

Research Question

I wanted to test the effect of different methods prior to washing a shirt on the opacity of a grass stain. This is because I get grass stains on my clothes a lot from playing outside and doing sports, and grass can be frustrating to get out, so I wanted to investigate what method would be the best for getting a grass stains out.

Hypothesis

- I predict that if I change the method of washing the shirts with stains it will affect the opacity of the stains and it would change to a lighter shade. I know this is testable because I can successfully measure it and I can do my experiment with household items. *I think that any of the other methods will reduce the opacity of the stain compared to just washing it, but I do think the shaving cream method will perform the best.* I think that any of the other method will perform better because usually if you just throw something with a stain in the wash it does not really come out and has almost the same opacity as before and you usually have to use stain remover to get it out. I also did some research and people say any of these methods work really well and are better than just washing the shirt. Also according to my research shaving cream tends to be really good for stain removal.

Variables

Controlled variables

Temperature - need to control the temperature the shirts are washed in

Shirts - need to make sure they are all 100% cotton

Detergent - need to use the same detergent for every shirt

Time - the amount of time I let them wash for

The size and opacity of the stain- to make sure all of them start at the same opacity when they go in the washing machine

Independent variable

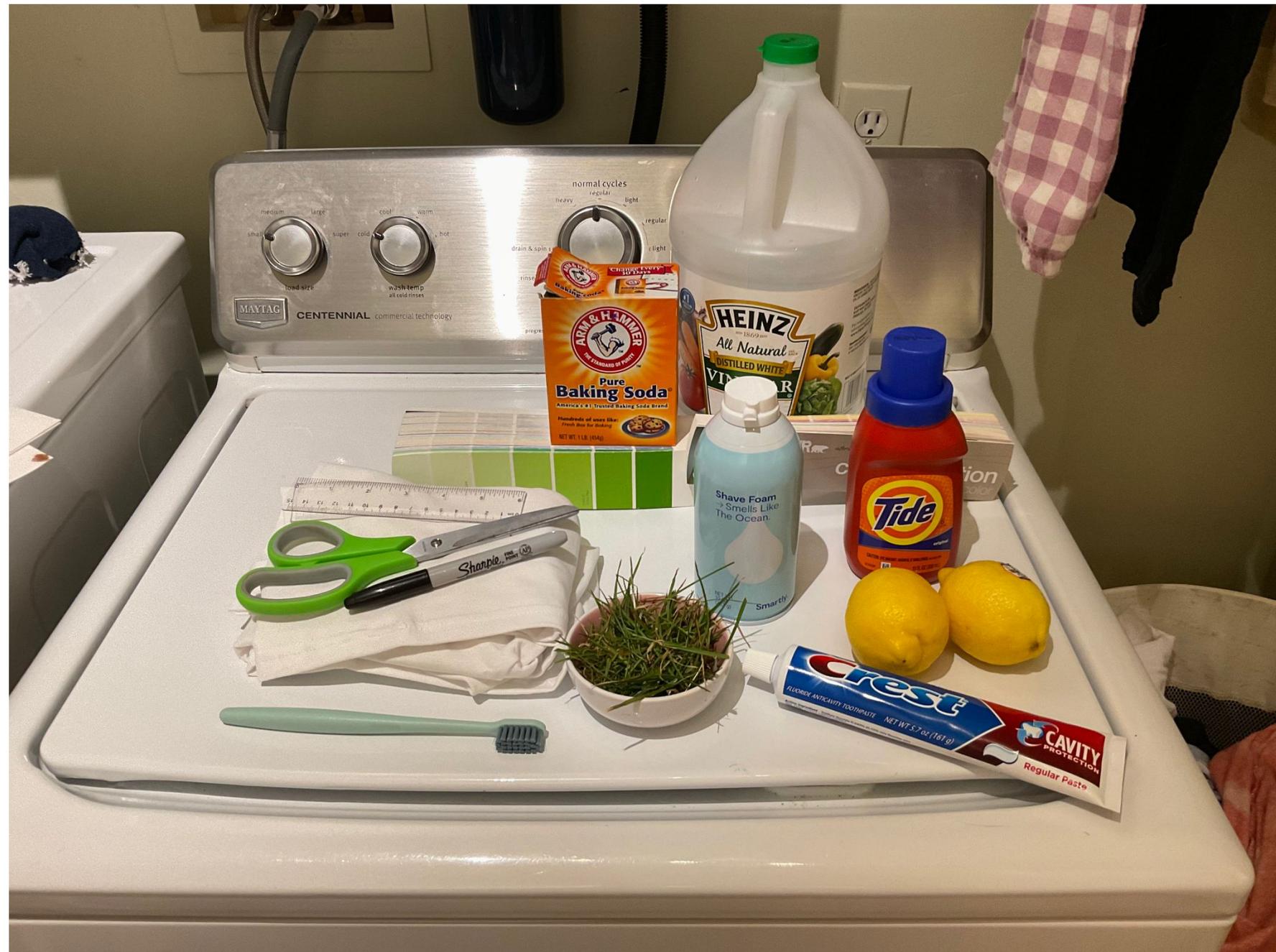
Method of washing the shirts

Dependant variable

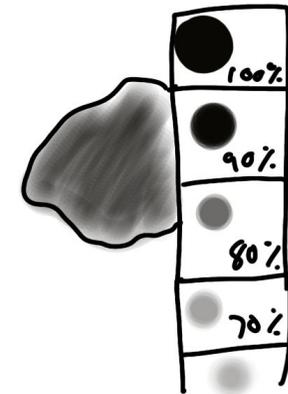
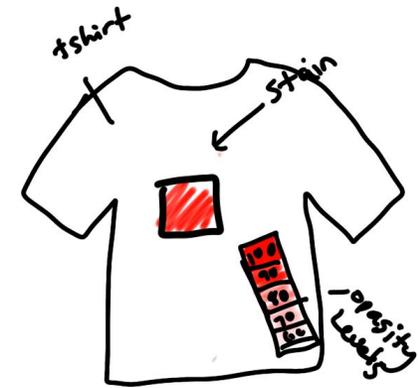
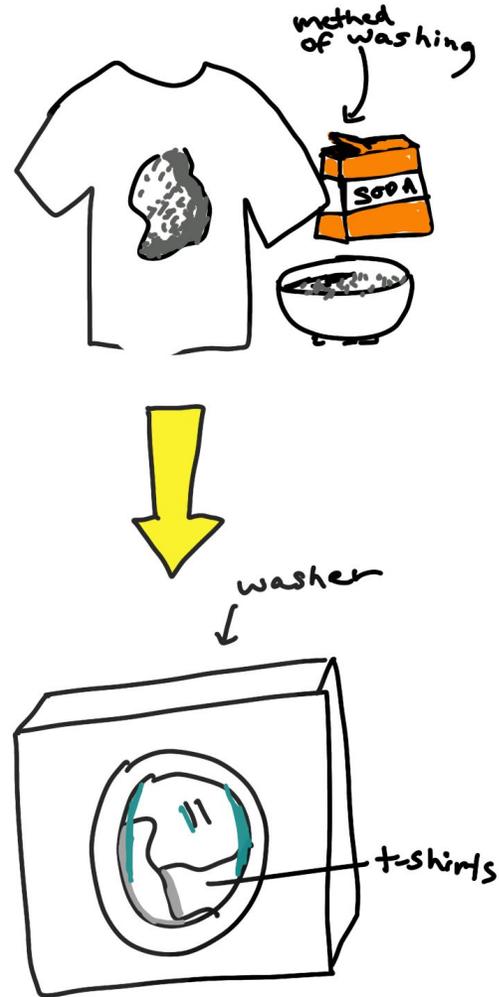
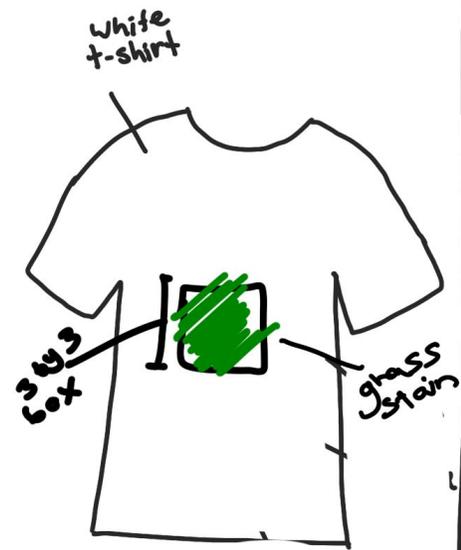
Opacity of the stains

Materials

- 2 white cotton t-shirts
- 1 cup of cut grass
- Shaving cream
- Distilled Vinegar
- 1 lemon
- Baking soda
- Toothpaste
- Detergent
- Washer
- Green opacity chart
- Ruler
- Permanent marker
- Small bowl
- Water

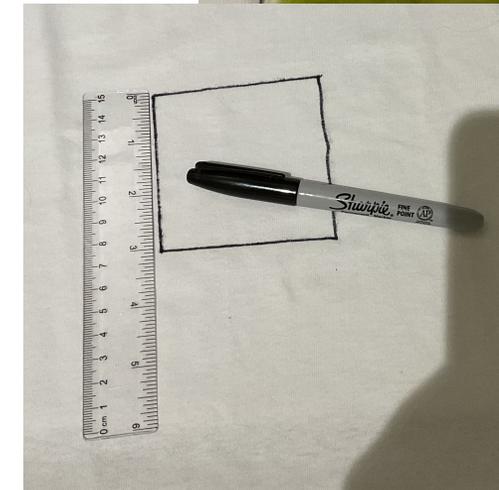


Set Up/Diagram



Procedure

1. Gather all materials
2. Place your shirt so it is flat and right side up on a smooth surface.
3. Cut along the sides and seams of the shirt so you separate the front and the back. Do this to all of the shirts.
4. Take all four fronts and backs of the shirts and lay them out so they are flat.
5. Draw a box in the middle of each shirt about 3 inches by 3 inches.
6. Next take your grass and fill a small bowl with water. Place the grass in the bowl and let the grass sit for about 30 seconds then pour all the water out but use your hand to stop the grass from coming out
7. Take a pinch of grass and rub it onto the shirt repeat for all of them
8. Label each shirt with either toothpaste, washer, vinegar, or shaving cream. Make sure each of your shirts has a title.
9. Make sure to measure the opacity of the stain before.
10. Once all that is done leave your shirts to sit for 24 hours.
11. Once 24 hours has passed take one of your shirts that says washer and place it in the washer and set the water to warm and do a normal wash cycle, and use a tablespoon of detergent.
12. While that is washing, take one of your other shirts that is the vinegar shirt and place it so it is flat.
13. Next take your baking soda and place about a teaspoon of it onto the stain.



13. Next take your baking soda and place about a teaspoon of it onto the stain next take your vinegar and do the same and then scrub it with a toothbrush for about 1 min (it will help if you dip the tooth brush into vinegar occasionally)
14. Then once the vinegar is scrubbed into the stains, take the shirt and place it in the washer when your other shirt is done and make sure you wash it the exact same way as the first shirt
15. Take the first shirt out of the washer and hang it up to dry
16. Now you can take another shirt the shaving cream one and take you shaving cream and spray some out onto the shirt, then you can rub the shaving cream into the shirt and then let it sit for about a 5 min
17. When 5mins is up rinse the shirt
18. Then after that put the shirt in the washer and make sure you wash it the same as the other two
19. Find your last shirt that says toothpaste and squirt a dollop of toothpaste onto the stain



20. Now you are going to take your lemon and cut in half and take one of the halves and squeeze it into a bowl you should have about $\frac{1}{8}$ of a cup now take the other half and do the same thing this should bring you to about $\frac{1}{4}$ cup of lemon juice

21. Now dip your toothbrush into lemon juice

22. Scrub the stain with a toothbrush for about 1 min and periodically re dip your toothbrush into lemon juice

23. After you have scrubbed the shirt for 1 minute you can take some baking soda and sprinkle a little on top and scrub and let sit for 5 min then rinse

24. take the shirt and put it in the washer and make sure to wash it the same as all the other shirts

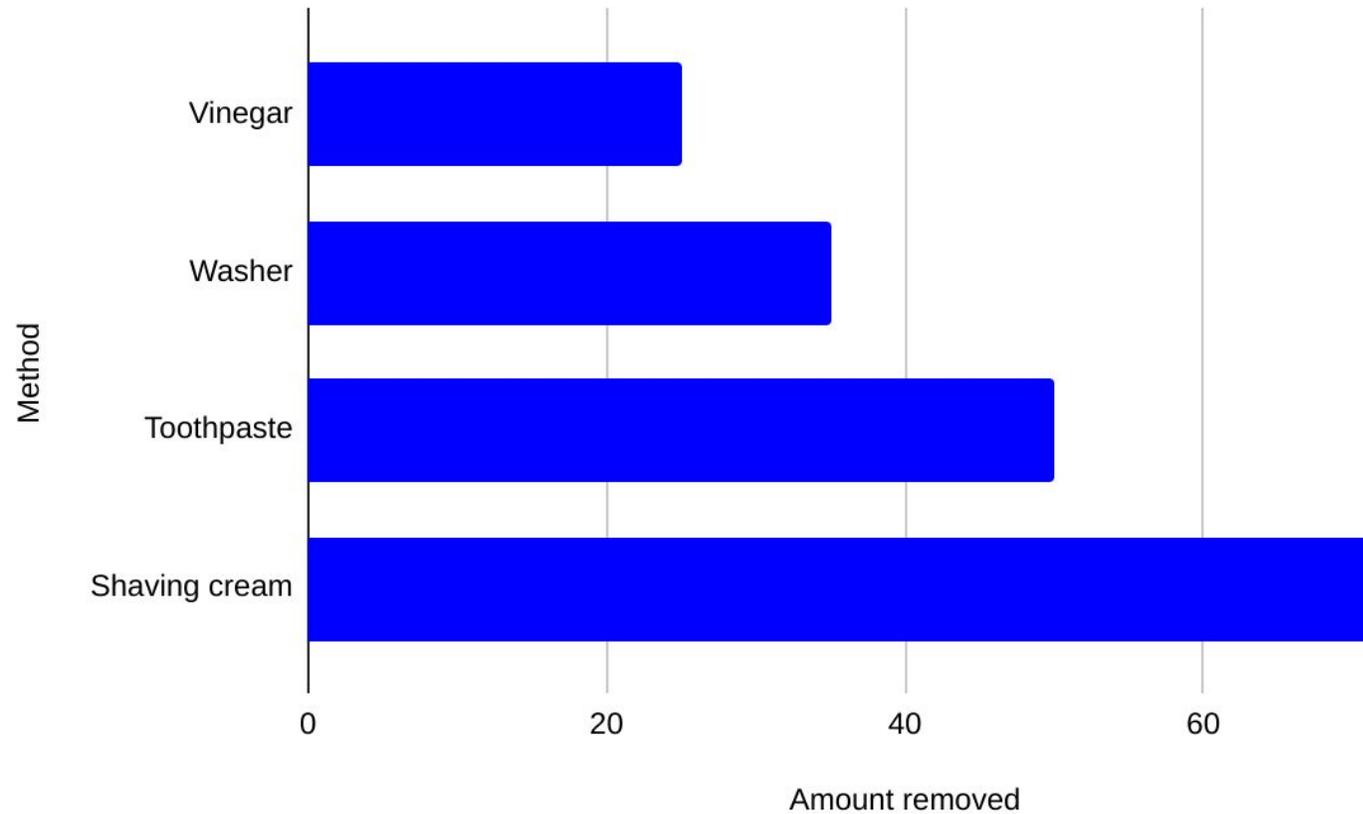
25. Once all the shirts are washed and are dry you can get out your opacity chart and measure the opacity of the grass stain for each method and determine which one worked the best. Make sure to measure the darkest spot of the stain



Data

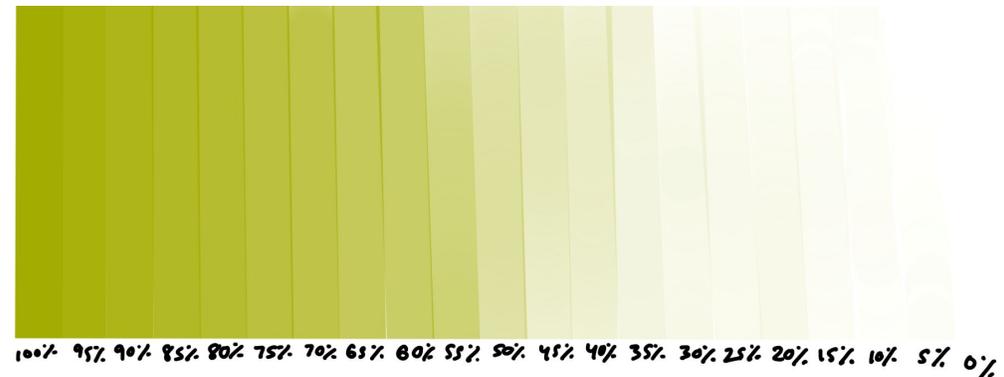
Method	Amount removed
Toothpaste	50%
Vinegar	25%
Shaving cream	80%
Washer	35%

The amount of grass removed from the shirts



Analysis

- My data shows that shaving cream is better for removing grass stains because it removed the most of the stain out of all 4 methods. My data suggests that vinegar is the worst for removing grass stains because it had the darkest opacity out of all of them.
- My data suggests that shaving cream works better because it foams up like a soap like detergent, meanwhile the method that performed the worst was vinegar, because vinegar actually preserved the stain making it perform worse than even just washing the shirt and it made the stain harder to remove because of all the acid in it, it just makes the stain absorb into the shirt more.



Summary

- I wanted to test if the method prior to washing the shirt affects the opacity of the stain after I washed them. I used vinegar and baking soda for one method and the other three were shaving cream, toothpaste and lemon juice and a little bit of baking soda, and then I just put one of the shirts in the washing machine, and once they were done I measured the opacity of each stain and I determined that shaving cream works the best because of how it foams up like a soap and I also found out that vinegar was the least successful of all of them because of the acid in it it makes the stain harder to remove. So if you have a grass stain that needs to be removed you should use shaving cream to get it out.

Improvements/questions

- I think if I was to do this experiment again or just redesign it I would make it so there would be multiple shirts that were put in the wash and then average their opacity at the end and same with all the other shirt too because it was really hard to make sure all the grass stains were the same and I managed to get them pretty close, but I think if I did trials it would have gotten me more accurate results.
- Another question I have is: Does shaving cream work really well for other stains too?