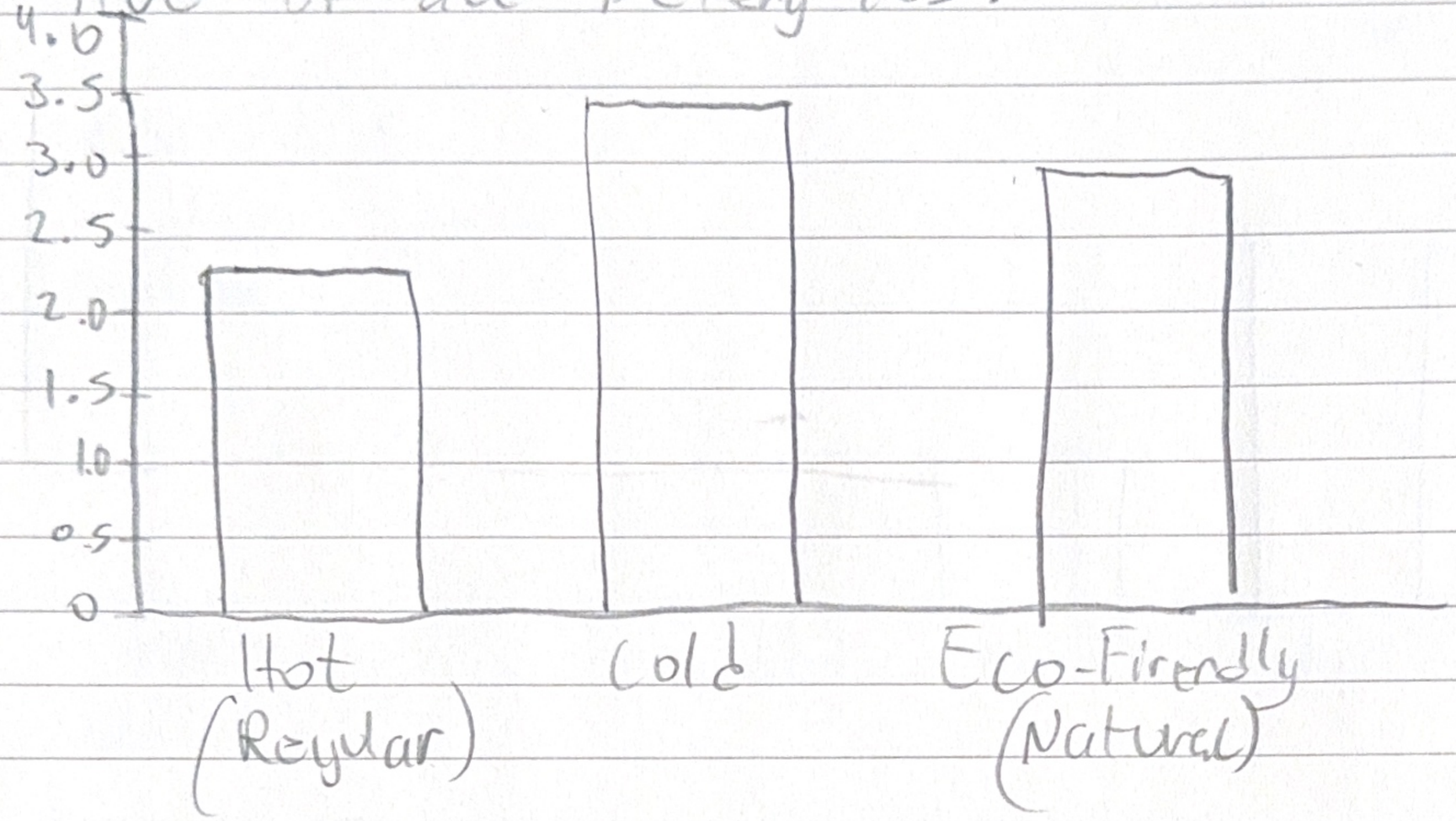
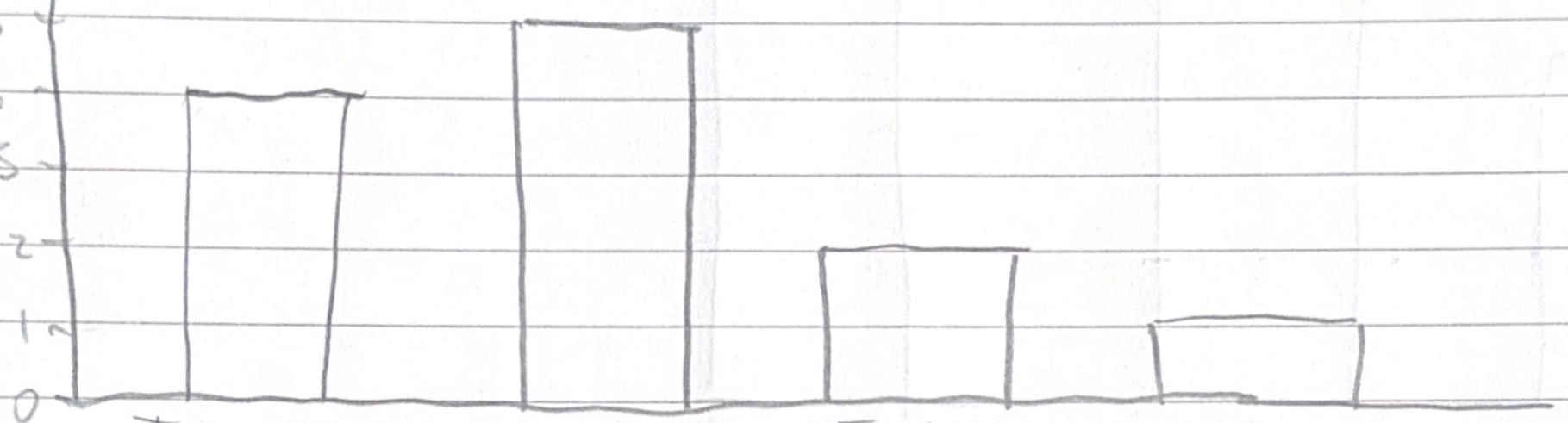
AVE of all Detergents:



* From AVE rank, cold did the best!!

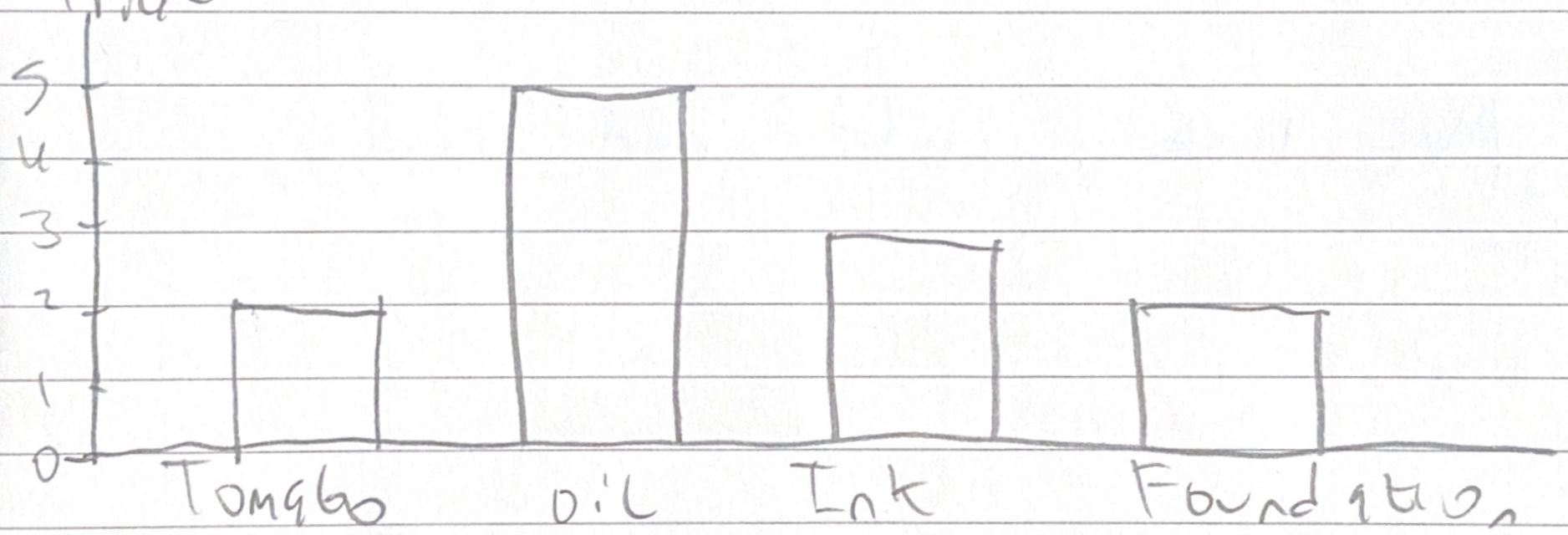
Natural detergent:

Trial 1:

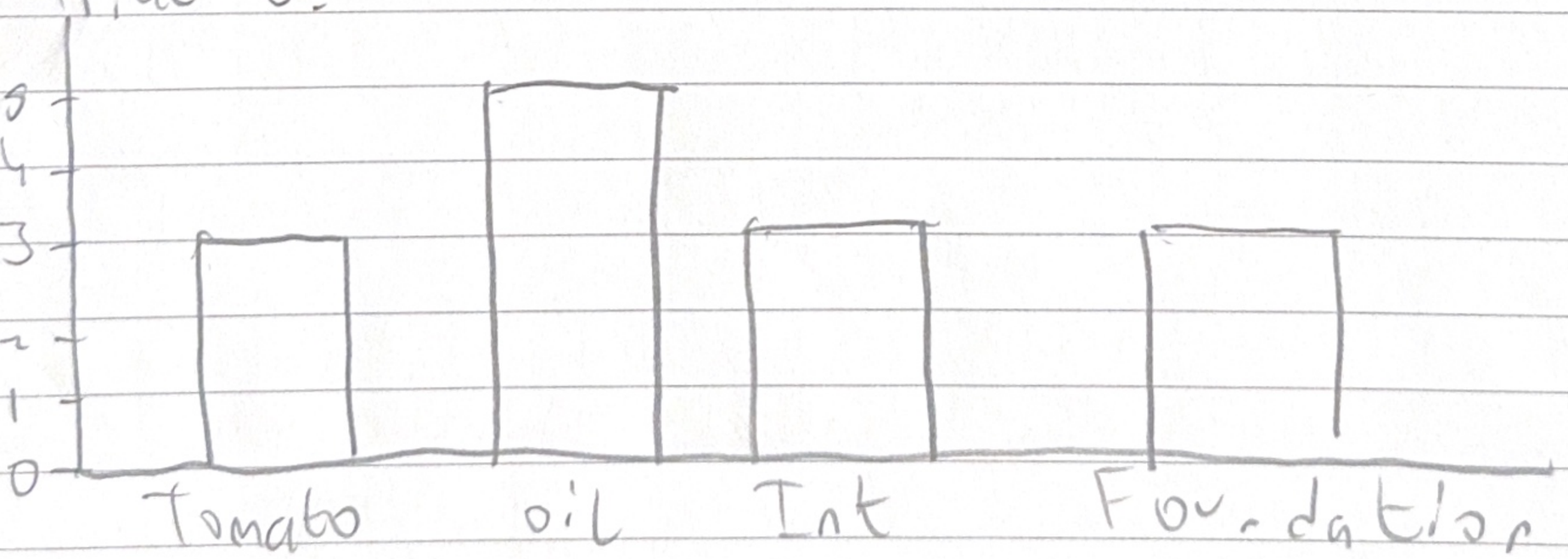


* Oil still most consistent

Trial 2:

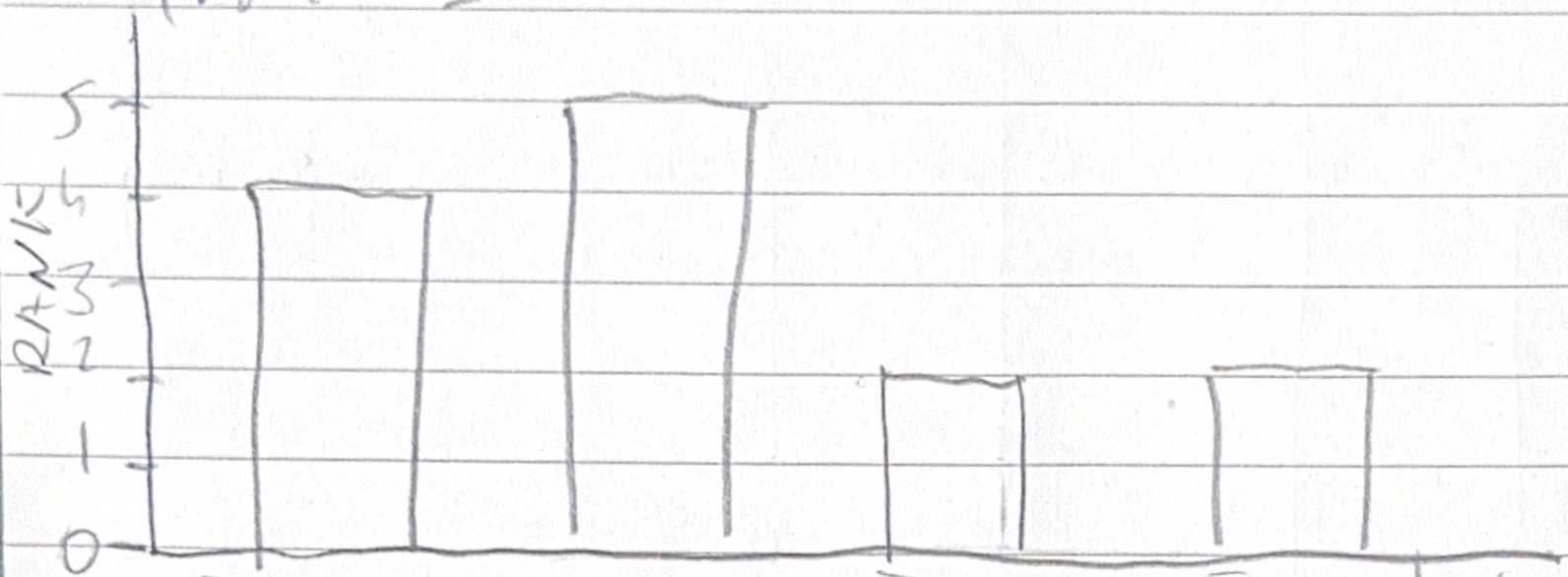


Trial 3:



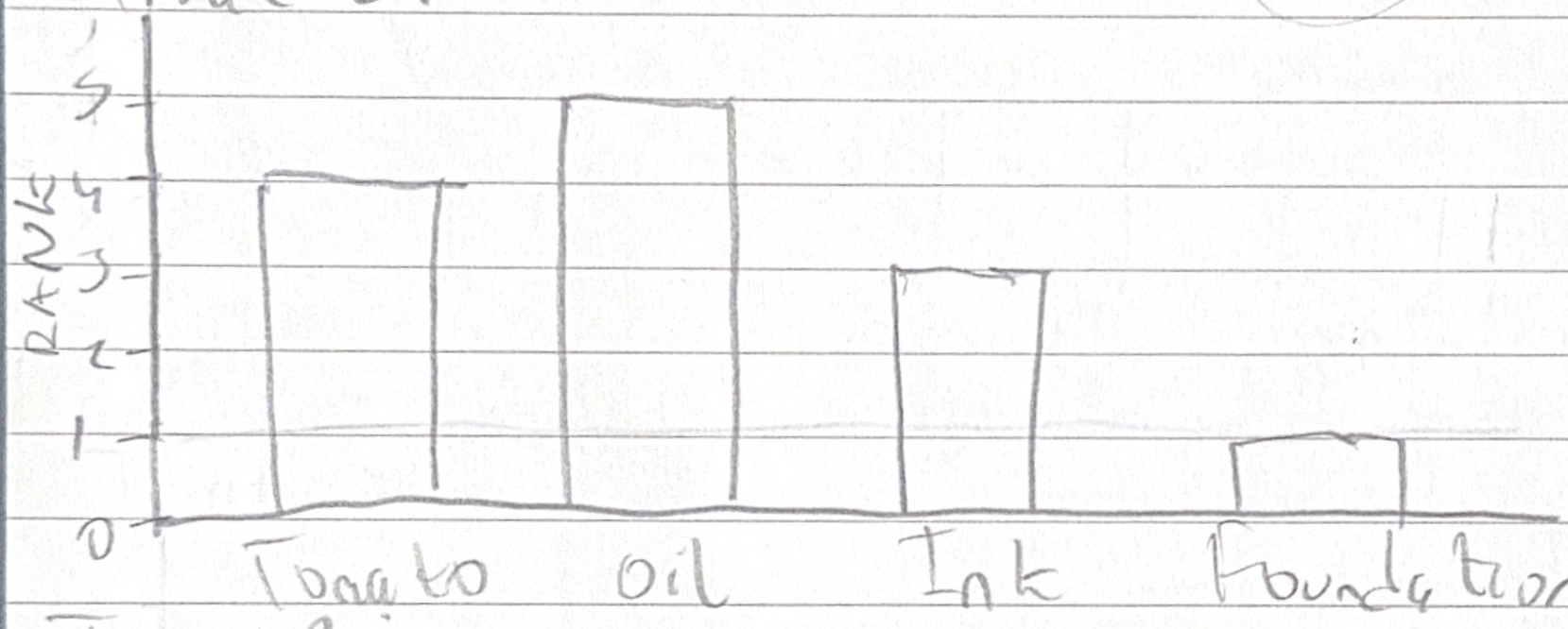
Cold water:

Trial 1:



* oil most consistant with 5.

Trial 2:



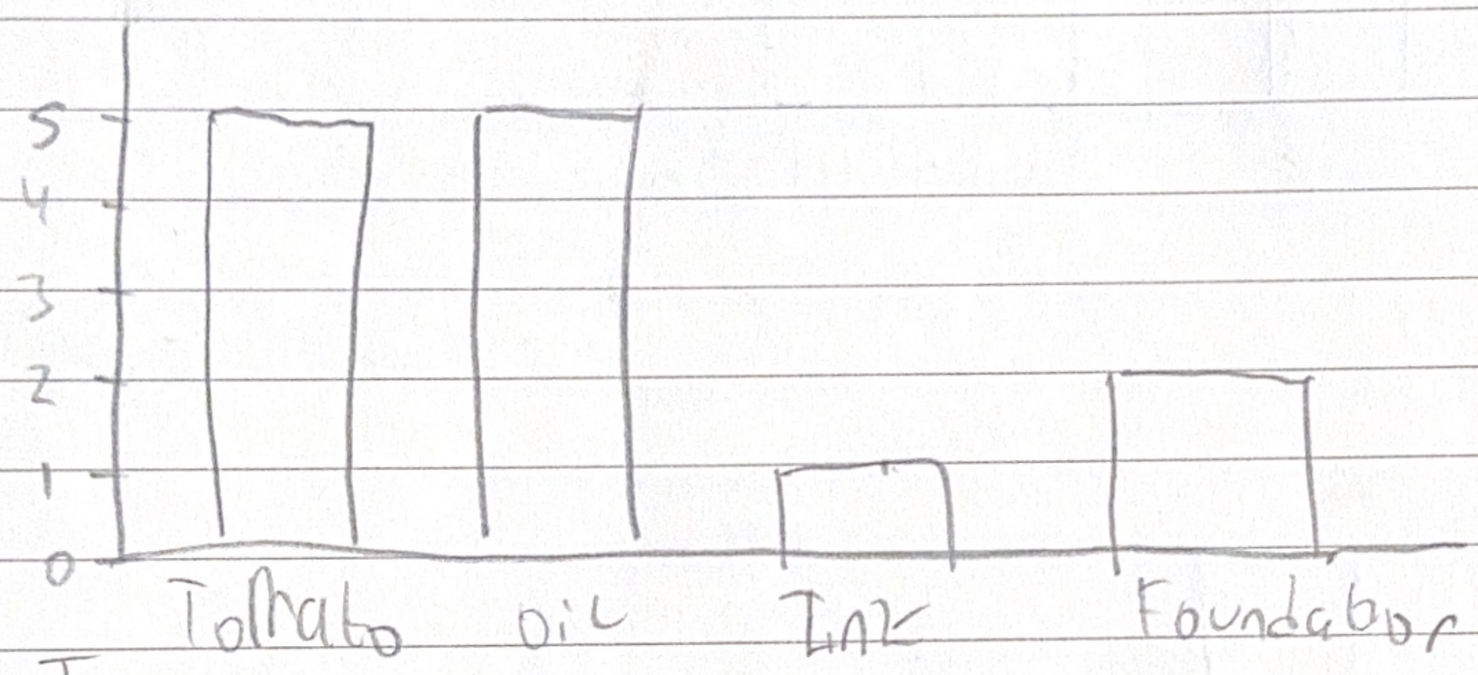
Trial 3:

Analysis: March 10

Graphs (preliminary):

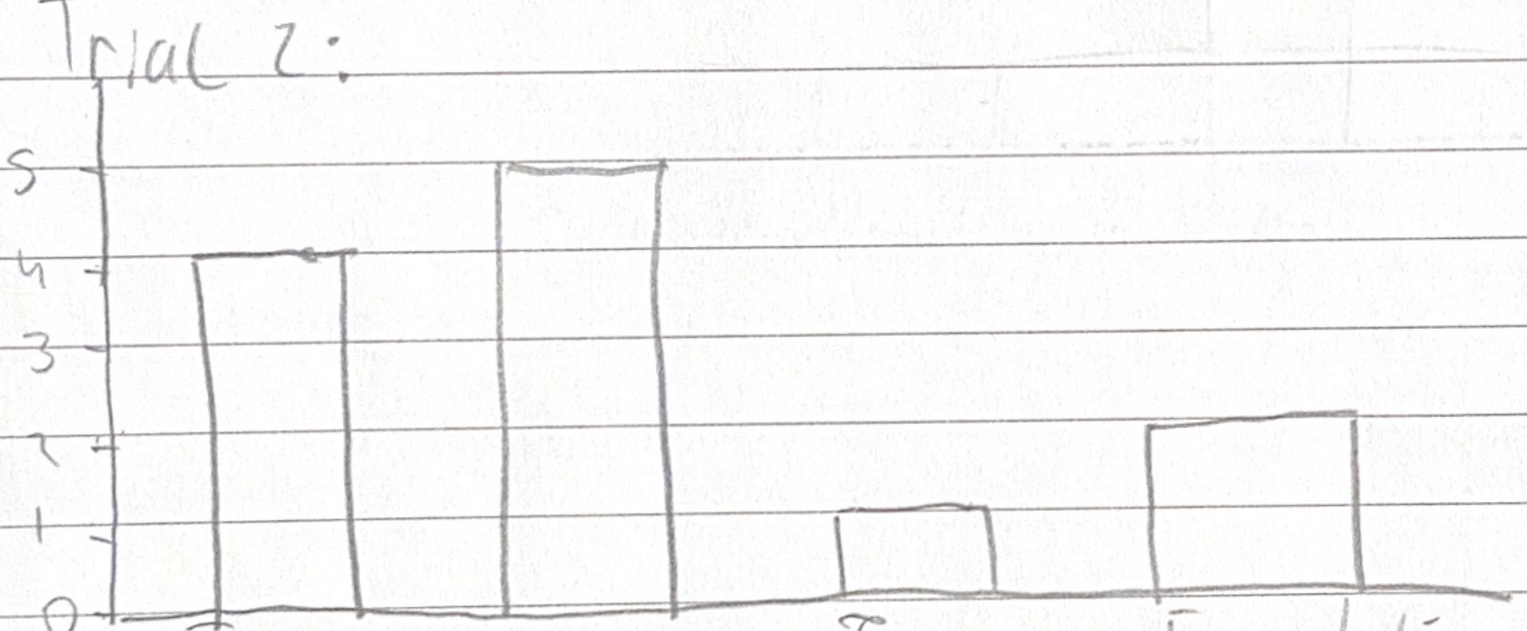
Hot (regular):

Trial 1:

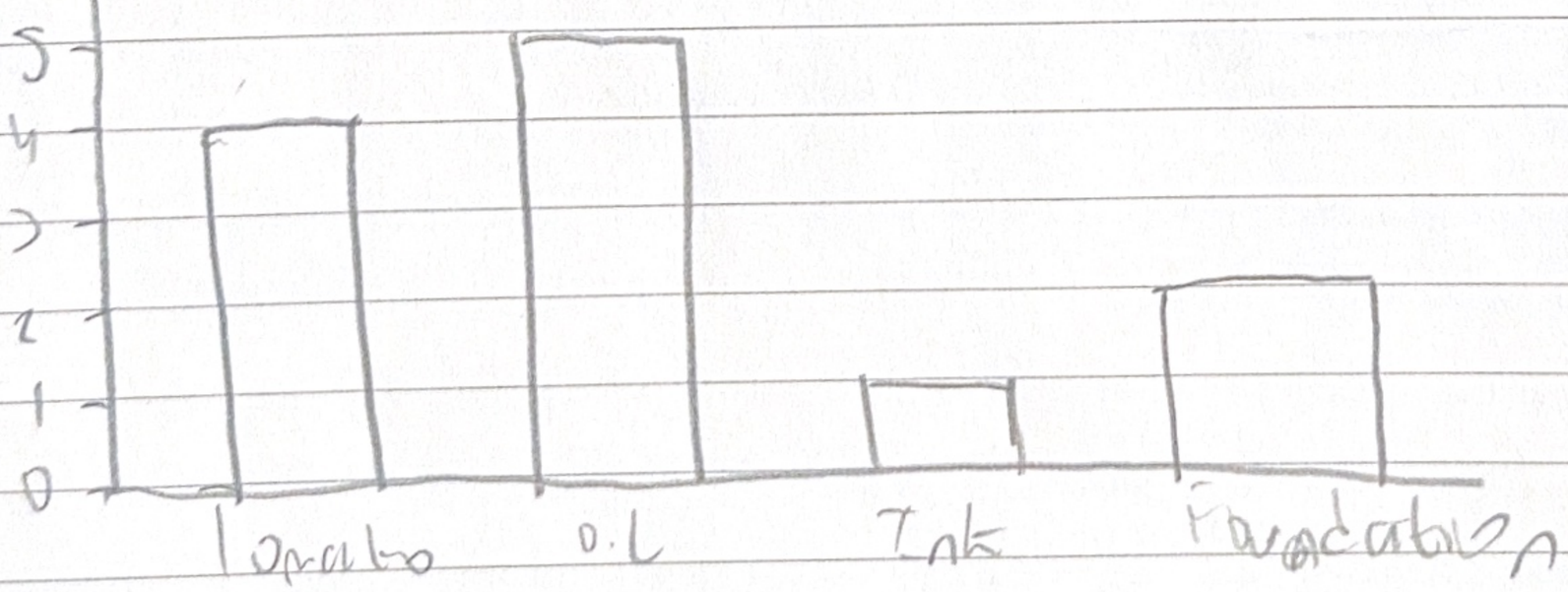


* oil, ink and Foundation stayed consistent

Trial 2:



Trial 3:



Observations:
- 3 and 2 had similar stain prominent
- detergent not very visual
- smelly good

Sources of error:
- amount of each stain added to sample (pressure added and amount)
- lost some water from spillage
- temperature errors

Table:
RANKING: (5 best ↦ 1 worst)

TRIAL	Tomato	Foundation	Ink	Oil	AVE rinse	AVE wash
1	4	1	1	5	24.2°C	24.475°C
2	2	2	2	5	23.975°C	22.35°C
3	3	2	3	5	22.95°C	24.575°C

AVE of detergent: 2.91666

Observations March 6 ENZYMES SURFACTANTS

Natural Detergent:

Detergent used: Ecomax liquid Detergent,

Notable Ingredients: hydroxyethylcellulose, potassium sorbate, Decyl glucoside*, cellulose, xanthan gum, sodium citrate, citric acid

* Decyl glucoside based on glucose

Price: $13.99 (canadiantire) (3L)

Trial 1:

TEMPS:	WASH	RINSE	AVE
foundation:	25.8°C	25.5 °C	wash: 24.2 °C
oil:	24.5°C	26.1 °C	RINSE 24.425 °C
ink:	22.7°C	22.2 °C	
tomato:	23.8°C	23.9 °C	

Trial 2:

Temps	WASH	RINSE	AVE
foundation:	23.7°C	25.7 °C	wash: 23.875 °C
oil	23.4°C	22.2 °C	rinse: 22.35 °C
ink	21.9°C	23.1 °C	
tomato:	24.0°C	23.4 °C	

Trial 3:

Temps:	WASH	RINSE	AVE
foundation:	24.0°C	26.2 °C	wash: 22.975°C
oil:	21.9°C	23.5 °C	RINSE: 24.575°C
ink:	23.9°C	28.7 °C	
tomato:	22.2°C	22.9 °C	

Observations:
- tomato stain much more prominent in 3rd trial
- water really foamy when washing into samples (all)
- water turn brown when washing foundation samples (all)

Sources of Error:
- amount of water added
- temperature inaccuracies
- lost water and detergent when shaking

Table: (preliminary)
RANKING: (5 best - 1 worst)

Trial	Foundation	Foundation	Ink	oil	AVE WASH	AVE RINSE
1	3	4	3	5	25.65°C	24.15°C
2	2	4	3	5	24.020°C	24.6°C
3	2	3	2	5	23.675°C	23.15°C

AVE of Detergent: 3.4166

Observations March 7th

ENZYMES
SURFACTANTS

Cold water detergent:

Detergent used: Tide coldwater

Notable ingredients: alcohol ethoxylates C16-18 2EO, alcohol ethoxylates (C10-C16) sodium salt, amylase, mannase, sulfuric acid (C10-C16) + more

Price: $14.99 2.04L (canadian tire)

Trial 1:

TEMPS	wash	rinse	AVE
foundation:	25.2 °C	24.7 °C	wash: 23.65°C
ink:	21.9 °C	25.1 °C	rinse: 24.15 °C
oil:	23.0 °C	23.9 °C	
tomato:	24.3 °C	22.9 °C	

Trial 2:

TEMPS	wash	rinse	AVE
foundation:	26.2°C	25.3 °C	wash: 24.025 °C
ink:	22.1°C	25.8 °C	rinse: 24.6 °C
oil:	27.6°C	24.0 °C	
tomato:	25.2°C	23.5 °C	

Trial 3:

TEMPS	wash	rinse	AVE
foundation:	27.7°C	22.6 °C	wash: 23.625° C
ink:	22.0°C	23.7 °C	rinse: 23.15 °C
oil:	27.2 °C	22.8 °C	
tomato:	22.6 °C	23.5 °C	

Observations:

- tomato trials, water turned red, heterogenous mixtures instantly clump off when water added.
- INK did not core off
- foundation trials; water turned brown.

Sources of Errors:

- amount of water added
- amount of strs to add in detergent
- lost water and detergent while shaking

Table: (preliminary)

RANKING: (5best - 1 worst)

Trial	Tomato	Oil	INK	Foundation	AVE Wash	AVE Rinse
1	5	5	1	2	41.4	42.45
2	4	5	2	2	41.225	40.825
3	4	5	2	2	41.125	39.85

AVE of Detergent: 3.25

trial 3:

	wash	rinse
tomato:	40.7°C	40.3°C

Average:

wash: 41.125°C

rinse: 39.85°C

Observations March 6

ENZYMES
SURFACTANTS

Hot water detergent:

Detergent used: Tide Free and Gentle

Notable ingredients: amylase enzyme, mannanase enzyme, alcohol ethoxylates (C12-16), C12-18 fatty acids and others

Price: $14.99, 2.042 (canadian time)

Trial 1:

Water temps: ≈50°C

	wash	rinse
foundation	41.2°C	40.0°C
oil:	40.2°C	42.7°C
ink:	40.1°C	41.0°C
tomato:	44.1°C	44.0°C

Ave:
wash: 41.4°C
rinse: 42.425°C

Trial 2:

water temps: ≈ 40°C - 50°C

	wash	rinse
foundation:	40.4°C	40.7°C
oil:	41.1°C	40.0°C
ink:	42.3°C	41.5°C
tomato:	41.3°C	41.1°C

Aver:
wash: 41.275°C
rinse: 40.825°C

Trial 3:

water temps ≈ 40°C - 50°C

	wash	rinse
foundation:	41.1°C	39.2°C
oil:	40.9°C	39.5°C
ink:	41.8°C	40.4°C

Variables March 3rd

Control:
- type of cloth used
- water source
- container
- stains
- Method of washing / How
- 3 trials being tested

Manipulated
- type of detergent
- temperture (hot vs cold & natural)

Responding:
- preformance of each detergent on the same 4 stains

Hypothesis March 3rd

If samples of various stains are tested using 3 different types of detergent; warm water detergent, cold water detergent and eco-friendly detergent then the warm water detergent will preform the best because of it's use of petroleum surfactants and it high water temperture being able too wash away stains more effectively then the alternitives.

Questions to answer / Background March 3

- Ingredients of used detergents
- ~~temperature for OPTIMAL use of each detergent~~
- prices of each detergent

↓

Compare use in conclusion/ application

Explain each ingredient and application

↓

look conclu

* surfactants

Research Questions Feb 22 2024

FAQs
- How does laundry detergent work? ✓
- Ingredients in detergent ✓
- What makes detergents different from one another ✓

Hot vs Cold
- Difference between hot vs cold detergents → OPTIMAL TEMP ✓
- Is cold really better? ✓
- Cost saved with cold vs performance ✓

Eco-Friendly:
- What makes it ecoFriendly ↑
- ~~Eco-friendly vs regular ingredients~~

Lab opinions:
- What is the recommended way to wash? ✓

Stain types:
- Stain type vs ~~detergents~~ temperature ✓

Fabric types:
- What fabrics are wash best in? (cotton)

- Find best detergent to clean cloth sample in their OPTIMAL conditions

↓

- cold water temp (est.)
- hot water temp (est.)

Science Fair

Feb 7th 2024

Preliminary ideas:

- testing 5 sec rule
- heart rate and exercise
- different types of liquids and teeth
- water quality/ brands

Hi

* laundry detergents

Test laundry detergents performance on samples of clothes with various stains

↳ . cold water
. eco-friendly
. hot water

* find best way to wash clothes