

Mystery Unit Part I

FRAMEWORK

I. Chromatography and Coding

II. Cross-Cutting Concepts

III. Physical Sciences

SKILLS/OBJECTIVES

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| <ul style="list-style-type: none">○ Use and understand chromatography○ Use and understand a decoding procedure |
| <ul style="list-style-type: none">○ |

MATERIALS

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| <ul style="list-style-type: none">• Vis-à-vis markers, 1 per 2-3 students• Sharpies, 1 per 2-3 students• Coffee filters, 1 per 4 students• Plastic cups, 1 per students• Coffee stirrer, 1 per student• Clear tape• Evidence folder (manila envelope with 'EVIDENCE' etc. written on it• Code handouts; one per child• Pencils• Coded letter – one part per child• Translation sheet – one per child |
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NOTES

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| <ul style="list-style-type: none">• Try to save the plastic cups and stirrers for re-use• Also try to save and reuse code handouts |
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BACKGROUND

Overview:

- Explain that you found a mysterious letter in the Science Club office at Wesleyan and need their help figuring out who sent it – it could be VERY important!
- Pass out the letter, announcing that this is a copy of the original letter
- Do decoding activity
- Note that the letter is unsigned and say that we will spend the next few weeks doing a number of scientific experiments to solve the mystery of the unsigned letter
- First experiment will be ink chromatography to determine which pen the letter writer used

Activity #1	Chromatography
Materials	<ul style="list-style-type: none">• Vis-à-vis markers, 1 per 2-3 students• Sharpies, 1 per 2-3 students• Coffee filters, 1 per 4 students• Plastic cups, 1 per students• Coffee stirrer, 1 per student• Clear tape
Worksheet	Y

- Announce that information has come in from the lab about the pen that was used to write the original letter. We now know it was either a sharpie or vis-à-vis marker. Tell them that we also searched each suspect and found out what pen they were carrying (point to poster)
- Ask them how they think we should figure out which marker they used – hopefully someone will point out that this will be hard because both markers appear the same (black) on paper. Then tell them that we will use chromatography to determine which one was used.
- Pass out supplies
- To make the chromatography tester, each student should take a strip of coffee filter strip and fold the top over a coffee stirrer, using tape to hold the paper in place (show them a pre-made example and help the youngers)
- Draw a straight line in pencil about $\frac{3}{4}$ inch from the bottom of the filter (show example)

- Have them work in pairs – one of them drawing a dot with vis-à-vis and one of them drawing a dot with the sharpie in the middle of their pencil line
- Fill the plastic cup with about ½ inch of water (below line) and place the filter apparatus so that the stirrer rests on the top on the cup and the filter is touching the water.
- The water will wick up the filter, taking the ink along with it. The sharpie and the vis-à-vis will result in very different patterns, allowing the students to identify which pen the mystery writer used.
- Pick volunteers to come in front of the group and show and tell how one can tell the differences between these two samples. (Sharpie doesn't bleed, vis-à-vis bleeds a rainbow)
- Tell them that back at our labs in Wesleyan, we too ran chromatography on the special pen sample from the letter. Dramatically take out the chromatography sample from the evidence folder
- Have them tell you which pen the letter writer used based on the sample from the evidence folder
- Fill out worksheets

Activity #2	Decoding
Materials	<ul style="list-style-type: none"> • Evidence folder (manila envelope with 'EVIDENCE' etc. written on it) • Code handouts; one per child • Pencils • Coded letter – one part per child • Translation sheet – one per child
Worksheet	N

- Retrieve code sheet from evidence folder, explaining that you found this letter in the Science Club office at Wes and you think it has vital information for all students in Science Club!
- Show them poster with four suspects
- Hand out pieces of the coded letter (cut in 4 pieces) to each child, along with code translation sheet
- Have students translate code to English. With younger/less literate students you may have to help them on-on-one with the volunteer doing every other 'translation'

- When everyone is finished, have everyone with the first part of the letter group together, and the people with the second part of the letter group together, etc until there are four groups. Have each group check that they all have the same 'translation'. Then have each group pick one representative to read there translation to the rest of the club.
- Finally, read the whole letter as a group
- Now, point out that something is missing from the letter – the signature of who it's from. The next activity will help us solve the mystery of who sent this letter!

CONCLUSIONS

