Oregon Pathways for Adult Basic Skills
Transition to Education and Work Initiative (OPABS)

Bridge Mathematics Course

Introduction to Course

Overview of Course Content

This course will explore how math is used in professional technical careers such as health occupations, construction, manufacturing and sales while preparing students to pass the math GED test. The course emphasizes problem solving and practical applications related to occupational fields and focuses on understanding from basic principles rather than the rote application of mathematical procedures.

Course Objectives, Term 1

Upon successful completion of the course, students should be able to:

- Understand and change units for metric length, volume, and mass;
- Define and express ratios and rates;
- Set up and solve problems using proportions;
- Solve percent word problems;
- Use information from graphs to solve percent problems;
- Use order of operations to simplify expressions;
- Evaluate expressions with roots and powers;
- Determine perimeter of 2-D quadrilaterals; and
- Calculate circumference.

Course Objectives, Term 2

Upon successful completion of the course, students should be able to:

- Understand and calculate mean, median and mode;
- Use the properties of triangles to establish congruency and similarity;
- Understand and use formulas to calculate perimeter, area, and volume;
- Understand vertical angles formed by transversal through parallel lines;
- Calculate distance using Pythagorean theorem;
- Plot points and graph linear equations;

- Add, subtract, multiply, and divide signed numbers;
- Use order of operations to simplify expressions; and
- Evaluate expressions with roots and powers.

Basic Skills Taught

Refer to:

- Topics and Related Skill Sets provided (Abt Associates: 7/11/07)

- Bridge Math Course Outlines – abbreviated form (see attached) and detailed form

Occupational Contexts Taught

- Health Occupations
  - Metric units and conversions for dosages;
  - Ratio and unit conversions for dosages and prepare solutions;
  - Ratio and unit rates used to interpret health data;
  - Using proportions to determine dosages and prepare solutions;
  - Use percent to determine insurance costs, safety hazards, hospital procedures; and
  - Use information in graphs to determine incidence of diseases, Medical Assistant duties.

- Construction
  - Metric measurements and calculations for materials, capacity;
  - Ratio and unit rate for building materials, pay rates and salaries, employee allocation, product weights, electrical supply costs;
  - Use percent to determine wages; and
  - Calculate perimeter of deck, garden (fencing), circular edging around trees.

- Sales
  - Ratio and unit rate for commissions, booking rates, annual losses, sales quotas;
  - Comparing rates for phone plans and financial ratios;
  - Using proportions to determine loan amounts;
  - Determine percent of sales returns, commissions, home sales; and
  - Determine percent of increase or decrease in employees, sales.

- Manufacturing
    - Ratio and unit rates for production results, welding materials; and
    - Using proportions to determine packaging and shipping costs.

Instructional Strategies Emphasized in Course

- Organized note taking
- Reflection and summarizing big ideas
- Problem solving approaches:
    - Understand the question
    - Identify known information
    - Relate problem to a known process or problem (math schema)
    - Estimate
    - Check for reasonableness

Theory Guiding the Course

- Use of manipulatives and graphics in development of concrete-representational-abstract thinking; and
- Lesson plan design of explain, model, practice, feedback.

Lesson Objectives, Term 1

1. Introduction to course
2. Metric system and equivalent units
3. Metric measurement – length
4. Metric measurement – mass and convert units
5. Metric measurement – volume and convert units
6. Ratios – part: part, part: whole, scaling up or down, simplest form
7. Unit rate
8. Comparing ratios and rates
9. Proportions – set up and solve
10. Proportions – w/decimals, GED answer format
11. Proportions – w/fractions, GED answer format
12. Review ratios and proportions

13. Proportions two-step word problems
14. Ratio/proportion single step unit conversion
15. Proportion w/ unit conversion
16. Review proportions – Make charts
17. Percent concept and equivalent fractions
18. Percent basics – change percent to decimal, decimal to percent, fraction to percent
19. Percent solved as proportion
20. Percent finding the part – using proportions
21. Percent two step problems finding part
22. Percent finding the percent – GED answer format and word problems for finding part and percent
23. Percent of decrease and increase
24. Percent finding the whole
25. Percent review - comparing fractions, decimals, percent values
26. Percent review – changing fractions to decimals, and to percents
27. Percent using pie graphs
28. Using information from graphs to determine part, percent, or whole values
29. Roots and powers
30. Order of operations – evaluate expression with more than one operation
31. Polygons and perimeter
32. Circumference and pi

Lesson Objectives, Term 2

1. Surface Area
2. Surface Area – square, rectangle, parallelogram, triangle
3. Area Circle and composite figures
4. Angles
5. Vertical angles and parallel and perpendicular lines, Parallel lines cut by transversal
6. Angles in triangles and quadrilaterals
7. Congruent Figures
8. Similar Triangles
9. Scale conversions

10. Scale drawings
11. Volume rectangle
12. Volume cylinder
13. Review
14. Assessment
15. Assessment
16. Measures of central tendency
17. Determine mean values
18. Coordinate geometry – plot points
19. Graph linear equations
20. Collect and graph data, line of best fit
21. Distances between two points Pythagorean theory
22. Pythagorean theory and triples
23. Assessment – Poster presentations
24. GED test questions – complexity and 3 types
25. Signed numbers
26. Signed numbers - multiply, divide, order of operations
27. Determining slope
28. Evaluate expressions using substitution
29. Solve one-step equations
30. Solve two-step equations
31. Solve equations w/terms on both sides and w/parentheses.
32. Solve multi-step equations
33. Multiply and divide monomials
34. Factor and expand algebraic expressions
35. Review
36. Assessment

Oregon Pathways for Adult Basic Skills'
Transition to Education and Work Initiative (OPABS)

Course Outline—Bridge Mathematics, Term 1

Lesson	Objectives	Basic Skills	GED Content	Occupational Skills, Knowledge	Assessment
1	Introduce course content. Provide clear expectations of teaching role. Engage Ss in occupational data.	Understand big picture. Understand scope and sequence of math course. Ss understand teacher and student roles in teaching and learning.	Scanning information for details Drawing conclusions Analysis of information	Use occupational data to describe nature of jobs, outlook, and earnings. Ss will analyze occupational data in terms of the kind of math kill that may be needed to perform jobs.	Ss organize information on charts from data on state wages information, occupational trends/outlook and a composite description of selected jobs.
2	Identify and understand metric units of length, mass, and volume.	Use symbols. Compare relative sizes. Find common equivalents. Understanding relative size.	Using information in charts	Determine symbols of common metric units. Evaluate and compare sizes of metric units.	

Lesson	Objectives	Basic Skills	GED Content	Occupational Skills, Knowledge	Assessment
				Find common equivalent metric units for grams, liters, meters. Determine the appropriate size metric units.	
3	Ss will perform operations using metric measurements for length. Ss will estimate measurements by approximating metrics units. Accurate use of metric rulers	Add, subtract, multiply, divide metric units. Add, subtract, multiply, divide decimals.	Add, subtract, multiply, divide metric units. Add, subtract, multiply, divide decimals in word problems.	Word problems specific to welding	
4	Ss will become familiar for metric units for mass. Ss will change metric units for length and mass.	Understand a number system. Understand the multiples of ten. Understand decimal place values.	Conversion of metric units	Word problems in health, welding, logging occupations	Adding decimals and converting answer in manufacturing context

Lesson	Objectives	Basic Skills	GED Content	Occupational Skills, Knowledge	Assessment
	Ss will compare metric units.	Use a mnemonic as a learning/memory strategy.			
5	Ss will understand metric units for capacity (volume). Ss will convert metric units.	Add, subtract, multiply, divide metric units. Add, subtract, multiply, divide decimals. Compare metric volume units. Determine appropriate use of units.	Two-step word problems - changing metric units. GED Workbook S-V, page 169	Word problems in construction, welding, health occupations	
6	Ss will identify ratios and simplify. Ss will identify ratios as part: part and part: whole. Ss will scale ratios up or down.	Understand meaning of "per" and "out of." Understand relationship between two values. Recognize and write ratios in three forms. Understand concept of reducing fractions by dividing. Understanding concept of raising fractions by	Workbook pages determining and writing ratios in GED format	Examples in construction, health, welding, machinists, forestry	

Lesson	Objectives	Basic Skills	GED Content	Occupational Skills, Knowledge	Assessment
		multiplying.			
7	Ss will identify ratios as rates and unit rates. Ss will calculate unit rates.	Understand special ratio of unit rate with denominator of 1. Significance of "per" as a sign of unit rate Recognize comparison of different units. Understand similarity of fractions. Steps to problem solving Recognizing patterns	Calculating unit rates in word problems	--Cancer rates per race. --Word problems in metal fabrication, building construction, electrical contracting, sales, manufacturing, health occupations	
8	Ss will compare ratios and rates to make decisions.	Understand greater than and less than. Steps to problem solving Construct a table. Enter data in a table. Simplify ratios.	Read charts. Calculate unit rate. Word problems that determine unit rate	--Determining pre-paid phone rates --Word problems in construction, fabrication, health occupations	

Lesson	Objectives	Basic Skills	GED Content	Occupational Skills, Knowledge	Assessment
9	Ss will recognize equal ratios as proportions. Ss will set up and solve proportion problems.	Recognizing equivalent fractions. Understanding the concept of proportion. Finding the cross products of the means and extremes. Ability to solve for unknown term. Understanding steps to solving a proportion.	Finding missing term of proportion Word problems for set up and solving of proportions		
10	Ss will set up and solve proportion word problems.	Solving proportion word problems using decimals Set up proportion using labeling.	Understanding alternate set-up of proportions Two-step word problems GED answer format	Using financial data for small business Health occupation ratios	
11	Ss will set up and solve proportions with fraction amounts.	Solving proportion word problems using fractions Set up proportion using labeling.	Recognize GED answer format for proportions. GED word problems	Changing a recipe (increasing) Ordering parts (scaling ratios up and down)	GED word problems on ratio and proportion (pg. 29, Steck Vaughn Math Exercise Book)

Lesson	Objectives	Basic Skills	GED Content	Occupational Skills, Knowledge	Assessment
12	Review ratios, proportions, mathematical expressions that represent proportional thinking.	Math vocabulary	GED test questions		GED Math Textbook
13	Ss will recognize, set up, and solve two-step proportion problems.	Problem solving strategies: What is question? What is given? Label. Solve for missing term.	Two-step word problems	Word problems in sales and health occupation context	
14	Ss will find relationships within ratios or between two ratios. Ss will set up proportions properly. Ss will make one step unit conversions.	Common measurement conversions Understanding relationships of various units (time, length, weight) Multiply and divide fractions.	GED word problems		
15	Ss will recognize set up and solve unit	Simple unit conversions	GED Practice Test questions	Word problems in construction,	Health occupation

Lesson	Objectives	Basic Skills	GED Content	Occupational Skills, Knowledge	Assessment
	conversion using proportions.	Change fraction to decimal and decimal to fraction. Multiply and divide fractions and decimals.		health occupations, manufacturing	scenario
16	Ss will recognize, set up and solve proportions. Ss will use knowledge of ratio and proportions to create classroom charts.	Steps to solving ratio and proportion problems			Create charts with steps for solving ratio and proportion problem.
17	Understand the concept of percent. Change percent to equivalent fraction.	Relate percents to everyday life. Percent = "per hundred" Percents less than 1 and greater than 100 Reducing fractions			
18	Ss will change percents to decimals, decimals to percents, fractions to percents.	Understand meaning of percent and decimals. Equivalent fractions			

Lesson	Objectives	Basic Skills	GED Content	Occupational Skills, Knowledge	Assessment
		Find the missing term in a proportion.			
19	Ss will recognize parts of percent problems. Ss will set up a proportion to solve a percent problem.	Change percent to fraction and fraction to percent and percent to decimal. Multiply extremes and means to verify proportion. Concept of part and whole Recognizing key words of percent problems "of" (of the total) "is" identifies the part	Word problems to set up	Various occupational contexts	
20	Will find part in percent problems.	Identify part, whole, and percent. Steps to solving percent problem Find missing term. Use a math sentence to determine the question being asked.	Finding the part in two-step word problems	Sales commission and sale prices Occupational hazards in health careers	

Lesson	Objectives	Basic Skills	GED Content	Occupational Skills, Knowledge	Assessment
21	Ss will recognize, set up, and solve proportions to find the part. Ss will solve two-step proportion problems.	Identify three parts of percent problem. Set up equal ratios. Number sense i.e., greater than less than Use % key on calculator.	Solving two-step word problems	Sales and commissions	
22	Ss will recognize, set up, and solve proportions to find the percent.	Identify three elements of percent proportion problem. Understand meaning of proportion.	GED answer format	Home sales in Oregon Word problems in health and sales context	
23	Ss will solve two-step problems to find percent of increase and decrease.	Identify three elements of percent problems: part,whole,percent. Number sense (increase and decrease). Know and follow problem solving steps.		Wages Context questions in small business and construction	Review question activity.
24	Ss will recognize, set up, and solve proportions to find the whole.	Identify three elements of percent problems: part, whole, percent.		Questions in context of construction crew jobs and hospital	Review of three types of percent problems. Use number

Lesson	Objectives	Basic Skills	GED Content	Occupational Skills, Knowledge	Assessment
				procedures	sentence format.
25	Ss will recognize, set up and solve proportions for one of three missing terms: part, percent, or whole. Ss will compare fractions, decimals and percents.	Convert fractions to decimals, decimals to fractions or percent.	One and two-step word problems	Health occupation context for word problems	
26	Ss will recognize, set up and solve proportions for one of three missing terms: part, percent, or whole.	Convert fractions, decimals, and percents. Set up proportion.	GED Practice Test questions		Mastery Test on percents
27	Ss will understand use of pie graph to depict percentages. Ss will use information in pie graph to solve percent problems. Ss will collect data	Understand characteristics of pie graphs. Record data.			

Lesson	Objectives	Basic Skills	GED Content	Occupational Skills, Knowledge	Assessment
	and use to create pie graphs.				
28	Ss will recognize, set up, and solve proportions to find the part, whole and percent using graphic information.	Read and extract information from pie and bar graphs.	GED word problems	Word problems in context of health occupations	
29	Ss will read and write numbers expressed as powers and roots. Ss will solve problems that involve numbers written as powers and roots.	Understand the meaning of the superscript numbers (exponents) and base, perfect squares and square root. Multiplication facts			
30	Ss will evaluate mathematical expressions having more than one operation.	Memorize a mnemonic. Follow process for simplifying an expression. Add, subtract, multiply, and divide.	Translate GED word problems to mathematical expressions.	Word problem context in construction and health occupations	
31	Ss will understand attributes of polygons.	Vocabulary: Characteristics of polygons	GED word problems finding perimeter or one side of a polygon	Two or three word problems in context of	

Lesson	Objectives	Basic Skills	GED Content	Occupational Skills, Knowledge	Assessment
	Ss will compute perimeter of polygons.	Measure perimeter.		construction.	
32	Ss will measure circumference and diameter. Ss will organize data in a table. Ss will discover that pi is the ratio of circumference of a circle to its diameter. Ss will calculate circumference of circles.	Define terms: radius, diameter, and circumference. Draw diagrams. Understand that radius is one half of diameter.	Determine radius and diameter measures given information on graphs.		

OPABS Bridge Mathematics Course: List of Materials for Term 1

Name: Mary Foust **School: Lane Community College**
Course Name: Bridge Mathematics, Term 1 **Date Completed: July 2008**

Title	Date Published	Author (s)	Publisher	Web Address for Publication	Lessons in which Document is Used
Notes on Pi	Retrieved 11/2007	Chris Witcombe		http://witcombe.sbc.edu/earthmysteries/EMi.html	Lesson 32
Measurement Perimeter	Retrieved 11/2007		A to Z Teacher Stuff, LLC	www.atozteacherstuff.com	Lesson 31
PEMDAS	Retrieved 11/2007			www.mathisfun.com	Lesson 30
Number Theory Worksheet	Retrieved 11/2007		Mrs. Glosser's Math Goodies	www.mathgoodies.com	Lesson 29
Oregon Census Data – People Quick Facts	Retrieved 6/2008		U S Census Bureau	quickfacts.census.gov/qfd/states/41000.html	Lesson 27
Steck-Vaughn GED Math Exercise Book	2002	Ellen Northcutt, (Ed.)	Steck-Vaughn: Texas		Lessons 26 & 11
Rate Plans – Prepaid Phones	Retrieved 2007			www.myrateplan.com/wireless-prepaid	Lesson 8
Essential Mathematics for Life: Percents and proportions, 4th ed.	1996	Charuhas, M.S. & McMurty, D.	Glencoe/McGraw-Hill: Ohio		Lesson 11
Applied Math Skills	1996	Moscowitz , M. (Ed.)	Cambridge Adult Education/Simon		Lesson 23

Title	Date Published	Author (s)	Publisher	Web Address for Publication	Lessons in which Document is Used
			and Schuster: New Jersey		
Home Sales – Oregon	Retrieved 8/2007			www.real-estate.nexctag.com	Lesson 22
Number Power 2: Fractions, decimals and percents	2000	Jerry Howett	NTC/Contemporary: Illinois		Lesson 21
Survey of Occupational Exposure	Retrieved August 2007 Article written 1990	W. L. Turnberg and F. Frost	American Journal of Health, Vol. 80 Issue 10	www.ajph.org/cgi/content/abstract/80/10/1262	Lesson 20
Contemporary's GED Mathematics	2002	Jerry Howett	McGraw Hill: Illinois		Lesson 12 & 15
GED Mathematics	2002	Ellen Northcutt, (Ed.)	Steck-Vaughn: Texas		Lesson 5,7,9 & 14
OLMIS	Retrieved 2007			www.qualityinfo.org	Lesson 1
World Map	Retrieved 2007		Wikipedia	http://en.wikipedia.org/wiki/Metric_system	Lesson 2
Metric Word Search	Retrieved 2007			www.metric.org	Lesson 2
Metric Expressions	Retrieved 2007			www.metric.org	Lesson 2
Metric ruler	Retrieved 2007			www.verdian.org/mncharity/dir3/paper_rulers/	Lesson 3
Visual metric	Retrieved			http://lamar.colostate.edu/~hillger/brownridge.ht	Lesson 3

Title	Date Published	Author (s)	Publisher	Web Address for Publication	Lessons in which Document is Used
measures	2007			ml	
Guide to Use the Metric system	Retrieved 2007	Valerie Antoine		www.metric.org	Lesson 3
Products-Milk Chocolate	Retrieved 9/2007			http://us.mms.com/us/about/products/milkchocolate/	Lesson 27
Exploring Ratios Activity Sheet	Adapted 7/2007			http://www.thirteen.org/edonline/ntti/resources/lessons/m_relative/m_relative1.pdf	Lesson 6