Lesson 3

Grids and ratio

Concepts

Enlarging and reducing
Grids and location
Grids and proportion

Expectations

Students are:

- **Expected to divide a rectangle into equal parts using its diagonal lines and their intersections.**
- **Expected to use a grid to enlarge, reduce or distort a drawing.**
- **Expected to develop an asymmetrical arrangement from a symmetrical one, using similar grids for each.**

The following Ministry Grade 6 expectations are addressed:

6a30 - describe how line can be used to direct the viewer's attention;

6a35 - describe how the strengths and limitations of both traditional and contemporary art tools, materials, and techniques affect artistic choices;

6a36 - identify the most appropriate tools, materials, and techniques for the size and scope of the work and use them correctly;

6a37 - solve artistic problems in their work, using the design elements and at least one of the design principles for this grade;

6a38 - produce two and three-dimensional works of art;

6a39 - describe, in their plan for a work of art, how they will research their subject matter;

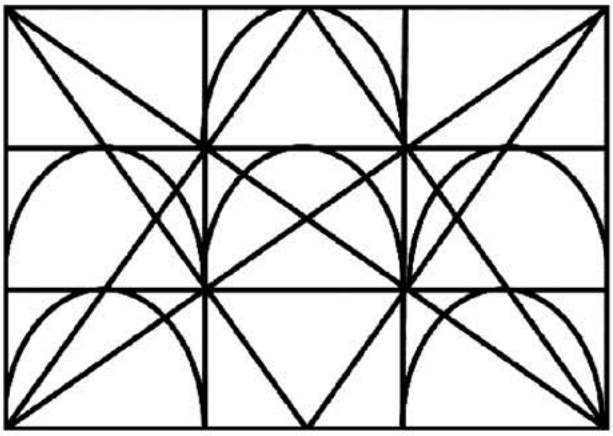
6a42 - demonstrate awareness that an artist intentionally used some of the design elements and principles to convey meaning, and explain how the artist accomplishes his/her intentions.

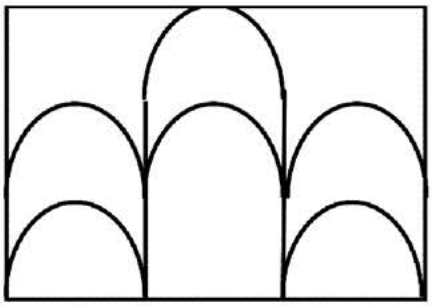
Teacher's notes

As you have learned from earlier lessons, the field is an important part of your composition and will affect the unity of your pictures. The field's negative spaces interact with the subject to create a unified whole. In this lesson, we will see how the field can also be divided into sections where you might place different parts of the subject. For certain kinds of compositions, such as a patterns, the sections might be evenly sized. When you divide the field this way, you are creating a grid. Grids are useful for subjects that are symmetrical, but they can also be used to organize informal arrangements.

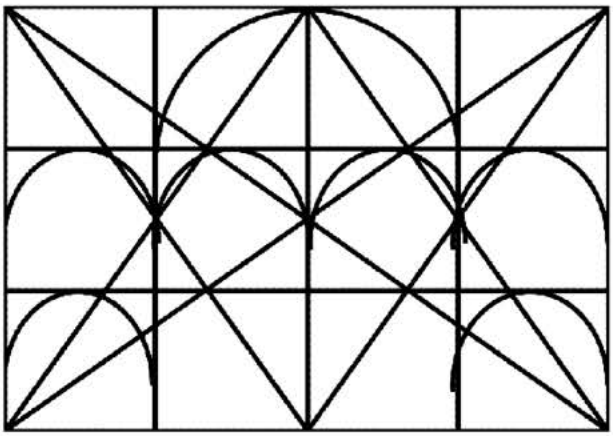
Grids

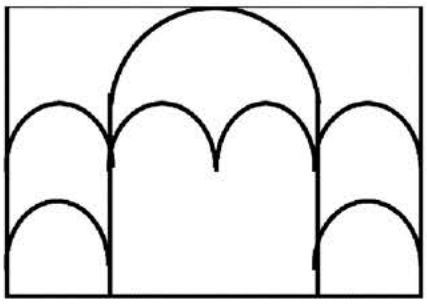
There are different ways to construct grids. The first we will discuss is based on divisions of the field's dimensions. With this type of grid, you divide its length and width with factors like 3:4, 3:5, 4:5, etc. For



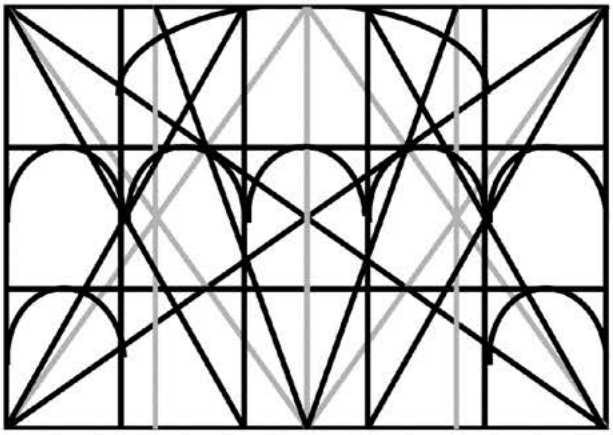


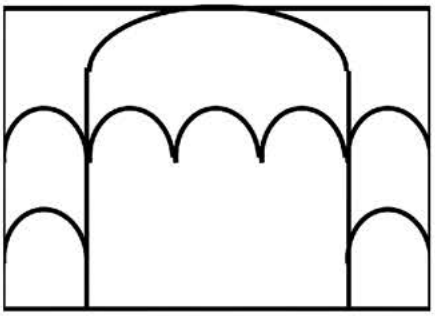
The rectangles to the left have both been divided using a factor of 3:3 - three sections across and down. The smaller version shows the effect of this grid on a series of arches.





These rectangles have been divided using a factor of 4:3 - four sections across and three down. The divisions can be created using geometry, shown on page 33.





The factors applied to these rectangles are 5:3. This structure controls the design but also allows for many kinds of variations. Please see pages 32 and 33 for other examples.

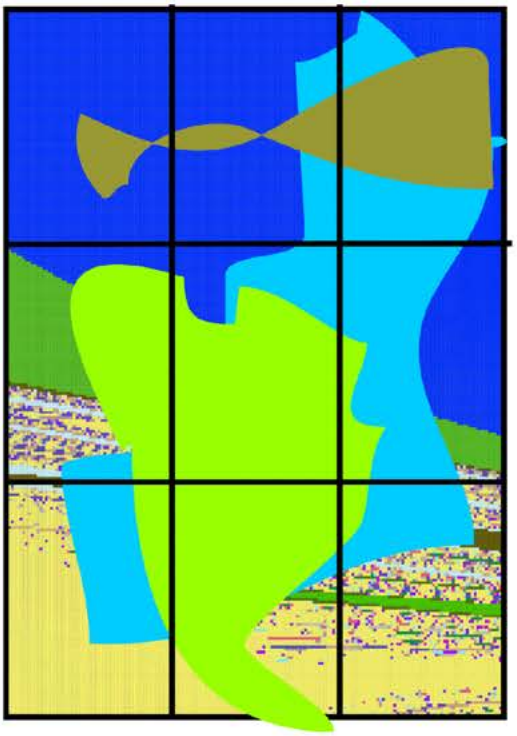
example, a field could be divided into three along the side and four across the top. Grids such as these may be used to explore the symmetry of architecture, for example cathedrals, mosques or antique structures. They can also be used to structure landscape subjects or abstract patterns.

Grids and location

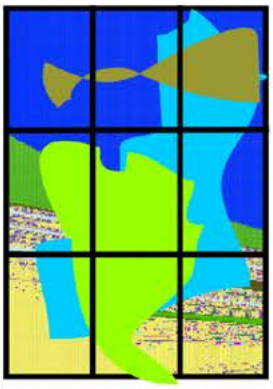
Grids also have a much more practical function. They can be used to copy, enlarge or reduce a picture. In these cases, the grid is a framework that is placed over a picture. You can then locate different parts of the subject much like the way you would use grids on maps. When you wish to copy something, place a grid of squares over the image. Then make a similar grid on your paper and replicate the parts of the picture found in each square. This is made a little easier by numbering the squares across the top and sides of each grid so that you do not lose your place.

Enlarging and reducing

If you want to enlarge or reduce an image, make your grid larger or smaller than the the original, and copy the contents of each square from one to the other. You must make sure that the proportions of both grids are the same, otherwise your new drawing will be distorted. For example, if your original grid is made from 1" squares, and you want to reduce the size of the new drawing, your second grid might be made from ½" squares. However, if instead of squares, you construct your new grid with rectangles that are perhaps ½" x ¾", you will stretch the picture in one dimension and create a distorted version.



By copying the lines and shapes found in each grid section, you can replicate an image, or you can enlarge or reduce it in size.



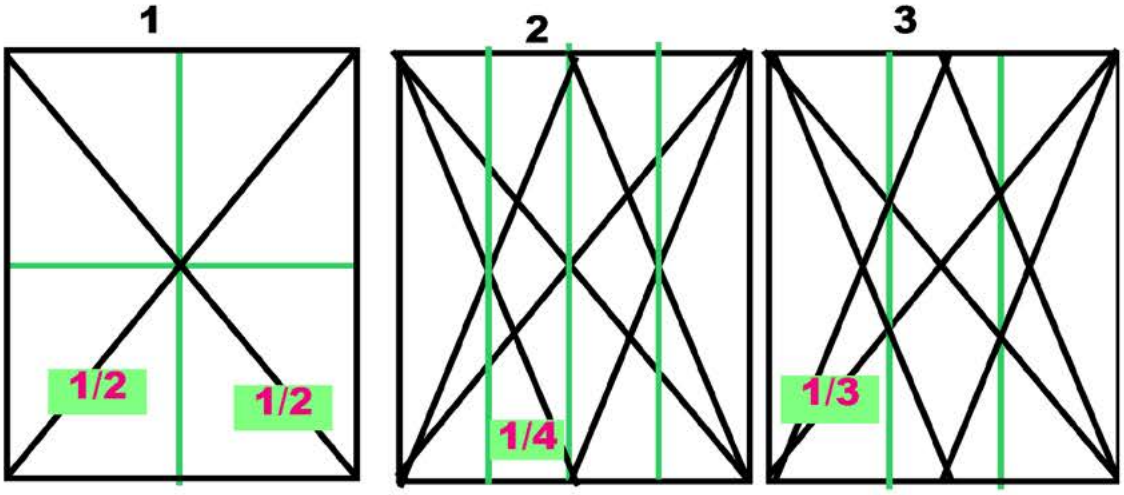
The field can also be divided using geometry instead of measurements. By drawing two diagonal lines from corner to corner, you will get a point at their intersection that is exactly in the middle of the field. You can then draw horizontal and vertical lines from this point out to the edges, which will divide the field in half both ways. You can continue with further divisions by placing two more diagonal lines that span the corners of each of the halves to divide the field in quarters. These lines will intersect with the first set of diagonal lines and divide the field into thirds. (Please see diagrams on page 33.)

This network of lines gives you two ways to work with and explore your field:

through the diagonal lines themselves

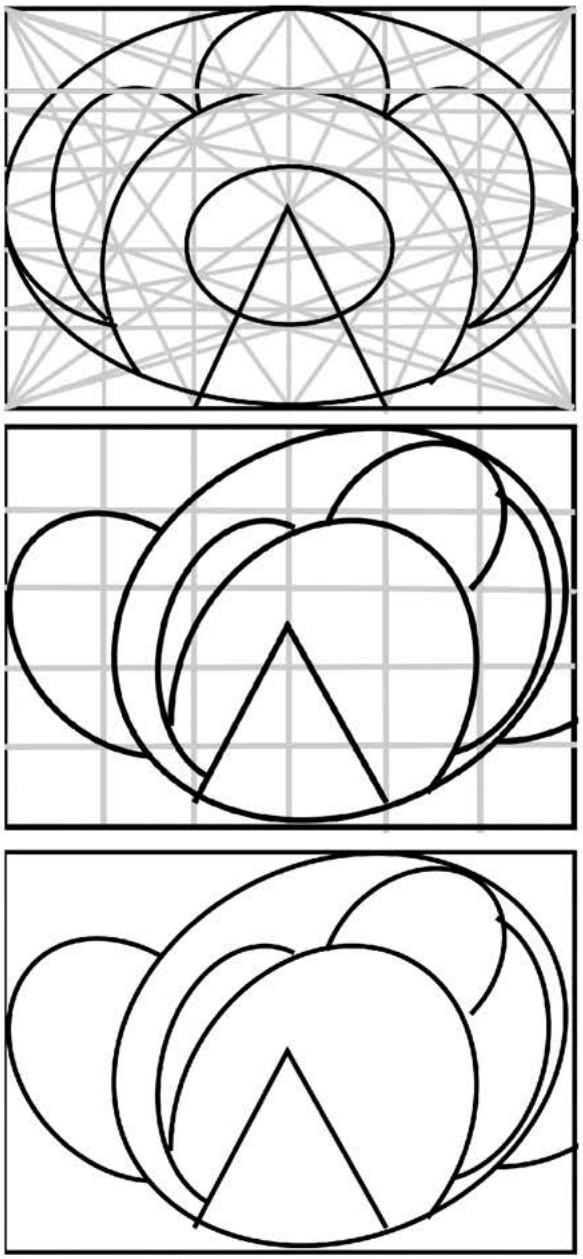
through the intersection points of pairs of diagonal lines

Because the divisions are made without measurement and with geometry



1. The two diagonal lines divide the field in half.
2. The diagonal lines within each half divide the field further into quarters.
3. The intersections of the first set of diagonal lines with the second set gives you a point where you can divide the field into thirds. Division into five and six sections is shown on page 37.

instead, you can use this technique along with a perspective system, if you are drawing a building that has windows and doors placed at regular intervals.



The sketches to the right were constructed on grids that divides the field with factors of 6:5. The first example is a symmetrical design. The two examples below show how the design can be changed to an asymmetrical one based on the grid framework.

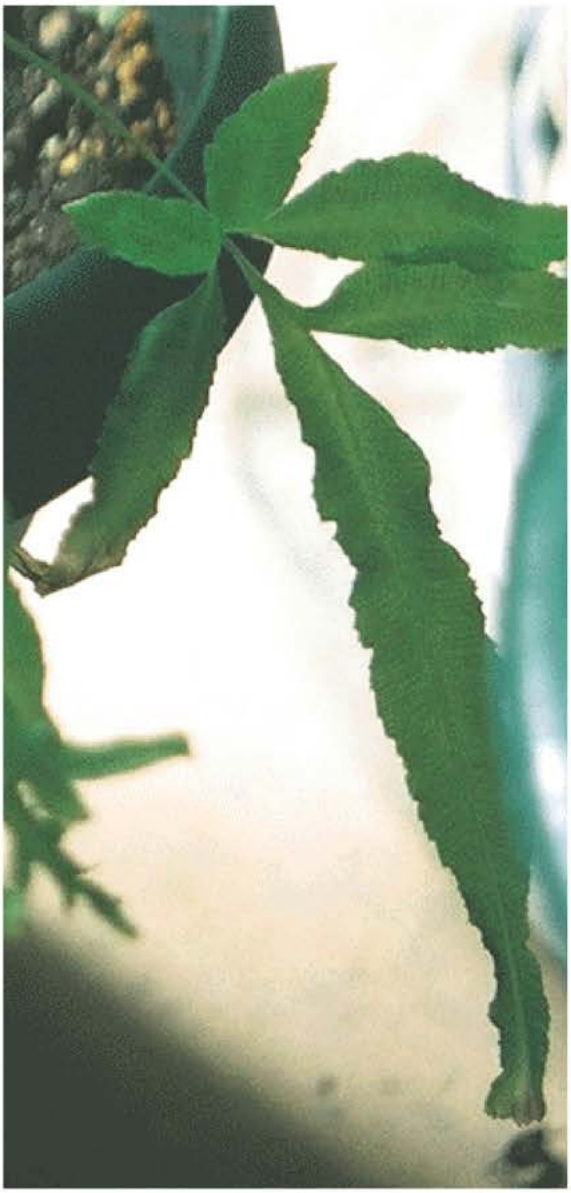
Lesson props and questions

1. How do grids of different proportions help you to enlarge, reduce or distort a drawing?
2. How must the grids be similar when enlarging or reducing a drawing?
3. How is a grid like a map?
4. Think of examples of grids in nature.
5. What would happen to shapes if you imposed an unrelated grid onto their forms?
6. How would you determine if the factors of a grid on a field can be applied to an object or shape?

Pictures of architecture and pattern

7. What are the main parts of these things?
8. What kind of grid could help you in drawing them?
9. How many sections are there across?
10. How many sections are there down?

Lesson props and questions



Exercise 1

divide a rectangle into equal parts using its diagonal lines and their intersections

1. Using geometry, divide a rectangle from left to right as follows:

   into equal halves

   into equal quarters

   into equal thirds

   into six equal parts

   into five equal parts

2. Repeat the above processes, dividing a rectangle from top to bottom.

Time required

total time: ¾ hour

Materials

paper

pencil

ruler

Evaluation criteria

- uses geometric procedures to divide the fields
- partitions a rectangle into each of the required interval arrangements

Exercise 1

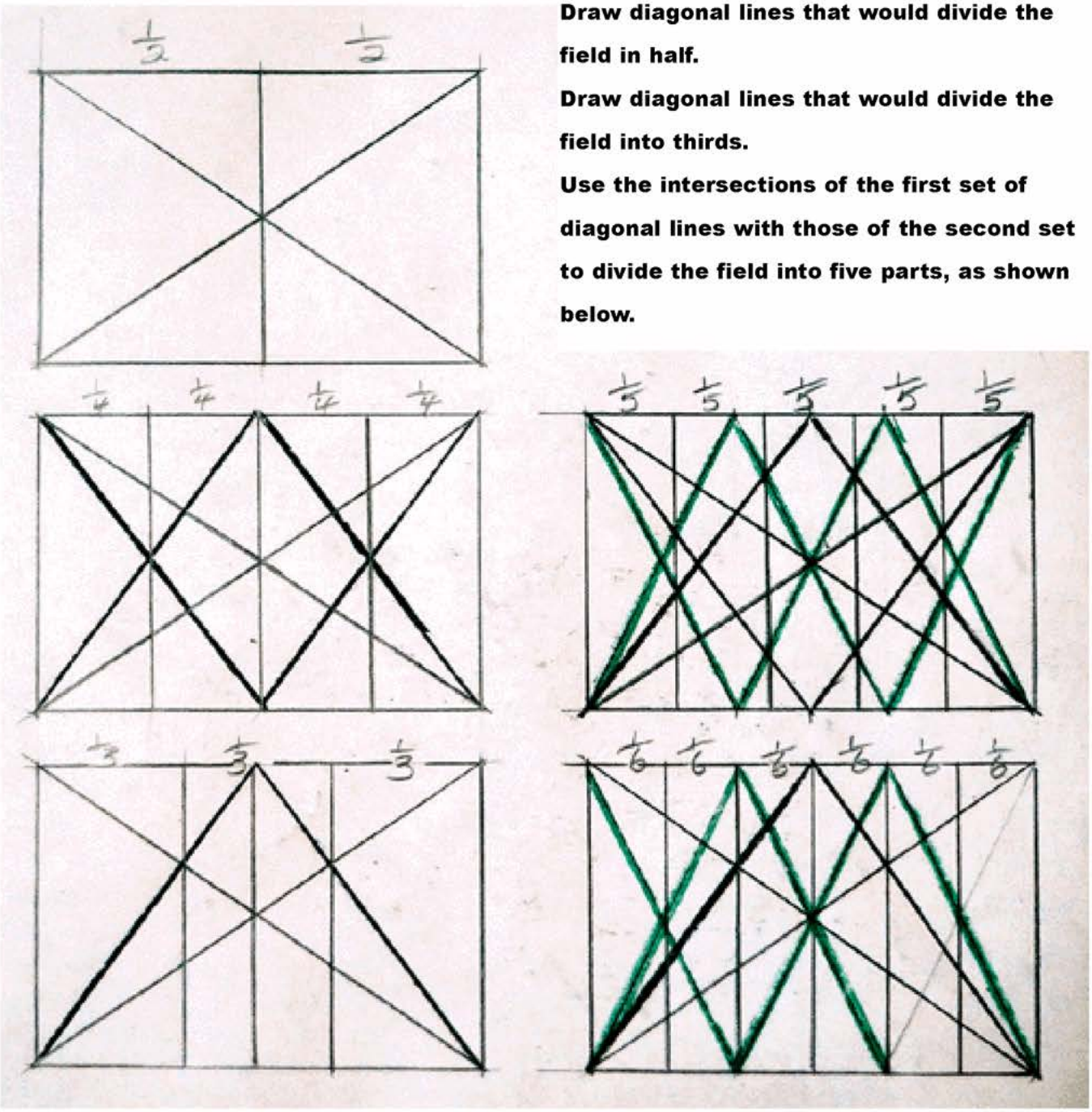
Illustration

To divide the field into five equal parts:

Draw diagonal lines that would divide the field in half.

Draw diagonal lines that would divide the field into thirds.

Use the intersections of the first set of diagonal lines with those of the second set to divide the field into five parts, as shown below.



Exercise 2

apply a grid framework to an example of architecture

1. Find a photograph of a building with prominent architectural features. (e.g. arches, cathedral, bridge, government building, palace)
2. Determine how the building can be divided into equal sections.
3. Choose a grid formula that best suits the subject you have chosen.
4. Construct the rectangle with the grid and draw the main elements of the architecture.
5. Determine if another set of division factors is needed for smaller parts of the building.
5. Colour the architecture so that it stands out from the grid.
6. Go over your grid and construction lines so that they are visible.

Time required

research:	¼ - ½ hour
drawing:	1 hour
total time:	1¼ - 1½ hours

Materials

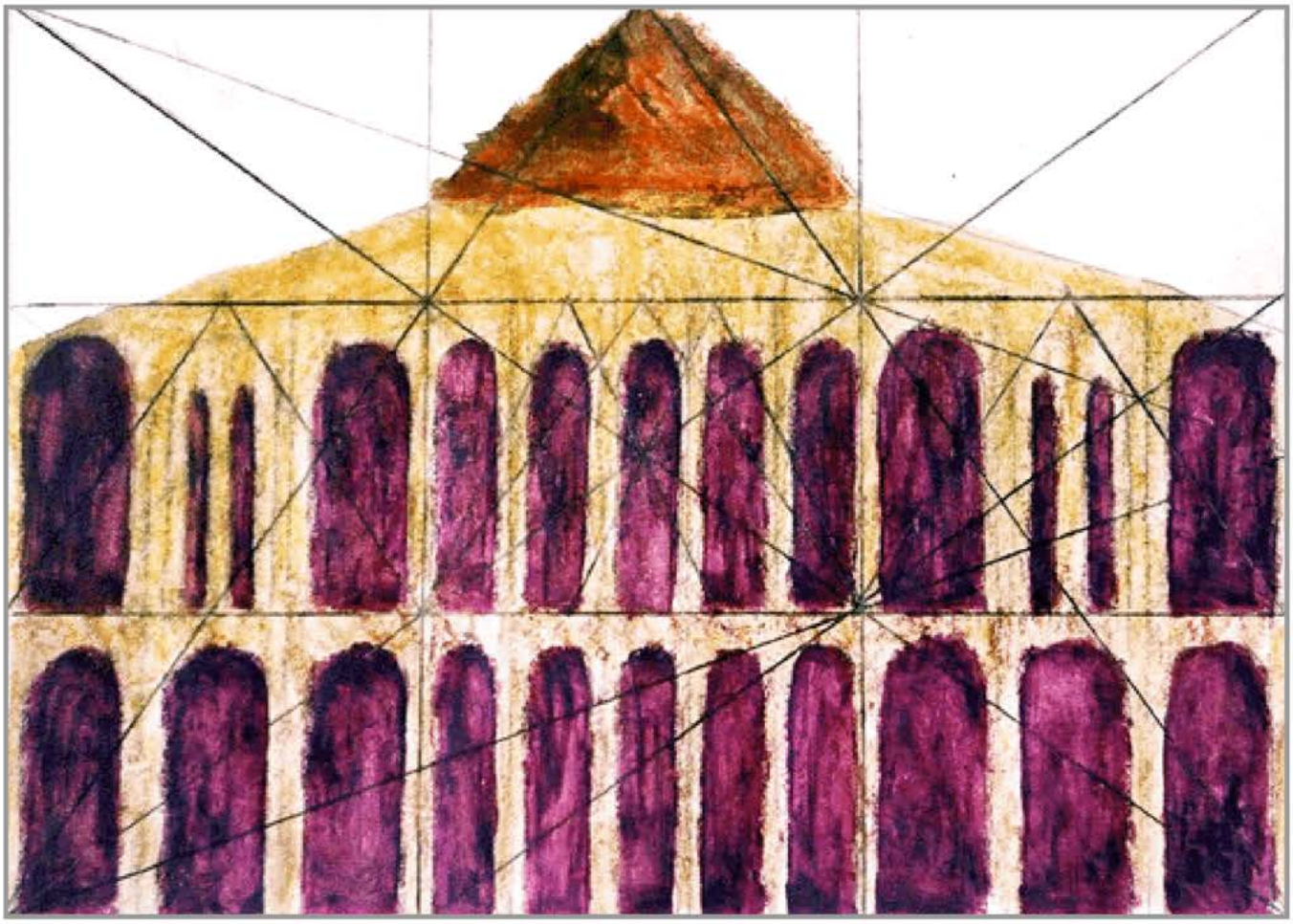
sturdy paper	pencil
ruler	paint or coloured pencils
brushes	rag
water container	

Evaluation criteria

- uses a grid with factors that are easily applied to the architecture
- develops the parts of the architecture within the grid
- correctly states the factor(s) used

Exercise 2

Illustration



Suggested cross-curricular topics

Social Studies/Canada and World Connections-Canada and its trading partners:

- Identify outstanding contributions of Canadians from various backgrounds to the global community through dance, sports, music, literature, art, science and technology.
- Describe the influences of other countries on contemporary Canada.

Exercise 3

develop an asymmetrical arrangement from a symmetrical one, using similar grids for each

1. Choose a pair of factors to divide the dimensions of a rectangular field.
2. Plan a symmetrical, geometric pattern on the grid.
3. Lay tracing paper over the composition.
4. Develop the geometric pattern into an asymmetrical, organic one, using the grid structure for placement.

Time required

drawing:	½ hour each
colour:	¾ - 1 hour
total time:	1¾ - 2 hours

Materials

sturdy paper	pencil
paint or coloured pencils	brushes
rag	water container

Evaluation criteria

- geometric pattern conforms to the grid structure
- pattern is developed from symmetrical and geometric to one that is asymmetrical and organic
- both works rely on the grid structure for placement and shape

Suggested cross-curricular topics

Social Studies/Heritage and Citizenship-Aboriginal peoples and European explorers:

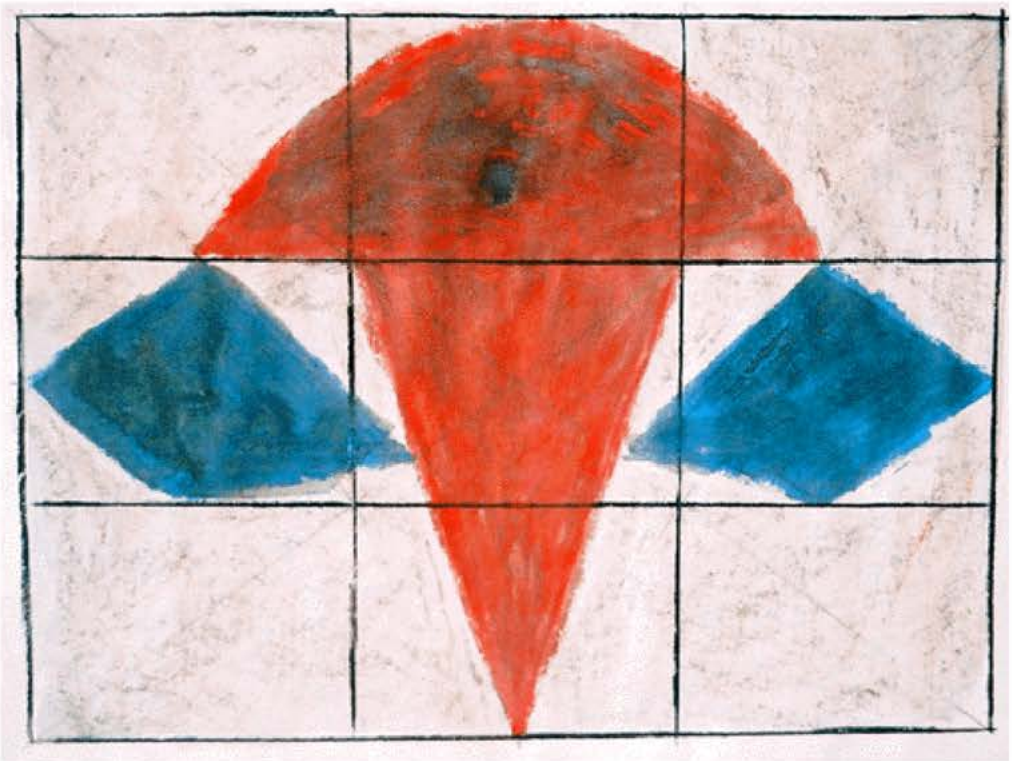
- Construct and read a variety of graphs, charts, diagrams, maps, and models for specific purposes.

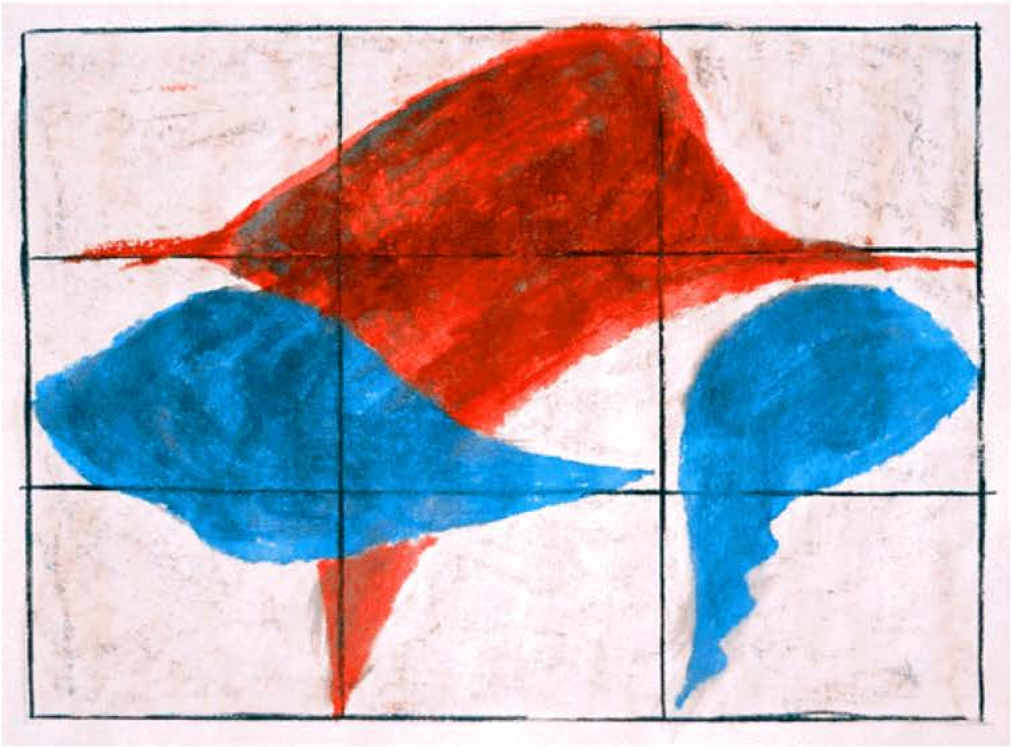
Social Studies/Canada and World Connections-Canada and its trading partners:

- Construct and read a variety of graphs, charts, diagrams, maps, and models for specific purposes.

Exercise 3

Illustration





Links to topics at other Grade Levels

2/3
field
grouping
pattern
rhythm

4/5
perspective
field and space

6
alignment
proportion
scale

7/8
perspective
proportional system
organization hierarchy

Suggested cross-curricular topics

Number Sense and Numeration:
- Demonstrate an understanding of ratio.

Other skills:
- observation
- analysis
- re-construction
- problem-solving