



Nature-Watch Activity Kit

Mason Bee House

(Nature Watch Kit #170s)

This page includes the Next Generation Science Standards (NGSS) mapping for this kit and a Science, Technology, Engineering, and Math (STEM) chart (on back) to use in adapting and extending this activity to other subject areas.

170s Kit Contents

<u>Item</u>	<u>Kit Size</u>	
	25	100
	<u>Quantities</u>	
Plastic cylinder	25	100
Thick straws	225	900
Rubber bands	50	200
Twine pieces	25	100
Instruction Cards	25	100
Glue bottles	2	7
Instructor Manual	1	1

Next Generation Science Standards Alignment

K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.

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

See Back for STEM Extensions Chart

Mason Bee House

Science

After placing your mason bee houses in an outdoor location, decide on a question you have about bees that you can answer with this home. For example, if you place multiple homes in different locations, you may wonder which location is best for attracting bees. Or you may want to know if multiple bees share the home, or if only one takes up residence. Whatever your question, you will want to plan for regular observations and create a data sheet on which to record your observations. Your data sheet should include the time and date of each observation, the temperature and general weather conditions, the direction the opening is facing, any changes to the bee home, and any observations about animals living in the home. Record this data for several weeks or months and see if you can answer your question(s) about mason bees. What did you learn?

Math

Bees are small but mighty, and the average bee can carry 122 times their body weight while walking, which would be comparable to an average adult human carrying a load that weighs almost 22,000 pounds! How much weight do you carry in your backpack each day? If you were a bee, how many backpacks of books and schoolwork would you be able to carry while walking to class?

Honeybees make their hives using regular shapes, and solitary bees create chambers for their larva to grow in, even though they don't live in hives. Look at pictures of beehives and the chamber designs of solitary bees. Notice that there is no wasted space, and that most bees create chambers using repeating shapes. Why do you think this is?

Bees, specifically honeybees, build with hexagons, and you can test why this might be. You can build hives using different shapes, and test the hives for strength and stability. Construct a beehive using different regular polygonal prisms from paper and joining them to make different types of beehives. You can do this by folding sheets of paper to make squares, triangles and hexagonal prisms. Once you create the prisms and tape them together, make some observations. Are some shapes better than others for constructing hives? Are some noticeably stronger? Compare the capacities of the different prisms.

Can you come up with appropriate formulas for perimeter, area and volume of the beehives? How much honey could fit into each cell of each type of hive? How would you find out?

Technology

There are numerous types of technology available to help beekeepers care for bees. This includes several smartphone-enabled apps connected with in-hive sensors that can give beekeepers instant updates on temperature and humidity, which, in turn, indicate bee activity and health. Other technologies use small microphones and sensors record and analyze the buzzing noises bees make, and track their movements. Some apps can even predict if the bees are going to swarm, which is particularly important in regards to honeybees.

If you were to invent a new technology to help bees, what would it be? Most of the technology that is available to help people monitor and care for bees has been designed specifically for honeybees. If you were to build a new sensor, system, or app to help solitary bees, how would it work? In what ways would it be similar to, or different from, those tools that already exist?

Engineering

Now that you have experience building one kind of home for native bees, can you design other ones? What might bees look for when selecting a home? What about bee behavior might you need to consider when creating your design and selecting your materials? You will need something that will protect them from harsh weather (rain and wind). It should also have multiple chambers or living spaces so that several bees can share the space, or use the space to house their young. Once you have created a basic design for your bee home, build it! Try making modifications as you test different materials. What location is best for this new design? Are some structures better than others? What other modifications can you make?

Bees need more than just the right nesting structures in order to live. Different species prefer different weather conditions, temperature ranges, and specific plants on which to feed. Choose one species of bee and research all of its needs. Use this information to design an entire yard for them that includes the structures and plants needed to support the species. How would you engineer the space so that it provides the right habitat?