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| **Atoms & Molecules Note Pages**   |  |  |  |  | | --- | --- | --- | --- | | Matter & Atoms | Elements & The Periodic Table | Molecules | Evaluating Historical Models | |  |  |  |  | | | |
| Level 3 | Using draw tool or the [PhET](https://phet.colorado.edu/sims/html/build-an-atom/latest/build-an-atom_en.html), model an atom that has 9 protons, 9 neutrons, and 10 electrons.  \*\*Your model should accurately represent the size and arrangement of particles and should be labeled\*\* |  |
| Use the periodic table: What element did you model? |  |
| Identify the elements in this molecule AND the quantity of each element. |  |
| Is the model above a compound or elemental molecule? Explain your reasoning. |  |
| Level 4 | Using the draw tool or the [PhET](https://phet.colorado.edu/sims/html/build-an-atom/latest/build-an-atom_en.html), model the element Boron.  \*\*Your model should accurately represent the size and arrangement of particles and should be labeled\*\* | Electron    Proton    neutron |
| How would the element be different if the proportion of protons to electrons was unequal? | It can become and ion charge or even become unstable |
| Identify the elements and their quantities for the caffeine molecule C8H10N4O2. | 8 carbon, 10 helium, 4 nitrogen, 2 oxygen |
| Compare the accuracies and limitations of the model on the right. | Accurate: has rings for electrons, has electrons, has a nucleus  Limits: no protons or neutrons, rings are not round |

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| **Properties of Matter Note Pages**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Properties of Matter | Organizing Substances | Elemental Groups | Murder in the Kitchen | Properties Determine Function | | | |
| Level 3 | Compare and contrast the properties of [copper](https://www.azom.com/article.aspx?ArticleID=2856) and [aluminum](https://www.elval.com/en/about-aluminium-aluminium-alloys-and-properties) by using the resource links.  1) Identify some of their properties  2) Identify possible uses while cooking  3) Explain how the properties make them useful for cooking |  |
| Level 4 | Research the properties of **steel** and **titanium**. Use evidence from your research to 1) identify possible uses of these materials and 2) explain what properties these substances have that make them useful for these reasons. | Steel has high strength and is good for welding. Titanium has high strength, but a lower density for its strength. They differ in weight, so if you wanted to make a lighter weight weld, then use titanium. Cheaper for steel though. |

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| **Chemical vs Physical Reactions Note Pages**   |  |  |  |  | | --- | --- | --- | --- | | Chemical vs Physical Changes | 6 Evidences of a Chemical Change | Investigation & Evidence of a Chemical Change | Chemical Reactions & Equations | | | | | | |
| Level 3 | | 1. Go to [go-el.com](https://apps.explorelearning.com/account/el/login/student) and enter the username: saallanSJH 2. Access the ***Chemical Changes Gizmos*** 3. Select **Calcium Chloride** as your Reactant 1. Select **Sodium Bicarbonate** as your Reactant 2. 4. Check the **Normal setup** radio button. 5. Check the **Label Reactants** checkbox. | | | |
| List the physical properties of calcium chloride |  | | |
| List the physical properties of sodium bicarbonate |  | | |
| Drag the thermometer to the sodium bicarbonate solution. What is the starting temperature? |  | | |
| Phenol red is another chemical indicator that tells us how acidic a substance is. Drag the phenol red up to test the acidity of the solution.  What color did phenol red turn?  What is the start pH? |  | | |
| What is the total mass of reactant 1, reactant 2 and all the tools? |  | | |
| 1. Click the **play** button and observe the reaction take place. | | | |
| What was the mass AFTER the reaction? Why did it change? What was produced? |  | | |
| What was the temperature AFTER the reaction? |  | | |
| What color did the phenol red turn? What was the ending pH? |  | | |
| There were **3 Evidences** of a chemical change occurring. What were they? |  | | |
| Level 4 | | 1. Go to [go-el.com](https://apps.explorelearning.com/account/el/login/student) and enter the username: saallanSJH 2. Access the ***Chemical Changes Gizmos*** 3. You will be planning and conducting an experiment to identify if a chemical reaction is taking place. You will get to select the reactants and use the tools to make observations and form a conclusion. **FYI:** Phenol red is another chemical indicator that tells us how acidic a substance is. | | | |
| |  |  |  | | --- | --- | --- | | **Reactant 1** | **Reactant 2** | **Observations: Describe the changes in temperature, mass, acidity,** | | Silver nitrate | 1. Hydrochloric acid | Makes a white cloud in the acid | | 1. copper | Forms white crystals on copper | | c. gold | nothing | | | | |
| Which of your reactants resulted in a chemical reaction? How do you know? Explain what **evidence of a chemical change** you observed. | Copper did because it made crystals and produced a new substance in the reaction. | | |
| |  | | --- | | **Law of Conservation Note Pages**  Law of Conservation Notes LOC Baking Soda & Vinegar Lab | | | | | |
| Level 3 | Create a model below to demonstrate the Law of Conservation for the following reaction. Use the insert shapes or the draw tool.  **2H2O2 🡪 2H2O + O2** Hydrogen = Oxygen= | | | |
| Level 4 | Hydrogen peroxdie and liver go through a chemcial reaction. Explain how the Law of Conservation applies to this reaction and a solution to this experiment that would get more equal results.  **Hydrogen Peroxide + Liver 🡪 Oxygen gas + Water**  Before  After | | | The law of conservation applies because the Hydrogen peroxide which is H2O2, and it turns into H2O and O2 (one of the oxygens in the O2 is from the liver) meaning no matter was lost or created. |

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| **States of Matter & Phase Changes Note Pages**   |  |  | | --- | --- | | Intro to States of Matter & Phase Changes | Exploring & Calculating Density | | |
| Level 3 | Use the graph to identify and model the following:     * Put an S where the substance is a solid  * Put an L where the substance is a liquid * Put an G where the substance is a gas  * + Put a at the boiling point and the melting point.   + Put a where the density is the greatest.  * + Put a where the energy is the greatest. |
| Level 4 | In the table below is the same substance at different temperatures and densities. 1) Calculate the density 2) Identify the state of matter based on the density you calculated 3) Predict the temperature that would match the density and phase, then 4) Model the particle of that substance in that state.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Mass** | **Volume** | **Density** | **Possible  State of Matter** | **Temperature** | **Model of the Substance** | | 100 g | 20 cm3 |  |  |  |  | | 100 g | 850 cm |  |  |  |  | | 100 g | 25 cm3 |  |  |  |  |   **Density=Mass ÷Volume** |

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| **Natural Resources Note Pages**   |  |  |  | | --- | --- | --- | | Natural vs Synthetic Materials | Distribution of Natural Resources | Using Natural Resources | | | |
| Level 3 | Review the information on [nylon](https://byjus.com/biology/types-of-synthetic-fibers/) and identify what natural resources make up that synthetic material. |  |
| Are natural resources distributed evenly across all areas? Explain your answer by giving an example of a resource. |  |
| Level 4 | Select a synthetic material of your choice and research to identify what natural resources make up that material and how it is made. | Plastic is a solid cheap material made from the natural resources Fossil fuels, Biomass (biodegradable materials), and other materials such as salt, crude oil, coal, etc. |
| Select a natural resource of your choice (water, trees, fossil fuels, etc.) and explain 1) how this resource is being used  2) how is consumption of this resource affect the environment. Provide evidence from your research as support. | Fossil fuels are being used for energy and to create cheap materials such as plastic.  Using this resource creates green house gasses that fill up the air and create global warming. |

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| **Climate Change Note Pages**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Climate vs Weather | Evidence of Climate Change | Causes of Climate Change | Effects of Climate Change | Solutions to Climate Change | | | |
| Level 3 | Identify a cause of climate change AND explain how it is affecting global temperatures and regional climates. | A cause is volcanoes and it barely affects global climate change and hardly even effect regional climate. |
| Level 4 | Explain how human activities like transportation, farming, and deforestation all contribute to rising greenhouse gases and a change to regional climates. |  |

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| **Kinetic and Potential Energy Note Pages**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Physics Measurements | Kinetic Energy | Sledding Challenge #1 & #2 | Potential Energy | Potential Energy Labs | | |
| Level 3 | Create a graph to show the relationship between the Mass AND Speed of the bowling ball and the amount of kinetic energy it has. Use a red line for mass and a blue line for speed.    Kinetic Energy of Bowling Ball  Mass of a Bowling Ball Speed of a Bawling Ball |
| Using the data chart, explain how the potential energy of an object changes as the height of the object changes. |
| Level 4 | Login to go-el.com and access the Sled Wars gizmos. Conduct an experiment and collect data to demonstrate how the kinetic and potential energy changes with the mass and height.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Mass | Energy |  | Height | Energy | | 90 | 22,050 |  | 25 | 22,050 | | 190 | 46,500 |  | 50 | 44,000 | | 120 | 29,400 |  | 20 | 17,000 | | 80 | 19,600 |  | 0 | 0 | | 10 | 2,450J |  | 5 | 4,400 |   What energy is affected by mass? Use evidence to support your answer.  What energy is affected by height? Use evidence to support your answer. |

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| **Energy Transformations Note Pages**   |  |  | | --- | --- | | Energy in a System | Energy Types & Transformations | | | |
| Level 3 | Explain the energy transformation occurring in this graph. What energy did this start with? What energy did it transform into? |  |
| Level 4 | Think of a scenario and design an experiment in order to gather evidence as proof that the kinetic energy can be transformed into thermal energy.  What scenario would result in **kinetic energy 🡪 thermal energy?**  What would the experiment look like?  What evidence will you collect? | Getting a roller coaster and seeing at high speeds if it sparks or not from a height. You would start at the top with pot energy and go down gaining kin energy which then you would hit the breaks making friction and creating sparks. |

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| **Waves Note Pages**   |  |  |  |  | | --- | --- | --- | --- | | Waves 101 | Light Waves & The EM Spectrum | Sound Waves | Wave Interactions | | | | | | |
| Level 3 | Explain how amplitude affects a sound wave. | | The amplitude changes volume | | |
| Explain how amplitude affects a light wave. | | The amplitude makes the light brighter | | |
| Explain how frequency affects a sound wave. | | Makes the pitch higher or lower | | |
| Explain how frequency affects a light wave. | | Makes the light color | | |
| Model reflection of a wave. |  | | | |
| Model absorption of a wave. |  | | | |
| Model transmission of a wave. |  | | | |
| Level 4 | You and your friend have tickets to a concert. You get to sit on the first row. Your friend has tickets on row 100.   * Model the sound wave energy you would hear on row 1. * Model the sound wave energy you would hear on row 100.   Two different light sources were produced. One from a headlight and the other from a candle.   * Model the light wave energy created by this bright light. * Model the light wave energy created by the dim light. | | | | |
| Explain why sound waves transmit through solids, liquids, and gases differently. | | | |  |
| Explain how reflection and absorption of light waves help us see colors. | | | |  |
| **Photosynthesis Note Pages**  Photosynthesis | | | | | |
| On June 1, a fast-growing species of algae (plant) is accidentally introduced into a lake in a city park. It starts to grow and cover the surface of the lake in such a way that the area covered by the algae doubles every day. If it continues to grow unchecked, the lake will be totally covered and the fish in the lake will have less oxygen to take in. At the rate it is growing, this will happen on June 30. However, the weatherman is forecasting that the sky will be overcast for the next three weeks. | | | | | |
| Level 3 | What resources must be present for the algae/plant to grow? Include the molecules (matter) that go into photosynthesis and the energy source necessary. | | |  | |
| As the algae is growing and doing photosynthesis what molecules (matter) are being produced? | | |  | |
| Level 4 | Using an algae sample removed from the pond, design an experiment to help you test whether the overcast skies are going to affect the photosynthesis of the algae.  Explain in detail how would you test and gather data to see if photosynthesis is affected by cloudy skies? | | | A good experiment would be to get 2 samples, put one in an area with decent lighting. Put the other in an area with little to no lighting. Keep all other variables the same as the others. You measure the oxygen produced by each alga. The more oxygen means it is growing better. If overcast does affect the algae growth, then the one with light should produce more oxygen then the other one without light. | |

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| **Respiration Note Pages**  Cellular Respiration | |
| Level 3 | Develop a model to illustrate the products and reactants of cellular respiration. |
| Level 4 | Develop a model to illustrate how reactants rearrange to become the products during cellular respiration, and how this process provides our cells energy. |