



Name \_\_\_\_\_

## ESSENTIAL QUESTION

# How Do Forces Affect Motion?

## EXPLORE

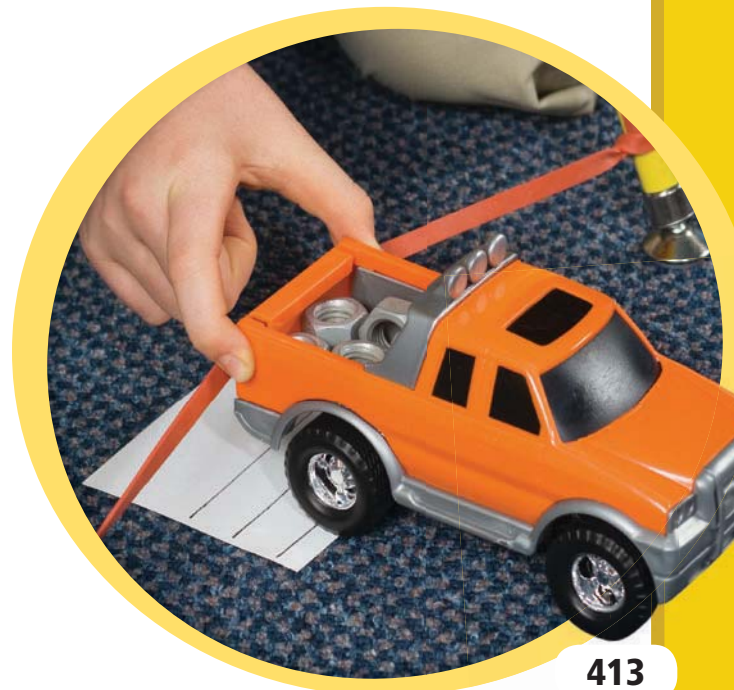
What can you do to make a toy truck move faster or travel farther?

## Before You Begin—Preview the Steps

- 1 CAUTION:** wear goggles. Cut a rubber band in half, and tie the ends around the legs of a chair.
- Place a piece of tape on the floor. Mark lines that are 1 cm, 2 cm, and 5 cm behind the rubber band.
- Place a toy truck against the rubber band. Pull the truck back to the 1-cm mark, and release it. Measure the distance the truck travels, and record the data. Repeat this step two more times.
- Repeat Step 3 using the 3-cm and 5-cm marks.
- Place four bolts in the toy truck. Launch the truck from the 3-cm mark, and record the distance it travels. Repeat this step two more times.
- Add four more bolts to the truck. Repeat Step 5.

## Materials

safety goggles  
giant rubber band  
chair  
tape  
ruler  
toy truck  
meterstick  
metal bolts



## Set a Purpose

What will you learn from this experiment?

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## State Your Hypothesis

Write your hypothesis, or testable statement.

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## Think About the Procedure

Why do you use a rubber band to start the cars, rather than your hand?

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Why do you add bolts to the truck?

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Name \_\_\_\_\_

## Record Your Data

In the table below, record the data you gathered.

How Forces Affect Motion									
Part 1	Distance rubber band was stretched								
	1 cm			3 cm			5 cm		
Distance traveled (cm)									
Part ii: Rubber band stretched to 3 cm									
	Empty Car			Car with 4 bolts			Car with 8 bolts		
Distance traveled (cm) Trial 1									
Distance traveled (cm) Trial 2									
Distance traveled (cm) Trial 3									

## Draw Conclusions

Each time you changed a variable and launched the truck, you ran three trials. Calculate the average distance traveled by the truck in each experimental setting.

Experimental settings	Average distance traveled (cm)
Rubber band at 1 cm	
Rubber band at 3 cm	
Rubber band at 5 cm	

Experimental settings	Average distance traveled (cm)
truck with 0 bolts	
truck with 4 bolts	
truck with 8 bolts	

Draw two bar graphs to display your data.

## Claims • Evidence • Reasoning

1. Interpret your data. Write a claim about how an object's mass is related to its change in motion when acted on by a force.

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2. Cite evidence that supports your claim and explain why the evidence supports the claim.

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3. Write a claim about how the size of the force applied to an object affects its motion.

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4. Cite evidence that supports your claim and explain why the evidence supports the claim.

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5. Why is it important to repeat an experiment several times or to have several people perform the same experiment? Explain your reasoning.

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