

Date: _____

Your Name: _____

Name(s) of Partner(s): _____



**NEW ENGLAND
COMMON ASSESSMENT PROGRAM**

Released Science Inquiry Task

Sled Pull

2009

Grade 4

Inquiry Booklet

Science

Directions:

You will conduct a science investigation called **Sled Pull**. First you will work with your partner(s) and then you will copy your data and work alone.

You will make a prediction on your own. You will set up and conduct the investigation and you will collect and record your data with your partner(s).

Scientists often make models to guide their investigations. You will be using a model to investigate the amount of force needed to pull objects with different weights.

Follow the directions in this Inquiry Booklet. Please remember that in addition to working with the science materials, you must **record your data in the Data Table on page 7**.

The words listed in the table below are used in this investigation.

Word Bank

Affect	to change something
Change in position	a move from one place to another
Fair test	an investigation in which scientists change one thing at a time
Force	a push or pull on an object
Median	the middle number in a set of numbers ordered from lowest to highest or from highest to lowest Example: Trial 1 has 12 pennies, Trial 2 has 10 pennies, and Trial 3 has 15 pennies. The order of these numbers from lowest to highest is 10, 12, 15. The <i>median</i> (or the middle number) in this set is 12.
Model	a smaller version of something that happens in the world
Prediction	what you think will happen based on <i>what you already know</i>
Trend	a pattern in a set of data
Trial	each time you do the steps of an investigation

Sled Pull

Mrs. Smith's class is having a contest with another class as part of an after-school science activity called **Sled Pull**. The students will use a sled to pull objects with different weights. Before the contest, the students must estimate how many students will be needed to pull different objects.

The contest rules do not allow the students to practice using the actual objects they will use in the contest. The students decide to use a model to investigate the amount of force needed to pull objects with different weights. The students know that scientists use models to try out new ideas. They know that models can represent things that happen in nature. They also know that models are useful for studying things that are too big or too small to investigate in a classroom. For example, the students used a stream table in their classroom when they were studying erosion.

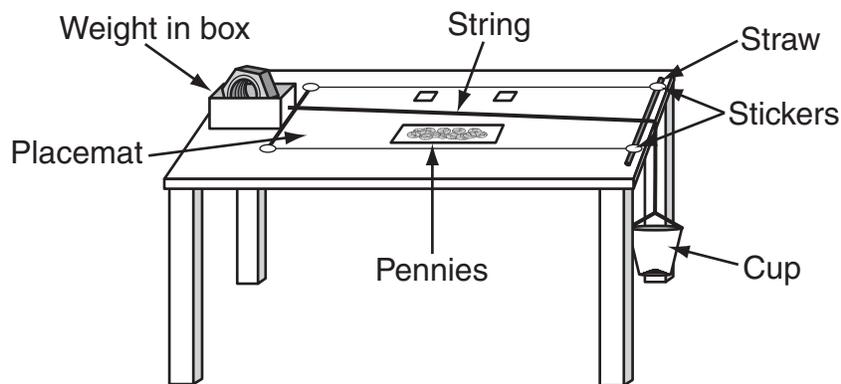
Mrs. Smith tells the students to think of a question they can investigate scientifically. The students decide to investigate the research question below.

Research Question:

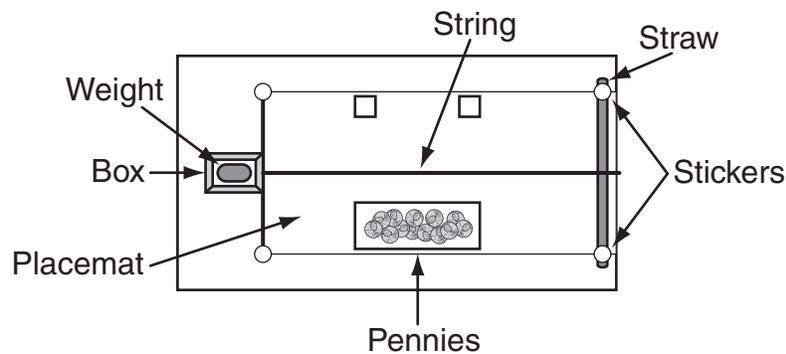
How does increasing the weight of an object affect the amount of force needed to make it move?

Mrs. Smith gives each pair of students some materials, including a small box attached to a piece of string and a cup, a small weight, a large weight, and 20 pennies. She tells the students they will use the pennies to measure the amount of force needed to move the box. She shows the students how to put together a model to investigate how increasing the weight of an object affects the amount of force needed to make it move. The diagrams below show how the students set up their investigation.

Side View



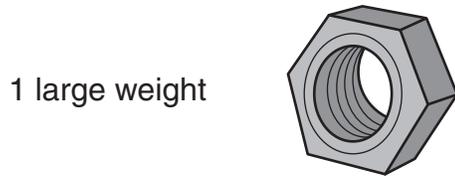
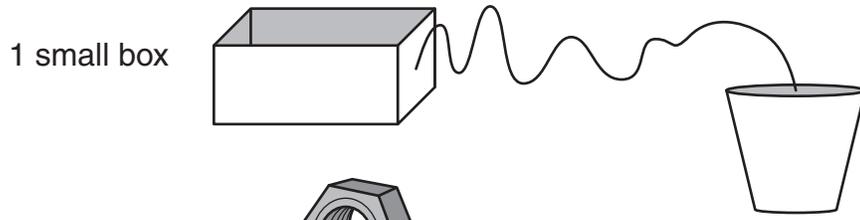
Top View



Setting Up:

You have the same materials as the students in Mrs. Smith's class.

Materials for the Investigation:



Making a Prediction—What Do You Think?

Research Question:
How does increasing the weight of an object affect the amount of force needed to make it move?

Make a prediction **on your own** about the research question.

- Use the information from the story about Mrs. Smith’s class and what you know about force and motion to make your prediction.
- Explain your prediction.

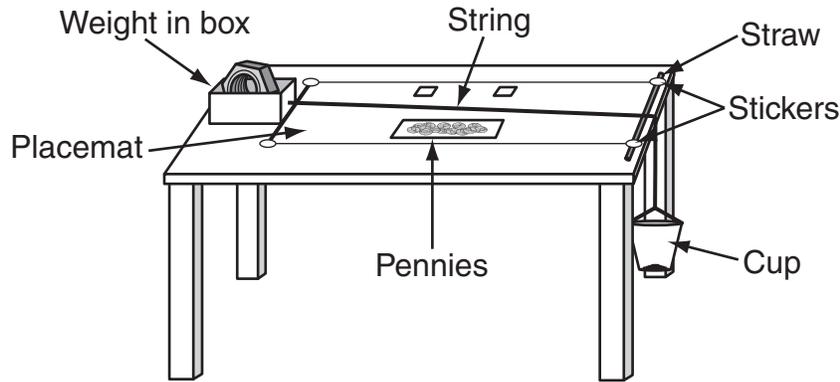
I predict _____

because _____

Procedure:

You and your partner(s) will take turns using the materials. You will each record all of the data in your own Inquiry Booklet. Make sure the materials are set up as shown in the diagram below.

Side View



Box with No Added Weight

Trial 1	Trial 2	Trial 3
<ol style="list-style-type: none"> 1. Set the empty box behind the starting line on the placemat. 2. Carefully add pennies, one at a time, to the cup until the box reaches the straw at the end of the placemat. 3. Remove the pennies from the cup and count them. 4. Record the number of pennies under Trial 1 in the Data Table on page 7. 	<ol style="list-style-type: none"> 1. Repeat steps 1 through 3 from Trial 1. 2. Record the number of pennies for the box with no added weight under Trial 2 in the Data Table on page 7. 	<ol style="list-style-type: none"> 1. Repeat steps 1 through 3 from Trial 1. 2. Record the number of pennies for the box with no added weight under Trial 3 in the Data Table on page 7.

Box with Small Weight

Trial 1	Trial 2	Trial 3
<ol style="list-style-type: none"> 1. Set the empty box behind the starting line on the placemat. 2. Put the small weight in the box. 3. Carefully add pennies, one at a time, to the cup until the box reaches the straw at the end of the placemat. 4. Remove the pennies from the cup and count them. 5. Record the number of pennies under Trial 1 in the Data Table on page 7. 	<ol style="list-style-type: none"> 1. Repeat steps 1 through 4 from Trial 1. 2. Record the number of pennies for the box with small weight under Trial 2 in the Data Table on page 7. 	<ol style="list-style-type: none"> 1. Repeat steps 1 through 4 from Trial 1. 2. Record the number of pennies for the box with small weight under Trial 3 in the Data Table on page 7.

Box with Large Weight

Trial 1	Trial 2	Trial 3
<ol style="list-style-type: none"> 1. Set the empty box behind the starting line on the placemat. 2. Put the large weight in the box. 3. Carefully add pennies, one at a time, to the cup until the box reaches the straw at the end of the placemat. 4. Remove the pennies from the cup and count them. 5. Record the number of pennies under Trial 1 in the Data Table below. 	<ol style="list-style-type: none"> 1. Repeat steps 1 through 4 from Trial 1. 2. Record the number of pennies for the box with large weight under Trial 2 in the Data Table below. 	<ol style="list-style-type: none"> 1. Repeat steps 1 through 4 from Trial 1. 2. Record the number of pennies for the box with large weight under Trial 3 in the Data Table below.

Data Table: Measuring Amounts of Force

	Number of Pennies		
	Trial 1	Trial 2	Trial 3
Box with No Added Weight			
Box with Small Weight			
Box with Large Weight			

Reminder: You will copy your data from this Data Table to the Data Table on page 2 of your Student Answer Booklet.

