

# BASIC NEEDS: SHELTER AND SPACE-BUILDING

## A HOUSE FOR A HORSE

### Objectives

- Students will be introduced to the basic needs and functions of living things.
- Students will be introduced to stimulus and response.
- Students will develop an understanding of the basic needs of shelter and space as they relate to horses.
- Students will build structures using common materials and explore ways to solve problems when building structures.
- Students will explore how large objects or structures can be made from smaller parts.

### Supplies

- Popsicle sticks
- Scissors
- Cardboard
- Foam board
- Toothpicks
- Yarn or string
- Pipe cleaners
- Glue bottles
- Pre-printed play money
- Rulers
- Colored pencils
- Electric fan
- Timer or stopwatch
- Student information and design worksheets

A kit of supplies for this lesson is available for purchase at [www.teachkyag.org/resources](http://www.teachkyag.org/resources).

### Teacher Suggestions

- This group activity can be done in groups of 3-4. Each group will need rulers to help them design their blueprint.
- To save time, pre-cut the string in strips of one-yard lengths, bundle popsicle sticks in groups of 25, and pre-cut cardboard and foam board into 5X5 squares, bundle toothpicks in groups of 25.
- This activity will take 2-3 class periods to complete. Providing each group with a shoebox in which to keep their materials could help students stay organized and your room tidy.

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### Kentucky Academic Science Standards

**3-LS4-3.** Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

**3-ESS3-1.** Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

**4-LS1-1.** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

**4-LS1-2.** Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

#### Engineering and Design

**3-5.ETS1-1.** Define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time, or cost.

**3-5.ETS1-2.** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.



- Print the different bills of money on different colors of paper. For example, \$1 on blue, \$5 on yellow, and \$10 on green, and so on. The money files can be found at <https://www.teachkyag.org/lessons/horse-shelter>.

Each group will need:

- 20 \$1 bills
- 16 \$5 bills
- 10 \$10 bills
- 10 \$20 bills
- 6 \$100 bills

Pre-printed money is included in the for-purchase kit referenced under supplies.

- You could assign one student to be the banker. This student could check each student's order to be sure the calculations are correct and dispense the supplies. This would free the teacher to monitor the groups as they work.
- In the event you do not have access to play money, students can calculate their expenses on their lab worksheet. Tell them not to exceed \$1,000.
- Pictures of barns, stables, and stalls can help students visualize the concept of what they are building. See <https://www.teachkyag.org/lessons/horse-shelter>.
- Set-up a "wind-tester" by using a small fan. A stopwatch can be used to determine how many minutes/seconds the structure held or create a pre-designated time that a structure must withstand.
- Awards could be given to the stable that looks most like the blueprint, the stable that weathers the wind best, the least costly that met all the criteria, etc.
- Science concepts to discuss prior to the passage or within the passage:
  - Stimulus/response
  - Physical adaptation
  - Basic needs of all organisms
  - Basic Functions of Life
- Terms that may need further explanation from the teacher:
  - Blueprint

All organisms, both plants and animals, have basic needs. These needs include nutrients from the food they eat, and most need oxygen and sunlight too. Plants need space to spread their stems and leaves to “capture” sunlight in order to make their own food through photosynthesis. Animals may need shelter and the right range of temperatures to help them meet their needs so they can carry out life’s basic functions to grow and develop, use energy, reproduce, respond to their environment, and get rid of waste.

Horses have a physical adaption to keep themselves warm by growing a winter coat. The longer hairs provide insulation by trapping heat next to the skin, warming up the air close to the body. Another adaption is shivering, like people do. Shivering is a reflex to cold temperatures and a response by our bodies to release more energy from our muscles to maintain our internal body temperatures. This response happens in horses too. In other words, shivering is simply the body’s response to an outside stimulus (something that makes you react in a certain way): the cold temperature sends a message to the brain where it interprets the information (I’m cold), and the brain sends out a message for a reaction (time to shiver).



Horses need shelter to protect their skin and coats from the elements of colder weather in the winter and from biting insects and the sun in the hot summers. Horses may spend part of their day in a room called a stall. In Kentucky, Thoroughbred farms tend to use the stalls, stables, or barns (building with many stalls) for feeding, medical check-ups, and treatments, a break from biting insects, and protection from very cold temperatures in wet conditions. In Kentucky, you may see horses covered in blankets during the coldest days. Horses burn body fat trying to keep warm. Older horses, and horses who need to maintain or grow their body weight may be dressed in a blanket to prevent the loss of calories.

Stalls may have openings that allow the horse to stick-out their heads to see each other. Horses are social and herding animals and prefer to be in the company of other horses.



Because horses are large herding animals, they require lots of space to graze on grasses, stretch, and exercise their long legs. Many horses are happiest outside and will choose the field over the barn/stable or stall given the choice. The combination of stables and open grassy fields provide horses with the habitat that helps meet their needs to carry out their basic functions for life.

Horses are quite comfortable in most temperatures. Typically, most horses are “turned-



out” or released to the fields in the later afternoon and stay in the field throughout the night. In the early morning the horses are led into the stalls by the groomers or handlers for a look-over to check eyes, posture, injuries, and overall health. Once in the stall, the horse is groomed, and fed. Thoroughbreds have regular medical check-ups just like you. A doctor who cares for the needs of an animal is called a veterinarian. Horses receive vaccinations to keep them healthy just like you.



The standard stall is typically 10 feet wide by 10 feet long for horses smaller than 1,000 pounds and at least 12 feet by 12 feet for horses 1,000 pounds or larger or mares with foals. A bedding material such as straw or soft wood shavings will be placed on the floor of the stall. This bedding provides comfort, will soak up the horse’s urine, and reduces contact with manure. A stall should be “mucked” at least once a day (manure and wet bedding is removed, and fresh straw or shavings are placed in the stall). Many farms will use rubber floor mats in the stalls because it is easier on the horse’s legs in comparison to concrete flooring or dirt floors.



### WOOD SHAVINGS AND SAWDUST

Wood shavings and sawdust are the leftover product from cutting and shaping wood. The advantages of this bedding type are 1) it can be more comfortable for the horse, and 2) it soaks up urine better than straw. Reasons that wood shavings or sawdust may not be used are 1) it is more expensive than straw, and 2) the dust may enter the horses’ lungs. The wood from some trees may also have oils that are poisonous to horses.



### STRAW

Straw is different than the hay that is fed to horses. Straw is the leftover plant material from growing wheat. The stems are much thicker and fibrous than hays, and since the plant has reached the end of its life, it does not provide much nutrition. Advantages of using straw are 1) it is cheaper than wood shavings, and 2) it does not have much dust that will collect in a horse’s lungs. The main reason it is not used as often is that it is difficult to clean. Horse owners also need to make sure it does not have any mold, which can make a horse sick.

## Build a House for a Horse

Architects are educated and trained in the art and science of designing and developing buildings. Engineers are educated and trained in science and math to creatively solve technical problems. You will use your own art and science skills to design, draw, and build a shelter for a horse.

### Instructions

1. Brainstorm and light up the room with ideas with your fellow architects and engineers to determine what kind of shelter you would like to design and build. Consider all suggestions. Sometimes the best design can be created by combining multiple suggestions together. You are a team. Think and act as one. Consider the materials you have to work with. Will your ideas work well with the materials you have available? Think about the weather in Kentucky... build to protect the horse from the elements of weather, such as rain, wind, snow, and heat.
2. Your shelter will be exposed to wind (a fan). So be sure it is steady. Your shelter must be large enough for a toy horse to fit in. The toy horse measures 6 inches long by 5 inches high.
3. Just like an architect, your group must draw a blueprint of what your shelter will look like after it is built. A BLUEPRINT is a set of plans or drawings for making something. Your blueprint will be compared to the actual shelter you build. Blueprints are better understood in color. Use your colored pencils to add color to your blueprint.
4. Architects and engineers have to work within the confines of a budget and so will your group. You will be given \$1,000 to build a shelter. Use your money wisely. Pay for all of your materials at once or pay as you go. Discuss this choice with your team.

Material	Price	Number Needed	Your Cost
Popsicle Sticks	\$5 each		
Cardboard	\$10 each		
Foam board	\$10 each		
Toothpicks	\$1 each		
Yarn or string	\$25/yard		
Pipe cleaners	\$25 each		
Glue bottle	\$50 each		
Scissors	\$1 each		
		<b>Your Final Cost:</b>	

**Signed by all team members:**

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## Blueprint for a Horse Shelter

