



CHILDREN'S PLACE

WOOD COUNTY DISTRICT PUBLIC LIBRARY



Summer Reading Program 2023 – All Together Now

Fusion, Cohesion, and Symbiosis:

The Science That Brings Us Together

FUSION!

Most common scientific definition:

Nuclear Fusion - the combination of two or more atomic nuclei to form one or more different nuclei, creating energy as a byproduct. The process that powers the stars.

LUCKILY, fusion is also an accepted term in branches of science other than particle physics, so let's focus on those.

FUSION! (Chemistry)

Chemical vs Physical Reactions

Chemical fusion just means bringing two substances together, so now is the time for:

- Water and oil and dish soap
- Baking soda and vinegar
- Diet Coke and Mentos
- Elephant Toothpaste
- Instant snow
- Slime
- Sugar crystals

Do some of these or all of these, and talk about the differences between a chemical reaction (creating a brand new substance) and a physical reaction (where the two initial substances can be separated out again)

FUSION! (Physics)

But I really want to teach particle physics to the children, Cassie.

- Fine. You need cookie dough, a digital scale, and a microwave

Cookie Dough Fusion

- Make two different balls of cookie dough and measure them by weight
- Place them on wax paper and microwave for one minute
- Once cool, weigh them again and compare the weights pre- and -post microwave
- Your cookies are atoms, cooking in the microwave is atomic fusion, and the weight difference is energy released by the act of fusion

<https://wonders.physics.wisc.edu/fusion-cookies/>

COHESION!

Cohesion- a measure of how well molecules stick together

If you have older kids, talk about:

- electron sharing
- covalent, ionic, and polar bonds
- chemical reactions on a molecular level

OR

COHESION!

How Much Water Will Sit on the Surface of a Penny?

- Split students into pairs
- Give each pair an eyedropper, some water, and a penny
- See which group can put the most drops of water on their penny before the water spills over the side
- Ask them to pay careful attention to the shape that the water makes on the penny as they add more and more drops
- Because cohesion, the fact that water molecules really like each other and want to stick together, is the reason this experiment works.

COHESION!

But wait, there's more!

Can You Float a Paperclip?

- Give students a paperclip and a basin of water and challenge them to float the paperclip on top.
- (This experiment is possible, but tricky, so you the librarian will want to practice a few times ahead of the program)
- Water cohesion makes this experiment possible, too – if students are careful not to break the cohesive bonds forming the water's surface tension, the paperclip will float

SYMBIOSIS!

The STEM Topic you've all been waiting for

BUT WAIT! Because it's possible that you keep using that word, but it doesn't mean what you think it means

Symbiosis - any type of a close and long-term biological interaction between two different biological organisms

SYMBIOSIS!

Types of Symbiosis

MUTUALISM - The one you're thinking of. A mutually beneficial relationship between two organisms, and a beautiful example of our Summer Reading Program theme. Think clownfish and anemones.

PARASITISM - One organism sucking the life away from another. Think parasitic wasps, which I will let you Google on your own. NOT a beautiful example of our Summer Reading Program theme.

COMMENSALISM - One organism benefits, and the other isn't bothered one way or the other. Think whales and barnacles. Technically an example of our Summer Reading Program theme.

MUTUALISM!

Mutualism Matching

Easy mode

- Find photos of your mutual symbiotes together, print two of each, your standard matching game

Advanced mode

- Use SEPARATE photos of your mutual symbiotes and make students match the clownfish to the anemone

With a twist mode

- Write out the symbiotes on post-its and stick one to each student's forehead. They have to identify what animal they are AND find their pair by asking yes or no questions.

You can also do any of these with parasitic or commensalistic symbiotes as well

MUTUALISM!

Want a more hands-on approach?

- Tape a maze on the floor
- Pair the students up and task them with retrieving an object at the end of the maze
- EXCEPT one student can't move and the other student can't see
- The seeing student will have to verbally lead the moving student through the maze and back out again in order to complete the task

And here's the beauty

- That exercise is a screen-free coding exercise
- It's also collaborative problem-solving
- Because the broadness of this theme allows you to get creative!
- Is it STEM related and has to do with bringing people or ideas or communities together? Run with it!

STEM ideas

What STEM concepts bring people or ideas together?

- Collaborative problem solving
- Coding and robotics
- The Internet
- Bridges
- Magnets
- Chromatology and color theory
- Dynamic science duos
- Partnerships with STEM-centric community organizations

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In Conclusion

Whether you're planning a one-time STEM program or a recurring weekly program, there are plenty of ideas to play with, and plenty of ways to make STEM programming work for your library this summer!

Cassie Greenlee
Wood County District Public Library
cassandragreenlee@wcdpl.org



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