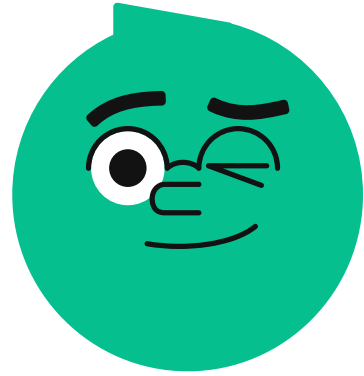


Learning and Evaluation Situation

alloprof
Head to alloprof.ca/en
for more ressources

Mathematics

Grades 3 and 4



MATHurin's Farm



Teacher Booklet



Activity Duration

Three 60-minute periods

Objective

Recognize and manipulate equivalent fractions using their visual representation.
Calculate area using square units.

Materials

For the teacher: one *teacher's booklet*

For the student: one *student booklet* per student, and one or more *cut-out sheets*, a pair of scissors, a glue stick, colouring pencils, and a large Ziploc bag for each student

Additional Resources

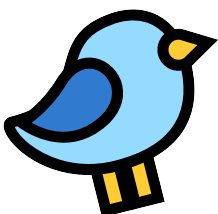
[Fractions | Elementary](#)

[Representing a Fraction | Elementary](#)

[Equivalent Fractions | Elementary](#)

[Comparing and Ordering Fractions | Elementary](#)

[Calculating Area | Elementary](#)



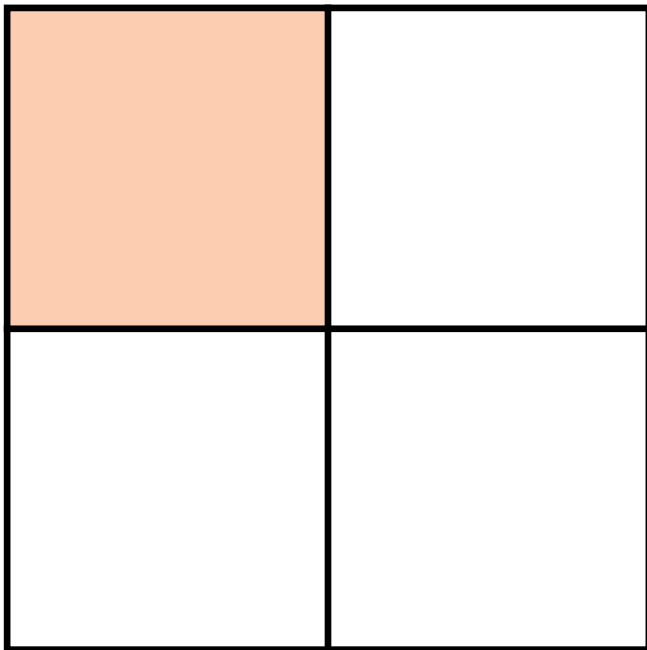
Scenario

Mathurin wants to build a farm so he can raise animals. His farm will have cows, horses, sheep, and pigs. To make sure that each type of animal has a suitable home, he needs to map out where the animal pens will be on his land.

Here are the criteria that Mathurin must meet:

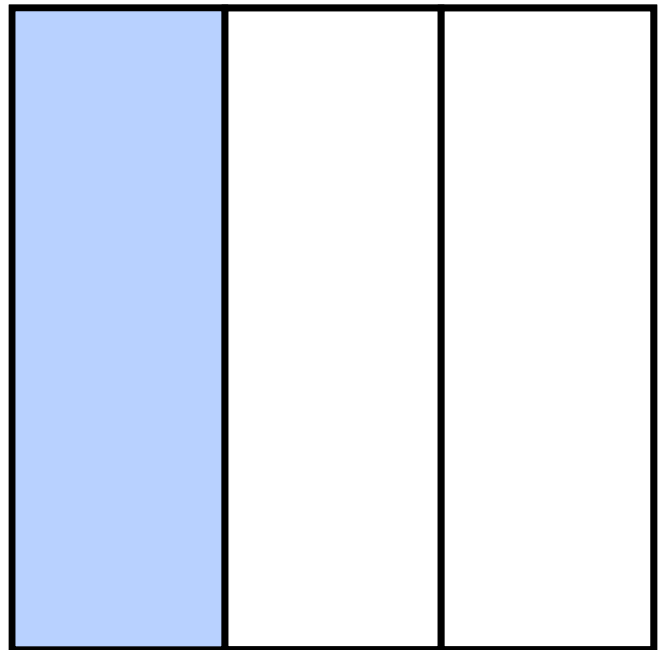
Cows

$$\frac{1}{4}$$



Horses

$$\frac{1}{3}$$



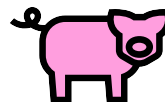
Sheep

The sheep pen takes up $\frac{1}{6}$ of the farm.



Pigs

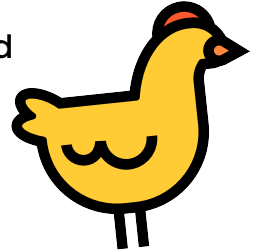
The pig pen is half the size of the cow pen.



Mathurin drew a plan of his farm, dividing it into 144 square units. He wants to use this plan to figure out where to put the animal pens and where to build a road. This road must give him access to all the animal pens from his house, which is not on the farm grounds.

It's a big project; Mathurin needs your help! Here's what you have to do:

- Calculate the number of square units in each pen.
- Choose the location for each animal pen.
- Plan a route that passes by each pen.
- Draw Mathurin's house off the farm grounds. It must be connected to the route that passes by each pen.

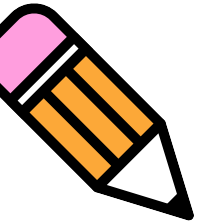
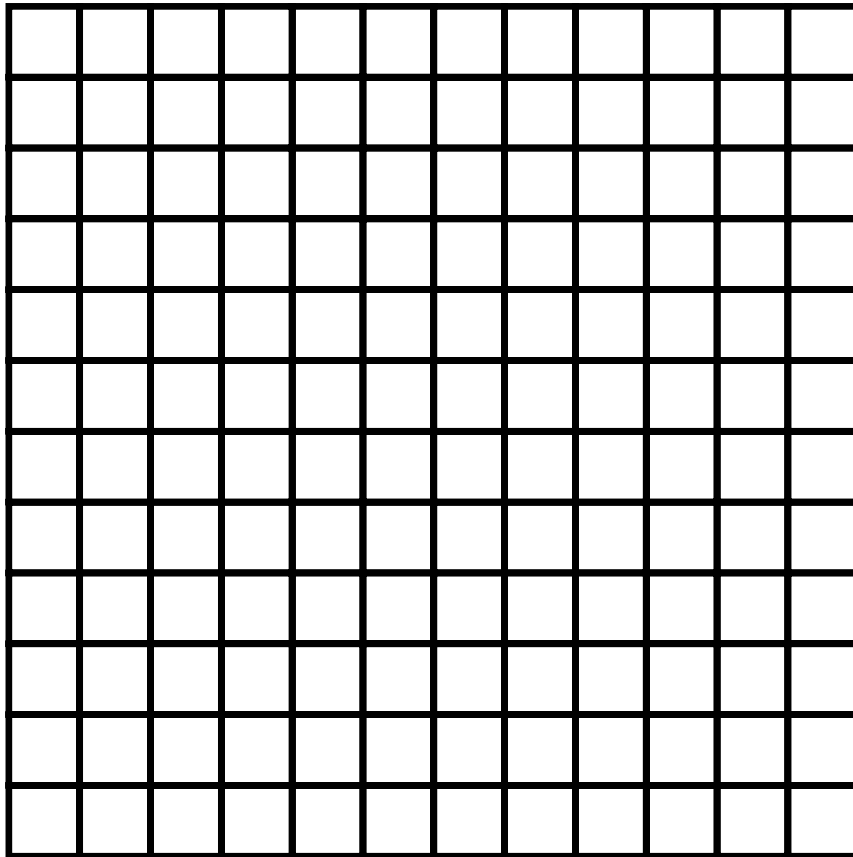


Answer

Write your answers below.

Don't forget to leave traces of your calculations!

Mathurin's farm grounds





What is the area of the cow pen?

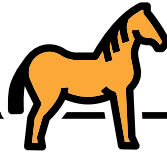


Calculations:

The area of the cow pen is _____ square units.



What is the area of the horse pen?



Calculations:

The area of the horse pen is _____ square units.



What is the area of the sheep pen?

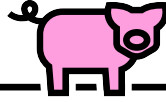


Calculations:

The area of the sheep pen is _____ square units.



What is the area of the pig pen?



Calculations:

The area of the pig pen is _____ square units.



What is the area of the route?



Calculations:

The area of the route is _____ square units.

To Go Further

The teacher can assign these extra tasks to students who are making quick progress on their project.

- Assign a metre value for each side of the square unit. For example, 1 side is equal to 2 m, or 1 square unit is equal to 4 m². Then ask: How many metres of fence does Mathurin need to close in all the animal pens?
- If the fence costs \$9 per unit of length, what will the total cost of the fence be?
- Is it possible to make the route 1 unit wide along the entire route?
- Which fraction represents the pig pen?

Procedure

Period 1

Part A

~40 minutes

The teacher provides each student with a student booklet; they read the word problem individually. Next, the teacher does a second reading as a group, taking the opportunity to clarify vocabulary and answer the students' initial questions. At minimum, the teacher should address the following questions:

- What does the top number in a fraction (numerator) represent?
- What does the bottom number in a fraction (denominator) represent?
- What are the route requirements?
- Where should Mathurin's house be placed?

Then, still in a large group, the teacher models one or more ways of calculating the area of the cow pen ($1/4$). Based on how the discussion unfolds, the teacher...

- explains their reasoning for moving from the visual representation of the problem to the grid
- describes their actions (cutting out the desired portion using the cut-out sheet, labelling the piece, etc.)
- specifies that students should not glue the cut-out onto the grid right away
- describes how to complete the activity, putting all the cut-out pieces back into the Ziploc bag



Part B

~20 minutes

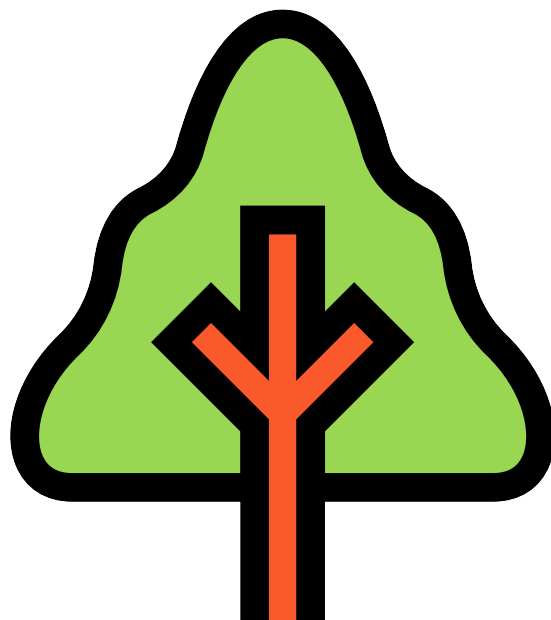
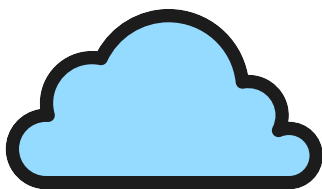
The teacher provides each student with a cut-out sheet, then gives (repeats) the instructions for the task to be carried out for the rest of the period.

The *cut-out sheet* contains six grids identical to the one in the *student booklet*. The teacher should have several extra copies available.

- The figures that are cut out of these grids will be used to form the different animal pens.
- To do this, the student must cut out the portion of the grid that corresponds to the criteria in the *Scenario* section.
- The student can then place the cut-outs on the grid in the *student booklet*.
 - At this stage, the students must not glue the cut-out pieces onto the *student booklet*, because they will probably want to move the pieces around as they work.
 - Encourage students to label each cut-out according to the animal pen it represents. They can simply colour the pieces, or be as creative as they want to be.

Once all the instructions have been given, the individual work period begins. The teacher moves from student to student to spot any recurring difficulties. If necessary, they pause the work period to discuss the difficulty as a group.

At the end of the period, to avoid losing any materials, students insert the pieces they have cut out into the Ziploc bag provided.



Period 2

Part C

~30 minutes

Continuation of individual work



Part D

~30 minutes

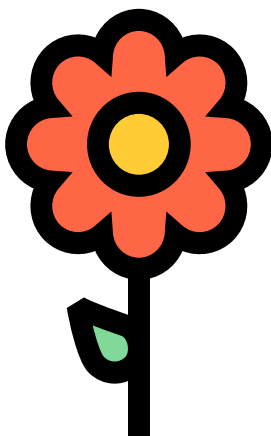
The teacher divides the class into teams of three to compare what each student has achieved so far, then sparks the discussion by suggesting a few questions for each student in the team to answer:

- What are the similarities between your farm and that of your teammates?
- What are the differences between your farm and that of your teammates?
- Can you explain to your teammates how you found the right number of squares for each of the pens?
- Can you explain to your teammates how you decided to place the pens on the farm?
- Etc.

When the discussion is over, students continue working on their farms. They can consult their teammates as needed.

Preliminary Analysis of Results

The teacher gathers all the students' work. They analyze the successes and challenges and make a note of them for the next period.



Period 3

The time allotted for each part of the third period is at the teacher's discretion. If necessary, they can spread the activity over four periods instead of three.

Part E

~20 minutes

The teacher presents the results of their analysis to the class. They start by highlighting and discussing the smart approaches that were used, then do the same with the less successful approaches. The aim of these discussions is to show students methods other than the ones they used and other than those they learned about during *Part D*.

Part F

~20 minutes

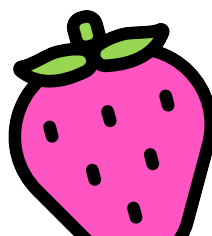
Students return to individual work and finish their project. The teacher makes sure that the student booklets are filled out.

Part G

~20 minutes

This last part consists of a self-assessment. First, the teacher starts a group discussion on the following questions:

- Did you have any difficulties during the activity? What did you find difficult?
- How did your teammates' work influence your own?
- What did you and your teammates disagree on?
- What did you learn by doing this activity?



Answer Key

Here's a table of the fractions provided in the *Scenario* section and their equivalent fraction as a 144th.

Pen	Irreducible fractions	Equivalent fractions
Horses	$\frac{1}{3}$	$\frac{36}{144}$
Cows	$\frac{1}{4}$	$\frac{24}{144}$
Pigs	$\frac{1}{8}$	$\frac{18}{144}$
Sheep	$\frac{1}{6}$	$\frac{32}{144}$
Road	$\frac{1}{8}$	$\frac{18}{144}$

- The number of squares used for an enclosure must correspond to the numerator of the equivalent fraction.
- An animal pen may or may not be rectangular in shape.
- The route must pass by all the pens.

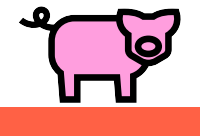
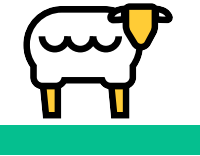
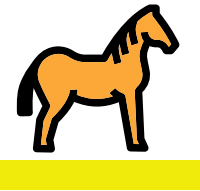
Additional Tasks

- The route entrance to the property does not count as a fence length to be calculated.
- The length of a fence must not be counted twice.

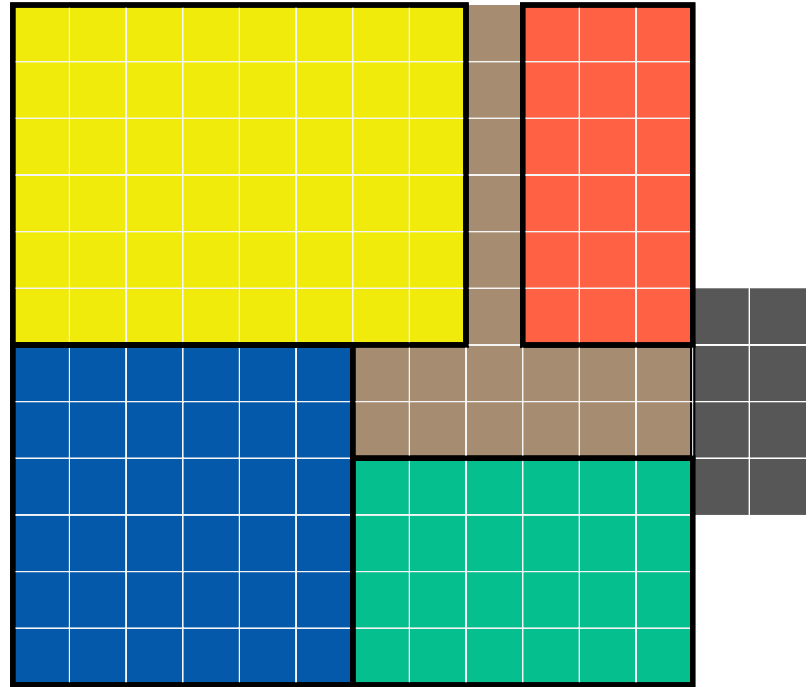


Examples

Legend



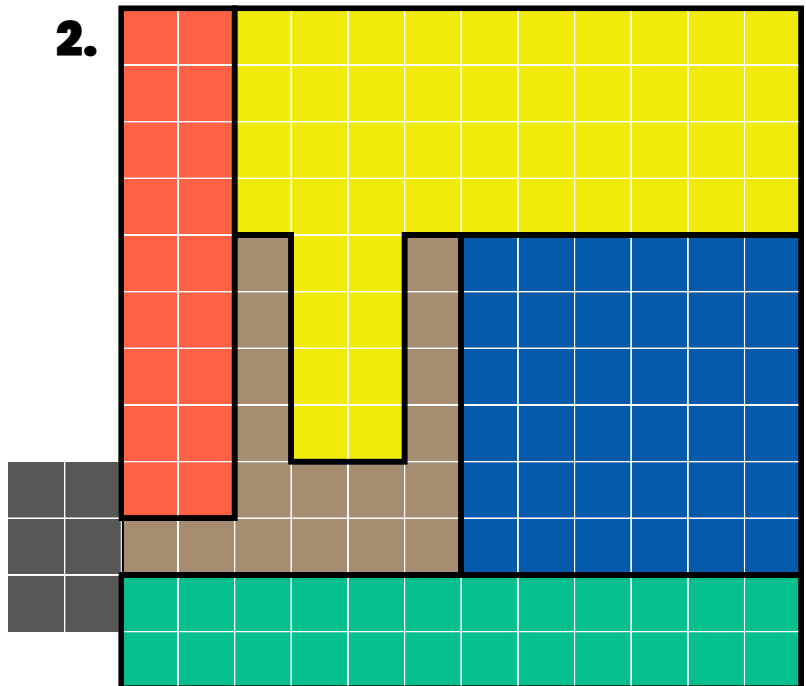
1.



Length of fence: 80 units

Cost for the fence: 80 units $\times$ \$9/unit = \$ 720

2.



Length of fence: 94 units

Cost for the fence: 94 units $\times$ \$9/unit = \$846