

# **PETERS TOWNSHIP SCHOOL DISTRICT**

## **CORE BODY OF KNOWLEDGE**

### **SCIENCE**

#### **GRADE 4**

For each of the sections that follow, students may be required to understand, apply, analyze, evaluate or create the particular concepts being taught.

#### **COURSE DESCRIPTION:**

This course will begin with a review of the scientific method of investigation. Major units of study include Matter, Weather, Plant Adaptations, Water/ Ecology, Force and Motion, and ending with STEM.

#### **STUDY SKILLS:**

- Organize information using a variety of graphic organizers.
- Organize accordion folder and sort through regularly.
- Determine with parent appropriate place and time to complete homework.

#### **1. SCIENTIFIC METHOD**

- Identify each step in the scientific method.
- Formulate questions that can be answered using the scientific method.
- Describe questions scientists ask and explain how scientists find answers to their questions.
- Identify tools that scientists use and explain how to properly and safely use these tools.
- Develop a hypothesis based on scientific knowledge.
- Identify the variable in the experiment.
- Design a simple experiment that uses the steps of the scientific method.
- Design and evaluate methods for creating a floating boat
- Collect accurate data from an experiment
- Evaluate data in order to draw conclusions from simple experiments
- Conduct a simple experiment with one variable
- Conduct a scientific experiment and change the variable
- Conduct multiple trials of an experiment and analyze the data collected

#### **2. MATTER**

- Recognize that all objects and materials in the world are matter
- Describe physical properties of an object
- Identify and classify examples of matter based on their observable and measurable physical properties.
- Compare and contrast two types of matter

- Differentiate between the three states of matter, classifying a substance as solid, liquid, or gas.
- Explain how matter changes state
- Compare and contrast the movement of particles in solids, liquids, and gasses
- Describe how water can be changed from one state to another
- Create a diagram demonstrating how water changes state
- Measure the volume of a box
- Measure the volume of a liquid
- Measure the volume of a ball using liquid
- Identify examples of a mixture
- Explain ways to separate mixtures of matter
- Explain how size and shape do not change the mass of matter
- Design an experiment to demonstrate conservation of mass
- Predict the results of an experiment involving changing shape and measuring mass.
- Demonstrate that materials are composed of parts that are too small to be seen without magnification
- Design and conduct an experiment to demonstrate how mixtures of matter can be separated
- Explain how matter can be combined to create a substance with new properties and give examples
- Describe how you can tell if a change in matter has occurred

### **3. WEATHER**

- Explain how clouds are formed
- Identify types of weather associated with various clouds
- Research a weather instrument with a small group
- Construct a visual to teach important points of a weather instrument
- Organize presentation to involve entire group and present points appropriately
- Identify symbols used by meteorologists to record and predict weather
- Apply weather concepts by recording weather symbols and predicting weather in a simulated weather map setting
- Design a weather station and record instrument readings
- Predict weather appropriately based on readings from instruments

### **4. PLANT ADAPTATIONS**

- List the four basic needs of plants (air, water, light, and nutrients).
- Identify where a plant finds these needs.
- Test what happens to a plant when one of its needs is taken away.

- Define adaptation and photosynthesis.
- Explain a plant's adaptation and how it will help it survive in its environment.
- Identify how living things rely on each other for their needs.
- Prove the purpose of a plant's adaptation on a cactus by testing a substitute for it in a lab.
- Explain the process of photosynthesis and how it helps a plant meet its needs.
- Construct a story based on a sequence of pictures incorporating concepts related to plant needs.

## **5. WATER/ECOLOGY**

- Explain where water collects on Earth
- Create a diagram demonstrating how much water falls on Earth
- Demonstrate an understanding of the water cycle including the terms condensation, evaporation, precipitation, and transpiration.
- Identify sources of surface water on Earth including oceans, lakes, ponds, rivers, streams, glaciers, and ice caps.
- Compare and contrast surface water and ground water.
- Define groundwater and water table.
- Compare and contrast ponds and lakes.
- Compare and contrast lotic (moving) and lentic (still) systems.
- Explain the movement of Earth's water through the water cycle.
- Create a diagram of the water cycle.
- Describe how water changes as it moves through the water cycle.
- Describe how human activities can positively and negatively affect water environments.
- Describe ways in which water can be harmed or spoiled.
- Describe how pollution is harmful to Earth's water.
- Describe ways that humans can protect Earth's water.
- Explain how a reservoir is used to store water.
- Explain examples of ways that our water is being protected.

## **6. FORCE AND MOTION**

- Define motion, position, frame of reference, force, gravity, weight, speed, and friction.
- Determine a way to measure the motion of an object.
- Sequence the events of a race car as it moves around a track.
- Compare and contrast the types of forces (pushes/ pulls, friction, gravity, and magnetic).
- Infer why objects fall towards the center of the Earth.
- Explain how force can be used to move a marble and bounce a coin.
- Categorize the type of force used in a variety of activities.
- Calculate the speed of an object moving down a ramp.

- Predict how the height of a ramp of the ramp's surface would affect the speed of an object.
- Summarize how friction affects the speed of an object.
- Analyze how a bicycle moves and stops.
- Design a lab to test a question relating height to potential energy.

## 7. STEM

- Discuss examples of everyday technologies (Ex. Refrigerator, microwave, computer, phone)
- Use the design process to create a catapult, a hovercraft, and or a bridge.
- Discuss ways that technology makes everyday life easier.
- Conduct research about a design process.
- Judge other design ideas and make improvements.
- Hypothesize what might happen if a new type of technology was used at our school or in our community.

## MATERIALS:

- Matter Sample Daily Plans 2012 (Consider Where to Links)
- *Delta Science Content Reader - Properties of Matter* science text
- *Delta Science Content Reader - Changes in Matter* science text
- Scholastic Study Jams - [http://teacher.scholastic.com/activities/studyjams/matter\\_states/](http://teacher.scholastic.com/activities/studyjams/matter_states/)
- Discovery Streaming - The Properties and States of Matter
- Discovery Streaming - Properties of Matter - Part 1
- Discovery Streaming- Properties of Matter - Part 2
- Discovery Streaming - A First Look - Solids, Liquids and Gases
- Evan-Moor - Solid, Liquid or Gas? Activity Sheets
- Brain pop Jr - Changing States of Matter
- Brain pop Jr. -Solids, Liquids, and Gases
- Brain pop Jr - Physical and Chemical Changes
- Brain pop - States of Matter
- Brain pop - Measuring Matter
- Brain pop - Matter Changing States
- *Bill Nye the Science Guy* video - Phases of Matter
- *Bill Nye the Science Guy* video - Chemical Reactions
- Physical Science Video: Solids, Liquids, and Gases - States of Matter and How They Change - 8 minutes
- Computer Lab access
- Student science journal (notebook used throughout the year)
- Lab supplies (see lab sheets)
- stevespanglerscience.com
- Daily Planner - Scientific Method Unit
- "How to Think Like a Scientist" By: Stephen P. Kramer

- Investigating the Scientific Method with Amax Axiom Super Scientist" By Donald b. Lemke
- Scientific Method Lab Kit
- Bouncing Balls Lab Kit
- Product Testing Lab Kit
- Year Long Science Supply Lab Kit
- Discovery Streaming - Everyday Science: Discovering the Scientific Method
- Discovery Streaming- How Scientists Work. - The Scientific Method
- Discovery Streaming - Rules of Motion and Forces
- Brain pop Jr - science projects
- Brain pop Jr- making observations
- Brain pop Jr -Scientific Method
- Brain pop - Scientific Method
- Computer Lab access
- Student science journal (notebook used throughout the year)
- Lab supplies (see lab sheets)
- stevespanglerscience.com
- Discovery Streaming - "Weather Smart: The Water Cycle and Clouds"
- Discovery Streaming - "Clouds"
- Computer Lab - Edheads ~ [http://edheads.org/activities/weather/frame\\_loader.htm](http://edheads.org/activities/weather/frame_loader.htm)
- Computer Lab - Tree House Weather Kids ~ <http://urbanext.illinois.edu/treehouse/index.cfm>
- Optional Activities ~
- Computer Lab - [www.scholastic.com/profbooks/netexplorations/index.htm](http://www.scholastic.com/profbooks/netexplorations/index.htm)
- Optional Activities website worksheets:
- Watching the Wind/Where's It Windy website worksheets
- Reporting the Weather/Write a Weather Report website worksheets
- Looking at Lightning/Lightning-Resistant Building website worksheets
- Cloud in a Bottle Lab sheet ~ (from <http://www.weatherwizkids.com/experiments-cloud.htm>)
- Weather Science Journal Thinkers
- Weather Packet cover
- Discovery Streaming: Water Cycle and Clouds Note Template
- Group Weather Instrument Research Template
- Weather Instrument Web
- Instrument Lab Set-up Practice
- Weather Channel Map
- Using a Weather Map
- Weather Chart
- The Beaufort Wind Scale
- Weather Research Sites (for instrument research)
- Weather Station Teacher Reference Pages
- Plant Adaptation Packet:
- Plant Adaptation Packet cover
- K-W-L (packet pg 1)
- Basic Needs Web (packet pg 2)

- Plant Adaptation Chart (packet pg 3)
- BrainPop Photosynthesis Notes (packet pg 4)
- Photosynthesis Chart (packet pg 5)
- Basic Needs Web KEY
- Plant Adaptation Chart KEY
- BrainPop Photosynthesis Notes KEY
- Photosynthesis Tag
- Plant Adaptation Science Journal Thinkers
- Movie: The Lorax
- Discovery Streaming - A First Look: Plants
- Discovery Streaming - Plant Adaptations in the Rainforest
- Discovery Streaming - Plants Survive in the Desert
- Discovery Streaming - Magic School Bus: Gets Planted
- BrainPop Jr - Plant Adaptations
- BrainPop - Photosynthesis
- Lab - Plant's Basic Needs (Water, Air, Light)
- Lab - Plant Adaptation
- Lab - Oxygen Leaves
- Quia Photosynthesis PowerPoint (concept review)
- Great Plant Escape (interactive online mystery game)
- Magic School Bus Scholastic (interactive photosynthesis review - easy)
- PBS Kids Ecosystem (interactive online game - challenging)
- Tagxedo (online word concept creation)
- Computer Lab access
- Student science journal (used throughout the year)
- Lab supplies (see lab sheets)
- *Top Secret* - by John Reynolds Gardiner (novel for read aloud)
- *Cactus Hotel* - by Brenda Guiberson
- *365 Simple Science Experiments* - by E. Richard Churchill
- *Safety in your Neighborhood* by Lucia Raatma
- *Safety on the Playground and Outdoors* by Lucia Raatma
- *Bicycle Safety* by Lucia Raatma
- *Safety in Public Places* by Lucia Raatma

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