

*“A soap that does it all:  
sanitize, moisturize,  
revitalize”*

# Mission and Vision

Mission statement: To provide an organic and chemical free eco friendly solution to everyday cosmetic needs.

Vision statement: To revolutionize the future cosmetic industry by finding eco friendly supplements without compromising great quality. Aim to grow market share by 10% by end of 2020

# Context/Background

Given the world's current requirement for sustainable and eco friendly products due to global warming, and the constant growing needs of the cosmetic consumers, as well as keeping the average minimum wage of the everyday consumer in mind; as 4 individuals, we decided to work collaboratively to develop a soap which would revolutionize the current handmade soap industry by fulfilling the eco friendly aspect without compromising quality or augmenting the price per unit.

The process to develop the soap is known as the “cold process”. A major component of the cold process is the “saponification process”. The saponification process is when triglycerides (animal or vegetable fat) are reacted with NaOH (to produce a hard soap) or KOH (to produce a soft soap) to produce glycerol (alcohol group) and fatty acid salts. Saponification is the hydrolysis of fatty acid esters. The general equation for the saponification process is

triglyceride + sodium hydroxide (or potassium hydroxide)  $\rightarrow$  glycerol + 3 soap molecules

# Rationale Behind Company Name

Thousands and pictures are taken and deleted on a daily basis due to people not being satisfied with the output of the photo. Every so often a moment comes where an individual experiences the right amount of lighting and a moment where the pictures turn out flawless. This moment is renowned as the “golden hour”. Individuals strive to have that perfect moment but often are disappointed as it just doesn’t workout. We decided to take that moment and transform it into an everlasting time frame so that individuals can feel more confident in themselves on a daily basis without having to worry about the moment ending. The name “golden hour” is a juxtaposition because we are extending an “hour” into an eternity.

# Product Quality

- Long winters and the cold weather have a big impact on dry skin. It is important for one to use the right items to take care of their skin.
- Surveys state that an average consumer tends to buy soap depending on its scent and appearance. With that fact, it was essential for our group to make soap that held the same properties.
- After thorough analysis, the group decided the soap will have high moisturizing properties.
- Additionally, we wanted the soap to be appealing to regular consumers, which is why a unique scent and color were added.
- Finally, the soap was to be marketed at a low cost by using cheaper materials (without compromising quality) allowing a lower cost of production.

# Process Selection

- Our group decided on the cold process, as it allows for the making of soap without the use of any external heat.
- Cold process method required the mixing of multiple oils and NaOH, which causes a chemical reaction called the saponification.
- The reason behind choosing the cold process was that it requires less equipment, and is more accessible.
- Not having to provide an external heat, saves on energy and also decreases the risk assessment behind the soap making.

# Material Selection

- Standard laboratory equipment was used including; beakers, weighing scales, heating plates, stirring rod, and a stick blender.
- The main purpose of the heating plate was to assist us in the mixing process with the use of magnets. No external heat was used as it is not necessary in the cold process.
- The chemical reason behind using the stick blender was that it increased the surface area of the compounds present in the container. The increase in the surface area would allow for more contact between the particles.
- As the collision between the particles increases, it increases the rate of reaction as stated in the collision theory.

# Rational For Packaging & Mold Selection

The aim of the final appeal of the soap was to be circular and resemble an orange colour as orange is affiliated with vitamin C and has a reputation for being a healthy, and mood lightening fruit. The scent added to the composition of the soap was also an orange citrus scent. The packaging was therefore fundamentally based off of this concept also, therefore we decided to add leaves to the packaging to resemble orange leaves.

Furthermore, a pringles can was chosen as the optimal mold to provide us with a soap with a well defined circumference. The pringles can facilitated transportation of the soap and due to its open surface, allowed for the constant air flow for the soap to harder.

Parchment paper was chosen due to its biodegradable properties as we wanted to minimise as much waste or garbage as possible in our product. Also parchment papers unit cost is fairly low which did not affect our overall unit cost of production by a significant amount.



# Ingredients

Many different combinations of oils had to be experimented with before coming up with the composition that optimised the attributes we wanted in our soap. Each material had a specific reason for it existing in the composition

- 62.467g NaOH:
  - Chosen because it has a lower cost and can break up oils at lower temperature than KOH
- 250g avocado oil
  - Highly effective moisturizing properties
- 150g olive oil
  - High quality moisturizing at a low cost
- 95g grapeseed oil
  - Protects skin barrier which allows moisture to be absorbed into skin throughout the day
- 1.5g citrus essential oil
  - To provide the soap with a refreshing orange scent
- 1.75g red food colouring and 1.75g blue food colouring
  - Optimal colour composition to provide us with the exact colour we required

# Soap Calculator

Soap Optimizer												
			Oil Properties									
Oils	Percentage	Quantity (g)		SAP (NaOH)	SAP (KOH)	Hardness	Cleansing	Bubbly Lather	Creamy Lather	Conditionning	Density	Cost
Avocado Oil	50%	250		0.133	0.186	22	0	0	22	70	0.92	1.86
Olive Oil	30%	150		0.135	0.19	17	0	0	17	82	0.92	0.6
Grapeseed Oil	19%	95		0.129	0.181	12	0	0	12	88	0.92	0.86
Citrus Essential Oil	0%	1.5		0	0	0	0	0	0	0	0.86	0.017
Red Food Colouring	0%	1.75		0	0	0	0	0	0	0	1.00	0.001
Blue Food Colouring	0%	1.75		0	0	0	0	0	0	0	1.00	0.001
Total	100%	500										
Oils	Percentage	Quantity (g)	Contribution to Overall Soap Properties									
Avocado Oil	50%	250		SAP (NaOH)	SAP (KOH)	Hardness	Cleansing	Bubbly Lather	Creamy Lather	Conditionning	Cost	
Olive Oil	30%	150		33.25	46.5	11	0	0	11	35	\$	5.05
Grapeseed Oil	19%	95		20.25	28.5	5.1	0	0	5.1	24.6	\$	0.98
Citrus Essential Oil	0%	1.5		12.255	17.195	2.28	0	0	2.28	16.72	\$	0.89
Red Food Colouring	0%	1.75		0	0	0	0	0	0	0	\$	0.00
Blue Food Colouring	0%	1.75		0	0	0	0	0	0	0	\$	0.00
Total	100%	500		0	0	0	0	0	0	0	\$	0.00
Mass of Oils (g)			500									
Percentage of Water as a Percentage of Oils			38%									
Mass of Water (g)			190									
				Mass of Na	Mass of KOH (g)	Hardness	Cleansing	Bubbly Lath	Creamy Lather	Conditionning	Cost	
Totals			65.755	92.195	18.38	0	0	18.38	76.32	\$	6.92	
Recommended Ranges				29-54	12-22	14-46	16-48	44-69				
Targets				20	0	0	25	70				
Objective Function				1.34e+02								

# Raw Data Affiliated to Ingredients

Oils	Oil Properties								
	SAP (NaOH)	SAP (KOH)	Hardness	Cleansing	Bubbly Lather	Creamy Lather	Conditioning	Density	Cost
Avocado Oil	0.133	0.186	22	0	0	22	70	0.92	1.86

## - Moisturizing Properties:

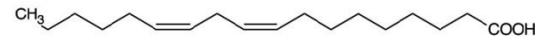
- Researched showed that a bubbly lather dries out skin, while a creamy lather provides deep nourishment and moisturizing properties. From this we chose an oil that was high in creamy lather and low in bubbly lather
- This oil was chosen to be avocado oil due to its bubbly lather value of 0 and creamy lather property of 22

## - Providing Further and Future Protection:

- To protect the skin even further, we researched ways on how to provide further protection to skin from the cold winter air. Research showed that grapeseed oil is has high contents of omega-6 fatty acids, which can be used to protect the skin barrier
- By protecting the skin barrier, moisture would be retained for longer periods of time and prevent the skin from drying out in the future

Oil	Linoleic
Grapeseed Oil	68

Omega-6 fatty acids



LA: Linoleic acid

C18:2 n-6

# Options and Iterations

## - Beginning Composition:

- Due to the high creamy lather of avocado oil, it was chosen to be the base for the soap to provide optimal moisturizing properties
- The composition first began at **80%** avocado oil and **20%** grapeseed oil, and had the following properties:

	Hardness	Cleansing	Bubbly Lather	Creamy Lather	Conditionning	Cost
-	19.88	0	0	19.88	72.72	\$ 8.98

## - Alternative Composition:

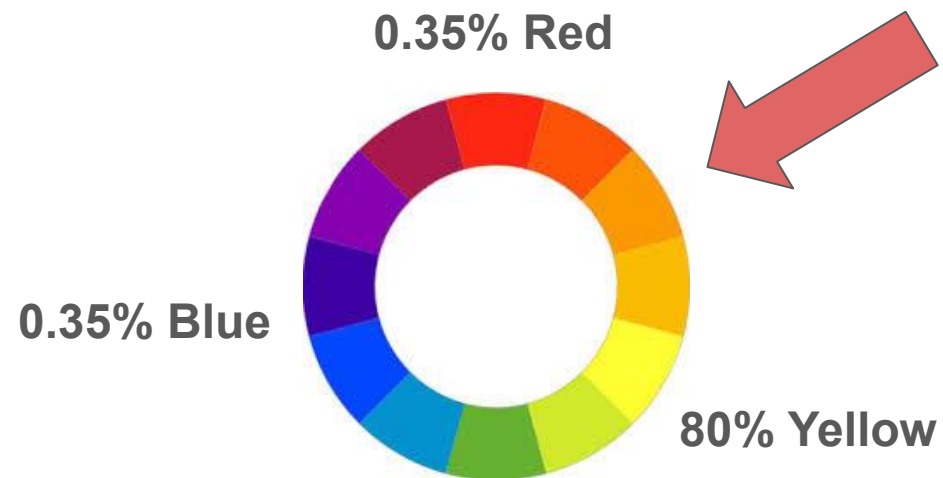
- The beginning composition had a very high cost of **\$8.98/500g** which would not be sustainable for marketing the product at a low cost
- This high overall cost is due to the high cost of avocado oil, so to decrease the cost we needed to decrease the percentage of avocado oil in the composition
- Avocado oil was decreased from **80%** to **50%** so it would still be able to be the base for the soap, and was replaced with an oil that had similar properties but at a lower cost. This oil was chosen to be olive oil and made up **30%** of the composition
- The final product was **50%** avocado oil, **30%** olive oil, and **20%** grapeseed oil, and had the following properties:

	Hardness	Cleansing	Bubbly Lather	Creamy Lather	Conditionning	Cost
	18.38	0	0	18.38	76.32	\$ 6.92

# Colour: Designed VS Final Product

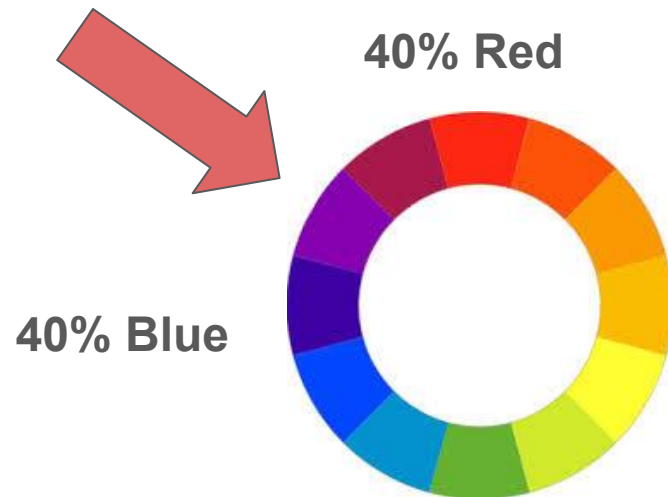
- Designed to be Orange VS Finalized as Purple
  - We strived to for our product to be orange to further enhance the theme of oranges, however, the final product did not meet our colour expectations
  - When designing the colour aspects in our soap calculator, we expected the oils to create a yellow base for our product, so we chose colours that would mix with a yellow base to create a final colour of orange.
  - The mixing colours were chosen based on their position on the colour wheel, but were in added in small concentrations of **0.35%** each so that they would drastically change the colour of the soap
  - However, our final product did appear to be changed by these small concentrations and created a final product that appeared to be **80%** red and blue colouring
  - This change in colour may be due to the fact that the base colour of the oils was more of a creamy white colour as opposed to our expected yellow base colour

# Designed:



Producing 100% orange

# Final Product:



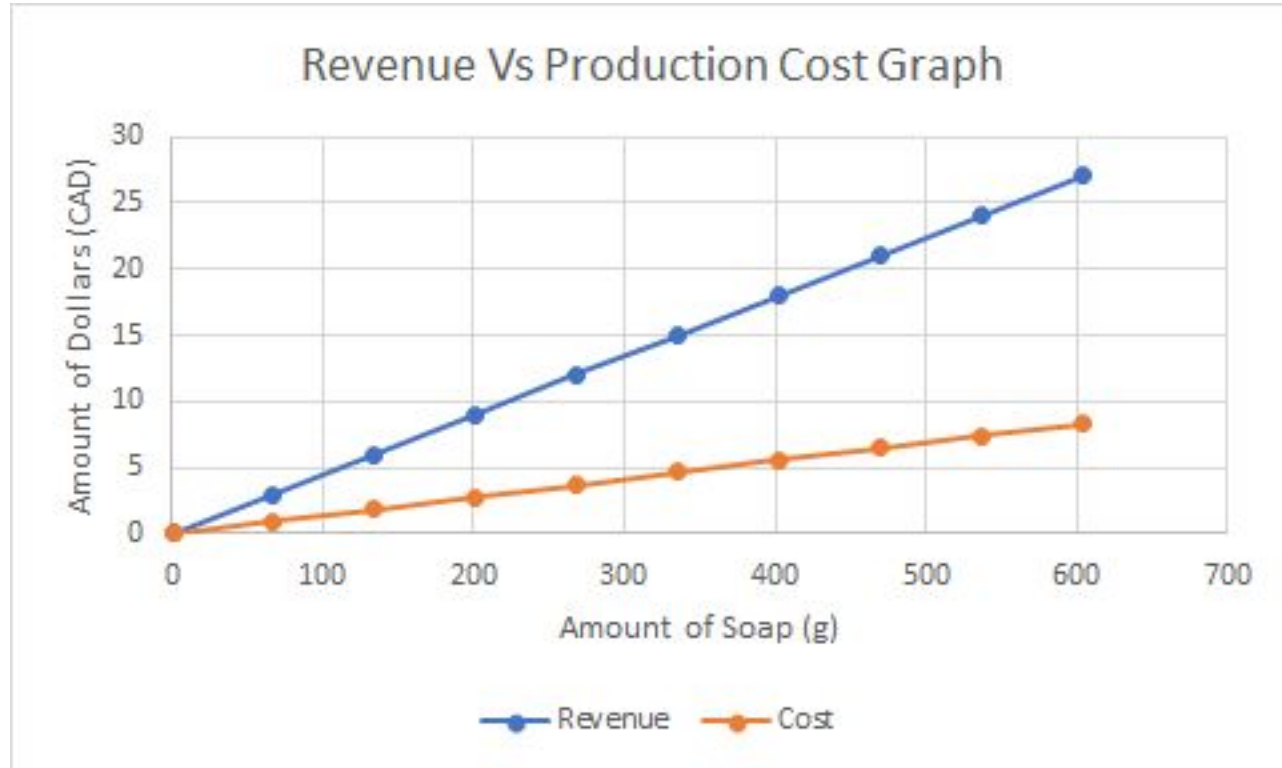
Producing 80% purple

# Mass: Designed VS Final Product

- Calculated to be **750g** VS Weighed to be **600g**
  - After conducting the calculations with the soap calculator, the final weight was predicted to be **752.47g** due to the added weights of:
    - **500g** oils
    - **190g** water
    - **62.467g** NaOH
  - However, after the final product solidified, the weight was measured to be **603g**
  - The final weight decreased **149.467g**
  - This decrease in weight could be the result of many factors including:
    - Loss of weight through transporting of liquids from weigh boats to mixing bowl to pringles can
    - The discard of the end pieces of soap that had become too dry and cracked
    - The reaction was exothermic and released heat and energy which may have transferred to a loss of mass
    - The product solidified in an open system which allows for easy loss of mass

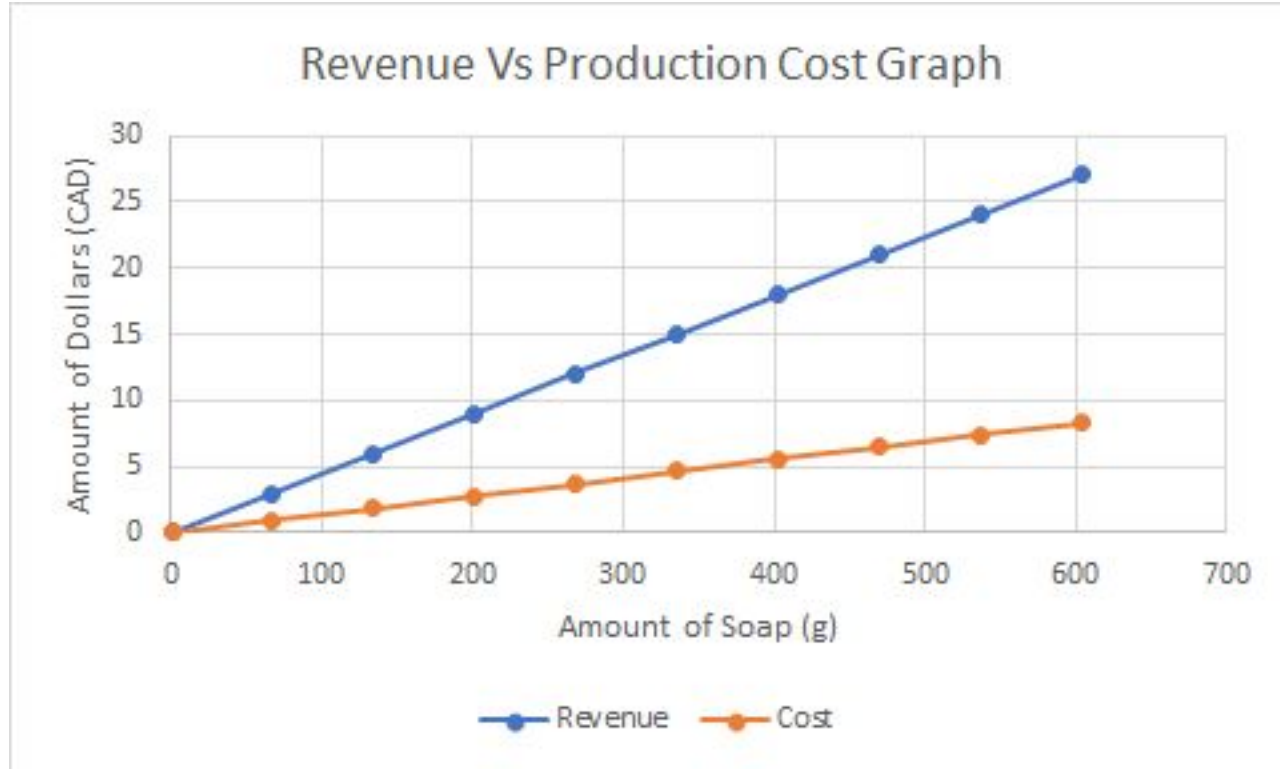
# Economics

- Price of soap per gram of hardened soap:
  - Expense for production = **\$0.0146/g**
- Cost of marketing the soap:
  - Retail price = **\$0.04478/g**
- Margin:





# Put beside Economics



# Added Bonuses

- Positive Environmental Impact
  - As a company we wanted to have as minimal of a carbon footprint as possible therefore we chose products and packaging to be as eco friendly as possible
  - By using parchment paper in the packing process, our product will have a positive environmental impact due to parchment paper being biodegradable
  - Waste was minimized and an optimal yield was sought so that nothing goes unused
- Inherently Safer Functionality
  - NaOH was chosen to be the base for the due to its low cost and ability to break up oils at a lower temperature than KOH
  - By breaking up oils at a lower temperature, our customers are able to safely use our product at lower temperatures while still achieving cleanliness
  - This allows customers to wash their hands at temperatures that are comfortable to them and safe for their own hands
- Economical Sustainability
  - As a whole, our company is sustainable due to its low cost of production, allowing for profit margins which keep production running as well as gives us the future opportunity to expand further.