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About the Teaching & Learning Collaborative

TLC is a non-profit organization in Ohio whose mission is to improve science and mathematics education. It is a coalition of school districts, organizations, businesses and government agencies with whom we collaborate to design and carry out our work. The TLC works at a variety of levels, from the classroom to the state level, to ensure that all students have access to quality education in science and mathematics.

Currently, our work is focused in three areas:

- Professional development in science and mathematics for grades K-12 educators in Ohio
- Special initiatives
- Tailored contracted professional services

Teacher's Guide to Science Tasks with Otis and Flask

Purpose

Science Tasks with Otis & Flask are designed to assist teachers in preparing students for the 5th Grade Ohio Achievement Test (OAT). The Development Committee identified Grade Level Indicators (GLI) that cover topics that are only taught once within the 3-5 grade level band (usually in 3rd or 4th grade) and/or are difficult to teach and learn. Fifth grade teachers and others can use these activities to reinforce prior learning or assure that content has been addressed.

Organization of Booklets

Each booklet contains science tasks that are presented in a "student-directed learning center" format addressing a specific science topic. Each booklet contains four parts:

Teacher Information

This section provides a summary of the center and directions for the teacher. It provides a list of all the necessary materials and step-by-step procedures for setting up one or more centers. A review of content identifies the key concepts that the center teaches. Prerequisite skills and key vocabulary are identified. The answer key for the final assessment, which the teacher will score, is also included within this section.

Task Cards

Each center contains one or more Task Cards that list the procedures for the students. Teachers can photocopy the Task Cards and provide them at the center. For repeated use, they can be laminated, glued to a file folder or other stiff material and stood up at the center for easy viewing and reading by the students.

Student Packet

The photocopy-ready Student Packet leads the student through all of the Task Cards and assessments. The packets may include observation/data sheets and questions related to hands-on activities, student readings, vocabulary words, and assessments. The "Check Your Understanding" assessments are modeled after the OAT and include multiple choice, short answer and extended response questions.

Answer Key

Student answer keys are provided for most questions and all of the "Check Your Understanding" assessments, the only exception being the final assessment that the teacher will score.

Development of the Centers

A group of curriculum directors in Ohio identified the need for resources to assist teachers in reviewing for the OAT. Since 5th grade is the first time science is assessed, they wanted to provide a tool that would help teachers review 3rd and 4th grade content while teaching 5th grade science.

Key grade level indicators were identified and draft science centers were developed. These centers were peer reviewed, revised, field tested with students, revised and reviewed again.

How to Use These Centers

The centers may be used in several ways. As an independent center, a student or small groups of students may work on them at their own pace. They are designed to require minimal teacher interaction. Students may complete one Task Card per visit to the center or do all tasks in one sitting depending on the time available. If desired, the teacher may provide multiple setups to facilitate more students working on the centers at the same time. In addition, teachers can use the activities with the whole class, either to teach as new content or as review.

Topics Addressed by the Centers

Each of the nine booklets provides learning experiences related to one major topic. These include:

- Processes that Shape the Earth's Surface
- Plant & Animal Structures/Function Relationships
- Forces Affecting Objects (contains 3 centers)
- Motion of Objects
- Thermal Energy Transfer
- Characteristics of Physical & Chemical Changes
- Fossils
- Earth Resources—Rocks
- Earth Resources—Soils

Correlations and Connections to Ohio's Academic Content Standards

One of the primary purposes of the centers is to provide a tool to assist 5th grade teachers and students in preparing for the OAT. The charts on the following pages identify two components: 1) the correlations of Ohio's standards to the centers and 2) the grade level indicators for 5th grade that most closely relate to the topics addressed by the centers.

Teachers may use these charts to determine the best time during the school year to use each of the centers. When using the centers, it is important to make references between the 5th grade curriculum and content being reviewed in the center. This will benefit students by increasing their understanding toward the Grade 3-5 Benchmarks.

Correlations and Connections to Ohio's Standards
Earth and Space Sciences

The chart below correlates each of the following centers to the appropriate Grade Level Indicators (GLIs) for Earth and Space Sciences.

Processes That Shape the Earth's Surface	Earth Resources- Rocks	Earth Resources- Soil
Grade 4 **Benchmark B** **Grade Level Indicator(s):** 10. Describe evidence of changes on Earth's surface in terms of slow processes (e.g., erosion, weathering, mountain building and deposition) and rapid processes (e.g. volcanic eruptions, earthquakes and landslides).	**Grade 3** **Benchmark C** **Grade Level Indicator(s):** 1. Compare distinct properties of rocks (e.g., color, layering and texture).	**Grade 3** **Benchmark C** **Grade Level Indicator(s):** 4. Observe and describe the composition of soil (e.g., small pieces of rock and decomposed pieces of plants and animals, and products of plants and animals).

The chart below identifies the grade level indicators for 5th grade that are most closely related to the indicators correlated to the above centers.

Connections to GLIs for Grade 5	Implications for Instruction
Benchmark C **Grade Level Indicator(s):** 5. Explain how the supply of many non-renewable resources is limited and can be extended through reducing, reusing and recycling but cannot be extended indefinitely. 6. Investigate ways Earth's renewable resources (e.g., fresh water, air, wildlife and trees) can be maintained.	• These two GLIs from 5th grade address the topic of renewable and non-renewable resources. Rocks and minerals can be considered nonrenewable resources. Use this opportunity to review rocks when discussing Earth's resources and ways that they can be conserved. • Soil can be considered a nonrenewable resource. Nutrients in soil can be depleted by planting the same crop year after year. Factors leading to erosion will deplete topsoil, the layer where the majority of nutrients are located and most plant growth takes place.

CORRELATIONS AND CONNECTIONS TO OHIO'S STANDARDS LIFE SCIENCES

The chart below correlates each of the following centers to the appropriate grade level indicators (GLIs) for Life Sciences.

Plant & Animal Structures/Function Relationships	Fossils
Grade 3 **Benchmark B** **Grade Level Indicator(s):** 2. Relate animal structures to their specific survival functions (e.g., obtaining food, escaping or hiding from enemies). **Grade 4** **Benchmark B** **Grade Level Indicator(s):** 2. Relate plant structures to their specific functions (e.g., growth, survival and reproduction).	**Grade 3** **Benchmark C** **Grade Level Indicator(s):** 5. Observe and explore how fossils provide evidence about animals that lived long ago and the nature of the environment at that time. **Grade 4** **Benchmark C** **Grade Level Indicator(s):** 4. Observe and explore that fossils provide evidence about plants that lived long ago and the nature of the environment at that time.

The chart below identifies the grade level indicators for 5th grade that are most closely related to the indicators correlated to the above centers.

Connections to GLIs for Grade 5	Implications for Instruction
Benchmark C **Grade Level Indicator(s):** 4. Summarize that organisms can survive only in ecosystems in which their needs can be met (e.g., food, water, shelter, air, carrying capacity and waste disposal). The world has different ecosystems and distinct ecosystems support the lives of different types of organisms.	• Within an ecosystem there are specific structures and functions of both plants and animals that help them survive. Connections should be made to specific organisms and how the structure/function meets the needs of that organism in an ecosystem. • Making connections from the indicator to fossils should focus on what occurs when an ecosystem can no longer meet the needs of an organism. The connection should also be made that the fossil tells us what the ecosystem (or environment) was like at a specific time.

Correlations and Connections to Ohio's Standards
Physical Sciences

The chart below correlates each of the following centers to the appropriate grade level indicators (GLIs) for Physical Sciences.

Motion of Objects	Forces Affecting Objects	Characteristics of Physical & Chemical Changes	Thermal Energy Transfer
Grade 3 Benchmark C Grade Level Indicator(s): 1. Describe an objects position by locating it relative to another object or the background. 2. Describe an objects motion by tracing and measuring its position over time.	**Grade 3 Benchmark C Grade Level Indicator(s):** 3. Identify contact/noncontact forces that affect motion of an object (e.g., gravity, magnetism and collision). 4. Predict the changes when an object experiences a force (e.g., a push or pull, weight and friction).	**Grade 4 Benchmark A Grade Level Indicator(s):** 1. Identify characteristics of a simple physical change… 2. Identify characteristics of a simple chemical change. When a new material is made by combining two or more materials…	**Grade 5 Benchmark D Grade Level Indicator(s):** 1. Define temperature as the measure of thermal energy and describe the way it is measured. 2. Trace how thermal energy can transfer from one object to another by conduction. *Note: Thermal Energy Transfer directly addresses a 5th Grade GLI.*

The chart below identifies the grade level indicators for 5th grade that are most closely related to the indicators correlated to the above centers.

Connections to GLIs for Grade 5	Implications for Instruction
Benchmarks E and F Grade Level Indicator(s): The 5th Grade Physical Sciences Indicators address the Nature of Energy (e.g., electrical current, light and sound).	• Many of the concepts within the Physical Sciences Standard were selected because they are only addressed at one grade level before being assessed. While there are not strong connections that can be made between the 3rd and 4th grade content to the 5th Grade Indicator, it would be good to have students complete the centers during the time of year that Grade 5 Physical Sciences concepts are being taught.

Resources Available on the Teaching & Learning Collaborative Website to Support the Centers

The TLC website provides the following additional resources to assist teachers in using the centers:

- **Comprehensive Materials List** - The list facilitates the gathering and procurement of all materials necessary to setup the centers.

- **Equipment Packs that Can be Purchased** - The "Essential Equipment Pack" contains selected equipment that may not be readily available to teachers. The "Complete Equipment Pack" contains almost everything necessary to setup and use the centers. The "Classroom Equipment Pack" provides critical items in numbers sufficient to conduct a center's activities simultaneously with a class of 27 in groups of three. Information on the content, cost and ordering of these equipment packs are provided.

- **Web-based Activities** - Web-based activities for many of the centers are available on the TLC website. To ensure that these activities and the associated websites remain current, they are provided online rather than in the booklets.

- **Additional Resources** - A list of children's books, websites and other resources to support the centers .

- **Tips, Corrections and Updates for Each Center** - As new information about the centers becomes available, it will be posted on the website.

- **Correlations to the National Science Standards** - While the centers were developed with Ohio's science standards in mind, they also correlate to the national science standards.

To access these resources visit ***www.teachinglearningcollaborative.org.***