**Corn**

**Introduction:** Video “Why popcorn pop” <https://www.youtube.com/watch?v=MBSmEbWZ2Qg>

Video “Slow motion popcorn pop” <https://www.youtube.com/watch?v=FSZd33awqQk>

**Background information** [source](https://www.popcorn.org/Facts-Fun/What-Makes-Popcorn-Pop)

Each kernel of popcorn contains a small drop of water stored inside a circle of soft starch. [Popcorn needs between 13.5-14% moisture to pop](https://www.popcorn.org/Facts-Fun/Industry-Facts#Moisture). The soft starch is surrounded by the kernel's hard outer surface.

As the kernel heats up, the water begins to expand. Around 212 degrees the water turns into steam and changes the starch inside each kernel into a superheated gelatinous substance. The kernel continues to heat to about 347 degrees. The pressure inside the grain will reach 135 pounds per square inch before finally bursting the hull open.

As it explodes, steam inside the kernel is released. The soft starch inside the popcorn becomes inflated and spills out, cooling immediately and forming into the odd shape we know and love. A single kernel can swell to 40-50 times its original size! The first bit of starch that emerges forms a “leg” of sorts, which catapults the kernel like a gymnast as the remaining starch spills out. This is why popcorn jumps as it cooks.

**Objectives:**

* Remember what is starch from the first lesson.
* Understand the concept of change of state of matter for water and starch
* Understand changes of pressure inside a hard surface
* Discuss how heat get transfer among different materials

**Materials:**

* Kernel
* Pop corn
* Cans
* Candle
* Popcorn machine
* Magnifier

Helpful links:

https://www.thoughtco.com/how-does-popcorn-pop-607429

**SECTION 1. Where is the starch in the popcorn**

1. Disect the kernel and a popcorn, you can cut them with scissors.
2. Put a drop of iodine in the white section of the kernel and see which area turns purple
3. Put iodine in the popcorn and see which section turns purple
4. Compare the volume of the starch in the kernel versus the popcorn

Discussion questions?

Why the volume of the starch changes between the kernel and the popcorn?

What happens to the Hull (seed coat) after the kernel pop? Does it change volume too?

**SECTION 2. Corn Kernel dissection**

1. Dissect a second kernel and a popcorn, you can cut them with scissors.
2. Talk about the sections of the seeds.
	1. Embryo (baby corn), endosperm (nutrients), seed coat (protection)
3. What does each section of the seed is made of?
	1. Embyo (germination), endosperm (starch), seed coat (fiber)
4. Look at the corn plants and compare the structures that you see in the seed with the ones in the plant

Discussion questions?

 Corn Kernel are seeds that could grow into corn, and starch is nutrients for them and for us

**SECTION 3. See popcorn maker in action and eat popcorn**

1. Ask the kids how the popcorn is made? Remind them about the drop of water inside that become steam and change the starch.
2. Explain how the heat will be transferred from the candle to the can and finally to the kernel
3. Put some corn kernel inside
4. Wait and see the kernel pop

Discussion questions?

 What happens to the kernel?

 What other ways are to transfer heat to corn kernel besides candle? Microwave, hot oil, hot air

 Look at the starch and the hull, and explain how the heat change the starch but not the hull

 How does the popcorn machine works?

 Where is the heat coming from? What determines the speed of the kernel popping?



