

2011-2012
Roosevelt High School



**A Construction/Geometry
Course Model**

**MINNEAPOLIS PUBLIC SCHOOL'S
CTE PROGRAM**

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**MINNEAPOLIS
CAREER &
TECHNICAL
EDUCATION**

Year 1 Model (2011-2012):



- 1 math teacher + 1 construction teacher
- 2 hour block of time each day for a year
- 1 section of students
- Common planning time
- Both teachers are present for all of class time (a traditional “team-taught” approach)
- NRCCTE Math-in-CTE model

NRCCTE Math-in-CTE Model: Pairs Math and CTE Teachers – 10 Days PD



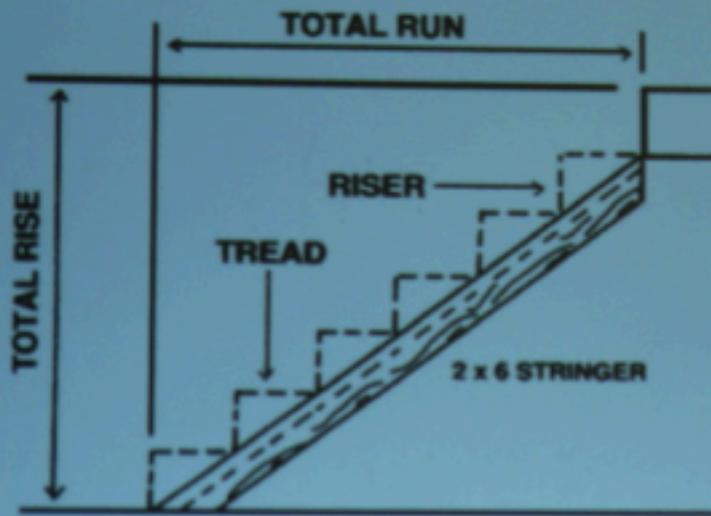
Find the Math Embedded in CTE



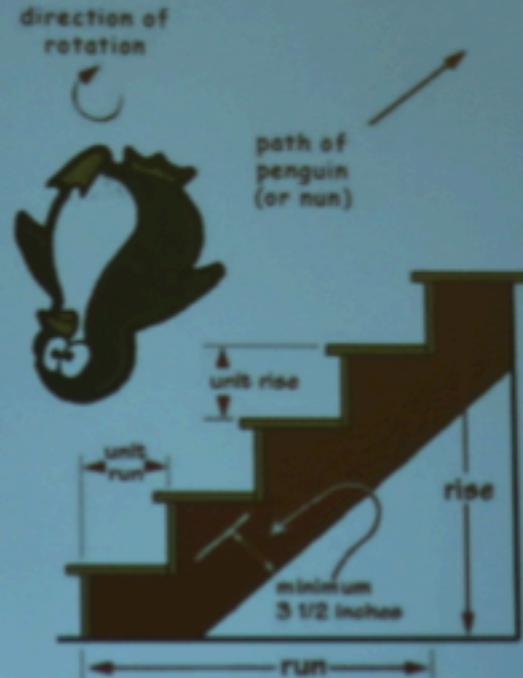
trip while climbing the steps in the dark.

Building codes require that there cannot be more than $\frac{3}{8}$ " difference in rise between any two steps on a stairway and rise must be less than $7\frac{1}{4}$ ". Tread width must be a minimum $11\frac{1}{4}$ ". See www.arcways.com.

The following terms will be used in explaining the math related to a set of stairs. (see Figure below)



Floor Thickness – Floor joist thickness plus sub floor plus underlayment plus floor finish (e.g. tile).



2. Assess students' math awareness as it relates to the CTE lesson.

Develop the Math/CTE Lesson



Gear Ratios

Diagram showing three gears: A (20 T, blue), B (12 T, green), and C (5 T, red). Gear C is meshed with gear B, and gear B is meshed with gear D (20 T, yellow).

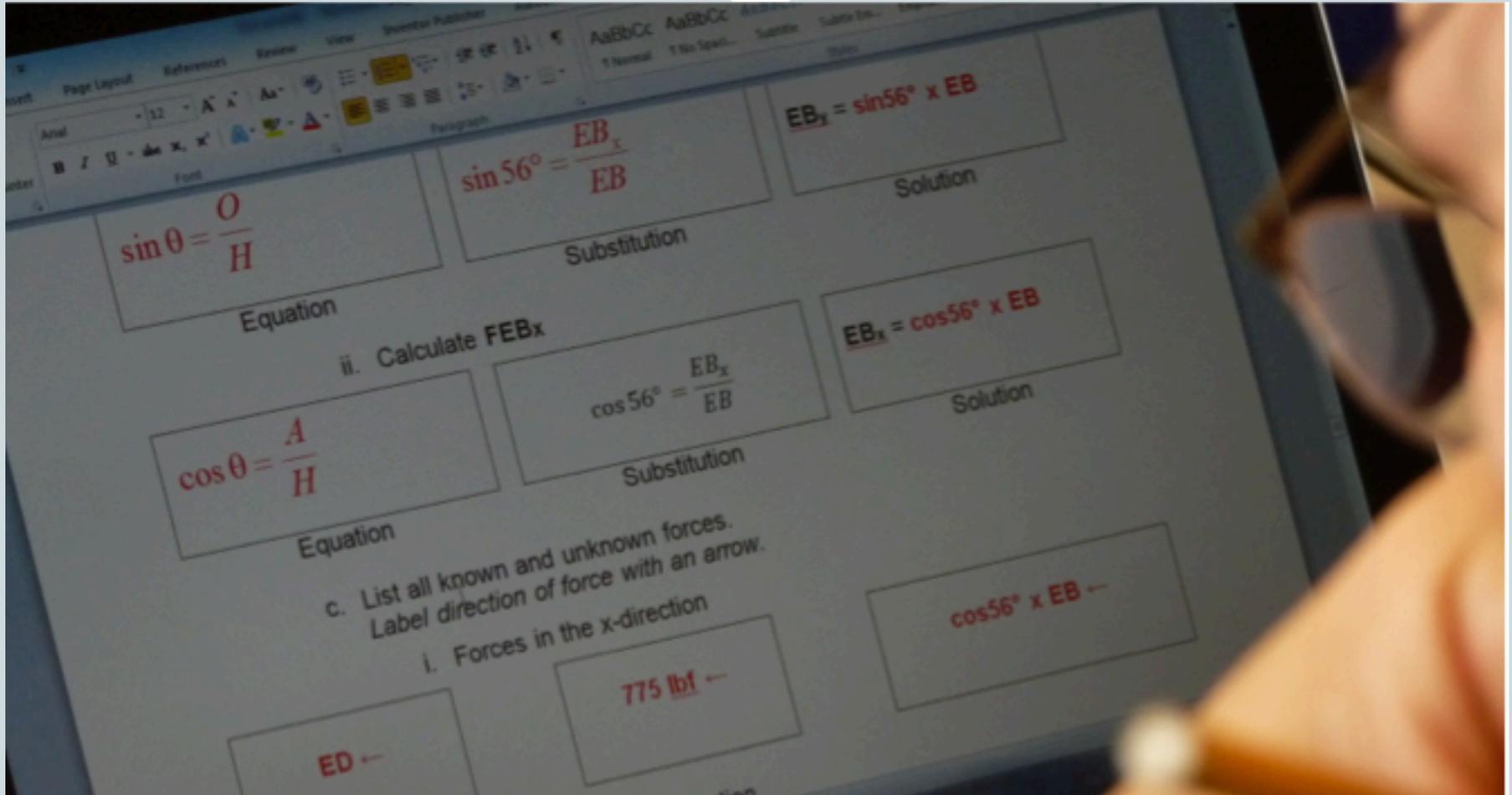
What is the gear ratio between gear A and B? $\frac{GR}{1} = \frac{n_{out}}{n_{in}} = \frac{12}{20} = \frac{.6}{1}$

What is the gear ratio between gear B and C? $\frac{GR}{1} = \frac{n_{out}}{n_{in}} = \frac{5}{12} = \frac{.42}{1}$

What is the gear ratio between gear C and D? $\frac{GR}{1} = \frac{n_{out}}{n_{in}} = \frac{20}{5} = \frac{4}{1}$

Frictions	The resistance that one surface or object encounters when moving over another.
Fulcrums	The fixed point around which a lever rotates.
Gears	A circular toothed object used to transfer rotary motion and torque through interlocking teeth.
Ideal-Mechanical-Advantages	Ratio of distance traveled by

Review the Traditional Mathematics



Deliver the Lesson; Debrief and Revise (Brian Nutter – Construction; Randy Naughton – Math)



A Solid Connection to the MN and CCSS for Math: www.scimathmn/stemtc



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Frameworks for the Minnesota Mathematics & Science Standards

CREATED BY SCIMATHMN AND THE MINNESOTA DEPARTMENT OF EDUCATION
BETA Site

WHAT ARE FRAMEWORKS?

Frameworks are resources developed to help teachers translate Minnesota state standards into classroom practice and assist in student achievement of those standards.
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About the Creators

SciMathMN is a non-profit business, education partnership promoting quality science, technology, engineering and mathematics (STEM) in Minnesota's K-16 educational systems. SciMathMN partnered with the Minnesota Department of Education to develop Frameworks for the delivery of Minnesota's mathematics and science standards, as well as the MN STEM Resource Teacher Center. Please note we are continuing to finalize the work on this website.

Getting the Most out of this Site

First, download and review the academic standards.
[Minnesota's mathematics standards](#)
[Minnesota's science standards](#)

Then, search our frameworks for your specific standard questions.

Frameworks for Delivering the CCSS & MN Math and Science Standards: The Parts...



Overview

Misconceptions

Vignette

Resources

Assessment

Differentiation

Parents/Admin

Standard in Lay Terms

MN Standard in Lay Terms

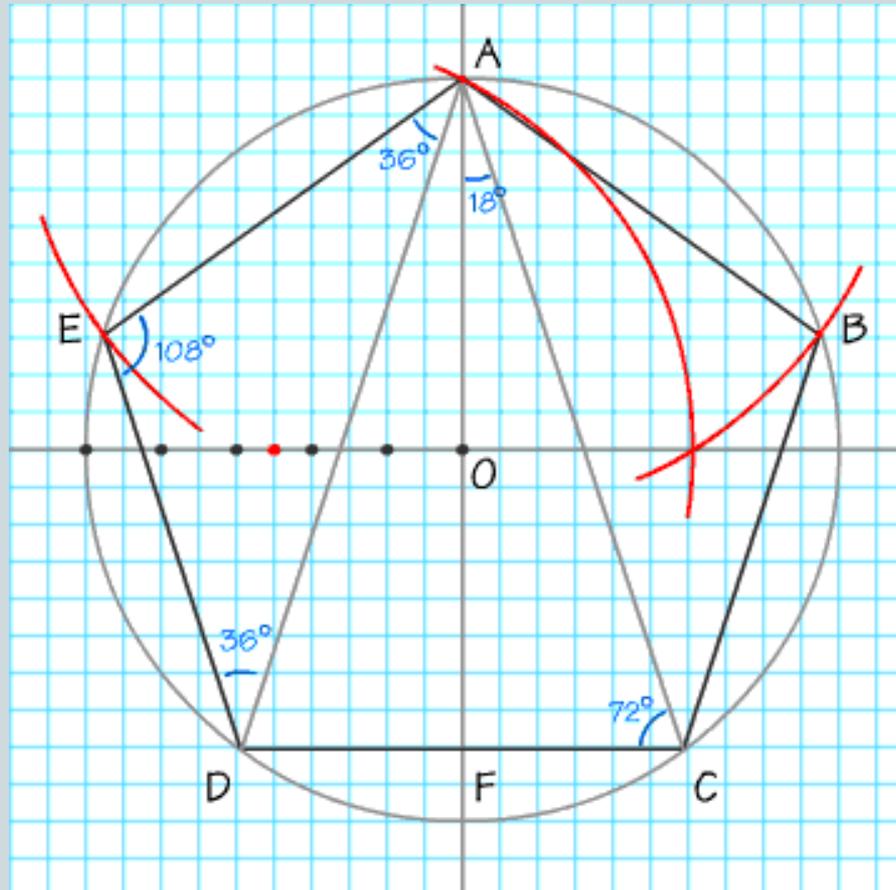
The chemical properties of all elements are the result of differences in atomic structure.

Big Ideas and Essential Understandings

Big Idea

Atoms are arranged in rows and columns in the periodic table depending on the number of protons. Along with protons, atoms also have electrons and neutrons. An element that has the same number of protons but a different number of neutrons is called an isotope and some of these are extremely unstable making them radioactive. All of this information was discovered over the last 150 years by chemists. The people given credit for the development and modification of these models include, Dalton, Thompson, Rutherford, Chadwick and Bohr.

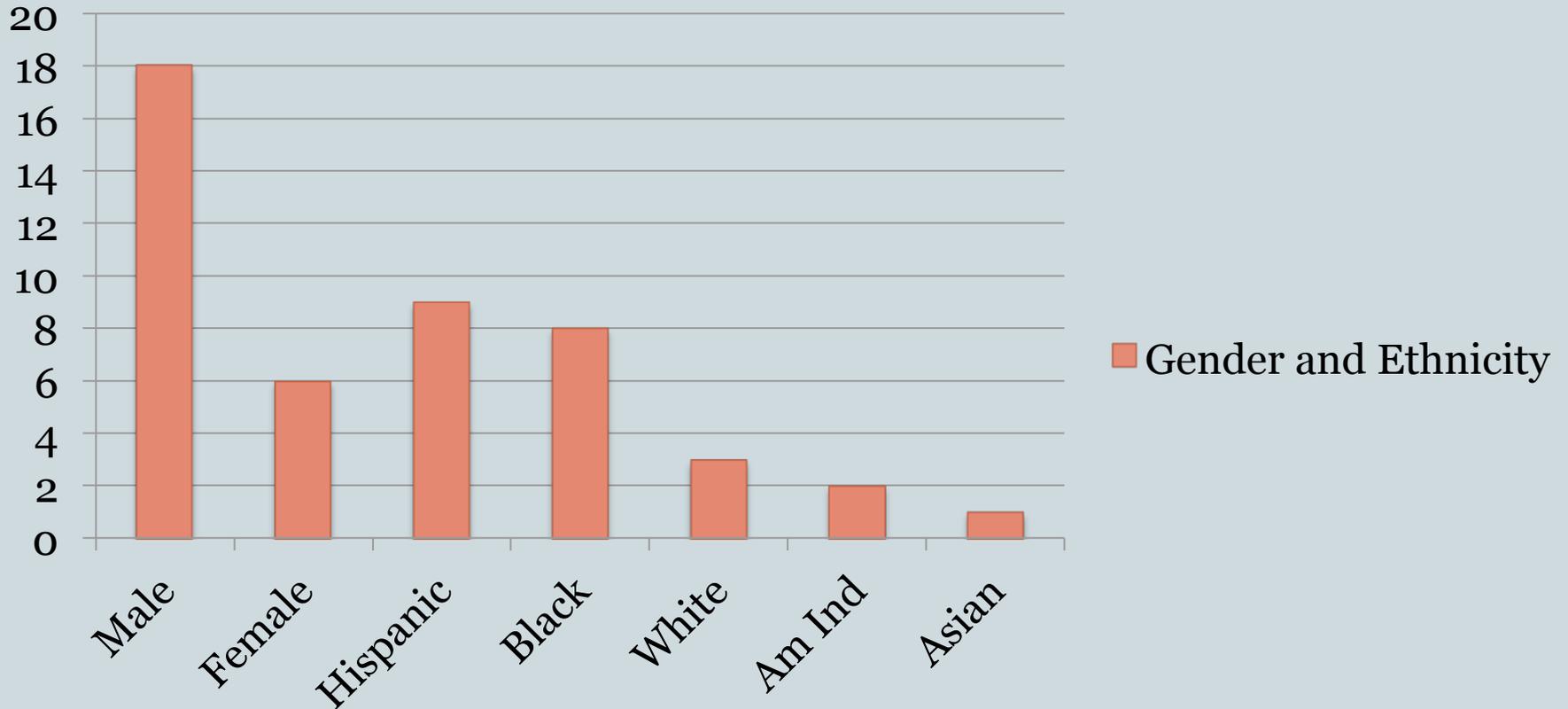
2011-2012 (Year 1) Academic Performance in Mathematics (Geometry):



Course Demographics



Gender and Ethnicity - # of Students



Demographics (continued)



F/R Lunch, SOC, ELL - # of Students



MAP Test Given



- Measures of Academic Progress (by NWEA)
- Computer Adaptive
- Fall, Winter and Spring
- Math Level and Growth
- Math Strands:
 - Algebra
 - Geometry
 - Statistics
 - Combined Score



MAP Math National Growth Tables (2005)



2005 Mathematics Achievement and Growth Norms (RIT values)

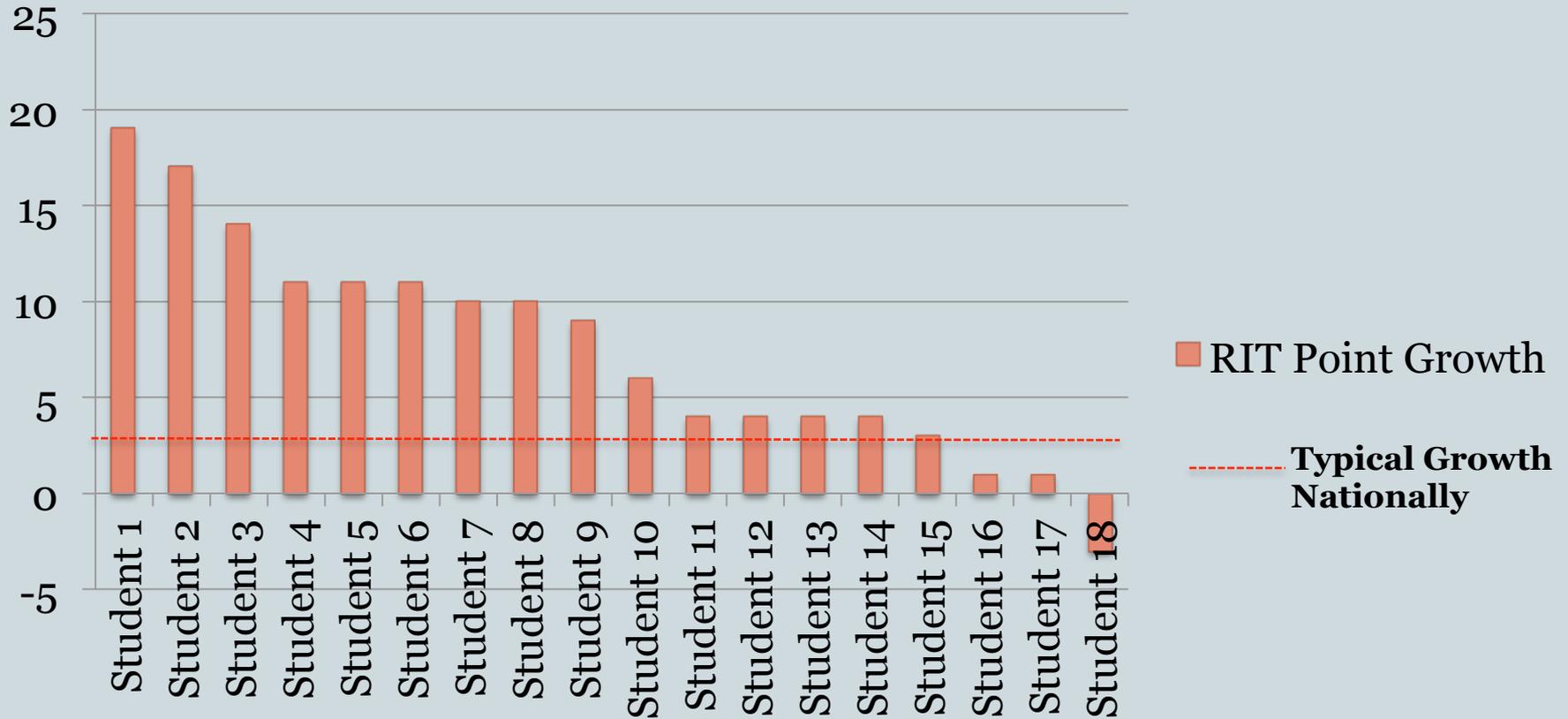
Grade	FALL		SPRING	
	Median	Mean	Median	Mean
2	179	179.3	191	190.6
3	193	192.3	202	201.7
4	203	202.7	211	210.4
5	211	211.2	219	218.3
6	218	217.4	224	223.3
7	225	223.4	229	228.0
8	230	228.5	234	232.8
9	234	231.7	239	236.2
10	238	235.6	240	238.1

Ending Grade	MEAN GROWTH		
	Fall to Spring	Fall to Fall	Spring to Spring
2	13.9	n/a	n/a
3	10.9	15.1	12.0
4	8.8	11.5	9.5
5	8.7	9.2	9.0
6	7.2	7.6	6.1
7	6.0	7.2	6.1
8	5.2	6.6	6.1
9	3.2	5.0	3.9
10	2.8	3.8	3.2

Fall to Spring MAP Math Overall Growth



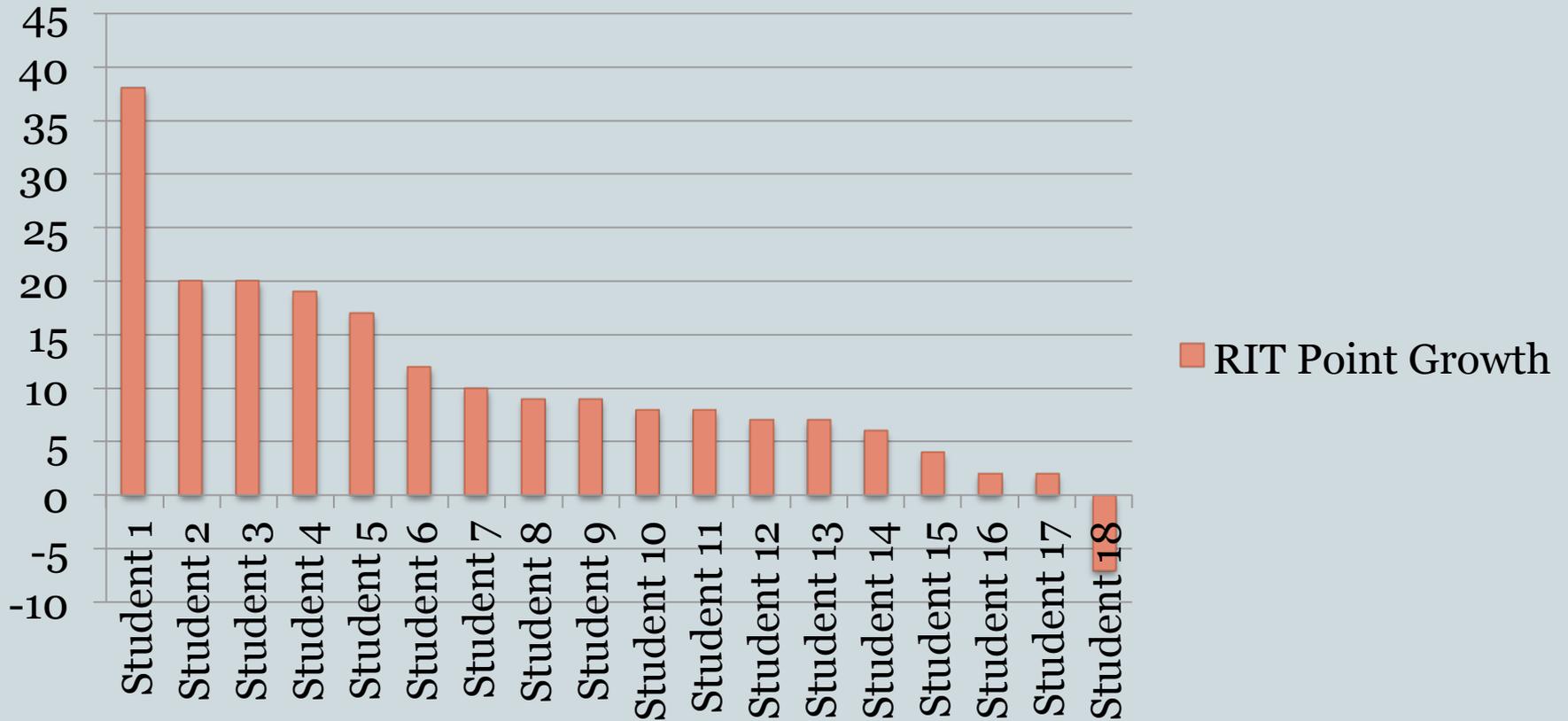
RIT Point Growth



Fall to Spring MAP Math Geometry Strand Growth



Geometry Strand RIT Point Growth



Overall MAP Math Growth (Fall to Spring) of the Implementation Year



- 14 of 18 students exceeded their growth target
- 1 student exactly met their growth target
- 3 of 18 students fell short of their growth target
- 15 of 18 students **(83%) either met or exceeded their personal growth target in mathematics**; The national average is 50% meeting/exceeding their growth targets...
- 15 of 18 students **(83%) exceeded typical national growth expectations for 10th graders (56% significantly exceeded those numbers)**
- 5 students dropped (performance unknown)

Cautious Optimism...



- From the NWEA website: “Classes in which 50% or more students have positive growth indices, show above average growth in relation to the norm group.”
- The margin of error for MAP is typically +/- 3%
- An extremely small percentage of classrooms nationally will have 83% of students meeting/exceeding growth targets
- This class at Roosevelt was demographically a much more “at risk” group than the national average
- Typically new programs score lower in their first year as “bugs” are worked out of the system

MPS CTE

A Continuous Improvement Model:



Year 2 Model (2012-2013):



- 1 math teacher + 1 construction teacher
- 2 one-hour blocks of time each day for a year
- 2 sections of students (some of the same students, but different hours)
- Common planning time
- Only one teacher present during each of the class times
- NRCCTE Math-in-CTE model continues

Improvement Options Under Consideration:



- Binder logos, shirts, signs to create program branding and increase marketing
- Increase common planning time (currently before or after school)
- Increase emphasis on daily formative assessment
- Explore partnership certifications with Dunwoody Technical College
- Restructure the 2-hour block to improve access to other electives

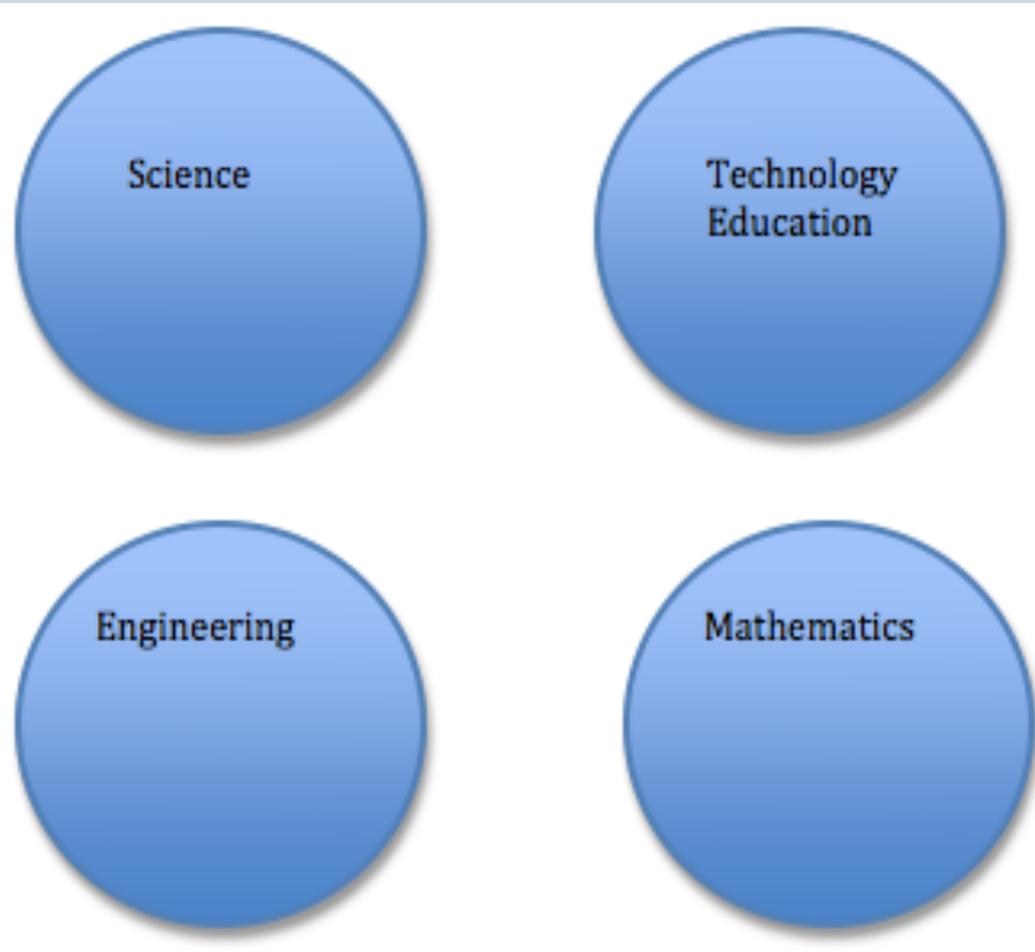
Additional Resources Recommended:



- CNC router added: should be a great additional tool to demonstrate geometry applications
- CAD training for both CTE and Math teacher to accompany CNC router
- Student binders to assist in student organization
- 2 Computers to integrate with CNC router

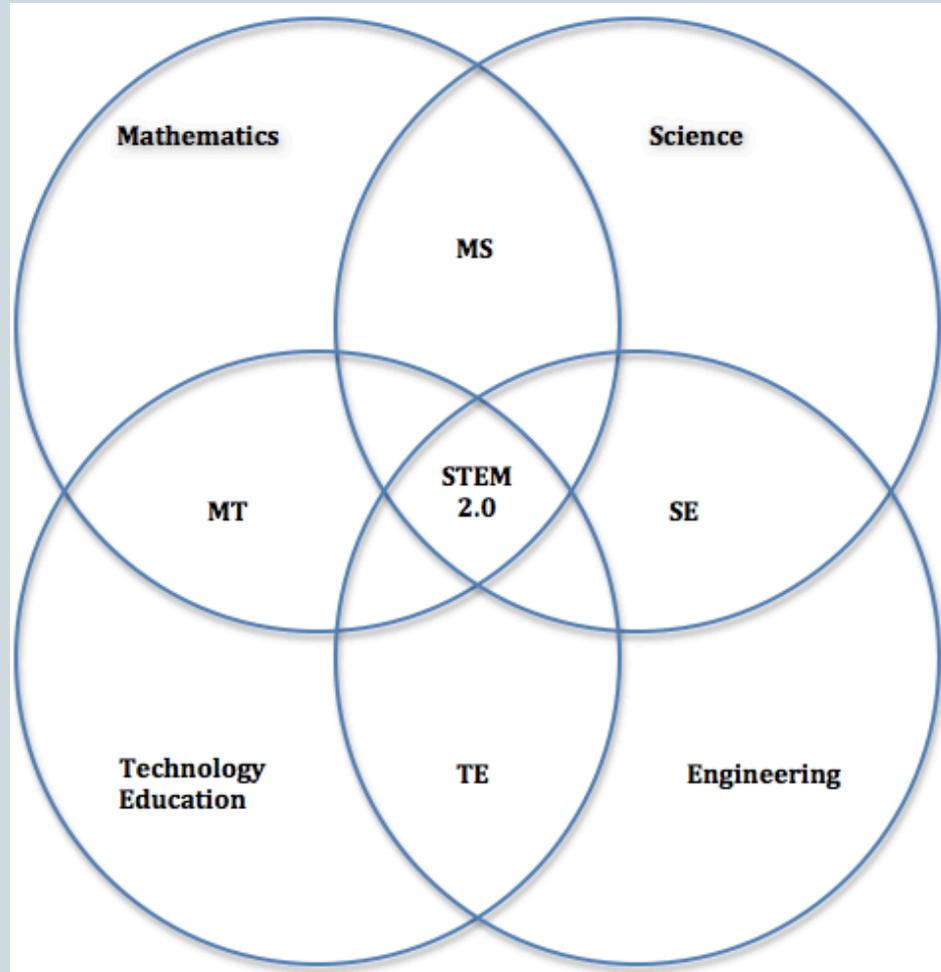
STEM 1.0 - The First Step...

Quality, Standards-based Courses in All 4 Areas



STEM 2.0 - The Ultimate Goal...

Integrated STEM for ALL Students



Lindstrom, 2009

Questions and Contacts



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