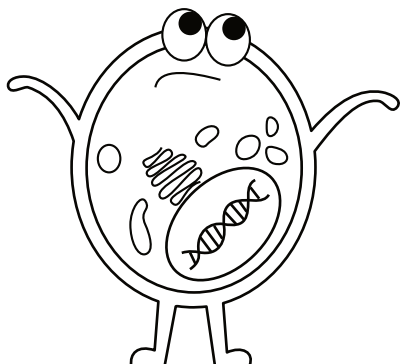


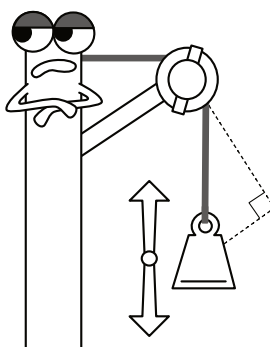
CHEMISTRY

The central and most important branch of science

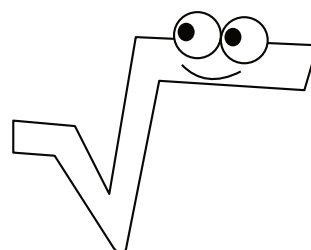
MOST CENTRAL
SCIENCE!?!? THAT
WOULD **CLEARLY** BE
BIOLOGY.



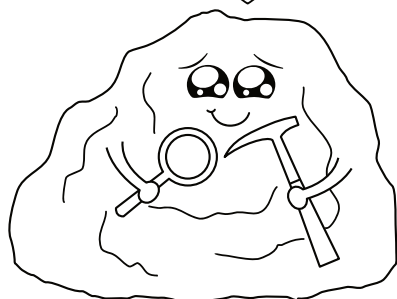
DON'T BE RIDICULOUS.
WITHOUT PHYSICS YOU
WOULDN'T EVEN HAVE A
PLANET TO LIVE ON!



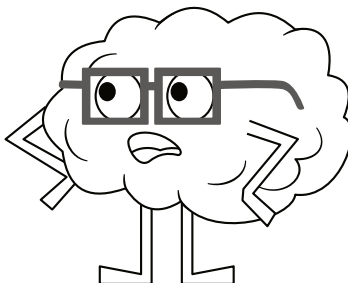
MATH IS OBVIOUSLY
THE MOST IMPORTANT.



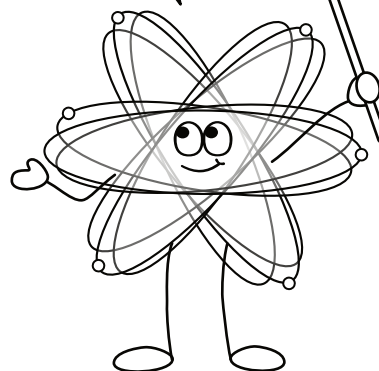
ROCKS ARE
AWESOME!



THAT'S YOUR BEST ARGUMENT
FOR GEOLOGY? REALLY? YOU JUST
PROVED THAT THERE'S NOTHING
MORE IMPORTANT THAN
PSYCHOLOGY.



COMPLAIN ALL YOU
WANT - THIS CLASS IS
DEDICATED TO ME!!!



Fall 2020 schedule:

	Date	Topic	NGSS (if applicable)
Week 1	Tuesday, Sept 1	The story of the atom	5-PS1-1
	Thursday, Sept 3	Elemental, dear Watson!	
	Friday, Sept 4	Hands-on Activity: Modeling Clay Orbitals	
Week 2	Tuesday, Sept 8	A noble quest	
	Thursday, Sept 10	Element vs mixture vs compound	5-PS1-3
	Friday, Sept 11	Hands-on Activity: Edible Experiments	
Week 3	Tuesday, Sept 15	Why is it radioactive?	
	Thursday, Sept 17	Conservation of matter	5-PS1-2
	Friday, Sept 18	Gameshow review	
Week 4	Tuesday, Sept 22	Chemical reactions part 1	5-PS1-4
	Thursday, Sept 24	Chemical reactions part 2	5-PS1-4
	Friday, Sept 25	Hands-on Activity: Time to Fizz	
Week 5	Tuesday, Sept 29	Chemical reactions part 3	5-PS1-4
	Thursday, Oct 1	How does a toaster work?	4-PS3-2, 4-PS3-4
	Friday, Oct 2	Hands-on Activity: Lemon or Vinegar Battery	
Week 6	Tuesday, Oct 6	The building block of life	4-PS4-3
	Thursday, Oct 8	Where does fuel come from?	4-ESS1-1, 4-ESS3-1
	Friday, Oct 9	Gameshow review	
Week 7	Tuesday, Oct 13	What is fire <i>really</i> ?	
	Thursday, Oct 15	Can we predict a volcano?	4-ESS3-2
	Friday, Oct 16	Hands-on Activity: Build a Levee	
Week 8	Tuesday, Oct 20	All about the solution	
	Thursday, Oct 22	Acids and bases	
	Friday, Oct 23	Gameshow review	
Week 9	Tuesday, Oct 27	Why do we chlorinate pools?	
	Thursday, Oct 29	Photosynthesis	5-PS3-1, 5-LS1-1
	Friday, October 30	Hands-on Activity: Frankenseeds	
Week 10	Tuesday, Nov 3	All about the sugars	
	Thursday, Nov 5	Why can't you eat books?	
	Friday, Nov 6	Gameshow review	

The gameshow reviews are interactive and best when attended live (10:00-10:45 a.m. Pacific / 1:00-1:45 p.m. Eastern time). If you can't attend live, it is recorded and you can watch the replay afterward. The questions used during the gameshow will also be emailed to all participants and can be used as a traditional assessment.

Have questions? Contact jenny@science.mom

	Date	Topic	NGSS (if applicable)
Week 11	Tuesday, Nov 10	Lipids!	
	Thursday, Nov 12	Plankton!	
	Friday, Nov 13	Hands-on Activity: Plant Propagation	
Week 12	Tuesday, Nov 17	Bioluminescence	
	Thursday, Nov 19	From cells to colonies	4-LS1-1
	Friday, Nov 20	Gameshow review	
Week 13	Tuesday, Nov 24	<i>Thanksgiving break - No class</i>	
	Thursday, Nov 26		
	Friday, Nov 27		
Week 14	Tuesday, Dec 1	The nitrogen cycle	5-LS2-1
	Thursday, Dec 3	Water reclamation	
	Friday, Dec 4	DIY Water Filter	
Week 15	Tuesday, Dec 8	Fireworks and lab safety	
	Thursday, Dec 10	Gameshow review	
	Friday, Dec 11	Gameshow review	

Supply List for Friday Hands-on Activities:

September 4 - Modeling Clay Orbitals

- Toothpicks
- Modeling clay or play dough (7 different colors)

September 18 - Edible Experiments

- Granulated Sugar (at least 7 cups)
- Kool-aid packets
- Cake pop sticks or string
- A ruler
- 2 pint-size mason jars with lids OR cups and rubber bands
- Coffee filters or paper
- 2 Microwavable popcorn packets
- Water and ice

September 25 - Time to Fizz!

- 6 Alka-Seltzer tablets
- 6 bottles of soda in plastic containers with narrow tops. Any size and type will work, but I recommend 16 oz coke bottles (because Coke is slightly more carbonated than other sodas). Be sure to save the bottles when finished because they will be used twice in this experiment and again in the December 4th water filtration experiment.
- Baking soda
- 3 packages of Pop Rocks candy
- 6 Balloons (standard 9 inch size)
- A funnel (to help get baking soda inside the balloon)
- Food Coloring
- Vinegar
- Vegetable oil (a whole bottle)

October 2 - Lemon or Vinegar Batteries!

- Citrus fruit such as lemons
- Potato
- Vinegar and three small cups
- An LED diode
- Copper penny, wire, or copper sheets
- Galvanized nail or zinc sheets
- Alligator clips

October 16 - Build a Levee

- A rectangular Tupperware container (or a glass pan)
- Duct tape
- A plastic bag
- Fine grained building materials (1 cup flour mixed with 1 Tbsp cocoa powder)
- Coarse grained building materials (beans, nuts, or dried fruit)
- Water
- (Optional) legos or other small items to represent the town

October 30 Frankenseeds

- Cardboard egg carton(s)
- Paper towels
- An empty bread or produce bag
- At least 6 types of seeds from the kitchen (could include rice, beans, lentils, chia seeds, walnuts, sunflower seeds, almonds, peanuts, flax seeds quinoa, or seeds from inside foods like apples, peas, avocados, pears, oranges, kiwis, or cucumbers)

November 13 - Plant Propagation

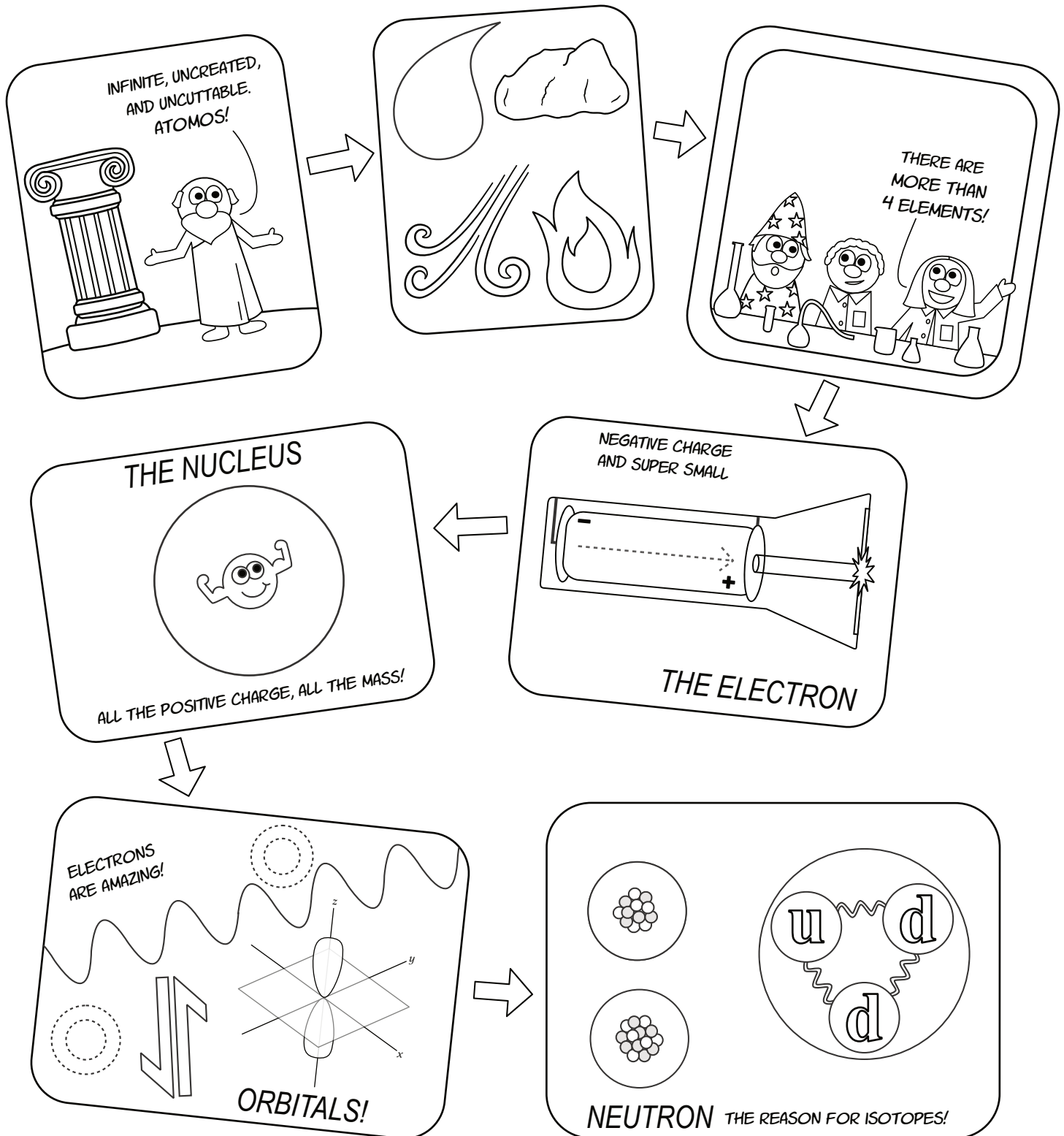
- One root vegetable (such as a carrot, beet, turnip, radish, or rutabaga)
- One tuber (sweet potato, potato, ginger, or turmeric)
- A pineapple
- 3 cups (drinking cups will work fine)
- Toothpicks

December 4 - DIY Water Filter













- 2 liter plastic bottle
- Scissors (some adult supervision may be needed when cutting the bottle)
- Sand
- Gravel
- Activated charcoal
- Coffee filters
- A small square of cotton fabric

The story of the ATOM

WHAT ARE THINGS REALLY MADE OF?



DRAW THE DIFFERENT MODELS IN THESE BOXES!

SOLID SPHERE	PLUM PUDDING	PLANETARY	BOHR
 1803 JOHN DALTON  ELEMENTS ARE MADE OF DIFFERENT ATOMS  THE ATOM ISN'T THE SMALLEST PARTICLE	 1904 J.J. THOMPSON  ELECTRONS ARE NEGATIVELY CHARGED  HAD NO NUCLEUS	 1911 RUTHERFORD  POSITIVE CHARGE IN THE NUCLEUS  DIDN'T PREDICT ELECTRON BEHAVIORS	 1913 NIELS BOHR  ELECTRONS HAVE DISTINCT ENERGY LEVELS  DID NOT EXPLAIN LARGER ATOMS

YOUR NOTES:

Welcome to the Elemental Cafe

How to order an element:

- Choose the number of protons*
- Make it an isotope!
Adjust the number of neutrons
- Make it an ion!**
Adjust the number of electrons


* NUMBERS ABOVE 90 ARE NOT SERVED.
** LIMITED AVAILABILITY.

Daily Special

CARBON 14

6 PROTONS
8 NEUTRONS
6 ELECTRONS

Remarkably stable!



Panel 1: Star 1: "WHAT CAN I GET YOU?" Star 2: "I'LL HAVE A NUMBER TWO."

Panel 2: Star 1: "HELIUM? SURE! DO YOU WANT TWO NEUTRONS OR THREE?" Star 2: (silence)

Panel 3: Star 1: "UH, I DON'T KNOW."

Panel 4: Star 1: "TWO NEUTRONS WILL BE \$5. THREE IS \$5,000." Star 2: "TWO NEUTRONS PLEASE!"

FILL IN THE BLANKS USING THESE WORDS:

element	positive	no	nucleus	orbitals	neutrons
nucleus	protons	nucleus	118	matter	negative

ELECTRONS

HAVE A _____
CHARGE AND OCCUPY SPACES
AROUND THE NUCLEUS KNOWN
AS _____. THEY DON'T
ADD ANY REAL MASS TO
THE ATOM.

PROTONS

HAVE A _____
CHARGE AND EXIST IN THE
_____ OF THE ATOM.
THE NUMBER OF PROTONS
DETERMINES WHICH
ELEMENT THE
ATOM IS.

ALL _____
IS MADE OF **ATOMS**.
ATOMS ARE THE SMALLEST
PIECE OF AN _____
THAT STILL BEHAVES
LIKE THAT ELEMENT.

AN **ELEMENT**
CANNOT BE BROKEN
INTO SIMPLER SUBSTANCES
BY CHEMICAL REACTIONS.
THERE ARE _____
KNOWN ELEMENTS.

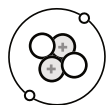
ATOMS ARE
MOSTLY MADE OF
EMPTY SPACE. ALL OF
THEIR MASS IS IN THE
THE _____

NEUTRONS

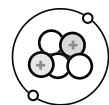
HAVE _____
CHARGE AND EXIST IN
THE _____ OF THE
ATOM. THEY ARE ABOUT
THE SAME SIZE AS
PROTONS.

THE **NUCLEUS**
OF THE ATOM CONTAINS
_____ AND _____
BUT NOT ELECTRONS.

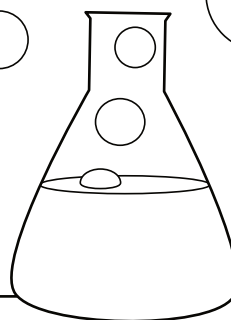
ISOTOPES
ARE VARIATIONS OF THE
SAME ELEMENT THAT HAVE A
DIFFERENT NUMBER OF NEUTRONS.



HELIUM



ALSO HELIUM

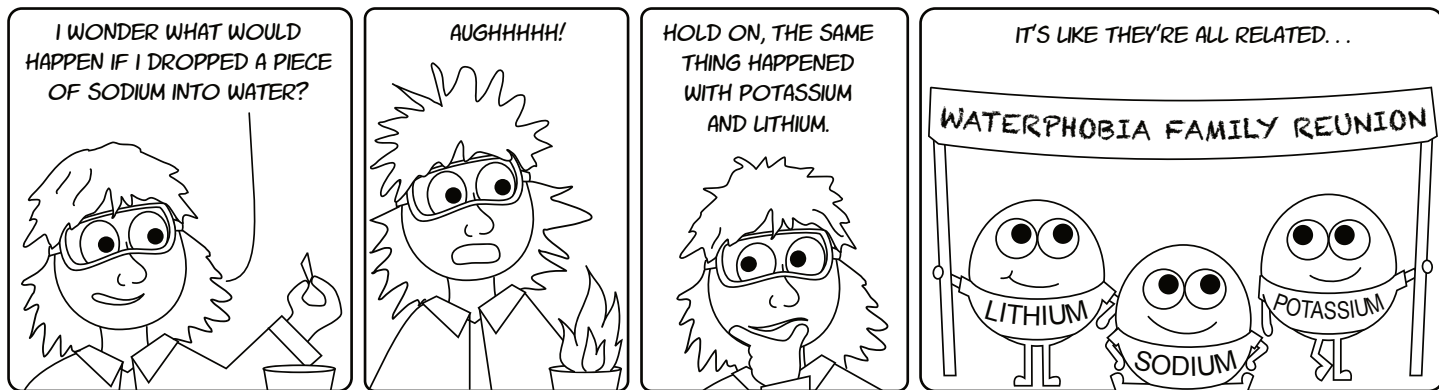


SCIENCE M@M

YOUR NOTES:

The PERIODIC table

PRETTY MUCH THE COOLEST CHART EVER



The ATOMIC NUMBER is the number of _____

ELEMENT NAME

5

B

Boron
10.81

CHEMICAL SYMBOL

The ATOMIC MASS is the average number of _____ and _____.

THE PERIODIC TABLE

EVERY SINGLE ELEMENT!

1 H Hydrogen																	2 He Helium														
3 Li Lithium	4 Be Beryllium																														
11 Na Sodium	12 Mg Magnesium																														
19 K Potassium	20 Ca Calcium	21 Sc Scandium																													
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium																													
55 Cs Cesium	56 Ba Barium	57 La Lanthanum	58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon
87 Fr Francium	88 Ra Radium	89 Ac Actinium	90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110 Ds Darmstadtium	111 Rg Roentgenium	112 Cn Copernicium	113 Nh Nihonium	114 Fl Flerovium	115 Mc Moscovium	116 Lv Livermorium	117 Ts Tennessine	118 Og Oganesson

ARRANGING ALL OF THE ELEMENTS BY NUMBER CREATES A REALLY WIDE TABLE. SO THIS BLOCK (THE LANTHANIDES AND ACTINIDES) IS USUALLY SHOWN BELOW THE REST OF THE ELEMENTS.

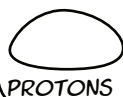
Hands-on Activity

MODELING CLAY ORBITALS!

MATERIALS:

TOOTHPICKS

CLAY OR PLAY DOUGH IN SEVEN DIFFERENT COLORS



PROTONS



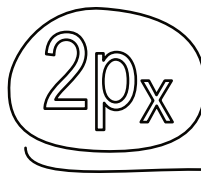
NEUTRONS



FIRST ORBITAL



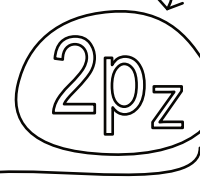
SECOND ORBITAL



2px



2py



2pz

MORE ORBITALS!

Don't have modeling clay?
No problem! Make play
dough using this recipe:

PLAY DOUGH

- 1 cup flour
- 1/3 cup salt
- 3/4 cup water
- 3 Tbsp lemon juice
- 1 Tbsp cooking oil
- Food coloring

Mix the flour and salt together in a bowl. Heat the water to boiling and add the oil and lemon juice. Then mix all the ingredients together. For best results, mix in a pot over the stovetop until mixture is thick (about 1 minute).

Let sit and cool for a few minutes before kneading. Add another spoonful of flour if the dough is too tacky. Kool-aid drink packets can be used instead of food coloring.



SALT



FLOUR



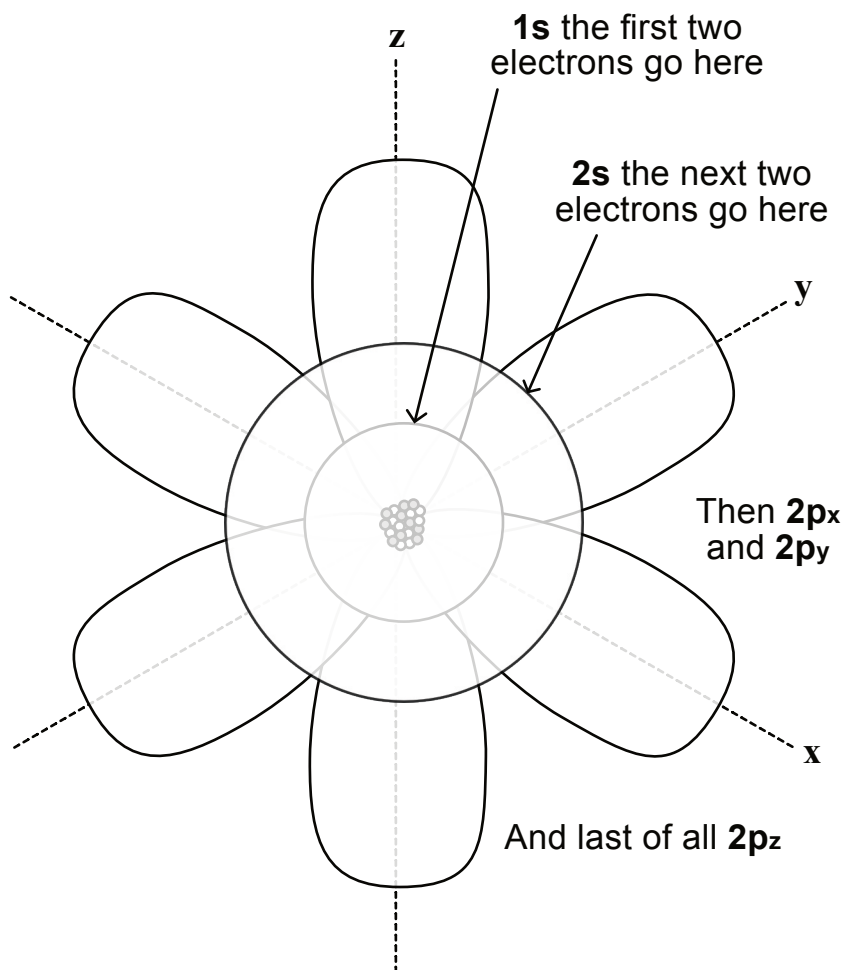
OIL

LEMON
JUICE



ORBITALS

WHERE AN ELECTRON IS
MOST LIKELY TO BE



~ INSTRUCTIONS ON PAGE 6 ~

SCIENCE MOM

INSTRUCTIONS:

Shape the colors of clay that represent neutrons and protons into small spheres and put them together to make the nucleus. Then cover the nucleus in layers of clay to represent the orbitals. Use the images below to guide you in making models of a hydrogen, helium, lithium, carbon, fluorine, and neon atom. Partially-filled orbitals can be represented by moulding half of the orbital. Use toothpicks to attach the p-orbitals.

HYDROGEN

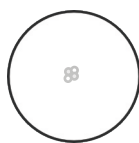
1 PROTON
0 NEUTRONS
1 ELECTRON



WARNING! VERY REACTIVE
ORBITAL INCOMPLETE

HELIUM

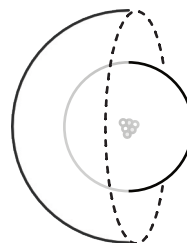
2 PROTON
2 NEUTRONS
2 ELECTRON



CONGRATULATIONS!
YOU ARE REMARKABLY STABLE

LITHIUM

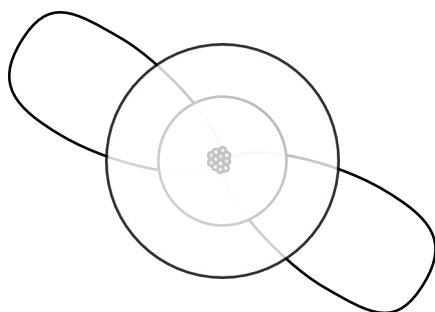
3 PROTON
3 NEUTRONS
3 ELECTRON



WARNING! VERY REACTIVE
ORBITAL INCOMPLETE

CARBON

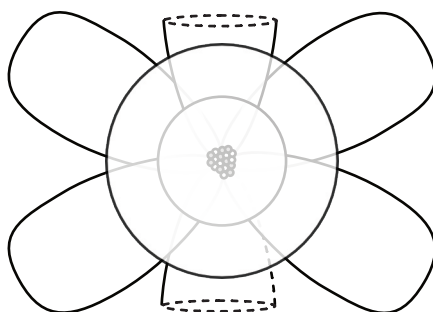
6 PROTON
6 NEUTRONS
6 ELECTRON



CONGRATULATIONS!
YOU ARE MODERATELY STABLE

FLUORINE

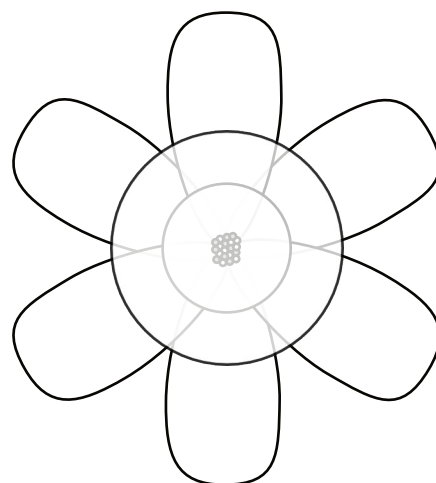
9 PROTON
9 NEUTRONS
9 ELECTRON



WARNING! VERY REACTIVE
ORBITAL INCOMPLETE

NEON

10 PROTON
10 NEUTRONS
10 ELECTRON



CONGRATULATIONS!
YOU ARE REMARKABLY STABLE