

## S U M M A R I E S

**INVESTIGATION 1: Identifying Matter**

In Investigation One, you explored the qualitative and quantitative properties of matter. During this Investigation, you:

1. observed the color, texture, and quantity of five samples: a wood block, a metal cube, a gram bear, water and baking soda.
2. used the pan balance to compare the amount of matter in the five samples.
3. used a triple beam balance to find the mass of the gram bear, the wood block and the metal cube.

Through these experiments, you concluded that:

1. qualitative properties are properties that can be described but generally are not measured.
2. quantitative properties are properties that can be measured.
3. the amount of matter in a sample can be determined by finding its mass.
4. a triple beam balance is the appropriate tool for measuring the mass of a sample.
5. matter can be identified by its unique combination of qualitative and quantitative properties.

**INVESTIGATION 2: Measuring Matter**

In Investigation Two, you explored the relationship between matter and mass. During this Investigation, you:

1. used a container when finding the mass of a wood block and a metal cube.
2. practiced using a weigh dish and a beaker to determine the mass of baking soda and water.
3. performed a trial in which you changed the size of samples of baking soda and water and observed how that affected the mass of each.

Through these experiments, you concluded that:

1. the mass of a container must be subtracted from the total mass of a sample plus a container before recording the mass of a sample.
2. solids and liquids have both qualitative and quantitative properties.
3. changing the size of a sample changes the mass of the sample.

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## **INVESTIGATION 3: Combining Matter**

In Investigation Three, you explored how matter interacts. During this Investigation, you:

1. compared a beaker and a graduated cylinder to determine which was more accurate when measuring volume.
2. combined salt with pepper and gravel and observed that all three substances were visible when mixed.
3. combined salt and gravel with water and oil to explore how solids and liquids interact. You observed that salt dissolved in water and could not be seen. You also observed that gravel did not dissolve in oil or water, and salt did not dissolve in oil.
4. combined water with vinegar and oil, and vinegar with oil to explore how liquids interact with liquids. You observed that water mixed with vinegar but water did not mix with oil. You also observed that vinegar and oil did not mix.

Through these experiments, you concluded that:

1. a graduated cylinder is more accurate than a beaker for measuring volume.
2. solids interact with other solids and liquids to form mixtures, and that some mixtures form solutions.
3. liquids interact with other liquids to form mixtures and solutions, and liquids which form solutions with each other are miscible.
4. liquids and solids can both act as solutes in a solution.

## **INVESTIGATION 4: Changing Matter**

In Investigation Four, you explored physical and chemical changes. During this Investigation, you:

1. compared the production of bubbles and gas by boiling water with the production of bubbles and gas in a solution of baking soda and vinegar.
2. compared the temperature change in melting ice to the temperature change caused by mixing powdered non-chlorine bleach with water.
3. compared the color change from adding food coloring to water with the color change on an apple slice exposed to air.

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Through these experiments, you concluded that:

1. boiling, melting, and adding food coloring to water are physical changes.
2. combining baking soda and vinegar, mixing non-chlorine bleach and water, and the browning of an apple are chemical changes.
3. matter can undergo physical or chemical changes.
4. common signs of chemical change can also appear during a physical change.
5. to find if a chemical change caused the appearance of one of the ten common signs of chemical change, a scientist must first eliminate the possibility that a physical change occurred.

**INVESTIGATION 5: Matter and pH**

In Investigation Five, you explored the pH scale. During this Investigation, you:

1. used pH paper to determine if a substance is acidic, basic, or neutral.
2. discovered that substances with a pH of 0 – 6 are acidic, and those with a pH of 8 – 14 are basic, while those with a pH near 7 are neutral.
3. used pH paper to test the pH of vinegar, lemon juice, baking soda and laundry detergent.
4. added water to a baking soda and tested the pH.
5. added water to vinegar and tested its pH.

Through these experiments, you concluded that:

1. pH is a quantitative property of matter.
2. substances are classified as acidic, basic or neutral based on their pH.
3. vinegar and lemon juice are acids, baking soda and laundry detergent are bases, and water is neutral.
4. adding water to a baking soda solution had little effect on its pH.
5. adding water to vinegar caused the pH to approach the pH of water.
6. adding water to some substances causes their pH to approach the pH of water, while it has no effect on the pH of other substances.