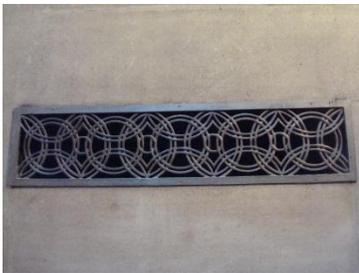


# Recognizing Geometry in Real Life

## A Teacher Resource Package for the Primary Grades



**Notes for Teachers:**

These are intended to be a starting point to help your class apply what they have learned in the Geometry and Spatial Sense strand to real-life situations. There are 10 pictures included, and each one has suggestions for the teacher regarding how to use each picture in a Grade One, Two, or Three classroom. The pictures will hopefully offer your students a way to engage themselves further in learning by applying their mathematical knowledge about shapes, polygons, and three-dimensional figures to a new situation – recognizing geometry when they see it in the real world.

One effective way to use these pictures would be to use a document camera (ELMO, Ladibug, etc.) to project the images onto an interactive whiteboard. This allows students to use the interactive pens to, for example, circle the polygons they find, and save their work. However, you could also project the images onto a traditional whiteboard, copy them onto overheads, or use them as part of a learning centre.

For each picture and grade, I have included the specific curriculum expectations that the teacher would be covering using the questions I have provided. Unless otherwise noted, all of the curriculum expectations are from the Geometry and Spatial Sense strand of the 2005 Ontario Elementary Mathematics Curriculum.

All photographs taken by and questions devised by Samantha Laforet, Queen's Faculty of Education Teacher Candidate 2012.



## The Skylight

### Grade One

#### *Geometry and Spatial Sense:*

– identify and describe common two-dimensional shapes (e.g., circles, triangles, rectangles, squares) and sort and classify them by their attributes (e.g., colour; size; texture; number of sides), using concrete materials and pictorial representations

- identify and describe shapes within other shapes

#### *Patterning and Algebra*

– identify, describe, and extend, through investigation, geometric repeating patterns involving one attribute

#### **Ask students:**

- What shapes do you see in this picture? (Circles, diamonds/squares) Can we count them?
- How do you know it's a circle/square/pentagon? (Students explain using attributes)
- What shape is the whole window? (Similar to a rectangle)
- What pattern do you see in this window? How can we keep the pattern going?

### Grade Two

#### *Geometry and Spatial Sense*

– identify and describe various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort and classify them by their geometric properties

– compose and describe pictures, designs, and patterns by combining two-dimensional shapes

– create and describe symmetrical designs using a variety of tools

#### **Ask students:**

- Can you find: circles, quadrilaterals, and pentagons in this picture?
- How do you know that they are those shapes? Tell me about their attributes.
- What kind of pattern do you see in this window? In how many directions can we extend this pattern?
- How many lines of symmetry can you find in this window?

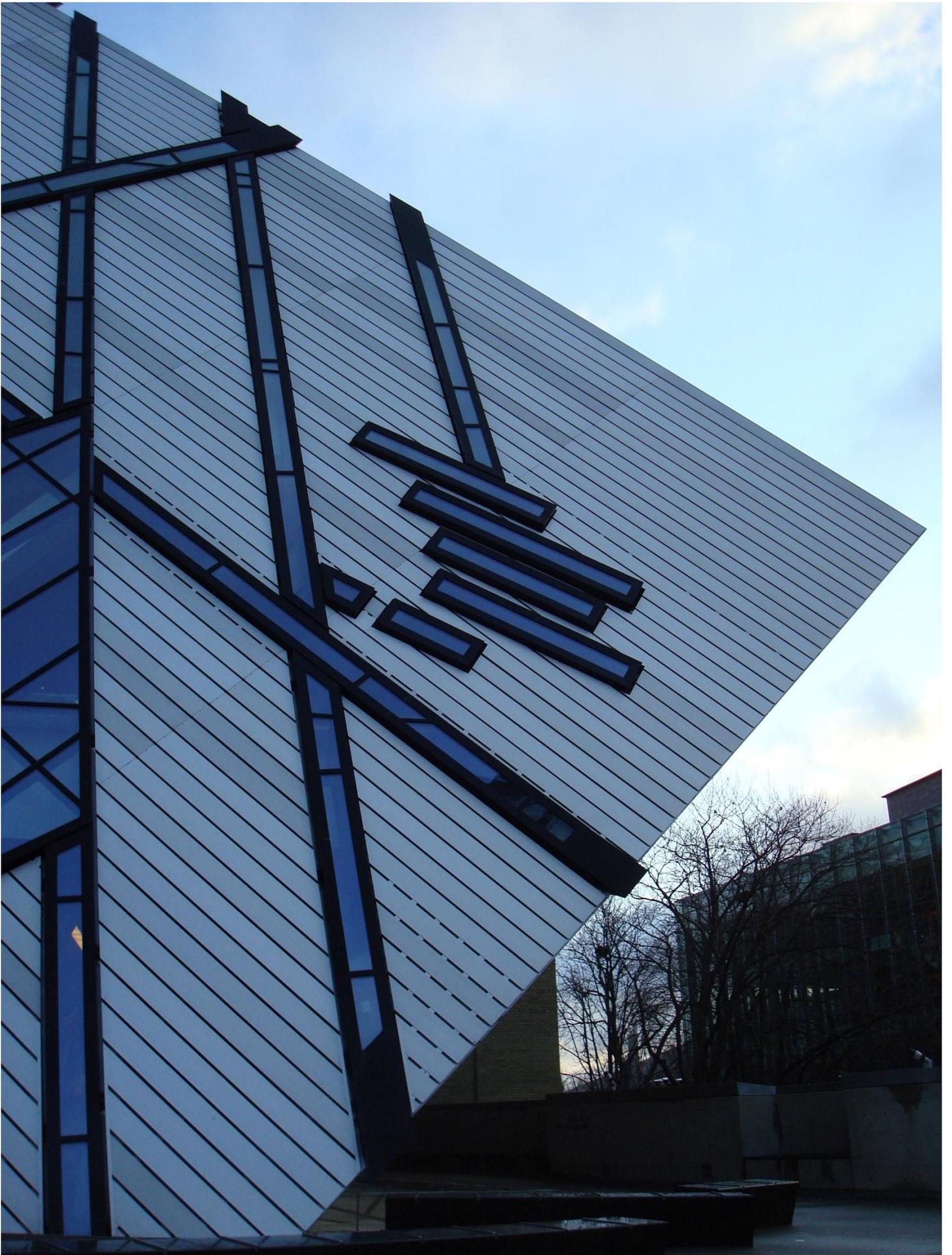
### Grade Three

– identify and compare various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort them by their geometric properties (i.e., number of sides; side lengths; number of interior angles; number of right angles);

– explain the relationships between different types of quadrilaterals

#### **Ask students:**

- Which polygons can you find in this picture?
- How are these polygons different? Explain your answer by telling me about the number of interior angles in each shape. Which shapes in the picture have right angles? How many right angles do they have?
- Is there more than one type of quadrilateral in this picture? Where? How do you know that they are both quadrilaterals? Do you think there is any difference between a diamond and a square?



## The New Building

### Grade One

– identify and describe common two-dimensional shapes (e.g., circles, triangles, rectangles, squares) and sort and classify them by their attributes (e.g., colour; size; texture; number of sides), using concrete materials and pictorial representations

- identify and describe shapes within other shapes

#### Ask Students:

- What shapes do you see in this picture?
- How can you describe them? Tell me about how big they are, the number of sides they have, their colour...
- How many shapes have we found? Let's count them all up.

### Grade Two

– distinguish between the attributes of an object that are geometric properties (e.g., number of sides, number of faces) and the attributes that are not geometric properties (e.g., colour, size, texture), using a variety of tools

– identify and describe various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort and classify them by their geometric properties (i.e., number of sides or number of vertices), using concrete materials and pictorial representations

– compose and describe pictures, designs, and patterns by combining two-dimensional shapes

#### Ask Students:

- What shapes can you find in this picture?
- What are some different ways you can describe the shape you found? Can you tell me one thing about the shape you found that is a geometric property and one that is NOT? (i.e. A rectangle has four vertices. This rectangle is bluish-grey coloured).
- Tell me how all of the shapes you found work together to make up this picture.

### Grade Three

– identify and compare various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort them by their geometric properties (i.e., number of sides; side lengths; number of interior angles; number of right angles);

– identify congruent two-dimensional shapes by manipulating and matching concrete materials

#### Ask Students:

- What kinds of polygons do you see in this picture?
- How can you identify these polygons? Think about using math language to describe them.
- Do you see any polygons that LOOK like rectangles but actually are not? Think about what we know about the interior angles of a quadrilateral.
- Can you find a set of true rectangles that are congruent? How do you know that they are congruent?



## The Table Top

### Grade One

– identify and describe common two-dimensional shapes (e.g., circles, triangles, rectangles, squares) and sort and classify them by their attributes (e.g., colour; size; texture; number of sides), using concrete materials and pictorial representations

#### *Data Management and Probability*

- collect and organize primary data (e.g., data collected by the class) that is categorical and display the data using one-to-one correspondence, prepared templates of concrete graphs and pictographs and a variety of recording methods.

#### **Ask students:**

- Tell me what kinds of shapes you see in the table top. Do you see any circles?
- Do you see squares? Do you see rectangles? How are they different and the same?
- Tell me about the size of the shape you see – is it big or small?
- Let's make a tally. When we find a new shape, we can put a mark under its heading. What shape do you predict we will find the most of?

### Grade Two

– identify and describe various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort and classify them by their geometric properties (i.e., number of sides or number of vertices), using concrete materials and pictorial representations

– locate the line of symmetry in a two-dimensional shape

– compose and describe pictures, designs, and patterns by combining two-dimensional shapes

#### **Ask students:**

- What are the different polygons that you see in this table top?
- How has the artist combined the polygons to make other polygons in his or her design? (I.e., the artist has put four triangles together to make one rectangle).
- Look at part of the design that the artist made. Can you find a line of symmetry anywhere? It doesn't have to be for the whole tabletop.

### Grade Three

– identify and compare various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort them by their geometric properties (i.e., number of sides; side lengths; number of interior angles; number of right angles)

– explain the relationships between different types of quadrilaterals

– complete and describe designs and pictures of images that have a vertical, horizontal, or diagonal line of symmetry

– identify congruent two-dimensional shapes by manipulating and matching concrete materials

#### **Ask students:**

- What are the different polygons you see in this table top? Describe them using information about their interior and right angles.
- Tell me which types of quadrilaterals you see. How are they similar and different?
- Find some examples of lines of symmetry in different parts of the design on this table top. There are at least five. It might help you to only look at certain parts of the design.
- How has the artist used polygons to demonstrate congruent shapes? (I.e. The artist used four triangles to make up a square that is congruent with the square above it).



## The Stained Glass Window

### Grade One

– identify and describe common two-dimensional shapes (e.g., circles, triangles, rectangles, squares) and sort and classify them by their attributes (e.g., colour; size; texture; number of sides), using concrete materials and pictorial representations

– identify and describe shapes within other shapes

#### Ask students:

- How many types of shapes can you find in this picture? Look at the window, what's around the window, and what's in the window.
- What shape is the window? What shapes did the artist use to make up the window?

### Grade Two

– identify and describe various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort and classify them by their geometric properties (i.e., number of sides or number of vertices), using concrete materials and pictorial representations

– create and describe symmetrical designs using a variety of tools

– compose and describe pictures, designs, and patterns by combining two-dimensional shapes

#### Ask students:

- Tell me about the polygons you see in this picture. Remember to tell me about their number of vertices and other attributes.
- Look carefully. Do you see any rhombuses in this picture? What about trapezoids?
- How has the artist used smaller polygons to create the large rhombuses?
- Do you see any examples of symmetry in this picture?

### Grade Three

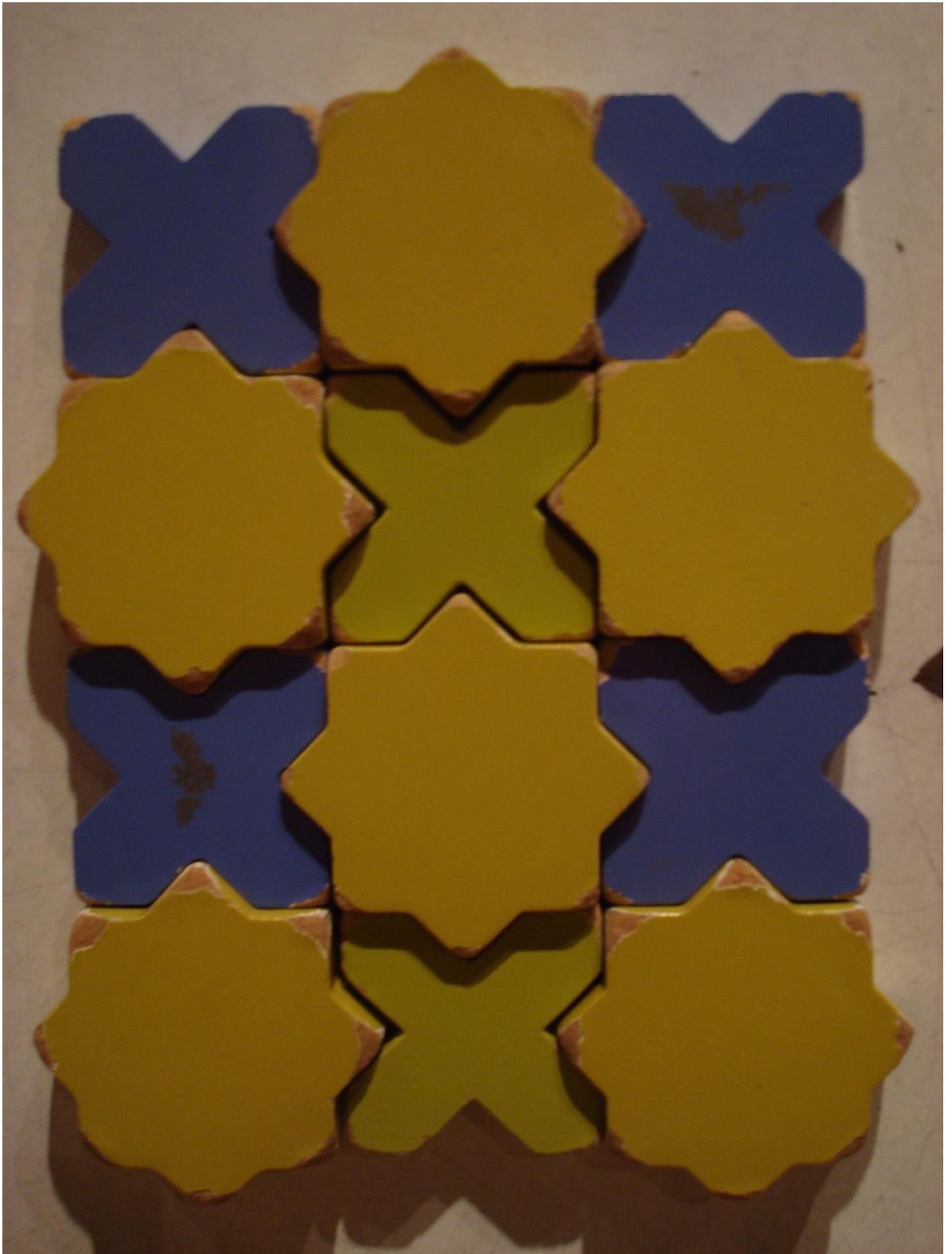
– identify and compare various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort them by their geometric properties (i.e., number of sides; side lengths; number of interior angles; number of right angles);

– identify congruent two-dimensional shapes by manipulating and matching concrete materials

– solve problems requiring the greatest or least number of two-dimensional shapes (e.g., pattern blocks) needed to compose a larger shape in a variety of ways

#### Ask students:

- Tell me about the types of polygons you see used in this picture. Use proper mathematical language – tell me about their angles, vertices, side lengths, etc.
- Do you see any examples of congruent shapes in this picture? How do you know that they are congruent?
- Look closely at the large rhombuses lined up down the centre of the window. How many medium-sized rhombuses would it take to cover them up? Could we find out how many smaller rhombuses it would take to cover the large one? What if we divided each medium rhombus up into four smaller rhombuses, following the same way that the large one was divided?



## The Wooden Tiles

### Grade One

- describe similarities and differences between an everyday object and a three-dimensional figure
- locate shapes in the environment that have symmetry, and describe the symmetry.
- compose patterns, pictures, and designs, using common two-dimensional shapes

#### *Patterning and Algebra:*

- identify a rule for a repeating pattern

#### **Ask students:**

- Do any of these shapes remind you of another shape? Tell me about it.
- Do you see any symmetry in these shapes? Tell me how they are symmetrical.
- What kind of pattern do you see happening here? Is there a rule for the pattern? Let's not worry about colour right now, tell me about a pattern with shapes.
- How could you make a pattern similar to this with our pattern blocks? Let's get them out.

### Grade Two

- distinguish between the attributes of an object that are geometric properties (e.g., number of sides, number of faces) and the attributes that are not geometric properties (e.g., colour, size, texture), using a variety of tools

- locate the line of symmetry in a two-dimensional shape

#### *Patterning and Algebra:*

- create a repeating pattern by combining two attributes

#### **Ask students:**

- What are some of the attributes of the two types of polygons you see here? Let's make a list. Which of the items on our list are geometric properties, and which ones are not?
- Can you find the lines of symmetry for each shape? There are two for each polygon. What about for the whole pattern?
- What kind of pattern do you see here? What are the attributes that are being repeated?

### Grade Three

- identify and compare various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort them by their geometric properties (i.e., number of sides; side lengths; number of interior angles; number of right angles)

#### *Patterning and Algebra:*

- identify, extend, and create a repeating pattern involving two attributes (e.g., size, colour, orientation, number), using a variety of tools

- represent simple geometric patterns using a number sequence, a number line, or a bar graph

#### **Ask students:**

- How many types of polygons do you see in this picture?
- Let's compare their number of sides, number of interior angles, and number of right angles.
- What kind of pattern is this? How would we extend this pattern? What would be the next step we would see?
- Let's draw the next step together and count the total number of polygons involved for each step.
- Show the results of the pattern's extension in a number sequence and/or bar graph.



White Egg  
of the  
American  
Robin  
Turdus migratorius  
House Wren  
Troglodytes aedon  
American  
Robin  
Turdus migratorius  
House Wren  
Troglodytes aedon

### Egg Hunt

Can you find the egg of the American Robin and the egg of the House Wren among the other Ontario bird eggs?

CADRE: IL N'EST PAS LÉGALE DE COLLECTER DES ŒUFS  
— SAUF CEUX DES POULES / CES ŒUFS  
ONT ÉTÉ RELEVÉS IL Y A DE NOMBREUSES ANNÉES.

### La chasse aux œufs

Pouvez-vous repérer l'œuf du merle d'Amérique et celui du troglodyte familier parmi les autres œufs d'oiseaux de l'Ontario ?

ATTENTION - IL EST MAINTENANT ILLÉGALE DE RECUEILLIR  
LES ŒUFS D'OISEAUX — SAUF CEUX DES POULES / CES ŒUFS  
ONT ÉTÉ RELEVÉS IL Y A DE NOMBREUSES ANNÉES.

American Robin  
merle d'Amérique  
*Turdus migratorius*

House Wren  
troglodyte familier  
*Troglodytes aedon*

## The Bird Eggs

### Grade One

– identify and describe common two-dimensional shapes (e.g., circles, triangles, rectangles, squares) and sort and classify them by their attributes (e.g., colour; size; texture; number of sides), using concrete materials and pictorial representations

– describe similarities and differences between an everyday object and a three-dimensional figure

*Data Management:*

– demonstrate an ability to organize objects into categories by sorting and classifying objects using one attribute (e.g., colour, size), and by describing informal sorting experiences

**Ask students:**

- What shape are the eggs in the picture? Are they the same as a circle or a sphere? Why or why not?
- What other things can you think of that might have the same shape as the eggs?
- How could we sort these eggs? Can anyone think of a good sorting rule for the eggs? Look closely at their size and colour.

### Grade Two

– distinguish between the attributes of an object that are geometric properties (e.g., number of sides, number of faces) and the attributes that are not geometric properties (e.g., colour, size, texture), using a variety of tools

– identify and describe various three-dimensional figures (i.e., cubes, prisms, pyramids) and sort and classify them by their geometric properties (i.e., number and shape of faces), using concrete materials

*Data Management:*

– demonstrate an ability to organize objects into categories, by sorting and classifying objects using two attributes simultaneously

– collect and organize primary data that is categorical or discrete and display the data using one-to-one correspondence in concrete graphs, pictographs, line plots, simple bar graphs, and other graphic organizers with appropriate titles and labels and with labels ordered appropriately along horizontal axes, as needed

**Ask students:**

- Tell me about the shape of the eggs you see in the picture. This is a picture of some eggs, but is an egg a two-dimensional or three-dimensional shape? How many faces does it have? How many vertices?
- Describe the eggs you see in the picture. Which descriptions are geometric properties and which are not?
- Let's think of some ways to sort the eggs in the picture. Let's think of a sorting rule that uses two attributes at once, like colour and size, or colour and speckles.
- Now that we've collected our data, let's make it into a bar graph. Which type does the graph say we saw the most and the least of?

### Grade Three

– identify and describe the two-dimensional shapes that can be found in a three-dimensional figure

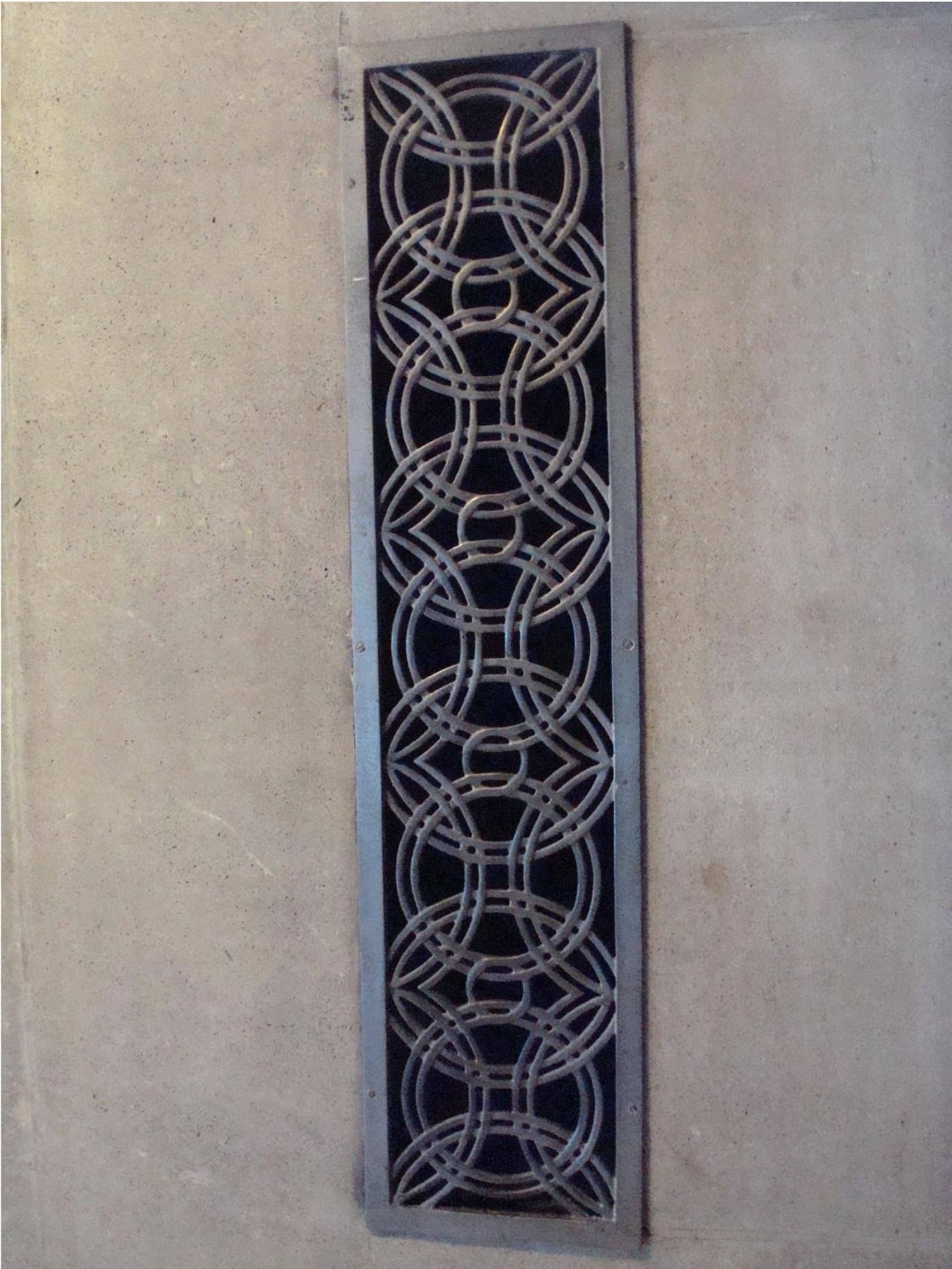
*Data Management:*

– demonstrate an ability to organize objects into categories, by sorting and classifying objects using two or more attributes simultaneously

– collect and organize categorical or discrete primary data and display the data in charts, tables, and graphs (including vertical and horizontal bar graphs), with appropriate titles and labels and with labels ordered appropriately along horizontal axes, as needed, using many-to-one correspondence

**Ask students:**

- This is a picture of a 3-D object. What could we call this type of 3-D figure? Is it the same as a sphere?
- Let's think of some ways to sort the eggs in the picture. Let's try to think of a way to sort the eggs that uses three of their attributes at once.
- Now that we've collected our data, let's show it using a bar graph. What type of correspondence is appropriate for our data? How will we set up our axes?



## The Grate

### Grade One

– identify and describe common two-dimensional shapes (e.g., circles, triangles, rectangles, squares) and sort and classify them by their attributes (e.g., colour; size; texture; number of sides), using concrete materials and pictorial representations

– locate shapes in the environment that have symmetry, and describe the symmetry.

#### Ask students:

- How many circles can you find?
- How many ovals can you find?
- How many half-circles can you find?
- How can you describe the shape you found? Tell me about the number of sides, how big they are, what colour they are...

### Grade Two

– distinguish between the attributes of an object that are geometric properties (e.g., number of sides, number of faces) and the attributes that are not geometric properties (e.g., colour, size, texture), using a variety of tools

#### *Patterning and Algebra:*

– identify repeating, growing, and shrinking patterns found in real-life contexts

#### Ask the students:

- Let's see how many shapes we can find. Can you give me an example of an attribute that is a geometric property, and an attribute that isn't?
- What kind of a pattern do you see here? How do you know?

### Grade Three

– identify and compare various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort them by their geometric properties (i.e., number of sides; side lengths; number of interior angles; number of right angles);

#### *Patterning and Algebra:*

– extend repeating, growing, and shrinking number patterns

– represent simple geometric patterns using a number sequence, a number line, or a bar graph

#### Ask the students:

- What types of shapes make up this pattern?
- What type of pattern is it? How do you know?
- How could we extend this pattern? What would be the next step in it? What would be the total number of each type of shape after we extended it three more times after that? Make a prediction.



## The Amethyst

### Grade One

- trace and identify the two-dimensional faces of three-dimensional figures, using concrete models
- identify and describe common three-dimensional figures (e.g., cubes, cones, cylinders, spheres, rectangular prisms) and sort and classify them by their attributes (e.g., colour; size; texture; number and shape of faces), using concrete materials and pictorial representations
- identify and describe shapes within other shapes

#### Ask students:

- Let's look at the way this mineral has grown. Do you see any shapes in the way it has grown?
- Imagine that we cut off just the part of the mineral shaped like a triangle. Let's make a prediction: what shape would we have left? Do you think it would be a cube?
- Tell me about the colours and sizes of the triangle shapes you see in the picture.

### Grade Two

- identify and describe various three-dimensional figures (i.e., cubes, prisms, pyramids) and sort and classify them by their geometric properties (i.e., number and shape of faces), using concrete materials
- distinguish between the attributes of an object that are geometric properties (e.g., number of sides, number of faces) and the attributes that are not geometric properties (e.g., colour, size, texture), using a variety of tools

#### Ask students:

- This mineral grows in a very unique way. Look closely at the way it's formed and tell me if you see any three-dimensional figures in the mineral.
- How do you know which figure you've seen?
- Let's make an estimation: how many faces do you think each part of the amethyst has? Can you explain why you think so?

### Grade Three

- compare and sort prisms and pyramids by geometric properties (i.e., number and shape of faces, number of edges, number of vertices), using concrete materials;
- identify and describe the two-dimensional shapes that can be found in a three-dimensional figure

#### Ask students:

- Take a look at the amethyst formation here. Does it form as a pyramid or as a prism? How do you know?
- Let's make an estimation: how many sides do you think each formation has? Why do you think so?
- Imagine that we cut off the part of the mineral that forms the pyramid. What shape would its base be? You might want to draw a picture.
- If we cut this amethyst into a pyramid, how many edges would it have?



## The Temple

### Grade One

– identify and describe common three-dimensional figures (e.g., cubes, cones, cylinders, spheres, rectangular prisms) and sort and classify them by their attributes (e.g., colour; size; texture; number and shape of faces), using concrete materials and pictorial representations

– describe similarities and differences between an everyday object and a three-dimensional figure

– identify and describe common two-dimensional shapes (e.g., circles, triangles, rectangles, squares) and sort and classify them by their attributes (e.g., colour; size; texture; number of sides), using concrete materials and pictorial representations

#### Ask students:

- What kinds of three-dimensional figures do you see in the picture?
- What kinds of two-dimensional shapes do you see in the picture?
- What kinds of describing words can you use to tell me about what you see?

### Grade Two

– distinguish between the attributes of an object that are geometric properties (e.g., number of sides, number of faces) and the attributes that are not geometric properties (e.g., colour, size, texture), using a variety of tools

– identify and describe various three-dimensional figures (i.e., cubes, prisms, pyramids) and sort and classify them by their geometric properties (i.e., number and shape of faces), using concrete materials

#### Ask students:

- What can you tell me about the three-dimensional figures you see in this picture?
- Can you tell me something about the three-dimensional figure that is a geometric property? Can you tell me something that is not?
- What about the two-dimensional shapes? Which ones can you see? Look closely, this is a detailed picture.

### Grade Three

– identify and compare various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort them by their geometric properties (i.e., number of sides; side lengths; number of interior angles; number of right angles);

– compare and sort prisms and pyramids by geometric properties (i.e., number and shape of faces, number of edges, number of vertices), using concrete materials;

– identify and describe the two-dimensional shapes that can be found in a three-dimensional figure

#### Ask students:

- What types of polygons can you spot in this picture? What can you tell me about their side lengths, number of sides, number of interior angles, etc...?
- What types of three-dimensional solids can you see in this picture? What can you tell me about their faces, edges, vertices, etc...?



1

2

3

4

5

11

12

13

14

15

16

17

18

## The Jewels

### Grade One

– identify and describe common two-dimensional shapes (e.g., circles, triangles, rectangles, squares) and sort and classify them by their attributes (e.g., colour; size; texture; number of sides), using concrete materials and pictorial representations

#### Ask students:

- Can you spot the triangles? There are three of them. What colours are they?
- Can you spot the squares? How many squares are there? Make sure they are squares and not rectangles! What colours are the squares you see?
- What about the ovals? What colours are they?
- Which jewel is the biggest? Which one is the smallest? The second biggest? The second smallest?
- Do you see any cubes in this picture?

### Grade Two

– distinguish between the attributes of an object that are geometric properties (e.g., number of sides, number of faces) and the attributes that are not geometric properties (e.g., colour, size, texture), using a variety of tools

– identify and describe various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort and classify them by their geometric properties (i.e., number of sides or number of vertices), using concrete materials and pictorial representations

– identify and describe various three-dimensional figures (i.e., cubes, prisms, pyramids) and sort and classify them by their geometric properties (i.e., number and shape of faces), using concrete materials

#### Ask students:

- What kinds of polygons do you see in this picture? Can you spot the hexagon and octagon? How do you know what types of polygons you're seeing?
- How can we describe these polygons we see? Can you give me examples of geometric properties that describe them? What about some descriptions that have nothing to do with their geometric properties?
- What about some three-dimensional figures? What properties can you tell me about the figures that you see?
- How many rectangular prisms are there? How many cubes?

### Grade Three

– identify and compare various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort them by their geometric properties (i.e., number of sides; side lengths; number of interior angles; number of right angles)

– identify and describe the two-dimensional shapes that can be found in a three-dimensional figure

#### Ask students:

- Let's list all of the polygons we can find in this picture.
- Let's make a chart of all the information that we know about the geometric properties of these polygons.

Polygon	Number of Sides	Number of Internal Angles	Number of Right Angles