Name: _____ Date: _____ Due: _____

Printing Power! Save the Environment, One Printer Page at a Time

Abstract

Do your parents ever get upset with you for "wasting" paper and ink from your printer? Maybe you wanted to print a comic you found online, or a whole bunch of pictures of you and your friends being goofy, or all the instructions on how to put together that really awesome LEGO® castle. But 20 pages of text and pictures later, your mom or dad is yelling at you. Why do they even care how much you print? And why do people say it is a "waste" of paper? Try this printer-saving science project to figure out the answer!

Objective

To experiment with a document's font size and a computer's print options to save paper.

Introduction

Has there ever been something that you really, really wanted to print out, but your parents, or maybe an older sibling, just called it a "waste of paper" and wouldn't let you print it? Maybe you thought to yourself "Hey, printers are for printing, right? What's the big deal?". To answer that question, let's think about what happens when you print something out. It takes electricity to power the printer, and paper (which is made from trees) to print on, and ink to make the printing visible. All of these things (power, paper, and ink) are created using **natural resources.** They cost money to make and to buy, and have an **environmental impact.**

Then, once you've printed something out, what do you do with it? It probably depends on what you printed, but let's say it's a set of LEGO® instructions, or a list of rides at a new amusement park. Will you use the printout often, or will you use it once or twice and then maybe it gets lost in your room, or thrown away, or **recycled**? If you recycle it, then you're part of the **minority**! According to the Environmental Paper Network, approximately 59 percent of all writing and printing paper is not recycled, and instead, ends up in **landfills.** No one really wants a landfill in their backyard, so as garbage mounts up and there is nowhere to put it, this could become a big problem.

The cost, both in terms of money and the environment, of printing out a single sheet of paper probably don't seem that huge. After all, how much could one sheet of paper cost? And surely there's room in the landfill or the recycling center for that one piece of paper. But what about a company with 10,000 employees? If each of them prints out a single page a day, that's up to 50,000 pieces of printed paper in a single work week! The cost starts to climb quickly. That's why businesses are very interested in finding ways to cut down on printing. What are some of the things they can do? Well, one way is to print less. Instead of printing out a report and giving it to his or her manager, an employee could just email the report and the manager could read it on the computer. But sometimes, there are things that *have* to get printed out. Or even just things that you might really want to print out, like those LEGO instructions or the words to a song you're trying to learn.

In this science project, you will explore ways to print out the same document using less paper. You'll change the font size in a document and see how it changes the amount of paper required for printing.

You will also change the print options in your **word processing** software and see how that changes the amount of paper required for printing. Maybe what you learn can help you avoid "wasting" paper!

Terms and Concepts

- Natural resources
- Environmental impact
- Recycle
- Minority
- Landfill
- Word processor
- Estimate
- Bar graph

Questions

- How is paper made?

- What are some of the environmental impacts of printing?

- List several ways that families, companies, and schools can reduce the environmental impact of their printing.

Lab Journal/notebook (composition/spiral notebook) ready:

1. Take a blank page and date
2. Label Printing Power Activity
3. Use journal as instructed
4. Make sure to label the information so when you come back to complete the lab you know what the information you have recorded.

Experimental Procedure

Experimenting with Printing

1. Turn on your computer and connect to the Internet.
2. We will be using **MOS Word** for this project.
3. You will NOT print any of the pages, so please be aware so we do not waste any paper.
4. Think of something that is mostly text, not a lot of pictures, that you would be interested in printing out. For example, some stories to read, some articles about your favorite sport, or a guide on how to beat a video game level you're stuck on. If you can't think of anything to print, try one of these:
    a. www.cubbi.org/disney/scripts/index.html: This website contains the full-length text scripts for several Disney movies. Choose your favorite one.
    b. constitutionus.com: This website contains a text version of the most important legal document in the United States, the Constitution.
5. Once you've found the text online that you're interested in printing, you'll need to copy it into a document in your word processor.
    a. Open up the word processing program on your computer.

    b. Go back to the text you want to copy from the Internet and put your cursor at the beginning of the text. Click and drag your mouse until you get to the end of the text you want to copy.
    c. Click on the *Edit* menu at the top of the screen on your Internet browser and click on *Copy.* A second way is to right click on your mouse and copy and then paste to document. A final way to do this is to press the "Control" key (Ctrl) and the "C" key at the same time on your keyboard.
    d. Paste the selection into the word processor document, either by right-clicking your mouse and selecting *Paste,* or by holding down the "Ctrl" and "V" keyboard buttons at the same time.
    e. Once the text is pasted into your word processor document, choose the *Save as* option from the *File* menu in your word processing program to save the document in your IT folder that can be found in your student folder (look for your student ID number). If you save it on your desktop of downloads it will not be there tomorrow.
6. In your lab notebook (composition/spiral notebook), write down the number of pages the document takes up. If you are using Microsoft Word® as your word processor, the page size is noted at the bottom left of the document in the gray bar (such as 4/5, which means you are currently looking at page 4, but there are 5 pages). The current number of pages is the size of the document before you start experimenting. If you were to print the document out, this is how many pages would print.
    a. Make sure that your document is *at least* 10 pages long. If it isn't, then either go back to step one and choose a new document, or find additional text (like another story) to add to this document.
7. Now change the font size of the document and see how this change the number of pages in the document. *Note:* Each time you change the font size of the document, remember to save the document under a new name somewhere on your computer (such as "Science Project Font Size 10). Again, be sure you know where you are saving it. To change the font size in Microsoft Word, do the following:
    a. Click on *Select All* under *Edit* on the tool bar. Then click on *Format* on the tool bar and choose *Font.* You now can change the font size.
    b. Write the font size in your lab notebook and the number of pages the document now has after you've changed to the new font size.
    c. Change the font size two more times and continue to write down in your lab notebook how changing the font size changes the total number of pages in the document.
    d. One thing to keep in mind is that the font shouldn't be too small, or you won't be able to easily read the printed document.
8. Now you will experiment with the print options. Use the document that is easiest to read, but still takes up fewest pages, from the above step.
    a. *Note:* If you are using a newer version of Microsoft Word, you can *Preview* the document after making changes to the print options, but before printing. If you are working with an older version, you will just have to **estimate** the number of pages you will get after you make the following changes. If you are using different word processing software, have an adult help you find out how to make changes to the print options and preview, if you can, or estimate how many pages will be in the document after you've made the following changes.
9. One printing option available on Microsoft Word is to print two pages of your document on a single sheet of paper (on one side.
    a. Click on *Print* under *File* on the tool bar and change to this option by selecting *Layout.* In the *Pages per Sheet* field, choose *2.* Now click on *Preview.* How many sheets of paper are used when you make the change?
    b. Write down *Two Pages per Sheet* in your lab notebook and record how many pages the document is now.
    c. Save this new document somewhere on your computer under a new name. Be sure you know where you are saving it.
10. An option available on certain printers is to print double-sided documents. Start with the document that you saved in the previous step—the one with two pages on one side. Printing

double-sided means that instead of just printing on one side of a sheet of paper, the printer can print on *both* sides of a piece of paper, like you see in a book. Choose the option to print double-sided. Your document should now have two pages per side and four pages per sheet.

11. If your printer can't print double-sided, you can trick it into doing so by choosing the correct print option. To print double-sided in Microsoft Word, do the following steps:
    a. Click on *Print* under *File* on the tool bar. Choose *Paper Handling,* and then where it asks *Pages to Print,* choose *Odd only.* In older versions of Word, you can directly choose to print the odd pages first in the *Print* window.
    b. Once you are done printing the odd pages, go back and print out the even pages. On the first odd page, flip it around, feed it into the printer and then print the first even page. On the second odd page, flip it around and print the second even page. Continue until the entire document is printed.
12. Since you are not yet printing out the document, estimate how many sheets of paper you would need to print your document in this double-sided way. Write down *Double-sided Printing* in your lab notebook. Next to it, write down your estimation of how many sheets of paper you would use to print double-sided.

Reviewing Your Data

1. Now make a **bar graph** showing the results of your experiment. You can make a graph by hand, or use a website like Create a Graph. https://nces.ed.gov/nceskids/CreateAGraph/default.aspx
    a. Label the x-axis *Printing Changes.* On the x-axis, make the following labels: *Original Document, Font Size Change, Two Pages Per Sheet,* and *Double-sided Printing.*
    b. Label the y-axis *Number of Printed Pages.*
    c. For each change on the x-axis, make a bar for the number of pages in the document.
2. Do you see a difference in how many pages your document is after making all of these changes? Do you think that making changes in how we all print documents could save paper?

Credits

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