

## Science and Engineering Practices

- Ask questions
- Develop and use models
- Plan and carry out investigations
- Analyze and interpret data
- Use mathematical and computational thinking
- Construct explanations
- Engage in scientific argument
- Obtain, evaluate, and communicate information
- Construct devices or design solutions



## Cross-Cutting Concepts (cuts across all disciplines)

- Patterns
- Cause and effect
- Scale, proportion, and quantity
- Systems and system models
- Energy and matter: Flow, cycles, and conservation
- Structure and function
- Stability and change

# Grade K-2 Science Content Framework

## ENGAGE: 5 Minutes

The teacher accesses the learners' prior knowledge and helps them become engaged in a new concept through the use of short activities or "hooks" that promote curiosity and elicit prior knowledge. The activity should help to establish connections between past and present learning experiences, expose previous conceptions, and shape students' thinking toward the learning outcomes. Students should be motivated to learn more.

### TEACHER:

- Poses thought-provoking questions
- Creates interest
- Creates an environment to encourage student-to-student discourse
- Elicits responses to peak curiosity

### STUDENT:

- Observes phenomenon
- Brainstorms generate ideas, makes connections
- Wonders, talks, and communes with other students/teacher

## EXPLORE: 20 Minutes

Student work collaboratively to explore ideas through hands-on learning experiences. During this stage, exploration experiences provide students with a shared base of learning activities to assist with the understanding of concepts, processes, and skills. Students may complete activities that help them access their prior knowledge to generate new ideas, explore questions, and design and conduct a preliminary investigation.

### TEACHER:

- Poses a real-world problem to solve
- Plans for student investigations (utilizing the Engineering Design Process)
- Constructs a model for students
- Researches and reads authentic sources

### STUDENT:

- Investigates using the Science and Engineering Practices (SEPs)
- Constructs models
- Tests predictions
- Participates in active literacy such as recording observations, ideas, and data

## EXPLAIN (ongoing):

This phase provides opportunities for teachers to introduce a concept, process, or skill directly. Learners explain their understanding of the idea using their own words. The teacher may teach and guide them toward more in-depth knowledge, or ask students for clarification. The explanation phase focuses students' attention on analyzing and interpreting data, synthesizing ideas, and clarifying concepts. Students learn how to justify and explain their understandings while the teacher checks for understanding and misconceptions.

### TEACHER:

- Structures questioning using a variety of DOK questions
- Reads discusses and explains
- Encourages students to explain using their own words

### STUDENT:

- Makes claims from evidence
- Justifies claims using supporting evidence using scientific terminology
- Uses thinking skills to solve problems, asks scientific questions
- Makes decisions, listens and responds to others

## ELABORATE: 15 Minutes

Students extend their new understanding and apply their new learning to a unique situation. Teachers challenge and extend students' thinking and conceptual knowledge and skills. The students develop a deeper understanding, additional information, and a variety of problem-solving and thinking skills. Students apply their knowledge of the concept by conducting additional activities.

### TEACHER:

- Remind students to apply or extend ideas or thinking
- Encourage students to think of alternate explanations

### STUDENT

- Apply new understandings and skills to a different situation
- Record, analyze, and interpret data
- Conclude from evidence
- Problem-solve and make decisions

## EVALUATE: 5 Minutes

Students and teacher review and assess learning. The evaluation phase provides opportunities for teachers to evaluate student progress toward achieving educational goals. Students demonstrate their mastery of content.

### TEACHER:

- Observes students and documents student questions/learning
- Asks open-ended questions to check for understanding
- Assesses new learning

### STUDENT:

- Explains and evaluates new learning
- Responds to a variety of questions
- Demonstrates knowledge of concept/content