## Discipline Outcome
Factoring a Quadratic Equation

### Measure 1 Type:
Direct

**Embedded exam items**

### Measure 1 Description:
This learning outcome is assessed by measuring algebra students’ ability to factor a quadratic expression. Factoring quadratic expressions and solving quadratic equations is a basic algebraic skill integral to the application of mathematics to engineering, physical sciences, and economics.

### Measure 1 Sample Size:
693

### Measure 1 Benchmark

1) **Describe the benchmark for this measure.**

A cross-sequential longitudinal design was implemented with statistically significant improvement in student performance across four algebra courses (MAT 090, MAT 095/099, MAT 121) predicted. Benchmarks were set for the college transfer-level course of MAT 121. In MAT 121, it was predicted that 80% of the students could correctly answer this question on the department final.

2) **What is the rationale for choosing this benchmark?**

Achieving the benchmark would confirm students’ comprehension of basic mathematical skills related to algebra after receiving continuing instruction in this concept.
Measure 2 Type:

Please select

Measure 2 Description:

Measure 2 Sample Size:

Measure 2 Benchmark

1) Describe the benchmark for this measure.

2) What is the rationale for choosing this benchmark?

Outcomes Met/not met

Met benchmark

Measure 1 Results:

Student responses for department finals were scored on scantrons. Item analysis was collected for all face to face sections in all four courses (MAT 090, MAT 095, MAT 099, and MAT 121). Online sections were disregarded for analysis. An identical multiple choice factoring question was embedded in each course’s final exam. Scores for 693 students were collected. Percentage of correct responses for this question was 39% for MAT 090 students, 56% for MAT 095/099 students, and 74% for MAT 121 students, as indicated in the graph below.

![Factoring: Percentage of correct answers](image_url)
Analysis of the responses indicates there is a statistically significant improvement (p < 0.05) in student performance on the factoring assessment from MAT 090 to MAT 121. This result provides evidence that the math department contributes to student learning at the discipline level. MAT 090 or appropriate accuplacer score is the prerequisite for MAT 099. The prerequisite for MAT 121 is either MAT 095 or MAT 099 or the appropriate accuplacer score. Therefore, it is not unexpected that MAT 121 students perform significantly better than MAT 090 and MAT 095/099 students since they have received more ongoing instruction.

Measure 2 Results:
Not applicable. Only one measure was used.

1) How did unit/department performance compare to the benchmark?
Student performances in the MAT 121 met the neutral benchmark between 70% and 79%.

2) How does the data compare to the previous year, if applicable?
There was a 1% increase in student performance from the previous year in the terminal course of MAT 121.

3) If multiple measures were used, how do they compare to each other?
Not applicable. A single direct measurement was employed.

1) Based on the findings, how does the unit/department rate performance in regards to this outcome (strong – exceeds benchmark, neutral – meets benchmark, or weak – misses benchmark)?
Met benchmark

2) How does this assessment affect plans for this coming year in terms of strategic planning, budget planning, administrative and educational support unit planning, and assessment planning?
The math department met the benchmark established for the factoring discipline outcome and we are satisfied with the results. However, redesign of the developmental education courses will result in a complete change in the assessment planning for the next academic year.
Discipline Outcome

Quantitative Reasoning: Students will demonstrate the ability to predict an appropriate course of action from analyzing graphical information.

Measure 1 Type:

Direct

Embedded exam items

Measure 1 Description:

This learning outcome is assessed by measuring algebra students’ ability to read and interpret a graph. Graphs play an important role in the modeling and understanding of complex systems. The ability to interpret problems that involve quantitative relationships by means of visual representation is a foundation skill for all disciplines.

Measure 1 Sample Size:

693

Measure 1 Benchmark

1) Describe the benchmark for this measure.

A cross-sequential longitudinal design was implemented with statistically significant improvement in student performance across four algebra courses (MAT 090, MAT 095/099, MAT 121) predicted. Benchmarks were set for the college transfer-level course of MAT 121. In MAT 121, it was predicted that 70% to 79% of the students could correctly answer this question on the department final.

2) What is the rationale for choosing this benchmark?

Achieving the benchmarks would confirm students’ comprehension of basic mathematical skills related to algebra after receiving continuing instruction in this concept.

Measure 2 Type:

Please select

Measure 2 Description:
Measure 2 Sample Size:

Measure 2 Benchmark

1) Describe the benchmark for this measure.

2) What is the rationale for choosing this benchmark?

Outcomes Met/not met

Surpassed benchmark

Measure 1 Results:

Student responses for department finals were scored on scantrons. Item analysis was collected for all face to face sections in all four courses (MAT 090, MAT 095, MAT 099, and MAT 121). Online sections were disregarded for analysis. An identical multiple choice question on interpreting a graph was embedded in each course’s final exam. Percentage of correct responses was 73% for MAT 090 students, 76% for MAT 095/099 students, and 91% for MAT 121 students, as indicated in the graph below.

![Graph Interpretation: Percentage of correct answers](image_url)

Analysis of the responses indicates there is not a statistically significant improvement (p > 0.05) in student performance on the interpreting graph assessment from MAT 090 to MAT 121. The multiple choice question selected for assessment was not appropriate to measure the math department’s contribution to student learning in interpreting graphs.

Measure 2 Results:
1) How did unit/department performance compare to the benchmark?
Student performances in the MAT 121 exceeded the benchmark of greater than or equal to 80%.

2) How does the data compare to the previous year, if applicable?
There was a 1% decrease in student performances from last year in the terminal course of MAT 121.

3) If multiple measures were used, how do they compare to each other?
Not applicable. A single direct measurement was employed.

1) Based on the findings, how does the unit/department rate performance in regards to this outcome (strong – exceeds benchmark, neutral – meets benchmark, or weak – misses benchmark)?
Surpassed benchmark

2) How does this assessment affect plans for this coming year in terms of strategic planning, budget planning, administrative and educational support unit planning, and assessment planning?
The math department exceeded the benchmark established for the quantitative reasoning learning outcome and we are satisfied with the results. However, redesign of the developmental education courses will result in a complete change in the assessment planning for the next academic year.

Further Action:
Further Action Planned

Describe the action plan:
The math department has been involved in a system-wide change in the developmental education courses. The change will be fully implemented by Fall 2014. We have defined success in the redesign assessment as the measureable improvement in state competencies and learning outcomes. In order to evaluate success, we will compare the number of correct answers to the same question on our department final exams
• By comparing the previous model to the new model
  o MAT 095/099 to MAT 055
  o MAT 090 to MAT 050
• By comparing the prerequisite course to the college transfer course
  o MAT 055 to MAT 121
  o MAT 050 to MAT 120
**Person/ Group responsible for action**
Debbie Grant

**Target Date for implementation of the action**
12/08/2014

**Priority**
High

Describe any additional resources needed (Leave blank if no additional resources are needed.)
The math department will need copies of new department final exams for the new developmental education courses and the corresponding transfer level courses for all sections of each course.

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**Discipline Outcome**
Information Management: Students will display an ability to critically evaluate a linear equation.

**Measure 1 Type:**
Direct

**Measure 1 Description:**
This learning outcome is assessed by measuring algebra students’ ability to determine the equation of line. Many phenomena can be modeled in a linear relation and used to approximate the behavior of processes in the real world. The ability to derive a linear equation from given data is a problem solving skill important to almost any discipline.

**Measure 1 Sample Size:**
693

**Measure 1 Benchmark**
1) Describe the benchmark for this measure.

A cross-sequential longitudinal design was implemented with statistically significant improvement in student performance across four algebra courses (MAT 090, MAT 095/099, MAT 121) predicted. Benchmarks were set for the college transfer-level course of MAT 121. In MAT 121, it was predicted that 80% of the students could correctly answer this question on the department final.

2) What is the rationale for choosing this benchmark?

Achieving the benchmarks would confirm students’ comprehension of basic mathematical skills related to algebra after receiving continuing instruction in this concept.

Measure 2 Type:
Please select

Measure 2 Description:

Measure 2 Sample Size:

Measure 2 Benchmark

1) Describe the benchmark for this measure.

2) What is the rationale for choosing this benchmark?

Outcomes Met/not met

Met benchmark

Measure 1 Results:

Student responses for department finals were scored on scantrons. Item analysis was collected for all face to face sections in all four courses (MAT 090, MAT 095, MAT 099, and MAT 121). Online sections were disregarded for analysis. An identical multiple choice numerical concept question was embedded in each course’s final exam. Percentage of correct responses was 32% for MAT 090 students, 59% for MAT 095/099 students, and 76% for MAT 121 students.
Analysis of the responses indicates there is a statistically significant improvement (p < 0.05) in student performance on the numerical concept assessment from MAT 090 to MAT 121. This result provides evidence that the math department contributes to student learning at the discipline level. MAT 090 or appropriate accuplacer score is the prerequisite for MAT 099. The prerequisite for MAT 121 is either MAT 095 or MAT 099 or the appropriate accuplacer score. Therefore, it is not unexpected that MAT 121 students perform significantly better than MAT 090 and MAT 095/099 students since they have received more ongoing instruction.

Measure 2 Results:

1) How did unit/department performance compare to the benchmark?
Student performances in the MAT 121 met the neutral benchmark between 70% and 79%.

2) How does the data compare to the previous year, if applicable?
There was a 4% increase in student performances from last year in the terminal course of MAT 121.

3) If multiple measures were used, how do they compare to each other?
Not applicable. A single direct measurement was employed.

1) Based on the findings, how does the unit/department rate performance in regards to this outcome (strong – exceeds benchmark,
neutral – meets benchmark, or weak – misses benchmark)?

Met benchmark

2) How does this assessment affect plans for this coming year in terms of strategic planning, budget planning, administrative and educational support unit planning, and assessment planning?

The math department met the benchmark established for the information management learning outcome and we are satisfied with the results. However, redesign of the developmental education courses will result in a complete change in the assessment planning for the next academic year.

Further Action:
Further Action Planned

Describe the action plan:

The math department has been involved in a system-wide change in the developmental education courses. The change will be fully implemented by Fall 2014. We have defined success in the redesign assessment as the measureable improvement in state competencies and learning outcomes. In order to evaluate success, we will compare the number of correct answers to the same question on our department final exams

· By comparing the previous model to the new model
  o MAT 095/099 to MAT 055
  o MAT 090 to MAT 050
· By comparing the prerequisite course to the college transfer course
  o MAT 055 to MAT 121
  o MAT 050 to MAT 120
  o MAT 050 to MAT 135

Person/ Group responsible for action
Debbie Grant

Target Date for implementation of the action
12/08/2014

Priority
High

Describe any additional resources needed (Leave blank if no additional resources are needed.)
The math department will need copies of new department final exams for the new developmental education courses and the corresponding transfer level courses for all sections of each course.

**Discipline Outcome**

Students will demonstrate the ability to simplify exponential expressions.

**Measure 1 Type:**

Direct

Embedded exam items

**Measure 1 Description:**

This learning outcome is assessed by measuring algebra students’ ability to simplify an exponential expression. Exponential expressions represent the symbolic language of algebra and demonstrates competency in math literacy and abstract reasoning skills necessary to excel in math and science.

**Measure 1 Sample Size:**

693

**Measure 1 Benchmark**

1) Describe the benchmark for this measure.

A cross-sequential longitudinal design was implemented with statistically significant improvement in student performance across four algebra courses (MAT 090, MAT 095/099, MAT 121) predicted. Benchmarks were set for the college transfer-level course of MAT 121. In MAT 121, it was predicted that 80% of the students could correctly answer this question on the department final.

2) What is the rationale for choosing this benchmark?

Achieving the benchmarks would confirm students’ comprehension of basic mathematical skills related to algebra after receiving continuing instruction in this concept.

**Measure 2 Type:**

Direct

Please select
Measure 2 Description:

Measure 2 Sample Size:

Measure 2 Benchmark

1) Describe the benchmark for this measure.

2) What is the rationale for choosing this benchmark?

Outcomes Met/not met
Met benchmark

Measure 1 Results:

Student responses for department finals were scored on scantrons. Item analysis was collected for all face to face sections in all four courses (MAT 090, MAT 095, MAT 099, and MAT 121). Online sections were disregarded for analysis. An identical multiple choice question on simplifying exponential expression was embedded in each course’s final exam. Scores for 693 students were collected. Percentage of correct responses was 47% for MAT 090 students, 59% for MAT 095/099 students, and 72% for MAT 121 students, as indicated in the graph below.

![Exponential Expression: Percentage of correct answers](image)

Analysis of the responses indicates there is a statistically significant improvement \((p < 0.05)\) in student performance on the exponential expression simplification assessment from MAT 090 to MAT 121. This result provides evidence that the math department contributes to student learning at the discipline level. MAT 090 or appropriate accuplacer score is the prerequisite for MAT 099. The prerequisite for MAT 121 is either MAT 095 or MAT 099 or the appropriate accuplacer score. Therefore, it is not unexpected that MAT 121 students perform significantly better than MAT 090 and MAT 095/099 students since they have received more ongoing instruction. While improvement was demonstrated, additional work is
required to bring students to a satisfactory level.

Measure 2 Results:

1) How did unit/department performance compare to the benchmark?
Student performances in the MAT 121 met the neutral benchmark between 70% and 79%.

2) How does the data compare to the previous year, if applicable?
There was a 3% increase in student performances from last year in the terminal course of MAT 121.

3) If multiple measures were used, how do they compare to each other?
Not applicable. A single direct measurement was employed.

1) Based on the findings, how does the unit/department rate performance in regards to this outcome (strong – exceeds benchmark, neutral – meets benchmark, or weak – misses benchmark)?
Met benchmark

2) How does this assessment affect plans for this coming year in terms of strategic planning, budget planning, administrative and educational support unit planning, and assessment planning?
The math department met the benchmark established for the exponential expression discipline outcome and we are satisfied with the results. However, redesign of the developmental education courses will result in a complete change in the assessment planning for the next academic year.

Further Action:
Further Action Planned

Describe the action plan:
The math department has been involved in a system-wide change in the developmental education courses. The change will be fully implemented by Fall 2014. We have defined success in the redesign assessment as the measureable improvement in state competencies and learning outcomes. In order to evaluate success, we will compare the number of correct answers to the same question on our department final exams
- By comparing the previous model to the new model
  - MAT 095/099 to MAT 055
  - MAT 090 to MAT 050
- By comparing the prerequisite course to the college transfer course
  - MAT 055 to MAT 121
  - MAT 050 to MAT 120
  - MAT 050 to MAT 135

Person/ Group responsible for action
Debbie Grant

Target Date for implementation of the action
12/08/2014

Priority
High

Describe any additional resources needed (Leave blank if no additional resources are needed.)
The math department will need copies of new department final exams for the new developmental education courses and the corresponding transfer level courses for all sections of each course.