This Field Guide Belongs To:

_____

Explore the Bees of Oregon

and how they help make our food

OREGON BEE ATLAS

THE OREGON BEE PROJECT

OREGON HARVEST for SCHOOLS

EPA United States Environmental Protection Agency

FOOD HERO FoodHero.org

Oregon State University Extension Service

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On the Cover: Our illustration shows (left to right) a long-horned bee, a bumble bee and a honey bee on a common sunflower (Helianthus annuus), and a mason bee in a camas (Camassia quamash) field. The background shows Douglas-fir trees (Pseudotsuga menziesii, the official Oregon state tree) and cedar trees, one of many Oregon waterways and the peaks of the Three Sisters mountain range. All of these help bees thrive in their habitat.

Number the featured bees in descending order (largest to smallest):

Squash Bee
11 to 14 mm in length

Mason Bee
6 to 12 mm in length

Leafcutter Bee
6 to 22 mm in length

Long-Horned Bee
9 to 15 mm in length

Cuckoo Bee
8 to 10 mm in length

Alkali Bee
12 to 13 mm in length

Green Metallic Sweat Bee
7 to 12 mm in length

Honey Bee
12 to 15 mm in length

Bumble Bee
11 to 23 mm in length

Penny = 19 mm | Dime = 18 mm | Quarter = 24mm

Convert from one metric unit to the other

19mm = _____cm _____mm = 1.8 cm 24mm = _____cm

Approximate coin sizes shown for comparison to the bee sizes

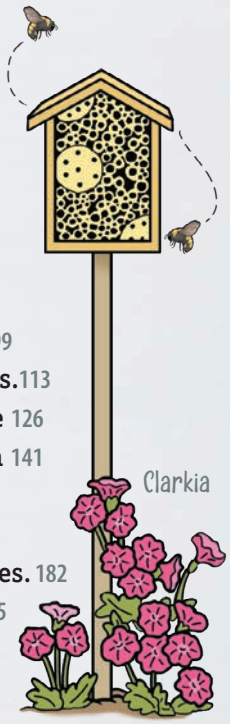
We would love to hear from you!

Email us at
food.hero@oregonstate.edu

Visit www.foodhero.org/bees for more, like fun videos, online coloring, mini posters, teacher's guide and book downloads in Spanish and English!

FOOD HERO
FoodHero.org/bees

Hello! My name is Josh, and my family has a food truck! Every weekday, 14
we sell great tasting lunches to customers from our truck. My little sister, 27
Jocelyn, and I help our parents. We work in our garden to grow many of 42
the foods we need for ingredients. We also help order the foods we don't 56
grow. Jocelyn and I go to school during the day. We help when there is no 72
school and on the weekends. It's hard work but we all love it. 85



Do you have a favorite meal? Jocelyn and I have different favorites. We couldn't 99
make any of them without local farmers and animals like chickens, cows and pigs. 113
Maybe the most important helpers of all are . . . bees! That's right! Bees pollinate 126
clover for cows to eat—you will learn what the word ***pollinate*** means later! Then 141
the cows give us milk and meat. Bees also help plants grow fruits like berries, 156
cherries, apples, peaches, pears, plums and watermelons. We use fruit in the 168
smoothies and salsas we make in our food truck. All our lunches include vegetables. 182
We grow many of our own vegetables from seeds. Bees pollinate our vegetable 195
plants. The vegetable we use the most is onions. Guess what? Without bees to 209
pollinate onion flowers, we wouldn't have seeds to grow onions. 219

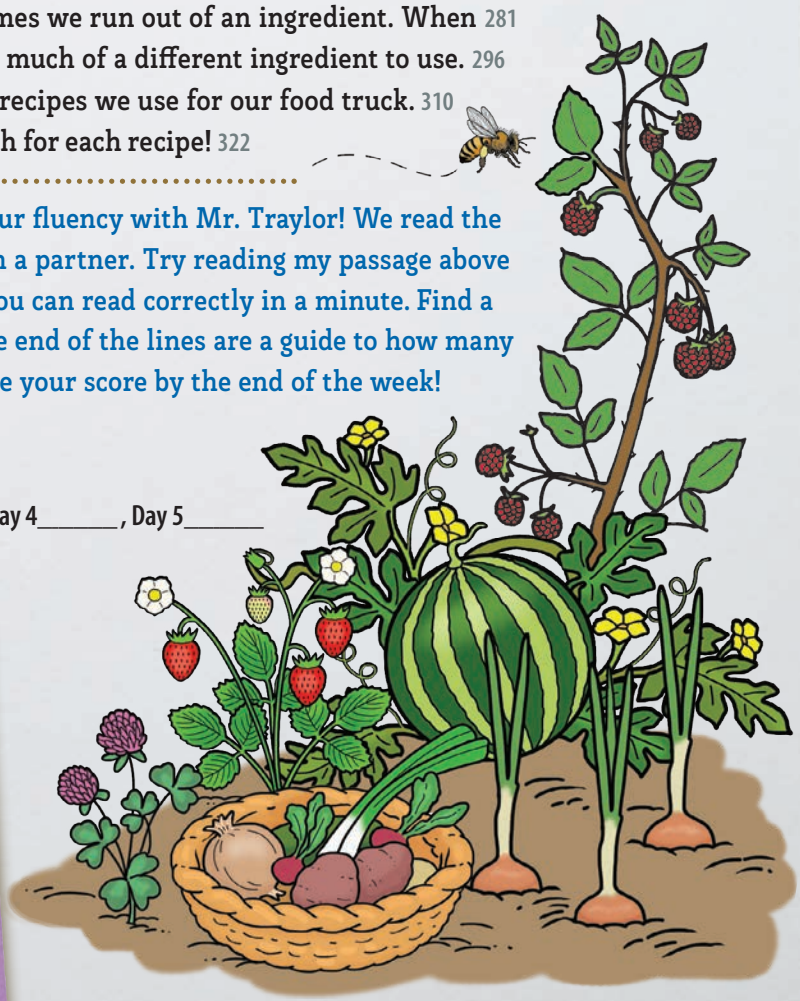
Do you like math? It's my favorite subject in school, but sometimes I need help. We have a 237
lot of customers, so we make a lot of food! Sometimes we have to double or triple 254
the ingredients in our recipes! My family asks me to figure out the right 268
amounts to practice my math. Sometimes we run out of an ingredient. When 281
that happens, I have to figure out how much of a different ingredient to use. 296
This book has the eight most popular recipes we use for our food truck. 310
I hope you can help me with some math for each recipe! 322

In reading this year, we are building our fluency with Mr. Traylor! We read the same passage each day for a week with a partner. Try reading my passage above out loud and track how many words you can read correctly in a minute. Find a partner if you can. The numbers at the end of the lines are a guide to how many words you read. See if you can improve your score by the end of the week!

Fluency Tracker

Day 1_____, Day 2_____, Day 3_____, Day 4_____, Day 5_____

what do you want to know about bees and how they help make our food?



Watch a family in Oregon at a community farm

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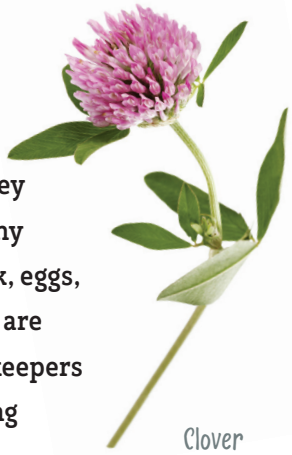
https://beav.es/Twb

What Bees Do for Us

Honey Bee



Clover

Next time you take a bite out of an apple or eat a tasty berry, thank a bee!

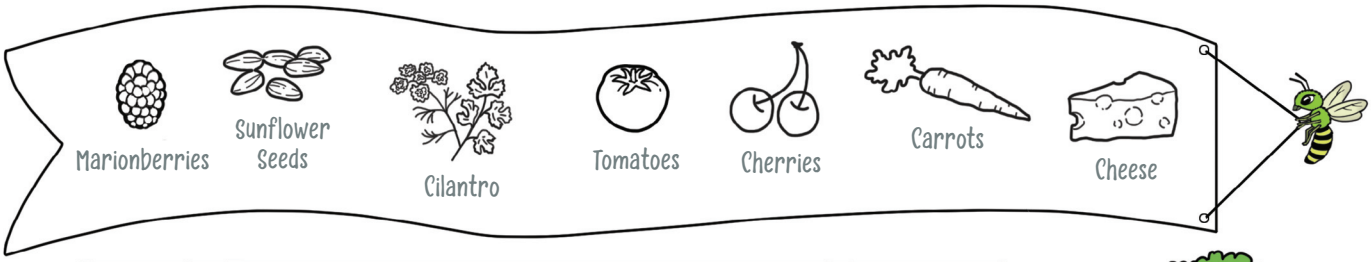
Bees are a very important group of insects that help make some of our favorite foods. How do they do this? By spreading pollen from flower to flower. This is called ***pollination***. Bees pollinate many different crops, including types of fruits, vegetables, nuts and seeds. Bees also help produce milk, eggs, cheese and meat—we'll explain how later in this book. Many of the crops Oregon bees pollinate are grown in the state of Oregon, but crops in other states rely on Oregon bees, too! Every year, beekeepers from Oregon bring their bees to other states to help pollinate their crops. For instance, they bring honey-bee hives to California to pollinate the almonds that are grown there.

There are over 780 species (types) of bees in Oregon, 4,000 in the United States and 20,000 in the world! In this book, you will get to know eight of the bee species in Oregon. You'll learn why they are so important to farmers, gardeners and everyone around the world.

Bees help farmers grow 1/3 of the foods we eat! That's like 1 in every 3 bites!

Color in the foods shown below that you like best. Why do you like these foods?

I like these foods because _____



Help Jocelyn and Josh and their family design and name their new food truck! They want their customers to know that bees help make everything they sell.

Find out about Oregon Pollinator License Plates at:
oregonbeeplate.org

Pollination: How Does It Work?

Why do bees visit flowers? To collect pollen and nectar to feed themselves and their **offspring** (babies). When bees go in search of pollen and nectar, it is called ***foraging***. Most bees collect and spread pollen as they forage. Pollen helps plants make seeds that grow into fruits we like to eat.

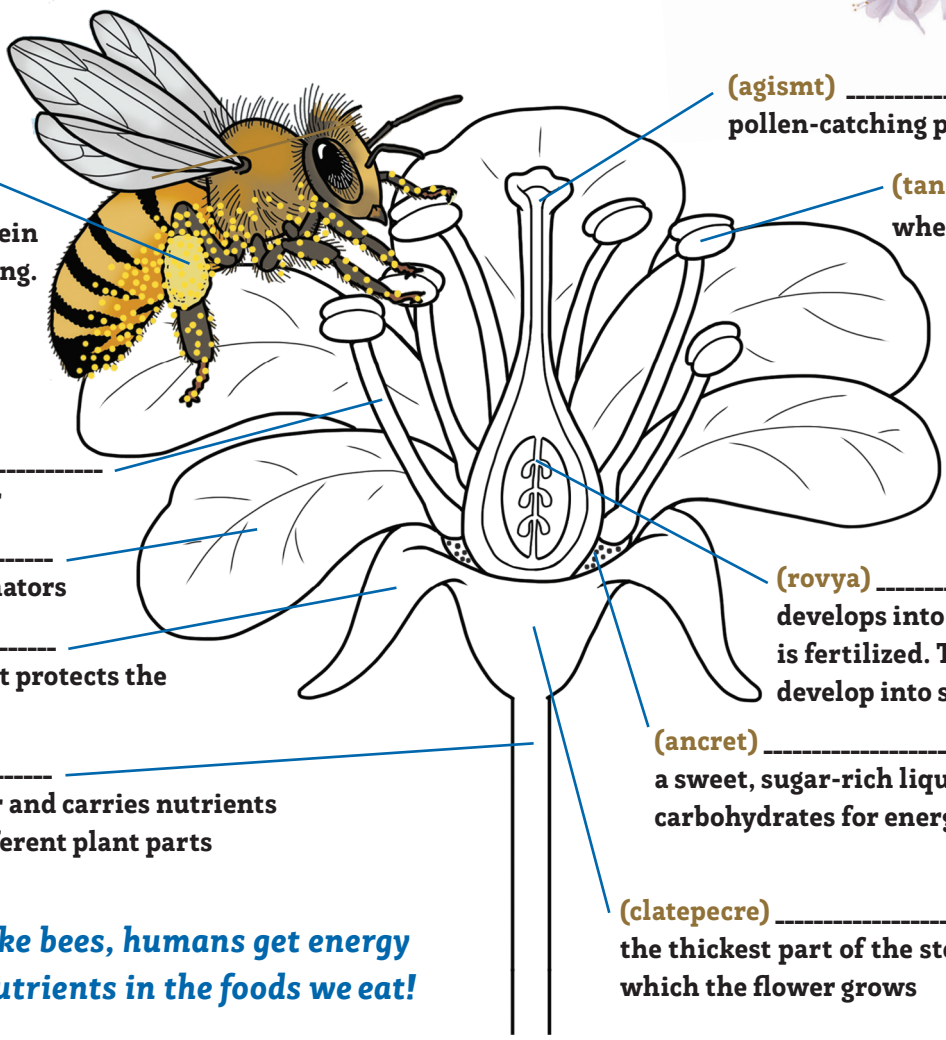
When bees forage, the fuzzy hairs on their bodies pick up and leave behind pollen. Bees often move pollen this way from one flower to another. Sometimes, the pollen from one flower makes it to the stigma of another flower of the same species. When that happens, the flower is ***fertilized*** and starts making seeds. Seeds are one of the ways plants make more plants (**reproduce**).

A honey bee on a cherry blossom just like in the drawing below!

Parts of a Flower

Unscramble the words to match the flower part with the definition. If you get stuck, check the word bank! Then color in the flower parts.

Honey Bee



Cherry Blossom

(lnloep) _____
a dusty powder that gives bees protein to feed their offspring.

(agismt) _____
pollen-catching platform

(tanerh) _____
where the pollen forms

(laftimen) _____
holds up the anther

(tleap) _____
color attracts pollinators

(pelas) _____
leafy plant part that protects the flower bud

(tesm) _____
supports the flower and carries nutrients from the soil to different plant parts

(rovya) _____
develops into fruit after plant is fertilized. The small ovules develop into seeds within the fruit.

(ancret) _____
a sweet, sugar-rich liquid that gives bees carbohydrates for energy.

(clatepecre) _____
the thickest part of the stem, from which the flower grows

Just like bees, humans get energy and nutrients in the foods we eat!

Word Bank:

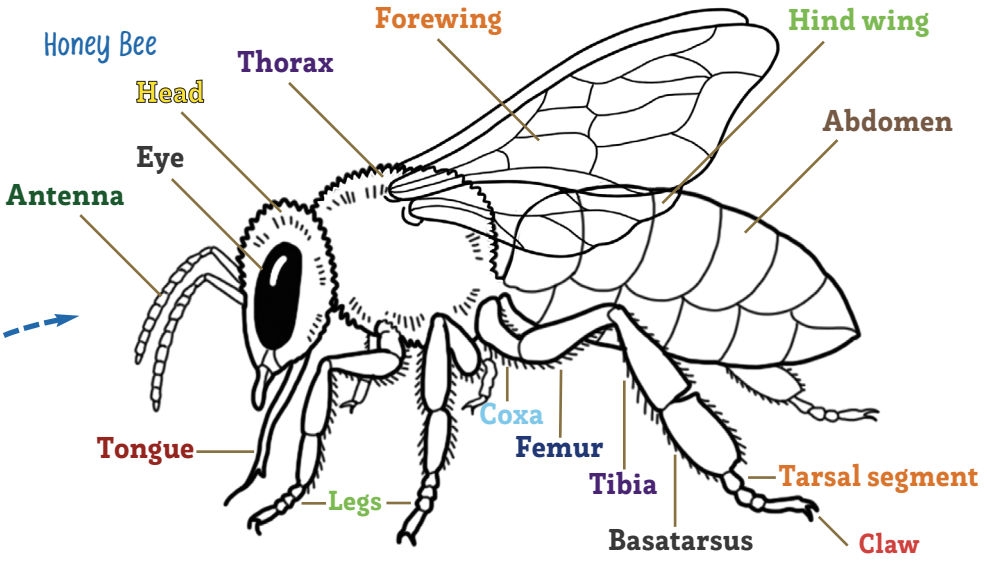
Ovary	Receptacle	Petal	Stem	Pollen
Anther	Filament	Sepal	Stigma	Nectar

Parts of a Bee

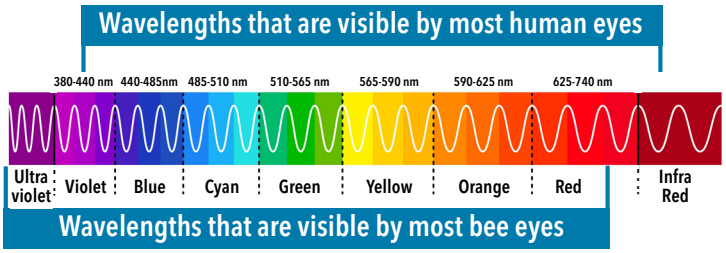
Did you know? All insects, like bees, are animals! Each type of bee is called a ***species***. Teams of scientists who study bees (*mellitologists*) use the parts of a bee to identify them. To help understand how alike or different they are, scientists put similar species together into a group called a ***genus***. In this book, you'll learn about a few of the most common ***genera*** (plural of genus) in Oregon.

Bees are like super-heroes with body parts adapted to help them find flowers and collect pollen and nectar!

All bees have 3 body segments (head, thorax, abdomen), 6 legs and 4 wings. Find them all on the bee drawing, and color the body parts the color family they are labelled with.



Bee and Human Color Vision Range



A Closer Look

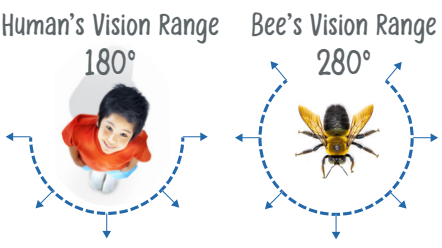
Wings - A bee's wings help them fly up, down, forward, backwards and sideways and hover. They beat so fast they make a buzzing sound and create a positive electrical charge. The charge remains on their body and helps them pull pollen from flowers. Plus, an "echo" of the electricity is left behind on the flowers they visit to signal to other bees that the flower was just visited.

Legs - Bees like the honey bee use their legs for a lot more than walking. They use their legs to move flower parts, push pollen around their body, clean their head and antennae and pass pollen from their pollen baskets to another worker in the hive.

Eyes - Bees see differently than humans.

❁ Bees have five eyes! Their two big eyes (called *compound eyes*) have thousands of tiny lenses each. These eyes help bees find flowers by sensing differences in light, color and movement. Bees' three small eyes (called *ocelli*) detect brightness and intensity of light, not images, and are arranged in a triangle between the compound eyes.

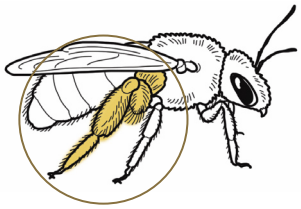
❁ Bees can see 280 degrees around them. Humans can see only 180 degrees.



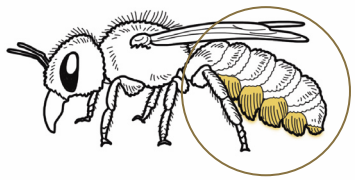
❁ Bee and human eyes have rod cells that see greys and cone cells that see colors. Different colors of light have different wavelengths (see the picture above). As light reflects from an object such as a flower and enters the eye, cone cells interpret its wavelength as a distinct color. Notice in the picture that humans, but not bees, can see all shades of red and that bees, but not humans, can see all shades of violet. Bees can also see colors in a range below violet, called ultraviolet (UV), that is not visible to humans. So bees can see certain markings on flowers that humans can't see, such as UV color patterns that guide bees to a flower's nectar or pollen.

Three Different Types of Pollen-Carrying Structures:

1 ***Corbicula (pollen basket)***
Honey bee



2 ***Scopa (hairs on back leg)***
Mining bee



3 ***Scopa (hairs beneath the abdomen)***
Leafcutter bee

Bumble bee with pollen in a corbicula

Bees Make Healthy Food Acrostic Poem

What is it? An ***acrostic*** is a poem in which the first letter of each line spells out a word. Often, that word is the title of the poem. Here's an example:

Cherry

Cool-weather blossoms
Helped to grow by mason bees
Excellent fresh or in fruit salad or parfait!
Ruby red
Ripe in midsummer
You can't eat just one!

Mason Bee

Ranier Cherries

Your Turn!

Try writing an acrostic poem about your favorite fruit or vegetable that bees help make! First write your title, in large letters, one letter at a time in the blocks on the side of the page. Use as many blocks as you need. Now write something you like about your fruit or vegetable or the bee that helps make it that begins with the letter at the start of each line.

Find someone to read your poem to!

Cherry Blossoms

Blueberry Bling Recipe and Bee Color-by-Number

Watch Oregon blueberry farmers in action: https://beav.es/xxx

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A bee's colors can help identify it.

Help Jocelyn identify which bees are pollinating the blueberry bushes. Solve the math problems to find out what to color each section in the picture below!

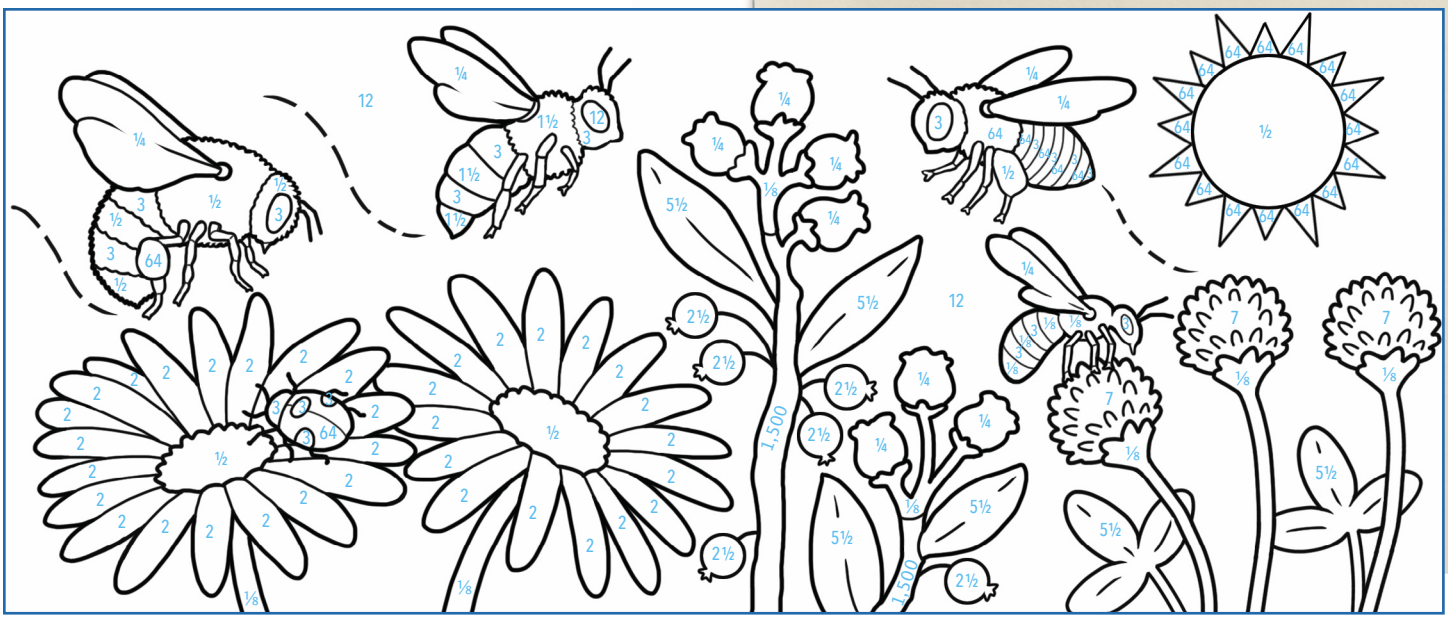
1. How many teaspoons of brown sugar would be needed if the recipe was tripled? _____ **black**
2. How many total seconds does the blueberry bling need to bake? _____ **brown**
3. How many total cups of oats and blueberries would there be if the recipe was doubled? _____ **red**
4. How many square inches are in the baking dish? _____ **orange**
5. How many teaspoons of butter would there be if the recipe was quartered? _____ **yellow**
6. How many teaspoons of cinnamon would be needed if the recipe was quartered? _____ **light green**
7. How many total teaspoons of brown sugar, cinnamon, and butter are needed for the recipe? _____ **dark green**
8. How many cups of blueberries would there be if the recipe was quadrupled? _____ **light blue**
9. If the recipe was halved how many cups of blueberries would there be? _____ **blue**
10. If the recipe was multiplied by five, how many teaspoons of cinnamon would be needed? _____ **dark blue**
11. If the recipe was quadrupled, how many cups of oats would there be? _____ **purple**
12. If the recipe was halved, how many cups of oats would be needed? _____ **white**




Recipe: Blueberry Bling

Blueberries, 3 cups fresh or frozen
Margarine or butter, softened, 2 teaspoons
All-purpose flour, 1 Tablespoon
Brown sugar, 1 Tablespoon
Cinnamon, 1/2 teaspoon
Old fashioned rolled oats, 1/2 cup

1. Preheat oven to 375 degrees F.
2. Put the blueberries in a 9-inch pie plate or 8x8-inch baking dish.
3. In a small bowl, use a fork to mix the rest of the ingredients.
4. Sprinkle the oat mixture over the berries.
5. Bake for about 25 minutes.



The illustration shows (left to right) a mining bee in the genus Andrena, a native bumble bee, genus Bombus Vosnesenskii Radoszkowski, a small carpenter bee, genus Xylocopa, a sweat bee, genus lasioglossum, and a ladybug, as well as asters, blueberry blossoms and crimson clover.

Take a Closer Look:

Bee Parts and Plant Parts

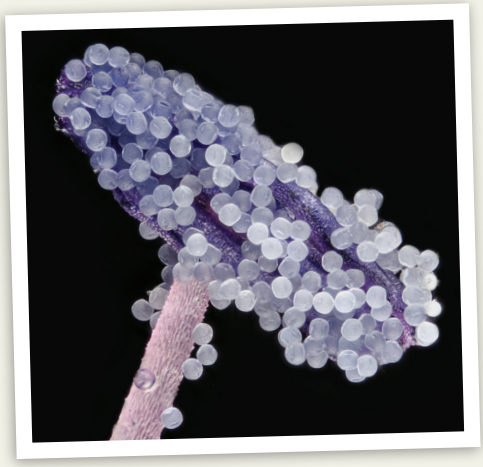
Blueberry Blossoms and a Honey Bee

Pretend you are smaller than a bee. What would the world look like to you?
1. Look at these close-up photos. **2.** Guess what you're looking at.
3. Write down your guesses on the lines below the photos.
4. At the bottom of this page, discover what you were looking at!

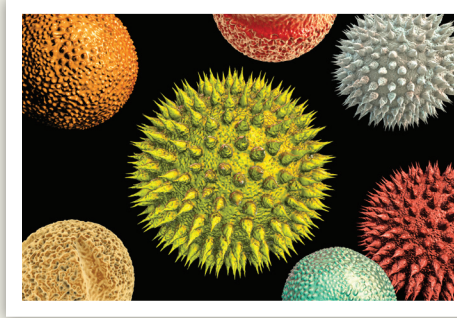
A. _____

B. _____

C. _____



D. _____

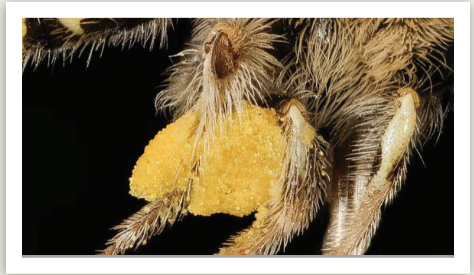


E. _____

F. _____

G. _____

H. _____



I. _____

A. Bee antennae where they attach to the bee's head; **B.** Bee's compound eye; **C.** Bee tongue (proboscis); **D.** Pollen grains on an anther with the filament below; **E.** Pollen grains of different plants; **F.** Bee claw; **G.** Bee wing tip; **H.** A nemophilia flower seen through a bee's eyes (in ultraviolet light); **I.** Loaded pollen basket of a foraging bee.

Images A, B, C, F, G and I courtesy of the United States Geological Service Bee Inventory and Monitoring Lab. Retrieved from https://www.flickr.com/people/usgsbiml/. Image H Svea Bruslind, Oregon State University.

Native Bees and Word Games

Can you solve the word puzzle?

Unscramble the words below; each one is a food featured in the book and pollinated in part by native bees. When you've finished, add each numbered letter into the mystery word to answer the riddle.

Riddle question:

What is a bee's favorite sport?

(answer the question below)

ESPEPRPO _ _ 1 _ _ _ _

NCOIRLTA _ _ _ _ _ _

OOTTSEAM _ _ _ _ _ _ _ _

PLSAEP _ _ _ _ 5 _ _

UFLLWACREOI _ 2 _ _ _ _ _ _ _ _ _

GSGE 6 _ _ _

EBEULBRISRE _ _ _ _ _ _ _ _ _ _ _

AHSUQA _ _ _ _ _ _

GPTNALEG _ 3 _ _ _ _ _ _

Riddle answer: ___ ___ ___ ___ ___ ___
1 2 3 4 5 6

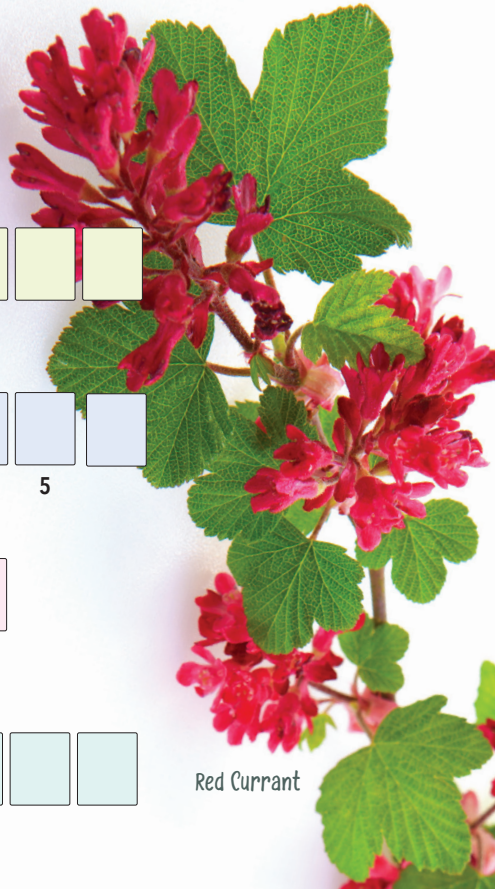
EFBE 4 _ _ _

Blue orchard mason bees (Osmia lignaria) are an Oregon native that excels at pollinating fruit crops, and they are managed for this purpose.

Wild bees are not kept by people, but live on their own. Wild bees started to appear in Oregon after continents started to separate around 60 million years ago and evolved together with flowering plants that came to dominate the forests, savannah and deserts of Oregon. The first wild bees and plants living in Oregon are different from those here today through a process of co-evolution, where the development of new plant and bee species helped each other along over the course of millions of years. This means that wild bees are important for the pollination of wild plants, as well as crop plants, which are often relatives of those wild plants.

Most wild bees are solitary and nest underground. There are hundreds of different species. Some are smaller in size than a grain of rice and some have not been identified yet. Wild bees help keep wild plants reproduce. Many farmers rent boxes of managed honey bees to pollinate their crops, but wild bees can help pollinate food crops. too! In fact, they help make all the foods featured in this book.

Perdita



Red Currant

Bee Word Game

Find a partner. Choose one person to be the "reporter" and one to be the "author." Without reading the story aloud, the reporter asks the author to think of a word for each prompt under the blank lines below. The reporter writes in the author's words. Then have the reporter read the story out loud!

Did you know that only _____ (adjective) bees sting? These bees use their _____ (part of their body) to _____ (verb). This is the same part of the body they use to lay _____ (plural noun). While almost all bees can _____ (same verb) multiple times, the _____ (adjective) bee stings only once. That is because when a _____ (same adjective) bee _____ (last verb again) its _____ (noun), along with a special venom sack, _____ (verb) off the bee and _____ (verb) into you. This _____ (verb) the bee. Although bee stings _____ (verb) for _____ (number) minutes, most people are not harmed by them. However, some _____ (plural noun) are allergic to them and as a result have to be _____ (adjective) around bees. Bees only _____ (verb) to _____ (verb) themselves from _____ (noun) that want to eat them. Since most _____ (plural noun) don't threaten bees, they rarely _____ (verb) them. When bees do _____ (same verb) people, it's often because _____ (name of a person in the room) swatted at the bee or _____ (verb) on it. Most of the _____ (noun) it's safe to observe _____ (plural noun) around you.

Explore the bees of Oregon and how they help make our food!

Visit **FoodHero.org** for a delicious Kale Salad recipe with sunflower seeds

Many native bees rely on native plants, and thus many native plants we eat rely on specific native bees. The sunflower shown on the cover and here is the native edible common sunflower. Native plants evolved over thousands of years in a particular habitat. There, they live in harmony (like a friendship) with the habitat's other species, soil, weather, etc. This interdependence allows them to thrive without human care.

Find the hidden fork, spoon, knife, dinner plate and drinking glass

Color in the illustration. Add a caption (short description of what is happening in the photo) using the text from the book to support your answer:

_____

_____

Healthy Habitat

Bees thrive and food grows!

A habitat is a home that provides everything a specific plant or animal needs. A bumble bee, for example, needs the right kind of place for a nest and the right kinds of plants close by to provide nectar and pollen. An ecosystem combines the habitats of many different plants and animals into a community. Living things like plants and animals and non-living things like water and soil interact in ecosystems. Bees are a "keystone" species— in some ecosystems the bees in them help the foods that grow there thrive. Different species of bees pollinate native blackberries like those shown below.

Fun Fact! Humans, birds and other animals eat blackberries, and bees harvest their pollen and build nests in their canes (stems). Cultivated blackberries are not invasive, but many non-native blackberries are highly invasive and can harm other plants and animals.

write a Ballad about cooking with foods bees make!

What is it? A **ballad** is a poem or song with four lines that rhyme. Words that rhyme end with the same sound. For example, **plot** and **lot** rhyme. In many ballads, the first and third lines rhyme with each other, and the second and fourth lines share a different rhyme. Here's an example:

Making Pollination Pizza

My class makes pizza from our garden plot
with peppers bees helped grow–tomatoes, too!
We spread the crust with sauce, then add a lot
of veggies on the top. It's fun to do!

Try writing a ballad about food that bees help make. First give your poem a title. If you like, draw a picture for your poem in the blank space below. Find someone to share your ballad with!

Title: _____

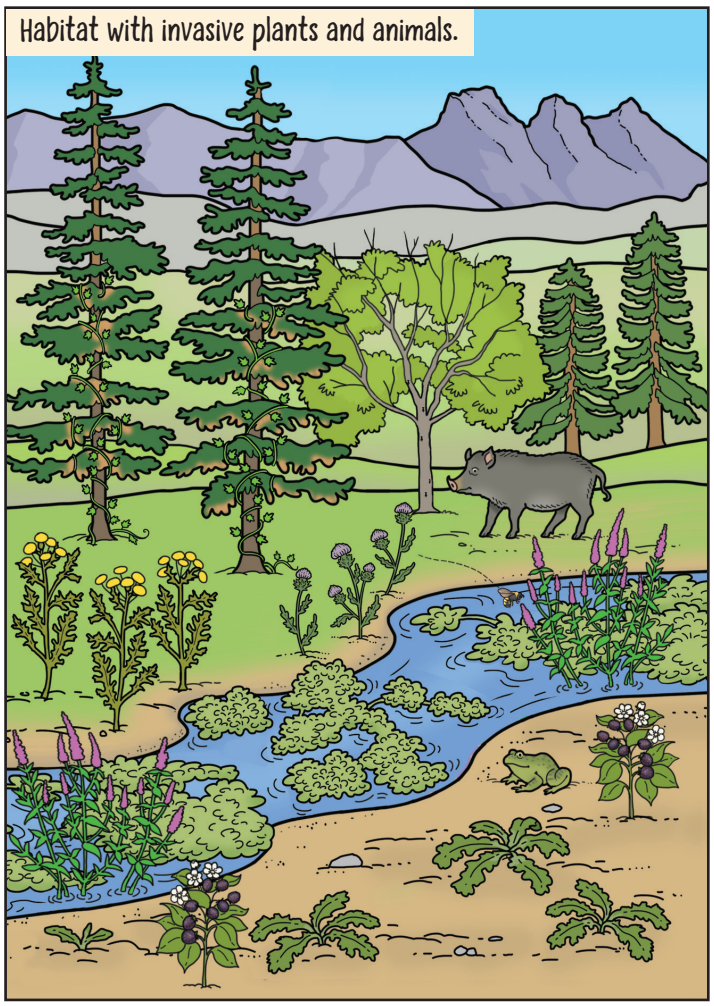
Some kinds of non-native plants and animals cause trouble when they are released outside their normal range. We call these "invasive species." Once they are established in a new area, invasive species can displace native plants and animals and damage the environment, the economy and human health. Gardeners, farmers and scientists manage invasive species in different ways. These are mechanical (pulling up the invasive plants), chemical (using a pesticide), cultural (conducting a controlled burn over an area and replanting with native plants) and biological (releasing or supporting enemy native species). Often these methods are combined to control invasive species and bring an ecosystem back into balance.

Bee and plant name here

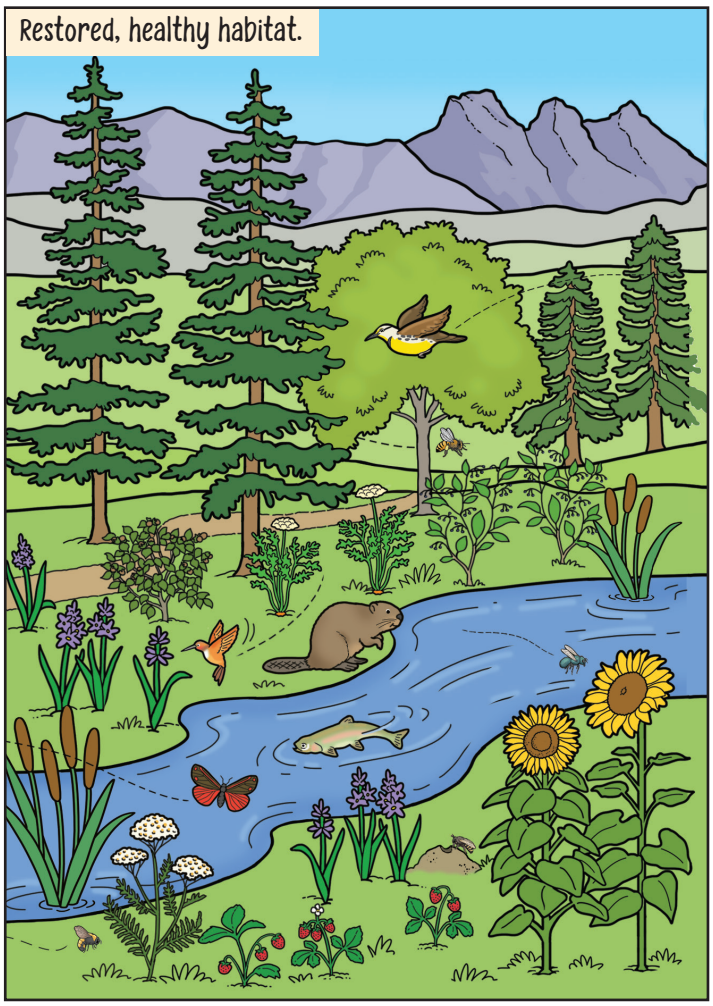
Some pesticides are toxic to bees! Other pesticides are important to keeping bee habitat free of invasive weeds that prevent plants bees like from growing. Only adults should use or handle pesticides! If pesticides are needed, they should be used in a place and time that doesn't harm bees. Adults should read the label on each pesticide container for warnings or other instructions that will help protect pollinators. If you have questions about pesticides, such as if a pesticide is safe to use around bees, contact the National Pesticide Information Center (NPIC) at **http://npic.orst.edu** or call **1-800-858-7378**.

Circle the differences **Compare the two pictures below and circle the ten differences. At the bottom of the page, check your answers.**

Habitat with invasive plants and animals.



Restored, healthy habitat.



1. Fir trees choked by ivy **2.** Ash tree canopy with fewer leaves **3.** Fewer types of pollinators (notice the Western meadowlark, cinnabar moth, and bees) **4.** River clogged with invasive plants (notice the purple loosestrife) **5.** Fewer species of bees **6.** More invasive animals (notice the feral swine [pig], emerald ash borer beetle, and American bullfrog) **7.** Fewer native animals (notice the American beaver and Coho salmon) **8.** More invasive plants (notice the Himalayan blackberry, tansy, and Canadian thistle) **9.** Fewer native plants, including edible plants (notice the sunflowers, camas, salmon berries, yampah [wild carrot] and cattails) **10.** Loss of hiking trail for outdoor recreation

What Bees Do for Oregon Crops

Bees pollinate many important crops in Oregon.

This map of Oregon can give you an idea of the types of crops statewide that bees help produce.

Native/Indigenous People live all over Oregon.

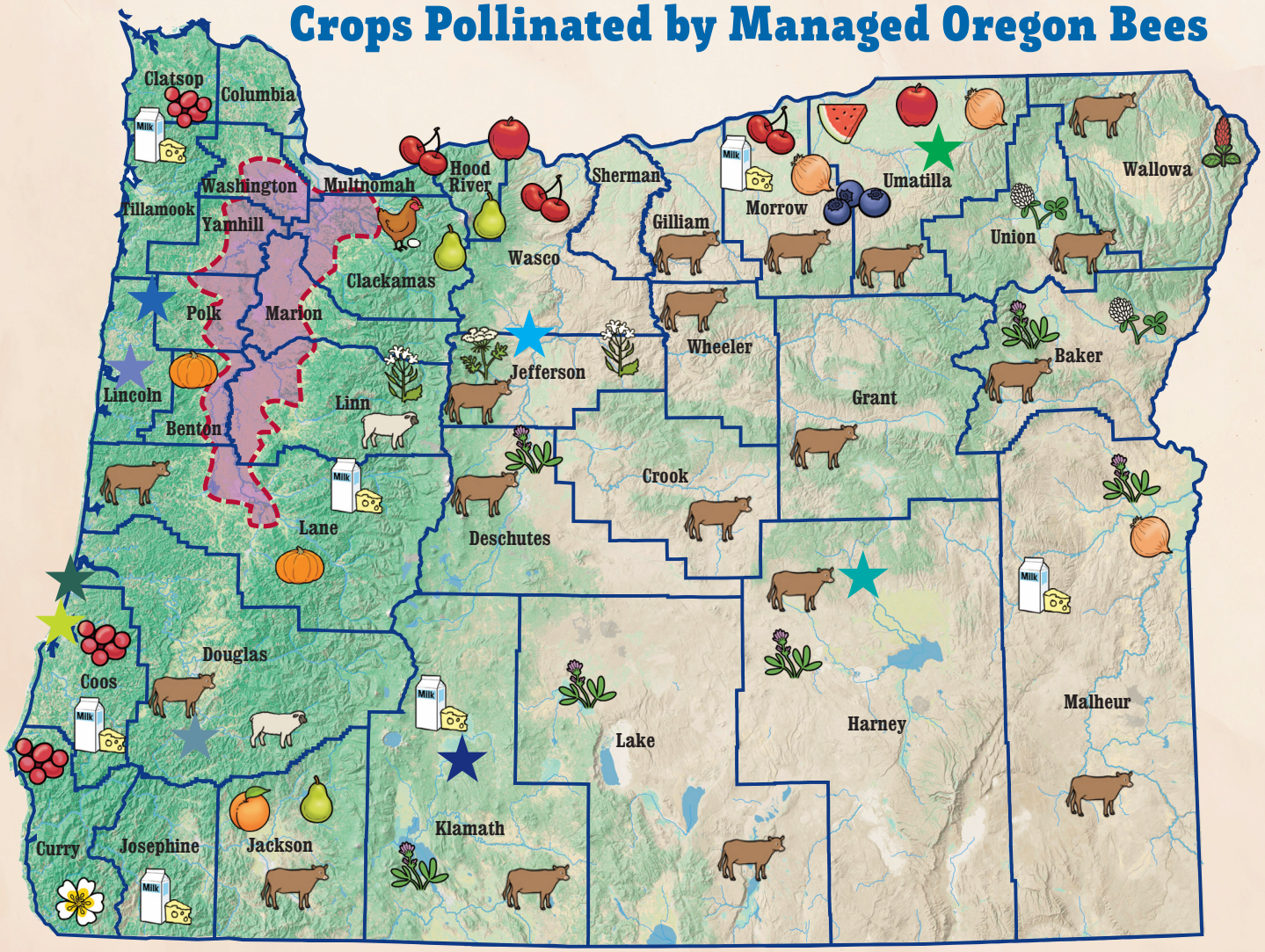
The stars represent the nine federally recognized Tribes in Oregon.

- Burns Paiute Tribe
- Confederated Tribes of Coos, Lower Umpqua and Siuslaw
- Confederated Tribes of Grand Ronde
- Confederated Tribes of Siletz
- Confederated Tribes of Umatilla
- Confederated Tribes of Warm Springs
- Coquille Indian Tribe
- Cow Creek Band of Umpqua Tribe of Indians
- Klamath Tribes

Map Legend

- Alfalfa seed
- Apples
- Beef
- Blueberries
- Carrot seed
- Caneberries
- Cherries
- Clover seed
- Chickens/eggs
- Cranberries
- Crimson clover seed
- Dairy
- Meadowfoam
- Mustard seed
- Onions
- Peaches
- Pears
- Pumpkins
- Sheep
- Vegetable/ flower seed
- Watermelon

Crops Pollinated by Managed Oregon Bees



Adapted from the Oregon Agriculture in the Classroom Foundation's Grown in Oregon map of the leading and unique commodities grown. **https://oregonaitc.org/**

Field Notes:

Bees are champion pollinators in habitats across Oregon. A team of pollinators work with bees in Oregon to make food. Insect and animal pollinators include ants, beetles, birds, butterflies, flies, moths and wasps! They may move pollen in different ways, but together they help plants make more plants and help make our food!

Dried Alfalfa

Use the map legend to find a favorite Oregon-grown food and where bees help pollinate it!

Cobalt Milkweed Beetle

Photo: Oregon Dept. of Agriculture

Male Anna's Hummingbird

White-Lined Sphinx Moth

Clouded Sulphur Butterfly

Honey bees on mustard flowers

Why are animals and dairy and on the map? Bees are important pollinators of alfalfa and clover flowers. Farmers grow these plants to feed many types of animals that give us milk, cheese, meat, eggs and more!

Agriculture in the Willamette Valley

The Willamette Valley's soil was enriched by volcanoes and glaciers. Its climate is cool and moist in the winter and warm and dry in the summer. These traits make it one of the best places to grow food in the world. All the crops shown and more than 150 others can be found growing in the Willamette Valley and enjoyed in meals across Oregon and the world.

Jory soil, the State soil of Oregon!

Write a Haiku About the Bees of Oregon

A haiku is a poem with three lines. It was invented in Japan. Often, it is about nature. Most haiku have 17 syllables. A syllable is a sound that you say on its own. The word **bee** has only one syllable. The word **springtime** has two. The first and third lines of a haiku each have five syllables, and the middle line has seven syllables: 5 + 7 + 5 = 17.

Here's an example:

Apple Tree
In springtime, it blooms.
Bees and blossoms make apples.
In fall, we make sauce!

Your turn. Try writing a haiku about how food grows. It can describe a farm, a garden, or any fruit or vegetable you like. Try a raspberry bush or a pumpkin patch! First give your poem a title. Then write three things about it, one on each line. Count your syllables! Find someone to read your poem to!

TITLE: _____

_____

[5 syllables]

_____

[7 syllables]

_____

[5 syllables]

Plant Parts

Fruits and Vegetables

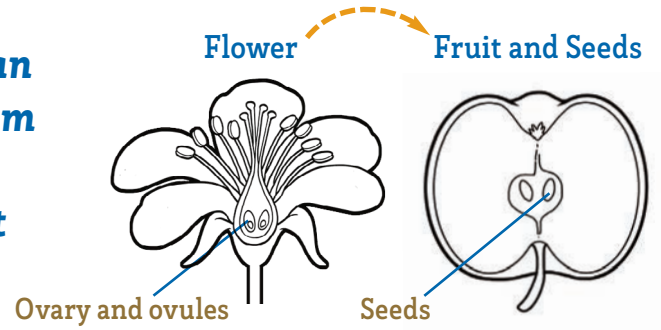
Vegetables are plant parts—roots, leaves, stems and flower buds. For instance, carrots are roots, lettuce is leaves, and celery stalks are stems! Broccoli has stems and flowers that both taste great! Broccoli heads are made of little flowers that have yet to open (see picture).

Fruits are made from plant parts, too. For some plants, after their flowers are pollinated, in time, a fruit is formed. For instance, this happens with apples, cherries and squash. In nature, fruit helps plants spread their seeds for miles: animals come to the plant to eat the tasty fruit and then spread its seeds in their poop.

In cooking and nutrition, some fruits are called vegetables. That's true for tomatoes, green beans, peppers and squash. This is because their taste and the nutrients they provide are more like vegetables than fruits. For example, green beans—also called string beans—are green, fleshy pods that grow around the seeds of a bean plant. People think of them as a vegetable, but plant experts think of them as a fruit.

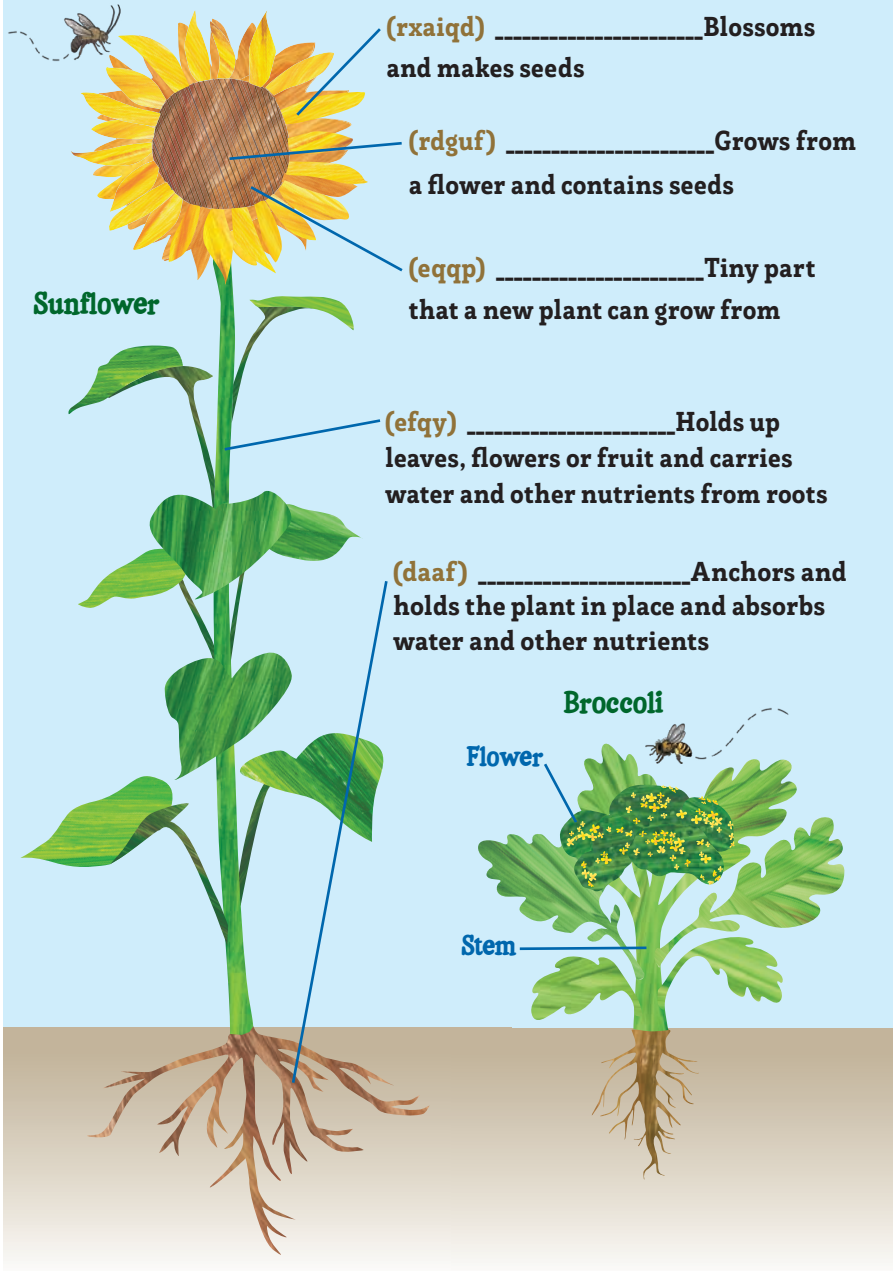
Many plants and bees need each other to survive; they are **interdependent**.

The Part of an Apple Blossom that Turns into a Fruit and Seeds



An ovary turns into a fruit; ovules turn into a fruit's seeds.

Decode the letters below to reveal the plant part.



(rxaiqd) _____Blossoms and makes seeds

(rdguf) _____Grows from a flower and contains seeds

(eqqp) _____Tiny part that a new plant can grow from

(efqy) _____Holds up leaves, flowers or fruit and carries water and other nutrients from roots

(daaf) _____Anchors and holds the plant in place and absorbs water and other nutrients

Decoder:

m=a	u=i	a=o	f=t
p=d	x=l	d=r	g=u
q=e	y=m	e=s	i=w
r=f			

Sunflower

Mixed vegetable seeds

Coriander seeds

Sunflower seeds

More About Seeds and a Plant Part Recipe

A seed contains everything that is needed for a plant to grow except water, healthy soil, air and sunshine. Bees help make seeds. In return, seeds can grow into plants that make pollen to feed bees. Seeds are high in protein. Pumpkin and sunflower seeds are great as a snack or in a salad, cereal or yogurt topper!

Fun Seed Facts!

- You can carve a pumpkin and roast and eat its seeds, or dry the seeds out and save them to plant.
- Sunflowers are also a plant with seeds we can eat or dry out and plant.
- Did you know that strawberries have their seeds on the outside? A strawberry flower is made of many tiny flowers fused into one big flower. The little dots on the surface of a strawberry are the seeds of each flower.
- How big are seeds? Seeds come in all shapes and sizes. Avocados have one large seed.

Carrot seeds

Avocado seed

Recipe: Plant Part Funny Face Sandwich

1. Cover a slice of bread with a spread.
2. Design a face on top using plant parts.

Spread, such as nut or sunflower butter, hummus, or cream cheese
Leaves, such as lettuce, herbs, or even pesto
Roots such as shredded carrots, radish slices or jicama sticks
Flowers, such as broccoli or cauliflower florets or nasturtiums
Stems, such as celery or chard stems
Fruit, such as apple slices, berries or peppers
Seeds, such as roasted sunflower or pumpkin seeds

Draw your sandwich!

Recipe Planning - Read the recipe above. Below, write down the ingredient you would choose for each plant part if you made the recipe.

- Flower _____
- Fruit _____
- Leaf _____
- Root _____
- Seed _____
- Stem _____
- Choose a spread: _____

Pumpkin seeds

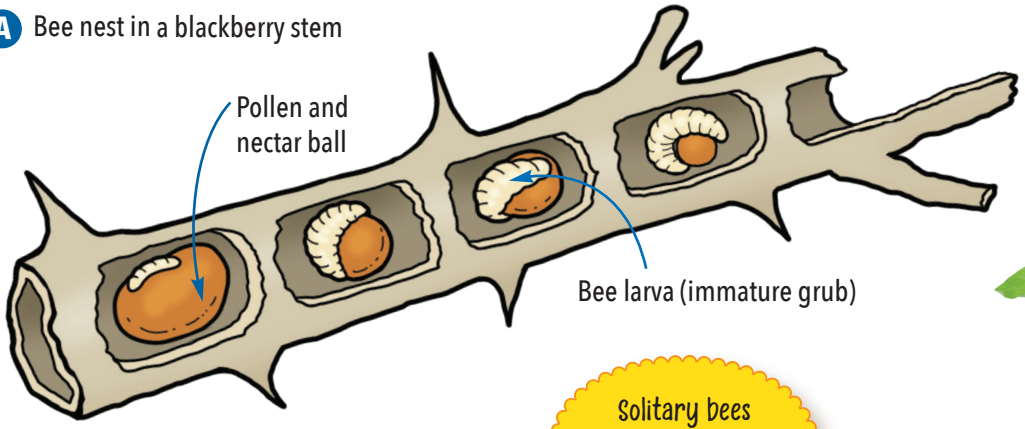
Solitary Bees

Solitary bees are bees that live alone–not in a hive or with other bees. Most bees found in Oregon are solitary bees.

Mason, leafcutter, long-horned and alkali bees are some examples of solitary bees. After mating, a solitary female bee, all on her own, will build her nest, forage for pollen and nectar, and lay her eggs. The solitary female bees below are making their nests in three different places: (A) a plant stem, (B) a tunnel in the ground, (C) an old tree stump.

Dandelion

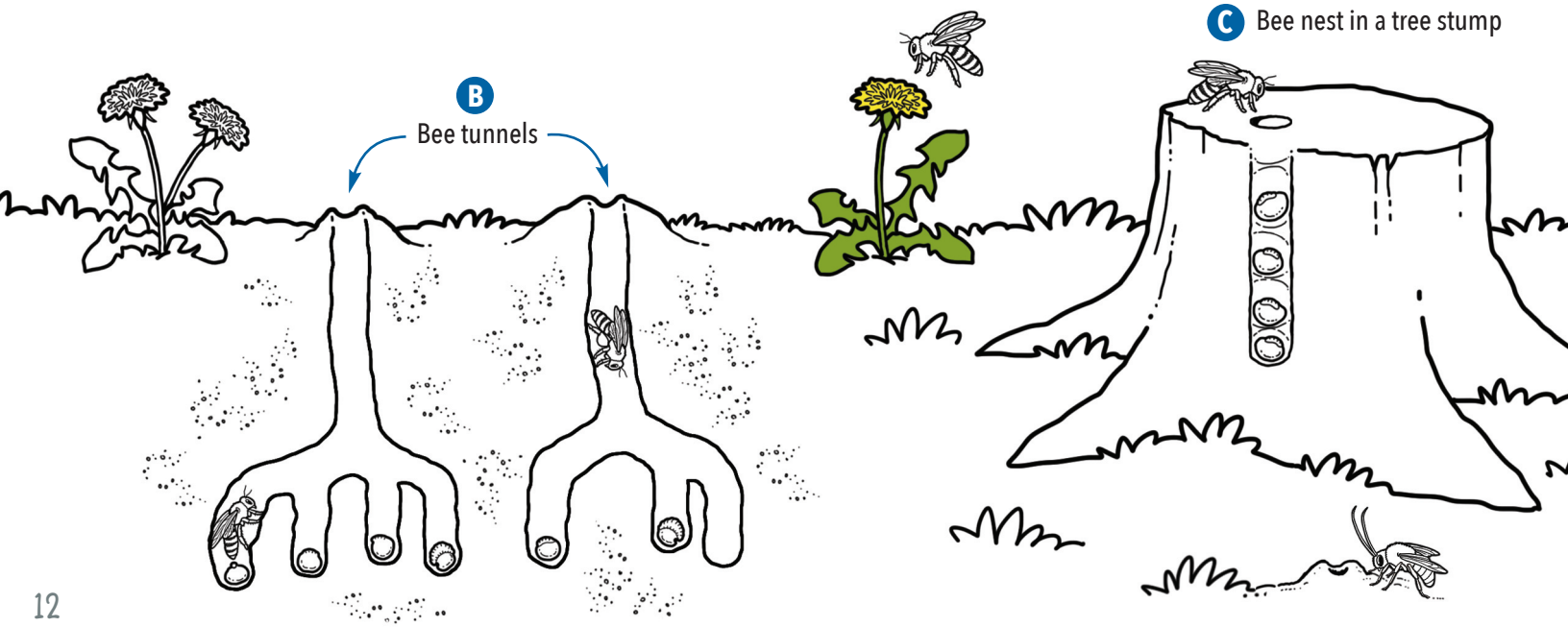
A Bee nest in a blackberry stem



Solitary bees don't make honey or wax.

Common dandelions *(Taraxacum officinale)* Unlike the horned dandelion, the common dandelion is not **indigenous** to North America. In the 1600s, colonists brought common dandelion seeds with them from Europe, as they believed the plant could cure many illnesses. In time, some people came to view the common dandelion as a weed that crowds out native plant species. Other people, including Indigenous Peoples, saw it as a great source of food and medicine. Did you know that you can eat dandelions from flower to root? They are an excellent source of vitamins A and C. One cup of dandelion greens contains almost twice as much iron as spinach! You can buy dandelion greens and teas at local grocery stores. In the kitchen, you can use the greens in salads, soups, bread, pesto, smoothies and desserts. Dandelions can also be used to make oils, teas, jellies, salves and traditional medicines. And of course, bumble bees and honey bees that pollinate dandelions make honey!

C Bee nest in a tree stump

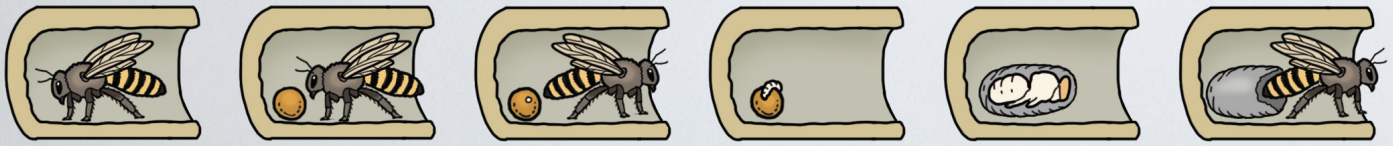


Solitary Bee Life Cycle


Mason bee emerging from a cocoon

No matter where a solitary female bee nests, these steps happen:

1. The bee creates a chamber or cell where she can safely lay an egg.
2. In any chamber she creates, she mixes a ball of pollen and nectar to feed her offspring.
3. She lays an egg on each ball, seals up the nest, and then leaves.
4. When an egg hatches, out comes a tiny larva (the first growth stage of a bee). The larvae all feed on their pollen balls and grow bigger.
5. When the larvae have grown big enough, they undergo ***metamorphosis***, (a change in shape). The bee larvae slowly change from immature grubs to adult bees. Just like caterpillars, some bee larvae spin silk cocoons before they go through this process.
6. When the adult bees come out of their cells, males and females will mate with bees from other nests. Mated females start new nests of their own.



Camas *(Camassia quamash)* Camas, a type of native lily flower, have been an important part of ecosystems for thousands of years. Camas have been an important traditional food for many Tribal people. Camas usually grow on prairies. Mason bees, bumble bees, hoverflies and European honey bees all pollinate camas flowers. Indigenous Peoples have long used traditional practices to protect Camas prairies. These include removing invasive plant species, turning the soil to allow air in, and traditional burning methods to promote new plant growth. These practices work: camas fields were once so abundant they were described from a distance as "seas of blue." Colonization removed Indigenous Peoples from their homelands and people began developing the prairies for agricultural use. Now less than 1% of native prairies in Oregon remain. Today, Indigenous Peoples and others are working to restore camas' habitats for future generations of people and bees. You can help them! Camas can easily be grown in your yard or a community or school garden. You can find seeds or bulbs at many garden stores and native plant nurseries.

A habitat is a home to living things that provides the shelter, water and foods they need. Draw more native camas flowers in the habitat above. The flowers will provide more pollen and nectar for the bee species that pollinate camas!

See Me In Action!
https://beav.es/SSL

Solitary Bees

Squash Bees

Genus: Peponapis

(pronounced *pep-on-A-pis*)

Squash Bee
11 to 14 mm in length

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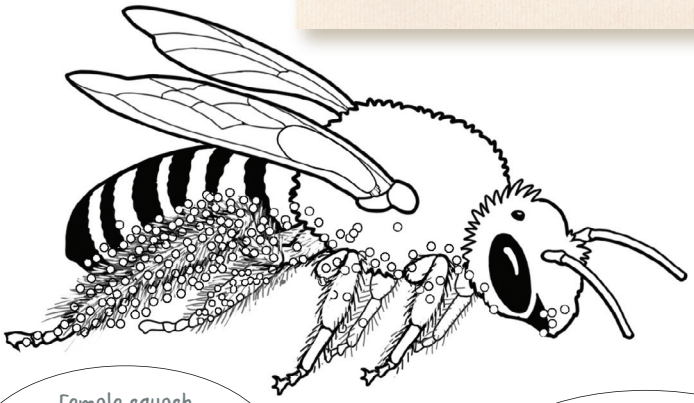


Female squash bees collect pollen on thick brushy **scopa** (hair) on their back legs.

Although other bees can pollinate squash plants, squash bees are some of the only bees that can fully digest squash pollen.

Color in the hidden pictures!

Zucchini

Gourd

Pumpkin

Field Notes:

Squash bees found in Oregon are medium-sized, fuzzy bees that feed only on the pollen of plants in the squash family (squashes, pumpkins and gourds). They spend their whole lives around the plants they pollinate. They nest in the ground beneath squash plants and even sleep inside squash blossoms. In fact, the best way to find squash bees is by looking inside squash blossoms in the cool of the morning when the bees are still asleep. Squash bees are new to Oregon and are still making their way around. Can you find squash bees in your community?

Why do you think the squash bee prefers squash?

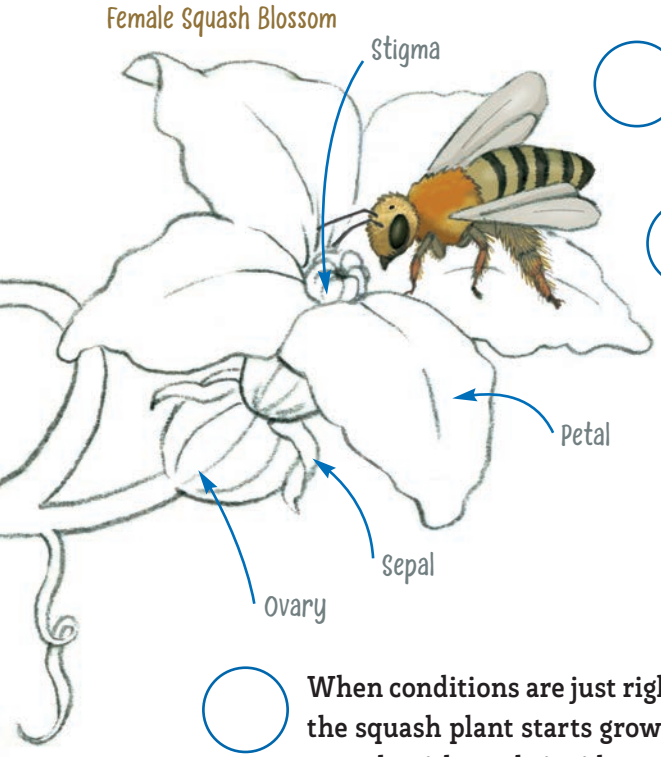
A trait of this bee is that it is **fuzzy**.
Name a synonym for **fuzzy**:

_____

Pollination in Action

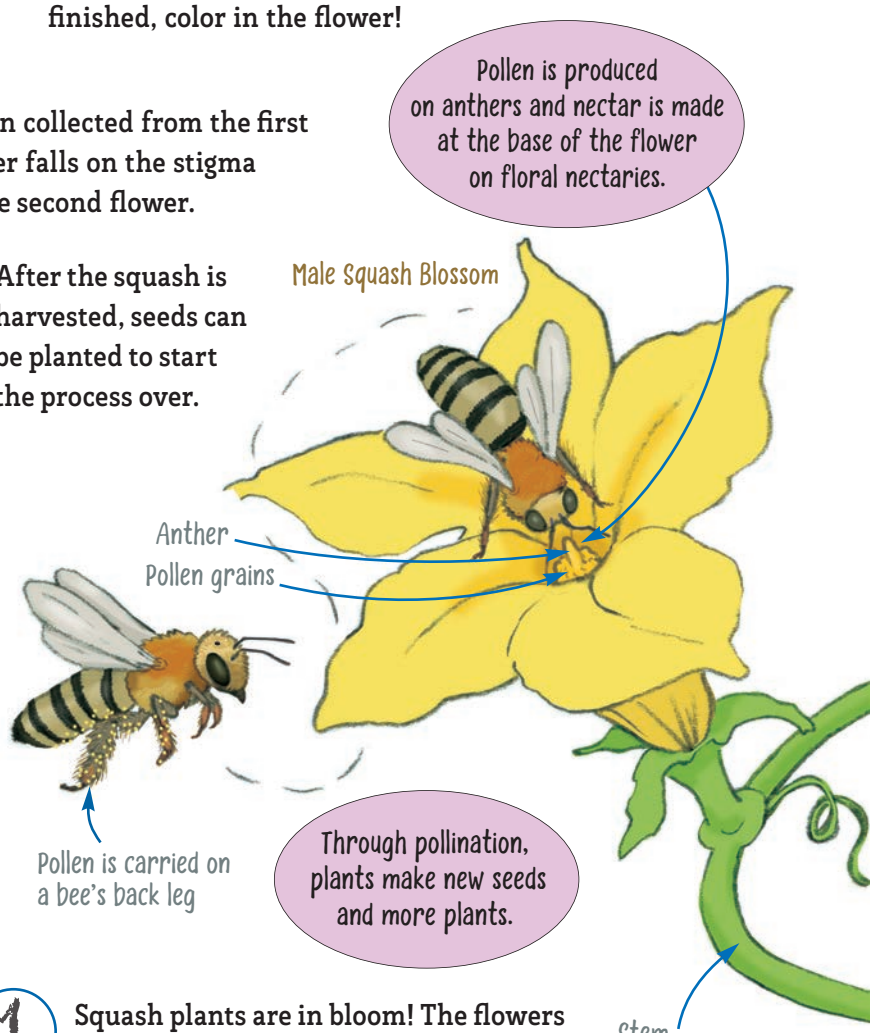
The Pollination of a Squash Plant

Follow this ***species*** of squash bee, *Peponapis pruinosa*, as it pollinates a squash flower. **In the circles below, enter the numbers 1 through 6 to put the steps of pollination in order.** Step 1 has been filled in for you. When you've finished, color in the flower!



( ) Pollen collected from the first flower falls on the stigma of the second flower.

( ) After the squash is harvested, seeds can be planted to start the process over.



( ) When conditions are just right, the squash plant starts growing a squash with seeds inside.

( ) A female squash bee travels to a squash plant to collect pollen from an exposed anther of a squash flower.

( ) The bee travels to another squash plant nearby.

(1) Squash plants are in bloom! The flowers are open and the anthers are exposed.

The Story of Squash and Squash Bees in Oregon

We would not have squash bees if not for squash plants and the Indigenous Peoples who formed a ***reciprocal*** relationship (taking care of each other) with the plants. This reciprocal relationship began over 10,000 years ago in Central America. As the people slowly ***cultivated*** the land to grow squash for food and for trade, they created a ***migration*** of squash to the north and the bees followed!

Squash was not originally part of the traditional diet of Indigenous Peoples of the Pacific Northwest. Only in recent years has enough squash been grown in the region to attract squash bees. In 2017, squash bees were first spotted in Oregon by kids in a garden in Ashland!

Squash Bee and Squash Flower

Three Sisters Soup

Which of the ingredients for this recipe would you most want to grow? Why?

_____

_____

_____

The Three Sisters—squash, corn and beans—thrive when planted together. Many traditional foods of Native Indigenous Peoples, past and present, need wild bees, like the squash bee, to grow. These foods include the Three Sisters, blueberries, chokecherries, cranberries, dandelions, huckleberries, peppers, pumpkins, sunflowers, sweet potatoes, tomatoes and many more.

Ingredients

1 1/2 Tablespoons **vegetable oil**
3/4 cup diced **carrot** (1 medium carrot)
1 cup chopped **onion** (1 medium onion)
1 teaspoon **garlic powder** or 4 cloves **garlic**, minced
2 cups diced **summer** or **winter squash** (fresh or frozen)
1 1/2 cups **corn** (fresh or frozen) or a 15-ounce can (drained and rinsed)
1 1/2 cups **cooked beans** (any type) or a 15-ounce can (drained and rinsed)
1 can (15 ounces) diced **tomatoes** or 2 cups diced fresh
3 1/2 cups low-sodium **broth** (any type)
1/4 teaspoon **pepper**

Indigenous Peoples continue to contribute vast amounts of knowledge and stewardship to our understanding of the plant world.

Directions

1. Wash hands with soap and water.
2. Heat oil in a large pan on medium heat. Add carrot and onion and sauté until onions have begun to turn slightly brown, about 8 to 10 minutes.
3. Add garlic, squash and corn. Stir for another 3 to 4 minutes.
4. Add beans, tomatoes, broth and pepper. Allow soup to come to a boil.
5. Turn heat down. Simmer until all vegetables are tender (15 to 30 minutes, depending on the vegetables used).
6. Refrigerate leftovers within 2 hours.

Makes 8 cups
Prep time: 15 minutes
Cook time: 30 minutes

Nutrition Facts

8 servings per container
Serving size 1 cup (297g)

Amount per Serving	
Calories	**170**
	% Daily Value*
Total Fat 4g	**5%**
Saturated Fat 0.5g	**3%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 130mg	**6%**
Total Carbohydrate 28g	**10%**
Dietary Fiber 3g	**11%**
Total Sugars 7g	
Includes 0g Added Sugars	**0%**
Protein 8g	
Vitamin D 0mcg	0%
Calcium 50mg	4%
Iron 1mg	6%
Potassium 494mg	10%
Vitamin A 294mcg	33%
Vitamin C 16mg	18%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Recipe Math Challenge

Today two friends come to eat lunch at the food truck. Each friend orders a 2-cup bowl of Three Sisters Soup. How many milligrams (mg) altogether will the friends consume of:

Potassium _____ Vitamin C _____

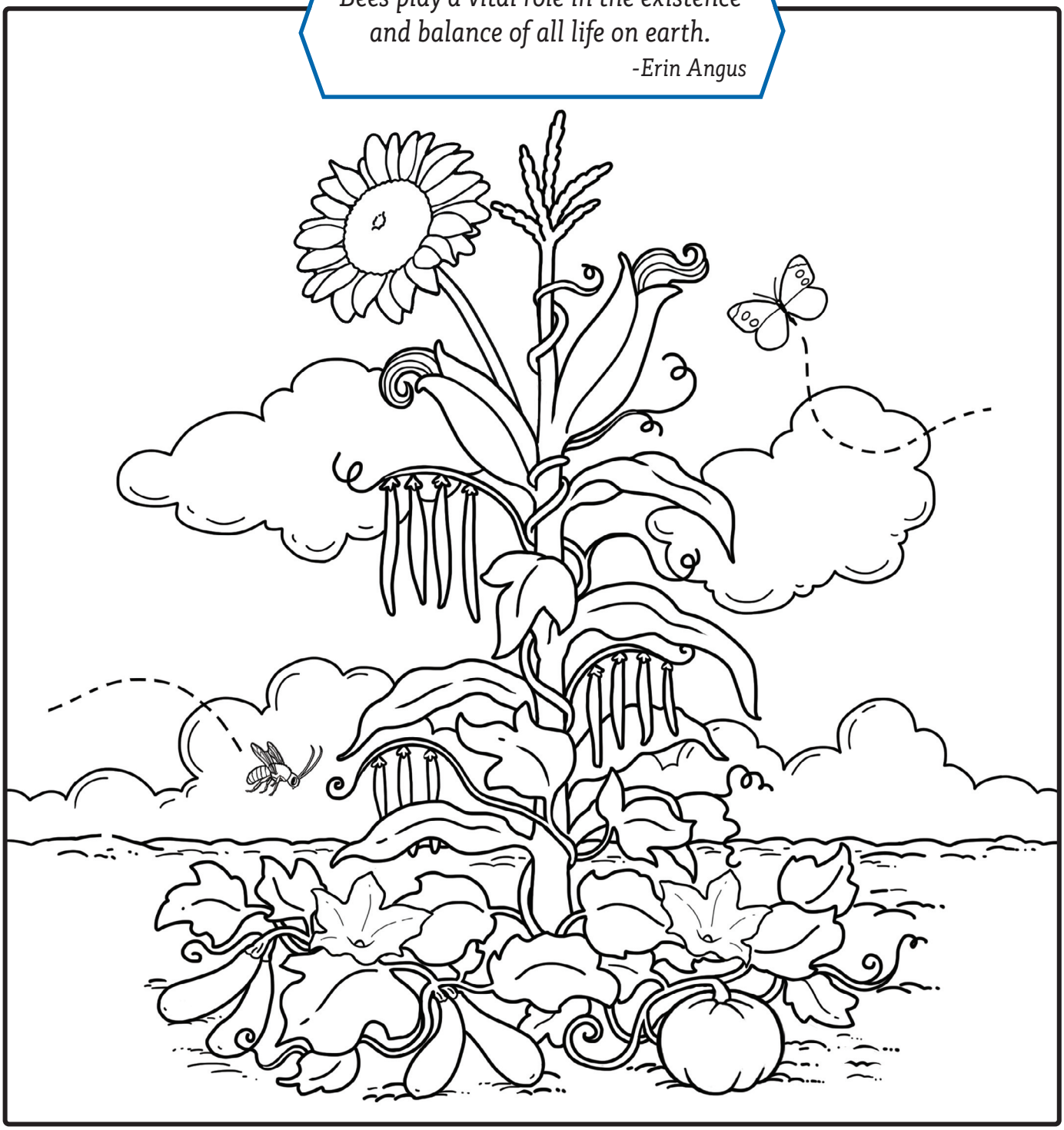
Hint: multiply by two twice or four once.

Bonus: Round your answers to the nearest 1000 mg (potassium) and 10 mg (Vitamin C).

Three Sisters

Bees play a vital role in the existence and balance of all life on earth.

-Erin Angus



Three Sisters is a companion planting method—these plants grow better when planted together. The corn stalk creates a trellis for the beans vine. Meanwhile, the beans bring in nitrogen (a key nutrient for plant growth) from the air. At the same time, the wide squash leaves keep the soil cool, moist and free of weeds. The Three Sisters way of planting, as well as the traditional Three Sisters Soup recipe, originated from Indigenous farmers. These included farmers from the ***Haudenosaunee Nation*** (pronounced hoe-dee-no-SHOW-nee), also known as the **Iroquois Confederacy**.

Draw more pollinators in the habitat above!

See Me In Action!
https://beav.es/SSR

Solitary Bees

Mason Bees

Genus: Osmia

(pronounced OZ-*me*-*a*)

Mason Bee
6 to 12 mm in length

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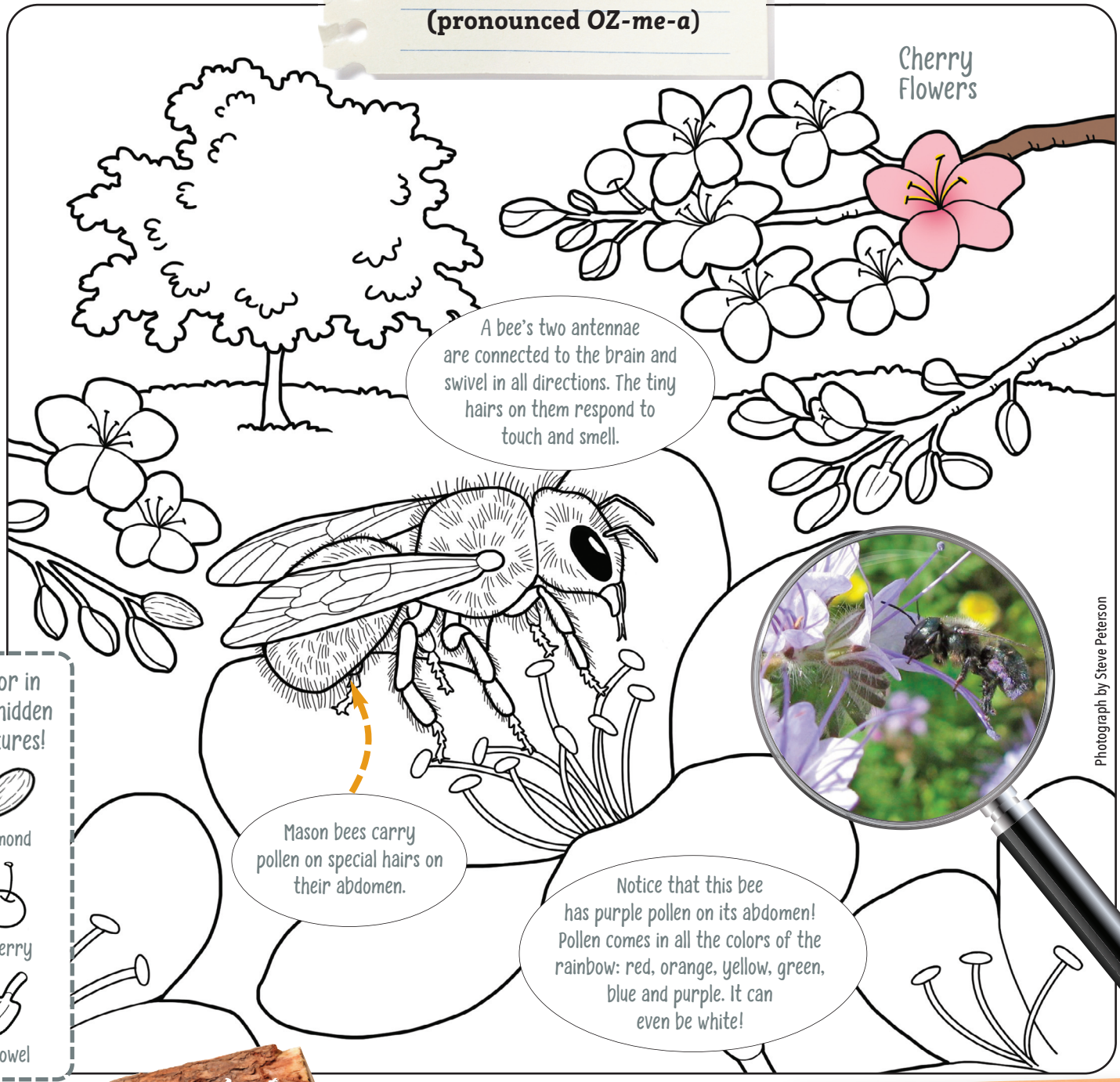


Photograph by Steve Peterson

Color in the hidden pictures!

Almond


Cherry

Trowel

Field Notes:

Some **mason bees** are pollinators of almonds, apples, blueberries, raspberries and cherries, as well as native plants like camas.. They are called mason bees because they use mud or clay to build their nests, just like a mason. A mason is someone who uses bricks and mortar to build homes and other buildings. They are small to medium-sized bees that are colored in bright metallic blues and greens and sometimes black. In Oregon, they are most often used to pollinate cherries. They work quickly: under some conditions one female mason bee can pollinate three times as many flowers as a single honey bee in the same amount of time.

Does the mason bee remind you of another animal? A classmate? Why?

A trait of this bee is that it is a **fast** pollinator.
Name a synonym for **fast**:

_____

Mason Bee and Cherry Flowers

Super Sundae

Do you think you could make this recipe without the help of bees?

Cherries bloom in early spring when the weather can still be cold and frosty. Mason bees do some of their best work pollinating cherry trees while most other bees are still sleeping in their warm nests.

Watch the Oregon cherry harvest in action: https://beav.es/TT3

OREGON HARVEST for SCHOOLS

Ingredients

1 cup low-fat plain or vanilla **yogurt**
2/3 cup chopped **peaches** (fresh, frozen, or canned and drained)
2/3 cup **cherries** (fresh or frozen)
2 Tablespoons **granola**

Instructions

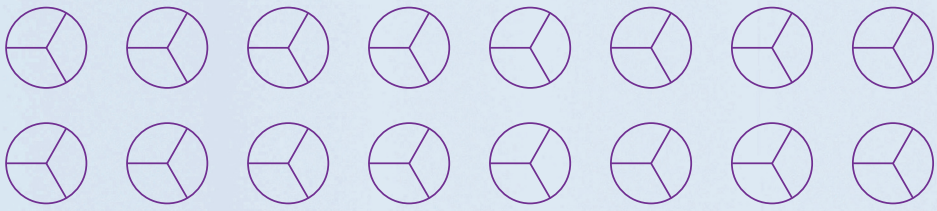
1. Wash hands with soap and water.
2. Divide yogurt between 2 clear glasses or dishes.
3. Spoon half of the peaches and cherries on top of the yogurt.
4. Sprinkle each sundae with granola.
5. Refrigerate leftovers within 2 hours.

Makes 2 cups
Prep time: 10 minutes

Recipe Math Challenge

Today the food truck is at the farmers' market. We did the math and found out we need 16 cups of fruit to make this recipe for our customers! We have 8 cups of cherries and 1⅓ cups of chopped peaches from our fruit trees. We decide to use frozen peaches for the missing peaches. How many cups of frozen peaches will we need to make this recipe?

Bonus: Check your work by using the fraction models below.



Nutrition Facts

2 servings per container
Serving size 1 cup (231g)

Amount per Serving	
Calories	150
	% Daily Value*
Total Fat 3g	4%
Saturated Fat 1.5g	8%
Trans Fat 0g	
Cholesterol 5mg	2%
Sodium 90mg	4%
Total Carbohydrate 24g	9%
Dietary Fiber 2g	7%
Total Sugars 18g	
Includes 1g Added Sugars	2%
Protein 8g	
Vitamin D 0mcg	0%
Calcium 231mg	20%
Iron 0mg	0%
Potassium 430mg	10%
Vitamin A 27mcg	3%
Vitamin C 6mg	6%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

See Me In Action!
https://beav.es/SSb

Solitary Bees

Long-Horned Bees

Genus: Melissodes

(pronounced *mel-eh-SOH-dees*)

Long-Horned Bee
9 to 15 mm in length

Sunflowers

Color in the hidden pictures!

Clarkia

Sunflower Seeds

Primrose

This is a male long-horned bee (you can tell because of the long antennae). Females have shorter antennae.

Only female bees collect pollen. Male bees of all species lack structures to carry pollen: corbicula and **scopa** (hair) on legs and abdomen.

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Field Notes:

Long-horned bees are beautiful medium-sized bees that are very fuzzy. They are dark with yellow, black or white hairs. Males have long ***antennae*** (horns) like the bee shown. Females have large, brush-like hairs on their back legs that they use to carry pollen. Bees in the genus Melissodes like to visit plants in the sunflower family the most. They also visit a number of native plants, (such as primrose and clarkia). Planting sunflowers in your community, and watching the blooms, is the best way to find these bees in Oregon.

Which animal do you think could cohabitate with (live in a habitat with) a long-horned bee? Why?

A trait of this bee is that they are **beautiful**.
Name a synonym for **beautiful**:

_____

Cranberry Oatmeal Balls

What is your favorite ingredient in this recipe? Why?

_____

_____

_____

Long-Horned Bee and a Sunflower

Pollinators can visit many different flowers, and you can choose many different ingredients to use in this no-bake treat! Think about the hard work of pollinator teams as you enjoy this super flexible treat!

Ingredients

1 cup **oats** (quick-cooking or old fashioned rolled)
1/3 cup dried **cranberries** or other dried fruit
1/3 cup **sunflower seeds** or other seeds or nuts
1/3 cup **peanut butter** or sunflower seed butter
3 Tablespoons **honey**. (Honey is not recommended for children under 1 year old.)

Instructions

1. Wash hands with soap and water.
2. In a medium bowl, add all ingredients.
3. Stir until well mixed.
4. Form about 2 Tablespoons of mixture into a ball and place on a plate. Repeat with the rest of the mixture.
5. Refrigerate for 30 minutes and until ready to eat.

Watch the Oregon cranberry harvest in action:
OREGON HARVEST for SCHOOLS
https://beav.es/TJq

Makes 16 balls
Prep time: 15 minutes
Chill time: 30 minutes

Honey bees and bumblebees are top pollinators of Oregon cranberries!

Nutrition Facts

8 servings per container

Serving size	2 balls (43g)
Amount per Serving	
Calories	**180**
	% Daily Value*
Total Fat 7g	9%
Saturated Fat 1g	5%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 65mg	3%
Total Carbohydrate 24g	9%
Dietary Fiber 3g	11%
Total Sugars 12g	
Includes 6g Added Sugars	12%
Protein 6g	
Vitamin D 0mcg	0%
Calcium 23mg	2%
Iron 1mg	6%
Potassium 84mg	2%
Vitamin A 0mcg	0%
Vitamin C 0mg	0%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Recipe Math Challenge

If the recipe were to be doubled, how much of each ingredient would you need?

- Oats_____
- Honey_____
- Sunflower seeds, peanut butter or cranberries

_____

Bonus: If you want to make 208 cranberry oatmeal balls, how much of each ingredient would you need?

See Me In Action!
https://beav.es/JSR

Solitary Bees

Alkali Bees

Genus: Nomia

(pronounced *NO-mi-a*)

Alkali Bee
12 to 13 mm in length

Alkali Bee Photo: Oregon Department of Agriculture

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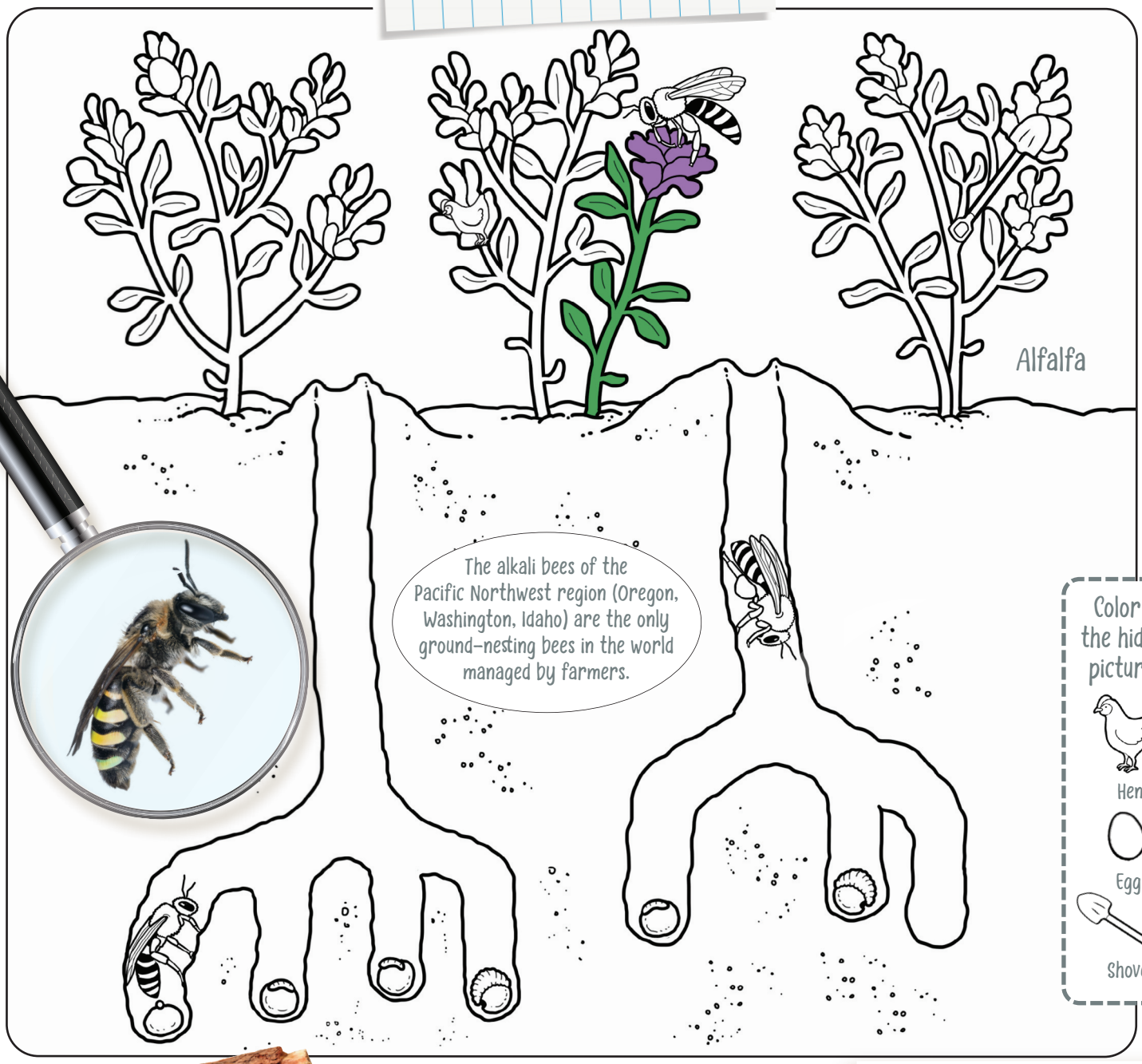


Color in the hidden pictures!

Hen

Egg

Shovel

Field Notes:

Alkali bees, like leafcutter bees, pollinate alfalfa flowers to make alfalfa seed. From the seed, farmers grow hay to feed many different types of animals. Even chickens like alfalfa hay! Alkali bees nest in the ground and are very picky; in the wild they love salty, moist and crumbly soil. Some farmers have figured out how to create these same conditions in the soil on their farms. At these sites, thousands of females build nests side-by-side, packing their nests with alfalfa pollen. After the females lay an egg, the hungry alkali bee larvae consume the pollen and complete their development underground.

What specific physical trait(s) make alkali bees unique?

A trait of this bee is that it makes its nest in the **ground**. A synonym for **ground** is:

_____

Baked Cauliflower Tots

Look up what "Alkali" means in the dictionary. What is the definition? What part of language is it?

_____

_____

_____

_____

Alkali Bee

People throughout Oregon and beyond keep chickens for the eggs they lay. If the chickens are fed alfalfa there is a good chance they have alkali bees to thank! Alfalfa is the only crop alkali bees pollinate. Can you believe female alkali bees can pollinate up to 4 alfalfa flowers per minute (that's 2,000 flowers per 8-hour day of flying)!

Ingredients

2 cups grated or finely chopped **cauliflower** rice (about half a medium head)
1 **egg**
3 Tablespoons **flour**
1/4 cup grated **cheddar cheese**
1/4 teaspoon **salt**

Directions

1. Wash hands with soap and water.
2. Preheat oven to 400 degrees F.
3. Lightly grease a baking sheet.
4. In a medium bowl, combine all ingredients and mix well.
5. Press mixture together to make about 15 tots. Place tots on the baking sheet with space between each one.
6. Bake for 20 minutes or until cooked through. For extra crispy tots, broil for an extra 2 minutes. Watch closely to avoid burning.
7. Refrigerate leftovers within 2 hours.

Watch Oregon families harvest eggs and cauliflower

OREGON HARVEST for SCHOOLS

https://beav.es/???
https://beav.es/???

Makes 15 tots
Prep time: 10 minutes
Cook time: 20 minutes

Nutrition Facts

3 servings per container

Serving size	5 tots (110g)
Amount per Serving	
Calories	**70**
	% Daily Value*
Total Fat 2.5g	3%
Saturated Fat 1g	5%
Trans Fat 0g	
Cholesterol 40mg	13%
Sodium 200mg	9%
Total Carbohydrate 9g	3%
Dietary Fiber 2g	7%
Total Sugars 2g	
Includes 0g Added Sugars	0%
Protein 5g	
Vitamin D 0mcg	0%
Calcium 67mg	6%
Iron 1mg	6%
Potassium 296mg	6%
Vitamin A 30mcg	3%
Vitamin C 43mg	48%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Recipe Math Challenge

How many total cups of cauliflower, cheese, and flour would be used if the recipe was quadrupled? **Hint:** 4 Tablespoons equals 1/4 cup.

Bonus: How many tots would the quadrupled recipe make?

See Me In Action!
https://beav.es/SSR

Solitary Bees

Leafcutter Bees

Genus: Megachile

(pronounced *me-ga-KY-lee*)

Leafcutter Bee
6 to 22 mm in length

Color this page online at: https://beav.es/???

Alfalfa Flowers

Find the hidden pictures!


Milk


Scissors


Hamburger

Leafcutter bees and mason bees belong to a family of bees called Megachilidae (meg-a-KILL-ih-dee), meaning "large jaw," referring to their large **mandibles** that act like teeth.

Leafcutter Bee Photo: Oregon Department of Agriculture

Field Notes:

Leafcutter bees are pollinators of alfalfa and many wild plants. They are called leafcutter bees because they cut out small pieces of leaves to use to build their nests. Leafcutter bees are darkly colored, small to medium-sized bees. In Oregon, they are important pollinators of alfalfa grown for seed. Farmers buy the seed to grow alfalfa plants, which are fed to cows and other ***livestock*** (animals raised on a farm) that give us milk, cheese, yogurt, eggs, meat and more.

Name at least one trait of the leafcutter bee that differs from a trait of a bee on another page. Name at least one trait that is the same.

A trait of this bee is that it can cut leaves for its nest. A synonym for cut is:

_____

Leafcutter and Alkali Bee and Alfalfa Flowers

Stuffed Potatoes

Name someone you would like to share this recipe with. Why would they like it?

_____

_____

_____

Many farmers and ranchers feed their livestock alfalfa hay. It's loaded with nutrients like protein, vitamins and minerals that help the animals produce high-quality meat and dairy products. Oregon leafcutter and alkali bees help produce the alfalfa seed that these farms animals eat.

Ingredients

2 medium **potatoes** or sweet potatoes

3/4 cup **salsa**

1 cup **broccoli** (frozen or fresh)

1 cup **cooked beef** or pinto or black beans (cooked or canned, drained and rinsed), or a mixture

1/2 cup shredded **cheese** (try cheddar, feta or pepper jack)

Directions

1. Wash hands with soap and water.
2. Scrub potatoes well. Poke each potato with a fork 2 or 3 times.
3. Microwave on HIGH for 5 minutes. Turn potatoes over, and microwave another 3 to 5 minutes, or until easily pierced with a fork. Set aside.
4. In a microwave safe bowl combine salsa, broccoli and beef and/or beans. Microwave for 2 to 3 minutes, stopping once or twiceto stir, until heated through.
5. Cut potatoes in half length-wise and fluff with a fork.
6. Divide salsa mixture between the halves.
7. Sprinkle halves with cheese and serve warm.*Refrigerate leftovers within 2 hours.

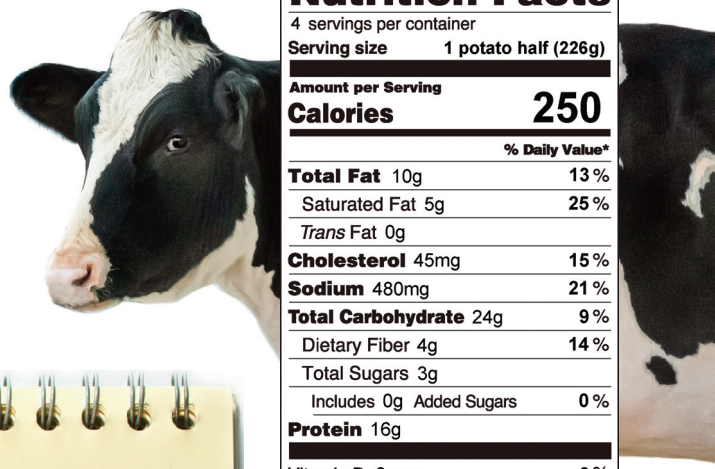
***Topping ideas**: chopped cilantro, avocado, hot sauce, black olives, green onion, plain low-fat yogurt or sour cream.

Makes 4 potato halves
Prep time: 5 minutes
Cook time: 10 minutes

Watch Oregon dairy and beef farmers in action:

OREGON HARVEST for SCHOOLS

https://beav.es/TJw
https://beav.es/TJU



Nutrition Facts

4 servings per container

Serving size **1 potato half (226g)**

Amount per Serving	
Calories	**250**
	% Daily Value*
Total Fat 10g	**13%**
Saturated Fat 5g	**25%**
Trans Fat 0g	
Cholesterol 45mg	**15%**
Sodium 480mg	**21%**
Total Carbohydrate 24g	**9%**
Dietary Fiber 4g	**14%**
Total Sugars 3g	
Includes 0g Added Sugars	**0%**
Protein 16g	
Vitamin D 0mcg	0%
Calcium 131mg	10%
Iron 2mg	10%
Potassium 667mg	15%
Vitamin A 67mcg	7%
Vitamin C 41mg	45%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Recipe Math Challenge

The food truck sells stuffed potato plates seven days a week. One plate contains two halves of a potato. How many stuffed potato plates will you sell in the month of July which always has 31 days?

Bonus: How many cups of cheese do you need to buy to make 56 stuffed potato plates?

Leafcutter Bee Photo:
New Zealand Arthropod Collection

See Me In Action!
https://beav.es/SSL

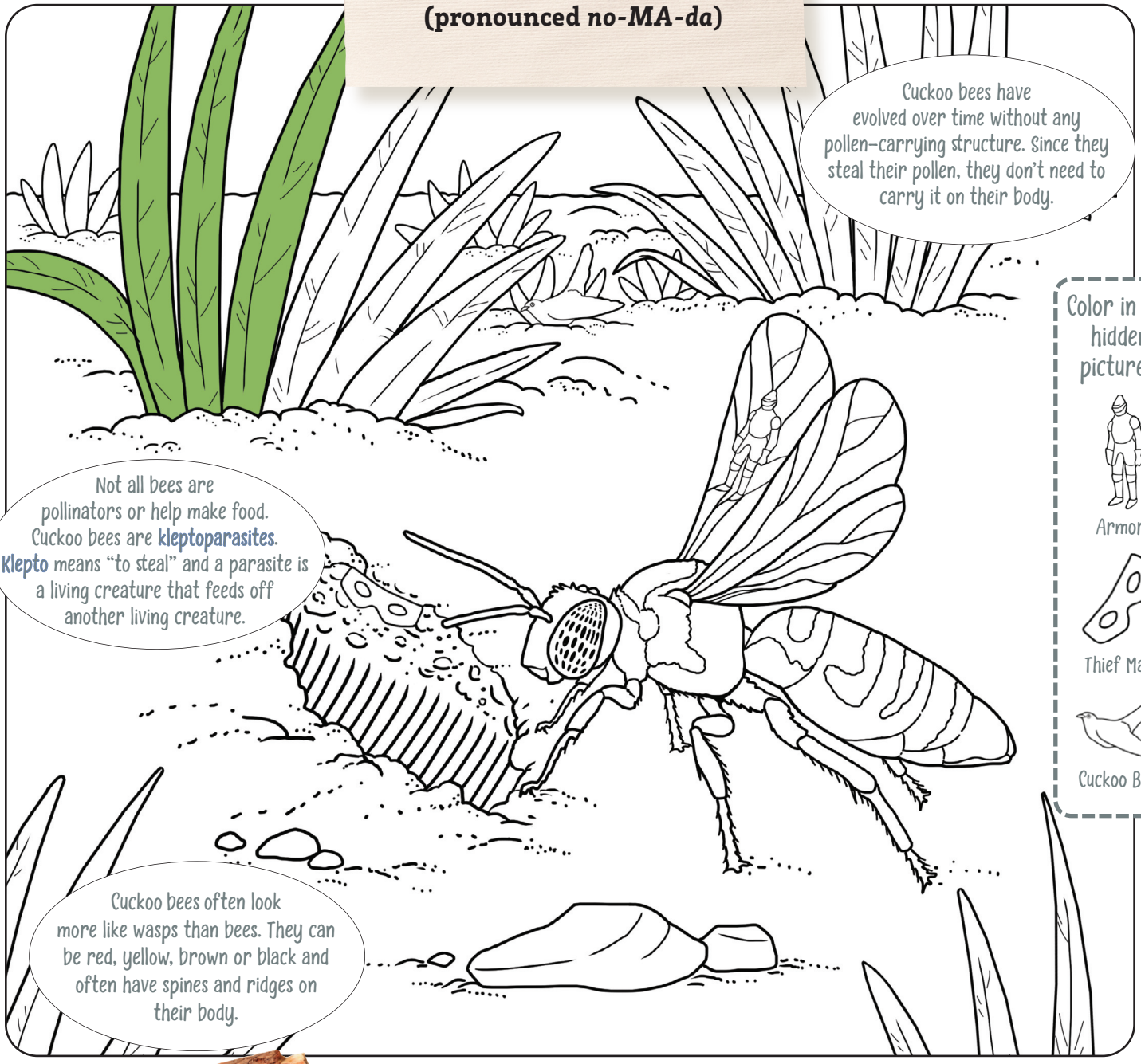
Solitary Bees

Cuckoo Bees

Genus: Nomada

(pronounced *no-MA-da*)

Cuckoo Bee
8 to 10 mm in length



Color in the hidden pictures!

Armor

Thief Mask

Cuckoo Bird

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Field Notes:

Cuckoo bees don't forage for pollen. They have found a way to steal it. When a Nomada female ***reproduces*** (has babies), she looks for a nest that is being built by a female bee closely related to her. Once she finds a nest, she waits for the female bee who made it to go forage. Then she sneaks inside and quickly lays her own eggs, right next to some of the other bee's eggs. Each of her eggs will hatch into a larva (the early stage of a bee that looks like a caterpillar), destroy the offspring of the other female and eat pollen left by the female who made the nest. Cuckoo bees got their name from cuckoo birds, which lay their eggs in other birds' nests.

If you could add a special trait to the cuckoo bee, what would it be? How would it help it survive or thrive?

A trait of these bees is that they are **sneaky**. Name a synonym for **sneaky**:

_____

Cuckoo bee

Skillet Granola

If you could add one extra ingredient to this recipe, what would it be? Why?

_____

_____

_____

Animals, plants and habitats have many unique features! Cuckoo bees, unlike all the other bees featured in this book, do not pollinate plants. What's more, not all plants need pollinators. Some plants can self-pollinate or are wind pollinated like barley, grapes, green beans, oats, snap and snow peas, sweet corn and wheat.

Ingredients

1/3 cup **vegetable oil**

3 Tablespoons **honey** or brown sugar

1 teaspoon **vanilla**

4 cups **old fashioned rolled oats**

1/2 cup **sunflower seeds** or other seeds or nuts

1 cup **raisins** or other dried fruit

Directions

1. Wash hands with soap and water.
2. Warm oil and honey in a skillet for one minute over (300 degrees F in an electric skillet).
3. Stir in vanilla, oats and seeds. Mix until coated with honey mixture.
4. Heat over medium heat, stirring, until oats are slightly brown.
5. Take off heat. Stir in raisins.
6. Cool mixture. Store in an airtight container.

Watch the Oregon wheat harvest in action:
OREGON HARVEST for SCHOOLS
https://beav.es/c5U

Makes 5 cups
Prep time: 10 minutes
Cook time: 10 minutes

Nutrition Facts

15 servings per container

Serving size 1/3 cup (52g)

Amount per Serving

Calories 220

	% Daily Value*
Total Fat 9g	12%
Saturated Fat 1g	5%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 10mg	0%
Total Carbohydrate 32g	12%
Dietary Fiber 4g	14%
Total Sugars 11g	
Includes 3g Added Sugars	6%
Protein 5g	
Vitamin D 0mcg	0%
Calcium 43mg	4%
Iron 1mg	6%
Potassium 241mg	6%
Vitamin A 13mcg	1%
Vitamin C 0mg	0%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Recipe Math Challenge

The food truck is catering a huge event at Oregon State University. We need to prep for 4,000 servings of skillet granola. How much of each ingredient will be needed? **Hint:** find the servings on the Nutrition Facts label!

- Vegetable oil _____
- Vanilla _____
- Raisins _____
- Honey _____
- Rolled oats _____
- Powdered milk _____
- Sunflower seeds _____

Bonus: If all 4,000 servings get eaten, how many grams of protein, total sugars, total carbohydrates and cholesterol will be consumed?

Social Bees

Social bees are bees that live together as a family.
They share the work of building a nest, foraging for food and caring for young. Honey bees and bumble bees are examples of social bees.

What do superheroes have in common? They all have superpowers! 10

Can you guess what honey bees' superpower is?

Honey Bees

When Jocelyn came into the lunchroom and spied her brother, Josh, reading a book, she asked him what he was reading.

"It's my favorite superhero's new comic book," he answered. "I love it when he teams up with other superheroes to help people!"

"You know," Jocelyn said, "social bees are kind of like superheroes. They work together on jobs like foraging for food, caring for their young, and building their nests."

"You mean bees have nests—like birds?" Josh asked.

Jocelyn shook her head. "Not exactly. The nest of social bees like honey bees is called a hive. Honey bees fill their hive with honeycomb. It's made of wax with little cells shaped like hexagons. In the wild, bees make their own hives, but people make hives for bees, too."

Josh frowned. "Why would people do that?"

"So they can harvest the honey, the wax, or even the honeycomb."

"Where does the honey come from?"

"First," Jocelyn explained, "the older worker bees collect nectar from flowers. They swallow the nectar, fly back to the hive, and spit it up into the mouth of a younger worker bee. That's called trophallaxis (tro-ful-AK-sis)."

"EWWWW!" Josh responded. "That's disgusting!"

"No kidding!" Jocelyn said. "But that's not all! The younger bee swallows the nectar, then travels to an open section of honeycomb and spits it out again. Bees' spit has chemicals called enzymes. As the nectar sits in the honeycomb, the enzymes make its sugars easier to digest."

Josh was impressed. "How do you know all this?"

Jocelyn giggled. "By BEE-ing an excellent listener in Mrs. Moran's class! But there's more. Other bees take turns fanning the nectar with their wings. This makes the water in the nectar evaporate—it dries up and changes to gas. The nectar gets stickier and sweeter and, in a few days, it turns into honey! And if the honey doesn't get wet, it stays good to eat for a long time. That's why worker bees cover the honey in the honeycombs with wax."

"What do you mean?" Josh asked.

"The wax keeps water out of the honey. Bees eat their stored honey when it's too cold to go outside. It helps them survive the winter. They may also come out of their hive in December to get food (pollen and nectar) from an early crop like almonds."

"Wow!" Josh exclaimed. "Bees really are superheroes. Even if they don't have capes!"

"Honey bees don't wear masks or fight crime," Jocelyn said. "But now you know why they're superheroes! They make and store honey!"

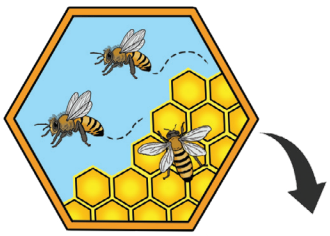
Fluency Tracker

Day 1_____, Day 2_____, Day 3_____, Day 4_____, Day 5_____

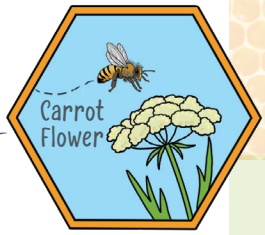
Almond Blossoms

Honey bees making honey and more!

1. During the spring and summer, older worker bees leave the hive to search for flowers within five miles of the hive.

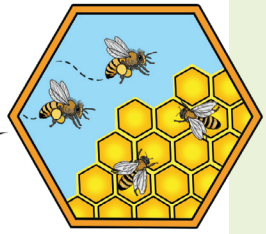


2. These worker bees collect nectar from up to 100 flowers per flight! By visiting these flowers they also pollinate them. Many of these pollinated flowers become the food we eat!



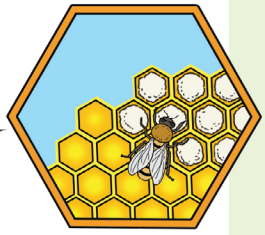
3. They swallow nectar and store it in their honey stomach. Once full of nectar and pollen, they fly back to the hive.

4. They pass the nectar from their stomach to a younger worker bee who swallows it into their stomach. The younger worker bee takes it and spits it into an open honeycomb cell.



5. Younger worker bees fan the nectar, so water evaporates. The nectar gets thicker and begins turning to honey.

6. They cap the honey with wax to keep it from spoiling so that they can eat it throughout the winter.



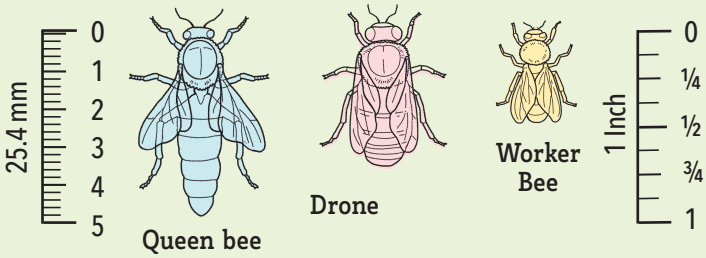
7. Honey can be harvested for people to eat. Beekeepers leave some honey in the hive for the bees, too!

Honey bees live in hives.

Honey bees live together in a hive. A hive is an above-ground structure where a group of bees nest (live) together. A hive can be made by people, or it can be made by bees in the wild. Inside the hive, honey bees use wax to make honeycomb. It has cells honey bees use to raise their young and store honey and pollen. Each cell is a hexagon (6 sided).

Who is in the hive?

Honey bee hives have caste systems (fixed roles bees are born into) made up of a queen bee, drones and worker bees. These bees play different roles in the hive. Each relies on the others to keep the hive healthy.

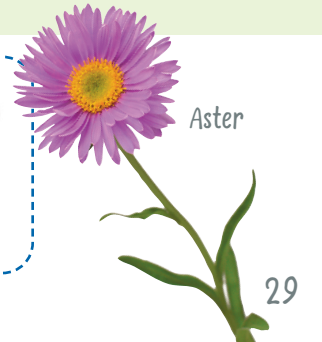


1 inch = 25.4 millimeters

- ***Queen bee*** (about 1 inch long): The queen is the mother of all the bees in the hive. Her job is to lay eggs to make more bees. Most queen bees leave the hive only once in their life, when it's time to mate.
- ***Drones*** (about ¾ inch long)**:** Male honey bees are called drones. They are produced in the summer and their job is to mate with queens from other hives. They do not have a stinger, don't work or gather food and are fed by worker bees.
- ***Worker bees*** (about ½ inch long)**:** Worker bees are all female and have different jobs depending on their age. When they are young, they start off cleaning the hive and then caring for and feeding young larvae. In their last stage of life, they become foragers, bringing in nectar and pollen to feed the bees in the hive. They use a figure-eight dance called a *waggle dance* to communicate. It tells other bees the direction and distance away from the hive to a flower patch.

Fun Fact! The color, flavor, texture and smell of honey changes depending on which flowers the nectar comes from. To make a pound of honey, about 2.6 million flowers must be visited!

Visit FoodHero.org for great tasting recipes with honey in them!



See Me In Action!
https://beav.es/SSb

Solitary and Social Bees

Green Metallic Sweat Bees

Genus: *Agapostemon*

(pronounced *a-ga-POSS-ta-mon*)

Green Metallic Sweat Bee
7 to 12 mm in length

Color this page online at: https://beav.es/???

Purple Aster Flowers

Metallic sweat bees carry pollen on their hind back legs.

Growing flowers in your community helps the bees that make your food.

Find the hidden pictures!


Dandelion


Salt shaker


Cilantro

Field Notes:

Green metallic sweat bees pollinate the flowers of many *cultivated* plants (plants grown on purpose) as well as many wildflowers. Sweat bees have been given this name because they lick the sweat of mammals as a way to add salt to their diet. They are medium-sized and have a bright metallic green color. These bees love open and flat-shaped flowers such as daisies, dandelions, wild roses and blackberry and apple blossoms. They love purple asters, a plant grown by many Oregon ***nurseries*** (places where plants are grown on purpose).

If a green metallic sweat bee visited your garden and you wanted to name it, what would you name it and why?

A trait of this bee is that it is **bright** in color.
Name a synonym for **bright**:

_____

Quick Tomato Salsa

Green Metallic Sweat Bee and Cilantro

The flowers of many common herbs, like cilantro, mint, rosemary, thyme and basil, provide great food for bees like the sweat bee. They also pack our food with flavor! A great way to enjoy fresh herbs is by making salsa.

If you could substitute one ingredient in this recipe, what would it be? Why?

_____

_____

_____

Ingredients

1 can (15 ounces) **diced tomatoes**

1/4 cup **onion**, chopped (a 1/4 medium onion or 2 green onions, including green tops)

1 clove **garlic**, chopped or 1/4 teaspoon garlic powder

Juice of 1 **lime**

1 can (4 ounces) diced **green chiles**

1/4 cup fresh **cilantro leaves**, (1/3 of a bunch) loosely packed

Directions

1. Wash hands with soap and water.
2. Combine ingredients, except cilantro, in a blender. Blend to the thickness you like.*
3. Finely chop cilantro and stir into other ingredients.
4. Refrigerate leftovers within 2 hours.

*No blender? Make a chunky salsa by cutting all ingredients to desired size before mixing.

Watch a family in Oregon grow and cook with herbs: https://beav.es/TJi

OREGON HARVEST for SCHOOLS

Makes 2 cups

Prep time: 5 minutes

Nutrition Facts

16 servings per container

Serving size **2 Tablespoons (39g)**

Amount per Serving

Calories **10**

	% Daily Value*
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 70mg	3%
Total Carbohydrate 2g	1%
Dietary Fiber 1g	4%
Total Sugars 1g	
Includes 0g Added Sugars	0%
Protein 0g	
Vitamin D 0mcg	0%
Calcium 0mg	0%
Iron 0mg	0%
Potassium 59mg	2%
Vitamin A 1mcg	0%
Vitamin C 2mg	2%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Recipe Math Challenge

On Friday the food truck will make lunch for a garden party of 40 people serving each person 1 cup of salsa. About how much of each of these ingredients do we need to buy?

- Ounces of canned tomatoes _____
- Whole limes _____
- Whole green onions _____
- Ounces of canned chiles _____
- Teaspoons of garlic _____

Bonus: About how many bunches of cilantro do we need to buy?
Hint: Each recipe makes 2 cups.

Green Metallic Sweat Bee Photo: US Department of Agriculture

See Me In Action!
https://beav.es/SSE

Social Bees

Honey Bees

Genus: Apis

(pronounced A-pis)

Honey Bee
12 to 15 mm in length

The average honey-bee hive contains around 25,000 bees.

Color in the hidden pictures!

Carrot Seed Packet

Carrot

Honey Pot

Carrot Flowers

Farmers from around the world grow carrots from Oregon carrot seeds.

Did you know that one honey-bee hive can produce up to 80 pounds of honey a year?

Color this page online at: https://beav.es/???

Field Notes:

Honey bees are pollinators of agricultural crops worldwide. That's because they pollinate many different types of plants (some other bee species are very picky eaters), and they are easy to manage. For hundreds of years, beekeepers have known how to raise them in portable nests that they can move from field to field. Honey bees make tasty honey, too, which is how they got their name. They are medium-sized bees that range in color from black to pale yellow. Colonizing Europeans brought honey bees to North America starting in the 1620s. In Oregon, they are one of the only pollinators of carrots, which Oregon farmers mainly grow not for the vegetable, but for the seeds produced by carrot flowers.

If you could build a home for a honey bee, what would you use? In what season of the year would you put the home outside? Why?

A trait of these bees is that they are easy to **manage**. Name a synonym for **manage**:

_____

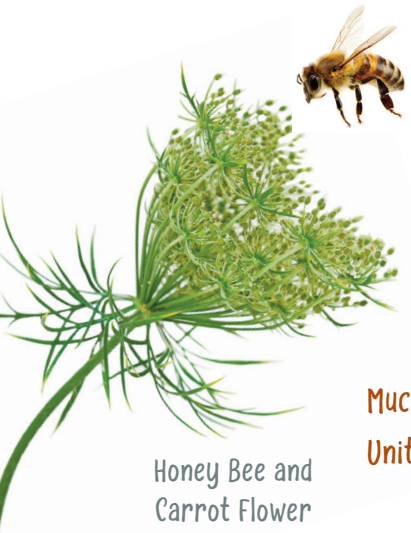
Carrot Peach Smoothie

What does this recipe have in common with another recipe?

_____

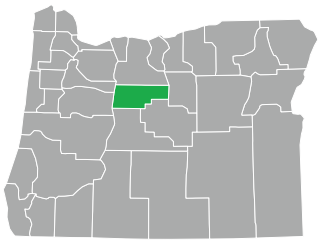
_____

_____



Honey Bee and Carrot Flower

Much of the carrot seed used to grow carrots across the United States comes from Jefferson County, Oregon.



Ingredients

1 can (15 ounces) **peaches**, undrained*

1 cup **carrots** (frozen, cooked from fresh, or canned and drained)

1 medium **banana**, peeled (fresh or frozen)

Directions

1. Wash hands with soap and water.
2. Combine all ingredients in a blender or food processor, including juice from the canned peaches.
3. Blend until smooth and serve right away.
4. Refrigerate or freeze leftovers within 2 hours. Try them as popsicles!

*Want to use fresh or frozen peaches instead? Use 1 1/2 cups fresh or frozen peach slices plus 1/2 to 3/4 cup water or 100% fruit juice.

Watch Oregon farmers harvest carrots: https://beav.es/TJT

OREGON HARVEST for SCHOOLS

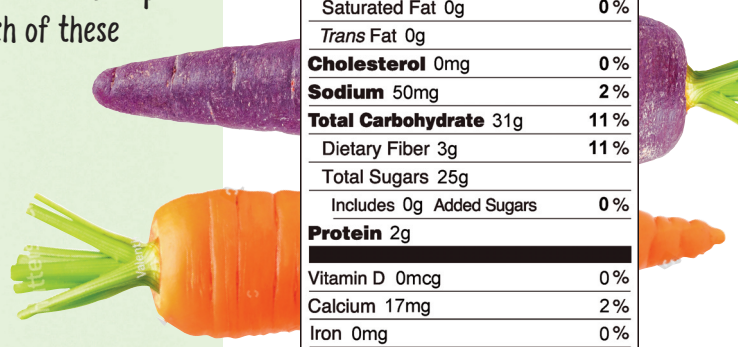
Makes 3 cups
Prep time: 5 minutes

Recipe Math Challenge

The food truck is making free summer lunches for 75 kids and teens. A 1-cup smoothie will be served with each lunch. **About** how much of each of these ingredients do we need to buy?

- Cans of peaches _____
- Cups of carrots _____
- Whole bananas _____

Bonus: About how many cups of peaches and 100% fruit juice do we need to buy if we use fresh peaches?



Nutrition Facts

3 servings per container

Serving size	1 cup (208g)
Amount per Serving	
Calories	**130**
	% Daily Value*
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 50mg	2%
Total Carbohydrate 31g	11%
Dietary Fiber 3g	11%
Total Sugars 25g	
Includes 0g Added Sugars	0%
Protein 2g	
Vitamin D 0mcg	0%
Calcium 17mg	2%
Iron 0mg	0%
Potassium 301mg	6%
Vitamin A 324mcg	36%
Vitamin C 6mg	6%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

See Me In Action!
https://beav.es/SSE

Social Bees

Bumble Bees

Genus: Bombus

(pronounced *BOM-bus*)

Bumble Bee
11 to 23 mm in length

Color this page online at: https://beav.es/c8p

Clover

A bee's tongue (or proboscis) is a thin and hairy tube. It can reach into flowers to suck nectar out like a straw, lick up water and helps bees communicate.

Here we see a pollen basket, also called a corbicula. This is how bumble bees and honey bees carry pollen.

The average bumble-bee colony contains one to 100 bees.

Color in the hidden pictures!

Apple

Cheese

Strawberry

Field Notes:

Bumble bees are important pollinators of many wild and ***agricultural*** plants (plants grown by farmers). Some of the crops they pollinate include cranberries and other berries, apples, tomatoes, peppers and squash. They are large and fuzzy bees, and their bodies are most often colored with a mixture of black, yellow, orange, brown or white hairs. In Oregon they are important pollinators of red clover. Oregon is one of the largest growers of clover seed in the world. Farmers buy the seed to grow clover plants, which are fed to cows and other livestock that give us milk, cheese, yogurt, eggs, meat and more.

Have you ever seen a bumble bee? Where? What was it doing?

A trait of this bee is that it is **large**. A synonym for **large** is:

_____

Bell Pepper Nachos

Bumble Bee and Clover

How many different types of plants could the ingredients for this recipe grow on? List them.

_____

_____

_____

Bumble bees not only help produce cheese, but also pollinate many crops grown in Oregon greenhouses, like tomatoes and peppers.

Ingredients

4 **bell peppers**

1 cup **salsa**

2 teaspoons **seasoning** (try one or a mixture- chili powder, garlic powder, ground cumin, pepper)

2 cups cooked **beans** or meat (chopped or shredded), or try a mixture

3/4 cup shredded **cheese**

Directions

1. Wash hands with soap and water.
2. Preheat oven to 350 degrees F.
3. Wash bell peppers, remove seeds and cut into bite-sized pieces. Arrange pieces close together in a single layer on a large foil-lined baking sheet.
4. In a medium bowl, combine salsa, seasoning, beans and/or meat. Spoon the mixture evenly over pepper pieces. Top with cheese.
5. Bake for 15 minutes, or until peppers are heated through and cheese is melted. Serve warm.*
6. Refrigerate leftovers within 2 hours.

*Topping ideas: chopped green onions, cilantro, black olives, plain low-fat yogurt or sour cream.

Makes 8 cups
Prep time: 5 minutes
Cook time: 15 minutes

Watch Oregon families harvest bell peppers and tomatoes.
OREGON HARVEST for SCHOOLS
https://beav.es/TJ5
https://beav.es/TJS

Nutrition Facts

8 servings per container

Serving size	1 cup (136g)
Amount per Serving	
Calories	**100**
	% Daily Value*
Total Fat 3.5g	4%
Saturated Fat 1.5g	8%
Trans Fat 0g	
Cholesterol 20mg	7%
Sodium 340mg	15%
Total Carbohydrate 9g	3%
Dietary Fiber 3g	11%
Total Sugars 3g	
Includes 0g Added Sugars	0%
Protein 9g	
Vitamin D 0mcg	0%
Calcium 72mg	6%
Iron 1mg	6%
Potassium 211mg	4%
Vitamin A 46mcg	5%
Vitamin C 48mg	53%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Recipe Math Challenge

The food truck is planning to sell 3,000 bell pepper nacho plates next month. Each plate is a 1 cup portion. How much of these ingredients do we need?

- Bell peppers _____
- Salsa _____

Bonus: How many cans of beans (1 can = 2 cups beans) will you need if you make the recipe as a mixture, half beans and half ground beef?

Fun Facts About Bees in a Bee Word Game

Find a partner. Choose one person to be the "reporter" and one to be the "author." Without reading the story aloud, the reporter asks the author to think of a word for each prompt under the blank lines below. The reporter writes in the author's words. Then choose one person to read your very own funny story out loud! Or try and add in the facts for each blank line — you will find the answers throughout the book!

There are so many _____ (adjective) kinds of bees!  **Squash bees** are _____ (adjective)-sized bees and feed only on nectar and pollen from _____ (plural noun). The squash bee had never been seen in Oregon until the year _____ (number).

 **Mason bees** pollinate almonds, apples, _____ (plural noun) and more. They use mud and _____ (noun) to build their nests, which is where they get their name. One super _____ (adjective) bee is the  **green metallic sweat bee**! These bees pollinate the flowers on many _____ (adjective) plants and wildflowers. They also _____ (verb) the sweat of mammals. If you have alfalfa or _____ (adjective) plants you need pollinated, then  **leafcutter bees** are the bees for you! They _____ (verb) out small pieces of leaves and use them to build their _____ (plural noun).

 **Bumble bees** help us by choosing berries, apples, tomatoes and _____ (plural noun)! They are large and _____ (adjective) bees that are black, yellow, orange or _____ (color).  **Long-horned bees** are _____ (adjective) medium-sized bees that are very _____ (adjective). The males have long _____ (plural noun). Females have large, brush-like hairs on the back of their legs that they use to carry _____ (plural noun). They love sun _____ (plural noun). One world-wide pollinator of _____ (adjective) crops is the  **honey bee**! That's because honey bees pollinate _____ (adjective) different kinds of plants and are _____ (adjective) to manage. They make _____ (noun), which is where they get their _____ (noun). Not all bees are hardworking, upstanding pollinators!  **Cuckoo bees** _____ (verb) their pollen from other bees! When they are ready to reproduce, females wait for females of another species of bee to go search for pollen or _____ (plural noun). While she is gone, they _____ (verb) into the nest and lay their eggs next to the other bee's _____ (plural noun). When the larvae _____ (verb), they will destroy the other bee's offspring and eat up all the _____ (noun) left by the other bee.  **Alkali bees** nest in the _____ (place). They are very picky and love salty, moist, _____ (adjective) soil. The alkali bees of the Pacific Northwest are the only ground-_____ (verb ending in -ing) bees in the _____ (place) managed by _____ (a group of people).

Bees need bee _____ (plural adjective)!

Bee Word Search

Use the word bank to find the hidden names of Oregon bees. Words can be horizontal, vertical, or diagonal.

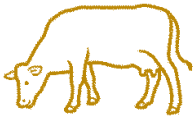
O	L	M	A	G	S	O	B	A	U	N	C	R	T	M	N
A	O	I	U	N	W	L	O	T	E	R	S	A	F	I	E
C	N	H	O	N	E	Y	B	E	E	O	N	H	O	N	C
R	G	A	G	L	A	A	Y	A	D	L	A	F	C	A	F
I	H	L	A	O	T	E	L	Q	M	E	R	L	L	X	R
S	O	G	I	A	B	M	A	S	O	N	B	E	E	H	O
W	R	A	I	O	E	P	A	C	E	H	K	E	V	S	N
I	N	D	H	A	E	I	U	E	L	R	B	L	E	A	H
A	E	H	S	A	F	H	B	R	A	H	C	I	R	I	A
Q	D	A	A	U	X	E	A	R	S	A	U	A	M	P	L
A	B	C	N	A	L	C	O	A	X	L	C	E	Y	L	K
M	E	K	U	B	W	A	U	R	R	S	K	A	R	U	A
E	E	Q	M	A	C	Q	L	E	T	I	O	A	Y	K	L
N	S	U	L	C	S	U	H	H	R	L	O	V	S	S	I
P	B	C	A	R	W	O	T	A	W	R	B	F	G	T	B
B	E	S	R	C	X	A	N	T	E	J	E	Y	E	A	E
J	T	W	L	E	A	F	C	U	T	T	E	R	B	E	E

Bees make healthy food!

Bumble Bee

Honey Bee

Mason Bee



Leafcutter Bee

Green Metallic Sweat Bee

Long-Horned Bee

Squash Bee

Talk with your family and friends about how bees make healthy food!

Word Bank:

Bumble Bee
Honey Bee
Mason Bee
Leafcutter Bee
Sweat Bee
Long-Horned Bee
Cuckoo Bee
Alkali Bee
Squash Bee

Find recipes by ingredient at www.FoodHero.org

Did you find the hidden images on all of the bee pages?

Reader's Theater

Presents:

A Read-Aloud Script About Bees for 12 Characters

"Sometimes It's Tough Bee-ing Different"

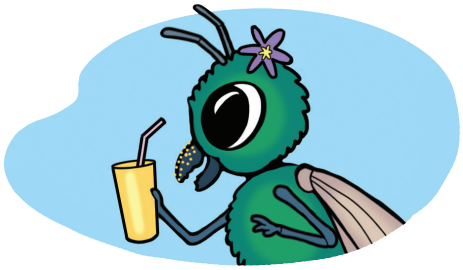
Instructions Read from the script aloud. You can help make the story even more entertaining by getting into character. Use a unique voice, and use your body and face to help act out the story. Find a group of up to twelve actors to play the bees. If your group doesn't have twelve actors, have each actor play more than one role.

Cast of Characters:

- **Sweat Bees: (Olympias)** #1 Ashley, #2 Maddy, #3 Ali, #4 Timberly
- **Mason Bee:** Jen
- **Squash Bees:** #1 Samantha, #2 Sierra
- **Fairy Bees (Perditas):** #1 Paul, #2 Pablo, #3 Parwana
- **Carpenter Bee:** Colton
- **Lava Hole Bee:** Rocky (no lines)

Setting: Blue Nectar Elementary School cafeteria, with bee kids buzzing about getting their lunch, visiting with their friends and finding their seats.

Script: ***The four sweat bees (Olympias) enter the cafeteria talking and giggling.***



Jen with a Camas Pollen smoothie

Timberly: Did you color your proboscis purple, Jen!?

Jen: Aw, you noticed Timberly!

Ali: It looks so-o-o-o buzziful, Jen-Jen.

Ashley: Jen, I'm so happy it's May and the cafeteria has camas drinks for you now!

Jen: The other drinks don't taste as good as my favorite, the camas pollen smoothie. For sure it's the most *buzztastic*!

Ali: For real! I can't wait for later in the summer when the summer-school meals cater to us Olympians and serve sunflower, watermelon, apple and alfalfa drinks!

Timberly: Right?!! They cater a ton to the "specialists" like Rocky, the lava hole bee. What in the world is penstemon anyway?

Maddy: It doesn't even look like real bee food. More like grasshopper grub!

Ashley: Obvs. There's a reason Rocky is sitting by himself.

The squash bees approach the sweat bees, who have stopped right next to a table. Samantha squeezes behind them, followed by Sierra.

Rocky with penstemon for lunch

Samantha: Uh, excuse me, Olympians.

Sierra: Sorry girls, coming through!

The sweat bees act annoyed, roll their eyes dramatically, and mock the squash bees.

Maddy: Ugh! As if??! Those squash bees almost touched us.

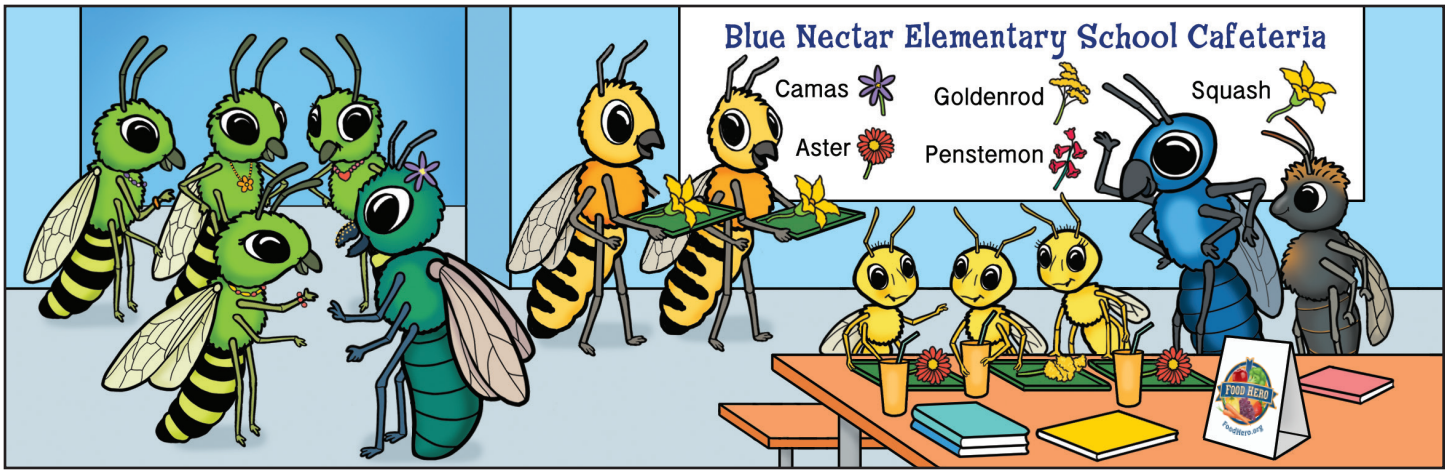
Ashley: If they had, we'd be washing off "squash germs" all day.

Ali: Seriously. Who do they think they are?

Paul, Parwana, and Pablo (the fairy bees) approach the sweat bees, who are still standing, blocking the table.

Paul: Hi, Olympians! Are you girls going to sit here or are these seats open?

Maddy: Well, not if YOU'RE sitting here!!



In the cafeteria, left to right: Ashley, Maddy, Timberly, Ali and Jen chatting together, Samantha and Sierra carrying trays with squash, Paul, Pablo and Parwana with asters for lunch, Colton and Rocky.

Ali: Right, I don't wish to be sitting near aster and goldenrod grub, thank you very much!

Paul looks hurt.

Colton carpenter bee walks up posturing and puts one leg up on the bench while still posturing.

Colton: Why, Ashley, Maddy, Alley and Timberly! Do my antennae deceive me? Surely my sensitive body hair has led my hearing astray.

The Olympians all blush and fidget nervously.

Colton: You CAN'T be giving these bees a hard time about liking foods that are different from your favorites, can you?

Timberly: Oh Colton, you know . . . we . . . I mean, they just . . .

Colton: Sheeeooot, I'm not a very picky eater myself. I mean, after a hard day of work, I'll eat almost anything. And I know you girls aren't all that picky either. We're generalists. But some bees are specialists! Did you know that? They have superpowers! Without them, some plants wouldn't ever be pollinated! And there are many types of specific plants like the many types of squash.

Sierra: Right! I love the winter for the huge number of squash options.

Samantha: Exactly! You have butternut, pumpkin, hubbard, delicata . . .

Sierra: . . . kabocha, acorn and spaghetti.

Samantha: And that's just winter!

Colton: Everyone has different things they like and different things they're good at. Every bee is different, just like every human is different. Some even have allergies or intolerances, so they can't eat certain foods. Would YOU want to be made fun of for that?

Ali: Well, of course not, Colton.

Paul: It's crazy how some of us only pollinate certain things, and we all need sugary nectar, whereas humans HAVE to eat lots of different foods to stay healthy, and they DON'T need sugary liquids!

Colton: That's right, Paul! Now, why don't you Olympians have a seat with me here and get to know Pablo, Paul and Parwana? They are pretty awesome bees and really great friends!

Ashley: *(Sheepishly)* I guess I never really thought of other bees like that before, Colton. I'm . . . I'm sorry, Perditas.

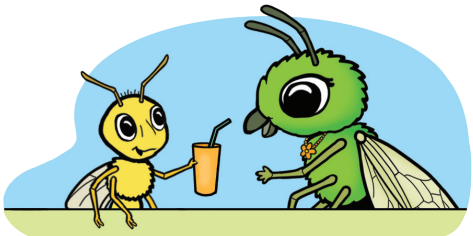
Ali: Yeah, me too.

Timberly: Totally guys. I'm sorry.

Maddy: Can I try some of your drink, Parwana?

Parwana: Sure! My mom says that's how you discover new things that you like.

Pablo: Thanks, Colton! You're the best!!

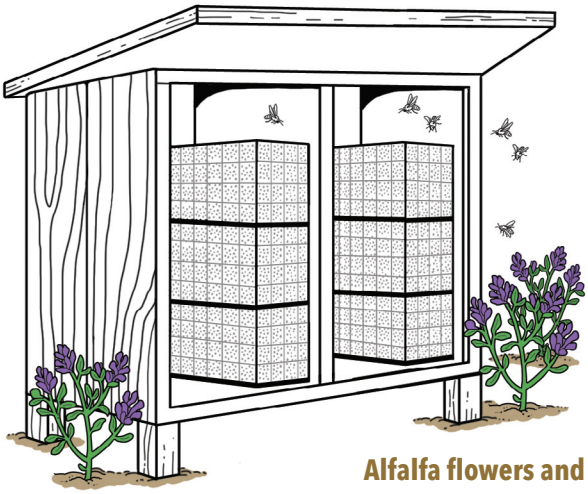


Parwana offering Maddy a drink.

Managed Bees of Oregon

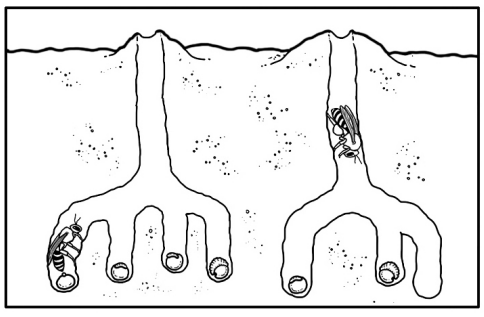
For over 9,000 years, humans have been seeking out wild bee nests. From these nests they gather things like wax and honey. The bees in the nests also help them pollinate their crops. Over time, people also figured out how to raise some wild bee species using structures they built themselves. These bees are called **managed bees**. In Oregon we have four types of managed bees: **honey bees**, **leafcutter bees**, **mason bees** and **alkali bees**. Honey bees are raised to make honey and wax and to pollinate crops. Oregon's other managed bees are raised only for pollination. Below are three types of structures used to manage bees and where they live (nest):

Help Jocelyn and her family color and pattern their hives below!



Alfalfa flowers and leafcutter bees nesting in blocks.

Mason bees nesting in small tubes.



Some farmers paint their hives. Color and patterns help bees find their way back home, and less likely to drift to another hive.

1 Tubes or blocks

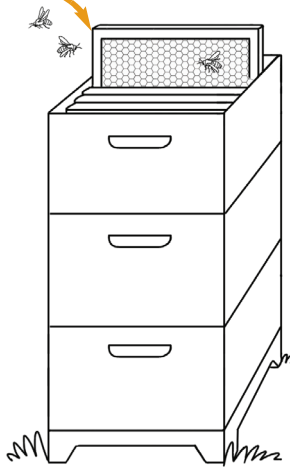
Managed **leafcutter bees** and **mason bees** nest in small tubes or in blocks with many holes in them. Hundreds of blocks or tubes are often stored next to each other in a bee shelter that protects the nests from rain and wind.

Managed bees do not fly far from their nest. Farmers place these nests next to the flowers being pollinated.

Participants in the Oregon Master Beekeeper Program's Spanish-language track holding a frame from a top bar hive.

2 Hives

Honey bees are kept in boxes called hives and are the most common managed bee worldwide.



3 Underground nests

Alkali bees are raised in underground nests.

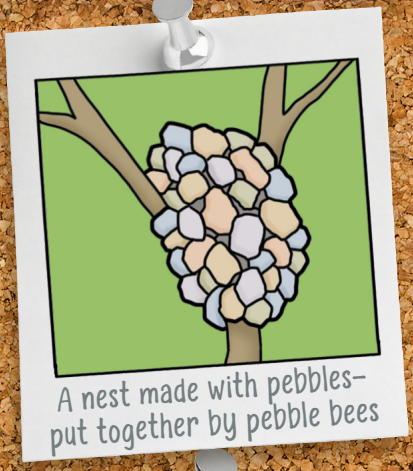
Wild Bees' Nests

What do bees use to make their nests?

You might be familiar with bees' nests made from wax. But did you know that most species don't even make wax? Most bees make their nests in the soil building tunnels. Others build their nests in plant stems using leaves, flower petals, mud, stones and plant resin to protect their young from predators and parasites! You can make some nests of twigs at home to watch bees at work.

A wax bees' nest

A nest made in a shell–
made by a mason bee



A nest made with pebbles–
put together by pebble bees

A nest made of resin–
constructed by resin bees

A nest made from leaves–
cut by leafcutter bees

Nests made in wood–
carved out by carpenter bees

Nests made in the soil–
dug out by mining bees

Design a bee home to increase bee nesting habitats!

1. What **type/s** of bee featured in this book might visit your nest? Why?

2. Thinking of the featured bee you listed in #1, what could you plant near the house for that bee species? Why?

3. Explain where you would place your bee nest to help the bees thrive.

Build a Bee House

You can make a bee nest.

Bee homes are nesting sites for solitary bees like mason bees and leafcutter bees that look for hollow stems or dead wood to lay eggs in. It can be hard for bees to find nesting spots so leaving some stems, twigs and branches helps.

1. **House:** Make a small house to keep nesting tubes together and out of the rain.

Teasel

2. **Nesting tubes:** Bundle together 12 to 50 hollow plant stems. A good source are dried-out teasel plants because they have natural backs to protect the bees' 'back door'of the tubes. Teasel can be found in ditches around Oregon. Other tube sources can come from your garden like canes and stems from cane berries (raspberries, blackberries, Marion berries), bee balm and grapes. You can also reuse paper straws, but they should not be waxed. Plastic and waxed paper straws may hold in moisture and mold may form, which can kill the developing bee. Aim to seal the back door, such as with soil, if the tube is not already sealed (like with teasel). Cut tubes to around 6 inches in length. Have a variety of tube diameters to attract a wide array of different bee species (from 1/4 to 1/2 inch inside in diameter).

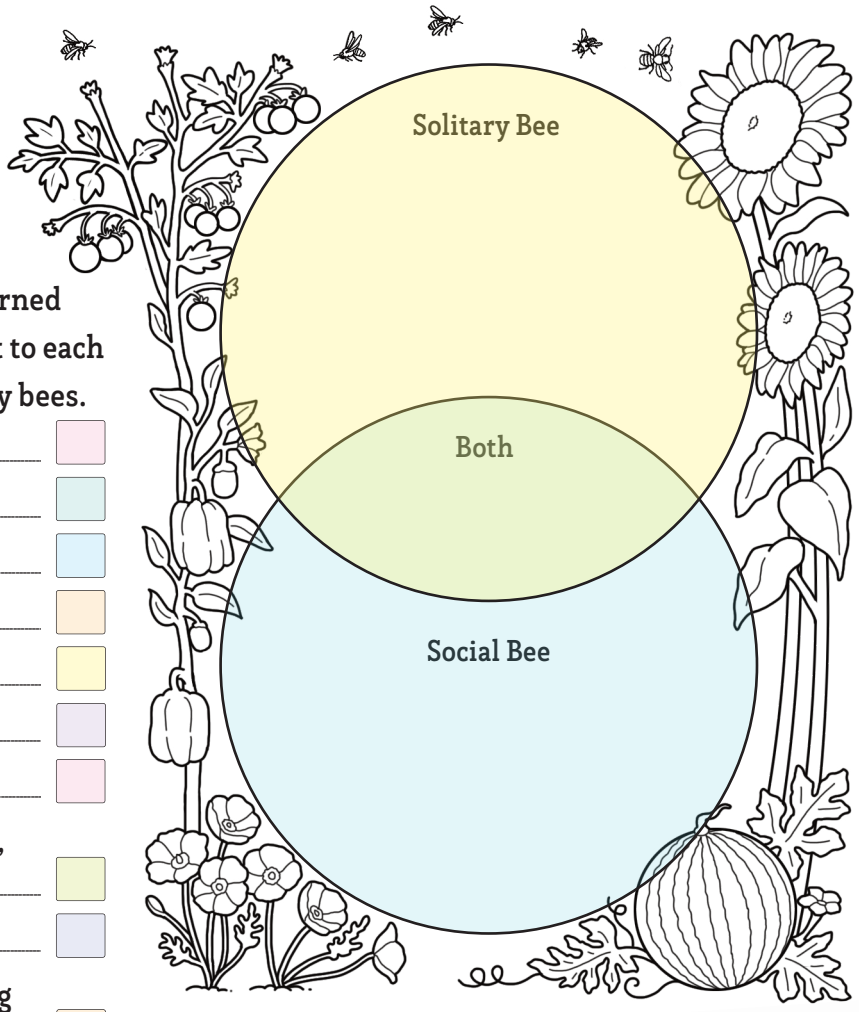
3. **Placement:** Within 300 feet of a pollen source and 30 feet of a clay-rich mud source (you can make your own mud hole). Facing south-east for warm sun, three to six feet above the ground, at eye level so you can see the fun. Out of the wind and rain and secure so it cannot move and displace the bees' eggs.

Placeholder copy

Information about what can be used to plug bee tubes placeholder copy. Text goes here, dirt, plug holes. Here we are with some placeholder copy and more info on how to make the nests, etc.

What Do You Know About Bees?

Compare Bees List at least one way you will remember how solitary and social bees are alike and different.



Social or Solitary? Use what you have learned in the book. Add a C (social) or L (solitary) next to each statement to note if it explains social or solitary bees.

Leafcutter, long-horned and alkali _____

Do not make honey. _____

Produce wax, honey and honeycomb. _____

Do not make wax _____

Bees eat stored food in winter (in wax) _____

Mason and bumblebees _____

Live together in a hive _____

Makes nest in different places like plant stems, tree stumps or tunnels in the ground. _____

Has a queen, drones and worker bees. _____

Leaves the hive to travel up to 5 miles searching for flowers. _____

Leafcutter Bee

We need bees!

True or False – Fun Bee Facts

1. Only female bees can sting.

True! The body part bees sting with (the stinger) is the same body part bees use to lay their eggs. Since only females lay eggs, only females can sting.

2. Bees can only sting one time.

True and False! This is true only for honey bees. All other bees can sting more than once. When a honey bee stings you, its stinger, along with a special venom sack, rips off the bee and sticks into you. This kills the bee.

3. Some people are allergic to bee stings.

True! Bee stings hurt for a few minutes, but most people are not harmed by them. Some people are allergic to bee stings and need to be extra careful when they are around bees.

4. Bees like to sting people.

False! Bees would rather not sting you! Bees sting to protect themselves from creatures that want to eat them. Most humans do not threaten bees, so bees rarely sting them. When stings do happen, it's often because someone accidently swats or steps on a bee, or is standing too close to a nest. Most of the time, though, it is safe to observe bees around you.

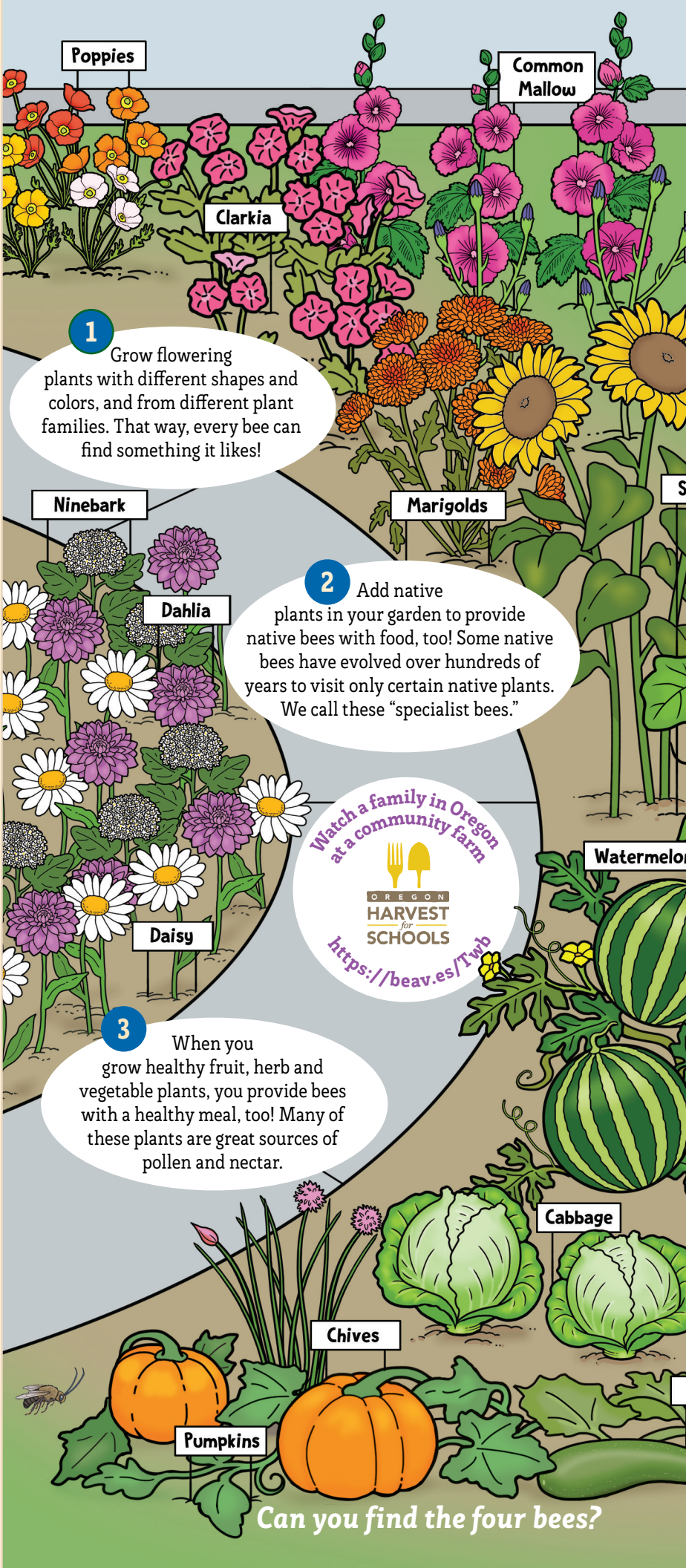
What You Can Do for Bees

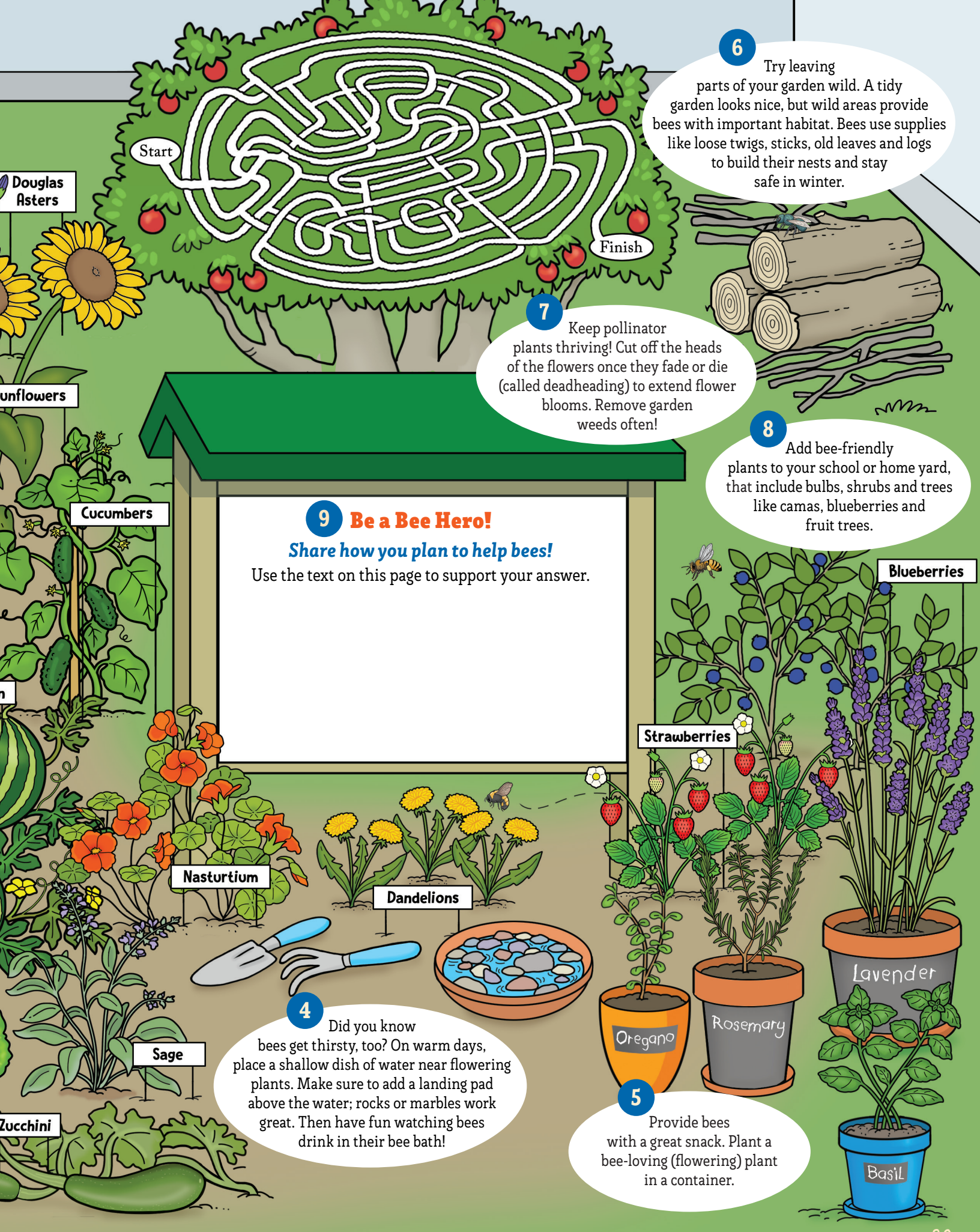
A school pollinator garden habitat tour of ideas!

Some bees are active in the spring, some are active in the summer and some are active from early spring through fall. This page shows a garden growing in mid-June. By making sure there is always something in bloom, you can help provide food for them all! This is most important early in the spring and late in the fall when fewer plants are ***in bloom*** (blossoming).

Design a garden mural to help bring more visitors to the garden! Use what you have learned in this field guide to support your design.

What did you include on your mural? Why?





6 Try leaving parts of your garden wild. A tidy garden looks nice, but wild areas provide bees with important habitat. Bees use supplies like loose twigs, sticks, old leaves and logs to build their nests and stay safe in winter.

7 Keep pollinator plants thriving! Cut off the heads of the flowers once they fade or die (called deadheading) to extend flower blooms. Remove garden weeds often!

8 Add bee-friendly plants to your school or home yard, that include bulbs, shrubs and trees like camas, blueberries and fruit trees.

9 Be a Bee Hero!

Share how you plan to help bees!

Use the text on this page to support your answer.

4 Did you know bees get thirsty, too? On warm days, place a shallow dish of water near flowering plants. Make sure to add a landing pad above the water; rocks or marbles work great. Then have fun watching bees drink in their bee bath!

5 Provide bees with a great snack. Plant a bee-loving (flowering) plant in a container.

In the Field with Bees

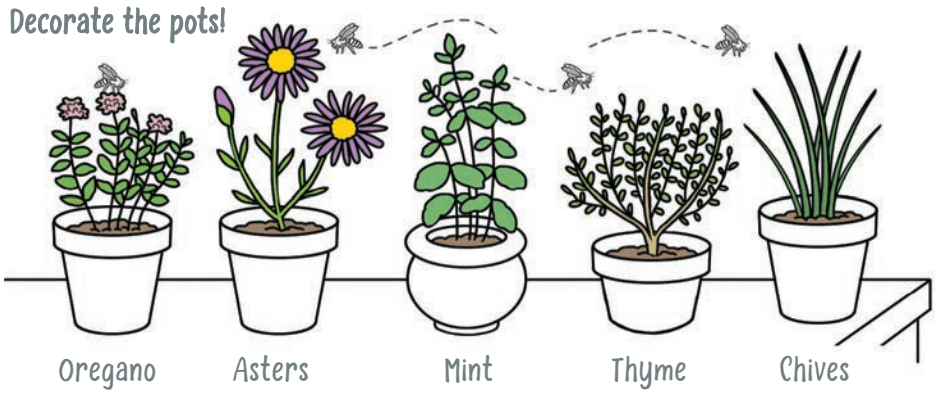
and How to Safely Watch Them

You can learn a lot about bees by watching them!

A great way to start is to find a patch of blooming flowers. Then, take a few minutes to watch the flowers to see if any bees appear. If they do, observe what they are doing and:

Follow these tips to keep you and the bees safe!

- ✓ Move slowly and watch what's going on around you so you avoid crushing or stepping on the bees.
- ✓ Do not pick bees up! If one lands on you, wait for it to leave on its own or gently brush it away.
- ✓ Do not run away from bees or swat them.
- ✓ Stay at least 10 feet away from bees if you see them coming in and out of a hole in the ground, a hole in a tree or a hole in a building.



Hi! Welcome back! Thanks for helping with our math last week. The food truck is closed today, but I'd 19
like to share a story about Jocelyn and bees! 28

Yesterday we went to the farmers' market. So many bees were flying around! Jocelyn got super scared 45
when some of them swarmed around her. She started trying to swat them and shouted, "I don't like bees!" 64
My friend Eli and I told her not to do that. We told her that bees usually don't sting unless they think 86
they're in danger. She didn't believe us. A few minutes later, we saw her teacher, Mrs. Moran, buying 104
flowers. Mrs. Moran backed us up. "Jocelyn," she said, "because of bees we have beautiful flowers to enjoy, 122
and all kinds of tasty fruits to eat, like peaches and berries. Bees also give us honey. I use honey in my 144
cooking." She even told Jocelyn that without bees, we wouldn't have pumpkins. Last school year, everybody 160
in Jocelyn's class got a pumpkin. They pulled the seeds out, counted them, and then roasted them to eat. 179
Plus, I read to Jocelyn some pages in my favorite bee book about being scared of bees. They said what to 200
do so you won't get stung! 206

Jocelyn REALLY likes peaches and berries and honey and pumpkins! So now she has become a big fan of 225
bees. In fact, now she loves bees so much, she's been coloring in pictures of them from my favorite bee 245
book, and looking for them all over. You can color the pictures in your book, too, and just like Jocelyn, 265
you can see how many different kinds of bees you can find. Now Jocelyn is trying to get Mom and Dad 286
to start our own beehive so the bees can pollinate our garden and she can harvest their honey. 304

Fluency Tracker Day 1_____, Day 2_____, Day 3_____, Day 4_____, Day 5_____

Bee Watching Worksheet

Questions to ask while watching bees:

Sketch or write down what you observe as you sit outside near a flower patch, or look at the photos on this page for ideas!

Honey bee on a Forget Me Not.

How many types of bees do you see in this spot?

Do different bees prefer different types of flowers?

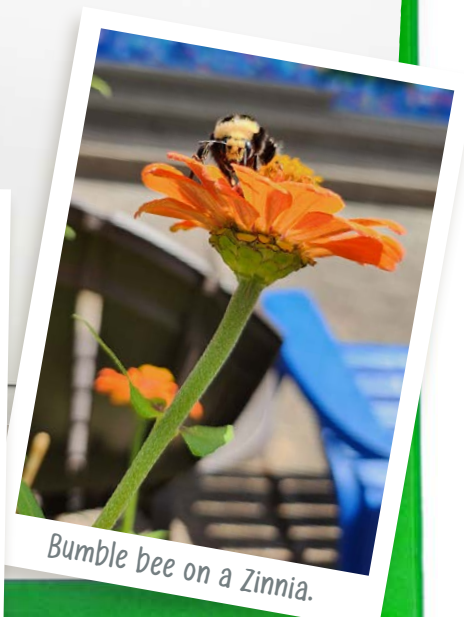
How do bees collect pollen?

How do bees drink nectar?

Sketch a bee pollinating a flower

A honey bee on a chicory flower.

A squash bee on a squash blossom.



Bumble bee on a Zinnia.

Draw a favorite bee of Oregon that helps to make food you like to eat.

Carpenter Bee

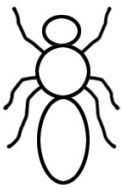
Which food or foods does your bee help make? Explain what features or body parts on your bee will help it survive and thrive in nature. Use the text from the book to support your answers. Find someone to share your answers with!

Bee Body-Part Checklist

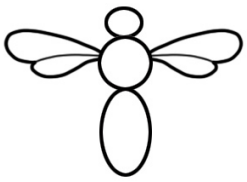
3 body segments

Head
Thorax
Abdomen

3 sets of legs

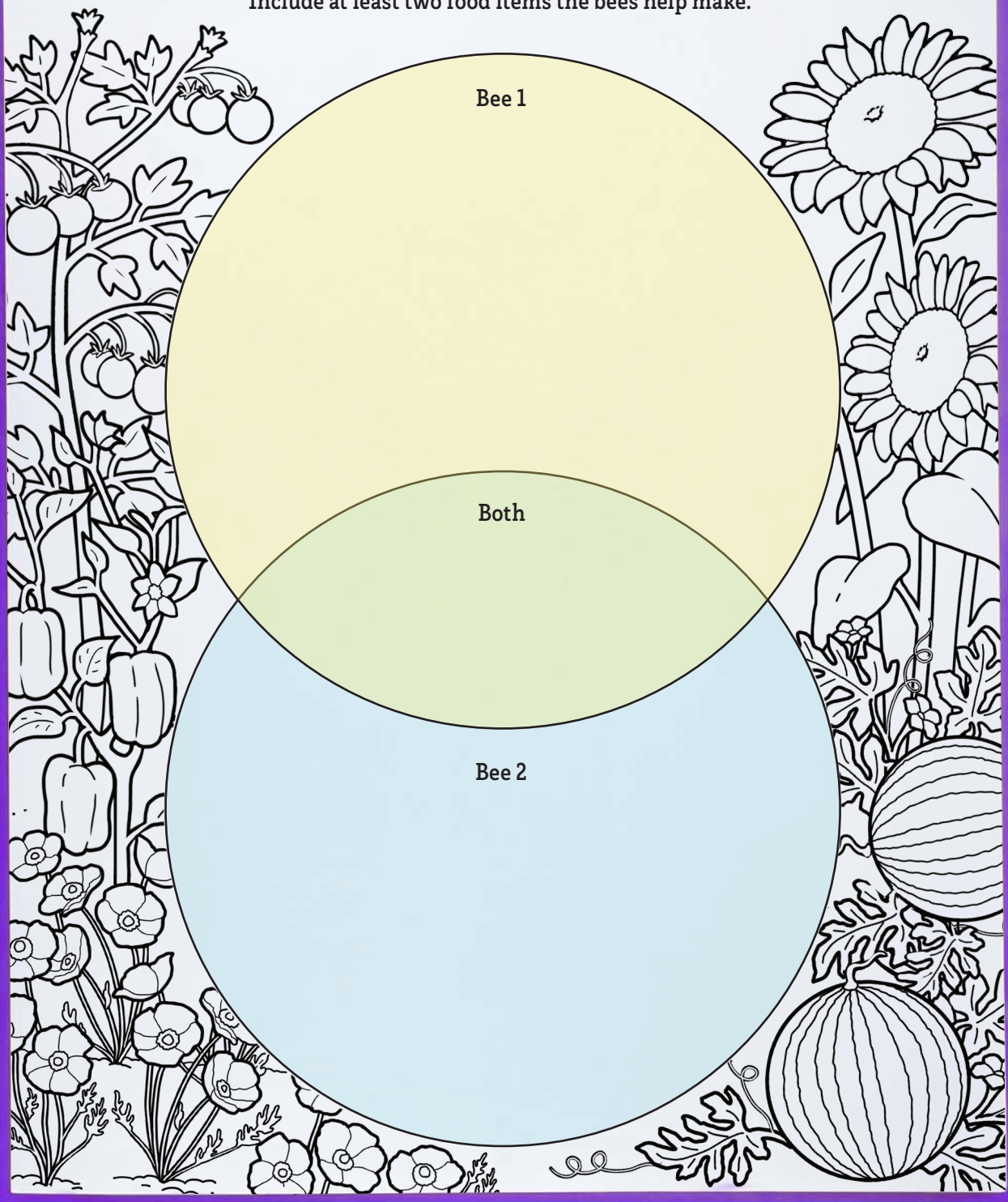


2 sets of wings



Compare Bees

Just like bee scientists (***mellitologists***), let's compare bees! Write down two bees to compare.
List or draw two or more ways your bees are alike and different.
Include at least two food items the bees help make.



What I learned!

In three paragraphs, summarize a main idea of the book. Include details from the book to support your ideas.

Enhance your response with a piece of art before finding someone to share your summary with!

MyPlate Crossword Puzzle

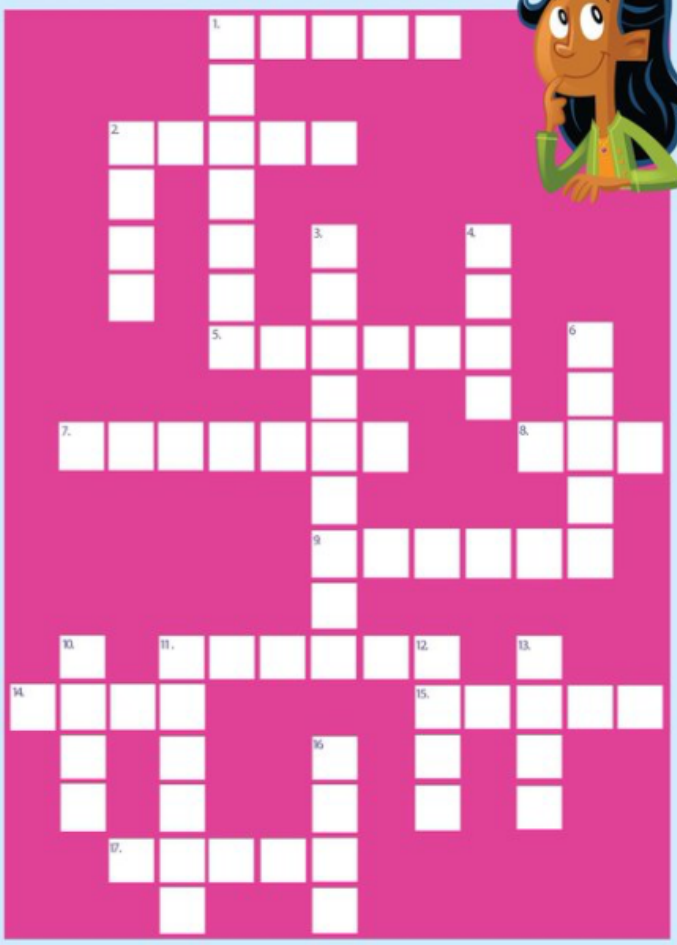
Use the words from MyPlate to help you complete this puzzle.

Across

1. Use the My _____ as a guide.
2. Apples, oranges, and bananas fit into this food group.
5. This sweet, smooth food comes in many different flavors and is a great way to get calcium for your bones.
7. _____ are an orange vegetable.
8. Try fat-free or low _____ foods when you can.
9. Use whole-grain _____ for your sandwiches.
11. Cheddar, swiss, mozzarella, monterey jack are examples.
14. Fits into the grains group of MyPlate. Goes great with stir-fry.
15. MyPlate is a _____ to help you eat a variety of foods for a healthy body.
17. Spaghetti is a type of _____.

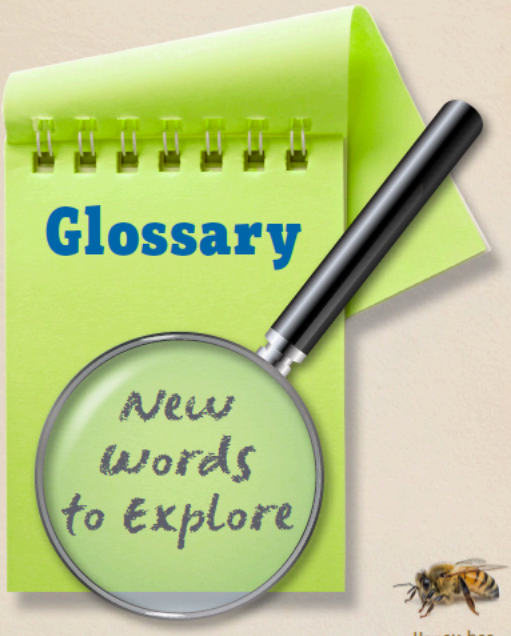
Down

1. Chicken and turkey are examples of _____.
2. Eat a variety of _____ from all of the groups.
3. Broccoli and green beans are examples of a _____.
4. These are a great source of protein and can be mixed with cereal and dried fruit for an "on-the-go" snack.
6. Pinto, kidney, black, refried – there are lots of different kinds and they can be eaten lots of different ways.
10. Vegetable or olive _____ are often used for cooking and are part of a healthful diet.
11. This makes a quick and easy "ready-to-eat" breakfast with fruit and milk.
12. You can hard-boil, scramble, fry, or poach these, or eat them as an omelet. How do you like your _____?
13. Salmon and trout are examples of _____.
16. Lean _____ is an excellent source of protein, iron, and zinc.



Adapted from
Team Up At Home Team Nutrition Activity Book

USDA



Honey bee

The page numbers next to the glossary words indicate the first time that the word appears in the book.

abdomen *(pg. 4)* The segment of an insect's body behind its head and thorax (the middle body part where legs and wings attach).

adjective *(pg. 7)* A word that describes a noun, such as its color, age or texture.

agricultural *(pg. 7 , 9, 30, 32)* Referring to the science or practice of farming, including growing crops or raising animals for food, eggs or milk.

antennae *(pg. 4, 22)* A pair of long, thin sensory appendages (external body parts) on the heads of insects; used to smell, hear and feel.

confederacy *(pg. 17)* A group or groups of people joined in or forming an alliance (relationship); a union.

cultivate *(pg. 15, 26)* To prepare and use land for farming or gardening; for example, to plant seeds or till the soil.

evaporate *(pg. 28)* To convert into vapor (gas); to vaporize.

fertilize *(pg. 3)* To introduce male reproductive material to an egg in a female animal or plant.

forage *(pg. 3)* To search widely for food or provisions (supplies); to scavenge.

fuzzy *(pg. 14)* Having a frizzy or fluffy texture or appearance (look); downy.

genus *(pg. 4)* (The plural is genera.) A category or grouping that ranks above a species and below a family.

indigenous *(pg. 8, 12)* Referring to the people, plants or other organisms living on a land from the earliest times; native.

ingredient *(pg. 11)* A component, part or element of something.

interdependent *(pg. 10)* Referring to two or more organisms that are dependent on each other.

klepto *(pg. 24)* Referring to an animal or insect that compulsively (can't stop themselves) steals.

livestock *(pg. 20)* Insects and animals cultivated, grown or raised for commercial (to make money) purposes; farm animals.

mandible *(pg. 20)* In an animal's mouth, a jawbone; in an insect's mouth, either half of the organ that crushes.

metamorphosis *(pg. 13)* The transformation (change) of one form of organism into another, such as a larva into an adult.

migration *(pg. 15)* The movement of a group of animals from one area to another; relocation.

nest *(pg. 28)* A structure or place made to lay eggs or for protection; a roost; to build or occupy a nest.

noun *(pg. 7)* A word that is used to name a person, place or thing.

nursery *(pg. 26)* A place where plants are grown for transplanting (moving plants from one place to another), for use as stock and for sale.

offspring *(pg. 3)* The immediate or first descendant of a person or organism; child.

pollinate *(pg. 2)* To deposit pollen on a plant or flower, enabling fertilization.

proboscis *(pg. 4)* In many insects, an elongated (long) sucking part of the mouth, similar to a tongue.

reciprocate *(pg. 15)* To exchange or give back what one has received.

reproduce *(pg. 3, 24)* To produce or make a copy of; to breed.

scopa *(pg. 5, 14, 22)* A small brush or tuft of hairs on some insects, such as bees, where pollen often collects.

solitary Existing or living alone or by itself.

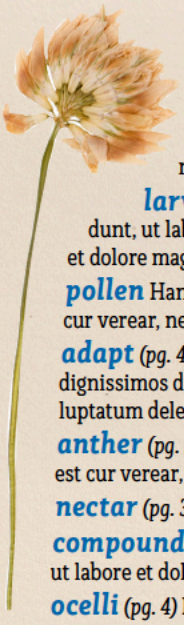
species *(pg. 4, 15)* A group of living organisms that can mate with each other and produce offspring. As a category, a species ranks below a genus.

spoil *(pg. 28)* To destroy the value or quality of something. When food spoils, it is not safe to eat.

trophallaxis *(pg. 28)* The mutual exchange of regurgitated (spit up) liquids between adult social insects or between them and their larvae.

verb *(pg. 7)* A word that identifies an action or a state of being.

Purple Aster



corbicula *(pg. 5, 32)* Tnemo enim ipsam voluptatem, quia voluptas sit, aspernatur aut odit aut fugit, sed quia consequuntur magni dolores eos, qui ration.

larva *(pg. 12, 13, 24)* Eius modi tempora incidunt, ut labore et dolore magnam aliquam quaerat voluptatem.

pollen Hanc ego cum teneam sententiam, quid est cur verear, ne ad eam non possim accommodare.

adapt *(pg. 4)* At vero eos et accusamus et iusto odio dignissimos ducimus, qui blanditiis praesentium voluptatum deleniti atque corrupti.

anther *(pg. 3)* Hanc ego cum teneam sententiam, quid est cur verear, ne ad eam non possim accommodare.

nectar *(pg. 3, 15)*

compound eyes *(pg. 4)* Eius modi tempora incidunt, ut labore et dolore magnam aliquam quaerat voluptatem.

ocelli *(pg. 4)* Hanc ego cum teneam sententiam, quid est cur verear, ne ad eam non possim accommodare.

cocoon *(pg.12)* At vero eos et accusamus et iusto odio dignissimos ducimus.

ecosystem *(pg. 13)* Eius modi tempora incidunt, ut labore et dolore magnam aliquam quaerat voluptatem.

habitat *(pg. 13)* Hanc ego cum teneam sententiam, quid est cur verear, ne ad eam non possim accommodare.

social *(pg.)* At vero eos et accusamus et iusto odio dignissimos ducimus, qui blanditiis praesentium voluptatum deleniti atque corrupti.

trait *(pg.)* At vero eos et accusamus et iusto odio dignissimos ducimus.

ocelli *(pg. 4)* Eius modi tempora incidunt, ut labore et dolore magnam aliquam quaerat voluptatem.

enzymes *(pg. 28)* At vero eos et accusamus et iusto odio dignissimos ducimus, qui blanditiis praesentium voluptatum deleniti atque corrupti.

digest *(pg. 28)* At vero eos et accusamus et iusto odio dignissimos ducimus, qui blanditiis praesentium voluptatum deleniti atque corrupti.

hives *(pg. 35)* At vero eos et accusamus et iusto odio dignissimos ducimus.

mellitologists *(pg. 41)* Tnemo enim ipsam voluptatem, quia voluptas sit, aspernatur aut odit aut fugit, sed quia consequuntur magni dolores eos, qui ration.

word *(pg.)* At vero eos et accusamus et iusto odio dignissimos ducimus.

another word *(pg.)* At vero eos et accusamus et iusto odio dignissimos ducimus. Glanditiis praesentium vok luptatum deleniti atque corrupti.

Select at least three words from the glossary and create a sentence for each word.

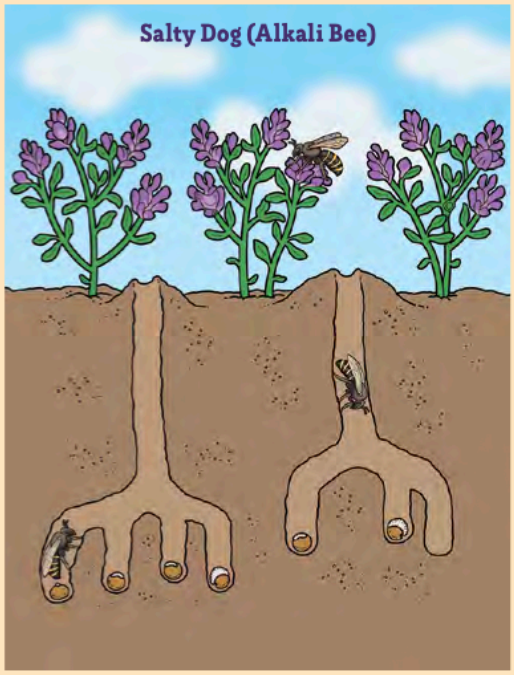
1.

2.

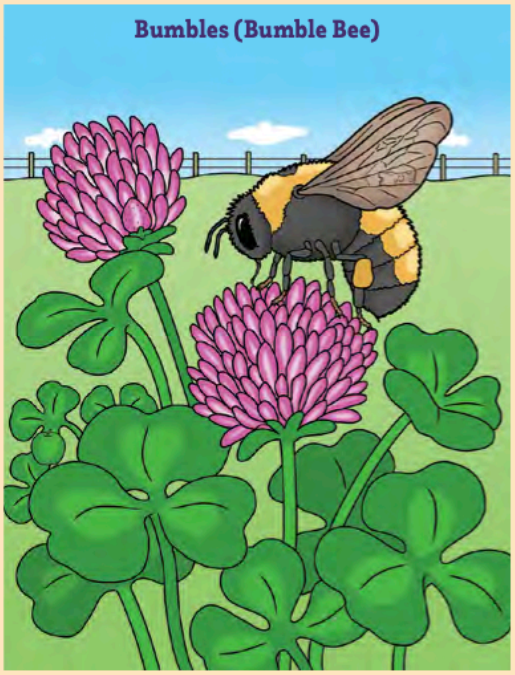
3.

Bonus sentence

Salty Dog (Alkali Bee)



Bumbles (Bumble Bee)



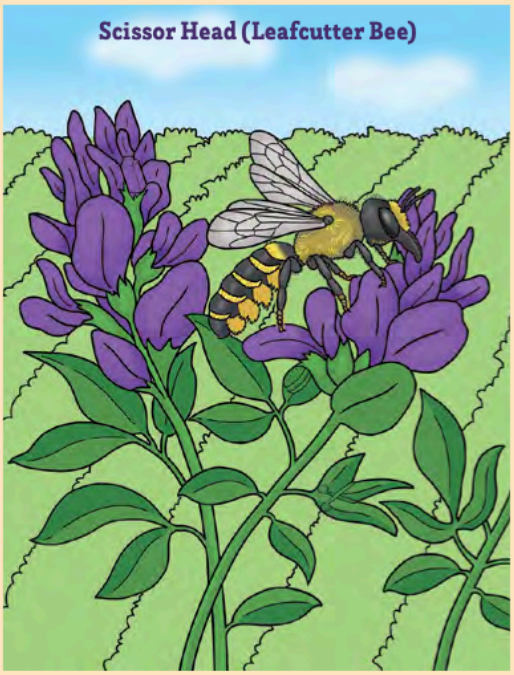
Klepto (Cuckoo Bee)

Waggle Dancer (Honey Bee)

Bling Bee (Green Metallic Sweat Bee)

The Picky Eater (Squash Bee)

Scissor Head (Leafcutter Bee)

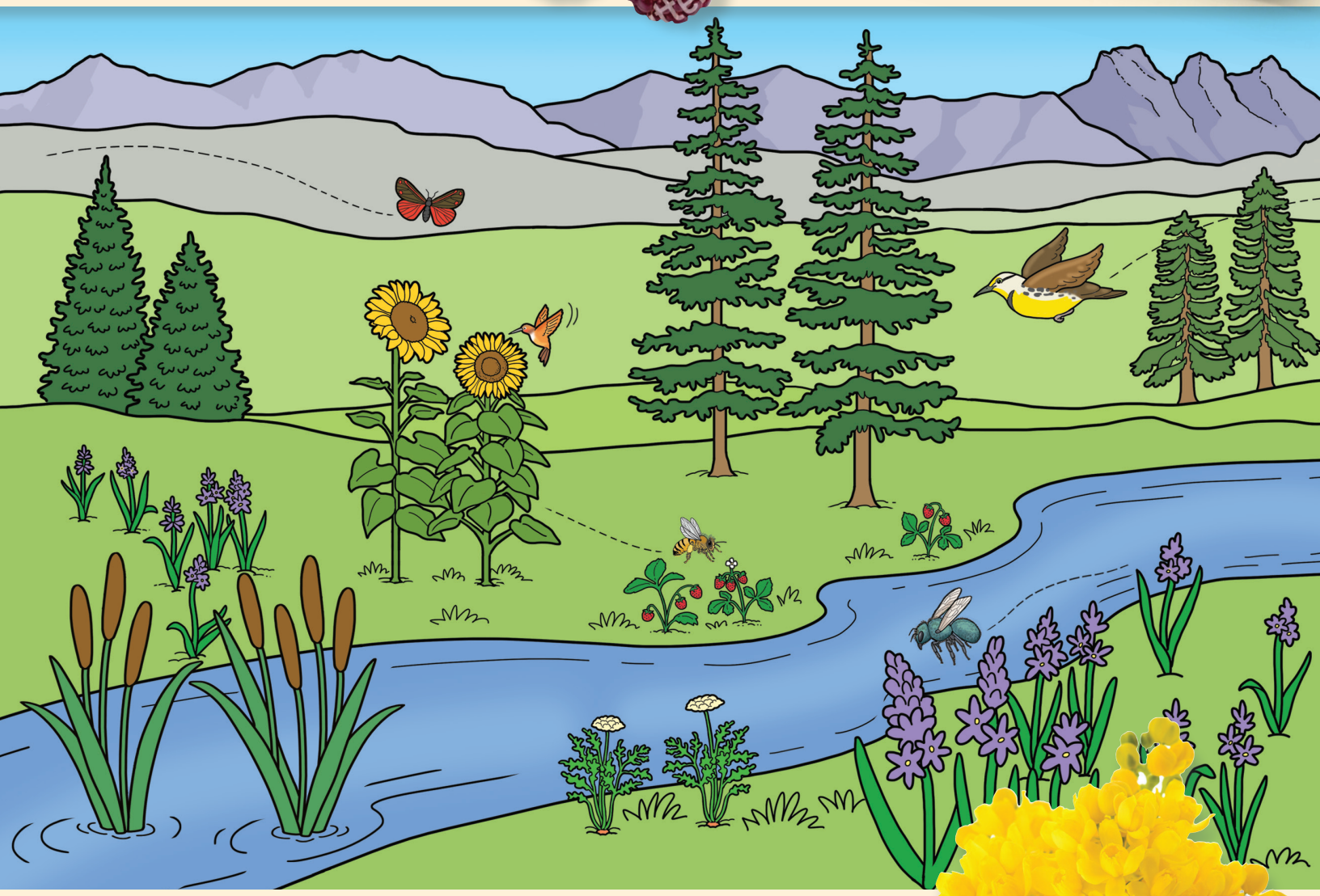


Long Horns (Long-Horned Bee)

The Mason (Mason Bee)

"Bee" a Food Hero! A Food Hero leads by example! Food Heroes teach their friends and family members about bees. They also help prepare meals and snacks using a variety of fruits and vegetables and other foods that depend on bees. This bee field guide is a great tool for Food Heroes! It was created by a team of bee, garden and healthy eating scientists. Native American Indigenous experts, farmers, elementary school teachers and elementary and middle school students, and Oregon State University students all helped to make this book special for you!

Field guide: *A book with words and pictures that help readers identify animals, plants, and other living and non-living things found in nature (including bees that help make our food!). The book can be brought outside.*



OREGON BEE ATLAS
oregonbeeatlas.org

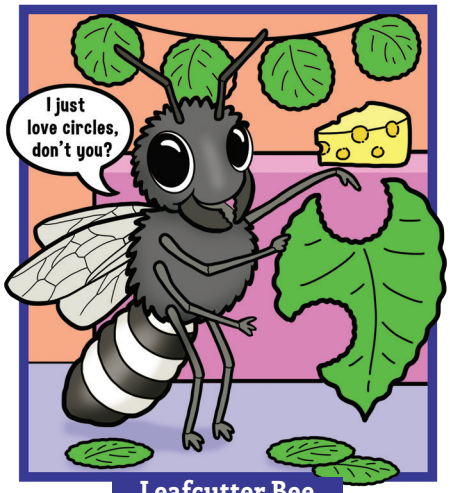
FOOD HERO
FoodHero.org

OREGON HARVEST for SCHOOLS

Oregon State University

Placeholder bee visiting an Oregon Grape flower

Scissor Head



Leafcutter Bee

Bees help make our food!

GrumpBee

Mining Bee

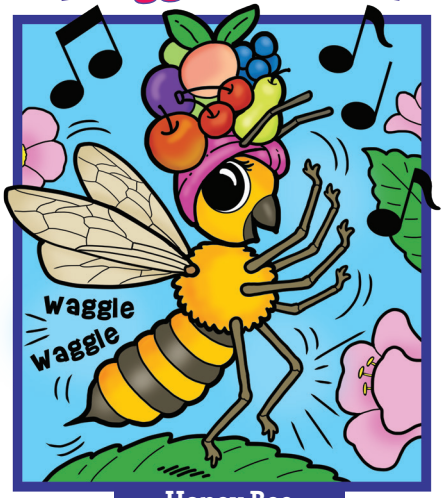
Bees help make our food!

The Salty Dog

Alkali Bee

Bees help make our food!

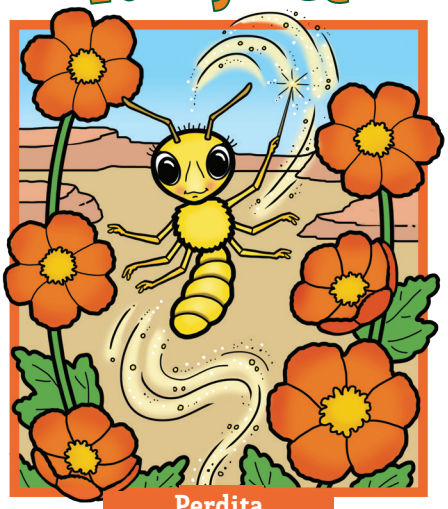
Waggle Dancer



Honey Bee

Bees help make our food!

Fairy Bee



Perdita

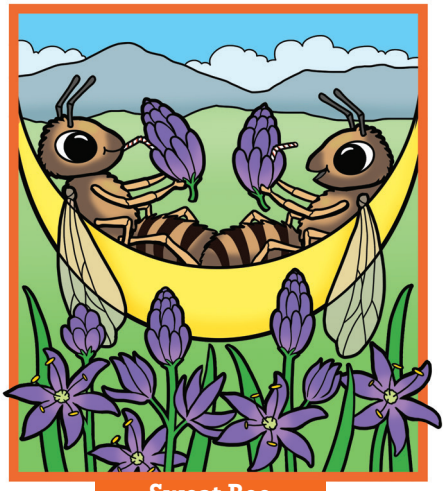
Bees help make our food!

The Picky Eater

Squash Bee

Bees help make our food!

Olympia



Sweat Bee

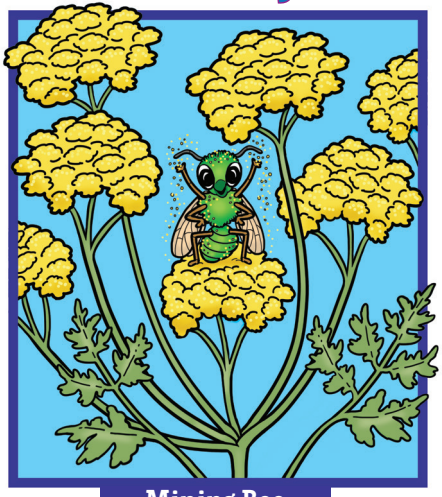
Bees help make our food!

Rocky

Lava Hole Bee

Bees help make our food!

Flashy



Mining Bee

Bees help make our food!

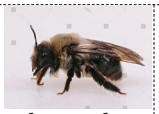
The Salty Dog

Alkali bees like to nest next to each other in special salty, moist, alkaline soils. They have beautiful iridescent stripes on their abdomens and are particularly good pollinators of alfalfa grown for seed. They also happen to be the only managed ground-nesting bee in the world! These characteristics give alkali bees solid scores across the board.

Bee Powers

Pollinating	6
Survival	6
Defense	6
Specialization	6

GrumpBee



Mining bees dig complex ground tunnels where each female builds her own nest. Some species share tunnels they defend together. Their deep nests help them survive in harsh habitats. Female mining bees have velvety hair on their forehead, which scientists believe they use to communicate with each other underground.

Bee Powers

Pollinating	5
Survival	7
Defense	5
Specialization	8

Scissor Head

Leafcutter bees cut out little leaf pieces to make their nests, which protect them from parasites. In alfalfa fields, thousands live together in outdoor houses. Even though they nest in large numbers, they are not as defensive as honey bees. They are the #1 pollinator of alfalfa grown for seed, which produces nutrition-packed hay to feed livestock worldwide!

Bee Powers

Pollinating	7
Survival	4
Defense	1
Specialization	6

The Picky Eater

Squash bees feed only on squash pollen. They eat squash pollen, drink squash nectar, and nest in protective ground tunnels at the base of squash plants. Squash is found in fields across the United States, so life is pretty good for squash bees. Just like their cousins, the long-horned bees, they are shy and rarely defend their nests.

Bee Powers

Pollinating	6
Survival	6
Defense	3
Specialization	9

Fairy Bee

Perdita are some of the smallest bees in the world. They can be half the size of a grain of rice. They often have colorful markings on their face and body. Some Perdita are very rare because they only visit rare plants. But because of their size and rarity, they score low in all other ways.

Bee Powers

Pollinating	1
Survival	1
Defense	1
Specialization	10

Waggle Dancer

European honey bees are very social. They visit many flower types and are the most used crop pollinator worldwide. Females use a "waggle dance" to send messages to each other. An army of worker bees keeps the hive running and defends against invaders. Living close together can be a challenge, though, and makes it easier for diseases to spread.

Bee Powers

Pollinating	10
Survival	3
Defense	9
Specialization	1

Flashy

You might miss me because I'm less than an inch long. To spot me, you need to sit patiently by wild biscuitroot plants when their yellow flowers bloom. Although I'm tiny, I'm flashy, with a metallic green and bronze body. And I'm mighty! By pollinating biscuitroot flowers, I help make their seeds. These grow into plants that have a tuber some Indigenous Peoples use for food.

Bee Powers

Pollinating	-
Survival	-
Defense	-
Specialization	-

Rocky

Who's the rarest bee of all? I am! My name's Rocky! People have only seen lava hole bees like me six times ever! That's because we nest in lava fields, in holes that formed in volcanic rock thousands of years ago. We forage for pollen on penstemon plants. When we fly by, people don't notice us because we're less than a quarter-inch long. It's sunset! Time to disappear again!

Bee Powers

Pollinating	?
Survival	5
Defense	8
Specialization	low?

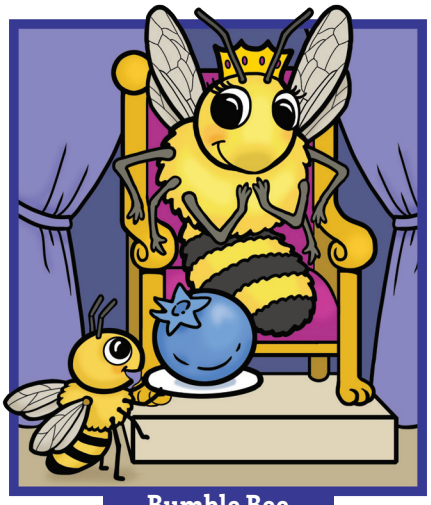
Olympia

I'm a sweat bee like my cousin Bling. But green metallic sweat bees are usually solitary, whereas Olympia sweat bees like me are social. When we need food, my sisters and I go out and pollinate camas flowers, but we'd rather just hang out together in our colony. Some people call us lazy sweat bees, but we just like to have fun!

Bee Powers

Pollinating	?
Survival	5
Defense	8
Specialization	low?

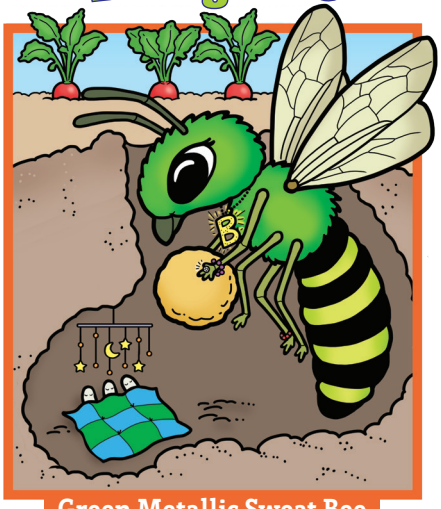
Bumbles



Bumble Bee

Bees help make our food!

Bling Bee



Green Metallic Sweat Bee

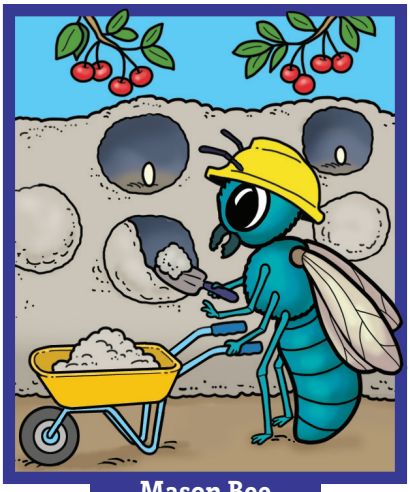
Bees help make our food!

Klepto

Cuckoo Bee

Bees help make our food!

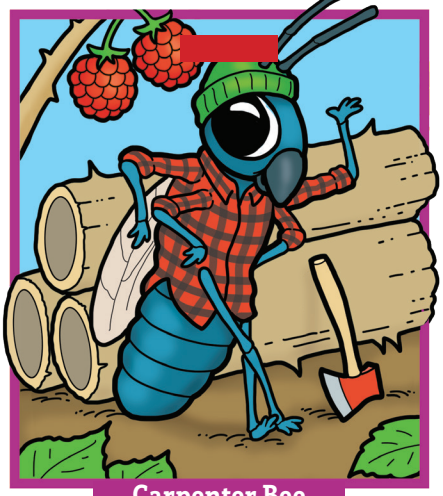
The Mason



Mason Bee

Bees help make our food!

Lil' Lumberjack



Carpenter Bee

Bees help make our food!

Long Horns

Long-Horned Bee

Bees help make our food!

Cutie Bee

Digger Bee

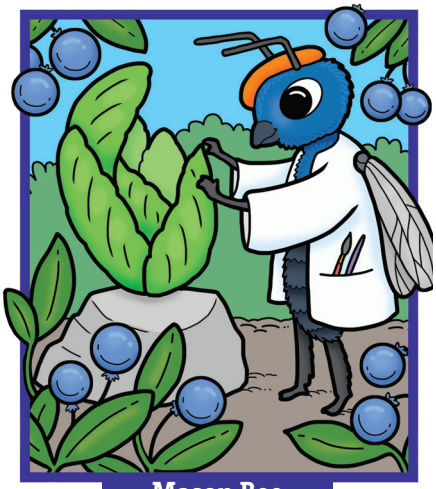
Bees help make our food!

Fuzzy

Long-horned bee

Bees help make our food!

Chomper



Mason Bee

Bees help make our food!

Klepto

Cuckoo bees like Klepto steal resources from other bees. They do this by breaking into nests and replacing the young eggs and larvae with their own. To help them break in, they have evolved to have special spines and "armor." They score zero in pollinating and specialization because they don't collect their own pollen.

Bee Powers

Pollinating	0
Survival	7
Defense	9
Specialization	0

Bling Bee

Green metallic sweat bees don't just sparkle, they are also great pollinators of many common garden plants. This gives them a good pollinating power score! Sometimes they nest alone, and sometimes with a big family, but they always nest in tunnels in the ground, so they have excellent survival power! Their bright metallic green color means they get noticed!

Bee Powers

Pollinating	7
Survival	8
Defense	6
Specialization	2

Bumbles

Bumble bees are large social bees. They have small colonies, with a small army of workers. They are great crop pollinators in cold weather and can buzz pollinate—vibrate their body as they collect pollen. Certain types of flowers only release pollen with buzz pollination. Bumbles are excellent pollinators of blueberries and cranberries, tomatoes, peppers and clovers.

Bee Powers

Pollinating	9
Survival	5
Defense	9
Specialization	3

Long Horns

Long-horned bees are solitary, and many species are sunflower family specialists. They nest in protective ground tunnels and females have thick hairs on their back legs to collect pollen. Like their cousins, the squash bees, they are shy and rarely defend their nests.

Bee Powers

Pollinating	4
Survival	6
Defense	3
Specialization	7

Lil' Lumberjack

Carpenter bees are small, mostly hairless and like to nest together as a family in hollowed-out blackberry stems. They score low in pollinating power and defense because of their size, but nesting together as a group safely inside a stem gives them great survival power!

Bee Powers

Pollinating	3
Survival	7
Defense	2
Specialization	3

The Mason

Mason bees are a bright metallic blue. They use paddle-like structures on their jaws to roll up mud balls to build their nests. The young are protected from parasites by the mud walls. Even in cold spring weather, they are hard workers, pollinating orchard crops (like apples and cherries)!

Bee Powers

Pollinating	7
Survival	5
Defense	4
Specialization	6

Chomper

I'm a mason bee, but instead of mucking around in mud or clay, I get creative! First, I use my strong jaws to chomp leaves to pulp. That's why my name is Chomper! Then, like a sculptor, I use the pulp to build my nest! Farmers use blueberry mason bees like me to pollinate their blueberry fields. Can you guess my favorite color?

Bee Powers

Pollinating	7
Survival	5
Defense	4
Specialization	6

Fuzzy

Take one look at me and you'll guess my name—Fuzzy! I might seem cuddly, but dusky long-horned bees are hard-working and loyal! That's because we're tarweed-dependent: we pollinate only tarweed flowers, and we never stray. Tarweed flowers are in the sunflower family and, like sunflowers, have edible seeds. I'm helpful to Indigenous Peoples because they grind the seeds to make dough for baking.

Bee Powers

Pollinating	4
Survival	6
Defense	3
Specialization	8

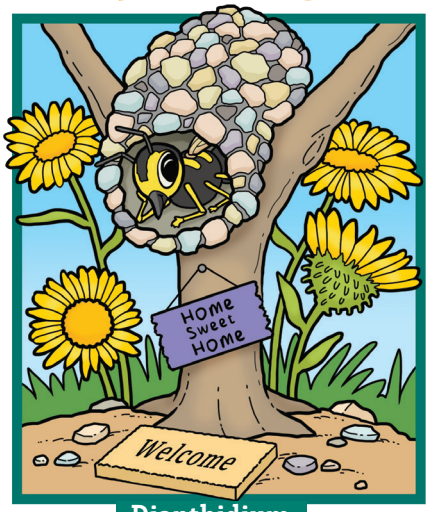
Cutie Bee

If you can't chat right now, that's okay. I'm used to waiting. Digger bees like me start out as eggs in an underground nest in spring—but we don't emerge as adults for a whole year! Even then, we wait patiently for our flowers—the wax currants—to bloom. I'm small and fuzzy and people say I'm adorable. I don't mind waiting for you to say so, too!

Bee Powers

Pollinating	?
Survival	?
Defense	?
Specialization	10

Pebbles



Dianthidium

Bees help make our food!

Glassy

Colletes michenerianus

Bees help make our food!

Dune Bee

Habropoda miserabilis

Bees help make our food!