

Specialist High Skills Major	Construction
Course code and course title	MBF3C – Foundations of College Mathematics
Name of contextualized learning activity/activities	Geometry in Design
Brief description of contextualized learning activity/activities	Students will learn how geometric shapes are used in construction. Students will represent a garden shed in a variety of ways and build a scale model of the garden shed.
Duration	11 lessons
Overall Expectations	C1 - Represent , in a variety of ways, two-dimensional shapes and three-dimensional figures arising from a real world applications , and solve design problems

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<p>What do we want the students to learn?</p>	<p>Students will be able to recognize geometry in construction and how two-dimensional shapes and three-dimensional figures have been used in different types of architectural design.</p> <p>Students will represent three-dimensional figures using isometric perspective drawings and orthographic drawings.</p> <p>Students will develop nets and plans which will be used to create scale models.</p> <p>Students will apply these skills to create a model of a garden shed, starting with a picture of the shed.</p>
<p>Specific Expectations</p>	<p>1.1 recognize and describe real-world applications of geometric shapes and figures, through investigation (e.g., by importing digital photos into dynamic geometry software), in a variety of contexts (e.g., product design, architecture, fashion), and explain these applications (e.g., one reason that sewer covers are round is to prevent them from falling into the sewer during removal and replacement)</p> <p>Sample problem: Explain why rectangular prisms are often used for packaging.</p> <p>1.2 represent three-dimensional objects, using concrete materials and design or drawing software, in a variety of ways (e.g., orthographic projections [i.e., front, side, and top views], perspective isometric drawings, scale models)</p> <p>1.3 create nets, plans, and patterns from physical models arising from a variety of real-world applications (e.g., fashion design, interior decorating, building construction), by applying the metric and imperial systems and using design or drawing software</p> <p>1.4 solve design problems that satisfy given constraints (e.g., design a rectangular berm that would contain all the oil that could leak from a cylindrical storage tank of a given height and radius), using physical models (e.g., built from popsicle sticks, cardboard, duct tape) or drawings (e.g., made using design or drawing software), and state any assumptions made</p>

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Essential Skills and Work Habits	<p>Students will read and interpret a scale to find missing dimensions.</p> <p>Students will be able to recognize the use of geometry in different building styles.</p> <p>Students will create isometric drawings.</p> <p>Students will create orthographic drawings.</p> <p>Students will create a net which can be used to make a scale model of a three-dimensional object.</p>
Catholic graduate expectations.	

Teaching/ Learning Strategies

Teacher Notes	<ol style="list-style-type: none"> 1. This unit is to be taught using McGraw-Hill Ryerson, grade 11, Foundations for College Mathematics as a primary resource. 2. Teachers will need to select building from their community to make geometry in architectural design more relevant. 3. Teachers will need to be familiar with the different architectural designs. An excellent resource is the website http://www.ontarioarchitecture.com 4. Teachers need to be very familiar with the drawing terms. The art and design teacher will be a good recourse 5. Materials will be needed to create a model of the garden shed.
Context	<p>Lesson 1 will require the students to have access to the internet. All the other lessons can be done in the mathematics classroom. Teachers will collaborate with the construction teacher.</p>
Instructional/Strategies	<p>Students will be taught the skills from chapter 6, Geometry in Design from McGraw-Hill Ryerson with an emphasis on construction. As each section of the chapter is covered students will apply the new skills to designing and creating a scale model of a garden shed</p> <p>A word wall should be created to help students learn the meaning of new terms associated with construction and design.</p>

Assessment and Evaluation of Student Achievement

Tasks	Type of Assessment
1. Oral Discussion. Student will identify geometric figures used in construction from a photo provided by the teacher. Also the student will be asked to identify the architectural design.	Diagnostic
2. Have the students create a 3-D model using linking cubes. Using isometric dot paper draw an isometric perspective drawing and the corresponding orthographic drawings.	Formative
3. Provide the students with a model or picture of a shed with a saltbox roof. Using graph paper the students will create a net that can be used to create a model of the shed.	Formative
4. Unit Project	Summative
5. Unit Test:	Summative

Resources

<p>Authentic workplace materials</p> <ul style="list-style-type: none"> - pictures of sheds with various roof styles
<p>Human Resources</p> <p>Collaboration with the Construction Teachers and Art or Design Teacher</p>
<p>Print</p> <p>McGraw-Hill Ryerson – Foundations for College Mathematics 11</p>
<p>Video</p> <p>3D Video Tours of Summerwood's Finest Styles (These videos are found at http://www.summerwood.ca)</p>

Software

Geometers Sketch Pad

Websites

<http://www.summerwood.ca>

<http://www.ontarioarchitecture.com>

<http://illuminations.nctm.org/Lessons/Isometric/Isometric-AS-DotPaper.pdf>

Other

- graph paper
- isometric dot paper Reproducible page found at:
<http://illuminations.nctm.org/Lessons/Isometric/Isometric-AS-DotPaper.pdf>
 Reproducible Page
- construction paper (to create models)
- linking cubes
- handouts

Accommodations

Students will be accommodated as per IEP for items such as:

- extra time
- additional assistance offered one to one
- collaboration with construction teacher
- extra resource help

Refer to individual student IEP's

Lesson Outline**BIG PICTURE**

Students will:

- identify geometric shapes and figures in different types of architecture
- represent three dimensional objects using isometric perspective drawings and orthographic drawings
- create nets, plans and patterns
- create scale models
- solve problems with given constraints
- apply what they have learned to create a model of a garden shed

Activity #	Activity Title	Description	Expectations
1	Geometry in Construction	<ul style="list-style-type: none"> • Identify geometric shapes and figures used in architecture • Make predictions 	C1.1

		concerning the architectural style of a building based on geometry	
2	Perspective and Orthographic Drawing	<ul style="list-style-type: none"> Investigate isometric perspective drawings Investigate orthographic drawings 	C1.2
3	Perspective and Orthographic Drawing	<ul style="list-style-type: none"> Create isometric and orthographic drawing for different types of Garden sheds 	C1.2
4	Creating a Net	<ul style="list-style-type: none"> Establish the difference between a net, a plan and a pattern Create nets, plans and patterns Establish the importance of nets, plans and patterns in the construction industry 	C1.3
5	Scale Models	<ul style="list-style-type: none"> Construct a scale model using nets, orthographic drawings or isometric perspective drawings Establish the importance of models in the construction industry 	C1.3
6	Building a Shed Unit Project	<ul style="list-style-type: none"> Create a net for three different garden sheds Create a scale model for one of the sheds 	
7	Problem Solving with Constraints	<ul style="list-style-type: none"> Solve problems where the project must satisfy given constraints. (Examples should include maximum cost, maximum/minimum size, building codes, bylaws) 	C1.3
8	Unit Test Assessment of Shed Unit Project	Summative Assessment	