The Get Wet assignment was a chance to allow us to explore our cameras and get to know how they work, as well as learn how to capture basic flow visualization and special techniques used to do so. For myself in particular who had limited experience of taking pictures with a DSLR camera, this provided me with a chance to practice using its many features. In regards to my choice of picture, the original intent of the image was to capture how fresh fruit can look when splashed with water. As far as the fluid phenomenon I was trying to capture, I was trying to demonstrate water's adhesive and cohesive properties. Originally, I chose an orange and tried splashing it with water. This came with minimal success as the water beads either rolled off the fruit or didn't sit on its surface in a way that would allow me to properly capture the characteristics of water I was trying to demonstrate. Due to this first gaffe, I decided to switch fruits and tried using an apple. The apple ended up working extremely well after rinsing it once, as the wax that is typically smothered on the surface of an apple was making the surface too hydrophobic and therefore, not allowing the water to sit properly. Despite this, the apple's hydrophobic skin did help in creating the final picture and helped to properly demonstrate the phenomenon I was trying to show.

Adhesive and cohesive properties are a result of the intermolecular forces of a water molecule. To begin understanding this however, it is important to understand the polarity of a water molecule. A water molecule is made of two hydrogen atoms and an oxygen atom. Covalent bonding occurs between the oxygen and hydrogen atom however, because oxygen in this orientation still has two unpaired electrons, the electrons from the oxygen atoms repel the hydrogen atoms' and thus, a 104.5° bond angle, which plays a major role in its polarity[1]. Since electrons have a negative charge, the oxygen end of the molecule has a negative charge while the hydrogen end has a positive charge[2]. The positive charges are attracted to negative charges in the molecule and thus, a strong hydrogen bond forms and creates the cohesive properties[3].

[1] "Hydrogen Bonds in Water." Khan Academy, Khan Academy, https://www.khanacademy.org/science/biology/water-acids-and-bases/hydrogen-bonding-in-water/a/hydrogen-bonding-in-water.

[2] Ibid

[3] Libretexts. "2.2E: Water's Cohesive and Adhesive Properties." Biology LibreTexts, Libretexts, 9 Sept. 2019, https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book:_General_Biology_(Boundless)/2:_The_Chemical_Foundation_of_Life/2.2:_Water/2.2E:_Water's_Cohesive_and_Adhesive_Properties#targetText=Cohesion holds hydrogen bonds together,the water toward other molecules.

The cohesive properties are demonstrated in the picture taken by the bead-like water droplets gripping to the surface of the apple. This cohesive force caused by the hydrogen bond is also responsible for surface tension and the water drop's shape. The adhesive properties are also on display in the form of the droplets holding onto the apple's surface at "extreme" angles. Adhesive properties are caused by the polarity of these water molecules and polarity in the other molecules of its surroundings[4]. The reason the beads of water prefer to stick to the apple rather than fall off the fruit are due to the adhesive forces being greater than the force of gravity. The apple itself being in dynamic equilibrium, meaning it experiences no acceleration in any direction, also allow the adhesive forces to retain the molecules to the fruit. I had briefly stated that I had to rinse the wax off of the apple's surface due to it acting too much like a hydrophobic material. The wax that is put on these apples at grocery markets are nonpolar and therefore do not allow the highly polar water molecule to interact with it[5]. By washing this wax off, the surface became less hydrophobic and more hydrophilic, allowing the adhesive properties to be on full display.

The visualization technique was very simple for this image. I only required a pink lady apple, though any apple likely would suffice, and a black canvas for the background. Due to the relative size of the image, I was able to use just a simple black T-shirt as my canvas. From here, the only additional items I required was a source of light and some water to drizzle over the apple. I used a desk lamp with a basic 60 Watt lightbulb as my lighting source. From here, it was a matter of capturing the right image from the right angle. For a visual representation, see Figure 1.

[4] BD Editors, et al. "Adhesion - Definition and Examples." Biology Dictionary, 25 Mar. 2019, https://biologydictionary.net/adhesion/.
[5] Libretexts (n 3)

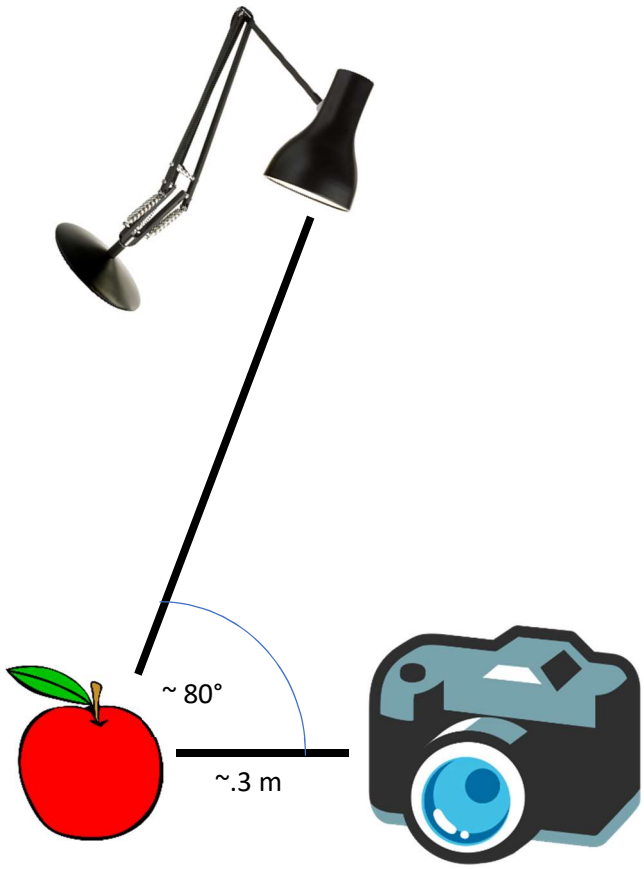

Figure 1: The picture was taken at a slightly elevated height, the light source in reference to the camera was at the approximate angle as shown

As this was my first time using a DSLR camera, I mostly only played with the manual focus, as this in it of itself was a new feature to me. In order to properly focus on the water droplets, I had to be very close to the apple. The lighting had been an issue as even in the final image, there is a slight glare. When I had tried to put the light source behind the fruit, the apple came out too dark and any closer to the camera made the glare worse. I ultimately decided on this angle as it decreased the impact on the photo caused by the glare. I decided not to photoshop the glare out either as I believe it adds to the image in demonstrating how smooth an apple's surface really is in the way light reflects off of it. The picture was captured with a

Sony ILCE6000, a digital camera. For this image, the focal length was 37 mm, the f number was 4.5, and the exposure time was 1/160 sec. The ISO setting was on 1600. The original picture has the same pixel dimensions as the final, at 6000 X 4000 pixels. I did use gimp to slightly alter the contrast. Below is the original picture and the edited, final picture

Figure 2: The original image (left) compared to the edited image (right)

I am very pleased with the final result of the image however, the only thing I do not like is the severity of the glare. As mentioned, I tried my best to get better angles where the glare was diminished but this was the best I could do. I am very pleased with the clarity and sharpness of the droplets, especially with this being my first time using other settings other than auto focus. The picture shows the fluid phenomenon I was trying to capture brilliantly and clearly showcases each property. If I was to pursue this image idea further, I would attempt to capture the fluid flow in a video as the water is being splashed over the apple. I think this would be a very interesting concept to see how the adhesive and cohesive properties change when they are in a dynamic motion rather than a static one. This would also allow for the hydrophobic surface of the apple to be better demonstrated and for its interaction with water to be clearly seen.