

## Units & Systems: Scene

### The Importance of Units

*Setting: Emon, Markus, Yesinia, and Kaitlyn meet Haitham at his locker. He's been upset since second period.*

**Emon:** Why are you so frustrated with Ms. Phan in science class, Haitham?

**Haitham:** She keeps telling me, “Don’t forget your **units!**” “It’s wrong without **units!**” I lost points on my last lab report. She thinks I know what she means, but I don’t. I looked “**unit**” up in my dictionary and there are 17 different definitions! For one stupid word!

**Markus:** You carry that dictionary in your backpack? How heavy is that thing?

**Haitham:** Not the point.

**Kaitlyn:** Seventeen entries? That’s interesting. It’s a pretty simple word, I would say.

**Haitham:** (*glaring*) I would respectfully disagree.

**Yesinia:** Haitham, is one of the definitions “book chapter”? My science text has a **unit** on evolution, a **units** on microorganisms, a **unit** on—

**Markus:** (*interrupting*) Hey, and my cousin at UMass gets three or four **units** for each of her college courses.

**Emon:** And Ms. Schultz says our marching band performs like a single **unit**. I think she means the band is a group that marches in step like one person.

**Haitham:** Whoa! I know you’re trying to help, but all I need to know is what my science teacher means by **unit**.

**Kaitlyn:** Well, I think we’re on the right track—a **unit** probably means one of something, because *uni* means one. A unicycle is like a bicycle, but it just has one wheel.

**Haitham:** What? So Ms. Phan wants me to write one of something all over my papers? One of WHAT?

**Kaitlyn:** No, no. Think about it. A **unit** is more like a thing you use when you measure.

**Haitham:** Are you talking about measuring things in pounds or inches?

**Kaitlyn:** You got it now. A **unit** can be a **weight** or a **distance** or time. We measure lots of quantities. And to make sense to everyone, every measurement needs a **unit**. It doesn’t make sense to say the **length** of the field is 200. You have to say 200 feet, meters, or whatever **unit** you are using.

**Haitham:** Oh, that’s all? Okay, now I get it. I’ve been writing ratios on my paper like 60 per 1. The numbers needed **units**: 60 miles per 1 hour.

**Markus:** Right, if you don’t write the **units**, nobody knows what you’re talking about. (*thinking*) Say I told you that I drank two sodas at lunch.

**Yesinia:** Your teeth are gonna rot.

**Markus:** Not the point. What I’m saying is that you don’t know if I drank two liters, two 12-ounce cans, or two tiny cups! It really doesn’t mean anything unless you know the **units**.

**Emon:** The **volume** of a two-liter bottle is way more than two soda cans.

**Markus:** You’re right about that, Emon, but wrong about something else. What I think you mean is **capacity**. The **capacity** of a two-liter bottle is more than two soda cans because the bottle can hold more.

**Emon:** Whatever.

**Haitham:** That reminds me that Coach Frassetto said the other day that the **length** of the football field was 100 yards. And then he said the **distance** to the goalpost was 25 yards. I was wondering, why did he say **length** and then say **distance** when both are yards?

**Kaitlyn:** Good catch. The **length** often means the longest side of an object. The football field has a long side, the **length**, and a width, the short side. A **distance** is the measurement between two things or points.

**Emon:** We totally use **length** and **distance** for each other all the time. Probably doesn’t matter that much.

**Markus:** There are lots of ways these words get used, like the **length** of time to finish your report or going the **distance** for the team.

**Kaitlyn:** All right, here is a challenge. Another pair of **units** that are really similar is **weight** and **mass**. Most people think they are the same. Any of you guys know the difference?

**Yesinia:** Okay, I think I know this. Every night after eating a bowl of ice cream my dad weighs himself. He’s measuring how heavy he is, like last night he was 210 pounds. But our science book never says **weight**, it says **mass**. **Mass** is the quantity of material, or matter, like my dad and his bowl of spumoni.

**Kaitlyn:** That’s right. **Weight** also has to do with quantity of matter, but **weight** changes according to the strength of gravity. **Mass** doesn’t.

*continued...*

## Units & Systems: Scene (continued)

**Markus:** Nice. The gravity on the moon is about one-sixth of the earth. So if your father moves to the moon, he'd weigh 35 pounds.

**Emon:** That's pretty funny. But this time, you're the one who is only half right. Technically speaking, pound is a **unit** used for **mass**, not **weight**.

**Haitham:** For real? When I say that I weigh 103 pounds, I should really be saying my **mass** is 103 pounds?

**Emon:** That's right. But it does sound kind of nerdy.

**Markus:** Then what is the right **unit** for **weight**?

**Emon:** Newton.

**Markus:** You're totally making that up.

**Emon:** No, Isaac Newton "discovered" gravity, and since **weight units** have to do with gravity, they are named after him.


**Kaitlyn:** People can just name **units** after themselves?

**Emon:** Well, it helps if you are a king or something. Last year in Ancient Civilization class, I read that the Egyptian pyramids were measured by a royal cubit that was equal to the forearm of an Egyptian pharaoh. So the pharaoh could just establish the **standard** measurement.

**Yesinia:** Hey, if a king can name a **length unit** after his arm, so can we. I hereby declare one "schnoz" to equal the **length** of Markus' nose.


## Comprehension Questions

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

 Can you complete this sentence to summarize why **units** are important? Ms. Phan wants Haitham to write the units for the numbers on his paper because

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 List several situations in which the word **unit** is used in different ways.

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Emon said that a pharaoh established a **standard** measurement called a royal cubit. What does Emon mean by the word **standard**?

- A) A **unit** equal to the **length** of a pharaoh's forearm
- B) A flag that is often carried by soldiers into a battle
- C) A **unit** used to measure something or someone that is standing up
- D) A **unit** that many people agree should be used to compare or measure things

Discuss the following questions with a partner, and come to an agreement on an answer.

 Yesinia's father weighs 210 pounds. Markus said that because the moon's gravity is one-sixth as strong as on earth, his **weight** on the moon would be one-sixth as much as on earth. But his **mass** would stay the same. The gravity on Saturn is about double the gravity of the Earth. What would Yesinia's father weigh on Saturn? What would his **mass** equal?

 Mr. Aristotle, a substitute teacher, told Emon's class to "use the beakers with a **volume** of 500 milliliters." Did Mr. Aristotle use the word **volume** correctly? Why or why not?

 Make up two different sentences: one with the word **length** and the other with the word **distance**. Then swap the two words and see if the sentences still make sense.