NEW ENGLAND
COMMON ASSESSMENT PROGRAM

Released Science Inquiry Task

Toy Skateboard Roll

2014

Grade 4

Inquiry Booklet

Science

Directions:

You will read a story about students using science to solve a problem. You and your partner will do the same investigation as the students in the story.

Word Bank

Median	the middle number in a list of numbers arranged from smallest to largest **Example:** The median for 2 cm, 4 cm, and 5 cm is 4 cm.
Model	a testable idea used to learn about the natural world
Ramp	a sloped surface connecting a higher place to a lower place

Toy Skateboard Roll

Andrew and Hillary are students in the same class. They often meet after school to ride their skateboards down the skateboard ramp in Hillary's driveway. Each student starts at the top of the ramp and rides down it. This gives them speed to go down some of the driveway. The picture below shows the students and the ramp.
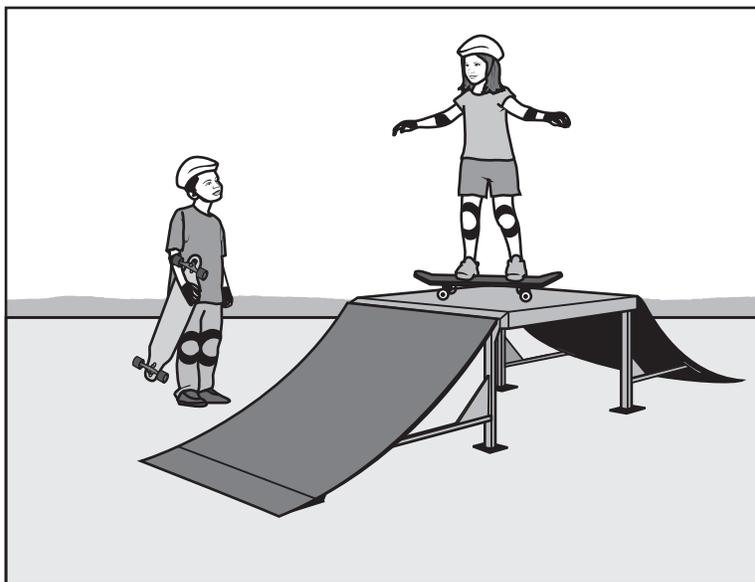
One day, Andrew rode his skateboard down the ramp. He rolled to a stop seven meters from the end of the ramp. Hillary rode next. She rolled to a stop five meters from the end of the ramp.

Hillary wants to roll farther. Hillary and Andrew wonder how they can change the ramp to help her roll farther. Hillary thinks they should raise the height of the ramp. They decide to test the idea by investigating the answer to this research question:

Will raising the height of the ramp cause the skateboard to roll farther from the end of the ramp?

GO ON

Making a Prediction—What Do You Think?

Make a prediction **on your own** about Hillary and Andrew's research question.

> **Research Question:**
>
> **Will raising the height of the ramp cause the skateboard to roll farther from the end of the ramp?**

Use the information from the story about the students and what you know about force and motion to make your prediction.

Explain your prediction.

I predict _____

_____

_____

because _____

_____
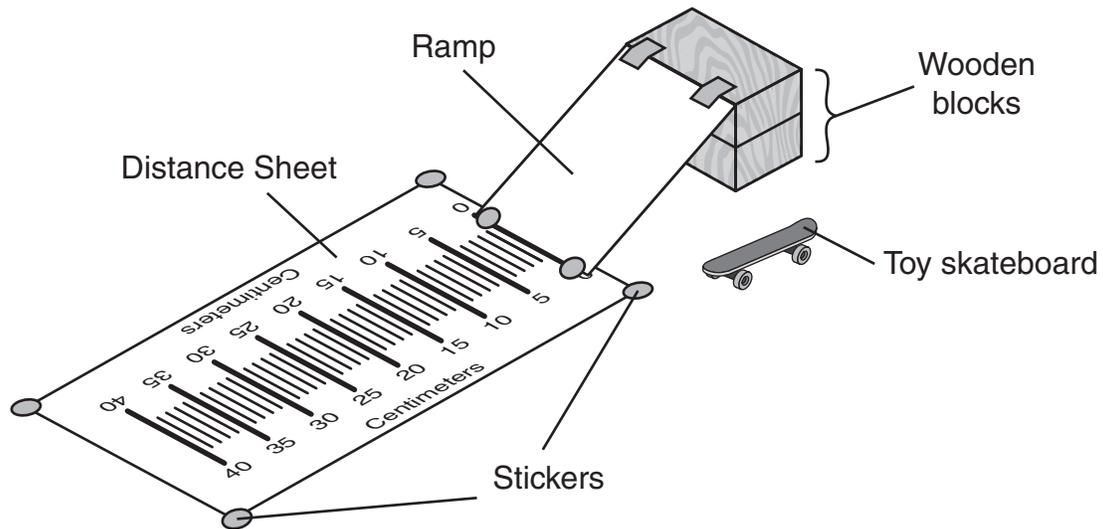
_____

_____

DO NOT GO ON. **STOP**

Hillary and Andrew decided that the best way to investigate their research question was to build a model of Hillary's real skateboard ramp. The diagram below shows the parts of the real skateboard ramp and their much smaller model skateboard ramp.

Real Skateboard Ramp   Model Skateboard Ramp

Skateboard

Ramp

Supports for
height

Blocks for
height
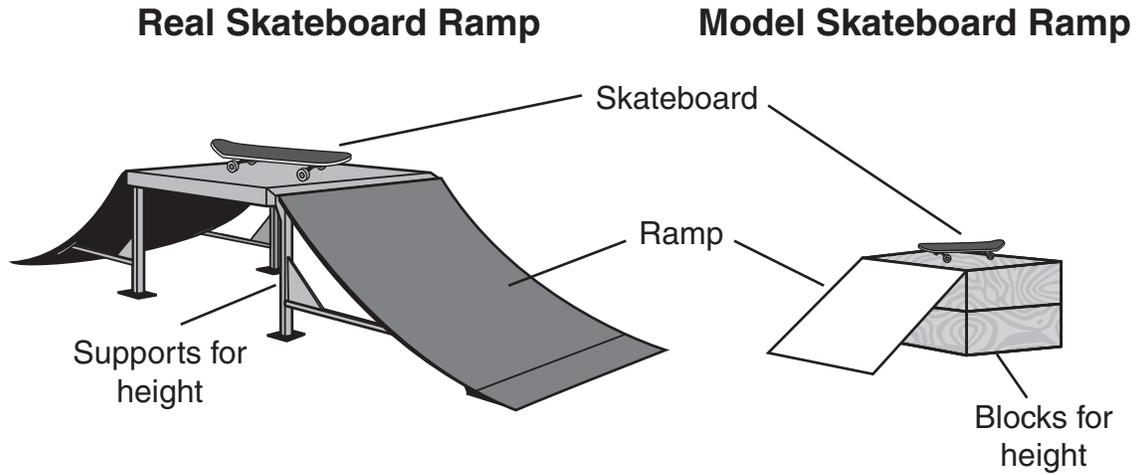
Hillary and Andrew used the setup below to do their investigation.

Model Setup

Ramp

Wooden
blocks

Distance Sheet

Toy skateboard

Centimeters

Centimeters

Stickers

Hillary and Andrew each rolled the toy skateboard three times down the ramp with one block and found the median distance. Then they repeated the test down the ramp with two blocks and found that median.

You will be doing the same investigation as Hillary and Andrew.

You have the same materials on the placemat in front of you as Hillary and Andrew used.

Materials for the Investigation:

1 toy skateboard

1 ramp

2 wooden blocks

2 rectangular stickers

6 round stickers

1 Distance Sheet

Procedure:

- You and your partner(s) will take turns using the materials in this investigation.

- You will test two different ramp heights and make three measurements at each height. Make sure the materials are set up as shown in the diagrams on pages 5 and 6.

- You will each record all of the data in your own Inquiry Booklet.

Part A: Test the Distance the Toy Skateboard Rolls with a One-Block Ramp and Record Your Data.

1. Look at Model Setup 1 as you do steps 2 through 6.
2. Place the Distance Sheet on a flat surface and attach each of its four corners to the surface with one round sticker.
3. Lay one wooden block down near the Distance Sheet, as shown in Model Setup 1.
4. Use the two rectangular stickers to attach the top of the ramp to the edge of the wooden block as shown.
5. Move the block so that the end of the ramp and the zero-centimeter line on the Distance Sheet meet.
6. Attach the edge of the Distance Sheet and the end of the ramp with the last two round stickers.

Model Setup 1
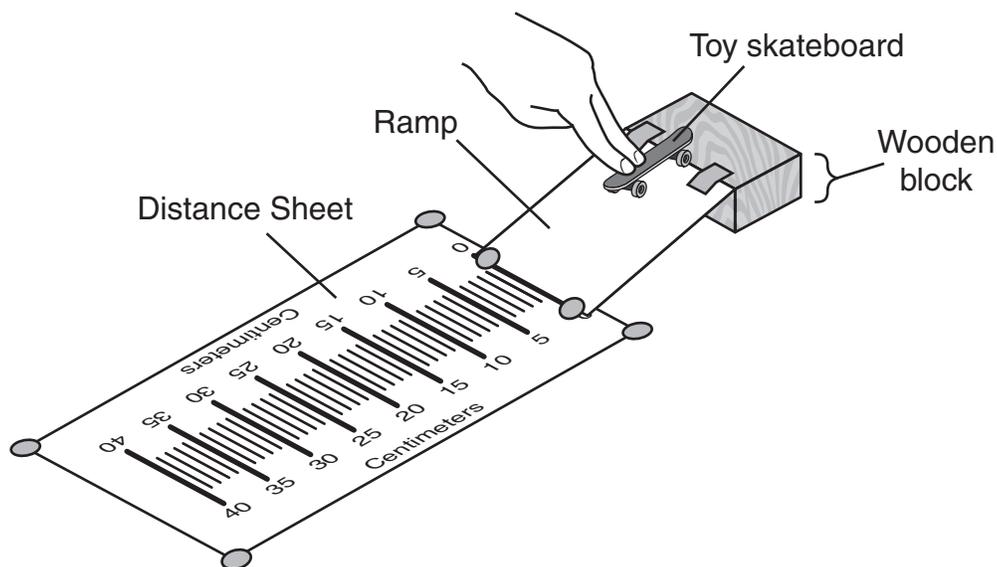
7. Place the toy skateboard at the top of the ramp so that its back wheels are on the line where the ramp meets the wooden block. Be sure to release the skateboard from the same place for each trial without pushing it.
8. **Release** the skateboard and allow it to roll to a complete stop.
9. Measure the distance, to the nearest centimeter, from the bottom of the ramp to the front wheels of the skateboard.
10. Record the distance for **Trial 1** of the one-block ramp in Data Table 1.
11. Repeat steps 7 through 9 two more times to get two more measurements for the one-block ramp.
12. Record the distances for **Trials 2 and 3** of the one-block ramp in Data Table 1.
13. Record the median distance in Data Table 1.

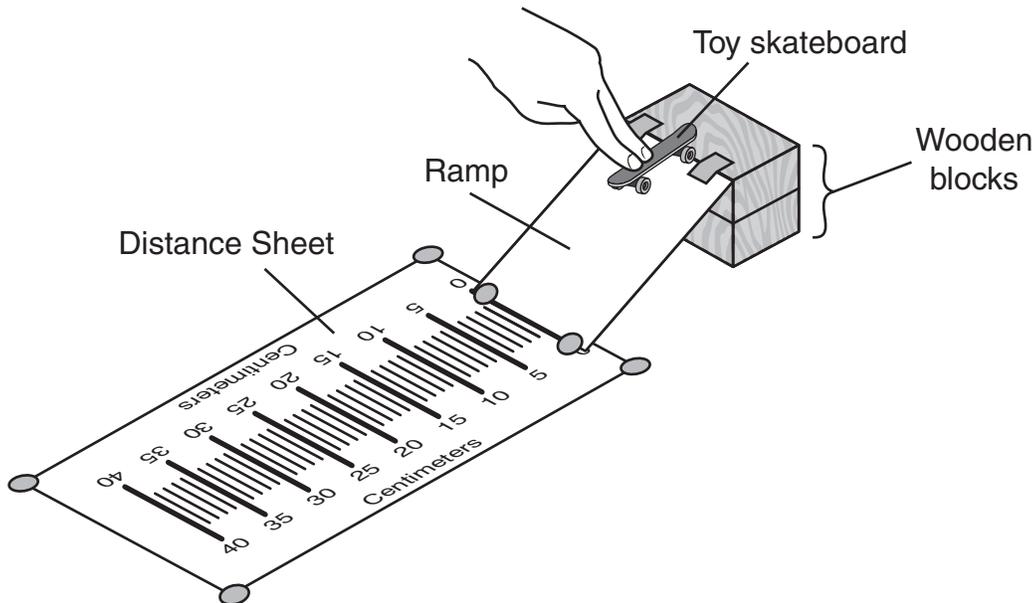### Data Table 1: Distance of Toy Skateboard's Roll (cm) Down 1-Block Ramp

Ramp Height	Trial 1	Trial 2	Trial 3	Median
1 block				

DO NOT GO ON. STOP

Part B: Test the Distance the Toy Skateboard Rolls with a Two-Block Ramp and Record Your Data.

Model Setup 2

1. Slide the second wooden block under the first block to raise the ramp height, as shown in Model Setup 2.

2. Be sure the stickers attaching the top block to the ramp stay in place.

3. Place the toy skateboard at the top of the ramp so that its back wheels are on the line where the ramp meets the top wooden block. Be sure to release the skateboard from the same place for each trial without pushing it.

4. **Release** the skateboard and allow it to roll to a complete stop.

5. Measure the distance, to the nearest centimeter, from the bottom of the ramp to the front wheels of the skateboard.

6. Record the distance for **Trial 1** of the two-block ramp in Data Table 2.

7. Repeat steps 3 through 6 two more times to get two more measurements for the two-block ramp.

8. Record the distances for **Trials 2 and 3** of the two-block ramp in Data Table 2.

9. Record the median distance in Data Table 2.

Data Table 2: Distance of Toy Skateboard's Roll (cm) Down 2-Block Ramp

Ramp Height	Trial 1	Trial 2	Trial 3	Median
2 blocks				