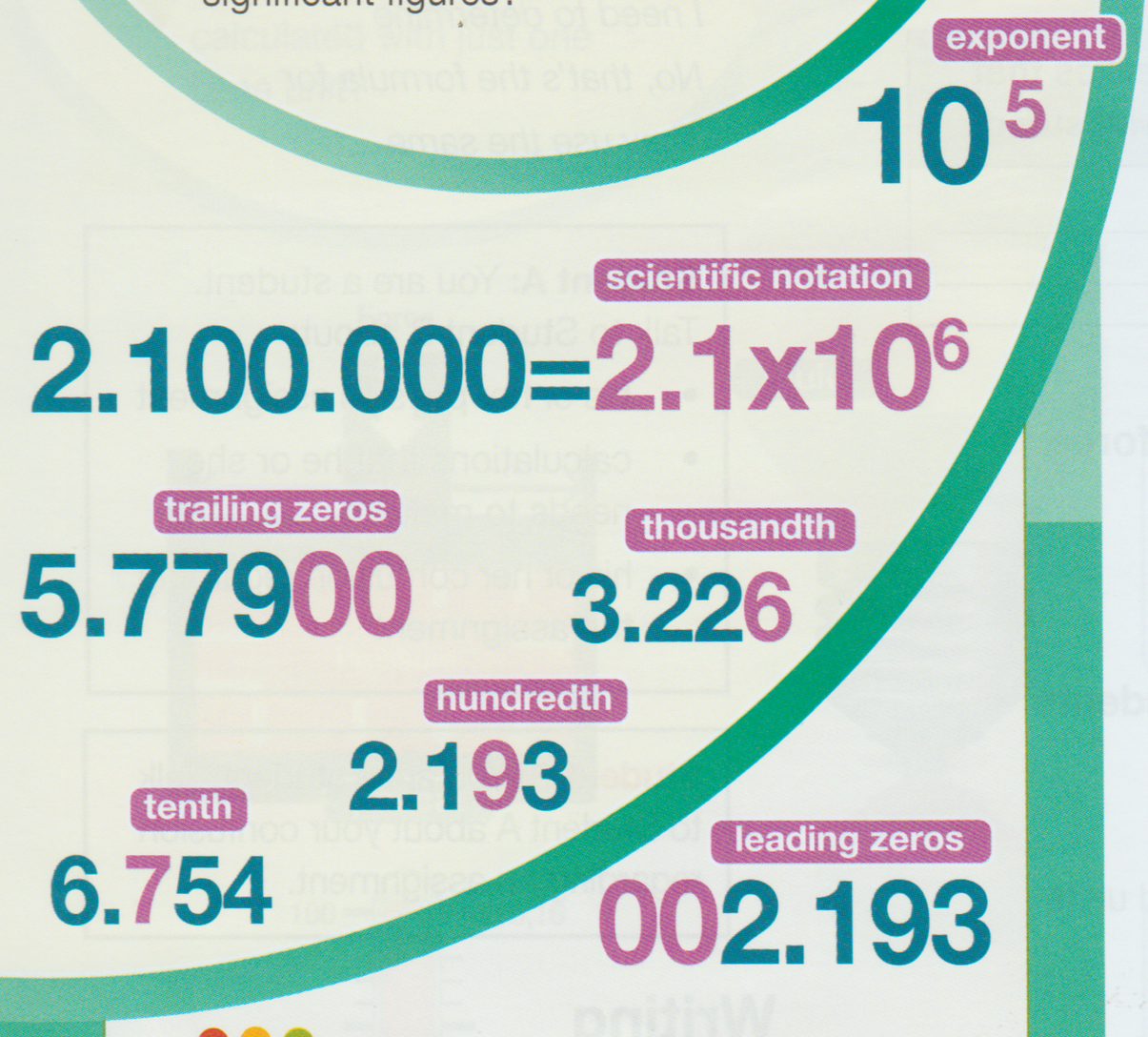
12 Large Numbers

Get ready!

1 Before you read the passage, talk about these questions.

1 What is the benefit of scientific notation?

2 What happens if a quantity has too few significant figures?



To: All Employees

From: s.green@pendlebergengineering.net

Subject: Number Conventions

Hello Everyone,

Some employees are not using our number conventions. Please review these guidelines for ensuring consistency and accuracy.

- Double-check your **exponents**. Someone recently recorded a quantity as **cubed** instead of **squared**. This caused serious errors in the results of the project.
- Very large and small quantities are easy to misread in decimal form. Express them in **scientific notation**. Raising a figure **to the nth power** is more reliable.
- Use appropriate **significant figures**. This prevents problems from **rounding errors**. Most of our formulas require precision to the **thousandths**. Rounding to **tenths** or **hundredths** instead produces inaccurate results. Use **trailing zeros** to indicate your number of significant figures.

Thanks for your cooperation.

Stanley Green

Pendleberg Engineering, Inc.

Reading

2 Read the email. Then, choose the correct answers.

1 What is the purpose of the email?

A to outline the special number conventions for a new project

B to remind employees about the importance of number conventions

C to describe a training course on number conventions

D to recommend changes to company policies on number conventions

2 What is NOT a guideline in the email?

A Use decimal form for large quantities.

B Express small quantities in scientific notation.

C Round to the thousandths for most formulas.

D Show significant figures with trailing zeros.

3 What was the problem with a quantity on a recent project?

A It was not expressed in scientific notation.

B It was raised to the wrong exponent.

C It had too few significant figures.

D It did not show trailing zeros.

Vocabulary

3 Match the words or phrases (1-6) with the definitions (A-F).

1 __ squared
2 __ hundredth
3 __ thousandth
4 __ to the nth power
5 __ significant figure
6 __ scientific notation

A a digit that identifies a quantity's level of precision

B multiplied by itself a particular number of times

C a quantity that is expressed in the third place after a decimal point

D having an exponent of two

E a way of expressing very large or very small quantities

F a quantity that is expressed in the second place after a decimal point

4 **Read the sentences and choose the correct words or phrases.**

1 The quantity is rounded to the **tenths/thousandths**, so it only has one digit after the decimal point.
2 If N is **squared/cubed**, it equals N x N x N.
3 Changing 10.99 to 11 causes a **rounding error/scientific notation**.
4 A(n) **trailing zero/exponent** does not have any numerical value.
5 If the **hundredth/exponent** is six, then the quantity is multiplied by itself six times.

5 **Listen and read the email again. What happens if the wrong exponent is used in an equation?**

Listening

6 **Listen to a conversation between a mechanical engineer and an assistant. Mark the following statements as true (T) or false (F).**

1 __ The result of the man's calculation was too high.
2 __ The formula was missing an exponent.
3 __ The man's error caused a system failure.

7 **Listen again and complete the conversation.**

Engineer: Hey, Paul? Something's **1** _____ _____ in this equation.
Assistant: Really? I checked it twice.
Engineer: The energy of this system should be under **2** _____ _____ _____. Your result came to nearly ten thousand!
Assistant: Wow, that's **3** _____ _____ _____! I wonder what I did wrong.
Engineer: Let's take a look at your formula. Oh, I see what happened.
Assistant: What is it?
Engineer: The meters are **4** _____ instead of squared.
Assistant: I see. So I used the **5** _____ _____.
Engineer: Exactly. You have to be **6** _____ _____ about this. That kind of error could be disastrous.

Speaking

8 **With a partner, act out the roles below based on Task 7. Then, switch roles.**

USE LANGUAGE SUCH AS:

I wonder what I ...
You ... instead of ...
You have to be ...

Student A: You are an engineer. Talk to Student B about:

- an error in an equation
- how he or she caused the error
- how the error affected the result

Student B: You are an assistant. Talk to Student A about an error in an equation.

Writing

9 **Use the email and the conversation from Task 8 to fill out the email from an engineer to an assistant.**

Hi Paul,

Your report contains an error. Please correct the error and submit the report again.

Error: _____ .

Result of the error: _____ .

Corrected quantity: _____ .

Lenore