



Food for Thought



Recipes and activities for families to share together



**Food for
Thought**



Welcome to the ***Food For Thought*** Research project presented by Kent State University, Cincinnati Museum Center, La Soupe and COSI. Our goal is to offer you the opportunity to cook together, try some tasty recipes and see if you are inspired to ask questions and have conversations around your observations and experimentation. **Scan the QR code below** to sign up for the popcorn challenge, and if you're still hungry for more tasty science try some of the recipes included in this recipe booklet!

Popcorn family fun challenge

Kit Ingredients: Popcorn and Vegetable Oil

Follow the QR code below to find the Popcorn Challenge experiment. If you would like to be a part of the study you will receive a gift card to Amazon for \$25!

To participate, you will need to be able click on the record button to allow your device to make an audio recording as your family makes popcorn!

We hope you enjoy!

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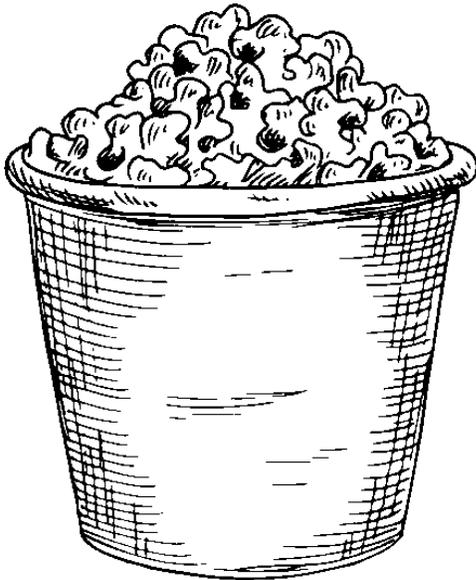




Carry Out Science: Stovetop Popcorn



Learn how to make your own delicious popcorn
and the science behind the POP!



Grades: 5 and up
Ability Level: Medium
Time: 15 minutes
Serving: 4 cups popped corn

Cooking Tip:

Use an oil with a high smoke point. Olive oil and butter don't work as well because when they heat up to a high temperature, they smoke and burn.

Tools:

- Measuring cup and spoons
- Pot with lid
- Stove

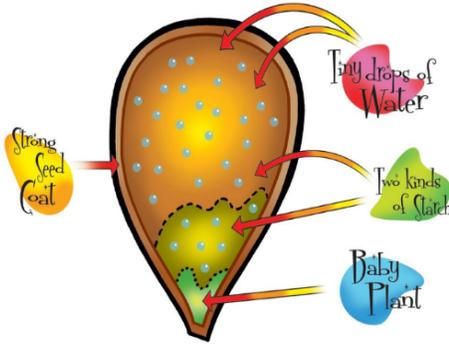
Ingredients:

- $\frac{1}{3}$ cup popcorn kernels
- 1 Tablespoon vegetable, canola or coconut oil
- Salt and/or other seasoning
- Butter (optional)

Instructions:

1. Add the oil to the pot with 2 or 3 kernels of corn. If using coconut oil, melt the oil in the pot first, then add a couple of kernels.
2. Turn the pot to medium-high heat, cover and wait for the 2-3 kernels to burst into popcorn.
3. When the kernels pop, add the rest of the $\frac{1}{3}$ cup of popcorn kernels in an even layer (try to keep them in a single layer).
4. Cover the pot and gently shake it by moving it back and forth over the burner.
5. As the popcorn pops, try to keep the lid slightly ajar to let the steam from the popcorn release (the popcorn will be drier and crisper).
6. Once the popping slows to several seconds between pops, remove the pan from heat, remove the lid and dump the popcorn into a bowl.
7. Gather your toppings, drizzle over the popcorn and toss to distribute. Add butter if desired. Enjoy!

Why does popcorn pop?

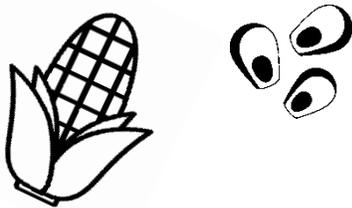


Popcorn Kernel

When the kernels are put on a heat source (like a stove), their insides heat up fast. The kernel has tiny drops of water inside of it that turn into steam. The steam builds up pressure inside the kernel's strong seed coat (called a *hull*). Eventually, the pressure can't be contained, and the kernel explodes! Once the kernel explodes, the sugar (called *starch*) inside it continues to expand and gives popcorn its soft texture.

Play with your food!

- Try cooking popcorn with different types of oil – Which one tastes best?
- Get creative with your popcorn toppings! Here are some ideas: dried or fresh herbs (e.g., sage, rosemary, basil, oregano, basil, cilantro, dill), spices (e.g., paprika, cayenne pepper, cumin, pumpkin pie spice), parmesan cheese, salt and pepper, nutritional yeast, coconut flakes, honey, butter, maple syrup, chocolate chips.
- Other ideas you have? _____



Watch a kernel pop in slow motion!

What do you notice?



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Tasty Questions

What questions do you have? Can you develop one for each of the categories below?

Noticing: _____?

Example: What do you see, hear and smell as the popcorn cooks?

Comparing: _____?

Example: What is different about the kernels before and after you cook them?

Explaining: _____?

Example: Why do some of the kernels not pop?

Predicting: What do you think would happen if (fill in the rest)

_____?



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Carry Out Science: Crispy Roasted Potatoes

Description: Make a yummy potato dish and learn more about these super tubers!



Grades: 5 and up
Ability Level: Medium
Time: 75 minutes
Yields 4 Servings

Ingredients:

- ¼ cup (¾ ounce) grated parmesan
- ¼ cup all-purpose flour
- ½ to 1 teaspoon salt
- Dash of black pepper
- 2 starchy potatoes (e.g., Russet) or 4 large all-purpose potatoes (e.g., Yukon Gold), about 1 ¾ pound total
- ½ stick (¼ cup) unsalted butter

Fun Fact! The potato nickname *spud* comes from the medieval word “spyde,” which referred to simple digging tools.

Instructions:

1. Preheat the oven to 350°F.
2. Wash, peel and quarter potatoes lengthwise.
3. In a large sealable bag, add flour, salt and pepper. Shake to mix.
4. Add potatoes to the flour mixture, tightly sealing the bag and shake to coat well.
5. Melt butter in the microwave.
6. Pour butter into a large shallow baking pan. Lift potatoes from the bag and arrange in an even layer.
7. Roast in the lower third of the oven, turning twice, until browned and crisp (about an hour).
8. Add parmesan and desired herbs (e.g., rosemary, thyme). Serve warm and enjoy!

Feeling Saucy?

Dip your taters in one of these yummy homemade sauces!

Chimichurri

An herby sauce from Argentina

- ½ cup (packed) fresh herbs, mostly parsley
- ¼ cup olive oil
- 1-2 Tablespoons red wine vinegar
- 1 garlic clove, peeled
- ½ teaspoon dried crushed red pepper
- ¼ teaspoon salt

Puree all ingredients in a food processor or with mortar and pestle. Garnish with pomegranate seeds.

Special Sauce

A tangy sauce made with items from your fridge

- ½ cup mayonnaise
- ⅓ cup ketchup
- ½ teaspoon Worcestershire sauce
- 2 teaspoons pickle brine
- ½ teaspoon paprika
- A pinch of cayenne

In a small bowl, combine and stir all ingredients together.

Tater Talk!

Potatoes are known as a **starchy tuber**. Starchy tubers are below-ground structures used by plants to store energy, which makes them perfect food staples for humans due primarily to their high starch content.

- Potatoes are often planted after the last frost of the year. They grow best between 45° to 55°F.
- When planting potatoes, choose a location that gets full sun – at least 6 hours of sunlight daily.
- Plant in rows spaced about 3 feet apart.
- With a round-point shovel, dig a trench about 6 inches wide and 8 inches deep, tapering the bottom to about 3 inches wide.
- Potatoes become inedible when exposed to sunlight for long periods. Place soil around the base of the plant to prevent sun exposure.



Cold Potato to Hot Potato

Try this experiment:

- Cold potato: After peeling and cutting your potatoes, place one of them on a plate and place it in the fridge. Let it sit for an hour.
- Warm potato: Place another sliced potato on another plate and leave it on your countertop at room temperature for an hour.
- Bake both potatoes in separate pans, remembering which potato was “cold” and which was “warm.”

Tasty Questions

Scientists ask questions to understand the world around them. What questions do you have while conducting this experiment? Here are some to get you started:

- Compare the look, taste and smell of the two potatoes before, during and after cooking. What do you notice?
- What would happen if you baked your potatoes in the oven for a longer amount of time?

Fun Fact! There are an estimated 200 varieties of potatoes grown in the United States.

What's going on?

As the water in the potato cools in the fridge, the starch in the potato will break down. This will lead to more browning during baking! Is your “cold” potato crispier than the “warm” potato after baking?



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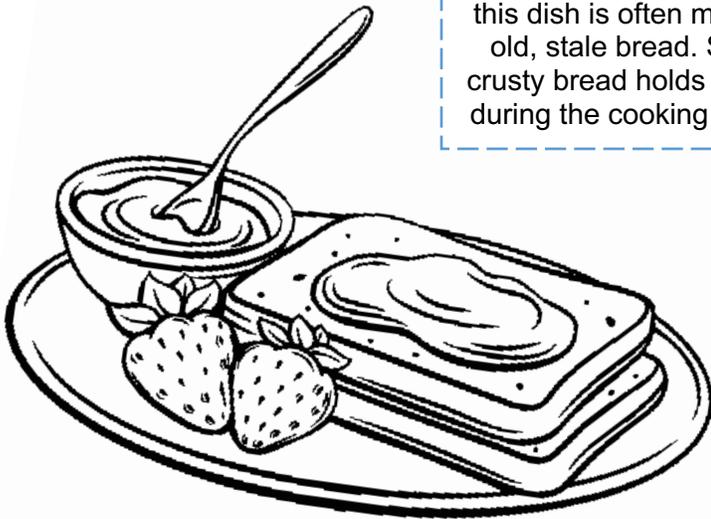


Carry Out Science: Pain Perdu (French Toast)



Description: Make a yummy breakfast dish and experiment with science!

In French, *Pain Perdu* means “lost bread” because this dish is often made with old, stale bread. Stale or crusty bread holds its shape during the cooking process!



Grades: 5 and up
Ability Level: Medium
Time: 15-20 minutes
Servings: 4 slices of toast

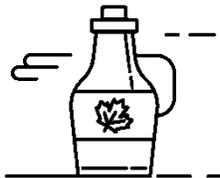
Tools:

- Wide and shallow bowl
- Whisk or fork
- Spatula
- Wide pan
- Stove

Instructions:

Ingredients:

- 2 medium eggs
- 1/4 cup milk
- 4 slices of bread
- 1 teaspoon cooking oil or butter
- **Optional spices:** cinnamon, nutmeg, ginger, vanilla, brown sugar



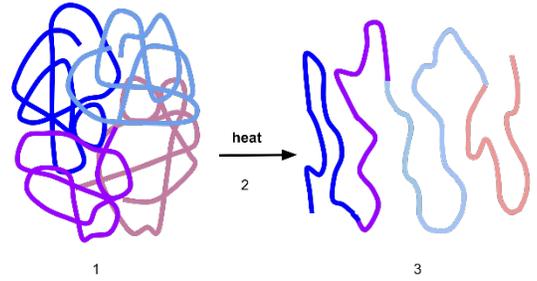
Play with your Food!

What are your favorite French toast toppings? Try some of these or come up with your own! Strawberries, bananas, peanut butter, honey, powdered sugar, chocolate chips, syrup.

1. Begin by cracking the eggs in the shallow bowl.
2. Add milk.
3. Whisk until the two parts of the egg and milk are well mixed.
4. Optional: Add 1 teaspoon of your favorite spices, such as cinnamon or nutmeg.
5. Add 1 teaspoon cooking oil or butter to the pan over medium heat on the stove.
6. Dip each slice of bread in the egg and milk mixture and allow the excess to drip back into the bowl. The bread should be evenly covered in the mixture.
7. Once both sides of the bread are coated, add to the pan. Add more than one slice if you have the space.
8. Cook until the outside of the bread begins to look like a fried egg, then use your spatula to flip the bread over.
9. Repeat Step 8 for the other side and continue to rotate until both sides are golden brown.
10. Place on a plate, add toppings and enjoy.

Eggs-citing Science!

Eggs have two well-known parts: the **egg white** (the clear part before it is cooked) and the **egg yolk** (the inner yellow part of the egg). Both parts of the egg contain **proteins**, which are materials found in all living things. The proteins are made up of chains of amino acids that fold into complex shapes, all held together by different types of bonds. When the egg is cooked, the heat makes the proteins dance around. The bonds keeping the amino acids together start to **denature**, or unfold. When two unfolded proteins bump into each other, they start to form new bonds. A large net of proteins forms, which causes the egg to harden and change color. See if you can notice the egg change as it cooks: What began as a liquid has now turned to a solid!



Heat causes the proteins in the egg to unfold and form new bonds.



Explaining: How can I tell if my egg is still good?

To learn an easy way to **test the quality of your eggs.**



SCAN ME

Tasty Questions

What questions do you have? Can you develop one for each of the categories below?

Noticing: _____?

Example: What do you notice about the content of the egg when you crack it open? How does it feel?

Comparing: _____?

Example: What is different about the egg mixture after it is cooked (compared to before)?

Predicting: What do you think would happen if (fill in the rest) _____?

Experimenting: How could you test to see how the French toast changes when you use more eggs in the mixture? How about if you used only egg whites or only egg yolks?



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Carry Out Science: Popcorn Balls



Description: Make a fun snack and learn more about honeybees!



Cooking Tips:

- You can use an ice cream scoop or spoon to help shape the popcorn balls.
- If you don't have salted peanut butter, add 1/8 teaspoon of salt to your peanut butter.

Grades: 5 and up

Ability Level: Medium

Time: 25 minutes

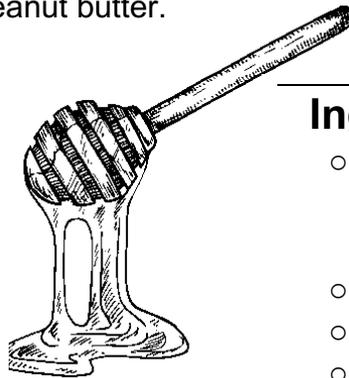
Serving: 10 popcorn balls

Tools:

- Measuring cup and spoons
- Glass or ceramic bowl
- Large plastic or glass bowl
- Wooden spoon
- Baking sheet with parchment paper
- Butter or oil for hands

Ingredients: **Version 1**

- 5 cups popped corn
 - See "Stovetop Popcorn" recipe
- 1/3 cup salted peanut butter
- 1/3 cup honey
- 1/3 cup chocolate chips

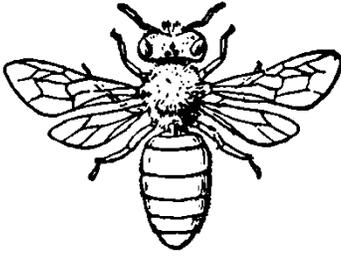


Ingredients: **Version 2**

- 5 cups popped corn
 - See "Stovetop Popcorn" recipe
- 1/2 cup honey
- 1/4 cup sugar
- 1 Tablespoon butter

Instructions:

1. In a microwave-safe glass or ceramic bowl, melt the peanut butter and honey (**Version 1**) OR honey, sugar and butter (**Version 2**) in the microwave – about 2 minutes. Remove and stir mixture halfway through cooking.
 - Be careful when removing the mixture as it will get very hot.
2. Put popped corn in a large plastic or glass bowl. Pour honey mixture over popcorn and gently stir with wooden spoon until the popcorn is evenly coated in the mixture.
3. Let cool for about 7-10 minutes, or until the mixture is lukewarm to the touch. Stir in chocolate chips (**Version 1**).
4. Wash hands thoroughly. Rub a small amount of butter on hands or spray with cooking oil to keep mixture from sticking to them.
5. Roll into balls about the size of your fist, squeezing within your two hands. Set balls on a baking sheet lined with parchment paper and put in the fridge for a half hour.
6. Once fully cooled, the popcorn balls can be put away in containers or sandwich bags. You can store them in the fridge for up to a week or freeze up to two weeks!



Where does honey come from?

Honey comes from the hard work of honeybees! A forager bee flies around flowers and sucks out *nectar*, which is made of plant sugars and water. The bees swallow the nectar and store it in a special “honey crop” stomach they have. The forager bee then regurgitates the nectar to a hive bee that lives in a beehive, who adds special chemicals called *enzymes* to the nectar. This process repeats until the nectar is turned into honey. The hive bees also evaporate some of the water out of the honey by rapidly flapping their wings over the honey for a few weeks. The honey is then stored in special wax pieces called *honeycomb*.

Learn more about **busy**

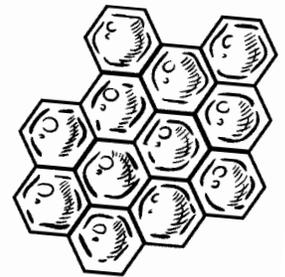
bees!



SCAN ME

Play with your food!

- For a vegan version, substitute the honey with brown rice or agave syrup.
- Consider adding different toppings to your popcorn balls!
 - Nuts, raisins, small pieces of dried fruit or spices
 - Your favorite toppings: _____
- Morph the popcorn into different shapes or different sized balls!
- Other ideas you have? _____



Tasty Questions

What questions do you have? Can you develop one for each of the categories below?

Noticing: _____?

Example: What do you notice about the texture of the honey mixture – how does it feel?

Comparing: _____?

Example: What is different about the honey mixture before and after you microwave it?

Explaining: _____?

Example: Why does the honey help the popcorn stick together?

Predicting: What do you think would happen if you used more honey in the mixture? What do you think would happen if (fill in the rest) _____?

Experimenting: How could you test to see if (fill in the rest) _____?



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Carry Out Science: Mint Tea



Description: Make a “cool” tea and learn about the science behind mint!



Grades: 4 and up
Ability Level: Easy
Time: 5-10 minutes
Servings: 1-2 cups of tea

Tools:

- Pot to boil water (or electric kettle)
- Stove
- Spoon for stirring
- Mug
- Strainer (optional)

Ingredients:

- 10-15 fresh mint leaves (spearmint or peppermint)
- 2 cups water

Instructions:

1. Bring 2 cups of water to a boil (either on the stove or using an electric kettle).
2. Remove from heat and add mint leaves.
3. Let steep for 3-5 minutes. Stir with spoon.
4. Strain mint leaves (optional).
5. Pour into mug and enjoy!

Play with your Food!

Try adding a sweetener to your tea, such as sugar, stevia or honey. Or experiment by adding other plants to the mix, such as lemon or orange juice, lavender or ginger root. For iced tea, let cool and add some ice cubes or store your tea in the fridge for up to 2 days.

A Useful Herb

Although it's unclear exactly how many species of mint (*Mentha*) exist, some estimate between 15-20 species. Spearmint and peppermint are the most commonly grown species in the West. These species have many culinary uses and are included in various beverages, jellies or sauces, desserts such as ice cream and as flavoring in products like toothpaste or chewing gum. Mint also has some medicinal uses. For example, large concentrations of mint have shown promising results in reducing gastrointestinal pain after surgery, relieving tension headaches and helping patients with breathing issues.

Cool Facts

Thermoception refers to our ability to detect changes in temperature. We detect a “cool” sensation from mint when the active ingredient in mint – called **menthol** – interacts with TRPM8 proteins in our body. As menthol molecules bind to the TRPM8 proteins, the proteins send signals to our brain that the temperature has dropped. This signal is intended to prevent you from eating something dangerous, but minty and spicy foods use this signal as a way to defend themselves (to avoid being eaten). This defensive strategy is so effective that humans and **tree shrews** (pictured below) are the only known mammals that will intentionally eat spicy food.



Menthol’s cooling effect is the result of confusion to our senses, not an actual temperature change.



Minty Questions

What questions do you have? Can you develop one for each of the categories below?

Noticing: _____?

Example: What do you notice about the fragrance of the mint leaves? Try rubbing the leaves between your fingers or tearing the leaves to release the scent.

Comparing: _____?

Example: What is different about the smell of the leaves before and after they are put into the hot water?

Predicting: What do you think would happen if (fill in the rest)

_____?

Experimenting: How could you test to see how the mint leaves are affected by different temperatures of water?

Explaining: Why does mint taste ‘cold’ and spice taste ‘hot’? To learn more about **thermoception**



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Carry Out Science: Salsa



Description: Try this healthy ancient snack!



Grades: 4 and up
Ability Level: Easy
Time: 20-30 minutes
Servings: About 2 cups
(4 servings)

Instructions:

1. Add tomatoes, onion and jalapeño to a large bowl.
2. Cut lime in half and squeeze juice into the bowl.
3. Roughly chop the cilantro and place into bowl.
4. Crush and chop the garlic into small pieces.
5. Add salt and pepper to taste.
6. Mix and serve with tortilla chips. Enjoy!



Be careful!

After you touch the pepper, make sure not to touch your face until after you thoroughly wash your hands!

Tools:

- Knife
- Vegetable peeler
- Cutting Board
- Large Bowl

Ingredients:

- 2-3 large tomatoes, diced
- 1 medium red onion, chopped
- ¼ cup cilantro
- 1 jalapeño pepper, diced
- 1 lime
- 1 clove garlic
- Kosher salt
- Freshly ground pepper
- Tortilla chips

Play with your Food!

Salsa is a very versatile recipe, so there are lots of options for modifying the ingredients and proportions based on personal taste. Want a spicier salsa? Try adding some chili powder. Want a smoother texture? Use a food processor to blend the ingredients together. Want a sweeter salsa? Try adding corn, mango, pineapples or strawberries to the mix!

Delicious Defense Mechanisms

Why do peppers make you feel pain, and why do onions make you cry?

Both these reactions are the result of evolutionary mechanisms designed to keep these plants alive. Human food preferences have adapted to this. Now we harvest these plants for their defense mechanisms.

Onions often make you cry. This is a result of the sulfur-rich amino acids meeting enzymes and creating sulfenic acids and **thiosulfinate**, which prevent bacterial infection.



Capsaicin is the chemical that makes peppers spicy. The chemical tells the protein receptors in your mouth and on your face that you are being burned. This is a combination of the strong feeling and rising heat signals to your nervous system.

Tasty Questions

What questions do you have? Can you develop one for each of the categories below?

Noticing: _____?

Example: What do you notice about the smell of the salsa once it's complete? How would you describe the texture?

Comparing: _____?

Example: Compare the sensory experience (taste, smell, touch, etc.) of each component of the salsa. How does the experience of the onion change when it is added to the salsa?

Predicting: What would happen if you put this salsa in a blender or food processor?

_____?

Experimenting: Acidic components lessen the effects of spicy food. How could you test this in your next batch of salsa?



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Carry Out Science: Tortilla Soup



Description: Make a delicious soup and learn some science along the way!



Ingredients:

- 1 Tablespoon canola/vegetable oil
- 1 medium onion
- 2 garlic cloves
- 1 teaspoon cumin
- 1 teaspoon chili powder
- 2 14.5-ounce cans low-sodium chicken broth
OR vegetable broth
- 1 pound skinless raw or cooked chicken
OR 1 can garbanzo beans and 1 can pinto
beans (vegetarian version)
- 14-ounce can low-sodium black beans
- 10-ounce can or frozen corn
- 15-ounce can diced tomatoes
- 10-ounce can enchilada sauce
- 1 teaspoon salt and black pepper

Optional: (for spicier soup!)

- 1 4-ounce can chopped green chili peppers

Optional Garnishes:

- Chopped cilantro or green onion
- Crushed tortilla chips
- Cheese or sour cream
- Sliced avocado

Grades: 5 and up
Ability Level: Medium
Time: 45-60 minutes
Servings: 5 (2 cups each)

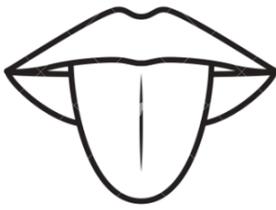
Tools:

- Cutting board and chef knife
- Can opener
- Measuring cups and spoons
- Strainer
- Medium pot
- Stove



Instructions:

1. Using cutting board and chef knife, chop medium onion. Next, mince garlic cloves.
2. Using can opener, open the cans and drain beans and corn.
3. If using raw chicken, chop into 1-inch cubes.
4. Heat the pot on medium-high, then add the oil. Add onions and sauté (which means “to jump” or stir items in a hot pan with a little oil) for 2 minutes.
5. Add the raw chicken and cook until no longer pink.
6. Add garlic, cumin and chili powder and allow the spices to toast. You will begin to smell the spices toasting (in less than 1 minute).
7. Add the stock followed by the rest of the ingredients.
8. Bring all the ingredients to a boil and then lower heat and simmer for 30 minutes.
9. If using cooked chicken, add the chicken in for the last 5 minutes of cook time, just to heat through.
10. Add desired garnishes to each serving.



What do you Taste?

Taste each ingredient as you go and try using these words to describe what you taste!

Taste is what we sense when chemicals in our food react with taste receptor cells on our tongues.

Scan here to learn more about the science of taste.



SCAN ME

5 Tastes: Unami (savory), Sour (acidic), Sweet, Bitter, Salty

Texture: Melty, Chewy, Chunky, Mushy, Creamy, Oily, Fatty, Crispy, Rough, Dry, Firm, Soft, Slimy, Silky, Smooth, Fibrous

Temperature: Cold, Warm, Hot

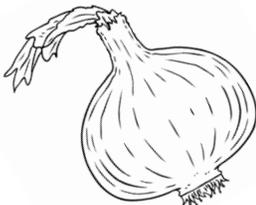
Descriptive Words: Sharp, Scrumptious, Aromatic, Moist, Delicious, Fragrant, Fresh, Spicy

Play with your Food!

Try using a packet of taco seasoning instead of enchilada sauce for a slightly different broth. Consider adding chunky salsa to the mix!

Add any fresh vegetables you have on hand, like bell peppers or your own favorites (fill in):

_____.



Tasty Questions

What questions do you have? Can you develop one for each of the categories below?

Noticing: _____?

Example: What do you smell when the spices are cooking?

Comparing: _____?

Example: What is different about the taste of the onions before and after you cook them?

Predicting: What do you think would happen if (fill in the rest)

_____?

Experimenting: How could you test to see if the taste changes when you use water instead of broth in the soup?

Scan here to learn about reflexive tears.



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