science generation

THE POWER OF PER

SCIENCE ACTIVITIES

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Overview
Unit 7.3

This unit builds on students' understanding of measurement and introduces the concepts of rate and ratio, along with the scientific language necessary to express these concepts.

Students read about a study that found a correlation between students who text frequently and students who make careless errors on tests. The unit also includes two different lab activities related to rate.

The word chart on the last page of the unit should be used as a resource for students.

Reader's Theater

Side Effects of Texting

Setting: Aymara just sent her friend Giselle a link to an article about texting. Giselle opened the article and she couldn't believe what she was reading.

Giselle: This professor says we make more mistakes and say things without thinking because of *texting*.

Reggie: What are you talking about? No professor has been watching me text.

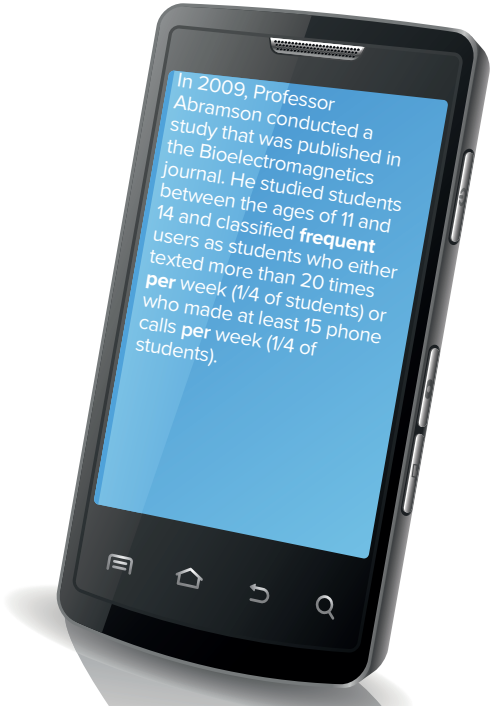
Giselle: *(rolling her eyes)* Uh, Reggie, when I said "we," I meant teenagers, not you and me. Anyway, the prof says the problem is that phones figure out what you're going to type after hitting two or three keys. Now we're getting too used to phones making decisions for us. That makes us do things with more **speed**, but also with lots more mistakes.

Reggie: Hmm, yesterday I did send Aymara a text that read, "Hope Valley Day," when it should have read, "Happy Valentine's Day." What's the article say?

Giselle: You want me to read it out loud? Okay, here goes:

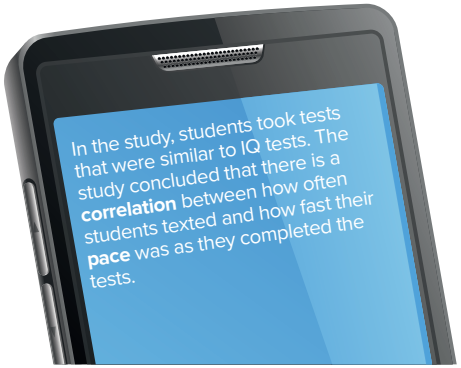
Reggie: Yeah, someone's always pointing out our mistakes. How about writing about how fast we are at typing?

Giselle: Reggie! Let me finish...



Reggie: In 2009! Did they even have cell phones back then? Twenty times **per** week is nothing! My BFFs text way more.

Giselle: I know, right? Get this:



Teacher Directions, Session 1

pages 2-5

Reader's Theater

You may want to assign students parts so they can read the Reader's Theater aloud.

Two friends (Giselle and Reggie) are talking to each other while another friend (Aymara) sends a link to an article. Aymara is rapidly texting her friend about a study suggesting that there is a correlation between students who text frequently and students who make careless errors while taking tests.

As the messages are coming in, Giselle is reading Aymara's messages to Reggie, and the two of them are discussing the merits of the argument. Because they respect Aymara's opinion, they ask her what she thinks. When her response comes back quickly, the three friends begin a discussion about texting speed and have a texting contest.

Review the focus words of the week. Use the word chart at the end of the unit to review definitions and sample sentences.

Reader's Theater

Side Effects of Texting

Reggie: **Correlation**? That means something's connected, right?

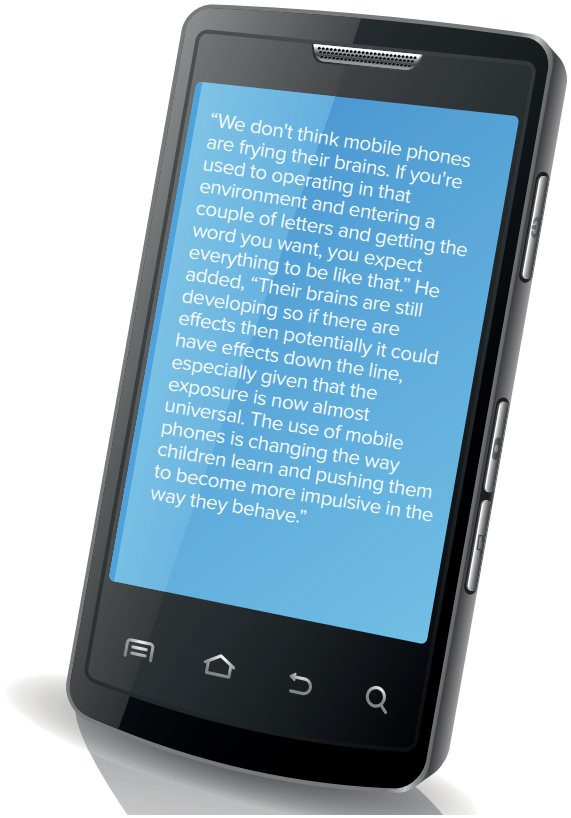
Giselle: Kind of, but not necessarily tied together like a cause and effect. They just happen at the same time. Kind of like: I grew taller this week, and my hair grew longer, but growing taller didn't cause my hair to grow longer. They both happen together, but some other reason causes both of them to happen. According to my mom, that reason is eating disgusting vegetables like broccoli. So this guy is saying that kids who text are likely to **speed** through the test. Let's see...where was I...

Reggie: Okay, this isn't cool. My dad better not see this. He already says I'm impulsive because my brain isn't connected to my body. Now he'll say that I'm impulsive because my cell phone is guessing what I'm typing. He's going to unplug me!

Giselle: Well, maybe both are true?

Reggie: Hey!

Giselle: Wait, listen to what else Professor Abramson said:



Reggie: *(sarcastically)* Nice of the professor to say that my phone isn't turning my brain into french fries. But I think it's too much to say that using phones makes teens impulsive.

Giselle: Yep, I agree. I don't think phones cause us to make other kinds of mistakes either. Say, I wonder what Aymara thinks about this article? She sent it to us. Why don't you send her a text and ask?

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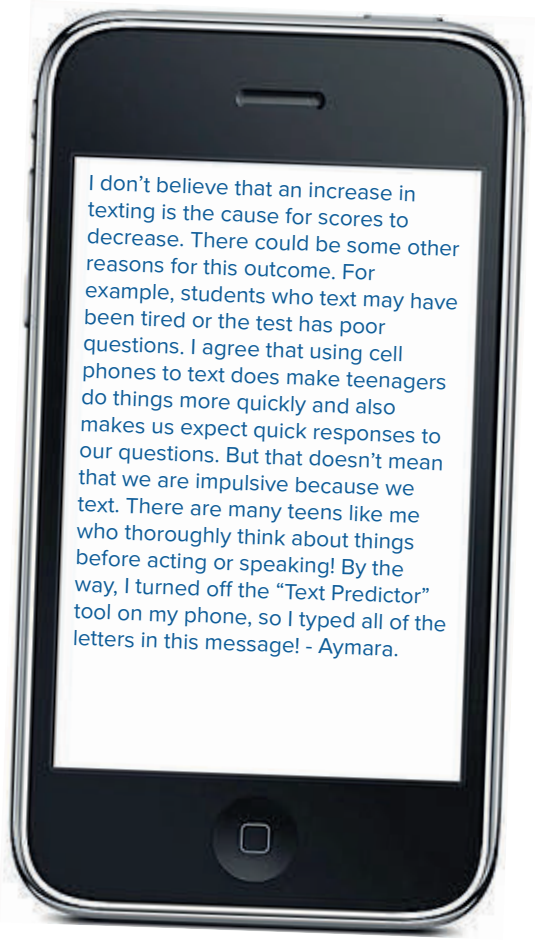
Reader's Theater

Side Effects of Texting

Reggie: *(a few minutes later)* Hey, Giselle, here is Aymara's answer:



Giselle: *(to Reggie)* This is classic Aymara—totally logical and totally opinionated! And she typed every word! Man, this is really long. She must text, like, at the **speed** of light!

Reggie: Hmm, okay, that's a good **pace**. But my thumbs hit the keys so fast, they burn the phone! I'm faster than Aymara.

Giselle: No way. Look, she filled my screen twice, no three times! Can you really beat that?

Reggie: But you don't even know how long it took her to do the texting! She could've taken five minutes! Here, time me for 30 seconds using the timer on your phone.

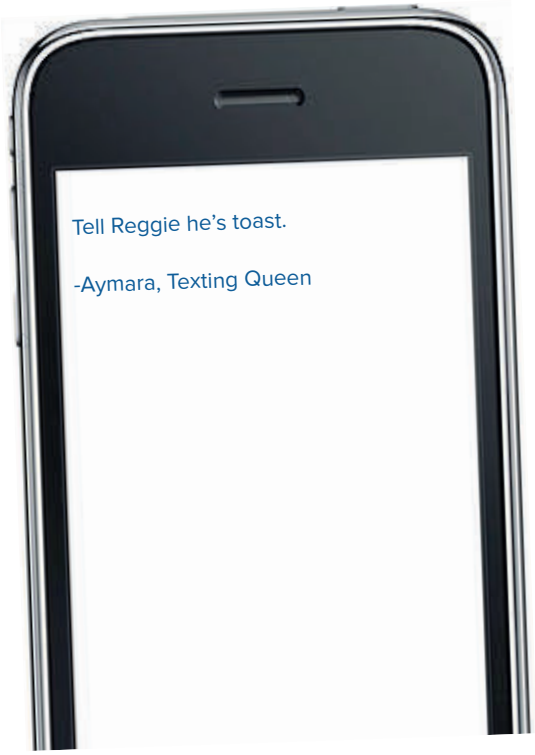
Thirty seconds elapse.

Giselle: ... and STOP! Let me check how you did. Nineteen words in 30 seconds. That's pretty fast! And I'm sorry but I'm counting LOL as one word. Not three. Okay, let's figure out your **speed**: 19 words **per** 30 seconds. And I can shift that to a **per** minute **rate** by doubling. That's 38 words **per** minute. For Aymara's text though, we know she typed a lot, but we don't know how long it took her. So I guess we don't know a **rate** for her.

Reggie: How about sending Aymara a text and tell her to time herself as she texts? Then we can compare our **rates**!

Giselle sends Aymara the message.

Giselle: Aymara is up for the challenge. *Look:*



Reader's Theater

Comprehension Questions

Respond in writing to the questions, then compare and discuss your answers with someone else.

Complete this sentence about the main idea of the article in the journal of *Bioelectromagnetics*.

Professor Abramson found in his study that

_____

_____

_____.

Reggie's dad says that Reggie is impulsive because his brain isn't connected to his body. What does the word *impulsive* mean in this use?

A) doing things quickly

B) doing things repetitively, or time after time

C) acting without thinking things through

D) doing physical things that don't require much thinking

Professor Abramson wanted to find out if students who used their phones a lot behaved impulsively, so he observed students who texted at least 20 times **per** week or called at least 15 times **per** week. When Reggie heard this, he said, "Twenty times **per** week is nothing! My BFFs text way more." Can you restate Reggie's point in more scientific language?

_____

_____

_____.

Reread this part of the Reader's Theater, when Giselle explained to Reggie what a **correlation** is:

> **Giselle**: Kind of, but not necessarily tied together like a cause and effect. They just happen at the same time. Kind of like: I grew taller this week, and my hair grew longer, but growing taller didn't cause my hair to grow longer. They both happen together, but some other reason causes both of them to happen. According to my mom, that reason is eating disgusting vegetables like broccoli.

Here are two more examples of **correlations:**

- People who eat yogurt every day weigh less than people who don't eat yogurt every day.
- People who are taller earn more money.

*Write some **correlations** you think may be true:*

1. _____

_____

_____.

2. _____

_____

_____ .

Discuss each question with a partner.

Aymara believes since her friends use cell phones, they've learned to do many things faster and expect other people to answer their questions quickly. Do you agree with Aymara? Can you provide examples to back up your opinion?

Professor Abramson thinks that if teens use tools to complete words when is texting, they will do many other things before thinking them through. Giselle, Reggie, and Aymara all disagree with the professor. What is your opinion?

For the previous question, did you really think about it, or did you decide on your opinion instantly?

Giselle timed how fast Reggie texted. His **rate** was 19 words in 30 seconds. Then Giselle calculated his **rate** of words **per** minute. Why do you think Giselle wanted to know how many words Reggie could text in one minute instead of 30 seconds?

Aymara texted Giselle a long message. But Giselle couldn't use it to compare Aymara's texting **speed** to Reggie's. Why not?

Reader's Theater, continued

When finished with the Reader's Theater, ask students to answer the questions.

1. *Sample response: Professor Abramson found in his study that kids who text frequently and rely on predictive spelling are becoming more impulsive when taking tests.*
2. *Correct response: (C) acting without thinking things through*
3. *Sample response: Reggie is suggesting that the teens observed in Professor Abramson's study text far less than Reggie and his friends text.*
4. *Sample responses:*

   People who drive red sports cars drive faster than others.

   Students who participate in activities at school have better grades than those who don't.

The questions in the grey box:

Have students discuss the questions with a partner and try to reach an agreement. This is an opportunity for students to practice using scientific language as they discuss the questions.

Sample sentence starters for struggling students:

1. *I do not agree with Aymara because ___ .*
2. *I agree with Professor Abramson because ____ . For example, ___ .*
3. *For the previous question, I ___ .*
4. *Giselle most likely converted the rate to a minute because ___ .*
5. *Giselle cannot determine Aymara's texting rate due to ___ .*

Speaking Scientifically

Ratio and rate: What's the diff?

You probably know this old trick:

If you said one is a square and one is a rectangle, you're right. And if you said they are both rectangles, you're also right! That's true even though the shape on the left is also a square. A square is a special kind of rectangle—one with equal side lengths.

Similarly, a **rate** is a special kind of **ratio**.

A **ratio** is just a comparison of amounts.

For example: In Ms. Litton's class, there are 15 girls to 16 boys.

You can also write this in other ways:

15 girls:16 boys

$\frac{\text{15 girls}}{\text{16 boys}}$

→ What is the gender **ratio** in your class?

By the way, it is also correct to use a total in the comparison instead of the way it's done above. For example: In Ms. Litton's class there are 15 girls to 31 total students. It's more like a simple fraction this way, but it's still correct.

15 girls:31 students

A **rate** is a special type of **ratio** that uses two different kinds of units together to give information. In Ms. Litton's class, we compared the number of girls to boys—all the same unit (students). But consider a different situation: You just got a job that pays $75,000 a year. In this case, you are putting together an amount of money and an amount of time. Two totally different units. This is a **rate**.

$75,000/year

You also use **rates** when you talk about **speed**. **Speed** is *always* a **rate**:

25 miles **per** hour (mph)

$\frac{\text{0.75 meters}}{\text{5 seconds}}$

Teacher Directions, Session 2

pages 6-8

Speaking Scientifically

This section introduces the relationship between ratio and rate.

The mini-lesson shows the two ways that we can express a ratio. Additionally, students can see that a ratio can show both a comparison of amounts (15 girls:16 boys) or a comparison with a total (15 girls:31 students).

In a rate, the kinds of units are different. For example, $75,000/year. One unit is money; the other unit is a period of time. Students will all recognize a speed limit and be able to identify the two different units used in this rate.

Speaking Scientifically

Ratio and rate: Can you tell the difference?

In the table below, mark whether each statement refers to a rate or just a ratio.

Tortoises walk about 100 feet every 5 minutes.	☑ rate	☐ just a ratio
Only three of the sodas were sugar free, and nine were regular.	☐ rate	☑ just a ratio
My internet connection can download two full-length movies in about 10 minutes.	☐ rate	☐ just a ratio
The Berkeley Yellow Jackets won 22 out of 25 games this season.	☐ rate	☐ just a ratio
Famous supermodels often make $250 **per** hour.	☐ rate	☐ just a ratio
At the 2008 Olympics, Usain Bolt ran 100 meters in 9.69 seconds.	☐ rate	☐ just a ratio

Two different kinds of units used: length and time.

This is a **RATE**.

Both of the numbers are referring to soda.

This is just a **RATIO**.

Unit Rates: They communicate better and are easier too.

A *unit* ***rate*** has a value of 1 for the second number. For example, 65 miles **per** 1 hour is a unit **rate**. So is this price for strawberries: $2.49 for 1 dry pint.

Two more examples of unit **rates:**

Dominic scores about 16 points per game.

Maggy types 45 words per minute.

These two examples are not unit ***rates****—yet. Work with a partner to calculate the unit* ***rate****. Show your work.*

The hose leaks 4 gallons of water every 5 hours.

$13.50/6 rides on the subway.

Speaking Scientifically, continued

Have students identify whether or not the ratio is also a rate. You may want to ask students to circle the units. If the units are different, then the ratio is also an example of a rate. The first two have been done for the students.

Answers:

- Tortoises walk about 100 feet every 5 minutes. **Rate** (different units)
- Only three of the sodas were sugar free, and nine were regular. **Just a ratio**
- My Internet connection can download two full-length movies in about 10 minutes. **Rate**
- The Berkeley Yellow Jackets won 22 out of 25 games this season. **Just a ratio**
- Famous supermodels often make $250 per hour. **Rate**
- At the 2008 Olympics, Usain Bolt ran 100 meters in 9.69 seconds. **Rate**

In a unit rate, the second unit is always equal to one. It is an easier and clearer way to express a rate. Go back to the Reader's Theater when Giselle converted Reggie's texting rate to a minute instead of 30 seconds. Ask students to convert the two rates to unit rates.

Answers:

- The hose leaks **.8 gallons per hour**. (per hour is the unit rate)
- The subway costs **2.25 per ride**. (per ride is the unit rate)

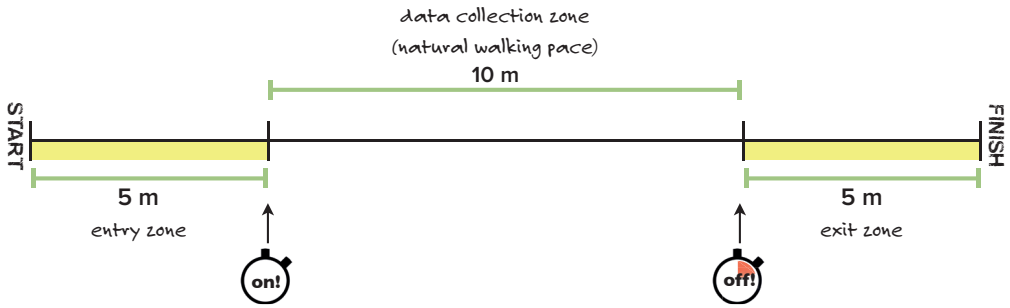
Speaking Scientifically

What is your natural walking pace?

When walking with friends, do you tend to struggle to keep up? Or do you have to slow down to let them catch up with you? In this activity, you and a partner will work together to measure your natural walking **pace**. When you are finished, you will be able to compare your unit **rate** (meters **per** second) with those of other students to see if you are faster or slower than others.

STEP 1: Establish the course

You and your partner will need to measure and mark off a 20-meter walking course in the way shown in the diagram below. This might be in a hallway or an area outside.



STEP 2: Collect data

Have your partner walk the 20-meter course. At the moment he or she moves past the 5-meter entry zone and into the 10-meter data collection zone, **start** your stopwatch. At the moment he or she finishes walking through the data collection zone and crosses into the 5-meter exit zone, **stop** your stopwatch.

Write down the number of seconds (round to the nearest hundredth) it took for your partner to walk through the 10-meter data collection zone.

Repeat this procedure and average the two times. Then trade jobs so your partner can collect data about you.

Natural Walking Pace Data				
Name	**Trial 1 time**	**Trial 2 time**	**Average time**	**Per second rate (unit rate)**

STEP 3: Share your findings during a class discussion.

Speaking Scientifically, continued

This activity asks students to determine their rate of speed while walking at a natural pace. For this activity, you will need the following:

- A hallway or outdoor space where students can mark off a 20-meter walking course
- A measuring tape for measuring the course
- Some tape or cones to mark the course at the various lengths
- Stopwatches for timing

Step 1: Establish the course. Remind students that they are figuring out their natural pace. It is not a race.

Step 2: Collect data. Students will be familiar with scientific processes, such as conducting multiple trials and controlling the variables. The table provides a space for students to record the data. Some students may need help averaging the time. They will need to divide 10 by their average time to get a per meter rate. For example, if it takes a student 5 seconds to walk the 10 meters, their calculation would be 10/5= 2, or a rate of 2 meters per second.

Step 3: Share the findings. Students can share their rates of speed. Other questions for students may include: *Why is it important to have an entry zone and an exit zone? Why is it necessary to conduct multiple trials and take an average of the two times? Why does a higher number mean a slower natural walking pace?*

Scientific language practice: Some students may need a language scaffold to share their data. Here are some examples of sentence frames that may be distributed strategically to students struggling with scientific language.

Sample sentence frame:

I walked an average rate of ____ meters per second. My partner walked an average rate of ____ meters per second. Therefore, my natural waking pace is ____ than my partner's.

While I walked ____, my partner's average pace was ____ .

Lab 1

Breathing rate and heart rate: Do they correlate?

Today you will be exploring whether there is a relationship between your breathing and your pulse.

You will need to work in groups of four for this lab. You will all get turns doing four different jobs:

1. Timekeeper
2. Breath counter
3. Pulse taker
4. Subject (the person being measured)

Materials:

- Jump rope
- Stopwatch
- Pencil and paper for taking notes

Preparation:

Decide who will take which job first.

STEP 1: Collect baseline data

Tell the subject to sit quietly for a few moments.

*Measure resting heart **rate**:*

Using the method shown in the photograph, the pulse taker locates where he or she can feel the subject's pulse. When the timekeeper signals, the pulse taker counts the number of heartbeats in exactly 30 seconds.

*Measure resting breathing **rate**:*

During the same 30 seconds, the breath counter observes the subject and counts the number of breaths he or she takes. Record your data in the table on the next page.

Repeat this procedure so you can find an average for **accuracy**. Remember to convert your data to a unit **rate** (**per** minute) by multiplying by 2.

When you have finished collecting baseline data for the first subject, continue Step 1 by rotating jobs until everyone in your group has had their resting heart **rate** and resting breathing **rate** measured.

STEP 2: Measuring the effects of exercise

Now you are going to measure the effects of exercise at two intensity levels.

The procedure is exactly the same as Step 1, but this time the subjects will be exercising prior to data collection.

Low-intensity test:

Have the subject jump rope (or a similar exercise) at a slow **pace** for one minute. Immediately after he or she completes this task, measure his or her pulse and breathing for 30 seconds. (Don't forgot to convert to a unit **rate**.) Record the data on the next page.

High-intensity test:

Have the subject jump rope (or similar) at a fast **pace** for two minutes. Immediately after he or she completes this task, measure his or her pulse and breathing for 30 seconds. (Don't forgot to convert to a unit **rate**.) Record data on the next page.

When you have finished the low- and high-intensity exercise tests for the first subject, continue Step 2 by rotating jobs so that everyone in your group is measured.

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Teacher Directions, Session 3

pages 9-11

LAB 1

This lab asks students to examine the correlation of heart rate and breathing rate by collecting data under two different conditions: during rest and after exercising. Students will work in groups of four and will be responsible for recording their own data in the table on the next page.

Step 1:

Students may need help locating the proper location on the wrist for taking a pulse. Remind students that they should take the resting pulse two times and find the average. Students will also need to multiply their rate by 2 in order to have a unit rate (per minute).

Repeat this process for all members of the group by rotating roles.

Step 2:

After all members have recorded their baseline data (the first three rows of the table), the group repeats the rotation; however this time they will exercise by jumping rope at both a low- and a high-intensity level. Because of the time involved, students do not need to conduct multiple trials. Make sure students convert to unit rates.

NOTE: Students who are unable to jump rope should be encouraged to elevate their heart rate in other ways depending on their abilities.

Lab 1

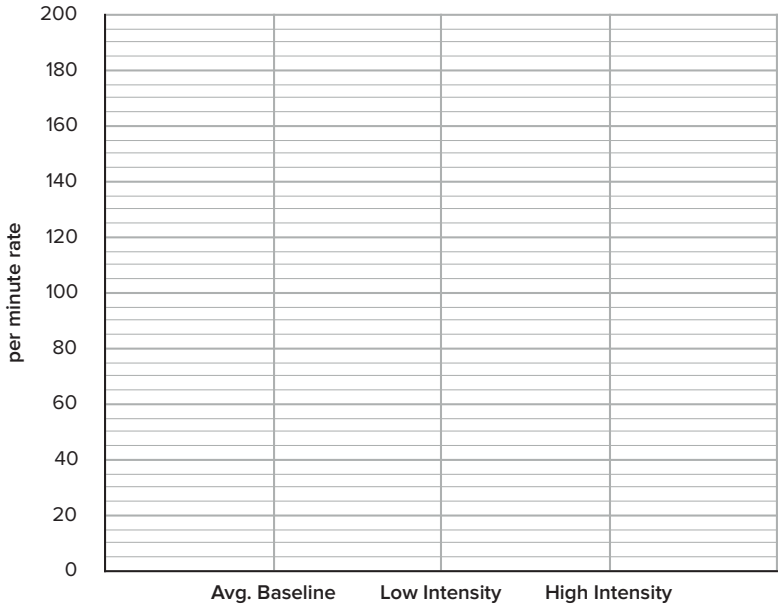
Breathing rate and heart rate: Do they correlate?

Enter your data from all tests into this table.

	Heart Rate		Breathing Rate	
	30-second sample	***per** minute **rate***	*30-second sample*	***per** minute **rate***
Baseline Test 1				
Baseline Test 2				
Average of Baseline Tests				
Low-Intensity Exercise Test				
High-Intensity Exercise Test				

STEP 3: Graphing your data

After you complete your table, plot your data points on the graph. Use one color to represent heart **rate** and a different color to represent breathing **rate**. If this is not a familiar task to you, ask your teacher to show you a sample graph.



LAB 1, continued

Step 3:

Have students plot their data points on the graph provided at the bottom of the page.

Ask students to use two different colors—one for heart rate and one for breathing rate.

Some students may need an example of how to plot data on a graph. Encourage group members to assist each other with the graph.

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Lab 1

Breathing rate and heart rate: Do they correlate?

STEP 4: Consider your data...What might it mean?

1. What effect does exercise have on your breathing **rate**? On your pulse **rate**?

_____

_____

_____

2. Is there a **correlation** between your breathing and pulse **rates**? If so, why do you think this relationship exists?

_____

_____

_____

3. Why did you repeat your measurements when collecting baseline data? Would you have better data if you repeated the other tests too? Why or why not?

_____

_____

_____

4. You have collected quantitative data about what happened when you exercised. Can you add some qualitative data about what happened during the tests? For example, did your face feel hot?

_____

_____

_____

5. On a scale from 1 to 4, **rate** your group's **precision** when collecting data:

☐ disorganized and imprecise (1) ☐ okay, but not great (2) ☐ good with minor exceptions (3) ☐ flawless (4)

Can your group make a claim about something you think is true based on the evidence in your lab work? If so, **MAKE IT**!

MAKE CLAIM HERE!

LAB 1, continued

Step 4:

Remind students to use full sentences when writing their responses to the questions.

Have students discuss these questions with their group prior to writing their responses. You may want to ask them to agree on a response based on all of their data. Students may also complete this independently based on their own data.

Some students may need sentence starters or sentence frames in order to complete this activity. You may want to use these strategically with students struggling with scientific language.

- *Exercise affects my heart rate by ____. Exercise also affects my breathing rate by ____.*
- *There is a correlation between ____. I think this relationship exists because ____.*
- *It is important to repeat measurements when collecting baseline data because ____. It is likely that ____ because ____.*
- *Some examples of qualitative data that occurred during the tests include ____ .*

Making a claim: Using the data from all of the subjects, the group can make a claim based on this lab work. Remind students that a claim is something that they think is true and have data or evidence to support it.

Lab 2

Unit Rates and Percentage: Concept Cousins

Shooting free throws

Competitive basketball players always try to improve the number of free throws that they make. As most of you know, when you are fouled, you can shoot a free throw. That means you stand alone on the free throw line, and no one blocks you. When you make it, the team scores a point. Sound easy? Actually, even professional basketball players miss a lot!

Michelle is a starting point guard for Patterson High. In the last 10 games, she made 27 out of 42 free throws. That's 27 made **per** 42 attempts.

To find the unit **rate** of Michelle's **accuracy** with free throws, this is what you do:

$$\frac{27 \text{ made}}{42 \text{ attempts}}$$

THINK:
What do I need to do to change the **ratio's** second number to 1?

$$\frac{27 \text{ made}}{42 \text{ attempts}} \begin{matrix} \div 42 \\ \div 42 \end{matrix} = \frac{.64 \text{ made}}{1 \text{ attempt}}$$

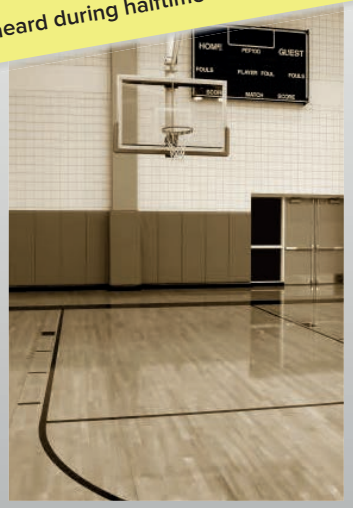
That unit **rate** is totally valid, but it's kind of strange to think of Michelle making .64 of a basket. One way that can help everyone understand how good (or bad) Michelle is at shooting free throws is to convert the unit **rate** into a percentage **rate**.

It's very easy:

.64 made per attempt = 64% accuracy

Percentage is a lot like unit **rate**. The difference is that unit **rate** is **per** one, and percentage **rate** is **per** 100. So in this case, we can think of Michelle making about 64 out of 100 of her free throws. Not bad!

Overheard during halftime at a recent game:



Coach: Michelle, so far in tonight's game, you've made 3 out of the 12 free throws you took. That is a **rate** of .25 baskets **per** 1 shot. Or just 25 percent.

Michelle: Geez coach, that's not too good. My free throw success **rate** is usually much higher. What should I do?

Coach: Well, you always shoot as soon as you get the ball from the official. Try to slow down to give yourself a few seconds before you shoot.

Michelle: Okay, sure! Lots of times if I slow down, I am more **accurate**!

Teacher Directions, Session 4
pages 12-13

LAB 2

This introduction explains how rate is also used to measure accuracy or effectiveness, using a basketball player's success with free throws as an example.

When measuring accuracy, the rate is expressed as a percentage. In order to arrive at the percentage, students may need a review of the mathematics involved in converting a ratio to a percentage.

The dialogue at the bottom of the page demonstrates how a coach and player would discuss rates of accuracy.

Lab 2

Can studying **rate** lead to a better strategy?

When Michelle and Jordan have the same free time, they enjoy competing in a friendly game of wastebasket-ball. The way they usually play is by crumpling up lots of paper from the recycling bin and shooting as many times as they can in one minute. Whoever gets more "baskets" wins.

But Michelle was thinking about what her coach told her the other day. On her real basketball team, she's trying to balance the **frequency** and **accuracy** of her shooting.

She asked Jordan to design an experiment with her using the same materials they use when they play their game.

Michelle wants to explore whether she would have a greater success **rate** making baskets if she attempts as many shots as possible or if she prepares more carefully for each shot.

If you were Jordan, how would you recommend Michelle set up her experiment?

Check with your teacher to see if you have time to try your experiment.

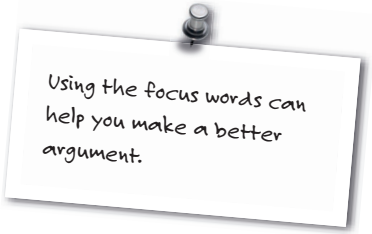
LAB 2, continued

This activity asks students to consider the scenario and design an experiment that allows Michelle to determine if she would have a greater success rate shooting more frequently or taking more time to prepare for a shot.

This can be done independently or with a partner. Students design a process that lets Michelle determine her accuracy.

Writing

There is an old saying: "Quality over quantity." It's nice and poetic, but is it always true? Write about aspects of your life when you feel your success is measured by **speed** or **frequency** more than how carefully you do things. In addition, write about times when you feel most successful by striving for **accuracy** or **precision**. Do you believe one is more important than the other? Do you think one is not emphasized enough in your life right now? Is your **pace** too fast? Too slow? Just right?



Teacher Directions, Session 5

pages 14-15

Writing

The writing prompt asks students to consider whether success in their life comes from doing things quickly and frequently or taking their time and paying attention to accuracy or precision.

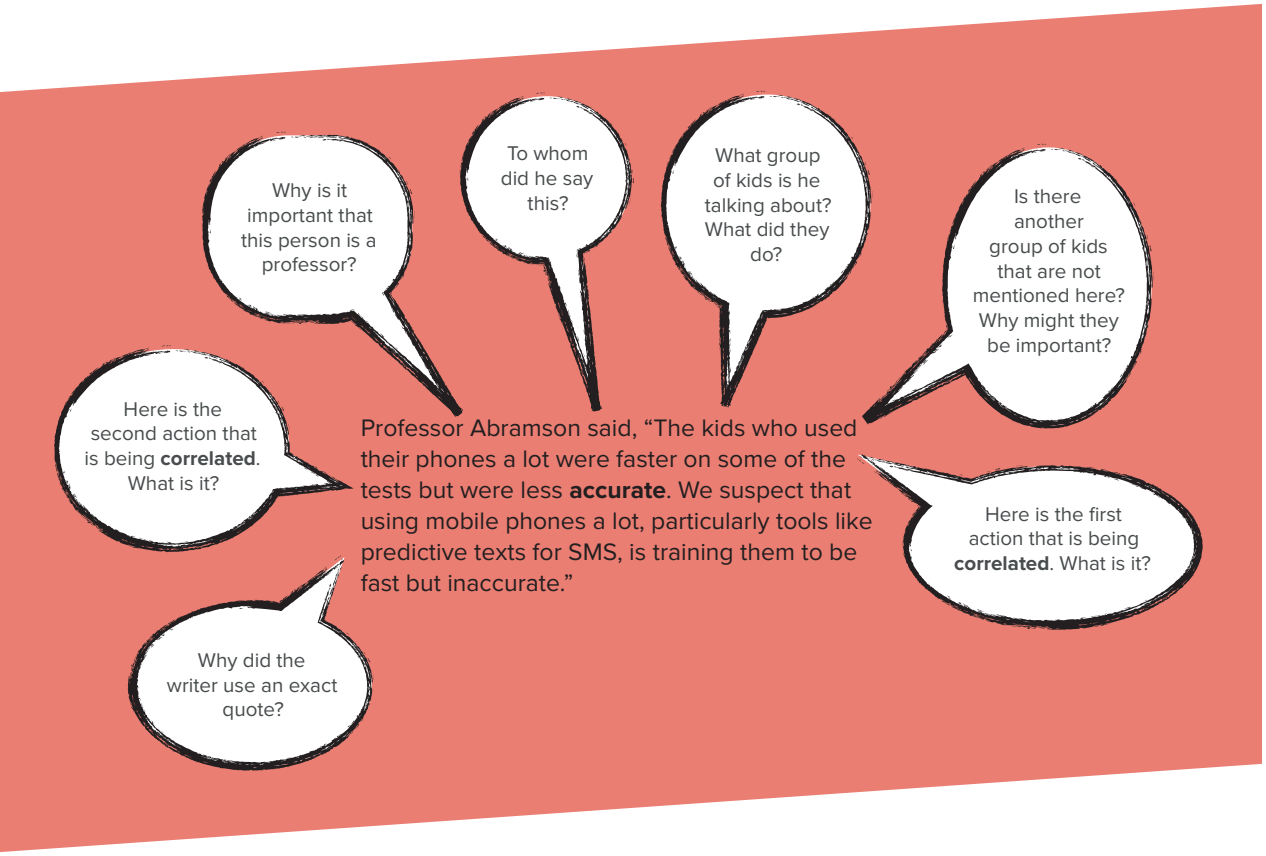
Remind students to use the focus words at the top of the page.

Writing

Sentence Surgery

The verb **correlate** is one of our focus words for the week. If two things **correlate**, it means there is a connection or relationship between them. So you are **correlated** to your brother? Not exactly.

Let's see if we can figure out what this word means by looking closely at how it was used in the Reader's Theater this week. Sometimes, we have to ask ourselves a lot of questions when we read in order to understand the meaning.



What two actions are being **correlated** here?

_____

_____

What do you think is the reason for this **correlation**?

_____

_____

Teacher Directions, Supplementary Activities
pages 16-18

ELA Activity

In their science class this week, students have been learning about **rates** and **ratios**. The unit begins with a Reader's Theater where three friends are discussing a scientific study that suggests that there is a correlation between students who text frequently and those who make errors when taking tests. The sentence at the center of this activity is from the Reader's Theater.

Have students answer the questions in the bubbles with a partner. These questions demonstrate the types of questions that readers might ask themselves in order to understand what the sentence means.

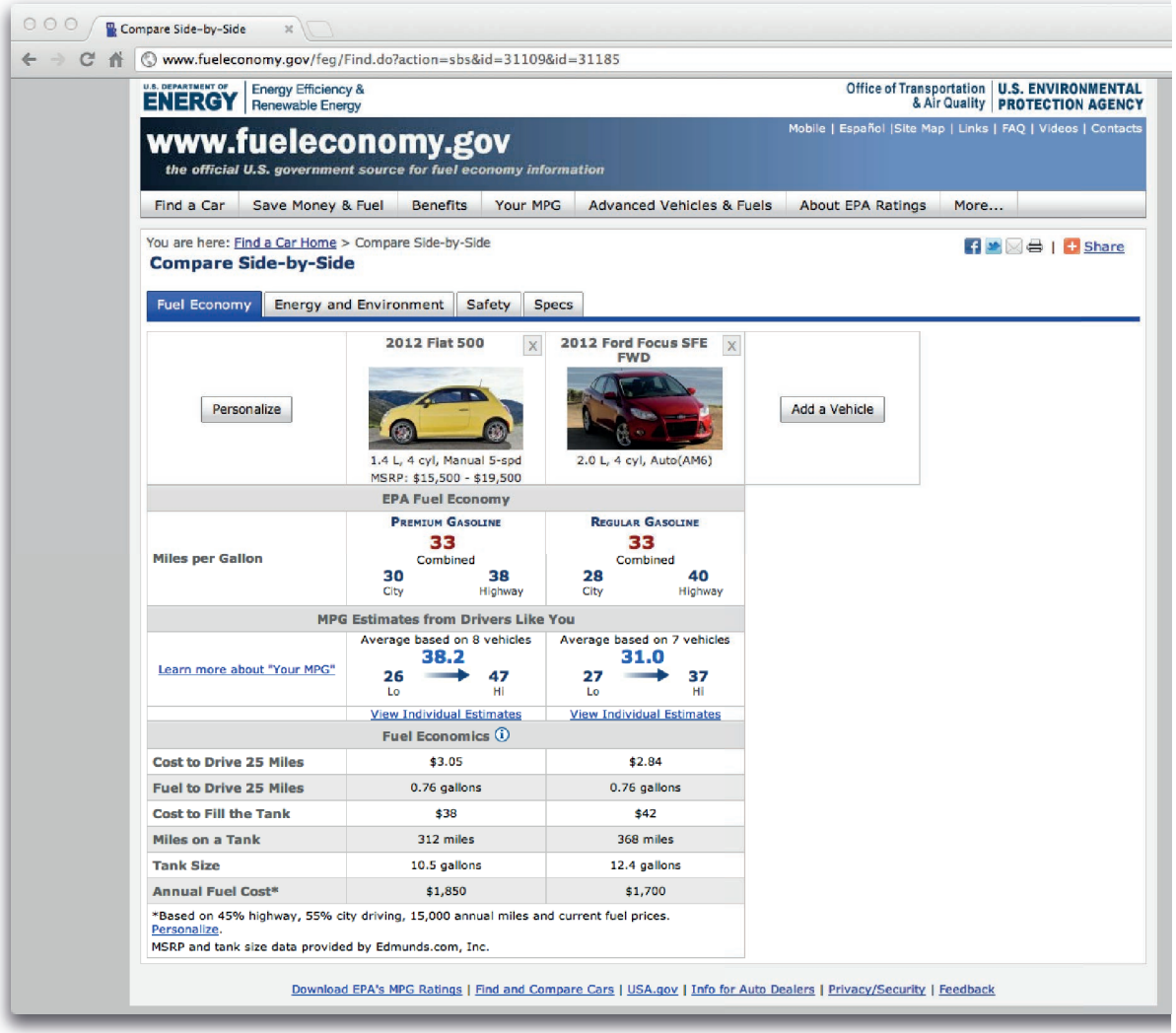
Questions at the bottom:

(Sample responses)

The two actions being correlated are the frequency of cell phone use and careless errors when taking tests.

The reason for this correlation may be that students develop a habit of rushing and rely on auto-correct for accuracy when using the cell phone. As a result, they do not see the need to be careful and accurate on other tasks where there is no auto-correct.

Talking Cars in Math Class



Your math teacher will project a page from the website above (or you can use this printout). Look at all the data available about the fuel economy of cars available in the United States. Your goal is to make a comment or ask a question during class discussion that relates to the webpage and also uses one of the focus words correctly. Your teacher will check off the word when he or she hears it used by a student in a mathematically **accurate** way.

Good luck!

Math Activity

In their science class this week, students have been learning about **rates** and **ratios**.

If possible, project the following webpage for the class: http://www.fueleconomy.gov/feg/Find.do?action=sbs&id=31109&id=31185. Have students read the information on the webpage about the two cars.

Tell students that the class will have a discussion about the data they read.

Explain that they must use the focus words correctly in full sentences as they discuss the webpage.

Check off the words as students use them in a sentence.

Sample responses:

The Fiat's average fuel-economy rate is 33 miles per gallon.

The Ford Focus is an automatic whereas the Fiat is a five-speed.

I wonder about the accuracy of these fuel rates.

The Fiat will accelerate much more quickly than the Focus due to its manual transmission.

Touch Type

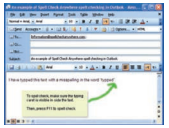
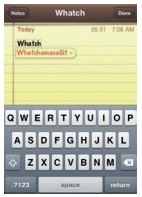
Throughout most of the 20th century, most American students took a typing class during middle or high school. Most people used typewriters to make their essays, letters, or other important documents appear more formal. It was common for people to compose drafts of documents in *long hand* (handwriting) first and then type on a typewriter. Making a mistake when typing meant starting over, so **accuracy** and **precision** were essential. But this took a long time. People had to look at their draft, remember a few words or sentences, find the keys on the typewriter, and hope that they didn't make a mistake!

Thus, touch type was invented to increase the **speed** at which a person could type a document. The touch type system allowed typists to keep their eyes on the long hand version of their documents without having to glance at the keyboard. The system required typists to learn where the keys were and to practice striking the keys accurately while increasing their **pace**. You may have noticed that on most keyboards, there is a little bump on the *F* and the *J* keys. These tiny bumps guide touch typists to the important home keys. Once their index fingers are on these two keys, a person who has learned to touch type uses muscle memory to strike the other keys. After a few months of practicing, most typists can reach the **rate** of 60 words **per** minute without looking at the keyboard!

Computers allow people to easily correct errors and revise their thoughts while typing. As a result, most people compose letters, essays, and other documents while typing on the computer. As the **frequency** of computer use in schools and work increased, schools stopped teaching touch type. Most kids develop their own system for typing by the time they reach middle school.

Some people think that students should still learn how to touch type because it frees their brain to be more creative and reflective when writing. They say that a person who has to hunt for keys while typing loses concentration and will produce less thoughtful work. Other people say there is no **correlation** between producing thoughtful essays or reports and the use of touch typing. What do you think? Do you think you would produce better essays if you didn't have to look at the keyboard?

A brief history of keyboard error correction:

1900–1950	1950s	1970s	1980s	1990s	2000s
Until around 1950, a person had to start all over after making a mistake while typing!	Correction fluid was invented. Mistakes could be covered up and typed over.	Early computers allowed for deletion and backspacing to correct errors	Spell check was introduced in word processing software.	Autocorrect was introduced in word processing software to automatically correct mistakes.	Predictive texting and typing became common on cell phones and computers.
					

For Discussion:

Improvements in error correction technology allow people to work faster and worry less about **accuracy** and **precision**. What do you think will be the next innovation in error correction technology? Why might some people say that this technology is harming society as much as it is helping it?

Social Studies Activity

In their science class this week, students have been learning about **rates** and **ratios**. The unit begins with a Reader's Theater, in which three friends are discussing a scientific study suggesting that there is a correlation between students who text frequently and making errors when taking tests.

Read the passage on touch type and the timeline of keyboard error correction.

Have a discussion using the prompts under "For Discussion."

Examining the Focus Words Closely

SciGen Unit 7.3

→ Scientific or ✱ Everyday Use	Definition	Try using the word...
→ **per** *preposition*	for each	*How many hours of TV do you watch **per** week?*
→ **speed** *noun*	the rate at which something moves	*Which is faster: the **speed** of light or the **speed** of sound?*
✱ **speed** *noun*	the rate at which something occurs	*I cleaned my room at a remarkable **speed**.*
→ **rate** *noun*	a comparison of two different units to give information	*Distance traveled compared to time tells the **rate** of speed. Do you know what* mph *stands for? Hint: The speed limit of many highways is 65 mph.*
✱ **rate** *verb*	to give something a value or rank	*How would you **rate** last year's Super Bowl?*
→ **ratio** *noun*	a comparison of two amounts	*What is the **ratio** of boys to girls in your classroom?*
→ **frequency** *noun*	the number of times that something happens within a particular period	*What is the **frequency** at which you send text messages?*
✱ **frequent** *adjective*	happening often	*Why are student absences more **frequent** during the month of June?*
→ **accuracy** *noun*	correctness in every detail	*In which sports is **accuracy** crucial?*
✱ **accurate** *adjective*	correct in all details	*Have you ever seen a news report that was not entirely **accurate**?*
→ **precision** *noun*	the state of being very exact	*Why is **precision** important when conducting a scientific investigation?*
✱ **precise** *adjective*	exact	*What are the **precise** words that Martin Luther King, Jr., said during the march on Washington, D.C.?*
→ **pace** *noun*	the speed or rate at which something is done	*At what **pace** can you run continuously for 30 minutes?*
✱ **pace** *verb*	to walk in one direction and then switch to the other again and again	*Why might a student **pace** in front of the principal's office?*
→ **correlate** *verb*	to have a relationship where two or more things happen or change together	*Why do you think obesity **correlates** with increased risk of a heart attack?*
✱ **correlation** *noun*	a relationship between two or more things that happen or change together	*Do you think there is a **correlation** between time spent on after-school activities and test performance in class?*

Teacher Directions, Focus Words

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Examining the Focus Words Closely

The word chart here includes the scientific definitions that are reinforced throughout the unit. Each of these words has an arrow next to it. Additionally, there are other forms of the words or polysemous meanings that sometimes cause confusion for students. These words are marked with an asterisk.

Have students discuss the questions next to each word to help them make these distinctions. Make sure students answer the questions using the focus word.