The Rice University Mathematics Leadership Institute
TASM Fall Meeting
September 18, 2006

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MLI Core Partners

Aldine Independent School District
Houston Independent School District
Rice University

- Rice University School Mathematics Project (RUSMP)
- Computational and Applied Mathematics Department (CAAM)
- Mathematics Department (MATH)
- Statistics Department (STAT)
Why Target Senior High Schools?

- unacceptable passing rates of high school students on TAKS
- high drop-out rates of senior high school students
- paucity of highly-qualified high school mathematics teachers
- high school restructuring requiring teachers to teach all mathematics courses at the high school level
MLI Goals

- Develop a cadre of 80 lead teachers in mathematics (two per high school in each of the school districts).

- Establish a leadership program at 40 individual campuses that will provide mathematics content and pedagogical support for the entire mathematics department at that campus.
MLI Goals

- Develop *entire* campus mathematics departments across participating districts as cadres of highly qualified mathematics teachers who have the content and pedagogical knowledge to engage *all* students in rich and challenging learning activities.
MLI Goals

- Ensure that *all* high school students have access to, are prepared for, and encouraged to participate in challenging and advanced mathematics courses at their schools.

- Impact the instructional practices of Rice University CAAM/MATH/STAT faculty, post-docs, and graduate students.
MLI Lead Mathematics Teachers Experiences

- four-week Summer Leadership Institute in each of two summers

- monthly meetings as a group to share experiences with other lead teachers
Tropical Mathematics

- A new mathematics
- Starts with a new arithmetic
- Includes polynomials, curves, higher algebra
- Useful in combinatorics, algebraic geometry
- Useful in genetics
- It is fun to do math in a different setting.
Troy borrowed money from his father so that he could buy a used car. The table shows the remaining balance, $b$, of Troy’s loan after each payment.

<table>
<thead>
<tr>
<th>Number of Payments, $p$</th>
<th>Loan Balance, $b$</th>
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<tbody>
<tr>
<td>1</td>
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Level 1 – Money, Money, Money

Use the table to answer the following questions.

1. Graph the relation.
   (a) Is the relation positive or negative?
   (b) How much money did Troy originally borrow?
   (c) How long (in months) will it take him to pay back the loan?

2. How much money does he pay back with each payment?

3. If Troy works for $6 an hour, how long will he have to work each month to fulfill his monthly obligation to his father?
Troy borrowed money from his father so that he could buy a used car. The table shows the remaining balance, \( b \), of Troy’s loan after each payment.

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4. Find the equation of the relation described in the table.

5. What is the rate of change in the table?
   (a) What is the meaning of this rate of change in real life?
   (b) Explain how you can find the rate of change from the table and from a graph.
   (c) How would the graph change if the rate of change would increase?
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6. Starting with the 7th payment Troy wants to pay an additional $25 each payment.
   (a) What is the percent increase?
   (b) How would the graph for this relation look like?
   (c) How long will it take him now to pay the full loan back?

7. Starting with the 7th payment Troy wants to increase his payments by 20%.
   (a) How much is the new payment?
   (b) How long will it take after this increase to pay the full loan back?
   (c) How much faster will he be paying the loan back?
MLI Lead Mathematics Teachers Experiences

- preparation for Texas Mathematics Master Teacher certification

- participation in the “Lessons Learned Conference” for other institutions interested in replicating the program
MLI Lead Mathematics Teachers Responsibilities

- serving as the campus mathematics advocate
- daily shared planning/professional development time
- observing, providing suggestions for improved instruction, co-teaching, demonstration teaching
Support from NSF over 5 years for Lead Mathematics Teachers

- stipends
- materials and books
- travel to conferences
- Texas Master Mathematics Certification
MLI Lead Mathematics Teachers Responsibilities to Other Professionals on Their Campuses

- working with others to increase student interest in taking advanced math courses

- providing administrators with support in understanding what good mathematics should look like