**The Shape and Space Strand: Outcome SS4.3**

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| **Outcome** | | **Indicators** | |
| SS4.3. Demonstrate an understanding of rectangular and triangular prisms by:   * identifying common attributes * comparing * constructing models.   [C, CN, R, V]  *In support of the K-12 Mathematics goals of Spatial Sense, Logical Thinking and Mathematical Attitude.* | | 1. Identify and name common attributes of rectangular prisms from sets of rectangular prisms. 2. Identify and name common attributes of triangular prisms from sets of triangular prisms. 3. Sort a set of rectangular and triangular prisms using the shape of the base. 4. Identify examples of rectangular and triangular prisms found in the environment. 5. Construct and describe a model of rectangular and triangular prisms. 6. Construct rectangular prisms from their nets. 7. Construct triangular prisms from their nets. 8. Construct nets for rectangular or triangular prisms. | |
| **Learning Space:** [**Top**](#top) | | | |
| In grade 3, students explored a wide variety of 3-D objects, describing the objects in terms of the faces, and describing the characteristics of 3-D objects in terms of the number of faces, edges, and vertices (corners). In grade 4, the students narrow their focus to prisms with rectangular and triangular bases and the connection between 3-D and 2-D.  It is important that the students continue to develop their spatial sense. Rectangular and triangular prisms can at first glance appear to be the same, depending on the line of site. Students need to have experiences in which they walk around and manipulate actual rectangular and triangular prisms to understand the differences between the two types of 3-D objects, and to develop their ability to reason three dimensionally.  Also in this outcome, the students are exploring the relationship of 2-D nets to the construction of the 3-D objects. When constructing a 2-D net, focus is on the 2-D shapes of the faces of the 3-D objects, but it is also important for the students to discuss and explore the relationship between the sides of the 2-D shapes to the edges of the 3-D objects. As well, students should be encouraged to explain what in the 2-D nets results in the corners of the 3-D objects. It is important that students make as many connections between 2-D shapes and 3-D objects as possible so that they are able to easily transfer their thinking between 2-D and 3-D.  In approaching these ideas relating 2-D and 3-D it is also very important to engage the students in a discussion regarding the nature of 2-D. Students at grade 4 should be starting to become aware that it is impossible to physically represent a 2-D shape, because whatever material is used the shape will actually have a third dimension (height or depth). Thus, 2-D shapes actually only exist in the abstract, however; they provide us powerful tools for describing, creating, and changing the world around us.  Connections can be made between the students’ study of rectangular and triangular prisms and their overall awareness and reasoning related to patterns and pattern recognition. There are also powerful connections that can be made between the students’ study of area of 2-D shapes and the faces of the 3-D objects. Arts education also provides a valuable setting in which the students can explore the realities of 3-D objects, including rectangular and triangular prisms. Often, these 3-D objects form a foundation for much of the objects that we use in everyday life – from homes to laptops. Students can be engaged in the exploration and design of objects that incorporate or rely upon rectangular and triangular prisms.  It is very important that very little, if any, of the students’ study of 3-D objects be done through the use of pictures and diagrams. Even when nets are created through 2-D pictures the ultimate “test” of those nets should be whether they can be folded to create the 3-D object desired. | | | |
| **What Students Should…** [**Top**](#top) | | | |
| **Know**   * the terms “net”, “rectangular prism”, “triangular prism”. | **Understand**   * the relationship between a net and a 3-D object, including 2-D shapes to faces of the 3-D object, the sides of the 2-D shapes to the edges of the 3-D object, and the corners of the 2-D shapes to the vertices of the 3-D shape. * the difference and relationship between 2-D and 3-D. * why 2-D shapes can never be constructed. * the importance of changing line of sight when considering 3-D objects. | | **Be Able to Do**   * distinguish between rectangular and triangular prisms. * construct nets for 3-D objects. * construct 3-D objects from nets. * identify rectangular and triangular prisms in everyday objects and situations. |
| **Key Questions:** [**Top**](#top) | | | |
| * What is the difference between 3-D objects and 2-D shapes? * What is the relationship between 3-D objects and 2-D shapes? * Where can you find rectangular and triangular prisms? * Why does just having the right 2-D shapes in a net for a 3-D object not guarantee that it can be used to make the 3-D object? * Why can you not make a 2-D shape? * Why is it important to look at 3-D objects from different directions? | | | |

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| **Suggestions for assessment:** [**Top**](#top) |
| **Big Idea:**  Reasoning three dimensionally.  **Suggestions for assessment tasks:**   1. Provide the students with a 3-D object and ask them to write a description of the object. Encourage the students to comment on as many features as possible. 2. Give the students a set of 3-D objects comprised of triangular and rectangular prisms. Ask the students to sort the objects according to the type of prism.   **What to look for:**   * See [*Thinking Three-Dimensionally Rubric*](file:///C:\Users\ru593\AppData\Local\Temp\Thinking%20Three%20D%20Rubric.doc)   *.*  **Big Idea:**  Relating 2-D to 3-D.  **Suggestions for assessment tasks:**   1. Provide the students with a 3-D object and a number of possible 2-D nets for that object. Have the students identify at least one net that represents the 3-D object and ask them to justify their choice. 2. Give the students a piece of isometric dot paper and ask them to sketch a triangular or rectangular prism and to identify the dimensions of the prism.   **What to look for:**   * See [*Relating 2-D to 3-D Rubric*](file:///C:\Users\ru593\AppData\Local\Temp\Relating%202D%20to%203D%20rubric.doc)*.* |
| **Suggestions for instruction:** [**Top**](#top) |
| **Big Idea:**  Reasoning three dimensionally.  **Suggestions for instructional activities:**   1. Have the students work in small groups of 4 or 5 students. Provide each group with one triangular prism and one rectangular prism, each of which has been labelled with the appropriate name. Have the groups explore the two prisms, identifying characteristics of each. Next, have the students create a Venn diagram to show the relationship between the characteristics of each of the 3-D objects. Have each group share their Venn diagram, and have the class discuss the similarities and differences between the diagrams. For any disagreements in ideas, have the students work together to determine which idea is correct. Create a class Venn diagram for showing the relationship between the characteristics that define a rectangular prism and a triangular prism. (This also addresses identifying the 2-D shapes in 3-D objects part of the relating 2-D to 3-D big idea). 2. Have each student select one 3-D object out of a set of triangular prisms and rectangular prisms that they are to analyze and determine if the object is a triangular or rectangular prism. Next, have the students go into pairs and have them show their partner their object and explain how they reached their conclusions. 3. Have the students collect 3-D objects, and pictures of 3-D objects that are either rectangular prisms or triangular prisms. For each object, have the students record their reasoning for their choice and identification of the type of object. Create a display for the students to visit and add to.   **Big Idea:**  Relating 2-D to 3-D.  **Suggestions for instructional activities:**   1. Provide the students with a number of different nets, most of which represent a cube, but at least one of which does not. Have the student work in pairs and construct from one set of nets the resulting 3-D objects by folding and gluing or taping the net together.Have the students compare the resulting 3-D objects to the original nets. For the nets that cannot be folded into a cube, ask the students to explain the problem with the net. 2. Working in pairs, have the students each design a net for a rectangular prism and a net for a triangular prism. Have the partners exchange nets and construct the 3-D objects using the nets to verify that the nets are correct. 3. Show the students drawings of triangular and rectangular prisms on isometric dot paper. Have the students discuss how the different lines on the drawings relate to the original 3-D objects that the drawings represent. Ask the students to duplicate the drawings to get used to the positioning of lines on the isometric dot paper, then give them a new piece of isometric dot paper and one 3-D object and ask them to sketch it on the paper. Have the students “flip the object” so that a different side is facing out and ask them to draw the 3-D object again. |