**Measuring Signal Strength**

**Be sure to follow each step, show all of your work, and ask for help when needed.**

**Part 2**

1. Students will open the COSMOS Node and open the GNU Radio Companion software.
2. Students will put one walkie-talkie in a ziplock bag, close the bag then place that bag into another zip lock bag to ensure walkie-talkie does not get wet. (Be sure to tightly close both bags)
3. Measure out 10 inches of string and tie the string around the top of the ziplock bag to ensure the bag is closed tightly.
4. Students will measure out 3 gallons of water to put into each bucket.
5. Students will place the ruler inside both buckets.
6. Students will pour ¼ cup of salt in bucket A. Wait for salt to completely dissolve. (2-5 minutes)
7. Divide students into groups of 4 and assign the following tasks. One task per student.
	1. Student A will hold the walkie-talkie bag by the string and place the bag into the water. (Do not allow the bag to touch the bottom of the bucket or the sides of the bucket.)
	2. Student B will push the PTT button on the walkie-talkie and hold the button down while the bag is submerged in the water (do not open the bag)
	3. Student C will record the maximum decibels to measure the signal strength showing on the GNU Radio
	4. Student D will write their findings in the table and answer any procedural questions or comments from group members.
8. Student C will add another ¼ cup of salt to bucket A.
9. Students will repeat steps 7a-7d
10. Student C will add another ¼ of salt to bucket A.
11. Students will repeat steps 7a-7d
12. Student C will add another ¼ cup of salt to bucket A.
13. Students will repeat steps 7a - 7d
14. Student A will submerge the walkie-talkie bag in water in bucket B (fresh water) while holding the string to ensure the top of the bag (the seal) does not go underwater. (Do not allow the bag to touch the bottom of the bucket or the sides of the bucket.
15. Student B will push the PTT button on the walkie-talkie and hold the button down while the bag is submerged in the water (do not open the bag)
16. Student C will record the maximum decibels to measure the signal strength showing on the GNU Radio
17. Student D will write their findings in the appropriate space and answer any procedural questions or comments from group members.
18. Students will complete their tables and graph their findings.
19. Students will decide if the graph is proportional.

**Measuring Signal Strength - Data Collection**

1. Complete the following table with your findings.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Amount of Salt, c** | 0 cups | ¼ cup | $\frac{2}{4}$cup | $\frac{3}{4}$cup | 1 cup |
| **Signal Strength, db** |  |  |  |  |  |

1. Label your axis and graph your findings.



1. Is the graph proportional why or why not?

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**Part 3**

**Extension Activity**

1. From your experiment, we found that there was a difference in signal strengths between fresh water and salt-water. Research what limits transmission of radio waves in the ocean and write a 500-word essay on your findings. Be sure to cite your sources.

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