



## 2010-2011 Curriculum Overviews

8<sup>th</sup> Grade

FALL SEMESTER  
&  
WINTER/SPRING SEMESTER

# 8<sup>th</sup> Grade Math, Fall Semester

## Unit 1: ANCIENT MATHEMATICIANS

### Guiding Questions:

- What do we owe to the innovation of ancient civilizations?
- What is  $\pi$ ? What is it used for? What are its origins?
- How have triangles been used to measure the circumference of the Earth?

### Resources & Technology:

- Glencoe C3 Chapter 7
- Glencoe C3 Chapter 9
- Glencoe C3 pages 663-669
- Geobra geometry software

**Summary of Expedition:** Students head out to the parking lot equipped with string and chalk to replicate the investigations of ancient Babylonians into the relationship between a circle's circumference and its diameter. Much like early 17<sup>th</sup> century Japanese and da Vinci, students dissect and rearrange circles into rectangles in search of a formula for a circle's area. Donning togas and laurels students spend some time in ancient Greece exploring how triangles were used to measure the circumference of the Earth.

### Learning Targets Specific to the Geometry Strand

I can...

- 7.3.1 Use models to explain the reasonableness of formulas for the circumference and area of circles.
- 7.3.2 Know common estimates of pi and use these values to estimate and calculate the circumference and area of a circle.
- 7.3.3 Solve problems involving areas and circumferences of circles.
- 8.3.4 Use models to explore the validity of the Pythagorean Theorem, and use it to find missing lengths.
- 8.3.5 Apply the Pythagorean Theorem to find distances in a variety of 2- and 3-dimensional contexts, including distances on coordinate graphs.
- 8.3.6 Use models and referents to explore and estimate square roots.
- H.1G.4 Use trigonometric ratios (sine, cosine and tangent) and the Pythagorean Theorem to solve for unknown lengths in right triangles.
- H.1G.6 Determine if three given lengths form a triangle. If the given lengths form a triangle, classify it as acute, right, or obtuse.

### Learning Targets Consistent Throughout the Year

I can...

- recognize that we all use math everyday
- use mathematics to solve problems in a variety of contexts
- appreciate the role of curiosity, discovery, and imagination in mathematics
- use precise mathematical language including symbols, notation, different forms of representation, and its procedures
- reflect critically upon my work and the work of others to include: explaining the reasonableness of an answer, justifying methods and conclusions, and suggesting improvements
- use a quiver of mathematical technology tools
- understand that mathematics is a human endeavor pursued by people the world around
- demonstrate REALMS Habits of Work and Attending Skills
- develop confidence in my ability to continue the study of mathematics

### Assessment:

- Classroom investigations/activities/experiences, Problem sets
- POW, Problem sets, & Quizzes
- Project: Windows between Worlds

# 8<sup>th</sup> Grade Math, Fall Semester

## Unit 2: Linear Equations

### Guiding Questions:

- If lines could talk, what would they say?
- How can lines help explain the past and present and predict the future?

### Resources & Technology:

- Glencoe C2 Chapter 6
- Glencoe C3 Chapter 1
- Glencoe C3 Chapter 7 section 9,10
- iPod touches with graphing calculator app
- Microsoft Excel

### Summary of Expedition:

Students investigate various phenomenons and explain their relationships and patterns with linear equations. The expedition begins with students constructing a meaning of slope through addition and subtraction of unlike fractions. Students extend their understanding when investigating bridge design and human physiology. Various verbal problems are posed with students translating the relationships into algebraic and graphic representations. An interdisciplinary project, Alexander Calder Mobiles, concludes the unit.

### Learning Targets Specific to the Algebraic Reasoning Strand

I can...

- 8.1.3 Identify and interpret the properties (i.e. slope, intercepts, continuity, and discreteness) of linear relationships as they are shown in the different representations and recognize proportional relationships ( $y/x = k$  or  $y = kx$ ) as a special case.
- 8.1.4 Use linear functions and equations to represent, analyze and solve problems, and to make predictions and inferences.
- 8.1.5 Relate systems of two linear equations in two variables and their solutions to pairs of lines that are intersecting, parallel, or the same line.
- 8.1.6 Use informal strategies (e.g., graphs or tables) to solve problems involving systems of linear equations in two variables.
- H.2A.1 Identify, construct, extend, and analyze linear patterns and functional relationships that are expressed contextually, numerically, algebraically, graphically, in tables, or using geometric figures.
- H.2A.2 Given a rule, a context, two points, a table of values, a graph, or a linear equation in either slope intercept or standard form, identify the slope of the line, determine the x and/or y intercept(s), and interpret the meaning of each.
- H.2A.3 Determine the equation of a line given any of the following information: two points on the line, its slope and one point on the line, or its graph. Also, determine an equation of a new line, parallel or perpendicular to a given line, through a given point.
- H.2A.4 Fluently convert among representations of linear relationships given in the form of a graph of a line, a table of values, or an equation of a line in slope-intercept and standard form
- H.2A.5 Given a linear function, interpret and analyze the relationship between the independent and dependent variables. Solve for x given  $f(x)$  or solve for  $f(x)$  given x.
- H.2A.6 Analyze how changing the parameters transforms the graph of  $f(x) = mx + b$ .
- H.2A.7 Write, use, and solve linear equations and inequalities using graphical and symbolic methods with one or two variables. Represent solutions on a coordinate graph or number line.
- H.2A.8 Solve systems of two linear equations graphically and algebraically, and solve systems of two linear inequalities graphically.

### Assessment:

- Classroom investigations/activities/experiences
- Problem sets & Quizzes
- Equations systematic analysis
- Interdisciplinary Project: Alexander Calder Mobiles

# 8<sup>th</sup> Grade Science First Semester 2010

## Watershed Ecosystem Analysis

### Guiding Questions

1. How do you measure the health of a stream and what does a healthy stream look like?
2. What is the role of Salmon and Trout in the streams of Central Oregon?
3. How do humans affect watersheds?
4. What is our role in maintaining healthy streams and watersheds?

### Anchor Text & Resources

#### Literature:

- David James Duncan readings
- John McPhee - "Conversations with the Archdruid"
- Barbra Kingsolver "Small Wonder"
- Kolleen Yake -Upper Deschutes Watershed Assessment
- Textbook - "Earth's Waters"

### Summary of Expedition

This Fall and Winter, 8<sup>th</sup> graders will complete an analysis of the health of our study site on Tumalo Creek. REALMS students have been monitoring riparian vegetation within the Tumalo Creek Bridge to Bridge Restoration project for five years. This year, we will analyze our data, evaluate the site, and make proposals for future restoration. This engineering problem will require students to gain a solid understanding of fish ecology, water quality parameters, and ecological functioning of riparian and river systems. Their science project will dovetail with the project they are completing in humanities. In addition to learning and doing the science necessary for this project, students will gain skills in presentation of information - they will write up their results, post their project on the StreamWebs web page, and present at the 3<sup>rd</sup> annual "Students Speak" watershed summit in the spring. Throughout the Tumalo Creek project, students are interacting with professional scientists and being scientists themselves; they are collecting and analyzing data that is used by the USFS and the Upper Deschutes Watershed Council, and they are developing a sense of service and an understanding of the importance and challenges that come with being stewards of public resources.

### Classroom Learning Content- Case Studies

- Evaluate the impact of human activities on environmental quality and the sustainability of Earth systems. Describe how environmental factors influence resource management (*study site analysis, watershed management analysis*)
- Explain how individual organisms and populations in an ecosystem interact and how changes in populations are related to resources (*Salmonid life cycle and requirements, stream feature analysis, riparian veg. monitoring*)
- Analyze the relationships between biotic and abiotic factors in ecosystems (*water quality testing, riparian vegetation monitoring*)
- Science Skill Standards - Scientific Inquiry (*design and conduct investigations; collect and analyze data; communicate results*) and Engineering Design (*define problem; design, test and propose solutions; collect relevant data and communicate results*)

### Reading Comprehension Strategies

Determining Importance

### Writing Traits

Ideas and Content  
Word Choice

### Fieldwork Learning Experiences

- Salmon Watch program (1 day) on Metolius River with ecology and water quality experts
- Water Quality and Riparian Vegetation Monitoring (6-8 days) in Tumalo Creek riparian area with USFS/UDWC personnel
- In-Class Presentations by various fish and water experts
- Presentation at Student Watershed Summit in May - preparation to begin in winter quarter

# 8<sup>th</sup> Grade Humanities Fall Semester 2010

## Tumalo Creek: Connection, Reflection, and Action

### Expedition Summary

Collaborating with Science, students will immerse themselves in the study and stewardship of Tumalo Creek. Grounded in the ideas of Place-Based Education, students will develop an understanding of the issues surrounding our watersheds and build a relationship with our study site. Their learning and connection will be shared with the public through a variety of products and their continued service to the site.

### Principles of Successful Place-Based Education (from - <http://www.promiseofplace.org>)

- Learning takes place on-site and in the local community and environment.
- Learning focuses on local themes, systems, and content.
- Learning is personally relevant to the learner.
- Learning experiences contribute to the community's vitality and environmental quality and support the community's role in fostering global environmental quality.
- Learning is supported by strong and varied partnerships with local organizations, agencies, businesses, and government.
- Learning is interdisciplinary.
- Learning experiences are tailored to the local audience.
- Learning is grounded in and supports the development of a love for one's place.
- Local learning serves as the foundation for understanding and participating appropriately in regional and global issues.
- Place-based education programs are integral to achieving other institutional goals.

#### Guiding Questions

- How do relationships between people and place affect your sense of place? (WHAT?)
- How does the interconnectedness between human (economic, societal, historical and political) issues and place affect our community? How does it affect our watersheds? (WHAT?)
- Why are healthy streams and watersheds important? Why do you care? (SO WHAT?)
- What is our role in maintaining healthy streams and watersheds? What can we do to help? (NOW WHAT?)

#### Anchor Text & Resources

The Man who Planted Trees  
 David James Duncan readings  
 The High Desert Journal  
 Healthy Waters (Magazine)  
 A Mosaic of Tumalo Creek  
 Seeing Through the Blindfold  
 First Fish First People  
 Reaching Home  
 Local periodicals

#### Fieldwork/Experts

REALMS Tumalo Creek Study Site – Exploration, Observation, Reflection, and Identification (multiple visits)  
City of Bend Intake – Patrick Griffiths shares the history, science, and politics  
Headwaters – Unique visit to experience the source and the human modifications  
Tumalo Ridge Hike – Gaining a different perspective of our study site  
Shevlin Park – Recreation and conservation  
In-Class visits by & connections with various experts – USFS, ODF, BPRD, BPTA, TID, UDWC, DRC, City of Bend,

#### Authentic Audience and Community Service

StreamWebs – Students around the state and country  
Watershed Summit – Central Oregon elementary to high school students who are WS experts  
Healthy Waters Magazine – students around the state  
High Desert Museum – Year of the Water exhibit (Fall 2011)

## In-depth Investigation: "Me and my Watershed"

### Summary

Through exploration activities, observations, study of local watershed issues, restoration service work, reflective writing, and visual art, students will build a relationship with Tumalo Creek that inspires life long stewardship. These experiences are stepping stones for immersing in the writing modes of reflection, persuasion, and poetry. These pieces will appear in a variety of products: our display, "Anatomy of a Watershed"; in environmental periodicals; shared at public events; and presented at the Watershed Summit.

### Learning Experiences:

Creating Sensory Imagery

Sacred Cartography – a look into how places we've been shape who we are, and how we affect these places

Exposure and Focus – How do photography concepts teach about writing?

How to be an Explorer of the World

## In-depth Investigation: "Humans: Friend and Foe"

### Main concepts

- Economic Tradeoffs
- Historical Skills
  - Cause and effect
  - Diverse perspectives
  - Relationships among events & issues
- Local History

### Literacy

- Discussion Techniques
- Reading Strategies
  - Synthesizing
  - Questioning
  - Determining Importance
- Writing Traits:
  - Ideas and Content
  - Organization,

### Art

- Principles of Design

### Summary

Using focus groups students will investigate human impact on our watersheds. Each student will work with a topic group and a subject area group to learn about a variety of issues from different perspectives. We will visit multiple sites, learn from experts in the community, and document and discuss our findings. We will present our findings through a *Rolacratic* Seminar at the Watershed Summit in the Spring.

**Learning Experiences:** Investigating in focus groups and subject area groups at fieldwork sites and with experts

- Topic Focus Groups –
  - Recreation
  - Fire
  - Municipal Water
  - Development
  - Restoration
  - Irrigation

## Products

**Anatomy of a Watershed** – A display representing the variety of factors that make up and affect a watershed for the High Desert Museum, *Year of the Water* Exhibit.

**Synthesis Essays** – Descriptive and persuasive essays for potential publication

**Rolacratic Seminar** – Representing the different perspectives in our community, we will discuss current issues relating to the human interactions with Tumalo Creek. We will present this discussion at the Watershed Summit.

### Art Skills

- I can make detailed observations and replicate these in different mediums
- I can interpret the aesthetic & emotional impact of a place using a variety of “exposures” & “focus” to illuminate the place through the textures, shanes, and colors I observe.

### Me & My Watershed

- I recognize the interconnectedness of people and place (Geo)
- I understand the participatory responsibilities of community members (Civics)
- I understand that resources are limited (Econ)
- I can observe, question, document, analyze using the SS filter (SS analysis)

### Humans: friend & foe

- I can study the river in the context of human interaction
- I understand economic tradeoffs & how choices result in both costs & benefits to individuals & society (Econ)
- I can analyze cause and effect relationships (Hist. skills)
- I can identify and analyze diverse perspectives on historical issues (Hist. skills)
- I understand relationships among events, issues, & developments in different spheres of human activity (Hist. skills)
- I can understand and interpret events & issues in the history of local communitv (local historv)

## Content: Geography, Local History, Economics, SS Analysis, Art

- The Responsibility for Learning
- The Natural World
- Solitude and Reflection
- Service &

### EL Design Principles

- Anatomy of a Watershed
- Synthesis Essay
- Rolacratc Seminar
- Watershed Summit

### Products

## Tumalo: Connection, Reflection, Action

### Writing Modes

- Reflective
- Informative
- Persuasive
- Poetry

### Literacy

#### I am responsible for my learning. This means I:

- come prepared to learn
- am organized
- complete my work on time and turn it in
- advocate for what I need to learn

### Habits of Work

#### I am an active, positive participant in learning. This means I:

- follow work time guidelines
- fidget appropriately
- have what I need
- work effectively in a group
- listen for understanding
- respond to questions appropriately

#### I show determination. This means I:

- accomplish high quality work
- challenge myself
- continue to work on LT's until I can reach proficiency or better enthusiastically, safely, and open-mindedly embrace adventure
- embrace adversity and uncertainty

#### Writing Process

- Pre-writing
  - Field writes
  - Graphic Org.
- Multi Drafts
- Feedback
- Revision
- Editing
- Publishing

#### Writing Traits

- Word Choice
  - Sensory imagery
  - Active Verbs
- Voice
  - Filter, exposure, focus
- Organization
  - Importance
  - Compare/contrast
  - Paragraphing

#### Reading Comprehension Strategies

- Creating Sensory Imagery
- Synthesizing
- Determining Importance
- Making Connections
- Asking Questions

# 8<sup>th</sup> Grade Math, Winter/Spring Semester

## Algebraic Thinking in Space

### Guiding Questions:

- How do mathematicians know what they know?
- How do we know that what mathematicians know is true?
- How can knowing what is true and doing the opposite help determine what is unknown?

### Resources & Technology:

- Geogebra
- Google Sketchup
- iPod touches with graphing calculator app
- Microsoft Excel

### Summary of Expedition:

Students use technology and manipulatives to investigate various 2D and 3D shapes. Students explain discovered relationships and patterns through algebraic equations and attempt to convince their peers that what they know is true. Students create various scenarios involving missing dimensions in 2D and 3D shapes requiring algebraic reasoning and the rearrangement of formulas. An interdisciplinary project involving the artwork of MC Escher concludes the unit.

### Unit Learning Targets: I can...

1. Use models to show that the sum of the angles of any triangle is 180 degrees and 360 for any quadrilateral. Apply these facts to find unknown angles.
2. Determine the missing dimensions, angles, or area of regular polygons, quadrilaterals, triangles, circles, composite shapes, and shaded regions.
3. Apply a scale factor to determine whether two- and three-dimensional figures are similar. Compare and compute their respective areas and volumes of similar figures.
4. Use properties of parallel lines, transversals, and angles to find missing sides and angles, and to solve problems including determining similarity or congruence of triangles and quadrilaterals.
5. Identify and explain formulas for surface area and volume of spheres, rectangular prisms, pyramids, cones, and cylinders. Apply these formulas in various contexts including those involving irregular shapes.
6. Rearrange above formulas and solve for missing dimensions in these shapes.
7. Recognize and identify line and rotational symmetry of two-dimensional figures.
8. Identify and perform single and composite transformations of geometric figures in a plane, including translations, origin-centered dilations, reflections across either axis or  $y = \pm x$ , and rotations about the origin in multiples of 90.
9. Apply slope, distance, and midpoint formulas to solve problems in a coordinate plane.

### Ongoing Learning Targets: I can...

- A. use mathematics to solve problems in a variety of real world applications
- B. understand that mathematics is a human endeavor pursued by people the world around
- C. appreciate the role of curiosity, discovery, and imagination in mathematics
- D. develop confidence in my ability to continue the study of mathematics
- E. use precise mathematical procedures and language including symbols, notation, and different forms of representation
- F. reflect critically upon my work and the work of others to include: showing work, communicating methods, explaining the reasonableness of an answer, and suggesting improvements
- G. use a quiver of mathematical technology tools

### Assessment:

- Classroom investigations/activities/experiences
- Problem sets & Quizzes
- Is it always true? (Geogebra and Google Sketchup Proofs)
- MC Escher Interdisciplinary Project

# 8<sup>th</sup> Grade Science, Winter/Spring Semester

## A Geologic Exploration of Central Oregon and Northern California

### Guiding Questions

1. What causes the land to look the way it does?
2. What can the rocks and landforms in an area tell about the geologic processes that happened in the past?
3. How is geologic research conducted?

### Anchor Texts & Resources

*Geology Underfoot in Yosemite Park* by Allen Glazner and Greg Stock  
*The Geologic Story of Yosemite National Park* by N. King Huber  
*Geology of the San Francisco Bay Region* by Doris Sloan  
Various geology textbooks and web resources

### Summary of Expedition

During second semester, student's work in science will be focused around two main topics - geology and travel study. We will start the semester gaining general background in plate tectonics and other forces that shape the earth, rock types and the rock cycle, and the practice of geology (in the lab and in the field). As we transition to travel study, student work will fit into one of three phases of travel study: Pre-Trip, Trip, and Post-Trip. During the pre-trip phase, students will continue building background knowledge in the area of geology, and will choose an independent project (IPP) in which to become an expert. The topics range from geology and biology to natural resources and cultural and social anthropology. Regardless of IPP topic, all students will research their chosen area and prepare a Building Background Knowledge activity for the rest of the class. Each student will also design a field research question and investigation. During the trip phase of the expedition, students will work with a teacher and/or an expert to attempt to answer their field research question. In addition, we will all be conducting fieldwork to deepen our knowledge of the content covered at school. In the post-trip phase of the expedition, students will reflect on their fieldwork, synthesize all that they have learned in the classroom and the field, and share their information with a wider audience (including peers, teachers, families, and community members).

### Classroom Learning Content

We will compare and contrast the landforms in the area around Bend with those in Yosemite and around San Francisco. What forces are responsible for shaping the land in these two areas? What rocks are present in the different areas? How can we use evidence that we find today to infer what geological processes have been at work in the past?

### OR State Standards

- Describe and compare the properties and composition of the layers of Earth.
- Explain how landforms change over time at various rates in terms of constructive and destructive forces.
- Describe the processes of Earth's geosphere and the resulting major geological events.
- Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation.
- Design and conduct a scientific investigation that uses appropriate tools, techniques, independent and dependent variables, and controls to collect relevant data.

### Major Projects/Products

- 1) Building Background Knowledge activity for other 8<sup>th</sup> graders
- 2) Research Question and investigation
- 3) Post-Trip Synthesis

### Fieldwork Experiences

**Pre-Trip Phase:** Local geology fieldwork  
**Trip-Phase:** Various fieldwork opportunities

# 8<sup>th</sup> GRADE HUMANITIES Winter/Spring 2

## Pre-trip Phase: "A Mystery of Cultures"

### Trip Phase: Experience

### Post Trip Phase: Synthesis

#### Summary of Pre-Trip Phase

During the pre-trip phase of the 8<sup>th</sup> grade travel study in Humanities, students will build background knowledge in several branches of anthropology: archeology, cultural anthropology, and sociology. We will focus on the different people who have influenced the area, and the current issues surrounding these. Students will also learn economic concepts through undertaking a fundraising effort to help pay for the trip and build ownership. Students will design individual research (IndePendent Projects – IPP) and prepare a Building Background Knowledge activity for the class. As part of the IPP, each student will design a field research question and investigation to be implemented during the trip phase.

#### Overall Guiding Questions

- Why is the past important? Why do we care?
- What if my beliefs are different from your beliefs?
- How do humans cope with adversity past and present?

#### Content Areas

- ANTHROPOLOGY
- Archaeology
  - Cultural Anthropology
  - Social Anthropology

#### In-Depth Investigation: "Importance of the Past"

##### Summary

Students develop skills of scientific methods in archaeology through exploration activities, analyzing, interpreting and documenting information. They learn the relevance of observation, context, descriptive names and avoiding ethnocentrism and use these to understand the importance of the past.

##### Main Concepts

- Importance of the Past
- Scientific Methods
- Stewardship
- Ethnocentrism

#### In-Depth Investigation: "What if my beliefs are different from your beliefs?"

##### Summary

Students learn about the people and cultures of the area: their historical context; cultural identities; and interrelations. A second focus is on the interaction between the people and the place. We will investigate the current and historical issues of the area and how the different perspectives affect both people and place.

##### Main Concepts

- Historic Context
- Cultural Diversity
- Tradition vs. modernism
- Interrelations
- Current Issues

## Trip Phase & Post Trip Phase:

### TRIP PHASE: The Experience – Trip Dates: April 11<sup>th</sup> – April 26<sup>th</sup>

- Authentic investigation – IPP/Content Fieldwork
- Community Connections
- Adventure

### **POST TRIP PHASE: The Synthesis**

- Reflection
- Synthesize the experience
- Share with the community and celebrate accomplishment

### **Summary of Authentic Investigation IPP/Content Fieldwork**

Authentic investigation for students' independent projects will be interspersed throughout the experience, connecting with various experts, site visits, and using research resources in the area. Students will work with a teacher and/or an expert to attempt to answer their field research question and document their learning. In addition, trip participants will be conducting fieldwork to deepen knowledge of the content covered at school.

### **Trip Phase Big Picture Learning Targets:**

- I can engage in meaningful fieldwork and take responsibility for my learning.
- I can meet adversity and uncertainty with poise and enthusiasm.
- I can experience a new community/culture with open-mindedness, humility, acceptance, flexibility, and politeness.

### **Reflection**

#### SYNTHESIZE THE EXPERIENCE:

- Metabolize learning and transform to understanding
- Making connections from the trip to the broader world

### **Synthesis Slideshow**

The class and leaders will create a slide show/movie that will help share the travel study experience with families, and the REALMS community (6<sup>th</sup> and 7<sup>th</sup> graders and staff). From watching the slide show, the audience will learn about where the group went, what they did, and gain an understanding of what the trip felt like. The goal is to help the community grasp the experience, the learning, and the growth.

### **IPPPP (IndePendent Project Presentation Piece)**

THE GOAL IS: To communicate knowledge of the topic through a visual and written representation of the topic information

- Using information from research
- Images and learning from related fieldwork experience
- Answering curriculum related questions

### **Learning Targets:**

- I consider my experiences with careful thought and serious consideration to internalize my learning and broaden my understanding.
- I can share my experiences with the greater community in a thoughtful and professional manner.
- I can synthesize my learning by combining pre-trip research with my fieldwork knowledge to create new understanding.
- I can clearly communicate my understanding of my topic area.