Lesson Summary

Objectives

This lesson will help students to:

- represent and compare fractions;
- relate decimal numbers to fractions;
- compare and order decimal numbers.

Curriculum Expectations

By the end of Grade 4, students will:

- read, represent, compare, and order whole numbers to 10 000, decimal numbers to tenths, and simple fractions, and represent money amounts to $100;
- represent, compare, and order decimal numbers to tenths, using a variety of tools and using standard decimal notation.

By the end of Grade 5, students will:

- read, represent, compare, and order whole numbers to 100 000, decimal numbers to hundredths, proper and improper fractions, and mixed numbers;
- represent, compare, and order whole numbers and decimal numbers from 0.01 to 100 000, using a variety of tools;
- demonstrate and explain equivalent representations of a decimal number, using concrete materials and drawings;
- determine and explain, through investigation using concrete materials, drawings, and calculators, the relationship between fractions (i.e., with denominators of 2, 4, 5, 10, 20, 25, 50, and 100) and their equivalent decimal forms.

By the end of Grade 6, students will:

- read, represent, compare, and order whole numbers to 1 000 000, decimal numbers to thousandths, proper and improper fractions, and mixed numbers;
- represent, compare, and order whole numbers and decimal numbers from 0.001 to 1 000 000, using a variety of tools;
- determine and explain, through investigation using concrete materials, drawings, and calculators, the relationships among fractions (i.e., with denominators of 2, 4, 5, 10, 20, 25, 50, and 100), decimal numbers, and percents.

Ontario   TFO

Materials

- large 10x10 grid
- large sample quilt patterns
- quilt pattern 10x10 templates (8.5 x 11 page cut in half)
- markers, pencil crayons, or crayons
- chart paper
- Quilt Design – Summary Page (optional – 1 per student)

Approach

Getting Started

Refer to the 10x10 grid and sample quilt patterns as you explain the following scenario:

Your aunt is making a quilt for the first time and is using a 10x10 grid as her pattern. Each of the 100 squares will be a solid colour. She wants to use equal numbers of each colour. Her favourite colour is green, so you know that there will definitely be some green in the quilt.

Show some samples of quilt patterns (halves, fourths). Showing two versions of fourths (traditional quarters, and non-traditional division into fourths) challenge the class to compare the designs – what's the same, what's different, why are they both fourths when they don't look identical? The task will be for students to work in pairs to devise as many quilt patterns as possible, using different fractions.

Go through one example (fourths) with the class. After designing and colouring the quilt, the students should use fractions and decimals to record in as many ways as possible the part that is green. Simple fractions (unit fractions) as well as hundredths should be used.

Distribute the Quilt Pattern Template grids to the students. Ask them to outline the sections on each grid and colour the sections in solid colours. At the bottom of each quilt template, they should record in fraction form and in decimal representation, in as many ways as possible, the portion that is green. Each quilt pattern the pair devises should have a different fractional amount.

Clarify that:

- a quilt pattern should divide the 10x10 grid into sections containing the same number of squares
- solid colours should be used for each square
- one section must be green (the aunt's favourite colour)
- the green part of the quilt should be recorded as a simple fraction, as a fraction out of a hundred, and as a decimal number. If there are other ways of recording the green portion (alternative fractions and decimal numbers), these should be included as well.
- each quilt pattern the group produces should have a unique fraction describing the green part of the quilt (two different ways of representing one tenth green, for example, are not needed)

Ontario

Divide the students into pairs or groups of three. Provide each pair or group with copies of the quilt template and with markers or crayons if required. Encourage the students to work together to solve the problem and to record their strategy and solution clearly on their paper.

Place nine posters (Bristol board or chart paper) around the room or along the blackboard. The completed quilts will be placed on the posters.

Working on It

Observe the students as they solve the problem. Ask questions that will help them to think about the problem, the strategies they are using to solve it, and their progress toward a solution:

- What strategy are you using to solve the problem?
- How are you finding different ways to divide the quilt?
- Is every fraction possible?
- Does every fraction have a decimal equivalent?
- Are there other ways to express that amount?
- What information will you need to record so that others can understand how you found your strategy and solution?

Once the students have completed a few quilts, ask them to place their work on the posters around the room. Indicate that each poster should contain quilts that have common characteristics.

Reflecting and Connecting

Reconvene the students after they have solved the problem. Invite a few pairs/groups of students to show their work and to explain their strategies and solutions. Consider having students who used inefficient strategies present first, followed by students who used more efficient strategies. This approach demonstrates to students that although some strategies work better than others, various strategies are possible and valid.

Pose questions that help students think about what they found out:

- What strategy did you use to figure out the amount of quilt that was coloured green?
- How did you record that amount as a fraction? As a decimal?
- Were there other ways of representing the same amount using different fractions or decimal numbers?
- What strategy did you use to find different quilt patterns?

As students present, label each poster with the decimal representation (in hundredths) that describes the quilts on that poster.

Ask the students if there are any quilts that do not belong on a particular poster. Alternatively, assign the posters to different groups to review. The groups should ensure that all the quilts on their poster share common characteristics, specifically the fractional amount coloured green. Then ask the students to reorganize the quilts, if necessary, until each poster contains only those quilts that belong to it.

Have the students order the posters from smallest to largest according to the decimal labels on each poster.

Optional

After the posters have been correctly ordered, have each student record on a Quilt Design – Summary Page an example from each poster, ordered from smallest to largest,. Students should colour only the green sections on each quilt and then label each quilt with the decimal representation that describes the green portion.

Assessment

Observe the students as they solve the problem. Listen to their explanations and assess how well they:

- understand the problem and apply an appropriate strategy
- divide the quilts into appropriate fractional parts
- relate decimals to fractions
- find additional fractional representations (e.g., two-tenths as an alternative to one-fifth)
- order decimal numbers

Extensions

A number of natural extensions to this activity can be made. Consider using, for example:

- geometric patterns
- reflections, and translations

Connections can also be made to other subject areas, such as art and social studies.

Rules Used in the Video

1. Each quilt must have one green section.
2. Use pencil before adding colour.
3. The quilts must have equal sections.
4. Write the fraction number name and the decimal number name below each quilt.
5. Sections of the same colour must be grouped together, each small square cannot be divided.
6. Each quilt must represent a different fraction of green.
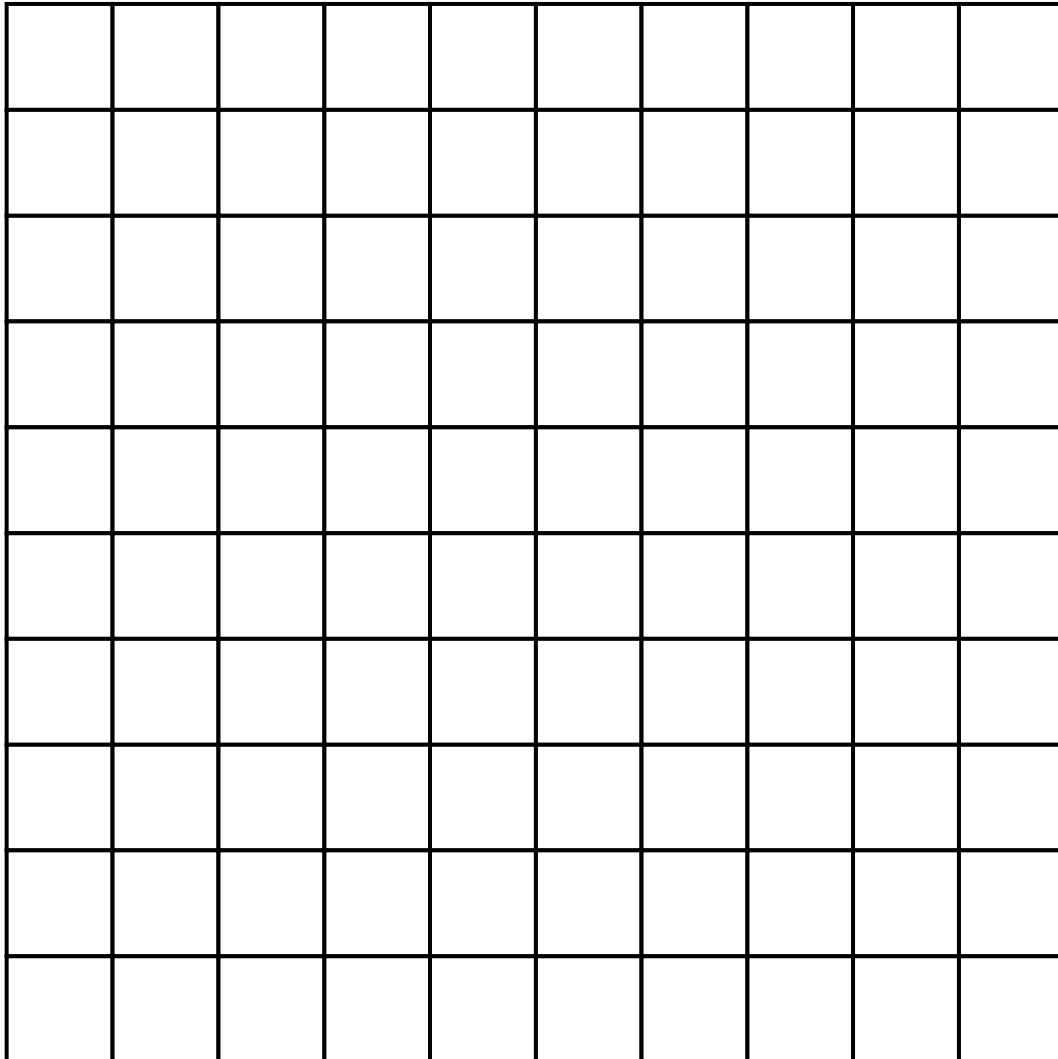
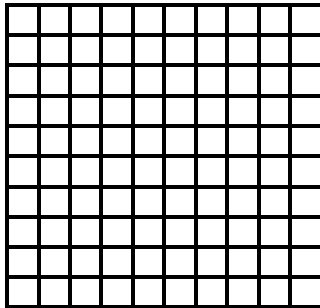# Sample Quilt - Halves

Ontario

Sample Quilt – Fourths 1

Sample Quilt – Fourths 2

7

Template for 10x10 Grid

Ontario TFO
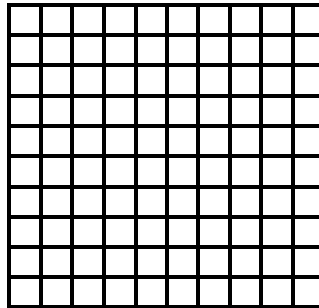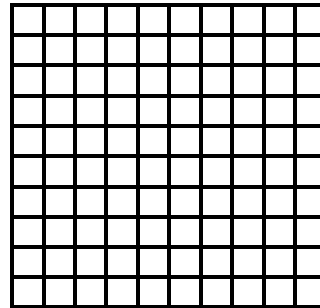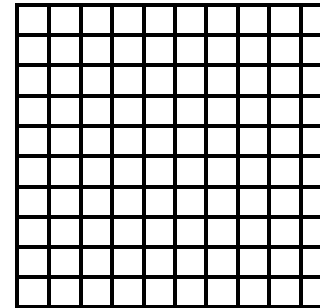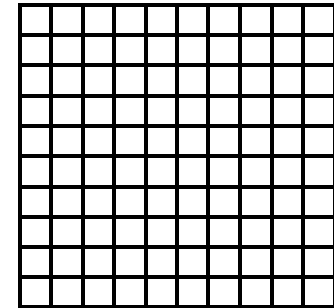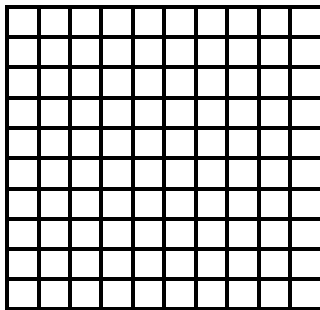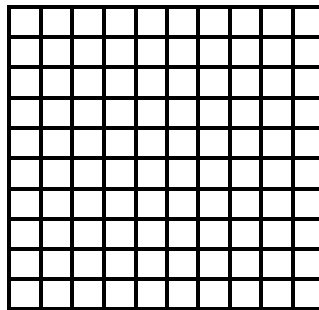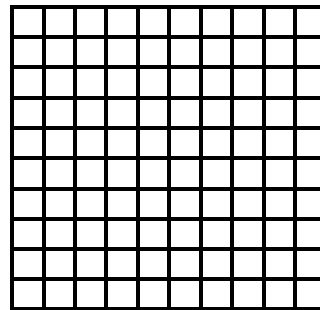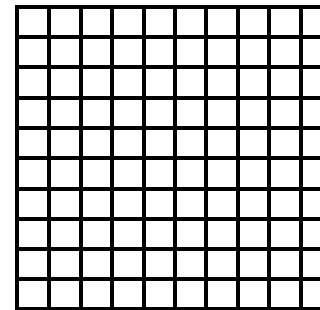
Quilt Design – Summary Page

The part of the quilt that is coloured green is:

The part of the quilt that is coloured green is:

The part of the quilt that is coloured green is:

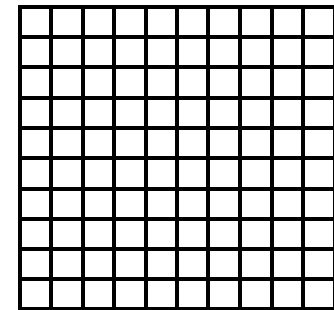The part of the quilt that is coloured green is:

The part of the quilt that is coloured green is:

The part of the quilt that is coloured green is:

The part of the quilt that is coloured green is:

The part of the quilt that is coloured green is:

The part of the quilt that is coloured green is:

The part of the quilt that is coloured green is: