Student name: _____ Date: _____

The Antioxidant Power of Colorful Fruits and Vegetables

You have heard it more than once: eat more fruits and vegetables! Do you wonder why? Are your parents, grandparents, teachers, and cafeteria personnel just trying to annoy you? Scientists are studying how the different chemical compounds found in fruits and vegetables may help fight diseases such as heart disease or cancer. Researchers may use animal studies or surveys of specific groups of people to help answer those questions. You can also investigate some of the chemical and biochemical properties of compounds found in colorful fruits and vegetables.

Think about it….

1. A friend who was getting paid to clean up after a big party, just texted you to say that pouring some left over purple grape juice into a glass of water turned the water into a blue green color! The blue green color of the water faded to an army green but the purple color of the leftover grape juice did not fade. What are your beginning ideas about what could cause this?

   To help you think about this question, consider whether the air in the glass could be a factor in causing the blue green color to fade.

   _____

2. You could design tests of fruit and vegetable juices in air (which contains oxygen) to explore your ideas about this color change. However, the chemistry of another oxidant, iodine, may provide a faster reaction to investigate. Test and describe the reaction of Vitamin C tablets or solution (an antioxidant) with iodine povidone solution from the drug store.

   _____

3. How can you use the vitamin C/iodine povidone reaction to test the antioxidant power of juices, such as grape, cherry, cranberry, blueberry, or the liquids from red onions, red cabbages, radishes? What reaction do you expect of iodine povidone if the fruit or vegetable is an antioxidant? (Be specific.) To help you organize your thoughts, record your discussions with your classmates by writing comments in the following three columns.

What is the testable question about fruit/vegetable juice and liquids with iodine povidone?	Describe the test and list the materials. What is the procedure? What data will be collected?	What control might be used to compare tested results? How will the data be organized?

4. Use the following pages to organize and summarize your science work.

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Science Research Summary

The investigating scientists are:

_____ _____

_____ _____

Our Question(s) — What we want to find out?

Our Test(s) — How we plan to find out?

We plan the following test:

Our Materials

Our Observations and Data (Results)

We plan to collect the following data:

We organize this data in the following data table to allow us to make a claim:

Student name: _____ Date: _____

Our Claim

From our test (experiment) and data (results) we claim:

Our Evidence

Our claim is supported by the following evidence:

Our Reasoning

Our claim and evidence are linked or supported by the following science reasoning:

Our Readings and Discussions — How do our results fit with what others know or have found out?

Our claim, evidence or reasoning fits because we heard:

Our claim, evidence or reasoning fits because we read:

Our Reflection

After working on this question or test we now know and wonder about:

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The Science Behind Your Investigation

This activity explores the reaction of the highly colored red/purple chemicals (anthocyanins) in fruits and vegetables with iodine povidone solution, which contains iodine, a colored oxidant. In this reaction, iodine reacts by causing the oxidation (loss of electrons) from the colored anthocyanin. In this process iodine is reduced (gains electrons) to become the colorless iodide ion. Anthocyanins and vitamin C work as antioxidants in biological systems because they become oxidized instead of other chemicals in the body that are susceptible to oxidation. In this way, antioxidant chemicals can protect cells from reactive oxygen species that might cause disease. Anthocyanins in both the acidic and basic form are antioxidants, but the acidic form, [AH], is slightly more stable to oxygen than the basic blue green form, [A^-] when investigated in these reactions.