ANIMAL SHELTERS (LEVEL 3)

Description	Learners will plan and design animal shelters to care for the animals around them. They will use and apply concepts of fractions and operations on fractions to do so.
Leading question	How can we design a space to care for stray animals in our locality?
Subjects covered	Math, Art, English
Total time required	40-60 min a day for 4 days
Resources required	Printouts of Appendix 1, chart paper, colour, paper, pencil/ pen, cardboard
Learning outcomes:	By the end of this project, learners will be able to: Knowledge-Based Outcomes: 1. Identify that in a fraction a/b, a represents equal parts while b represents the whole. 2. Represent fractions pictorially. 3. Identify numerators and denominators in a fraction. 4. Convert mixed fractions to improper fractions. 5. Add and subtract fractions with the same denominator. 6. Multiply fractions with each other and whole numbers. 21st Century Skill Outcomes: 1. Think creatively while designing the different areas in a shelter and making a model. 2. Collaborate effectively while receiving and incorporating feedback on the design of the shelter. 3. Communicate effectively by presenting their shelters based on the required features to be addressed. 4. Think critically while calculating the costs to run the shelter and the food that animals will need.
Previous Learning	Adding and subtracting whole numbers Multiplying whole numbers
Supervision required	Medium

Day 1 -

Today, you will identify stray animals in your surroundings that need to be cared for and start designing your animal shelters.

Time	Activity and Description

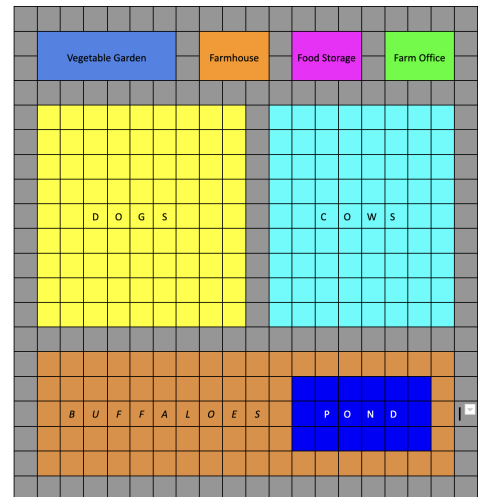| 10 minutes	**Introduction to the Project**
	Let us start this project with a story!
	Note:
	*Get learners to read the story in **Appendix 1**. If learners struggle with reading, read the story out to them.*
	Once done, get them to answer these questions:
	- *Why did Ana want to help the stray animals?*
	- *What did she do to help the stray animals?*
	- *Do you see any stray animals in your surroundings? Which ones?*
	- *What can you do to help them?*
	The **Leading Question** that we will answer in this project is: How can we design a space to care for stray animals in our locality?
	- To answer this question, you will make a model of an animal shelter in which stray animals that we see around us can live! We will also calculate how much food the animals will need, and how much money we will need to run the shelter.
	- Throughout this project, we will use concepts of fractions. Let us first find out what fractions are!

Story box (image content):

Ana noticed that the animals in her neighborhood were unwell and weary. She felt a desire to lend a hand.

Initially, she focused on the cows. Ana gathered surplus food from vendors and fed it to the cows. This simple act brought joy to the cows.
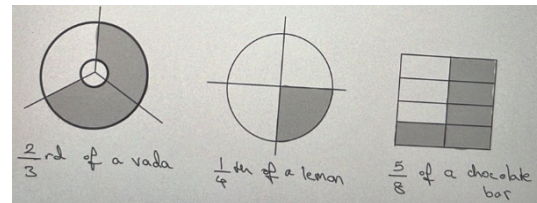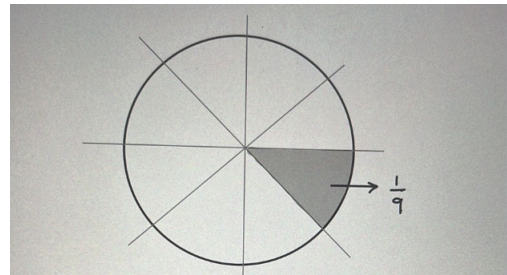
Later, she turned her attention to the stray dogs. She provided them with biscuits and rice, spending time playing with them. The dogs responded happily!
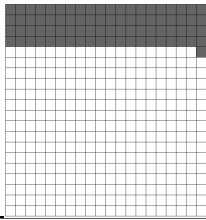
Soon, Ana's efforts inspired others in the community. Together, they built a shelter for these animals.

Ana shared her kind teachings with everyone. As a result, people witnessed that caring actions could bring about positive changes for all.

10 minutes	**Planning Shelters**
	Before we make models of our shelters, let us plan them!
	- Which and how many animals would you like to keep in your shelter?
	- How many adults and young ones?
	- How much space would these animals need?
	- What does each of these animals need to live happily? Based on this, what should you include in your shelter?
	- What are some other areas that you want to include? (an office, a vegetable garden to grow food for the animals etc)
	- How will you travel between different areas in your shelter?
	Now, sketch your shelter on paper.
	*Note: Distribute printouts of the shelter plot (**Appendix 3**) to learners. Alternatively, ask them to neatly draw 20 x 20 grids on paper.*
	Imagine that this entire area is your shelter.

Shelter plot (image): grid labeled with Vegetable Garden, Farmhouse, Food Storage, Farm Office, DOGS, COWS, BUFFALOES, POND.

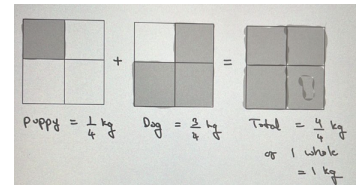|	To make it easier for us to allot parts to different animals, we have divided the plot into 400 smaller squares. You can consider each square as big as a room. - You will first design your shelters on the plot, and then make a model using the design. - Based on the sketch of your shelter, colour squares on the grid to assign areas to the animals and other areas that would be needed in your shelter (like an office, roads etc). **Tip:** *Show them a sample shelter design (**Appendix 4**) to give them some ideas if needed.*

10 minutes	**Introduction to Fractions**
	- How will you find out what part of the entire plot each area takes on your shelter?
	- Parts of a whole are called **fractions**.
	- Let us understand what fractions are. After that, we will find out what fraction of the plot each area is.
	
	Note: *Draw a pizza on the board.*
	- *Ask learners how they will divide the pizza equally among 9 friends.*
	- *As shown in the image, explain to the learner that:*
	   - *The pizza shows a whole. To divide it among 9 friends, we need to cut it into 9 equal pieces.*
	   - *If the whole is considered 1, each of the 9 pieces shows $\frac{1}{9}$.*
	   - *9 parts make the whole pizza and each friend gets 1 out of 9 parts, or $\frac{1}{9}$th of the pizza.*
	   - *A fraction is written as $\frac{part}{whole}$.*
	   - *The number on top, which shows the part is called the **numerator** and the number at the bottom, which shows the whole is called the **denominator**.*
	
	Draw these fractions: $\frac{2}{3}$rd of a doughnut, $\frac{1}{4}$th of a lemon, and $\frac{5}{8}$th of a chocolate bar.
	
	Tip: *To challenge learners, ask them to draw a fraction in which the numerator is greater than the denominator.*

10 minutes	**Fractions of Shelter Plots** Identify and write down the fraction of the area (out of 400) that each structure in the shelter covers.

	For example, based on the shown image, if the sheds for dogs cover 81 squares, the fraction it takes is $\frac{81}{400}$ (Refer to **Appendix 5**). *Tip: If some groups need support, show them some more examples similar to the one shown in the given image.*
At-home activities	Inform an elder in your family or community about your project and ask them for feedback on the facilities that you have included to ensure that animals living in your shelter live happily. Improve your shelter designs based on the feedback.

Day 2

Today, you will use the addition of fractions to calculate the total amount of food that the animals living in the shelter will need every day.

Time	Activity and Description
10 minutes	**Improving Shelter Designs** Today you will calculate how much food animals living in your shelter will need each day. *Note: Draw the following table to show how much food different animals need to eat every day. Add any other animals that learners may have included in their projects, and assume the amounts of food accordingly.* <table><tr><td>*Dogs* *Adult - $\frac{3}{4}$ kg meat* *Puppy - $\frac{1}{4}$ kg meat*</td><td>*Cows* *Adult - $\frac{22}{3}$ kg grass* *Calf - $\frac{11}{3}$ kg grass*</td><td>*Buffalos* *Adult - $\frac{19}{2}$ kg hay* *Calf - $\frac{5}{2}$ kg hay*</td><td>*Any Other Animals* *Adult - $\frac{x}{y}$ kg of food* *Young - $\frac{a}{y}$ kg of food*</td></tr></table> How will you calculate how much food animals living in the shelter will need each day? To do this, you need to multiply the quantity of each type of food by the number of animals and add the total quantities. To be able to do this, you need to learn how to add and multiply fractions. Let us first find out how to add fractions.
10 minutes	**Adding Fractions** If you have 1 dog and 1 puppy in the shelter, the total rice that they will need will be = $\frac{1}{4} + \frac{3}{4}$ kg = $\frac{4}{4}$ = 1 kg. To add two fractions, the denominators need to be the same. If the denominators are the same, we simply add the numerators but leave the common denominator as it is. Denominators should not be added.

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	Note: Ask learners to calculate the total grass the shelter will need if 1 cow and 1 calf lived there ($\frac{33}{3}$ kg). *Tip:* To challenge learners, teach them how to add fractions with different denominators by calculating the LCM of the denominators. Ask them to solve $\frac{1}{4}+\frac{3}{2}$ and $\frac{7}{5}+\frac{2}{7}$. You can change the animal food requirements to have different denominators to challenge the learners.

10 minutes	**Multiplying Fractions**
	If you have 5 adult dogs in your shelter, how will you calculate the total rice needed by them?
	
	We can either add $\frac{3}{4}$ kg 5 times or simply solve 5 x $\frac{3}{4}$
	
	Let us understand how we can multiply fractions.
	
	Note: Explain that
	  - to multiply a fraction with a whole number, we multiply the whole number with the numerator.
	  - To multiply two fractions, we multiply the two numerators and the two denominators as shown in the image.
	
	Calculate the total hay the shelter will need if 3 buffaloes and 4 calves live there ($\frac{19}{2}$ x 3 + $\frac{5}{2}$ x 4 = $\frac{71}{2}$ kg)
	
	Tip: To challenge learners, teach them how to divide fractions. Explain that to divide fractions, we multiply the first fraction by the reciprocal (flipped version) of the second fraction. Ask them to solve $\frac{1}{4}÷\frac{3}{2}$ and $\frac{7}{5}÷\frac{7}{2}$.
	Example for reference: $\frac{1}{4}÷\frac{3}{2}$ = $\frac{1}{4}x\frac{2}{3} = \frac{2}{12}$

10 minutes	**Food Needed Per Day** Now, you will calculate the total amount of each type of food that they will need for the shelter each day. *Note:* Provide them with the shown table to help them organise their calculations.

Food	*Calculation*	*Total*

	Rice	$\frac{3}{4}$ x no. of dogs + $\frac{1}{4}$ x no. of puppies	
	Grass		
	Hay		
	Other		

At-home activities	Talk to a family member or a person in your community who rears animals for milk or meat. Find out how much - food they need per animal per day, - the food costs, and - how many animals they have. Based on this calculate their monthly expense on food for animals.

Day 3 –
Today, you will decide how much it will cost to run your shelters, and start making your models!

Time	Activity and Description
10 minutes	**Activities Needed to Run Shelters** What activities will you need to do every day to run your shelter? You will need to carry out activities such as feeding the animals, taking care of sick animals, cleaning the shelter and maintaining the shelter. You may also need some people to help you out with these activities. **Note:** *Draw the table below showing the time taken for each activity and per hour cost for each activity.* <table><tr><th>Activity</th><th>Time Taken Each Day</th><th>Cost per Hour</th></tr><tr><td>Feeding the animals</td><td>$2\frac{3}{4}$ hours</td><td>$40</td></tr><tr><td>Taking care of sick animals</td><td>$2\frac{1}{4}$ hours</td><td>$60</td></tr><tr><td>Cleaning the shelter</td><td>$3\frac{1}{4}$ hours</td><td>$30</td></tr><tr><td>Maintaining the shelter</td><td>$1\frac{3}{4}$ hours</td><td>$50</td></tr></table>

	Other activities	$1\frac{1}{4}$ *hours*	*$35*

| 10 minutes | **Mixed Fractions to Improper Fractions**
How will you calculate the cost per day?

To do this, you will need to learn how to convert mixed fractions to improper fractions, or fractions written in $a\frac{p}{q}$ form, to $\frac{p}{q}$ form.

Note: *Explain to learners how to convert mixed fractions to improper fractions using the example of time taken each day to feed the animals, as shown. Once done, ask learners to convert the time taken each day for activities shown in the other four rows to improper fractions.*
Answers:
(a) taking care of sick animals = $\frac{9}{4}$
(b) cleaning the shelter = $\frac{13}{4}$
(c) maintaining the shelter = $\frac{7}{4}$
(d) other activities = $\frac{5}{4}$ |

| 10 minutes | **Cost**
Now you will calculate the cost per day to run your shelters!

Note: *Provide learners with the shown table to help them organise their calculations, and explain one example.* |

Activity	*Time Taken Each Day*	*Cost Each Day*
Feeding the animals	$\frac{9}{4}$ *hours*	*$40 x* $\frac{9}{4}$ *= $* $\frac{360}{4}$ *= $90*
Taking care of sick animals		
Cleaning the shelter		
Maintaining the shelter		
Other activities		

| 10 minutes | **Making Shelter Models**
Now, you will design your shelters! You can use materials such as: | |

	- Small coloured paper pieces or real leaves/sticks to make grass and roads. - Matchsticks to make fences and sheds for animals. - Paper to make models of animals - Cardboard to make buildings.
At-home activities	Finish your shelter models.

Day 4 –
Learners finish making their models and present them to the class.

Time	Activity and Description

10 minutes	**Preparation for the Presentation**
	Imagine that you will present your model to the authorities, asking for their help to build a shelter for animals based on your model! What will you include in your presentation to convince the municipality to build the shelter?
	
	Note: Ask learners to include answers to these questions in their presentations:
	   - *Why should the shelter be built? How will it help solve the problem of stray animals?*
	   - *Which and how many animals will be kept in the shelter?*
	   - *What facilities/ features of the shelter will ensure that animals are well taken care of?*
	   - *How much food will be needed each day to feed the animals?*
	   - *How much would it cost each day to run the shelter?*

20 minutes	**Presentation**
	Note: Inform learners to bring their friends and family to class today for the presentation.
	
	Now you will present your projects! As you do that, your audience will
	   - appreciate anything they like in the design of the models;
	   - ask any questions that they may have; and
	   - share any feedback that they may have.

10 minutes	**Reflection**
	Clap for yourselves for making beautiful models!
	Now that we have completed the project, let us think and share:
	   - Do you think it is possible to design a space to care for stray animals in our locality?
	   - Do you think this would solve the issue of stray animals in our community? Why/why not?
	   - What did you learn during this project?
	   - What will you do differently in the next project?

Additional enrichment activities:	Learners can estimate the number of employees they will need to run the shelter and the salaries they will need to pay them based on the hourly costs of different activities.

EAA welcomes feedback on its projects in order to improve. For feedback please use this link
https://forms.gle/pVXs3vQEufuzSShs7

Modifications for simplification	Learners can skip cost calculations and consider the model of the shelter as their final product.

ASSESSMENT CRITERIA

A majority of my learners were able to:
☐ Express areas on the shelter plot as fractions.
☐ Add and multiply fractions to calculate the total amount of food that animals will need per day.
☐ Convert mixed fractions to improper fractions to calculate the cost of running the shelter per day.
☐ Make models of shelters based on created designs.

APPENDIX

Appendix 1: Story: Ana's Animal Friends

Ana noticed that the animals in her neighbourhood were unwell and weary. She felt a desire to lend a hand.

Initially, she focused on the cows. Ana gathered surplus food from vendors and fed it to the cows. This simple act brought joy to the cows.
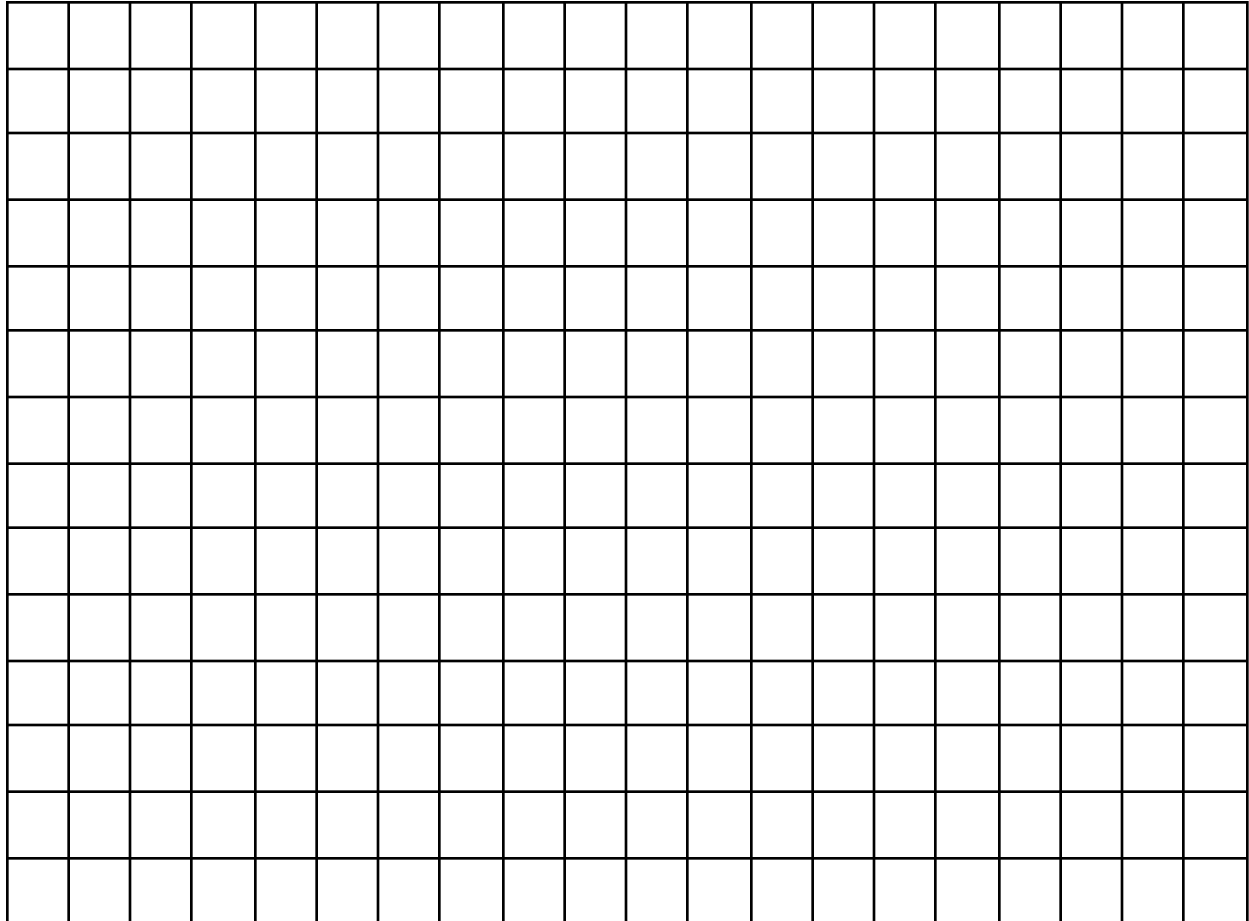

Later, she turned her attention to the stray dogs. She provided them with biscuits and rice, spending time playing with them. The dogs responded happily!

Soon, Ana's efforts inspired others in the community. Together, they built a shelter for these animals.
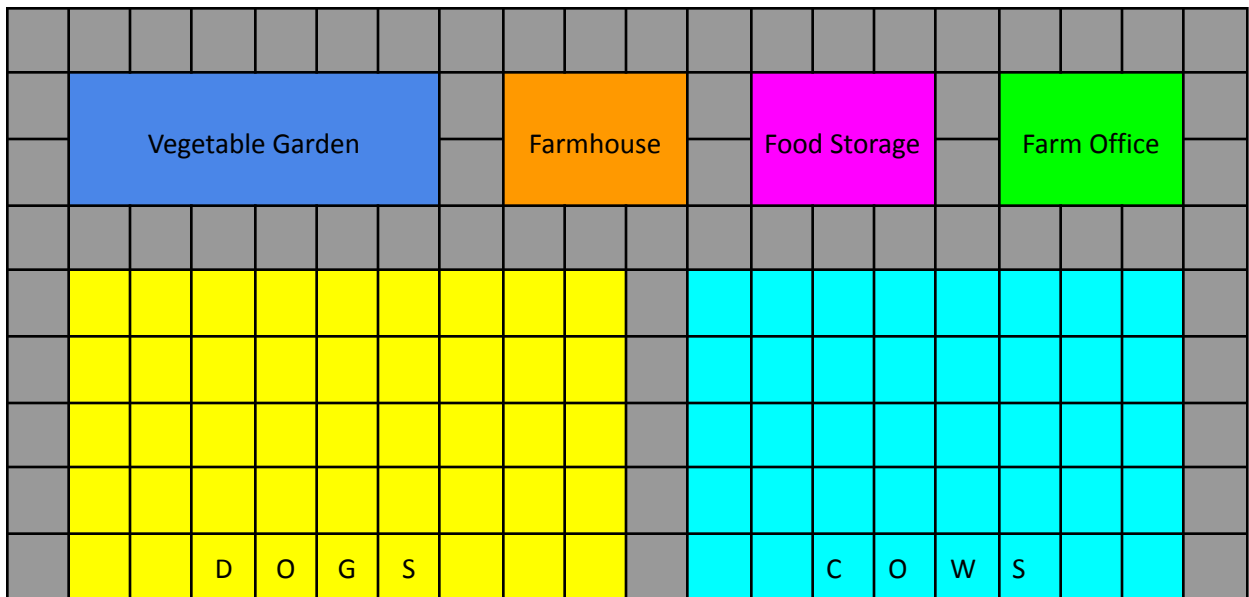
Ana shared her kind teachings with everyone. As a result, people witnessed that caring actions could bring about positive changes for all.
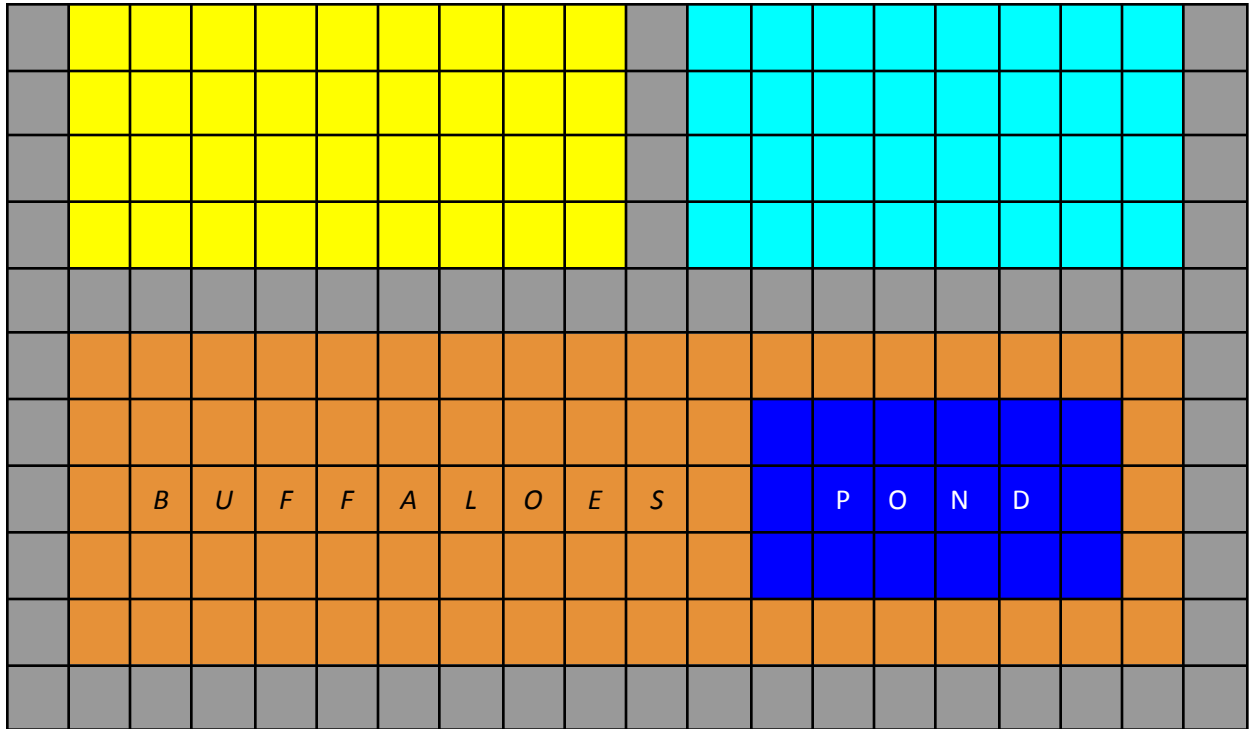
Appendix 2: Farm Plot (20 x 20)

Appendix 3: A sample shelter design

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Appendix 4: 81/ 400 on a Farm Plot (20 x 20)