SYNOPSIS

It is nearly inevitable that one day you will experience that "OH NO" thought when spilling a coffee on your shirt. It is also likely that you may have split the coffee because you may have been distracted, or in a hurry.

If you are in the workplace or at school… this can present a problem which needs to be solved…and needs to be solved *fast* with a readily accessible stain removing solution!

Therefore, we are trying to determine how you can remove a coffee stain from your shirt *if you do not have access to a commercially produced stain remover.*

We are also exploring eco-friendly options to assess if they can achieve the same outcomes, or better, as a commercial stain remover.

AIM OF EXPERIMENT

The aim of our experiment is to find the best eco-friendly option for removing coffee stains from your shirt.

We will be using a 100% cotton based t-shirt as our test material, as this is the most common makeup of shirts from our research of clothing stores.

We will test the effectiveness of readily available eco-friendly products that you may be able to find in any office, school, or home environment.

We will also compare dry treatments, cold water treatments, and hot water treatment.

Hypothesis:

I think that lemon will work because it's naturally a good stain remover and it's quite acidic.

I don't think milk will work because it's not normally used as a stain remover, but it could work because it could dilute the coffee and the milk is the same colour as the t-shirt.

I think boiling water will work because it will thin out and dilute the coffee stain and the boiling water could also heat out the stain like some bleaches do.- **Kinga**

We will show that a combination of vinegar and bicarbonate of soda with hot water is the most effective at removing coffee stains from a shirt. – **Daniel**

I think that vinegar, bicarb soda and lemon are going to be the best. I think that adding hot water will do a better job because it is used to remove a lot of stains. – **Zane**

Lemon and bicarb soda, together with cold water, will be the best for removing stains from cotton fabric. – **Jack**

Materials:

- **Standardised materials**
  - white Cotton t-shirt Large x2- ruled into squares with a black permanent marker
  - permanent marker for marking T-shirt
  - instant coffee Nescafe Blend 43 brand– two teaspoons dissolved in 125ml water (heated for 30 seconds in microwave)
  - X2 tea spoons- 1x for measuring coffee, 1x for pouring hot water
  - Echo panelling pinboard backing to prevent stains from soaking through to the back of the shirt
  - Timer- for measuring consistent time for each stain
  - Plastic 5ml syringe- for squirting consistent sized coffee stain in each section

- **Eco-friendly testing materials**
  - lemon juice Black and Gold brand (99.9% lemon)
  - table Salt-Black and Gold brand
  - bicarbonate of soda- McKenzies brand
  - toothpaste Red Seal brand (with baking soda)-
  - vinegar Black and Gold brand (4% strength)
  - skinny Milk- Dairy Choice brand (5% fat)

Variables:

The temperature could change the result, therefore each time we heated cold water in the microwave for 30 seconds when mixing the coffee.

The volume of coffee to water ratio and possible stain remover could change the result of the stain.

The time we let the coffee soak into the t-shirt could change the end result. We estimated it would take about 15 seconds to get up, go to the staff room/ kitchen, get the possible stain remover and put the possible stain remover on your t-shirt.

Controls:

We used an eco-friendly felt board to stop the coffee stain from sinking through to the other side of the shirt. We did that because in real-life your body would stop the coffee stain from sinking through to the other side of the shirt.

We also used a syringe to get the same amount of coffee on the shirt for each stain test.

Method:

1. Rule the front of Large White Cotton T-shirt into 16 by 16cm squares, totalling 12 squares
2. Put 2 level teaspoons of coffee into 150ml of cold water in mug
3. Put the mug in the microwave for 30 seconds on full power (don't add milk afterwards)
4. Get 2ml of coffee out with a syringe
5. Squeeze onto the middle of a ruled-up square
6. Set timer for 15 seconds
7. Add assigned stain remover (lemon, bi-carb, salt, milk, vinegar, toothpaste, vinegar + bicarb)
8. Then either:
    a. Dry-dab with a paper towel only
    b. Pour on 1 tablespoon cold water, then dab-dry with paper towel
    c. Pour on 1 tablespoon boiled water (100◦C), then dab-dry with paper towel
9. Compare samples when dry, rating via the "Stain Removal Effectiveness Scale"

Observations:

Stain Removal Effectiveness Scale:

5= highly effective (stain gone), 4=slightly visible, 3= faded, 2=no change, 1=worse

STAIN REMOVAL DATA			
	Paper Towel	**Cold Water**	**Hot Water**
Lemon	**4**	**5**	**4**
Salt	**4**	**4**	**4**
Toothpaste (baking soda)	**3**	**3**	**3**
Bicarb soda	**3**	**3**	**3**
Vinegar	**3.5**	**4**	**4**

Milk	**3.5**	**4.5**	**4.5**
Vinegar + Bicarb	**3.5**	**4.5**	**4**
Commercial stain remover	**3**	**NA (no attempt at removing stain)**	**4**

In all examples, the stain lightened. Under no circumstances did the stain get worse. The most effective stain remover combination was hot water and milk.

Results/Conclusions:

Our findings determined that the best way to remove a coffee stain is to use either a combination of *vinegar and bicarb soda with water (cold or hot)* or *milk with water (cold or hot)*.

A combination of milk with either hot or cold water scored the highest rating of 4.5 each.

From our findings, we recommend that if you spill coffee on your shirt in the workplace, then you should quickly pour a teaspoon of milk onto the stain, dry-dab it, and then pour on a teaspoon of how water and dry-dab it; *the challenge still remains as to how you might do this dependent upon where the spill is located on your shirt*.

What's next?

We used black coffee as our "spill stain" but we would be interested to see if we gained the same results with white coffee.

We would also like to find out more about the active ingredients in plant products to see if there is a truly natural stain remover.

We would also be interested to know what results we would gain if we used other liquids as the "spill stain" such as soft drink, orange juice, etc.

We would also like to know the different impacts upon different materials, such as wool blend jumpers.