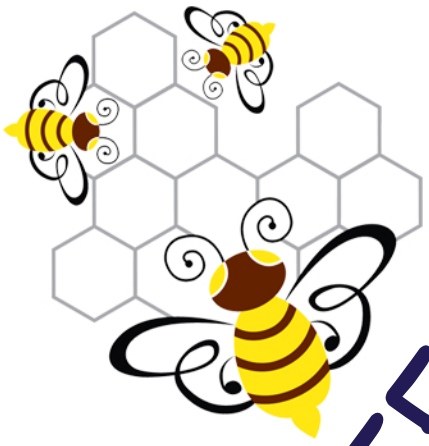
ENGINEERING DESIGN

Nuisance or Necessity?



BEES

A SCIENCE @ HOME ACTIVITY

James E. Richmond Science Center

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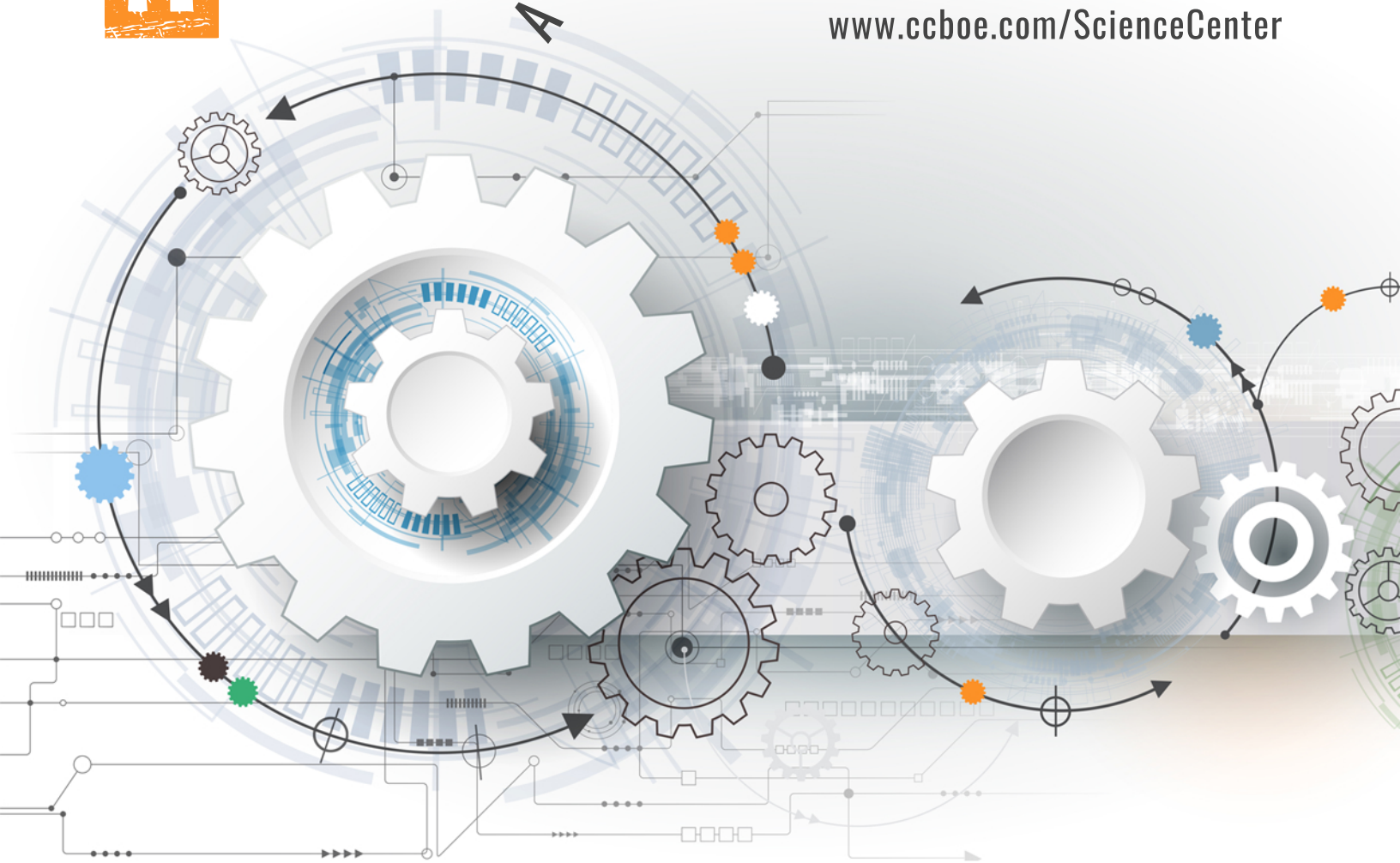


LESSON OVERVIEW FOR PARENTS

Bees: Nuisance or Necessity?

It is that time of year when there is more activity among flying insects, including bees. Most of us are wary of bees because of fear of being stung. This is more than just a painful inconvenience; for some it may lead to a severe life or death allergic reaction. Do bees serve a positive purpose in our lives? This week's lesson will explore that question.

Lesson objectives

- Explain the importance of bees.
- Explain the impact the bee population has on humans.

Outcomes

- Students should demonstrate an understanding of the importance of bees.
- Students should demonstrate an understanding that each person has a responsibility to assure the bee population survives.
- Students will gain an understanding of what a world without bees would be like.
- Students will gain an appreciation of what impact bees have on the food they enjoy.

Resources

'Save the Bees' campaign

https://towardsdatascience.com/whats-buzzing-with-the-bees-99f9be0bc4c6

The Importance of the Bee

https://clever.discoveryeducation.com/learn/videos/0d6337fe-0b64-4875-90b6-3c6ac5183270/

Saving the bees—One Man's Attempt

https://clever.discoveryeducation.com/learn/videos/67d02434-16f9-4033-8dd2-7c59a3ae974c/

Dancing Bees— How Bees Communicate

https://clever.discoveryeducation.com/learn/videos/232d0127-aa09-4886-9ed9-837a694eed85/

We would love to see your child's creativity so please tag us at James E. Richmond Science Center on Facebook and Twitter.

Thanks for visiting! See you soon!

Engineering Challenge

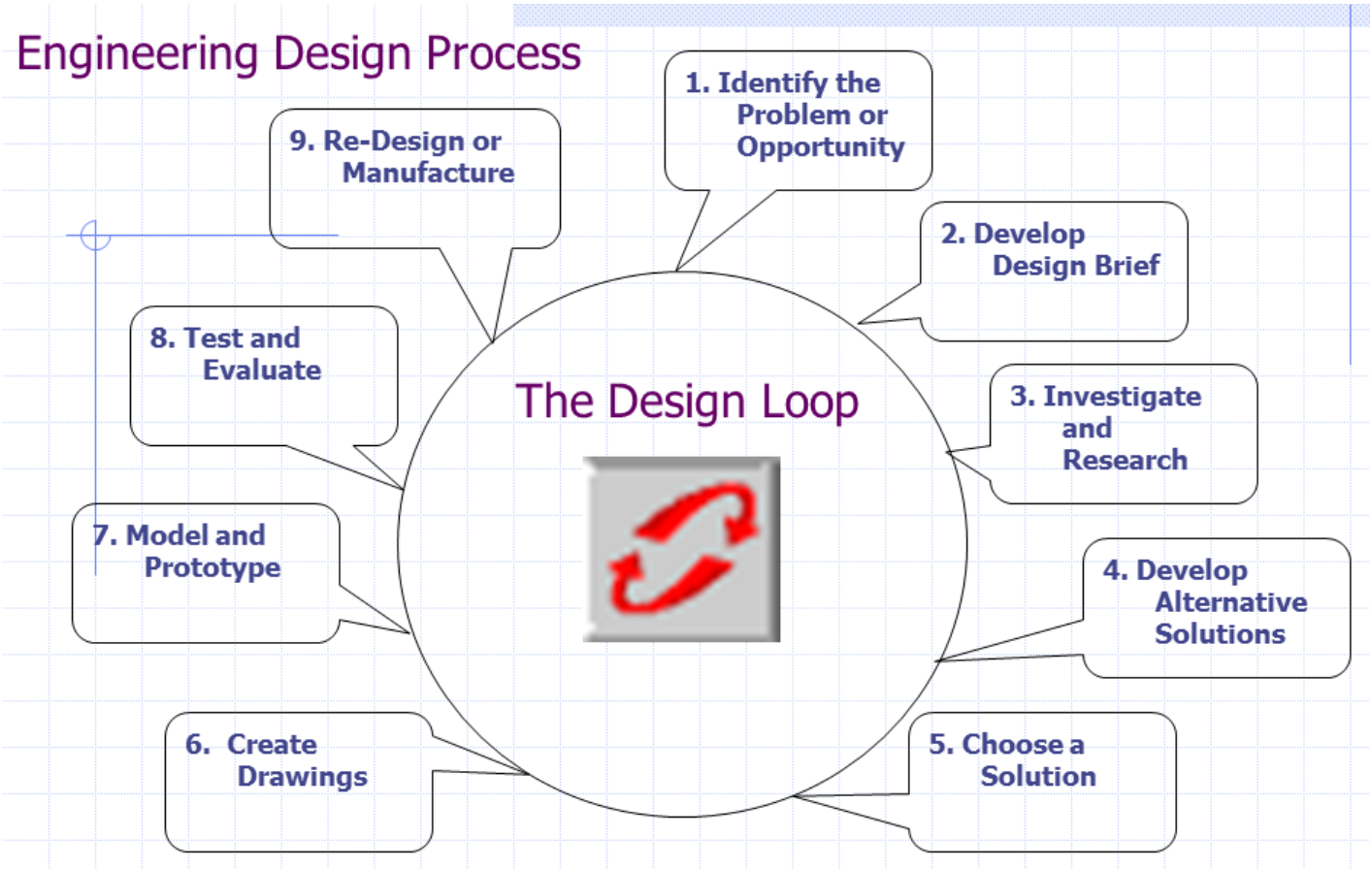
Bees : Nuisance or Necessity?

PURPOSE

Engineering challenges are a fun and educational activity to solve a stated task. There is not a single solution or one correct answer for each specific challenge. Try alternative solutions and use the Engineering Design process to meet each mini-lab or challenge for the optimal result.

ENGINEERING DESIGN PROCESS

The **engineering design process** is a series of steps that engineers follow to come up with one possible solution to a problem. Often the solution involves **designing** a solution that accomplishes a certain task and/or meets certain criteria. However, one very important aspect of the design process, is the feedback loop. This is used to look at outcomes and then make adjustments to develop a solution that is more successful at meeting the task.



BEES : NUISANCE OR NECESSITY?

It is that time of year when we are beginning to see more activity among flying insects, including bees. Most of us are wary of bees because of the fear of being stung and for a fair number of us this is more than just a painful inconvenience but may lead to a severe life or death allergic reaction. Do bees serve a positive purpose in our lives?

Benefits of Bees

Bees play a critical role in the human food chain.

Bees are important because they pollinate approximately 130 agricultural crops in the US including fruit, fiber, nut, and vegetable crops. Bees are a crucial component of food production and are estimated to be responsible for a third of the food that we eat. Pollination by bees is called entomophily, which is a form of plant pollination whereby pollen is distributed by insects,

Most staple food grains, like corn, wheat, rice, soybean and sorghum, need no insect help at all; they are wind or self-pollinated.

Fun facts about bees

Did you know?

- Bees have 5 eyes
- Bees have 6 legs
- Bees have 2 pairs of wings and can fly about 20 mph (so you can't outrun a bee)
- Losing its stinger will cause a bee to die
- Male bees are called drones
- Female bees (except the queen) are called worker bees
- Number of eggs laid by queen may be as high as 2,000 per day
- Bees carry pollen on their hind legs in a pollen basket or corbicula
- An average beehive can hold around 50,000 bees
- Foragers must collect nectar from about 2 million flowers to make 1 pound of honey
- The average forager makes about 1/12 th of a teaspoon of honey in her lifetime
- The principal form of communication among bees is through chemicals called pheromones

Do bees have anything to do with what I eat?

Bees pollinate 70 of the top 100 crops. Lets see how this impacts your daily diet.

Materials:

- Daily food diary
- List of food products involving bees

Procedure:

- Keep a record of what you eat in a single day.
- Choose a meal and complete the chart on page 4
- Break each item down into what ingredients go into it.
- Use the list “Crop Plants Pollinated by Bees” on page 5 as a reference.
- Look at each ingredient and determine if a bee was involved or not.
- Circle Yes or No
- If a bee is indirectly involved such as a dairy product or meat circle “IND”

Example:

Meal or Snack	Food	Ingredients	Did a bee play a part in this ingredient?
Lunch	Pizza	Crust	YES (NO) IND
		Cheese	YES NO (IND)
		Tomato Sauce	(YES) NO IND

Explanation:

- Pizza is made of primarily 3 ingredients (not including your favorite toppings).
- Crust which is usually a wheat product that is pollinated by the wind (No Bees).
- Cheese is a dairy product that is not directly affected by bees, however, bees pollinate the food that cows that make the milk eat. Milk is used to make cheese so bees indirectly affect the cheese on your pizza.
- Tomatoes which are the base of tomato sauce are directly pollinated by Bees.

Conclusion:

- If there were no bees, would it affect what you eat?
- Are your favorite foods or snacks dependent on bees?
- What is a possible alternative to killing bees around your home?

MY DIET DIARY

Use the following chart to track what you eat in a single day. Pick a meal and using the list on page 5, determine if a Bee was involved in the ingredients used in making your food.

Meal or Snack	Food	Ingredients	Did a bee play a part in this ingredient?
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND
			YES NO IND

List of Crop Plants Pollinated by Bees

While bees do **NOT** pollinate every single crop, here is a list of some of the foods we would lose in the United States if our bees were not able to do their job.

Acerola (Vitamin C supplement)
Adzuki Beans
Alfalfa
Allspice
Apples
Apricots
Avocados
Beets
Black and Red Currants
Black Eyed Peas
Blackberries
Bok Choy (Chinese Cabbage)
Boysenberries
Brazil Nuts
Broccoli
Brussels Sprouts
Buckwheat
Cabbage
Cactus
Cantaloupe
Caraway
Carrots
Cashews
Cauliflower
Celery
Cherries
Chestnut
Peppers (Chili, red, bell, green)
Clover
Cocoa
Coconut
Coffee
Congo Beans
Coriander
Cotton
Cranberries
Cucumber
Custard Apples
Durian
Eggplant
Elderberries
Fennel
Figs
Flax
Goa beans
Grapes
Green Beans
Guava
Hazelnut
Kidney Beans
Kiwi Fruit
Lemons
Lima Beans
Limes
Loquat
Lychee
Macadamia Nuts
Mangos
Mustard Seed
Nectarines
Okra
Onions
Orchid Plants
Palm Oil
Papaya
Passion Fruit
Peaches
Pears
Persimmons
Plums
Pomegranates
Prickly Pear
Quince
Rambutan
Rapeseed
Raspberries
Rose Hips
Safflower
Sesame
Star Apples
Starfruit
Strawberries
Sunflower Oil
Sword beans
Tamarind
Tangelos
Tangerines
Tomatoes
Turnips
Vanilla
Walnut
Watermelon

Dairy Products and Meat:

Bees aid in the production of alfalfa and clover that is used for feed in the beef and dairy industries. It is estimated, that without bee-pollinated clover and alfalfa we might see up to a 50 percent reduction in milk products, including cheese production.