algebraic fractions.

📖 Course Student Learning Outcomes

MATH 60 Elementary Algebra Outcome Set

Outcome	
Outcome	Mapping
Outcome 1 Evaluate and perform algebraic operations on polynomial, rational and radical expressions.	Institutional Student Learning Outcomes: Think 1
Outcome 2 Solve word problems and equations involving linear, quadratic and rational expressions using appropriate algebraic techniques.	Institutional Student Learning Outcomes: Act 3, Communicate 1, Communicate 2, Learn 2, Think 1, Think 2, Think 3
Outcome 3 Manipulate and analyze linear equations including finding slope, intercepts, graph and equation.	Institutional Student Learning Outcomes: Learn 2, Think 1, Think 2

2014-2015 Assessment Cycle

Measurements

Outcomes and Measures

MATH 60 Elementary Algebra Outcome Set

Outcome

Outcome 2

Solve word problems and equations involving linear, quadratic and rational expressions using appropriate algebraic techniques.

▼ **Measure:** Math 60, Elementary Algebra SLO 2
Course level; Direct - Exam

Description of Measurement Tool: Students are given a departmental final with embedded questions (seven free-response) pertaining to specific topics for this SLO.

The rubric scale used is from 0 - 3.
3: Correct with appropriate algebraic approach
2: Minor error or algebraic approach
1: Attempted, but no appropriate algebra used
0: blank

Criteria for Success: Individual & Collective Student Criterion: Individually, success is an average score of 2 or 3 on the rubric scale.
Collectively, success is defined as 70% of the class being individually successful.

Cycle of Assessment: This outcome is assessed every three years.

For this report, the data was gathered in Fall 2014, collated, analyzed, reported, and discussed in Spring 2015, with recommendations implemented in Fall 2015.

Who is Responsible for Assessment Activity?: The Math 060 coordinators of record for 2014-2015, Laney Wright and Jane Francis, are responsible for the assessment.

Findings

Finding per Measure

MATH 60 Elementary Algebra Outcome Set

Outcome

Outcome 2

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Course level; Direct - Exam

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Who is Responsible for Assessment Activity?: The Math 060 coordinators of record for 2014-2015, Laney Wright and Jane Francis, are responsible for the assessment.

Findings for Math 60, Elementary Algebra SLO 2

Summary of Findings: Seven questions were embedded into the final exam (listed below).

There were 15 of the 16 sections offered that were assessed. Six students from each of the 15 classes were randomly chosen ($n = 90$).

Collective student success rates per question:

- 1) Solving Linear Equations: 93%
- 2) Solving Quadratic Equations (factoring): 70%
- 3) Solving Quadratic Equations (formula): 54%
- 4) Solving Rational Equations: 49%
- 5) Solving Discount Problems: 47%
- 6) Solving Reading Problems
 - a. Price: 58%
 - b. Investment: 60%
- 7) Solving Reading Problems
 - a. Work Rate: 51%
 - b. Distance: 64%

Overall: 61%

Results: Criteria for Success Achievement Status: Not Met

Analysis of Findings: Our success rates are not as high as we like.

Areas of concern

A. Solving Quadratic Equations (formula): Many students knew to use the formula, but either wrote the formula incorrectly or made several errors when simplifying. Only 62% of the students who passed the course got this correct.

B. Solving Rational Equations: Students did not include the variable in the LCD when clearing the fractions, and then re-wrote $10/x$ as $10x$. Only 54% of the students who passed the course got this correct.

C. Solving Discount Problems: Students did not use variables/algebra, and did not have the correct answer. Only 55% of the students who passed the course got this correct.

D. Solving Reading Problems: Those who were not successful either stopped at an incorrect equation or left them blank.

CHOICE 1-

- a. Price: 50/90 of the students attempted the Price problem. 69% of the students who passed the course got this correct.
- b. Investment: 40/90 of the students attempted the Investment problem. 68% of the students who passed the course got this correct

CHOICE 2-


- a. Work Rate: 57/90 of the students attempted the Work Rate problem. 61% of the students who passed the course got this correct.
- b. Distance: 33/90 of the students attempted the Distance problem. 67% of the students who passed the course got this correct.

Recommendations: These results will be sent to current and past Math 60 instructors.

Encourage instructors to focus on the four areas of concern listed under Analysis of Findings.

Most of the reading problems are taught at the beginning of the semester (ch. 2) and the Quadratic Formula is taught at the very end of the semester (ch. 11). We need to discuss spreading out the reading problems throughout the semester or encourage including them on every subsequent exam and perhaps moving up the Quadratic Formula to earlier in the semester to give students more time with the formula.

Substantiating Evidence:

 Math 60 SLO 2 Assessment Data F14-I15 (Adobe Acrobat Document) (See appendix)

This Findings is associated with the following Actions:

Math 60 SLO 2 Fall 14

(Plans of Action; 2014-2015 Assessment Cycle)

Overall Recommendations

No text specified

Plans of Action

Actions

MATH 60 Elementary Algebra Outcome Set

Outcome

Outcome 2

Solve word problems and equations involving linear, quadratic and rational expressions using appropriate algebraic techniques.

▼ Action: Math 60 SLO 2 Fall 14

This Action is associated with the following Findings

Findings for Math 60, Elementary Algebra SLO 2

(Measurements and Findings; 2014-2015 Assessment Cycle)

Summary of Findings: Seven questions were embedded into the final exam (listed below).

There were 15 of the 16 sections offered that were assessed. Six students from each of the 15 classes were randomly chosen ($n = 90$).

Collective student success rates per question:

- 1) Solving Linear Equations: 93%
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- 3) Solving Quadratic Equations (formula): 54%
- 4) Solving Rational Equations: 49%
- 5) Solving Discount Problems: 47%
- 6) Solving Reading Problems
 - a. Price: 58%
 - b. Investment: 60%
- 7) Solving Reading Problems
 - a. Work Rate: 51%
 - b. Distance: 64%

Overall: 61%

Details of Plan of Action: These results will be sent to all full-time and part-time math faculty, and will be discussed at our department meeting. The following will be addressed:

- 1) Possibly moving up the Quadratic Formula earlier in the semester to give students more time with the formula.
- 2) Stressing finding the LCD with Rational equations and the distinction between $10/x$ and $10x$.
- 3) Reading problems (including Discount/Mark-up) need to be addressed throughout the semester with strong algebraic approaches. Not "hunt and peck" arithmetic.
- 4) Less than 70% of our passing students are successful with these topics. We need to discuss how to ensure that our students who are passing are prepared for Math 80.

Plan of Action Timeline: Spring 2015: The Plan of Action will begin during the next scheduled

faculty meeting after the assessment. Faculty meetings are once a month during Fall and Spring semesters.

Fall 2015 – Fall 2017: All faculty teaching Math 060 will be given reminders of the SLO results and the suggestions laid out in our Plan of Action at the beginning of each semester in their welcome packet.

Fall 2017: New Data will be collected to reassess this SLO.

Who is responsible for carrying out the Plan of Action?: The Math 060 coordinator(s) of record for 2015-2018 will be responsible for the assessment.

How will you determine if the Plan of Action has been effective?: We will reassess this SLO in three years to determine if this Plan of Action was successful.

Additional Resources Required (if any):

Budget request amount: \$0.00

Priority: High

Status Reports

Action Statuses

MATH 60 Elementary Algebra Outcome Set

Outcome

Outcome 2

Solve word problems and equations involving linear, quadratic and rational expressions using appropriate algebraic techniques.

▼ Action: Math 60 SLO 2 Fall 14

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- 2) Stressing finding the LCD with Rational equations and the distinction between $10/x$ and $10x$.
- 3) Reading problems (including Discount/Mark-up) need to be addressed throughout the semester with strong algebraic approaches. Not "hunt and peck" arithmetic.
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Fall 2015 – Fall 2017: All faculty teaching Math 060 will be given reminders of the SLO results and the suggestions laid out in our Plan of Action at the beginning of each semester in their welcome packet.

Fall 2017: New Data will be collected to reassess this SLO.

Who is responsible for carrying out the Plan of Action?: The Math 060 coordinator(s) of record for 2015-2018 will be responsible for the assessment.

How will you determine if the Plan of Action has been effective?: We will reassess this SLO in three years to determine if this Plan of Action was successful.

Additional Resources Required (if any):

Budget request amount: \$0.00

Priority: High

Status for Math 60 SLO 2 Fall 14

No Status Added

Status Summary

No text specified

Summary of Next Steps

No text specified

2013-2014 Assessment Cycle

Measurements

Outcomes and Measures

MATH 60 Elementary Algebra Outcome Set

Outcome

Outcome 1

Evaluate and perform algebraic operations on polynomial, rational and radical expressions.

▼ **Measure:** Math 060 Elementary Algebra - SLO 1
Course level; Direct - Exam

Description of Measurement Tool: Students are given a departmental final. Seven free-response questions are assessed for this SLO. The rubric scale is from 0 - 3.

- 3: Correct with appropriate algebraic approach
- 2: Minor error or algebraic approach
- 1: Attempted, but no appropriate algebra used
- 0: blank

Criteria for Success: Individual & Collective Student Criterion: Individually, success is an average score of 2 or 3 on the rubric scale. Collectively, success is defined as 70% of the class being individually successful.

Cycle of Assessment: This outcome is assessed every three years.

For this report, the data was gathered in Fall 2013, collated, analyzed, reported, and discussed in Spring 2014, with recommendations implemented in Fall 2014.

Who is Responsible for Assessment Activity?: The Math 060 coordinator of record for 2013-2014, Laney Wright, is responsible for the assessment.

Outcome 3

Manipulate and analyze linear equations including finding slope, intercepts, graph and equation.

▼ **Measure:** Math 060, SLO3 (Graphs), Fall 2012
Course level; Direct - Exam

Description of Measurement Tool: Two multiple choice questions from the departmental final exam were assessed.

- 1) Calculate the slope of a line (#7 on Forms A and B on Part 1)
- 2) Find the y-intercept of a line (#8 on Forms A and B on Part 1).

Criteria for Success: Individual & Collective Student Criterion: Individually, success is defined as correctly answering both questions. Collectively, success is defined as at least 70% of the students are successful in achieving the outcome.

Cycle of Assessment: Data is collected in the Fall and assessed during the Spring.

This SLO is assessed every 3 years. (i.e. 2012-2013, 2015-2016, 2018-2019, etc.)

Who is Responsible for Assessment Activity?: Jane Francis and Alison Williams

Findings

Finding per Measure

MATH 60 Elementary Algebra Outcome Set

Outcome

Outcome 1

Evaluate and perform algebraic operations on polynomial, rational and radical expressions.

▼ Measure: Math 060 Elementary Algebra - SLO 1 Course level; Direct - Exam

Description of Measurement Tool: Students are given a departmental final. Seven free-response questions are assessed for this SLO. The rubric scale is from 0 - 3.

3: Correct with appropriate algebraic approach

2: Minor error or algebraic approach

1: Attempted, but no appropriate algebra used

0: blank

Criteria for Success: Individual & Collective Student Criterion: Individually, success is an average score of 2 or 3 on the rubric scale. Collectively, success is defined as 70% of the class being individually successful.

Cycle of Assessment: This outcome is assessed every three years.

For this report, the data was gathered in Fall 2013, collated, analyzed, reported, and discussed in Spring 2014, with recommendations implemented in Fall 2014.

Who is Responsible for Assessment Activity?: The Math 060 coordinator of record for 2013-2014, Laney Wright, is responsible for the assessment.

Findings for Math 060 Elementary Algebra - SLO 1

Summary of Findings: Seven questions were embedded into the final exam (listed below).

Finals from 11 of the 14 sections were assessed. Ten students from each of the 11 classes were randomly chosen (n = 110).

Individual Success Rates per question:

- 1) Factoring by grouping: 71%
- 2) Factoring trinomials: 66.3%
- 3) Factoring difference of two squares: 86.7%
- 4) Multiplying rationals: 69.4%
- 5) Multiplying Radicals: 76%
- 6) Multiplying Polynomials: 84%
- 7) Simplifying Radicals: 68%

Overall: 74.5%

Results: Criteria for Success Achievement Status: Met

Analysis of Findings: Our results are slightly lower from our last assessment. This may be due to the type of problems chosen (Multiple Choice vs. Free Response).

Factoring and fraction skills are necessary prior knowledge when working with rationals. If we improve factoring, there is a good chance our rational success rates will improve.

Radicals are generally introduced toward the end. This may be an issue with its success rates.

Recommendations: These results will be sent to current and past Math 60 instructors.

Encourage instructors to focus on trinomial factoring and strong fraction reviews before hitting the rational sections.

Discuss pacing of class to be sure teachers are not falling behind, feeling rushed or skimming the material when reaching the radical sections.

Redesign the final so there are more assessable algebraic operations on polynomial, rational and radical expressions.

Outcome 3

Manipulate and analyze linear equations including finding slope, intercepts, graph and equation.

▼ **Measure:** Math 060, SLO3 (Graphs), Fall 2012
Course level; Direct - Exam

Description of Measurement Tool: Two multiple choice questions from the departmental final exam were assessed.

- 1) Calculate the slope of a line (#7 on Forms A and B on Part 1)
- 2) Find the y-intercept of a line (#8 on Forms A and B on Part 1).

Criteria for Success: Individual & Collective Student Criterion: Individually, success is defined as correctly answering both questions. Collectively, success is defined as at least 70% of the students are successful in achieving the outcome.

Cycle of Assessment: Data is collected in the Fall and assessed during the Spring.

This SLO is assessed every 3 years. (i.e. 2012-2013, 2015-2016, 2018-2019, etc.)

Who is Responsible for Assessment Activity?: Jane Francis and Alison Williams

Findings for Math 060, SLO3 (Graphs), Fall 2012

No Findings Added

Overall Recommendations

No text specified

 **Plans of Action**

Actions

MATH 60 Elementary Algebra Outcome Set

Outcome

Outcome 1 *No actions specified*

Evaluate and perform algebraic operations on polynomial, rational and radical expressions.

Outcome 3
Manipulate and analyze linear equations including finding slope, intercepts, graph and equation.

▼ **Action:** Improve calculation of slope and y-intercept

This Action is associated with the following Findings
No supporting Findings have been linked to this Action.

Details of Plan of Action: The findings will be presented to all part-time and full-time faculty. Successful teaching methods will be discussed.

Plan of Action Timeline: The Plan of Action will be carried out during the next faculty meeting after the assessment.

Who is responsible for carrying out the Plan of Action?: The course coordinators are responsible for presenting the findings and facilitating a discussion on successful teaching methods for slope and y-intercepts. All Math 60 instructors are responsible for focusing on slope and y-intercept when teaching their respective section.

How will you determine if the Plan of Action has been effective?: We will reassess this SLO in three years to determine if this Plan of Action was successful.

Additional Resources Required (if any):

Budget request amount: \$0.00

Priority: Medium

 **Status Reports**

Action Statuses

MATH 60 Elementary Algebra Outcome Set

Outcome

Outcome 1

Evaluate and perform algebraic operations on polynomial, rational and radical expressions.

No actions specified

Outcome 3

Manipulate and analyze linear equations including finding slope, intercepts, graph and equation.

▼ **Action:** Improve calculation of slope and y-intercept

Details of Plan of Action: The findings will be presented to all part-time and full-time faculty. Successful teaching methods will be discussed.

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Who is responsible for carrying out the Plan of Action?: The course coordinators are responsible for presenting the findings and facilitating a discussion on successful teaching methods for slope and y-intercepts. All Math 60 instructors are responsible for focusing on slope and y-intercept when teaching their respective section.

How will you determine if the Plan of Action has been effective?: We will reassess this SLO in three years to determine if this Plan of Action was successful.

Additional Resources Required (if any):

Budget request amount: \$0.00

Priority: Medium

Status for Improve calculation of slope and y-intercept

No Status Added

Status Summary

No text specified

Summary of Next Steps

No text specified

2012-2013 Assessment Cycle

Measurements

Outcomes and Measures

MATH 60 Elementary Algebra Outcome Set

Outcome

Outcome 3

Manipulate and analyze linear equations including finding slope, intercepts, graph and equation.

▼ **Measure:** Math 060, SLO3 (Graphs), Fall 2012
Course level; Direct - Exam

Description of Measurement Tool: Two multiple choice questions from the departmental final exam were assessed.

- 1) Calculate the slope of a line (#7 on Forms A and B on Part 1)
- 2) Find the y-intercept of a line (#8 on Forms A and B on Part 1).

Criteria for Success: Individual & Collective Student Criterion: Individually, success is defined as correctly answering both questions. Collectively, success is defined as at least 70% of the students are successful in achieving the outcome.

Cycle of Assessment: Data is collected in the Fall and assessed during the Spring.

This SLO is assessed every 3 years. (i.e. 2012-2013, 2015-2016, 2018-2019, etc.)

Who is Responsible for Assessment Activity?: Jane Francis and Alison Williams

Findings

Finding per Measure

MATH 60 Elementary Algebra Outcome Set

Outcome

Outcome 3

Manipulate and analyze linear equations including finding slope, intercepts, graph and equation.

▼ **Measure:** Math 060, SLO3 (Graphs), Fall 2012
Course level; Direct - Exam

Description of Measurement Tool: Two multiple choice questions from the departmental final exam were assessed.

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Cycle of Assessment: Data is collected in the Fall and assessed during the Spring.

This SLO is assessed every 3 years. (i.e. 2012-2013, 2015-2016, 2018-2019, etc.)

Who is Responsible for Assessment Activity?: Jane Francis and Alison Williams

Findings for Math 060, SLO3 (Graphs), Fall 2012

Summary of Findings: There were 292 students from 11 sections of Math 060 taught during fall of 2012 that were assessed.

The results are as follows:

Successful: 64% (187 students)
Not Successful: 36% (105 students)
30% (87 students) answered only one of the questions correctly
6% (18 students) answered neither question correctly

Results: Criteria for Success Achievement Status: Not Met

Analysis of Findings: Approximately the same number of students missed the slope question as those who missed the y-intercept question. Thus, it doesn't appear that one question was more difficult than the other. Possible reasons for students getting an incorrect response range from simple calculation errors to complete lack of understanding of the concepts being tested. Since the questions had multiple-choice answers, there is no way to know what types of errors were made by these students.

Students who missed both questions probably do not have a good understanding of the concepts. Since the number missing both questions was small, however, it seems that overall students are grasping the concepts of slope and y-intercept.

Recommendations:

Overall Recommendations

No text specified

Plans of Action

Actions

MATH 60 Elementary Algebra Outcome Set

Outcome

Outcome 3

Manipulate and analyze linear equations including finding slope, intercepts, graph and equation.

▼ Action: Improve calculation of slope and y-intercept

This Action is associated with the following Findings

No supporting Findings have been linked to this Action.

Details of Plan of Action: The findings will be presented to all part-time and full-time faculty. Successful teaching methods will be discussed.

Plan of Action Timeline: The Plan of Action will be carried out during the next faculty meeting after the assessment.

Who is responsible for carrying out the Plan of Action?: The course coordinators are responsible for presenting the findings and facilitating a discussion on successful teaching methods for slope and y-intercepts. All Math 60 instructors are responsible for focusing on slope and y-intercept when teaching their respective section.

How will you determine if the Plan of Action has been effective?: We will reassess this SLO in three years to determine if this Plan of Action was successful.

Additional Resources Required (if any):

Budget request amount: \$0.00

Priority: Medium

Status Reports

Action Statuses

MATH 60 Elementary Algebra Outcome Set

Outcome

Outcome 3

Manipulate and analyze linear equations including finding slope, intercepts, graph and equation.

▼ Action: Improve calculation of slope and y-intercept

Details of Plan of Action: The findings will be presented to all part-time and full-time faculty. Successful teaching methods will be discussed.

Plan of Action Timeline: The Plan of Action will be carried out during the next faculty meeting after the assessment.

Who is responsible for carrying out the Plan of Action?: The course coordinators are responsible for presenting the findings and facilitating a discussion on successful teaching methods for slope and y-intercepts. All Math 60 instructors are responsible for focusing on slope and y-intercept when teaching their respective section.

How will you determine if the Plan of Action has been effective?: We will reassess this SLO in three years to determine if this Plan of Action was successful.

Additional Resources Required (if any):

Budget request amount: \$0.00

Priority: Medium

Status for Improve calculation of slope and y-intercept

Current Status: Completed

Budget Status:

Explanation of current status: We have seen improvement in this SLO.

Has the Plan of Action been effective? What are the next steps?: Reassess during next cycle (2015-2016).

Status Summary

No text specified

Summary of Next Steps

No text specified

Appendix

A. **Math 60 SLO 2 Assessment Data F14-I15** (Adobe Acrobat Document)
