Second Grade Curriculum

Theme: Exploring Materials and Motion
Duration: 3 Months (Approximately 12 weeks)

Curriculum Overview

- **Unit 1: States of Matter** (Weeks 1–4)
- **Unit 2: Forces and Motion** (Weeks 5–8)
- **Unit 3: Digital Art Creation** (Weeks 9–12)

Unit 1: States of Matter

Duration: 4 Weeks

Unit Objectives

- Identify and describe the properties of solids, liquids, and gases.
- Understand how matter changes state through heating and cooling.
- Recognize examples of reversible and irreversible changes.
- Conduct experiments to observe changes in states of matter.
- Develop skills in observation, data recording, and scientific reasoning.

Week 1: Introduction to States of Matter

Lesson 1: Matter Matters

- **Duration**: 60 minutes
- **Activities**:
    - **Interactive Presentation**:
        - Introduce the concept of matter and its three states: solid, liquid, gas.
        - Use real-life examples (ice, water, steam).
    - **Group Sorting Activity**:
        - Provide various objects and substances.
        - Students categorize them into solids, liquids, or gases.
    - **Vocabulary Building**:
        - Introduce terms like volume, shape, flow, compressible.
- **Assessment**:

    - Participation and accuracy in sorting activity.
    - Completion of a worksheet matching states of matter to their properties.

Lesson 2: Properties of Solids, Liquids, and Gases

- **Duration**: 60 minutes
- **Activities**:
    - **Hands-On Exploration**:
        - Stations with different materials to explore properties.
        - Solids: Blocks, rocks (fixed shape and volume).
        - Liquids: Water, oil (take shape of container, fixed volume).
        - Gases: Balloons, air in syringes (fill available space).
    - **Observation Recording**:
        - Students fill out a chart noting properties observed.
- **Assessment**:
    - Accuracy and completeness of observation charts.
    - Ability to describe properties in their own words.

Lesson 3: Gases Around Us

- **Duration**: 60 minutes
- **Activities**:
    - **Demonstration**:
        - Inflate a balloon to show gas takes up space.
        - Compress air in a syringe to show gases can be compressed.
    - **Experiment**:
        - Capture gas from a fizzy tablet reacting in water.
        - Observe gas filling a balloon over the container.
    - **Discussion**:
        - Talk about how gases are invisible but have mass and volume.
- **Assessment**:
    - Participation in experiments.
    - Ability to explain observations.

Lesson 4: Matter Scavenger Hunt

- **Duration**: 60 minutes
- **Activities**:
    - **Classroom Activity**:
        - In small groups, search for examples of solids, liquids, and gases in the classroom.
        - Take pictures or draw findings.
    - **Presentation**:
        - Groups share their findings with the class.
- **Assessment**:

    - Number and accuracy of examples found.
    - Clarity during presentations.

Week 2: Changing States of Matter

Lesson 5: Changing States - Heating and Cooling

- **Duration**: 60 minutes
- **Activities**:
    - **Interactive Discussion**:
        - Talk about how heating and cooling can change states (e.g., ice melting).
    - **Melting Ice Experiment**:
        - Observe ice cubes at room temperature and record time taken to melt.
        - Compare to ice in warm water.
    - **Data Recording**:
        - Create graphs showing melting times under different conditions.
- **Assessment**:
    - Accuracy in data recording.
    - Ability to explain the effect of temperature on melting.

Lesson 6: Melting Chocolate Experiment

- **Duration**: 60 minutes
- **Activities**:
    - **Experiment**:
        - Place chocolate pieces in different environments (sunlight, shade, warm water bath).
        - Observe and record how quickly they melt.
    - **Discussion**:
        - Talk about why chocolate melts and re-solidifies.
        - Introduce the concept of reversible changes.
- **Assessment**:
    - Detailed observations.
    - Explanation of the melting and solidifying process.

Lesson 7: Evaporation and Condensation

- **Duration**: 60 minutes
- **Activities**:
    - **Demonstration**:
        - Boil water to produce steam (with safety precautions).
        - Capture condensation on a cold surface.
    - **Concept Introduction**:
        - Explain evaporation (liquid to gas) and condensation (gas to liquid).
    - **Activity**:

        - Set up cups of water in different locations to observe evaporation over time.
- **Assessment**:
    - Understanding of evaporation and condensation.
    - Predictions about evaporation rates.

Lesson 8: Reversible and Irreversible Changes

- **Duration**: 60 minutes
- **Activities**:
    - **Examples and Discussion**:
        - Reversible changes: melting/freezing water.
        - Irreversible changes: cooking an egg.
    - **Sorting Activity**:
        - Provide scenarios; students classify them as reversible or irreversible.
- **Assessment**:
    - Correct classification in sorting activity.
    - Ability to justify their choices.

Week 3: Investigating Materials and Their Properties

Lesson 9: Solubility Exploration

- **Duration**: 60 minutes
- **Activities**:
    - **Experiment**:
        - Test the solubility of various substances (salt, sugar, sand) in water.
    - **Data Recording**:
        - Note which substances dissolve and which do not.
    - **Vocabulary**:
        - Introduce terms like soluble, insoluble, solution.
- **Assessment**:
    - Accuracy of observations.
    - Use of vocabulary in explanations.

Lesson 10: Mixing and Separating

- **Duration**: 60 minutes
- **Activities**:
    - **Hands-On Activity**:
        - Mix different solids (e.g., rice and beans) and devise methods to separate them.
        - Use sieves, magnets, or other tools.
    - **Problem-Solving**:
        - Encourage students to think creatively about separation techniques.
- **Assessment**:
    - Effectiveness of separation methods.

    - Teamwork and collaboration.

Lesson 11: Density and Buoyancy

- **Duration**: 60 minutes
- **Activities**:
    - **Sink or Float Experiment**:
        - Test various objects to see if they sink or float in water.
    - **Prediction and Observation**:
        - Students predict outcomes before testing.
        - Record results in a chart.
    - **Discussion**:
        - Explore why some objects float and others sink.
- **Assessment**:
    - Accuracy of predictions.
    - Understanding of density concepts.

Lesson 12: Solid Structures

- **Duration**: 60 minutes
- **Activities**:
    - **Building Challenge**:
        - Use different materials (clay, sticks, blocks) to build structures.
        - Observe how material properties affect construction.
    - **Reflection**:
        - Discuss which materials were easiest to use and why.
- **Assessment**:
    - Stability and creativity of structures.
    - Ability to relate material properties to their uses.

Week 4: Culminating Activities and Review

Lesson 13: Matter Matters Review Game

- **Duration**: 60 minutes
- **Activities**:
    - **Jeopardy-style Game**:
        - Teams answer questions about states of matter, properties, and changes.
    - **Categories**:
        - States of Matter, Changing States, Properties, Experiments.
- **Assessment**:
    - Correctness of answers.
    - Teamwork and participation.

Lesson 14: States of Matter Posters

- **Duration**: 60 minutes
- **Activities**:
    - **Creative Project**:
        - Students create informative posters about solids, liquids, and gases.
        - Include definitions, examples, and illustrations.
    - **Presentation**:
        - Share posters with the class.
- **Assessment**:
    - Accuracy and completeness of information.
    - Presentation skills.

Lesson 15: Science Experiment Showcase

- **Duration**: 60 minutes
- **Activities**:
    - **Group Experiments**:
        - Students select a favorite experiment from the unit to replicate.
        - Prepare to demonstrate and explain it.
    - **Parent Involvement**:
        - Invite parents or another class to observe.
- **Assessment**:
    - Clarity of explanations.
    - Demonstration of scientific understanding.

Lesson 16: Reflection and Assessment

- **Duration**: 60 minutes
- **Activities**:
    - **Written Reflection**:
        - Students write about what they learned, their favorite activities, and any questions they still have.
    - **Unit Test**:
        - Assess knowledge through a combination of multiple-choice and short-answer questions.
- **Assessment**:
    - Depth of reflections.
    - Performance on the unit test.

Ongoing Assessments Throughout Unit

- **Science Journals**: Regular entries documenting experiments, observations, and thoughts.
- **Participation**: Engagement in class discussions and activities.
- **Worksheets and Quizzes**: Periodic assessments to check understanding.

Standards Alignment

- **NGSS 2-PS1-1**: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
- **NGSS 2-PS1-4**: Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.
- **CCSS.ELA-LITERACY.W.2.2**: Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement.
- **CCSS.MATH.CONTENT.2.MD.D.10**: Draw a picture graph and a bar graph to represent data sets.

Unit 2: Forces and Motion

Duration: 4 Weeks

Unit Objectives

- Understand how pushes and pulls (forces) affect the motion of objects.
- Explore concepts of speed, direction, and friction.
- Conduct experiments to observe the effects of different forces.
- Develop skills in making predictions, collecting data, and drawing conclusions.
- Introduce simple machines and their impact on force and motion.

Week 5: Introduction to Forces

Lesson 1: Pushes and Pulls

- **Duration**: 60 minutes
- **Activities**:
    - **Demonstration**:
        - Use toy cars to show how pushing or pulling affects movement.
    - **Class Discussion**:
        - Define "force" and discuss everyday examples.
    - **Prediction Activity**:
        - Students predict what will happen when different amounts of force are applied.
- **Assessment**:
    - Ability to predict and explain outcomes.
    - Participation in discussions.

Lesson 2: Direction and Speed

- **Duration**: 60 minutes
- **Activities**:
    - **Experiment**:

        - Use ramps to change the direction and speed of rolling objects.
        - Observe how angle affects speed.
    - **Data Collection**:
        - Measure time taken for objects to travel certain distances.
    - **Math Integration**:
        - Create simple charts or graphs with collected data.
- **Assessment**:
    - Accuracy in measurements.
    - Understanding of how angle affects speed.

Lesson 3: Friction Exploration

- **Duration**: 60 minutes
- **Activities**:
    - **Experiment**:
        - Slide objects across different surfaces (carpet, wood, plastic).
        - Observe how friction affects motion.
    - **Data Recording**:
        - Note which surfaces create more or less friction.
    - **Discussion**:
        - Discuss real-life applications (e.g., why we use brakes).
- **Assessment**:
    - Detailed observations.
    - Ability to explain the role of friction.

Lesson 4: Gravity Introduction

- **Duration**: 60 minutes
- **Activities**:
    - **Demonstration**:
        - Drop objects of different weights to observe gravity.
    - **Prediction**:
        - Students guess which objects will hit the ground first.
    - **Explanation**:
        - Simplify the concept of gravity as a force pulling objects toward Earth.
- **Assessment**:
    - Participation in the experiment.
    - Understanding of gravity's effect on objects.

Week 6: Experimenting with Forces

Lesson 5: Ramp Experiments

- **Duration**: 60 minutes
- **Activities**:

    - **Building Ramps**:
        - Use cardboard and blocks to create ramps at various angles.
    - **Data Collection**:
        - Measure how far cars travel from each ramp.
    - **Variables**:
        - Change one variable at a time (e.g., ramp height, surface texture).
- **Assessment**:
    - Accuracy of measurements.
    - Data recording and organization.

Lesson 6: The Effect of Mass on Motion

- **Duration**: 60 minutes
- **Activities**:
    - **Experiment**:
        - Add weights to toy cars and observe changes in motion.
    - **Prediction and Observation**:
        - Students predict how added mass will affect speed and distance.
- **Assessment**:
    - Correctness of predictions.
    - Ability to explain observations.

Lesson 7: Air Resistance Exploration

- **Duration**: 60 minutes
- **Activities**:
    - **Parachute Making**:
        - Construct simple parachutes using plastic bags and string.
    - **Testing**:
        - Drop parachutes from a height and observe descent.
    - **Discussion**:
        - Talk about how air resistance slows down falling objects.
- **Assessment**:
    - Effectiveness of parachute design.
    - Understanding of air resistance.

Lesson 8: Designing an Experiment

- **Duration**: 60 minutes
- **Activities**:
    - **Group Project**:
        - Students design their own experiment to test a force-related question.
    - **Planning**:
        - Outline the question, hypothesis, materials, procedure.
- **Assessment**:

    - Clarity and feasibility of experiment plans.
    - Collaboration within groups.

Week 7: Simple Machines

Lesson 9: Introduction to Simple Machines

- **Duration**: 60 minutes
- **Activities**:
    - **Interactive Presentation**:
        - Introduce six types of simple machines: lever, wheel and axle, pulley, inclined plane, wedge, screw.
    - **Real-Life Examples**:
        - Identify simple machines in everyday objects.
- **Assessment**:
    - Ability to recognize and name simple machines.
    - Participation in discussion.

Lesson 10: Lever Exploration

- **Duration**: 60 minutes
- **Activities**:
    - **Hands-On Activity**:
        - Build levers using rulers and fulcrums (erasers or blocks).
    - **Experiment**:
        - Test how the position of the fulcrum affects the effort needed to lift an object.
- **Assessment**:
    - Understanding of how levers work.
    - Recording observations.

Lesson 11: Inclined Planes and Pulleys

- **Duration**: 60 minutes
- **Activities**:
    - **Inclined Plane Experiment**:
        - Roll objects down ramps and observe the ease of movement.
    - **Pulley Demonstration**:
        - Use a simple pulley to lift weights.
    - **Discussion**:
        - How these machines make work easier.
- **Assessment**:
    - Engagement in experiments.
    - Ability to explain the benefits of simple machines.

Lesson 12: Building a Simple Machine

- **Duration**: 60 minutes
- **Activities**:
    - **Group Project**:
        - Design and build a device using at least one simple machine to perform a task (e.g., lifting a small object).
    - **Presentation**:
        - Demonstrate and explain how their device works.
- **Assessment**:
    - Functionality of the device.
    - Clarity in explanation.

Week 8: Culminating Activities and Review

Lesson 13: Forces and Motion Review Game

- **Duration**: 60 minutes
- **Activities**:
    - **Quiz Show**:
        - Teams answer questions about forces, motion, and simple machines.
    - **Categories**:
        - Forces, Motion, Simple Machines, Experiments.
- **Assessment**:
    - Correct answers.
    - Team participation.

Lesson 14: Science Fair Preparation

- **Duration**: Multiple sessions totaling 120 minutes
- **Activities**:
    - **Project Completion**:
        - Finish any ongoing experiments or projects.
    - **Display Creation**:
        - Prepare posters or models for the science fair.
- **Assessment**:
    - Quality of displays.
    - Scientific understanding demonstrated.

Lesson 15: Science Fair Presentation

- **Duration**: 60 minutes
- **Activities**:
    - **Event**:
        - Host a class science fair.
        - Invite other classes or parents to attend.
    - **Presentation**:

        - Students explain their projects to visitors.
- **Assessment**:
    - Confidence and clarity during presentations.
    - Ability to answer questions.

Lesson 16: Reflection and Assessment

- **Duration**: 60 minutes
- **Activities**:
    - **Written Reflection**:
        - Students write about what they learned and enjoyed in the unit.
    - **Unit Test**:
        - Assess understanding through written questions and practical tasks.
- **Assessment**:
    - Insightfulness of reflections.
    - Performance on the unit test.

Ongoing Assessments Throughout Unit

- **Science Journals**: Regular entries with experiment notes and reflections.
- **Participation**: Engagement in hands-on activities and discussions.
- **Worksheets and Quizzes**: To monitor understanding of concepts.

Standards Alignment

- **NGSS 2-PS1-1**: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
- **NGSS 2-PS1-2**: Analyze data obtained from testing different materials to determine which materials have the properties best suited for an intended purpose.
- **NGSS 2-PS2-1**: Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
- **CCSS.ELA-LITERACY.SL.2.4**: Tell a story or recount an experience with appropriate facts and relevant details.

Unit 3: Digital Art Creation

Duration: 4 Weeks

Unit Objectives

- Develop basic computer and digital literacy skills.
- Use digital tools to create artwork and express creativity.

- Understand the principles of design (color, shape, line).
- Enhance communication skills through digital presentations.
- Learn about responsible use of technology.

Week 9: Introduction to Digital Tools

Lesson 1: Computer Basics

- **Duration**: 60 minutes
- **Activities**:
    - **Hardware Introduction**:
        - Identify parts of a computer (monitor, keyboard, mouse).
    - **Operation Skills**:
        - Practice turning on/off computers.
        - Learn to use a mouse and keyboard effectively.
    - **Typing Practice**:
        - Use simple typing programs to practice letters and words.
- **Assessment**:
    - Ability to operate the computer independently.
    - Accuracy in typing exercises.

Lesson 2: Navigating Software

- **Duration**: 60 minutes
- **Activities**:
    - **Exploration of Drawing Software**:
        - Introduce a kid-friendly program (e.g., Microsoft Paint, Tux Paint).
    - **Guided Tour**:
        - Demonstrate basic tools: brush, eraser, shapes, colors.
    - **Hands-On Practice**:
        - Students experiment with tools to create simple drawings.
- **Assessment**:
    - Engagement during exploration.
    - Ability to use basic tools.

Lesson 3: Digital Citizenship

- **Duration**: 60 minutes
- **Activities**:
    - **Discussion**:
        - Talk about staying safe online and respecting technology.
    - **Rules and Guidelines**:
        - Establish class rules for computer use.
    - **Role-Playing**:
        - Act out scenarios to practice appropriate behavior.

- **Assessment**:
    - Understanding of digital citizenship concepts.
    - Participation in activities.

Lesson 4: Introduction to Digital Art

- **Duration**: 60 minutes
- **Activities**:
    - **Art Concepts**:
        - Discuss elements of art: line, shape, color.
    - **Digital Application**:
        - Show how to apply these concepts using software tools.
    - **Practice Activity**:
        - Create drawings focusing on one element (e.g., lines).
- **Assessment**:
    - Application of art concepts.
    - Creativity in drawings.

Week 10: Creating Digital Artworks

Lesson 5: Using Shapes and Colors

- **Duration**: 60 minutes
- **Activities**:
    - **Tutorial**:
        - Learn to use shape tools and color fills.
    - **Art Project**:
        - Create a scene (e.g., a park, underwater world) using shapes.
- **Assessment**:
    - Use of a variety of shapes and colors.
    - Originality in artwork.

Lesson 6: Drawing with Brushes

- **Duration**: 60 minutes
- **Activities**:
    - **Tool Exploration**:
        - Experiment with different brush sizes and types.
    - **Creative Expression**:
        - Draw a self-portrait or favorite animal.
- **Assessment**:
    - Effective use of brush tools.
    - Attention to detail.

Lesson 7: Adding Text and Labels

- **Duration**: 60 minutes
- **Activities**:
    - **Instruction**:
        - Learn how to insert text into digital art.
    - **Project**:
        - Create a digital poster about a favorite hobby or topic.
- **Assessment**:
    - Integration of text and images.
    - Clarity of message.

Lesson 8: Saving and Printing

- **Duration**: 60 minutes
- **Activities**:
    - **File Management**:
        - Teach how to save work in appropriate folders.
    - **Printing Skills**:
        - Print artworks to display in the classroom.
- **Assessment**:
    - Ability to save and retrieve files.
    - Correctly printing documents.

Week 11: Digital Storytelling

Lesson 9: Story Planning

- **Duration**: 60 minutes
- **Activities**:
    - **Brainstorming**:
        - Develop ideas for a short digital story.
    - **Storyboarding**:
        - Plan scenes using sketches and notes.
- **Assessment**:
    - Completeness of storyboards.
    - Creativity of ideas.

Lesson 10: Creating Digital Illustrations

- **Duration**: 60 minutes
- **Activities**:
    - **Art Creation**:
        - Draw scenes for the story using digital tools.
    - **Consistency**:
        - Maintain style and characters throughout.
- **Assessment**:

    - Quality of illustrations.
    - Cohesiveness of visuals.

Lesson 11: Narration and Sound

- **Duration**: 60 minutes
- **Activities**:
    - **Voice Recording**:
        - Record narration or dialogue for the story.
    - **Adding Sound Effects**:
        - Incorporate sounds to enhance the story.
- **Assessment**:
    - Clarity of recordings.
    - Appropriate use of sounds.

Lesson 12: Assembling the Digital Story

- **Duration**: 60 minutes
- **Activities**:
    - **Software Use**:
        - Combine images and audio using basic multimedia software (e.g., PowerPoint, simple video editors).
    - **Finalizing**:
        - Add transitions and review the final product.
- **Assessment**:
    - Completion of the digital story.
    - Technical proficiency.

Week 12: Sharing and Reflecting

Lesson 13: Presenting Digital Stories

- **Duration**: 60 minutes
- **Activities**:
    - **Class Viewing**:
        - Share digital stories with classmates.
    - **Feedback Session**:
        - Offer positive comments and constructive suggestions.
- **Assessment**:
    - Engagement during presentations.
    - Respectful feedback.

Lesson 14: Exploring Careers in Digital Arts

- **Duration**: 60 minutes

- **Activities**:
    - **Discussion**:
        - Talk about careers like graphic design, animation, game development.
    - **Guest Speaker**:
        - Invite a professional to speak about their work (if possible).
- **Assessment**:
    - Participation in discussion.
    - Thoughtful questions.

Lesson 15: Reflecting on Digital Creativity

- **Duration**: 60 minutes
- **Activities**:
    - **Class Discussion**:
        - Share what students enjoyed and found challenging.
    - **Goal Setting**:
        - Write about how they might use digital tools in the future.
- **Assessment**:
    - Insightfulness of reflections.
    - Articulation of future aspirations.

Lesson 16: Digital Art Gallery

- **Duration**: 60 minutes
- **Activities**:
    - **Event Preparation**:
        - Organize a digital art gallery in the classroom or online.
    - **Invitation**:
        - Invite other classes or parents to view the artworks.
- **Assessment**:
    - Participation in event setup.
    - Pride in displaying work.

Ongoing Assessments Throughout Unit

- **Digital Portfolios**: Collection of student artworks.
- **Observation**: Monitoring skill development and creativity.
- **Participation**: Engagement in lessons and activities.

Standards Alignment

- **ISTE Standards for Students**:
    - **1.1 Empowered Learner**: Students leverage technology to take an active role in achieving learning goals.

    - **1.6 Creative Communicator**: Students communicate clearly and express themselves creatively.
- **CCSS.ELA-LITERACY.SL.2.5**: Add drawings or other visual displays to stories or recounts of experiences.
- **CCSS.MATH.CONTENT.2.G.A.1**: Recognize and draw shapes having specified attributes.

Additional Notes for Educators

- **Differentiation**:
    - Provide additional support or challenges based on individual needs.
    - Adapt activities for students with varying levels of computer access.
- **Technology Considerations**:
    - Ensure all students have access to necessary devices.
    - Establish clear rules for responsible use.
- **Parental Involvement**:
    - Encourage parents to explore digital art programs at home.
    - Share student work through newsletters or online platforms.
- **Integration Opportunities**:
    - Incorporate literacy by having students write about their artwork.
    - Link to other subjects, such as science (e.g., drawing animals, habitats).