

BSD Math Sequence

Data related to measuring the BSD Strategic Plan Measure College-readiness.

To assess college-readiness:

- Students completing Oregon University System minimum entrance requirements (15 specified college-prep courses with C or better)
- Students earning 9 or more College-level credits in High School

Each item below refers to BSD 2014 Graduates. Approximately 15% of BSD students don't complete a diploma, modified diploma, GED, etc. and they are not included in the data.

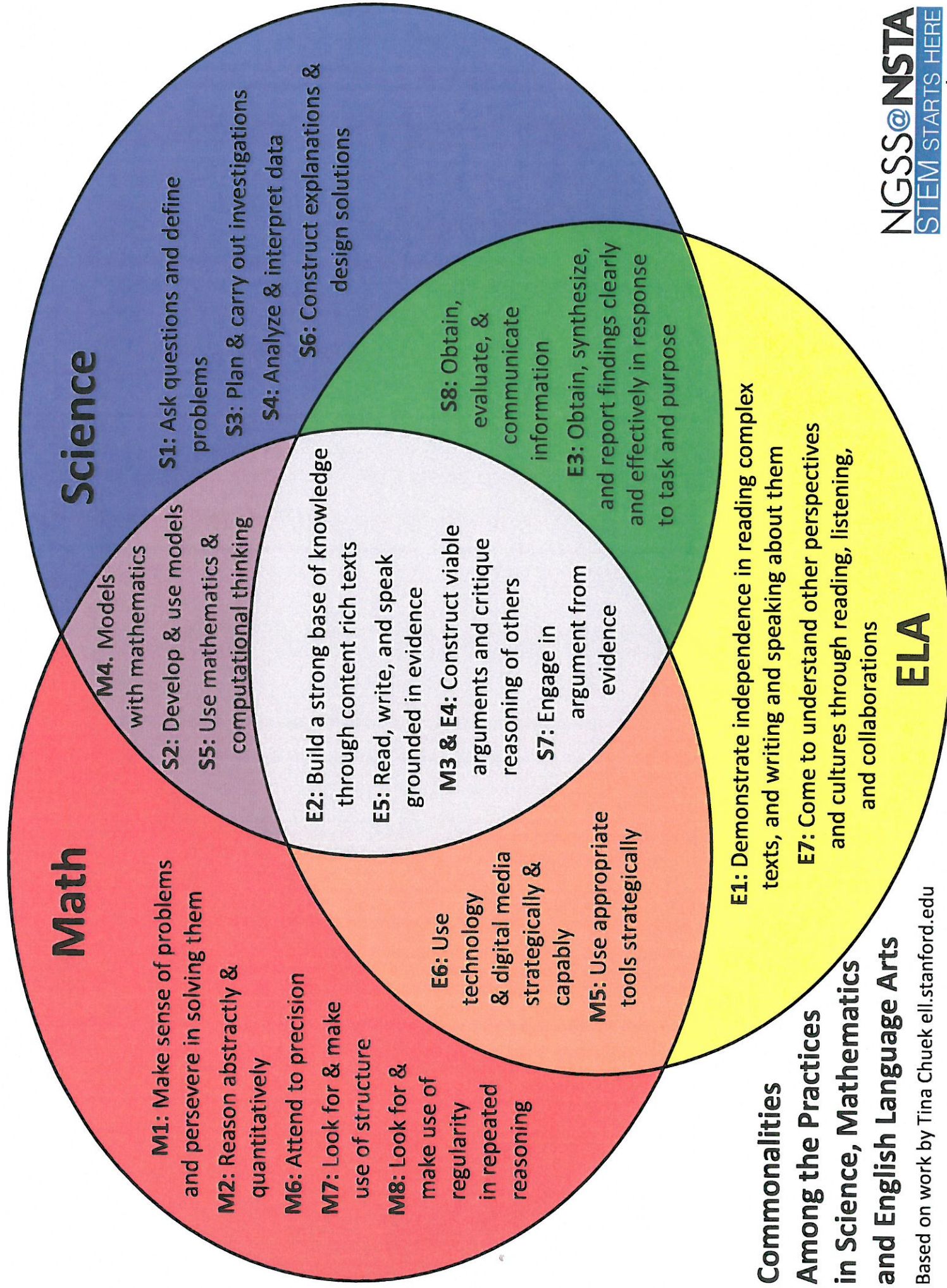
1. Seventy-eight percent of BSD 2014 Graduates met OUS entrance requirements in Math. This would mean approximately 66% of the senior class (included 5th year seniors) meet OUS entrance requirements in Math.
2. Approximately 27% of BSD 2014 graduates went to OUS Universities.
3. Of the BSD 2014 Graduates who enrolled in OUS Universities **slightly more than 15% were required to take a remedial (below 100 level) math class** that does not provide them with college credit.
4. Of the BSD 2014 Graduates who enrolled in OUS Universities 29% of them did not take a math class as a freshman. There are various reasons for this.

The table below indicates the percentage of students meeting OUS Entrance requirements for math. For BSD this means the percentage of students who completed 3 math classes with a C or better including an Algebra II and/or Statistics class.

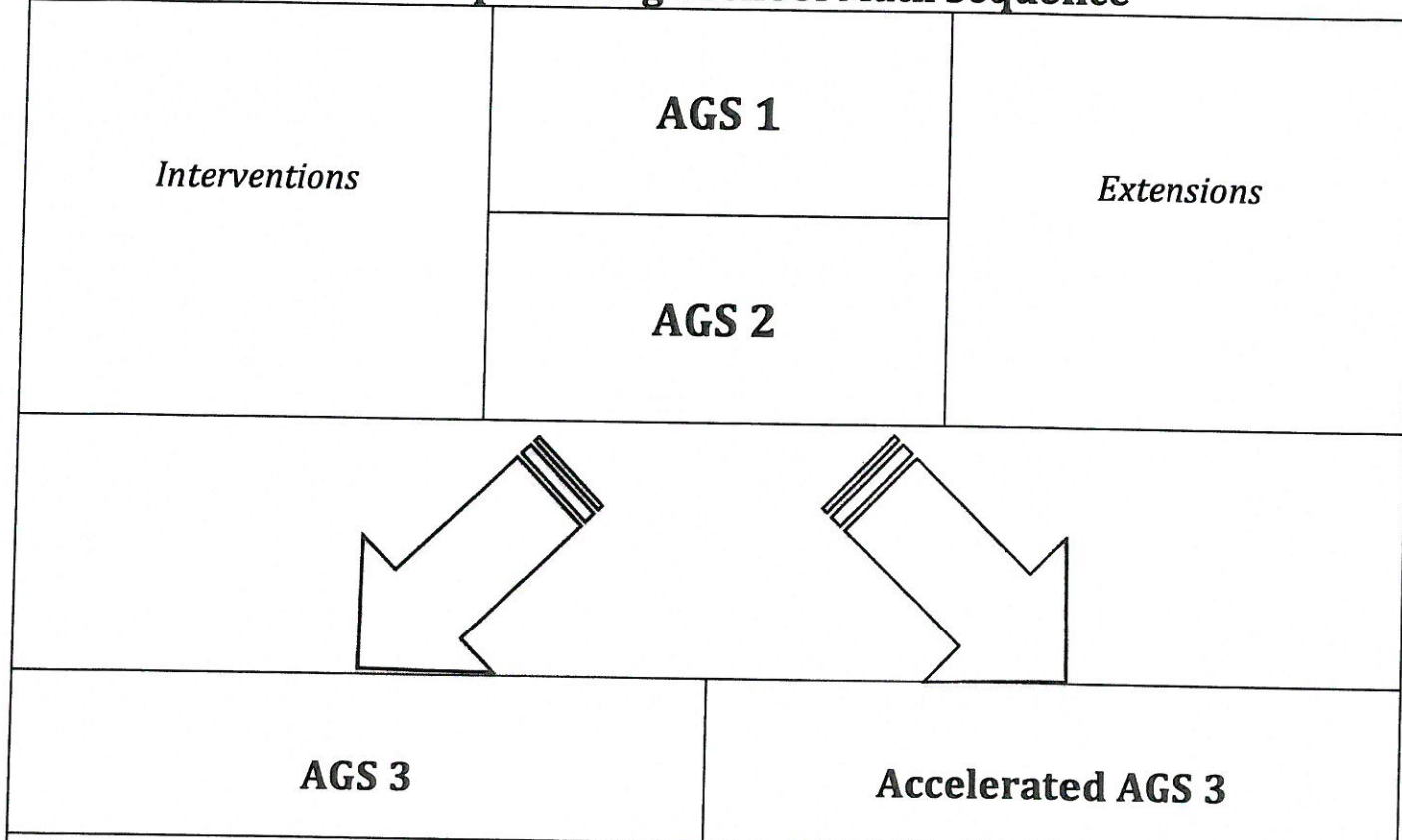
School Name	2012-13	2013-14
Aloha High School	73%	72%
Arts & Communication Magnet Academy	86%	91%
Beaverton High School	74%	67%
Community School	32%	21%
Health & Science School	94%	82%
International School of Beaverton	90%	92%
School of Science & Technology	89%	94%
Southridge High School	80%	73%
Sunset High School	68%	72%
Westview High School	85%	85%

Oregon University System: High School Transition Entering Freshman Profile

Math Highlights for BSD Class of 2012	Count	Percent of the Freshmen in each of the first math class categories	Average GPA for the class
Number of BSD High School Graduates...	2425		
... Entering OUS as Freshman	650		3.06
... Taking a math class as Freshmen	461		2.93
... Whose first math class is remedial (below 100 level)	70	15.2	2.65
... Whose first math class is College Algebra (Math 111)	185	40.1	2.91
... Whose first math class is Pre-Calculus (Math 112)	60	13.0	2.74
... Whose first math class is Calculus	87	18.9	3.01
... Whose first math class is beyond Calculus	28	6.1	3.58
... Whose first math class is another 100 level or above course	31	6.7	



BSD Proposed High School Math Sequence



After successful completion of AGS3 or Accelerated AGS3, students would have the option to take any of the following courses.

Potential Dual Credit:

- Math 95
- Math 111/Math 112
(equivalent to Pre-Calculus)
- Math 243/Math 244
(Statistics 1 and 2)

AP Courses:

AP Statistics

IB Courses:

IB Math
Studies
IB Math SL1

High School Courses:

Pre-calculus

1. After successful completion of Pre-calculus or equivalent (Math 111/112), students could enroll in AP Calculus AB or Math 251/252 (Calculus 1 and 2). The AP and Dual Credit Calculus options will be incorporated into same classes as well as AP Calculus BC (Year 1).
2. After successful completion of IB Math SL 1 (essentially Pre-calculus), students could enroll in IB Math SL 2 (Essentially Calculus 1)
3. After successful completion of Pre-calculus, students could enroll in IB Math HL 1

1. After successful completion of AP Calculus AB, students could enroll in AP Calculus BC.
2. After successful completion of Math 251/252 (Calculus 1 and 2), students could enroll in Math 253 (Calculus 3)
3. After successful completion of IB Math HL 1, students could enroll in IB Math HL 2.

Key Components of the Math Sequence:

Highlights of the new sequence...

- All BSD Math students will take two Algebra/Geometry/Statistics courses (AGS1 and AGS2).
- These two courses, AGS1 and AGS2, will replace Algebra 1 and Geometry.
- AGS1 and AGS2 will be the advanced middle school courses.
- Students will have a choice between AGS3 and Accelerated AGS3 the third year.
- The three AGS courses will mix Function-based, Geometry/Trigonometry, and Probability and Statistic learning targets with a focus on Mathematical Modeling to meet CCSS requirements and to prepare students for Pre-Calculus, AP courses, Dual Credit courses and IB courses.
- Flexibility in course offerings for year four and beyond to meet the unique requirements of IB, AP, Expeditionary Learning (EL), Project Lead the Way (PLTW) and Dual Credit options.

District math teachers and administrators brought forth the following advantages to the new common sequence.

- Focused teacher collaboration within buildings and between schools around specific targets and courses.
- Mixing the Algebra, Geometry and Statistic targets will alleviate some of the issues around Geometry being in the middle of two function-based Algebra classes (Algebra 1 and Algebra 2).
- Align some math learning targets with science and social studies learning targets to provide the context and application for math required by the CCSS Math standards and practices.
- System-wide development of assessments, lessons, units, performance tasks, and classroom activities.

Timeline:

- One or two schools will pilot the new courses. (Fall 2015 for AGS1 and/or AGS2)
- The new sequence will begin Fall 2016 with AGS1, adding AGS2 Fall 2017 and Year 3 courses Fall 2018.
- The Math Articulation Team and other district math teams will begin designing the courses by...
 - Determining placement of learning targets. (Spring 2015)
 - Reviewing and adopting and/or developing materials. (Spring 2015 and then ongoing)
 - Developing lessons, units, assessments, performance tasks, and activities. (Summer 2015 and then ongoing)
- Develop interventions and extensions beginning in the Spring 2015 and then ongoing, which will include...
 - Developing strategies for Tier 1/2 intervention and Extensions.
 - Creating, developing or enhancing school and system supports, such as learning target focused study halls, support courses, after-school homework clubs, Saturday School, and Summer School.
- Provide Staff Development. (Summer 2015 and then ongoing)

Representation from all Middle, High and Option schools will be required as we gather information and data and make decisions around curriculum, instruction and assessment.

BSD Proposed High School Math Sequence at an AP School

<i>Interventions</i>	AGS 1	<i>Extensions</i>
	AGS 2	
AGS 3		Accelerated AGS 3
Function Statistics Trig (FST) Possible dual credit option: Intermediate Algebra (Math 95)		Pre-calculus Possible dual credit option: College Algebra (Math 111) and Elem. Functions (Math 112)
AP Statistics Possible dual credit option: Statistics 1 (Math 243) and Statistics 2 (Math 244)		AP Calculus AB Possible dual credit option: Calculus 1 (Math 251) and Calculus 2 (Math 252)
		AP Calculus BC Possible dual credit option: Calculus 3 (Math 253)

BSD Proposed High School Math Sequence at an IB DP School			
Interventions	AGS 1		Extensions
	AGS 2		
AGS 3		Accelerated AGS 3	
Math 95	IB Math Studies SL 1	IB Math SL 1 Could provide college credit in College Algebra (Math 111) and Elementary Functions (Math 112)	IB Math HL 1 Could provide college credit in College Algebra (Math 111), Elem. Functions (Math 112) Calculus 1 (Math 251)
	IB Math Studies SL 2	IB Math SL 2 Could provide college credit in Calculus 1 (Math 251) and Calculus 2 (Math 252)	IB Math HL 2 Could provide college credit in Calculus 2 (Math 252) and/or Calculus 3 (Math 253)
Note: AP Statistics and/or Statistics 1 and 2 (Math 243/244) courses would be an option at various places in the course sequence after Accelerated AGS 3, AGS 3 (B or better) or Math 95.			

Below are a few examples of how students might move through the BSD Math Sequence.

Grade 6	Math 6	Math 6	Accelerated Math 6	Accelerated Math 6	Accelerated Math 7
Grade 7	Math 7	Accelerated Math 7	Accelerated Math 7	Accelerated Math 7	AGS 1
Grade 8	Math 8	AGS 1	AGS 1	AGS 1	AGS 2
Grade 9	AGS 1	AGS 2	AGS 2	AGS 2	Accelerated AGS 3
Grade 10	AGS 2	AGS 3	Accelerated AGS 3	Accelerated AGS 3	PreCalc College Alg. / Elem. Functions (Math 111/112)
Grade 11	AGS 3	IB Math Studies SL 1	PreCalc College Alg. / Elem. Functions (Math 111/112)	IB Math SL 1	AP Calculus AB (Math 251/252)
Grade 12	Math 95	IB Math Studies SL 2	AP Calculus AB (Math 251/252)	IB Math SL 2	AP Calculus BC (Math 253)
College Freshman	Statistics 1 and 2 (Math 243/244) or College Alg. / Elem. Functions (Math 111/112)	Statistics 1 and 2 (Math 243/244) or College Alg. / Elem. Functions (Math 111/112)	Calculus 3/4 (Math 253/254)	Calculus 1, 2 or 3 depending on IB Math SL Mark	Calculus 4 (Math 254) & other 200/300 level math courses

Below are a few links to select research-based articles related to the math sequence changes.

Comparing Subject-specific and Integrated Content Organizations.

1. Journal for Research in Mathematics Education 2013, Vol. 44, No. 2, pp. 416-463. Curriculum and Implementation Effects on High School Students' Mathematics Learning from Curricula Representing Subject Specific and Integrated Content Organizations. (The link below will get to the article, but there is a cost to download.)

<http://www.jstor.org/discover/10.5951/jresematheduc.44.2.0416?uid=3739856&uid=2134&uid=2&uid=70&uid=4&uid=3739256&sid=21104653830883>

Highlights of the article:

p. 416 Paragraph 1, sentence 2.

Hierarchical linear modeling with 3 levels showed that students who studied from the integrated curriculum were significantly advantaged over students who studied from a subject-specific curriculum on 3 end-of-year outcome measures: Test of Common Objectives, Problem Solving and Reasoning Test, and a standardized achievement test.

p. 440 Paragraph 1, beginning at sentence 3

However, there was significant difference in the likelihood that students used graphing calculators during a lesson, with students of the integrated curriculum using graphing calculators in about 74% of the lessons, compared to 30% of lessons in the subject-specific curriculum.

p. 444 Paragraph 3, Analysis of Test A student scores.

For the content organization research question, we found a significant main effect ($p < .001$) on Test A in favor of the curriculum in which the mathematical content was presented in an integrated manner.

p.445 Paragraph 2, Analysis of Test B student scores.

Students studying from the integrated curriculum scored significantly better than students from a subject-based curriculum with an effect size of .45 on the test measuring reasoning and problem solving.

p.450 Paragraph 1 Analysis of ITED student scores.

Students learning from integrated textbooks performed significantly better than students learning from subject-specific textbooks on the standardized achievement test,...

High Schools That Work: What Can Local Districts Do?

1. Research Brief: Improving Achievement Is About Focus and Completing the Right Courses.

<http://eric.ed.gov/?id=ED479508>

<http://files.eric.ed.gov/fulltext/ED479508.pdf>

This is the article that Susan Holveck shared when the Science Sequence discussion began. The following excerpt is on page 12 of the article. Under Action 2... the default curriculum requirements for high school graduation would... include at a minimum Algebra I in grade 9, Geometry, Algebra II **and a high-level mathematics course in the senior year.**

Integrated Studies

1. Integrated Studies Research Review: Evidence-Based Practices and Programs

<http://www.edutopia.org/integrated-studies-research-evidence-based-practices-programs#graph2>

The third section "Science, Technology, Engineering and Math" discusses the research behind students being provided integrated learning opportunities. This would be much easier to accomplish in our High Schools if we have fewer courses and our math courses are better aligned with our science classes.

2. Why Should Schools Embrace Integrated Studies?: It Fosters a Way of Learning that Mimics Real Life.

<http://www.edutopia.org/integrated-studies-introduction>

This article focuses on why we would want to have an integrated approach to the design of our courses. Making our math classes focus on mathematical modeling, data exploration and problem solving will allow us to move toward an integrated-studies model, especially making a connection to our science classes.