

Lab Notebooks



Lab Notebooks



Legal Documents

Critical for establishing “prior art”

Significant evidence in civil litigation

Vital accurate records be kept in clinical situations

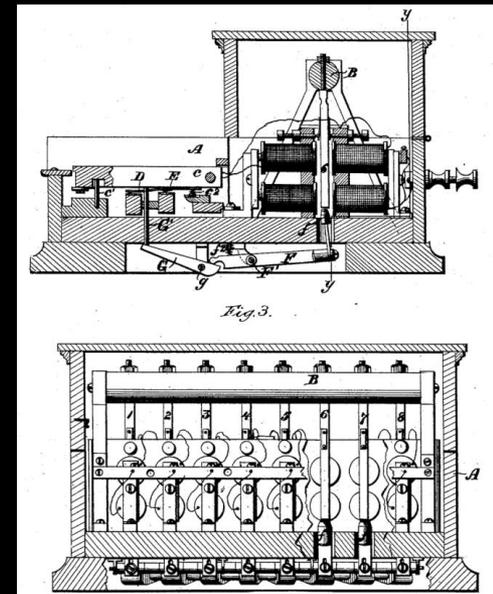
1876 – Bell Invents “harmonic telegraph”

1876 – Elisha Gray files brief for telephone patent 3 hours before Bell

1871 – Telephone invented by Antonio Santi Giuseppe Meucci

(did not file a patent)

Bell fortune based on patent application & lab notes:
“simultaneous transmission of multiple harmonic tones, possibly even the human voice.”



Lab Notebooks



Must be:

Legible

In pen (Blue or black ink; never red ink!)

Consecutive, pre-numbered pages (often accountants' ledger)

Witnessed

Understandable to someone “skilled in the art”



Lab Notebooks



Inside cover:

Your name & contact information

Your instructor's name, the course/ section #, & your lab meeting time

Table of Contents:

Date, title, & page numbers for each week's lab report

Each week you should update the Table of Contents



Writing in the Notebook

Insert the back cover under the copy sheet before writing on a page

Top of each page:

Lab #, title, date, your name, name(s) of lab partner(s), course & section #

All data must be entered with ink directly into the journal

Errors corrected by drawing a line through the mistake

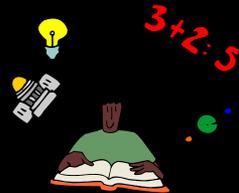


Before leaving:

Tear out the original pages, staple and give to your instructor to grade

Trim the edges

Save the copy in your journal as a record of your work.





Page 1: Safety Agreement



I have viewed the ACS DVD on Chemical Safety

I understand a seat in the laboratory of CEM 101 is contingent upon:

Arriving on time ... I acknowledge the policy of denying a seat for late arrivals

Following all safety rules as defined by the instructor:

Dressing appropriately as defined in the lab briefing

Leaving all food and beverages out the lab (or concealed in backpacks)

Leaving all electronic devices (except calculators) in the storage area.

Turning off all cell-phones

Never returning reagents to original bottles

Wearing safety goggles/glasses when advised to do so by the instructor

Leaving the lab bench clean

Print Name

Signature

Student Witness

Date Signed:

Required Sections

PURPOSE: (1 point)

Your words (Based on lab handout)

PROCEDURE: (2 points)

Step-by-step list of things you plan to do during the lab

Short, “to do” list

Should not be more than a page

DATA: (4 points) Tables before class; data during class

Record all pertinent information & numerical (quantitative) observations

All measurements with units to the correct number of significant figures

Report any qualitative (non-numerical) experimental information in sentences

Record what you observe in as much detail as is practical

CALCULATIONS: (4 points)

Correct significant figures & unit labels

RESULTS/DATA INTERPRETATION: (4 points)

Tabulate the answers to all the calculations

Any needed graphs or charts

CONCLUSION: (4 points)

Use complete sentences to describe what you learned, determined, or discovered

You must answer the question posed in the purpose of the lab



Required Sections: Rationale for Order



PURPOSE: (1 point)

Why

PROCEDURE: (2 points)

How

Before Class

DATA: (4 points) Tables before class; data during class

What was observed / measured

CALCULATIONS: (4 points)

Arithmetic on data with appropriate units and sig figs

RESULTS/DATA INTERPRETATION: (4 points)

Summary / Graphs

During Class

CONCLUSION: (4 points)

Answers Purpose

Questions: (5 points)

Tests Understanding of lab principles

Helps prepare to answer exam problems

Done independently ('cause exams are done independently)

Most can be done before class

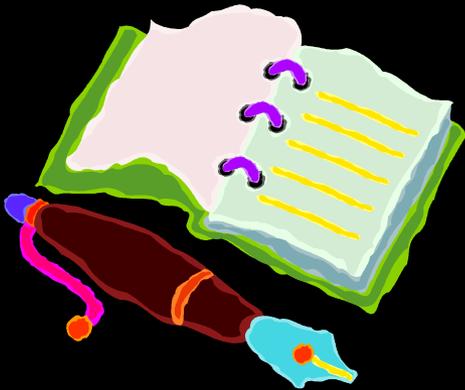


Lab Notebook Measurements



Electronic Devices: Record All Displayed Digits

**Non-Electronic Scales: Record 1 decimal digit beyond scale
(Will discuss “significant figures” in Unit 3)**



Answer the Questions

No need to copy questions into notebook



I Am NOT a mushroom!

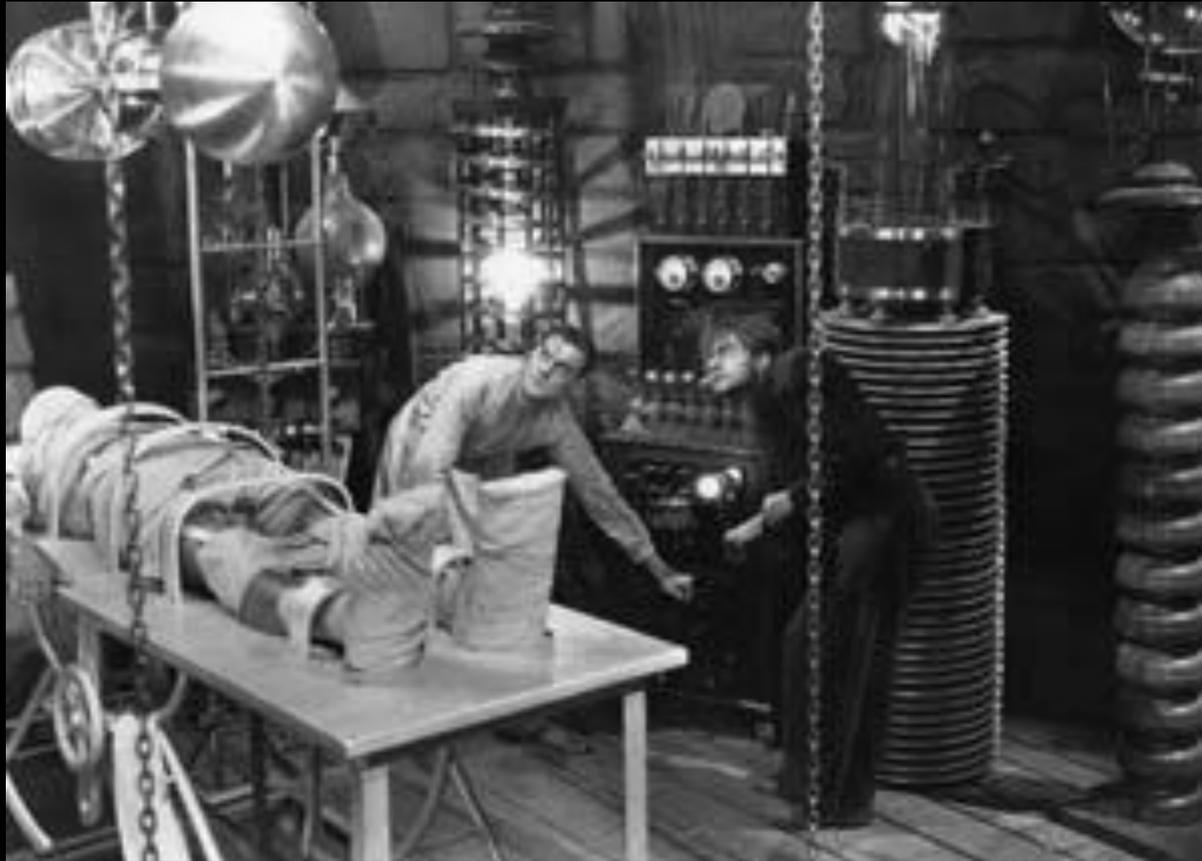
Sources of Answers:
Lab Briefing Slides
The Lab Briefing
Your data

Web Search Engines
often give inappropriate answers

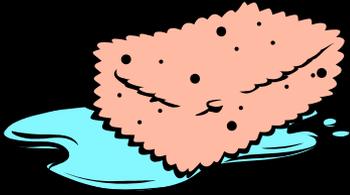
In the delta variant world:
Where possible, do questions ahead of class
Staple sheet to lab report

Primary Criteria:

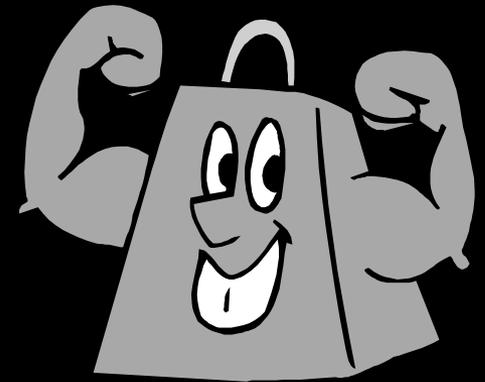
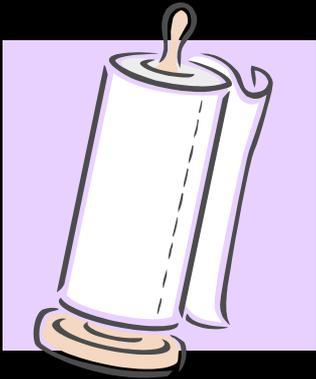
Must contain Enough Material to Reproduce the Experiment



Even if decades have passed!

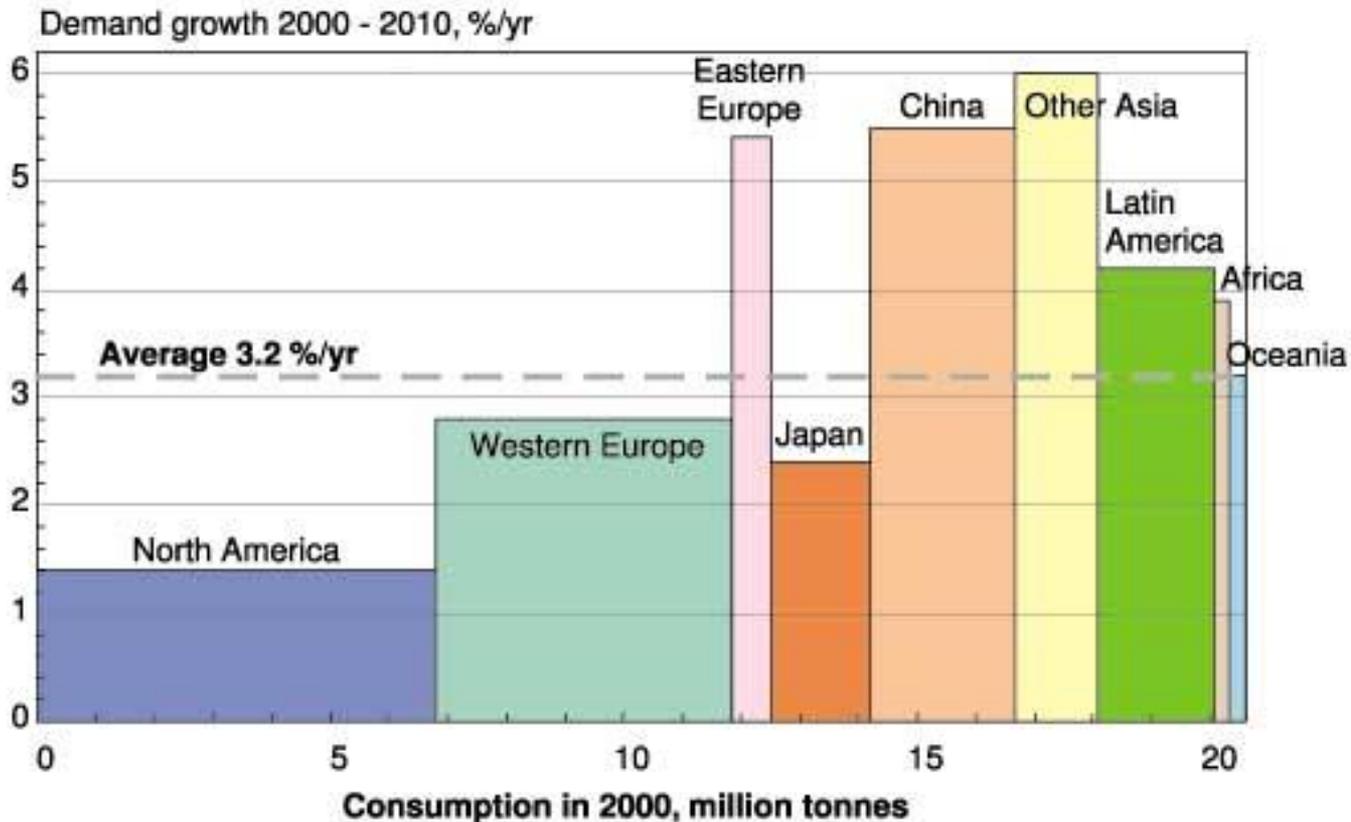


Testing Paper Towels Lab

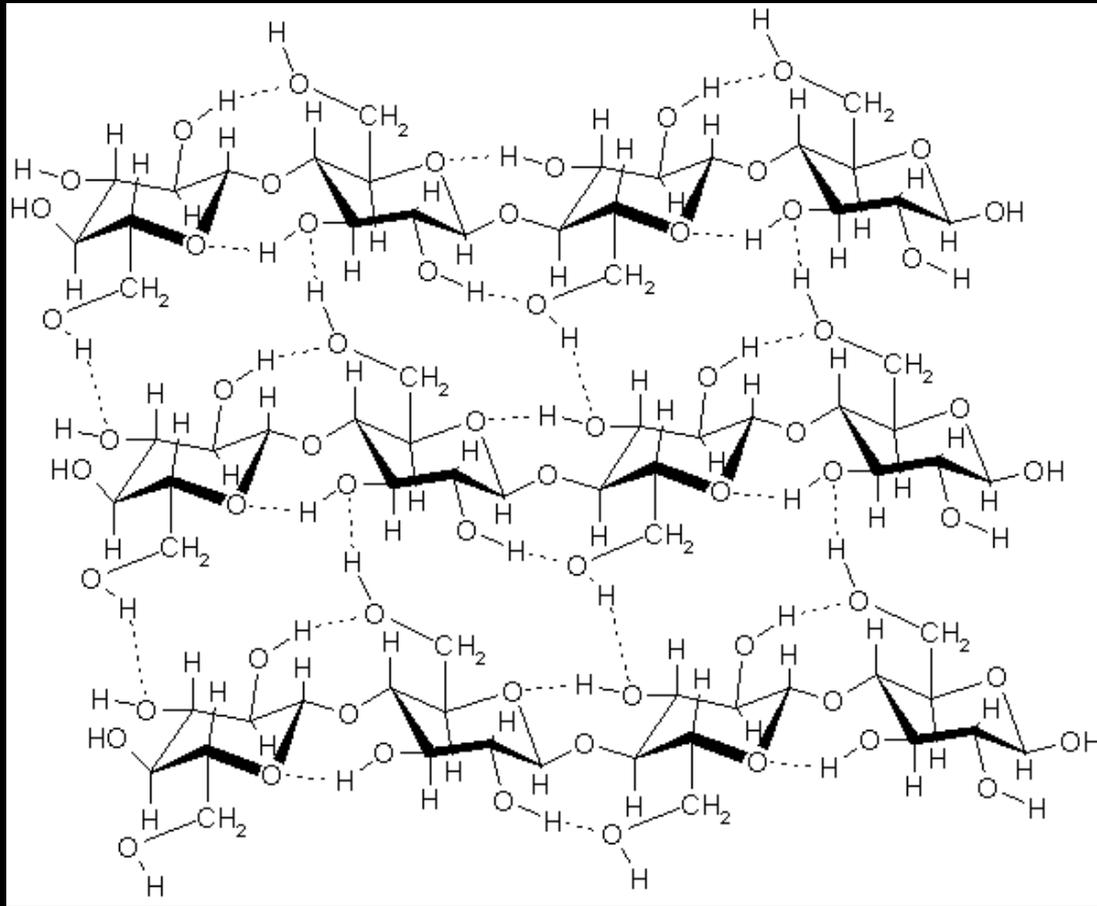


Paper Towels – Not a trivial business

Figure 1: World tissue demand in 2000 - 2010



Cellulose (Cotton)



**Every Sugar – OH
Can
Grab HOH molecules**

A poly-sugar that is capable of attracting many water molecules

Cellulose (Cotton)

Ability to hold water makes cotton a “great” summer fabric

perspiration “grabbed” by cotton fibers

water evaporates

evaporation takes heat

result is a cooling effect



Ability to hold water makes cotton an undesirable winter fabric

evaporative cooling promotes heat loss & hypothermia

water removes heat 25 x faster than dry still air of same temperature

Fogery : > 50% wilderness deaths a result of wearing cotton jeans

Yosemite Rangers: wearing cotton in winter → “death-seeking behavior”

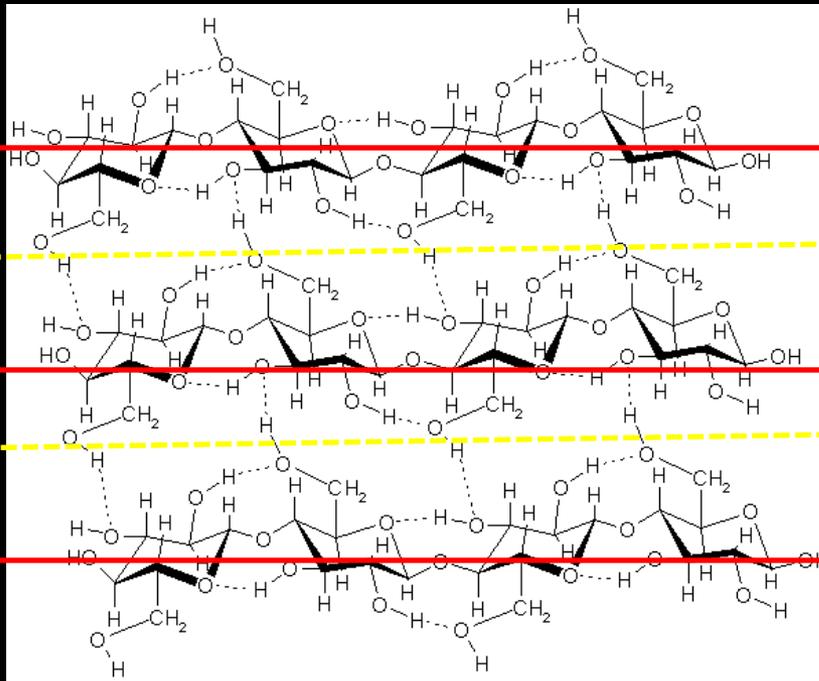


Cellulose (Cotton)

Ability to absorb water depends upon amount of cellulose present



Strength depends upon molecular orientation of polymer strands



Strong Chemical Bonds

Weaker "Hydrogen Bonds"

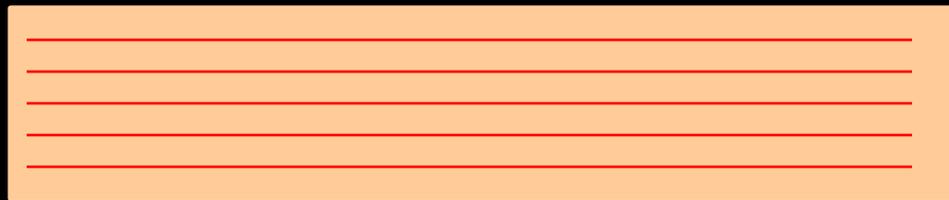
Tearing Occurs Between Strands

Molecular Architecture Defines Macro Behavior

Cellulose (Cotton)

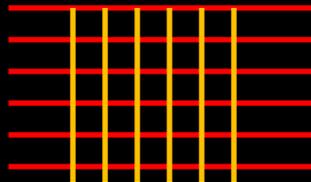
Mechanical Strength Dependent on Direction of Force Applied

Strongest along Direction of poly-sugar strands



Less Force Required To Tear

Mechanical Strength gained by orientation of poly-sugar strands



Each layer (ply) a different direction

Assume YOU are Quality Control Lab

Need to:

Determine Your Product Marketing Strengths

Market best feature – strength vs. absorbency

Compare Your Product to Others

Are you the best?



Absorbency = Measure of ability to absorb water

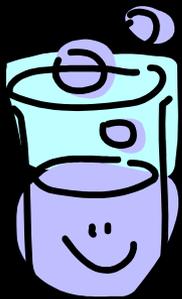
Two Basic Measurements:

Mass

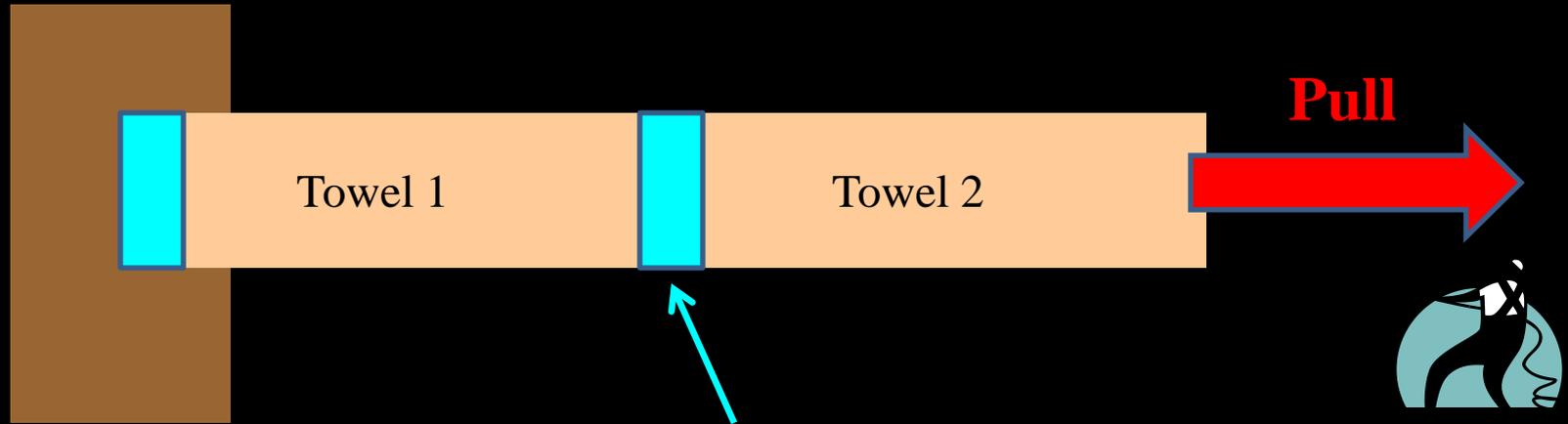
Volume



Suggestions?



Strength = Resistance To Tearing

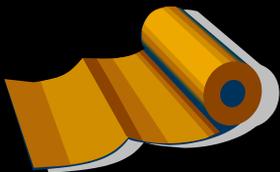


Secure with transparent tape

Towel that rips is the weakest

If break occurs at the tape, need to redo test

If break occurs on only one ply, consider it a tear



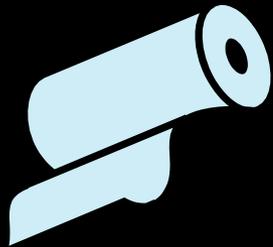
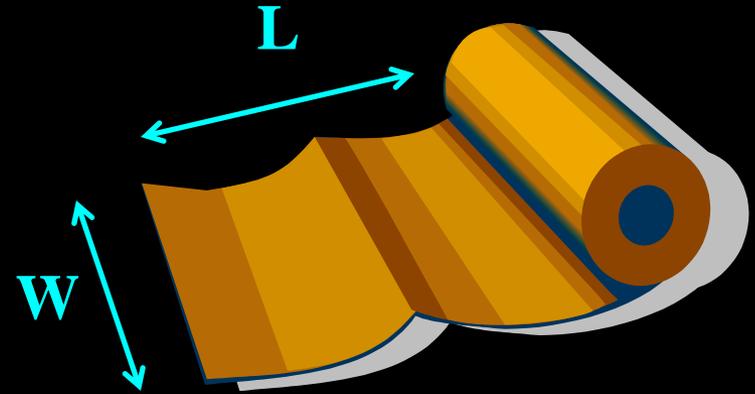
Strength Test

Strips:

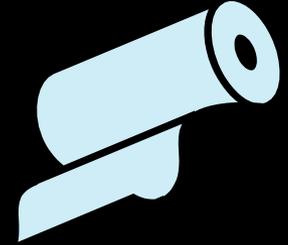
Same size for each test strip

Width vs. length for each brand

Strongest (of each brand) against other brands



The Lab Today



I. Determining the Absorbency of Paper Towels

Work with a partner

Agree on a set of procedural

Carry out your plans

When finished, clean & dry all glassware: put away all equipment

II. Determining the Dry-Strength of Paper Towels (*for each brand*)

Cut one sheet into 4 lengthwise strips, 20 cm long by 5 cm wide

Code them BRAND-L (for BRAND, lengthwise direction)

Cut another sheet into 4 widthwise strips, 20 cm long by 5 cm wide

Code these strips BRAND-W (for BRAND, widthwise direction)

Strengthen one end of each strip by putting tape on it

Use tape; fasten together 1 BRAND-L strip to 1 BRAND-W strip

Fasten one end to the lab bench

Pull the free end of the taped strip until one breaks

Record which strip is stronger, that is which doesn't break

Repeat to make sure the same strip (L or W) breaks first again.

Test the stronger strip for each brand against each other brand

Repeat to make sure the same strip breaks first again.

Report strongest brand

Notebook Pages should include:

Purpose: What you intend to accomplish by doing today's lab work

Procedure: What you will do

Data: Record your measurements / observations

Calculations: Show any calculations

Results: Report in an organized table

Conclusion: Describe paper towel brand strength & absorbency



Don't Forget the questions!



Let's Boldly Go Explore Today's Lab

