**Teacher Resource: Unit 1 Activity 1 Observation Stations**

**The “Hub” of Modeling Physical Science:**

**Selecting Useful Observation Stations**

The Unit 1 Observation Stations are intended to set up discussion for the rest of the year in Modeling Physical Science. These stations allow students to observe changes and interactions that will allow them to start developing their “science skills” in Unit 1, and will allow them to start discussing the cross-cutting ideas of Interactions, Energy, and Structure. Each station chosen should support at least one of Units 2-10 in the Modeling Physical Science curriculum.

To help you select useful and meaningful Observation Stations, a list of sample stations is provided in Table 1. Table 1 also includes information on the equipment needed, the energy storage and transfers that are involved in each station, and the connection of each station to later Units of the Modeling Physical Science curriculum.

Alternative stations you may wish to consider are provided in Table 2. You may also wish to record ideas from other participants during your workshop! The last page is a blank “checklist” that you may use to list out and identify the stations you wish to use in your classroom.

Remember, the goal is to have a representative set of stations that you will refer to as you progress through the school year. These stations will serve as the “Hub” of your Units!

**Table 1: Suggested Energy Stations**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Station** | **Equipment** | **Energy Connections** | **Unit Connection** |
| **1** | Tumble Buggy | Example: <http://www.arborsci.com/constant-velocity-car?gclid=CKrry9HxvtMCFY61wAodGUcDbg> | Ech (batteries), Ek, W, | Unit 2 |
| **2** | Wind-up toys / “Pull back” Cars | Examples from Amazon.com: <https://www.amazon.com/s/ref=nb_sb_noss_1?url=search-alias%3Daps&field-keywords=wind+up+toys&rh=i%3Aaps%2Ck%3Awind+up+toys>) | Eel, Ek, Eg, W | Unit 3 CA  Unit 5 force |
| **3** | Air Puck | Example: <http://www.arborsci.com/air-powered-puck>) | Ek, W | U4-5 (and U2) |

*Continued next page…*

**Table 1 Continued: Suggested Energy Stations**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **4** | Ball Drop | One small ball, one large ball (i.e. small rubber kickball and basketball) | Eg, Ek, Eelast, W, Q | Unit 3 CA  Unit 5 Force |
| **5** | Carts on a Track | Dynamics carts with Springs & with Magnets and/or on an incline  \*Be sure to indicate which direction students should push carts towards each other so that the magnets or springs exert repulsive forces.  Dynamics Carts Examples: <https://www.vernier.com/products/lab-equipment/dynamics/dts/>  <https://www.pasco.com/products/equipment/carts-and-tracks/index.cfm> | Ek, Eg (if use Atwood’s Set-up), Ee (and action at a distance, fields)  W | U2-5 |
| **6** | Ice Melting Blocks | Example:  <https://www.flinnsci.com/ice-melting-blocks/ap6488/> | Eph, Eth, Q | U7 |
| **7** | Glowsticks | Glow sticks from a Dollar Store work great! Or from Amazon:  <https://www.amazon.com/Glow-Sticks-Bracelets-Assorted-Colors/dp/B000JDZF1W> | Ech, R | U8, 9, 10 |
| **, 8** | Cheetos on Fire! | Bag of Cheetos, aluminum pie tins, barbecue lighter | Ech, Eth  Q, R | U 8, 9, 10 |
| **9** | Tuning Forks (in air and water) | Ask your music department, or search on Amazon:  <https://www.amazon.com/s/ref=nb_sb_noss_2?url=search-alias%3Dmi&field-keywords=tuning+fork>  Video of tuning fork in water:  <https://www.youtube.com/watch?v=B0AKuxTEDQg> | Ek?, W, R? | U10 waves |
| **10** | Airzooka | Available on Amazon:  <https://www.amazon.com/s/ref=nb_sb_noss?url=search-alias%3Daps&field-keywords=airzooka&rh=i%3Aaps%2Ck%3Aairzooka> | Ek, Eg, Eth?, W | U4-5 forces  U10 waves |

**Table 2: Additional Possible Observation Stations:**

|  |  |  |
| --- | --- | --- |
| **Station Description** | **Energy Storage & Transfers involved** | **Unit Connection(s)** |
| Roll the bowling ball (basic broom ball) | Ek  W | U2-4 |
| Popper (plastic toy popper) | Eel, Ek, Eg  W | U3, U5 |
| Rubbing Hands | Ech (body’s energy), Eth (“hot hands”),  W, Q | U7 (Eth) |
| Pop Pop, Fizz Fizz | Ech, Eg, Ek  W, Q | U8-9 |
| Ball Drop (bouncy ball drop until stops bouncing) | Eg, Ek, Eelast  W, Q | U3-5 |
| Hot packs / cold packs | Ech, Eth, Q | U8 |
| Newton’s Cradle | Ek, Eg  Q, W | U2-5  U10 (sound) |
| Squeeze Flashlight | Ech(person), Ek, Eth?  W, R | U4-5  U10 (light) |
| Nose Crusher (bowling ball Pendulum) | Eg, Ek  W | U3-5 |
| Electroscope | Ee  W (action at a distance) | U4-5 |

**Unit 1 Observation Stations Template**

Use this chart to identify stations you will use as your “Hubs” for Modeling Physical Science:

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Station Description** | **Energy Connection** | **Unit Connection** |
| **1** |  |  |  |
| **2** |  |  |  |
| **3** |  |  |  |
| **4** |  |  |  |
| **5** |  |  |  |
| **…** | Insert additional stations as needed… | | |

**Teacher Energy Station Checklist:**

Do I have at least one station that allows for discussion of...

Energy Storage:

* Energy in moving object, Ek
* Energy in gravitational field, Eg
* Energy in springs or “stretchy” things, Eel
* Energy in a collection of moving particles (temp), Eth
* Energy in electric field due to physical state, Eph
* Energy in electric field due to chemical bonding, Ech

Energy Transfer:

* Working, W
* Heating, Q
* Radiating, R
* “Action at a distance” Forces

Do I have at least one “Hub” Station for

* Unit 2 Constant Velocity Motion
* Unit 3 Uniformly Accelerated Motion
* Units 4 & 5 Forces (balanced and unbalanced)
* Unit 6 Quantifying Energy Storage & Transfer
* Unit 7 Energy and States of Matter
* Unit 8 Describing Substances
* Unit 8 Energy and Chemical Change
* Unit 10 Energy and Wave Phenomena