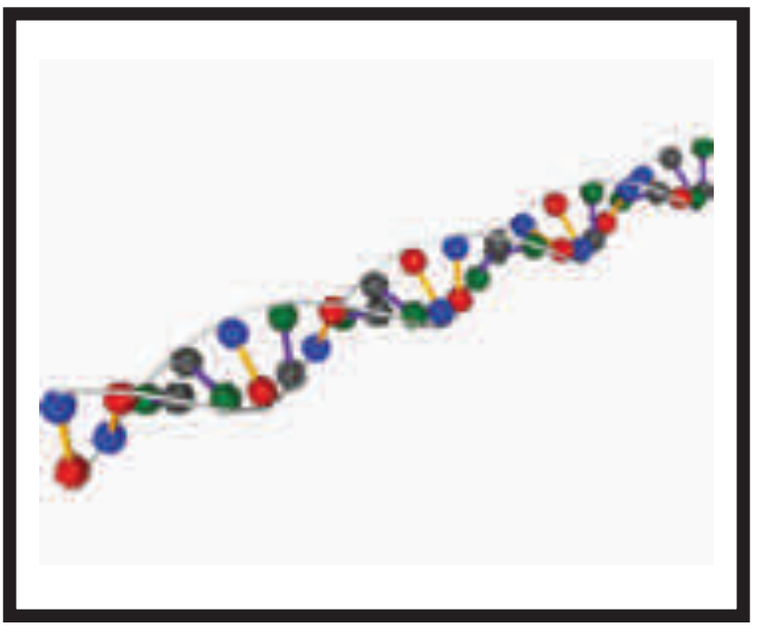
Science TECHNOLOGY STEM ENGINEERING MATH

# HOW TO:

# Extract DNA

**Items Needed:**

1/2 cup split peas
1/8 tsp. table salt
1 cup cold water
2 Tbsp. dish detergent
Meat tenderizer
Rubbing alcohol (70-95% isopropyl)



Approximate time to complete: 10 minutes
Skill Level: Intermediate
Budget for materials: $5.00

**Project Instructions:**

Mix peas, salt, and water in blender and blend on high for 15-30 seconds. Next, pour your “pea soup” through a strainer or colander into a container such as a small bowl or measuring cup. Add the dish detergent to this soup and swirl to mix. Let the mixture sit for 5-10 minutes. After letting it sit, put the mixture into small containers (test tube, etc.) where you want your DNA to stay. Fill these containers about 1/3 of the way full. Next, add a pinch of meat tenderizer to each tube and gently swirl to stir. It is important that you do not stir to hard or else you could break the DNA, making it difficult to see. Finally, turn your containers sideways and pour the rubbing alcohol slowly down the side of the tube. Add the same amount of alcohol as you have pea mixture. The alcohol is less dense than the pea mixture, so it will form a l ayer on top. The white stringy stuff that gathers between the pea juice and the alcohol is the DNA. If you want to see it better, try pulling the DNA slowly upwards into the alcohol layer or even transferring it into a separate test tube with only alcohol. If you are having trouble extracting the DNA, try using ice-cold water and alcohol.

**What’s Happening:**

So what happened in all those steps to extract the DNA? When you first put the peas through the blender, you were separating all of the pea cells from each other, creating a pea-cell soup. The strainer simply helps remove remaining large chunks of pea. But why dish detergent? The molecules in dish soap are made of two parts: a head that likes water, and tails that don’t. These molecules are similar to those that make up the lipid (fat) cell membrane of the pea cells. When the two substances (soap and cell membrane) come in contact with each other, they combine into small droplets with the heads facing out. This is the same way soap removes grease from your hands or dishes. Once you have the membrane dissolved, the DNA is still folded around and covered by proteins. The meat tenderizer acts as an enzyme to take the protein off of the DNA, allowing it to unwind and become visible to the human eye. The salt from step one helps this now free DNA stick together. The DNA will float above the pea soup, suspended partially in the alcohol due to the differences in density.

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