

MOTION AND MATTER—*Investigation 3, Part 2*

Investigation 3, Part 2:

*Distance
Challenge*



Teacher
Notes

Complete Teacher Notes



Investigation 3, Part 2

Measuring Distance



New cart challenge: Construct a cart that can roll down a ramp and travel some distance past the ramp.

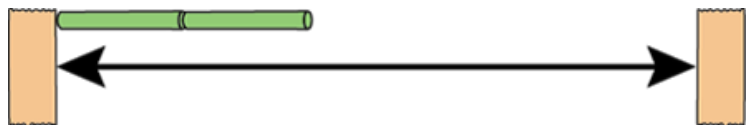
How do people measure distance?

Measure the distance between the two pieces of tape using straws.

Are the straws placed end to end, no overlaps or gaps?

Is the student keeping count of how many straw units it takes to move from one piece of tape to the other?

Now, measure the same distance in straws on another table across the room.



IG pg. 184, Steps 1–3

Investigation 3, Part 2

The Meter

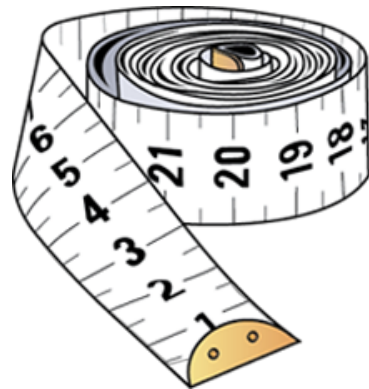


Scientists need a **standard unit** that never changes. The unit used by scientists to measure length and distance is the **meter**. The meter is the standard unit for measuring distance in the **metric system**.

The meter is too large for measuring small objects like a straw. The meter is divided into 100 equal parts called **centimeters**.

"Centi" means one hundredth.
100 centimeters = 1 meter.

The symbol for centimeters is **cm**, and the symbol for meters is **m**.



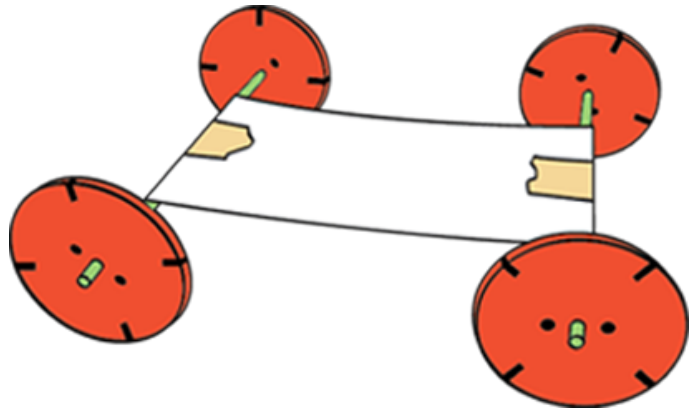
IG pg. 185, Steps 4–7

Investigation 3, Part 2

Focus Question



- How can you improve the design of your cart?



Teacher
Notes

IG pg. 186, Step 8

Investigation 3, Part 2

Design New Carts



Can you construct a new cart that can roll down a ramp and some distance past the ramp?

Materials:

- Your bag of materials
- Scissors
- Tape
- Index cards
- Ramp
- Meter tape

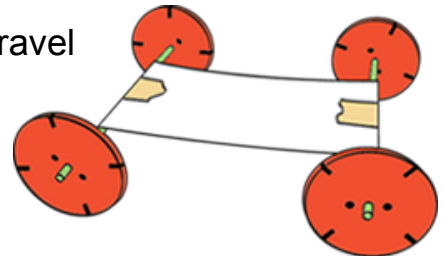
Procedure:

1. Construct a new cart.
2. Test your cart by rolling it down the ramp.
3. Measure how far your cart rolls past the ramp.
4. Record the distance in your notebook.
5. Conduct at least three trials.



New challenge: Can you modify your cart to travel at least 15 cm farther than your longest run?

Time



Teacher
Notes

IG pg. 186–187, Steps 9–12

Investigation 3, Part 2

Vocabulary Review



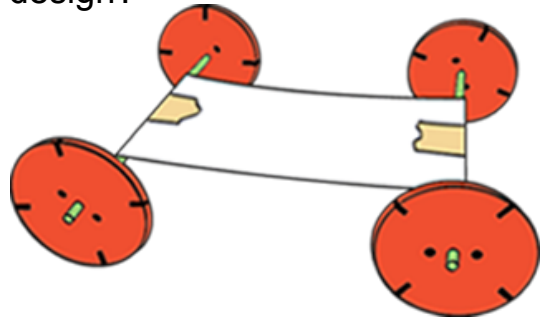
IG pg. 187, Step 13

Focus Question

► How can you improve the design of your cart?



- Draw a labeled diagram of the system you designed in your notebook.
- Write a few sentences describing what you did to make your cart travel farther (shorter).
- What was a problem you had in your design? How did you solve the problem?



Investigation 3, Part 2

Clean Up!



Save your cart. Put it in your zip bag for storage.



Teacher
Notes

IG pg. 187, Step 15

Reading in Science Resources



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Wrap-Up/Warm-Up

► How can you improve the design of your cart?

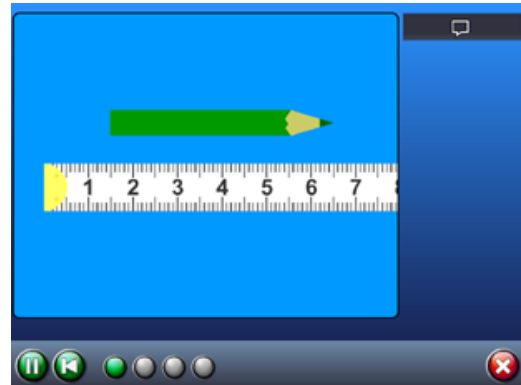
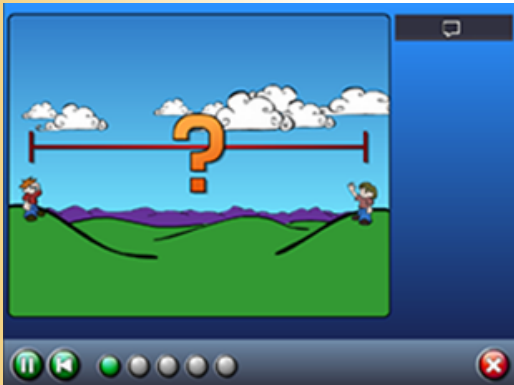
Pair up with a partner to



- share your answer to the focus question;
- share and compare your diagrams;
- share an interesting thing you learned about cart design.

Investigation 3, Part 2

Online Measurement Activities



Teacher
Notes

IG pg. 189, Step 22

Investigation 3, Part 2

Motion and Matter

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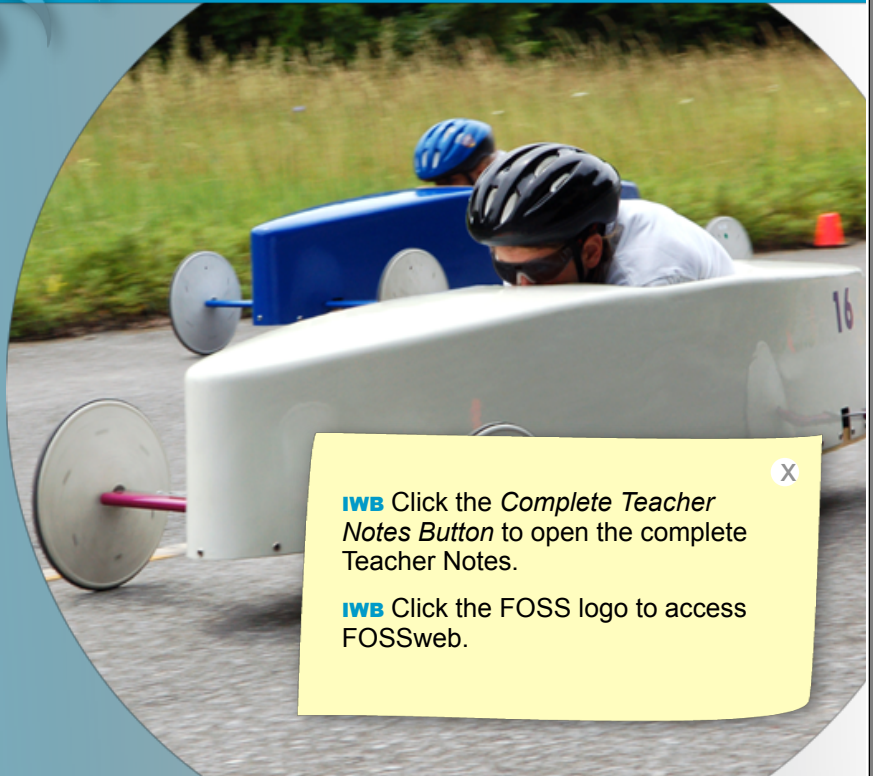
FOSS Program Overview



MOTION AND MATTER—*Investigation 3, Part 2*

Investigation 3, Part 2:

Distance Challenge



IWB Click the *Complete Teacher Notes Button* to open the complete Teacher Notes.

IWB Click the FOSS logo to access FOSSweb.



Teacher
Notes

Complete Teacher Notes



Measuring Distance



New cart challenge: Construct a ramp and travel some distance.

How do people measure distance?

Measure the distance between two points using tape using straws.

Are the straws placed end-to-end?

Is the student keeping count of the number of straws it takes to move from one point to another?

Now, measure the same distance on a table across the room.

Motion and Matter, IG pg 184, Steps 1–3



Tell students about the new cart challenge. See Step 1.

IWB You can use the *Pen Tool* to record students' responses.

Before students work on the challenge, do the measurement activity described in Steps 2–3 so students understand the need for a standard measuring system.

Have one student measure the distance between two pieces of tape that you have prepared on a table (see Getting Ready Step 3) using two pieces of straws.

Have a second student measure the distance the first student measured in straws on another table across the room. (This student unknowingly has different-sized straw pieces.)

Discuss the discrepancy.

The standard measuring system will be introduced on the next slide.



Investigation 3, Part 2

The Meter

Scientists need
The unit used to
distance is the
for measuring

Motion and Matter, IG pg 185, Steps 4–7

X

Show students a meter tape and introduce the meter as the standard unit for measuring distance in the metric system.

IWB Click the arrow to introduce the centimeter as a subset of the meter.

Distribute a meter tape to each pair of students. Have them look over the numbers, 1–100. Ask them to locate the longer marks printed next to the numbers. They are 1 cm apart. The shorter lines measure half centimeters.

Ask students to locate zero on the meter tape. It is obscured by the metal tab on the end, but students should understand that zero is exactly at the end of the tape and is the best place to start measuring from.

Have a volunteer measure the tape marks on the table, using the meter tape, and report the distance (50 cm). Have a second student confirm the distance.

New Word Introduce *standard unit*.

standard unit: a unit that never changes. The meter is the standard unit for measuring distance in the metric system.

New Word Introduce *meter*.

meter (m): the basic unit of distance or length in the metric system

New Word Introduce *metric system*.

metric system: a measuring system based on multiples of ten

New Word Introduce *centimeter*.

centimeter (cm): one 100th of a meter; a measurement unit used by scientists to measure distance

Add all new words to the word wall.



IG pg. 185, Steps 4–7

Investigation 3, Part 2

Focus Question



➤ How can you improve the design of your cart?



X

Motion and Matter, IG pg 186, Step 8

Ask students to write the focus question in their notebooks.

Have them share their notebook entries from Part 1 and discuss what they liked about their original designs and what they might like to change.



IG pg. 186, Step 8

Investigation 3, Part 2

Design New Carts



Can you construct a ramp and some carts?

Materials:

- Your bag of materials
- Scissors
- Tape
- Index cards
- Ramp
- Meter tape

Motion and Matter, IG pg 186–187, Steps 9–12

Have students start building new carts. They should test their carts by rolling them down a ramp and measuring the distance the cart rolls.

Make sure students tape their ramps to the floor so they don't move.

Students can mark the floor at 1 m with a piece of tape and then use the meter tape from that piece of tape to measure the final distance if their carts travel more than 1 m.

IWB Click the arrow to present a new challenge. Have students try to design a cart that travels even farther than 1 m. For those groups that already have met that challenge, challenge them to design a cart that will travel at least 15 cm less than 1 m.

Guide students as needed using the questions in Step 11.

When everyone has met the challenge, have them share and demonstrate their cart designs.

See the Teaching Notes in the margins next to Steps 10 and 11.

IWB Use the *Pen Tool* to write when you want students to finish the activity.

X



Teacher
Notes

IG pg. 186–187, Steps 9–12

Investigation 3, Part 2

Vocabulary Review



Motion and Matter, IG pg 187, Step 13

Review vocabulary.

IWB You can use the *Pen Tool* to write class definitions beside the words or use this slide as a vocabulary resource/reminder.

IWB Click each word to reveal its definition at the top of the page.

These words should find a permanent place on a word wall in your classroom so that they are always accessible to students.



IG pg. 187, Step 13

Focus Question



► How can you improve the design of your cart?



- Draw a labeled diagram of the system designed in your notebook.
- Write a few sentences describing what you did to make your cart travel farther (and shorter).
- What was a problem you had in your design? How did you solve the problem?

Motion and Matter, IG pg 187, Steps 14 and 16

Ask students to answer the focus question in their notebooks. They should draw a labeled diagram of the system they designed and write a few sentences describing what they did to make their cart travel farther (and shorter). Have them write one problem they had and how they solved it.

Assess progress using the "What to Look For" in Step 16.

Clean up is on the next slide.

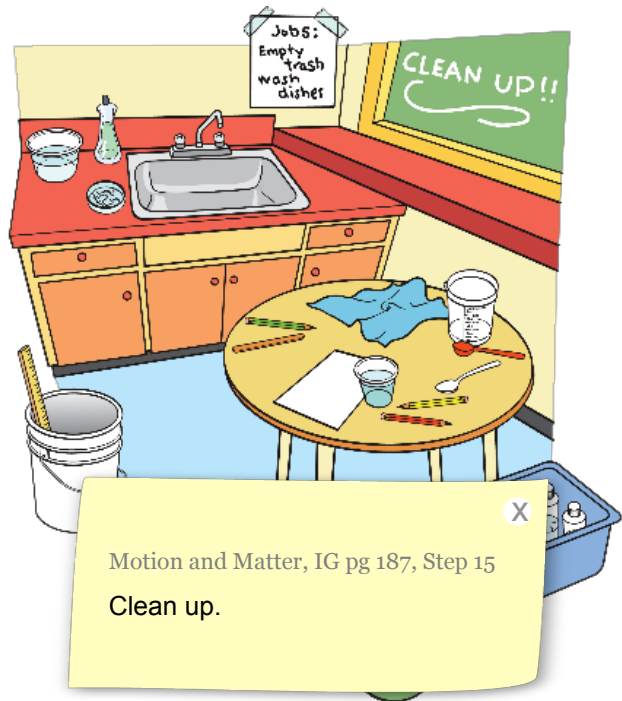


Investigation 3, Part 2

Clean Up!



Save your cart. Put it in your zip bag for storage.



IG pg. 187, Step 15

Investigation 3, Part 2

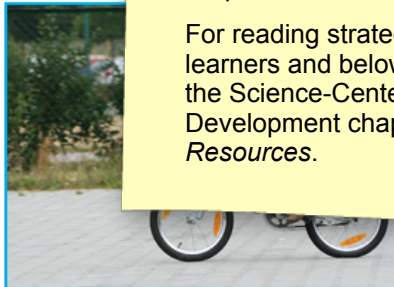
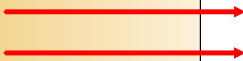
Reading in Science Resources



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- What Engineers Do . . .
- Science Practices
- Engineering Practices . . .
- Soap Box Derby
- The Metric System
- How Engineers and Science
- Magnets at Work



Motion and Matter, IG pg 188, Steps 17–20

Turn to page 34, "Soap Box Derby," in *Science Resources*. Have students preview and read the selection as described in Step 17. Discuss the reading using the questions in Step 18.

Turn to page 38, "The Metric System," in *Science Resources*. Have students read the selection using a reading strategy of your choice. Discuss the reading as described in Step 20.

For reading strategies to support English learners and below-grade-level readers, see the Science-Centered Language Development chapter in *Teacher Resources*.



Teacher
Notes

IG pg. 188, Steps 17–20

Wrap-Up/Warm-Up



➤ How can you improve the design of your cart?

Pair up with a partner to

- share your answer to the focus question;
- share and compare your diagrams;
- share an interesting thing you learned about cart design.

Motion and Matter, IG pg 189, Step 21

Wrap-Up/Warm-Up

Conclude this part or start the next part by having students share their notebook entries with a partner.

See the Science-Centered Language Development chapter in *Teacher Resources* for suggestions for how students can share responses.

Conduct a science talk as described in Step 21.



Investigation 3, Part 2

Online Measurement Activities



Motion and Matter, IG pg 189, Step 22

If students need more help measuring distance, have them engage with the tutorials "Measuring Length" and "Measurement Logic."

The links to these activities for teachers are in the Resources by Investigation and in the Digital-Only Resources, and for students in the Online Activities on FOSSweb.

NOTE: You must be connected to the Internet and logged into FOSSweb to access the activities.

IWB Click the arrow on the left to access the "Measuring Length" online activity. You can also access the activity directly via the Internet by going to http://www.fossweb.com/delegate/ssi-foss-ucm/Contribution%20Folders/FOSS/tutorials/Measuring_Matter_440_Release/vht.html?config=t06/build.xml&log=3&title=Measuring%20Length

IWB Click the arrow on the right to access the "Measurement Logic" online activity. You can also access the activity directly via the Internet by going to http://www.fossweb.com/delegate/ssi-foss-ucm/Contribution%20Folders/FOSS/tutorials/Measuring_Matter_440_Release/vht.html?config=t10/build.xml&log=3&title=Measurement%20Logic



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IG pg. 189, Step 22

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Motion and Matter

IWB Click each logo to access its respective website.

IWB Click the *FOSS Program Overview Button* to open the FOSS Program Overview.



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Notes

FOSS Program Overview

