

# Content for 3rd Math Credit

Prepared for State of Washington State  
Board of Education

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Linda Plattner  
Strategic Teaching

## Legislative language

- **"...the state board of education shall revise the high school graduation requirements under RCW 28A.230.090 to include a minimum of three credits of mathematics, one of which may be a career and technical course equivalent in mathematics, and prescribe the mathematics content in the three required credits."**

Retrieved Sept. 29 from Washington State Legislature website:

[http://search.leg.wa.gov/pub/textsearch/search\\_results.html?q=3+credits+in+mathematics](http://search.leg.wa.gov/pub/textsearch/search_results.html?q=3+credits+in+mathematics)

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## Legislative language

- **These credits must be earned in classes “intended to increase the student's mathematics proficiency toward meeting or exceeding the mathematics standards assessed on the high school WASL.”**
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## Ways to earn 3 credits:

- **Algebra I, geometry, and algebra II or Integrated I, II, and III**
  - **Algebra I, geometry, and 1 CTE math credit (called “Two + One”)**
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## SBE direction to Strategic Teaching

- **Define content in:**
    - Algebra I, geometry, and algebra II, and
    - Integrated math I, II, and III
  
  - **Define content parameters in Career and Technical Course Equivalent (CTE)**
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## Timeline

- **Final draft to SBE end of October**
  
  - **Public feedback in fall 2007**
  
  - **Final due to SBE early December**
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## Strategic Teaching approach

- **Define the content in algebra I, geometry, and algebra II**
  - **Reorganize that content into an integrated series, keeping the same identifying numbers so content statements can be cross matched**
  - **Identify the characteristics of CTE courses that qualify for mathematics credit**
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## Progress

- **Working draft of algebra, geometry, algebra II**
  - **Process for defining integrated series content**
  - **Discussing, gathering information about CTE credit**
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## Today

- **What should the 3rd year of math look like?**
- **What are the implications for CTE courses?**
  - How rigorous should the math in the course be?
  - How much math is necessary to warrant cross (math) credit?

## Two types of CTE courses

- **Courses that are specifically designed as applied mathematics courses:**
  - **Business Mathematics**
  - **Applied Mathematics**
- **CTE courses deemed “mathematics equivalencies” by some districts:**
  - **Edmonds example:**
    - **Accounting (1 credit),**
    - **Computer Programming (1 credit),**
    - **Pre-Engineering (1 credit),**
    - **Automotive Technology (2 credits = 1 credit of math), and**
    - **Carpentry/Construction Trades (2 credits = 1 credit of math)**

# The States' Career Cluster Initiative

(National CTE Foundation Initiative)

- **16 Career Clusters with curriculum similar to High Schools that Work**
- **All clusters require at least 3 years of high school math through algebra II**
- **All clusters specify CTE courses that prepare students for chosen career pathway**
  - **Some CTE courses are designed as math classes**
  - **Some CTE courses contain significant amounts of math that may be granted math credit by districts**
  - **Some CTE courses are not math-based**

[Http://www.careerclusters.org/16clusters/cfm](http://www.careerclusters.org/16clusters/cfm)



SAMPLE

**Finance: Financial and Investment Planning**

**Career Pathway Plan of Study for ► Learners ► Parents ► Counselors ► Teachers/Faculty**

This Career Pathway Plan of Study (based on the Financial and Investment Planning Pathway of the Finance Career Cluster) can serve as a guide, along with other career planning materials, as learners continue on a career path. Courses listed within this plan are only recommended coursework and should be individualized to meet each learner's educational and career goals. \*This Plan of Study, used for learners at an educational institution, should be customized with course titles and appropriate high school graduation requirements as well as college entrance requirements.

EDUCATION LEVELS	ENGLISH/LANGUAGE ARTS	MATH	SCIENCE	SOCIAL STUDIES/SCIENCES	OTHER REQUIRED COURSES Other Electives Recommended Electives Learner Activities	*Career and Technical Courses and/or Degree Major Courses for Financial and Investment Planning Pathway	SAMPLE Occupations Relating to This Pathway	
Interest Inventory Administered and Plan of Study Initiated for all Learners								
SECONDARY	9 English Language Arts I	Algebra I Geometry	Earth Life or Physical Science or Biology	State History Geography	All plans of study should meet local and state high school graduation requirements and college entrance requirements. Certain local student organization activities are also important, including public speaking, record keeping and work- based experiences.	<ul style="list-style-type: none"> <li>► Business Essentials</li> <li>► Business Technology Applications</li> <li>► Business Finance</li> <li>► Accounting</li> <li>► Fundamentals of Financial Management and Investment Planning</li> <li>► Advanced Accounting</li> </ul>	<ul style="list-style-type: none"> <li>► Accountant</li> <li>► Brokerage Clerk</li> <li>► Comptroller Representative</li> <li>► Development Officer</li> <li>► Financial Analyst</li> <li>► Financial Planner</li> <li>► Foundation Manager</li> <li>► Fund Manager</li> <li>► Fund Raiser</li> <li>► Investment Advisor</li> <li>► Mutual Fund Manager</li> <li>► Non-Profit Manager</li> <li>► Personal Financial Advisor</li> <li>► Planned Giving Director</li> <li>► Sales Agent</li> <li>► Securities Representative</li> <li>► Tax Preparer</li> </ul>	
	10 English/ Language Arts II	Geometry or Algebra II	Biology or Chemistry	U.S. History				
	11 English/ Language Arts III	The Calculus of Algebra I	Chemistry or Physics	World History Psychology				
	12 English/ Language Arts IV	The Calculus of Calculus or Trigonometry or Statistics	Physics or other science course	Government Economics				
College Placement Assessments-Academic Career Assessment Provided								
Articulation/Dual Credit Transcribed-Postsecondary courses may be taken/moved to the secondary level for articulation/individual credit purposes.								
POSTSECONDARY	Year 13 English Composition English Literature	Algebra or Calculus	Lab Science	Economics Psychology	All plans of study need to meet learners' career goals with regard to required degrees, licenses, certifications or journey worker status. Certain local student organization activities may also be important to include.	<ul style="list-style-type: none"> <li>► Principles of Accounting</li> <li>► Regulatory Requirements for Financial and Investment Planning</li> <li>► Customer Service in Financial</li> <li>► Financial Planning</li> <li>► Financial and Investment Planning Procedures</li> <li>► Continue Courses in the Area of Specialization</li> <li>► Complete Financial and Investment Planning Major</li> </ul>		
	Year 14 Speech/ Oral Communication Technical Writing			Sociology Public Policy				
	Year 15	Continue courses in the area of specialization.						
	Year 16							



Name \_\_\_\_\_  
 Learner ID \_\_\_\_\_  
 School/College/University \_\_\_\_\_

**SAMPLE**

**Architecture and Construction**

**Career Cluster Plan of Study for ► Learners ► Parents ► Counselors ► Teachers/Faculty**

This Career Cluster Plan of Study (based on the Architecture and Construction Career Cluster) can serve as a guide, along with other career planning materials, as learners continue on a career path. Courses listed within this plan are only recommended coursework and should be individualized to meet each learner's educational and career goals. \*This Plan of Study, used for learners at an educational institution, should be customized with course titles and appropriate high school graduation requirements as well as college entrance requirements.

EDUCATION LEVELS GRADE	English/ Language Arts	Math	Science	Social Studies/ Sciences	Other Required Courses Other Electives Recommended Electives Learner Activities	*Career and Technical Courses and/ or Degree Major Courses for Architecture and Construction	SAMPLE Occupations Relating to This Career Cluster
Interest Inventory Administered and Plan of Study Initiated for all Learners							
SECONDARY	9	English/ Language Arts I	Algebra I	Earth or Life or Physical Science	State History Civics or World History	All plans of study should meet local and state high school graduation requirements and college entrance requirements. Certain local student organization activities such as SkillsUSA are also important including public speaking, record keeping and work-based experiences.	**Introduction to the Built Environment ► Architect ► Carpenter ► Civil Engineer ► Construction Foreman/Manager ► Contractor ► Demolition Engineer ► Drafter ► Drywall Installer ► Electrician ► Electronic Systems Technician ► Equipment/Material Manager ► General Contractor/Builder ► Heating, Ventilation, Air Conditioning and Refrigeration Mechanic ► Interior Designer ► Painter ► Paperhanger ► Plumber ► Project Estimator ► Project Inspector ► Roofer ► Safety Director ► Sheet Metal Worker ► Tile and Marble Setter
	10	English/ Language Arts II	Geometry	Biology	U.S. History		
	11	English/ Language Arts III Technical Writing	Algebra II	Physics	Economics Psychology		
	College Placement Assessments-Academic/Career Advice Provided	English/ Language Arts IV		Chemistry		Continue courses pertinent to the pathway selected.	
Articulation/Dual Credit/Transcripted-Postsecondary courses may be taken/moved to the secondary level for articulation/dual credit purposes.							
POSTSECONDARY	Year 13	English Composition English Literature	Dependent on chosen pathway	Physics	American Govt. or History, plus Psychology/ Interpersonal Skills	All plans of study need to meet learner's career goals with regard to required degrees, licenses, certifications or journey worker status. Certain local student organization activities may also be important to include.	Continue courses pertinent to the pathway selected.
	Year 14	Speech/ Oral Communication	Dependent on chosen pathway	Environmental Science	Sociology Business Law		
	Year 15	Continue courses in the area of specialization.					
	Year 16						

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Career Clusters (a.k.a., career pathways, programs of study) lead to :

- Direct entry into the work force,
- State approved apprenticeship programs,
- Community and technical college certificate programs,
- Community college degree programs, or
- 4-year college/university degree programs.

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## Math required for work-force entry:

- **Too variable to describe**
  - **More math is always better**
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## Math required for apprenticeships

- **32 approved apprenticeship programs**
    - **Automotive machinist**
  - **Many apprenticeships have sub-categories**
    - Automotive Mechanic/Parts Technician/Auto Body Repair/Auto Refinisher Technician/Automotive Technician/Diesel Mechanic/Garage Mechanic/School Bus Mechanic/Industrial Maintenance Transportation Mechanic Heavy Duty Repairman/Equipment Mechanic/Auto Painter/Glass Installer, Auto Industrial Mobile Equipment Mechanic/ Industrial Mobile Mechanic/Automotive Sheet Metal, Diesel Engine Technician, Transmission Technician, Medium/Heavy Diesel Mechanic
  - **Most apprenticeships are offered by multiple organizations**
    - **6 automotive machinist offerings: Northwest Automotive Heavy Duty Equipment Apprenticeship Committee**
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## Math required for approved apprenticeships

<b>General recommendations from apprenticeship website</b>	<b>Algebra I Geometry</b>
<b>Ironworker</b>	<b>Diploma/GED preferred</b>
<b>Plumber - Steamfitter</b>	<b>Algebra I Geometry</b>
<b>Machinist (aircraft oriented)</b>	<b>COMPASS with a 43 minimum in math OR College, above 100</b>

<http://www.lni.wa.gov/TradesLicensing/Apprenticeship/Programs/Standards/default.asp>

## Machinist (non-aircraft)

(Advantage Manufacturing Technologies Apprenticeship Program)

- **Age**: All applicants must be at least 18 years of age
- **Education**: All applicants must have a high school diploma or the equivalent
- **Physical**: All applicants must be physically capable of performing the tasks of the trade
- **Testing**: None
- **Other**: Prior to application into the AMT apprenticeship program, applicant must have a minimum of one (1) year of full time employment with AMT

<http://www.lni.wa.gov/TradesLicensing/Apprenticeship/Programs/Standards/default.asp>

# Plumber

(Industry Training Council of Washington)

- **Education:** Must be a high school graduate or have a GED. Applicants must supply the Apprenticeship Committee with proof of graduation from high school or successful completion of GED. Official transcript must show courses and grades. Must have completed one year of high school algebra and one year of high school plane geometry or one each post-high school algebra and plane geometry courses with passing grades. The Apprenticeship Committee reserves the right to waive the math requirements for plumbing applicants providing the applicant can satisfy the Apprenticeship Committee with written document of proof that he/she possesses knowledge equivalent to the above mentioned math requirements.
- **Testing:** Plumbing applicants must have a qualifying score of 50 or higher on the Scheig Utility worker 1.0 test. The cost of the aptitude test will be paid by the applicant.

# Math for community and technical colleges

- ASSET, COMPASS, ACCUPLACER
  - Determines course placement, not necessarily acceptance
- Correlation between these and WASL
  - There are areas of overlap in the content of the WASL and the college placement tests.
  - The WASL requires a wider variety of types of response, covers a wider range of content strands, and has more questions requiring drawing on multiple strands.
  - The placement tests include material at a higher mathematical and reading level than does the WASL.
  - The average difficulty ratings for WASL test questions fall in the middle of the range of difficulty ratings for the college placement tests.
  - Scores are moderately correlated: the higher a student's WASL score, the higher their score on the placement test in the same subject was likely to be.

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## Math suggested/required for 2- and 4-year colleges

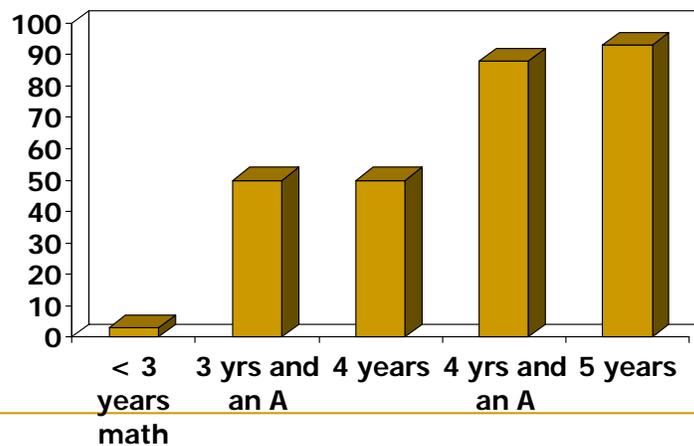
- **Three years of high school mathematics study prior to taking the college-level math**
  - **Arithmetic, pre-algebra, business mathematics, and statistics courses are not sufficient preparation for the associate transfer degree.**
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## Importance of high school mathematics courses

- **About 70% of graduating students enter 2- or 4- year colleges**
- **About one third need remedial math**
- **Correlation not causation:**
  - **63% of students who take remedial math do not graduate**

## Relationship between high school math and credit bearing college courses



## Summary information

- **Not all apprenticeship programs explicitly require mathematics**
- **All 16 CTE career pathways include at least 3 years of high school math, in addition to CTE courses**
- **Baccalaureate programs recommend/require 3 years of high school mathematics**

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## Summary

- **Students need at least 3 years of high school math (including algebra II) to begin college with credit-bearing math courses**
  - **Current math-earning CTE courses align to grade 9/10 GLEs**
  - **Two high school classes and CTE course will prepare students for some apprenticeships, not 2- or 4- college**
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## Questions:

- **How can we use the additional 3rd math credit to prepare students for multiple postsecondary options?**
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## Questions:

- **What math should a CTE course contain before it warrants math credit?**
    - How rigorous should the math be?
    - How much math should there be?
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