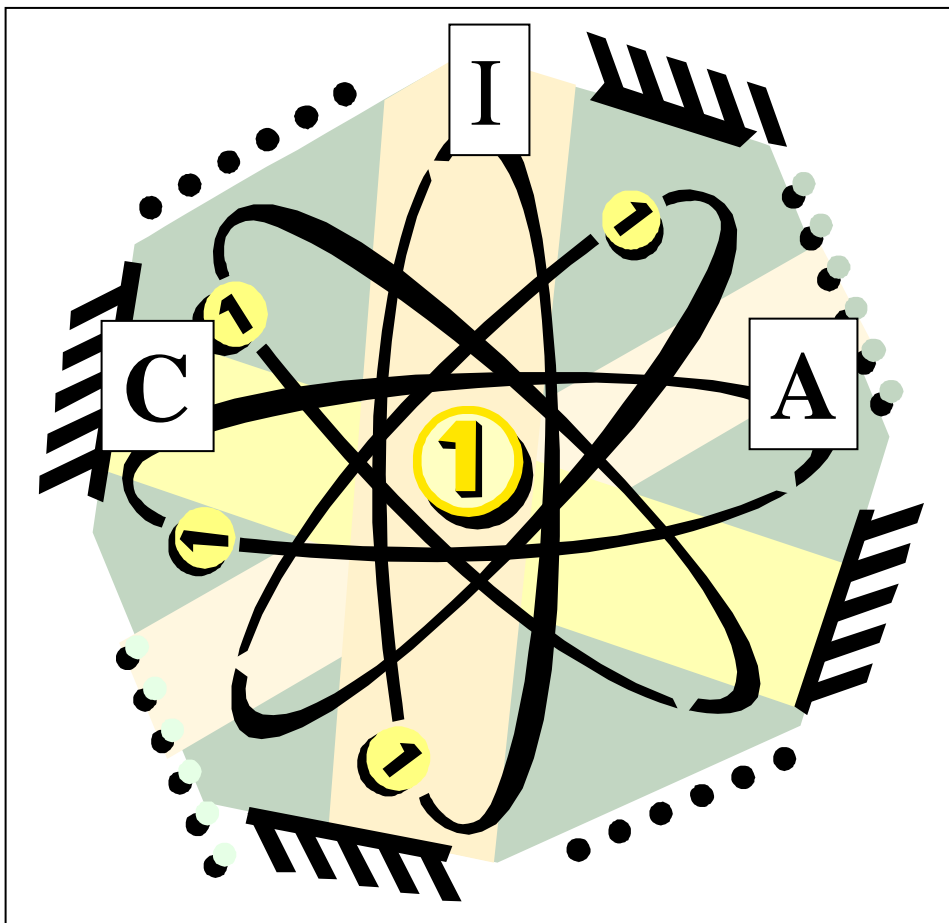


# Curriculum, Instruction, Assessment (CIA) Alignment

## Science, Kindergarten Unit 2: Force and Motion

### Task Analysis and Hands-on Investigations



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Orlando, Florida**

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**Subject Area:** Science  
**Strand C:** Force and Motion  
**Grade:** K

**Benchmarks**

SC.C.1.1.1: The student understands that different things move at different speeds.

SC.C.1.1.2: The student knows that there is a relationship between force and motion.

SC.C.2.1.1: The students knows that one way to change how something is moving is to give it a push or a pull.

**TASK ANALYSIS**

**The student...**

**FORCE AND MOTION**

- changes the position and motion of objects by pushing or pulling on them.
- relates the amount of the change to the strength of the push or pull.
- compares and contrasts many different ways of moving, such as straight, zigzag, round and round, back and forth, and fast and slow.



# A PUSH OR A PULL?

## **BENCHMARK and TASKS**

**SC.C.1.1.2** The student knows that there is a relationship between force and motion.

- The student changes the position and motion of objects by pushing or pulling on them.
- The student relates the amount of the change to the strength of the push or pull.

## **KEY QUESTION**

How do we make things move?

## **BACKGROUND INFORMATION**

Young students should have many experiences in moving objects, getting objects to stop moving, and in changing the direction of moving things. It is important for them to understand that there is a relationship between force and motion, and that a **force** (push or a pull) causes objects to move or to stop moving. Starting, stopping, changing direction, falling and other motion-related phenomenon are explained by forces.

Things people do using the force of push include:

- pushing a shopping cart
- pushing a baby stroller
- closing a drawer
- pushing the pedals of a bicycle
- opening/closing a door
- throwing a ball



Things people do using the force of pull include:

- pulling a wagon
- opening a drawer
- catching a ball
- opening/closing a door

Sweeping with a broom and vacuuming are motions that involve push and pull.

## **MATERIALS**

### **Teacher**

1 large container (cardboard box works well)

several small-to-medium size books

*Berlioz the Bear* by Jan Brett

*Some Things Push and Some Things Pull* (Dominie Press)

## **ENGAGE**

1. Read and discuss the book, *Berlioz the Bear*.
2. Place a box with a light load, such as several books, on a table where all students can see it.
3. Ask one student to move the box. Ask the student to describe what kind of movement was used to move the box. Accept all answers. (Record student responses.)
4. Ask:  
*Is there another way to move the box?*

Allow students to move the box in different ways, and ask each student to use a word to describe the way the box was moved. Record all responses.

5. Read the list of responses back to the students.

**EXPLORE**

1. Ask each student to stand by some object in the room that can be moved.
2. Have each student name the object chosen and demonstrate for the class how it can be moved. Again, ask students to name the type of movement used (push, pull, lift, raise, etc.)
3. Ask one student to push or pull a student desk or another object with similar mass. Have the students identify whether the force he/she used was a push or a pull. Ask another student to help the first student move the desk by working together – the first student continues to use the pushing or pulling motion he first used and the second student uses the opposite motion (students should be on opposite sides of the desk). Note: one student will be pushing and one student will be pulling to move the object.
4. Discuss the advantages of having more than one student push and pull an object in order to move it.
5. Have the students try to move the desk with both of them using the same force (i.e., both pushing or both pulling at the same time).

**EXPLAIN**

1. Create a chart with columns, labeled with the headings the students used earlier to describe the movements they made during the exploration phase (e.g., push, pull, lift, shove).

<b>Push</b>	<b>Pull</b>	<b>Lift</b>	<b>Shove</b>
chair	curtain	pencil	book

2. As each student names the object moved and the type of movement that was used, record the responses on the chart.
3. Develop the concept of movement and clarify with the class the related vocabulary through questioning. Accept all answers while emphasizing that all responses, such as lift, slide, roll, etc. are related to push and pull movements.

Ask:

*What kind of movement is this? (Demonstrate a push.)*

*What kind of movement is this? (Demonstrate a pull.)*

*How are they different?*

*How are they the same?*

*Is a lift like a pull or a push?*

*In what directions are you moving an object when you pull it?*

*In what directions are you moving an object when you push it?*

*Can you move anything in this room without pushing or pulling it?*

(Work through any examples students mention. For instance, if a student blows on a piece of paper to move it, discuss the blowing as air pushing the paper.)

### **EXTEND/APPLY**

1. Take students on a walk where they can observe both objects and people moving and being moved. Stop along the way and discuss any obvious movements and whether they seem to be examples of a push or a pull.
2. Discuss and demonstrate common actions, such as mowing a lawn, sweeping, throwing and catching a bean bag, etc. and discuss whether a pull or a push would be the most efficient way to move the object being used.
3. Teacher sits on a rolling chair while students push and pull the chair.
4. Read *Some Things Push and Some Things Pull*.

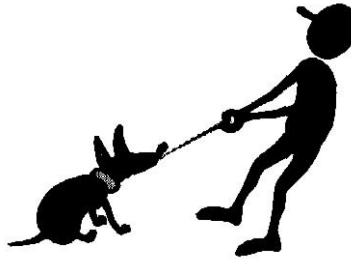
### **EXTENSION**

Make a push or pull class book. Use photos of students pushing or pulling objects. On each page write, "Is (child's name) pushing or pulling the (object)? Write the answer on the back of the page.

### **ASSESSMENT**

Conference with student. Have student open and close a door. Have him/her move a chair. Can the student explain how he/she used a push or a pull to move the door and the chair?

# WHAT A DRAG!



## **BENCHMARKS and TASKS**

**SC.C.1.1.1** The student understands that different things move at different speeds.

**SC.C.2.1.1** The student knows that one way to change how something is moving is to give it a push or a pull.

- The student changes the position and motion of objects by pushing or pulling on them.
- The student compares and contrasts many different ways of moving, such as straight, zigzag, round and round, back and forth, and fast and slow.

## **KEY QUESTION**

How does a block move differently when it is pulled across different surfaces?

What are some ways you can move a block?

Do all objects move at the same speed?

## **MATERIALS**

### **Teacher**

block

string or yarn

*The Enormous Turnip* by Kathy Parkinson or

*The Enormous Watermelon* – Wright Group

Sunshine big book or

*Cucumber Soup* by Vickie Leigh Krudwig

magic markers or round sticks

### **Per group**

1 large block (at least 20 cm x 15 cm x 15 cm)

string or yarn

various surfaces – floor, carpet, grass,

sand, cement, wood, paper, etc.

items to travel on an inclined plane (e.g.,

cotton ball, toy car, block, etc.)

## **TEACHER TIPS**

1. Ask a volunteer or an older student assistant to help with tying string around the blocks.
2. Try moving the block across the carpet/tile yourself before the lesson. If the difference in difficulty is not noticeable, substitute it with a box with blocks. (Be sure it's not too heavy.)
3. Books can be substituted if you do not have blocks.

## **ENGAGE**

1. Read and discuss *Cucumber Soup*, *The Enormous Turnip*, or *The Enormous Watermelon*.
2. Begin the lesson by dragging (pulling) a block with a string tied around it across both the carpet and the floor (or pull the box with blocks).

Ask:

*Did the block move the same way on the floor as it did on the carpet?*

Discuss responses.

3. Recite the poem:  
A block on a rug is hard to tug.  
A block on the floor moves out the door.

### **EXPLORE**

1. Encourage pairs of students to pull a block with a string tied around it along as many different surfaces as they can find.
2. Challenge the students to:
  - pull the blocks fast, then pull the blocks slowly.
  - pull the blocks in a straight line, a zigzag pattern, around in circles.
3. Use an inclined plane (box, board, cardboard, Hot Wheels track, etc.) to show that different things slide down a ramp at different speeds. Send different items (cotton ball, toy car, block, etc.) down an inclined plane.
4. Use a T-chart labeled “*Fast Lane/Slow Lane*” to record the names of the objects used in #3.

### **EXPLAIN**

Ask:

*On which surface was it the easiest to move the block?*

*On which surface was it the most difficult to move the block?*

*Do you think it would be easy to pull the block over a surface made of glass? Why?*

*What are some other surfaces where you think it would be easy to pull the block? Why?*

*What are some surfaces where you think it would be difficult to move the block? Why?*

*Was it easier to pull a block slowly or quickly? Why?*

*What did you discover when you pulled the block in a straight line, a zigzag pattern, around in circles?*

*When you sent items down an inclined plane, why do you think some items slid faster or slower than others?*

### **EXTEND/APPLY**

1. Bring a broom to class. Let children take turns trying to sweep a bare floor and a carpeted area. Discuss the ease or difficulty of sweeping the different surfaces. Relate the sweeping motion to a push and pull.
2. Have students bring in different kinds of shoes (or use the ones they are wearing). Compare the soles of the shoes (smooth/rough). *Which shoes allow you to “glide” across the floor? Why?*
3. *Which ones would be hard to “glide” across the floor? Why?*
4. Ask students to try to push a very heavy box (test first) with one finger across the table. Then give them something round such as magic markers. Place them under the box and push with one finger again. *Why was the box easier to push?*

### **ASSESSMENT**

Have the students draw a picture showing on which surface they would choose to ride a scooter. Dictate to an adult why they chose that surface.

# WHEN PUSH COMES TO SHOVE

## BENCHMARKS and TASKS

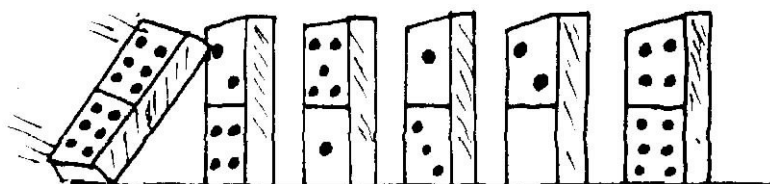
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## KEY QUESTION

How can one object move another?



## MATERIALS

### Teacher

2 dominoes

### Per group

dominoes or hexagonal pattern blocks

### Per class

small ball

## TEACHING TIPS

Caution students not to interrupt, touch, or disturb other students' dominoes.

## ENGAGE

1. Gather students in a circle near a table with dominoes. Place one domino standing up at one end of the table and another domino standing up at the other end of the table.
2. Ask: *If one domino is pushed, will it knock the other domino down? What could we do to make the other domino fall down without moving the dominoes closer together?* Try students' suggestions.

## EXPLORE

1. Divide the class into small groups and distribute dominoes.
2. Ask: *How can you set up the dominoes so that they can move each other?*
3. Give students the opportunity to experiment with the dominoes until they can arrange them in such a way that they move each other.

## **PLAIN**

Ask:

*How did the dominoes move each other?*

*Were the movements pushes or pulls?*

*How did you start the dominoes moving?*

## **EXTEND/APPLY**

1. Allow students additional time to continue exploring the “domino effect” using various lines other than a straight line (spirals, circles, zigzag, etc.) that can demonstrate the motion caused by pushing.
2. Have students sit in a large circle. Ask one student to roll a small ball toward another student. Point out that he/she is “pushing” the ball. The student receiving the ball changes the direction and speed of the ball by pushing it to a different student. Relate this activity to a sport that uses a ball (e.g., baseball, soccer, tennis).

## **ASSESSMENT**

Have students recreate the domino activity using hexagonal pattern blocks and have the students explain why the pattern blocks moved.