

Be A Scientist!

Johns Hopkins Center for Talented Youth

Monday, Day 1

| Session | Topics/Agenda | Equipment Needs |
|-------------------------------|--|--|
| Morning 1 (9 – 10:20) | Introduction <ol style="list-style-type: none"> Icebreaker – Pick a Color Honor Code/Classroom Rules Brainstorm: What is a scientist? Observation – What’s different about your partner? | <ul style="list-style-type: none"> Colored erasers Copies of honor code |
| Morning 2 (10:30-11:40) | Pre assessment, Lab Safety <ol style="list-style-type: none"> Pre assessment Lab Safety/Computer Usage docs Make lab safety posters | <ul style="list-style-type: none"> Copies of pre assessment Poster board |
| Afternoon 1 (12:40 – 1:40) | Observation and Experimentation <ol style="list-style-type: none"> Mystery boxes Using the scientific method – how do we find out which object rolls farther? (Come up with hypothesis and write procedures in groups) | <ul style="list-style-type: none"> Mystery boxes Marble, ball, ramp, ruler |
| Afternoon 2 (1:50 – 2:30) | Scientific Method <ol style="list-style-type: none"> Test out procedures to see if they are detailed enough Carry out experiment, collect data, and reach conclusion Go through scientific method and identify each piece | |
| Homework | Write a scenario in which you solved, or could solve, a problem using the scientific method. | |

Tuesday, Day 2

| Session | Topics/Agenda | Equipment Needs |
|--------------------------|---|---|
| Morning 1 (9 – 10:20) | Nature of Science <ol style="list-style-type: none"> Hear students’ ideas about the scientific method NoS Puzzles Part 1 NoS Puzzles Part 2 Create puzzle piece – how is science like a puzzle? | <ul style="list-style-type: none"> NoS puzzle pieces |

| Session | Topics/Agenda | Equipment Needs |
|-------------------------------|--|---|
| Morning 2 (10:30 – 11:40) | Finish Nature of Science <ol style="list-style-type: none"> 1. Modeling – what is a model? 2. Analyzing the globe as a model 3. How do models help us? 4. Draw a model of the classroom 5. Taxonomy: classifying our class 6. Discuss why classification might be useful 7. Card sort – living/non-living/dead, plant/animal, vertebrate/invertebrate | <ul style="list-style-type: none"> • Construction paper puzzle pieces for bulletin board |
| Afternoon 1 (12:40 – 1:40) | Be a Biologist <ol style="list-style-type: none"> 1. Brainstorm examples of 5 animal kingdoms 2. Class discussion: What is an organism, anyway? 3. List organisms that you find near your home – discuss importance of environment 4. Read “Mixed Beasts” if students need mental break | <ul style="list-style-type: none"> • “Mixed Beasts” (in BSCI library) |
| Afternoon 2 (1:50-2:30) | Be a Biologist <ol style="list-style-type: none"> 1. Nature walk – detailed science drawing of at least one living thing | <ul style="list-style-type: none"> • Petri dishes |
| Homework | Come up with an example of a model that we have not already discussed. Tell me what the model represents, one thing it does well, and one thing it does not do well. | |

Wednesday, Day 3

| Session | Topics/Agenda | Equipment Needs |
|-----------------------------|--|---|
| Morning 1 (9-10:20) | Be an Ecologist <ol style="list-style-type: none"> 1. Parachuting Cats into Borneo – complex causality in ecosystems 2. Web of Life game 3. The Cyclic Journey of an Atom (read) 4. Prep for owl pellets | <ul style="list-style-type: none"> • Borneo handouts • Web of Life cards, thread • Atom handouts |
| Morning 2 (10:30-11:40) | Be an Ecologist <ol style="list-style-type: none"> 1. Dissect owl pellets | <ul style="list-style-type: none"> • Owl pellets, forceps, gloves, bone sheet |
| Afternoon 1 (12:40-1:40) | Be an Ecologist/Zoologist <ol style="list-style-type: none"> 1. Finish owl pellets, clean up | |

| Session | Topics/Agenda | Equipment Needs |
|----------------------------|--|--|
| Afternoon 2 (1:50-2:30) | Be a Zoologist <ol style="list-style-type: none"> 1. Classification worksheets 2. Build A Bug – create a camouflaged insect (must have accurate bodies, so three body parts, two antennae, six legs) | <ul style="list-style-type: none"> • Classification worksheets • Construction paper, markers, glue, and scissors |
| Homework | Ecosystems assessment | <ul style="list-style-type: none"> • Worksheet |

Thursday, Day 4

| Session | Topics/Agenda | Equipment Needs |
|-----------------------------|--|--|
| Morning 1 (9-10:20) | Be an Evolutionary Biologist <ol style="list-style-type: none"> 1. Finish build-a-bug 2. Bird beak adaptation activity 3. Class discussion: what happens if your environment changes? 4. The story of Darwin | <ul style="list-style-type: none"> • Bird beak supplies – spoons, clips, forceps, oatmeal, water, strips of tissue, cups, plates, beakers • Darwin reading sheet |
| Morning 2 (10:30-11:40) | Be an Evolutionary Biologist <ol style="list-style-type: none"> 1. Peppered Moth activity 2. If time: Life Through Time picture observations | <ul style="list-style-type: none"> • Hole punch months, bark sheets, info packets, forceps • Life Through Time pictures, projector and computer |
| Afternoon 1 (12:40-1:40) | Be a Geneticist <ol style="list-style-type: none"> 1. Introduce terms (gene, inherit, DNA) 2. Strawberry DNA extraction – Part 1 (set up) | <ul style="list-style-type: none"> • Strawberries, coffee filters, cups, Ziplocs, shampoo etc. |
| Afternoon 2 (1:50-2:30) | Be a Geneticist <ol style="list-style-type: none"> 1. Skittle Families | <ul style="list-style-type: none"> • Packet, Skittles, cups |
| Homework | Interview your family – what traits have you inherited? | |

Friday, Day 5

| Session | Topics/Agenda | Equipment Needs |
|-----------------------------|--|---|
| Morning 1 (9-10:20) | Be a Geneticist <ol style="list-style-type: none"> 1. Finish Skittle Families 2. The story of Mendel 3. Thinking about dominant and recessive 4. Tracking our traits | <ul style="list-style-type: none"> • Story about Mendel • Traits worksheet |
| Morning 2 (10:30-11:40) | Be a Geneticist <ol style="list-style-type: none"> 1. Strawberry DNA extraction Part 2 2. Modern Genetics: introduce human genome project, cloning, selective breeding | <ul style="list-style-type: none"> • Ethanol, test tubes, materials from day before |
| Afternoon 1 (12:40-1:40) | Modern Science! <ol style="list-style-type: none"> 1. Introduce debate assignment – should we be allowed to clone humans? | <ul style="list-style-type: none"> • Modern Genetics handout to read along • Rules for debate |
| Afternoon 2 (1:50-2:30) | Modern Science! <ol style="list-style-type: none"> 1. Conduct debate 2. With leftover time, introduce students to their mealworms | <ul style="list-style-type: none"> • Mealworms, petri dishes, oatmeal |
| Homework | None | |

Monday, Day 6

| Session | Topics/Agenda | Equipment Needs |
|-----------------------------|---|---|
| Morning 1 (9-10:20) | Be a Physiologist <ol style="list-style-type: none"> 1. First: check on mealworms 2. Class discussion: What do animals need to survive? How are our bodies structured to help us? 3. Skeletal system labeling: how many bones do you know? 4. Skeletal System Simon Says 5. Identify bones in the owl pellet skeletons 6. Breath rate testing | <ul style="list-style-type: none"> • Skeletal system worksheet |
| Morning 2 (10:30-11:40) | Be a Physiologist <ol style="list-style-type: none"> 1. Muscle labels 2. Muscle testing activity | <ul style="list-style-type: none"> • Muscular system worksheet |
| Afternoon 1 (12:40-1:40) | Be a Physiologist <ol style="list-style-type: none"> 1. Finish muscle testing 2. Reaction Time | <ul style="list-style-type: none"> • Reaction Time worksheet, rulers |

| Session | Topics/Agenda | Equipment Needs |
|----------------------------|---|---|
| Afternoon 2 (1:50-2:30) | Be a Physiologist 1. Touch Test | <ul style="list-style-type: none"> • Touch Test worksheet, paper clips |
| Homework | Match 5 bones with the muscles you use to move them. Also, bring in a food item that has a nutrition label. | |

Tuesday, Day 7

| Session | Topics/Agenda | Equipment Needs |
|-----------------------------|---|---|
| Morning 1 (9-10:20) | Be a Cell Biologist 1. Review physiology 2. Introduction to cells Be a Food Scientist 1. Bill Nye: <i>Nutrition</i> | <ul style="list-style-type: none"> • Cells handout |
| Morning 2 (10:30-11:40) | Be a Food Scientist 1. Class discussion: where does our food come from? 2. Nutrition label lab | <ul style="list-style-type: none"> • Food label lab packets |
| Afternoon 1 (12:40-1:40) | Be a Food Scientist 1. Observe onion and cheek cells under microscope – visit SCOP | |
| Afternoon 2 (1:50-2:30) | Be a Food Scientist 1. Fat and carbohydrate testing | <ul style="list-style-type: none"> • Iodine, brown paper towels, different types of food (turkey breast, apple, bread, butter, etc.) |
| Homework | Use ChooseMyPlate to make your own balanced breakfast | <ul style="list-style-type: none"> • Worksheet |

Wednesday, Day 8

| Session | Topics/Agenda | Equipment Needs |
|------------------------|---|---|
| Morning 1 (9-10:20) | Be a Food Scientist 1. Discuss fat and carb testing 2. Explore mystery ingredients from food labels 3. Complete student check-in Be a Botanist 1. Flower parts 2. Flower dissection | <ul style="list-style-type: none"> • Flowers, construction paper to display dissections, gloves, goggles |

| Session | Topics/Agenda | Equipment Needs |
|-----------------------------|---|--|
| Morning 2 (10:30-11:40) | Be a Marine Biologist <ol style="list-style-type: none"> 1. Introduction to density 2. Class discussion: What is a watershed? What is the Chesapeake Bay watershed? | |
| Afternoon 1 (12:40-1:40) | Be a Marine Biologist <ol style="list-style-type: none"> 1. Build a pencil hydrometer | <ul style="list-style-type: none"> • Unsharpened pencils, thumbtacks, graduated cylinders, salt • Salinity packets |
| Afternoon 2 (1:50-2:30) | Be a Marine Biologist <ol style="list-style-type: none"> 1. Leech game | <ul style="list-style-type: none"> • Macro-invertebrate cards |
| Homework | Density assessment | <ul style="list-style-type: none"> • Worksheet |

Thursday, Day 9

| Session | Topics/Agenda | Equipment Needs |
|-----------------------------|---|--|
| Morning 1 (9-10:20) | Be a Marine Biologist <ol style="list-style-type: none"> 1. Use a salinity map 2. Build a water filter Be an Electrical Engineer <ol style="list-style-type: none"> 1. Exploration: Get a light bulb to light up | <ul style="list-style-type: none"> • 2L bottles, coffee filters, sand, pebbles, leaves, etc. • Batteries, wire, bulbs, battery and light bulb stands |
| Morning 2 (10:30-11:40) | Be an Electrical Engineer <ol style="list-style-type: none"> 1. Class discussion: How does a simple circuit work? 2. Conductors and Insulators 3. Create a switch 4. Current electricity – what is an electron? | <ul style="list-style-type: none"> • Circuit supplies and switches |
| Afternoon 1 (12:40-1:40) | Be a Physicist <ol style="list-style-type: none"> 1. Discuss Newton's Laws of Motion 2. Straw and balloon challenge | <ul style="list-style-type: none"> • Twine, balloons, tape |
| Afternoon 2 (1:50-2:30) | Be a Physicist <ol style="list-style-type: none"> 1. Finish straw and balloon challenge 2. Recap, copy down laws | |
| Homework | Rocket Science reading | <ul style="list-style-type: none"> • Worksheet |

Friday, Day 10

| Session | Topics/Agenda | Equipment Needs |
|-----------------------------|---|---|
| Morning 1 (9-10:20) | Be a Aero-Space Engineer <ol style="list-style-type: none"> 1. Discuss rocket science homework 2. Alka-seltzer rockets 3. History of flight/discussion about the Space Shuttle program and its last mission | <ul style="list-style-type: none"> • Film canisters, Alka-seltzer, water |
| Morning 2 (10:30-11:40) | Modern Science! <ol style="list-style-type: none"> 1. Watch JFK “We choose to go to the moon” speech 2. Group project: Come up with a presentation for President Obama explaining what next steps we should take in space exploration | <ul style="list-style-type: none"> • Video clip, media projector |
| Afternoon 1 (12:40-1:40) | Scientist Research <ol style="list-style-type: none"> 1. Assign final project 2. Come up with research questions as a class 3. Observe mealworms | <ul style="list-style-type: none"> • Scientist list |
| Afternoon 2 (1:50-2:30) | Be an Aero-Space Engineer <ol style="list-style-type: none"> 1. Paper airplane challenge | <ul style="list-style-type: none"> • Paper |
| Homework | None | |

Monday, Day 11

| Session | Topics/Agenda | Equipment Needs |
|-----------------------------|--|---|
| Morning 1 (9-10:20) | Be a Geologist <ol style="list-style-type: none"> 1. Getting to Know a Rock 2. Discuss igneous rocks – cooling and solidification 3. Virtual Volcano Builder (http://dsc.discovery.com/convergence/pompeii/interactive/interactive.html); how do volcanoes give us clues about the inside of the earth? | <ul style="list-style-type: none"> • Rock kit • Media projector |
| Morning 2 (10:30-11:40) | Be a Geologist <ol style="list-style-type: none"> 1. Discuss sedimentary (weathering and erosion) and metamorphic (heat and pressure) rocks 2. Layers of the earth model | <ul style="list-style-type: none"> • Cross-Section Earth model, white paper, meter sticks, coloring supplies |
| Afternoon 1 (12:40-1:40) | Be a Geologist <ol style="list-style-type: none"> 1. Finish layers of the earth model Miscellaneous <ol style="list-style-type: none"> 1. Observe mealworms 2. Introduce scientist project | |

| Session | Topics/Agenda | Equipment Needs |
|----------------------------|-------------------------------------|-----------------|
| Afternoon 2 (1:50-2:30) | Scientist research | • Computer lab |
| Homework | Spend 30 minutes working on project | |

Tuesday, Day 12

| Session | Topics/Agenda | Equipment Needs |
|-----------------------------|--|--|
| Morning 1 (9-10:20) | Be a Geologist <ol style="list-style-type: none"> 1. Pangaea – Putting the Clues Together 2. Observing fossils | • Pangaea clue cards |
| Morning 2 (10:30-11:40) | Be a Computer Scientist: Lesson taught by PA <ol style="list-style-type: none"> 1. What is a server? | • Computer lab |
| Afternoon 1 (12:40-1:40) | Be a Paleontologist <ol style="list-style-type: none"> 1. Graham cracker plate tectonics 2. Start Dinosaurs: Putting Together the Clues | • Graham crackers, cake frosting, wax paper, spoon, cups with water • Worksheet |
| Afternoon 2 (1:50-2:30) | Be a Paleontologist <ol style="list-style-type: none"> 1. Finish Dinosaurs 2. Mary Anning, Fossil Hunter 3. Create your own crystals | • Worksheet • Plastic cups, black paper, glue, Epsom salt, water |
| Homework | Work on webpage OR brainstorm ideas for scientist project | |

Wednesday, Day 13

| Session | Topics/Agenda | Equipment Needs |
|-----------------------------|--|--------------------------------|
| Morning 1 (9-10:20) | Be a Climatologist <ol style="list-style-type: none"> 1. Explore EPA website 2. Reading sheet 3. Create a public service announcement explaining the science behind climate change and offering a suggestion for one action you can take – be sure to identify the intended audience | • Climate change reading sheet |
| Morning 2 (10:30-11:40) | Be a Climatologist <ol style="list-style-type: none"> 1. Develop PSAs | |
| Afternoon 1 (12:40-1:40) | Scientist Interviews <ol style="list-style-type: none"> 1. Interview other CTY science students about how they have used scientific thinking 2. Present Scientist Interviews - what did we find out? | • Interview sheet |

| Session | Topics/Agenda | Equipment Needs |
|----------------------------|--------------------|-----------------|
| Afternoon 2 (1:50-2:30) | Scientist Research | • Computer lab |
| Homework | None | |

Thursday, Day 14

| Session | Topics/Agenda | Equipment Needs |
|-----------------------------|--|--|
| Morning 1 (9-10:20) | Be a Climatologist 1. Film PSAs Miscellaneous 1. SPEs | • Camera |
| Morning 2 (10:30-11:40) | Final in-class chance to work on posters | |
| Afternoon 1 (12:40-1:40) | Be a Chemist 1. Cabbage juice chemistry | • Cabbage juice, water, soap, vinegar, baking soda, lemon juice, trays |
| Afternoon 2 (1:50-2:30) | Be a Chemist 1. Oobleck | • Cornstarch, water, cups |
| Homework | Finish posters | |

Friday, Day 15

| Session | Topics/Agenda | Equipment Needs |
|----------------------------|---|--------------------|
| Morning 1 (9-10:20) | Miscellaneous 1. Post assessment 2. Last visit with mealworms 3. Begin giving presentations 4. 10:05-10:20 – Visit Invention Convention | • Post assessments |
| Morning 2 (10:30-11:40) | 1. Complete presentations | |