



Description

- Design and build scale models of geometric structures as a project.
- Use nets to construct 3-D structures.
- Present the models and design analysis to the class.

Materials

- Impact Math: *Geometry and Spatial Sense*
- Geo Visions – Design and Construct
- BLM 20.1

Assessment Opportunities

Minds On ...

Whole Class → Discussion

Discuss some famous sites known for their geometric design, e.g., the pyramids in Egypt, the Eiffel Tower, Geodesic Dome. Which 3-D figures are most often used in construction?

Why are triangles used so frequently in construction?

Read the task on BLM 20.1 with students. Review the rubric that will be used.

Geo Visions is a unit written for Grade 6/7 by York Region Teachers and available on the Ontario Curriculum Unit Planner.

Action!

Individual → Model Making

Curriculum Expectations/Performance/Rubric: Assess students on their design and response to questions 1-4 on BLM 20.1.

Students design and build scale models of castles, cars, people, animals, abstract geometrical structures, etc. using a variety of three-dimensional figures that they construct from nets. Nets can be made using any of the methods from Day 19.

Scaffold: Students can manipulate different combinations of the polyhedrons created in Day 19 to help them visualize the type of structure they might choose to design.

Consider integrating expectations from the Grade 7 Science strand Structures and Mechanisms with this activity.

Consolidate Debrief

Individual → Reflection

Learning Skills/Self Assessment/Checklist: Students complete a self-assessment of their work using the checklist on BLM 20.1.

- How much of the required work have I completed?
- How much must I finish to be ready for a presentation?
- What clarifying questions must I ask to be able to complete the work?

If questions 1-4 are being used as summative assessment data, the questions must be completed under the teacher's supervision so that the level of independence demonstrated by the student can be assessed.

Application

Home Activity or Further Classroom Consolidation

Complete the building of your structure.

20.1: Design/Construction Project

Task

You are a designer with the Geo Visions Company. Geo Visions specializes in creating and constructing geometric structures, e.g., office buildings, art galleries, castles, houses, bridges, etc. They also design geometric vehicles, e.g., cars, trucks, boats, or geometric sculptures, e.g., people, animals, abstract sculptures.

You have been hired by the city to design and construct _____
(Select a type of structure, vehicle, or sculpture.)

You will need to submit a model and an analysis of your design to the city planners during the week of _____ (Write in the due dates.).

Details of the Design Project

Your model must:

- be constructed with 3-D geometric figures (each figure constructed from a net)
- fit on a base 30 cm by 30 cm
- include at least 2 different types of prisms
- include at least 2 different types of pyramids
- include at least 2 other different types of 3-D figures.

Your design analysis must include:

- nets of the 2 different types of prisms (label dimensions of each face)
- net of the 2 different types of pyramids (label angle measure of each face; label dimensions of each face)
- sketch of front, back, and side views of your structure or sculpture
- a description for each of the prisms and pyramids mentioned above (number of faces, edges, vertices; classification of faces, e.g., rectangle, square, acute isosceles triangle, etc.; tell which faces are congruent.).

To show the city planners that you have a good understanding of 2-D and 3-D geometry, include answers for the following.

1. If Cube A has dimensions 2 cm by 2 cm by 2 cm and Cube B has dimensions 4 cm by 4 cm by 4 cm, which faces are congruent and which faces are similar? Explain. Include a diagram with your explanation.
2. Draw the net for a rectangular prism that has dimensions of 6 cm by 4 cm by 2 cm. Include the dimensions of each face on your net.
3. Can a quadrilateral contain 3 obtuse angles? Explain.
4. Is this statement always true, sometimes true, or never true? Explain.
"A right-angled triangle is isosceles."

Hand in your model, your design analysis, and answers to the questions. Use the check boxes on this page to make sure you have completed everything.