Unit 2 Project

Mathematics 10, page 256

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Suggested Timing

60–90 min

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Materials

• coloured pencils and markers, coloured paper, scissors, glue, and other materials for artwork

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Blackline Masters

Master 1 Project Rubric
BLM U2–3 Unit 2 Project Final Report

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Mathematical Processes

✓ Communication (C)
✓ Connections (CN)
✓ Mental Math and Estimation (ME)
✓ Problem Solving (PS)
✓ Reasoning (R)
✓ Technology (T)
✓ Visualization (V)

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General Outcome

Develop algebraic reasoning and number sense.

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Specific Outcomes

AN1 Demonstrate an understanding of factors of whole numbers by determining the:
• prime factors
• greatest common factor
• least common multiple
• square root
• cube root.

AN2 Demonstrate an understanding of irrational numbers by:
• representing, identifying and simplifying irrational numbers
• ordering irrational numbers.

AN3 Demonstrate an understanding of powers with integral and rational exponents.

AN4 Demonstrate an understanding of the multiplication of polynomial expressions (limited to monomials, binomials and trinomials), concretely, pictorially and symbolically.

AN5 Demonstrate an understanding of common factors and trinomial factoring, concretely, pictorially and symbolically.

Planning Notes

Begin the class by having students discuss examples throughout the unit of how artists use mathematics in their work. Prompt them to discuss how they might use their understanding of irrational numbers, exponents, and polynomials to design their own artwork. Emphasize that the artwork can be historical or contemporary. It might involve nature, stylized models, or another idea of their choice that relates to the unit. List and post ideas from the class discussion and encourage students to use the ideas as a springboard to develop their own artwork.

Encourage students to think about what format they might use to present their work. Students who are interested in using multimedia (e.g., images and text, images and audio) to publish their work online may find the related Web Link at the end of this section helpful.

Have students complete their unit project by creating their artwork and developing a presentation. Review the expectations for the presentation outlined on page 256 in the student resource. Clarify with the class that the final part of the project involves a brief report that describes how the mathematics from Unit 2 specifically relates to the work of art.

Emphasize that students are being encouraged to use their imagination to create their artwork, and then to describe how the mathematics skills they have acquired relate to their artwork.

Give students time to review the contents of their project portfolio and ensure that they have completed all required components for their final report and presentation.

WWW Web Link

For information about how to develop a multimedia presentation that can be created in a web tool using images, audio, and/or video, go to www.mhrmath10.ca and follow the links.

Assessment	Supporting Learning
Assessment *of* Learning	
Unit 2 Project This unit project gives students an opportunity to apply and demonstrate the concepts, skills, and processes learned in Unit 2. **Master 1 Project Rubric** provides a holistic descriptor that will assist you in assessing student work on the Unit 2 project.	• You may wish to have students use **BLM U2–3 Unit 2 Project Final Report**, which provides a checklist for students to identify where in their project they demonstrate the skills, concepts, and processes explored in Unit 2. • Reviewing **Master 1 Project Rubric** with students will help clarify the expectations and the scoring. It is recommended to review the scoring rubric at the beginning of the unit, as well as intermittently throughout the unit, to refresh students about the project assessment.

The Specific Level Notes below provide suggestions for using **Master 1 Project Rubric** to assess student work on the Unit 2 project.

Score/Level	Specific Level Notes
5 **(Standard of Excellence)**	• provides a complete and correct response with clear and concise communication; may include a minor error that does not affect the understanding of the overall project; may include weak communication in no more than one calculation
4 **(Above Acceptable)**	Demonstrates *one* of the following: • shows a thorough understanding of exponents and polynomials by providing a complete response to all parts of the project, with possibly weak or missing justification in no more than two calculations; includes good communication that addresses the relationships among radicals, irrational numbers, exponents, and polynomials; demonstrates a clear understanding of radicals to analyse the golden ratio • provides a complete response with one error that is carried through correctly (e.g., incorrectly reads the dimensions from a polynomial model but carries through the multiplication of the factors correctly); includes good communication that addresses how the concepts relate to art • provides a response that addresses all parts of the project but that is difficult to follow and that lacks organization; does not provide support for how mathematics is incorporated into art; includes good communication
3 **(Meets Acceptable)**	Demonstrates *one* of the following: • makes a correct start to all sections of the project • correctly completes square roots and cube roots and explains their connection to geometric representations; with some errors, demonstrates a basic understanding of the golden ration and how it applies to a rectangle and related problems; uses models and algebraic expressions for combining like terms of polynomials; models the relationship between multiplication and factoring; with some possible errors, models and explains the difference of squares and squaring a binomial; includes good communication with some connections • provides answers to all parts without supporting work or justification
2 **(Below Acceptable)**	• makes a start to various sections of the project; provides some correct links • is able to calculate square roots and cube roots with some difficulty; links them to geometric representations • draws and determines the ratio for the golden rectangle; has some success in applying or explaining whether other objects model the golden ratio • demonstrates the ability to solve radical numbers; is able to solve irrational numbers with limited success • demonstrates combining like terms of polynomials with a model/diagram and algebraically • models multiplication of polynomials with relative accuracy • attempts to use models to explain the difference of squares or squaring a binomial, with some success • includes some communication
1 **(Beginning)**	• makes a start to various sections of the project but is unable to carry through or link concepts together • calculates square roots or cube roots but does not link them to geometric representations • draws and determines the ratio for the golden rectangle; is unable to apply or explain whether other objects model the golden ratio • demonstrates the ability to solve radical numbers but has difficulty with irrational numbers • when combining like terms, demonstrates addition *or* subtraction of polynomials with limited success • attempts to model multiplication of polynomials with limited success; may not attempt multiplication • attempts to explain the difference of squares or squaring a binomial, with little or no success • includes little or no communication