

Teacher/School: Rebecca Carlton

Unit Title: Force & Motion

Grade Level: 3

Subject/Topics:

What MSP content from last summer's training is incorporated in this plan?

<http://www.livingscience.org>, Engineering in the Classroom, Teaching Physics with Toys, iRespond

Time Needed: 13 35 min. sessions

Learning Objectives: What will students learn?

What is essential for students to know or understand about the subject? If students remembered one thing about this study, what would it be?

- Students will discriminate between pushing and pulling forces
- Students will generate balanced and unbalanced forces
- Students will predict the effects of net forces on objects
- Students will recognize the affect of gravity
- Students will investigate Newton's 2nd Law using classroom objects
- Students will understand that the force required to move an object is relative to the object's mass
- Students will identify simple machines

Sunshine State Standards:

Math, Science, and Reading

SC.C.2.2.1, SC.C.2.2.2, SC.C.2.2.4, SC.C.2.2.3, SC.H.3.2.2, SC.H.1.2.2, LA.A.2.2.8, LA.C.1.2.1

Materials/Supplies:

Spring scales 24 ft. of rope

Gravity is a Mystery by Branley

Forces and Motion by Trumbauer

Simple Machines by Berger

How Do You Lift a Lion by Wells

Teaching Physics with Toys (Terrific Science Press)

Third Grade Science (Steck-Vaughn)

101 Science Poems and Songs for Young Learners by Goldish (Scholastic)

Newton's Laws Power Point (downloaded from <http://www.livingscience.org> and then modified)

LCD projector

Rubber bands

Science textbooks

Workbooks

Yardsticks

Glue sticks

Sink

Play-Doh

Bathroom Scale

Chart paper

Markers

Prerequisite Skills:

- Students should distinguish between weight and mass.
- Students should be able to operate spring scales correctly.

Instructional Procedures: What will the teacher be doing? What will the students be doing?

Plan a sequence of instructional activities and assignments that address the learning objectives. Plan work samples or performance tasks that allow students to express understanding of the learning objectives. Integrate technology as appropriate. Include in your unit plan copies of instructional materials prepared for the unit and links to web resources.

Session 1: What is a Force?

Discussion: Facilitate a class discussion of what causes motion in a variety of contexts. Use demonstration as appropriate.

ex. What causes a kickball to move? *You kick it*

What causes the top to come off a marker? *You twist it.*

What causes cake mix to move around a bowl? *You stir it.*

List all forces on chart paper, sorting into pushes and pulls. At the end of the discussion, point out that all the listed words are examples of forces. Head the chart with "A force is any push or pull."

Homework/Assessment: Have students list at least 5 forces they utilized that day.

Session 2: Balanced and Unbalanced Forces

Review the definition of a force from Session 1.

Demonstration: Push against a wall or closed door. Ask students to determine if you are exerting a force on the object. *Yes, you're pushing on it.* Ask students to recognize whether the force you are exerting is causing any motion. *No.* Explain to students that this is an example of a balanced force because neither you nor the wall is moving. Select a student to participate in the next part of the demonstration. Face the student, place palms against one another, and step back until you are both leaning forward and balanced. Help students recognize that this is another instance in which the forces are balanced. Hypothesize with students about what would happen if you pushed with greater force. Demonstrate.

Hands-On Experience: Take the students outside. Tug-of-War is an excellent way to experience the effects of balanced and unbalanced forces. Have half the class Tug-of-War while the other half observes.

Discuss the observations: At what point were the forces balanced? How could you tell when the forces became unbalanced? Which team exerted the greater amount of force? How could you tell? Switch and repeat so all students participate.

Session 3: Gravity

Read-Aloud: Gravity is a Mystery

Session 4: More About Gravity

Demonstration: Hold a marker out on the palm of your hand. Ask the students if the forces acting on the marker are balanced or unbalanced. The forces are balanced because the marker is not moving. Point out to the students that you are using your hand to lift the marker. Remove your hand and let the marker fall to the floor. Ask the students then if the forces were balanced or unbalanced. Unbalanced, the marker was falling.

Investigation: Gravity Makes Things Fall (p. 11-14 - Teaching Physics with Toys)

Song: Teach children "Gravity" (p. 90 - 101 Science Poems and Songs)

Assessment: Investigation Rubric

Session 5: Calculating Forces (p. 32-33- Third Grade Science)

Discussion/Demonstration: Explain to students that scientists use math to calculate the amount of force on an object and to predict an object's motion. Stand behind an empty student chair. Ask the students to predict what will happen if you push on the chair with a fair amount of force. The chair will move across the floor. Verify the prediction with a demonstration. Have a student volunteer come up and stand in front of the chair. Ask the students to predict what will happen, if you push again on the chair while the student pushes the opposite direction. The chair will not move as long as the forces are balanced. Explain to students that forces that work in the same direction are added to together, while opposing forces are calculated using subtraction.

Guided Practice: Work through the worksheet together.

Differentiated Instruction:

How will learning be accommodated for:

An ESE student?

An ESOL/Limited English student?

A gifted student?

Accommodations: Questions for the unit test will be read - aloud to below-average readers. All class charts will be left up for student reference for the duration of this unit.

Assessment:

Plan assessment that puts the learning objectives in operational terms. Build rubrics that identify what students must do or create to show evidence of understanding of each objective. Include in your unit plan copies of any assessments and rubrics developed for this unit.

Session 1: What is a Force?

Homework/Assessment: Have students list at least 5 forces they utilized that day.

Session 4: More About Gravity

Assessment: Investigation Rubric

Session 7: Does an Object's Mass Affect the Amount of Force Required to Move It?

Assessment: Investigation Rubric

Session 8:

Homework/Assessment: Word Search (from the Teacher's Guide that comes with the book)

Session 9: Simple Machines

Assessment: Investigation Rubric

Session 10:

Homework/Assessment: Spot the Simple Machines worksheet (from the Teacher's Guide that comes with the book)

Session 11:

Assessment: A.R. Test

Session 12: Levers

Assessment: Investigation Rubric

Session 13: Unit Test

Investigation Rubric



Name: _____
Teacher: _____
Date: _____
Title of Work: _____

Criteria Points

- 1
- 2
- 3
- 4

Participation

- Student does not participate in activity.
 - Student participates infrequently or sporadically.
 - Student participates frequently.
 - Student is actively participating throughout the activity.
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Use of Materials

- Materials and instruments are used for purposes irrelevant to the investigation.
 - Materials and instruments are used inefficiently or ineffectively.
 - Materials and instruments are used appropriately, but maybe not accurately.
 - Materials and instruments are used efficiently and accurately.
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Thinking

- Student is unable to express any learning as a result of the activity.
 - Student reports observations, but is unable to draw any conclusion from them.
 - Student arrives at a conclusion which may or may not be accurate, but cannot explain the thinking behind it.
 - Student draws accurate conclusions and is able to explain the thinking behind it.
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