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SC Metric Week October 6 – 12, 2013, Governor's Proclamation

October 1, 2013

Please See Attached

Dear District Leader and/or Math & Science Coordinator:

Celebrating *Metric Week in South Carolina* 2013 (October 6 – 12 this year) is very important for grades K-12. An announcement at each school in your district, and encouragement of metric system activities during and after Metric Week, would be an excellent idea. (Some easy-to-use ideas on celebrating Metric Week are available online at: <http://www.artsandsciences.sc.edu/cse> or www.metric.org.)

As you know, companies (which will eventually employ many of our students) are gradually producing products to metric system standards. This means that the jobs of tomorrow will require employees to be able to use metric units.

In addition, I believe that one of the reasons for poor scores made by U.S. students in international tests lies in the disadvantage that they do not have the knowledge to easily work with metric system units - a knowledge that the competing students from the rest of the nations of the world possess. A research study in the 1970s showed that from 6 to 8 months of elementary arithmetic could be eliminated from educational curriculums by the simple adoption of the metric system.

We now have over two hundred teachers and administrators certified as Metric Specialists in our Certification Program for South Carolina. These individuals serve as metric resource persons and may help you develop activities as we celebrate Metric Week. Also, a teacher or administrator who plans to become a Certified Metric Specialist may reach me by phone at (803) 777-7007 or email djordan@sc.edu (Center for Science Education, College of Arts & Sciences, Sumwalt, University of South Carolina, Columbia, SC 29208).

The certification is recommended and approved by the South Carolina Academy of Science (SCAS) and coordinated with the State Department of Education and the Office of Metric Programs at the National Institute of Standards & Technology, USC Department of Commerce. Special thank you goes to Governor Nikki R. Haley for her support of this worthwhile endeavor.

Sincerely,

Don Jordan, USC

<http://www.artsandsciences.sc.edu/cse> click on programs then metric for information on CMS.

Check out the USMA & National Institute of Standards (NIST) Metric Programs at www.metric.org & www.nist.gov/metric It will be FUN! and others at:

<http://www.artsandsciences.sc.edu/cse> click on Programs then Metric

Teachers- these sites have something for all grades!

We encourage your students to visit www.MetrologyCareers.com, where they can learn about careers in Metrology (measurement science). Currently, over 25 % of the metrology workforce is eligible to retire.

SUGGESTED YEAR-ROUND METRIC ACTIVITIES

TO START DURING

SOUTH CAROLINA METRIC WEEK

OCTOBER 6 - 12, 2013

1. Have a school Open House or Parents' Night sponsored by the Science and Mathematics Departments and include a session on "Why we need to teach metric first".
2. Devise a Metric Fair for your school with all metric events. Create a Metric Contest, i.e - Crossword Puzzles. Have awards for the winners.
3. Write articles for the school or local newspaper promoting the use of metric measurement.
4. Have the Science and Math Departments plan a metric in-service session for the school faculty.
5. **Metric Survey** -- Conduct a survey of the student body and families of students to determine:
 - What people know about the metric system.
 - How people feel about the ongoing conversion to metric.
 - Reasons given in favor of conversion.
 - Objections given by those opposed to conversion.
6. **Metric Center** -- Collect and catalog recent, significant articles, books and pamphlets on the Metric System to serve as reference materials.
7. **Shopping Assignments** -- Choose a product line such as food, cosmetics, drugs, hardware, medical devices or sports equipment, and shop for items in that product line which carry labels or descriptions in metric units. Report findings to the class.

MULTIDISCIPLINARY PROJECTS/ACTIVITIES

8. **ART** -- Design posters and bulletin boards to illustrate the Metric System. Make up cartoons to illustrate the humorous aspects of metric conversion. Make a mural of the history of the Metric System. Create Metric Songs. Most art supplies are produced in metric.
9. **ENGLISH** -- Write a glossary of metric terms for the average person working with metrics for the first time. Prepare a series of essays for the school or local newspaper on the advantages of the ongoing metric conversion in the U.S. Have a "Metric Bee" using words taken from a dictionary of metric terms.
10. **HISTORY AND SOCIAL STUDIES** -- Prepare and give an illustrated talk on the history of weights and measures in the U.S. or another country of your choice. Write a brief biographical sketch and description of James Watt, Andre Ampere, Gabriel Moulton, John Quincy Adams or Napoleon. Make a map of the school using metric scale.
11. **HOME ECONOMICS** -- Research how foreign cooks measure food quantities in metric units. Then find a metric recipe (or make one) and have students prepare it. Take body measurements in metric units. Determine size with a metric pattern chart. Research how clothing is sized in some of the countries already using metric. Ask the lunch room staff to create a "Metric Meal" and have your students prepare signs with metric slogans beside each food item.
12. **PHYSICAL EDUCATION** -- Have a Metric Field Day, with track and field events using the Metric System. Check with AIMS (Activities Integrating Math & Science) for suggestions.
13. **INDUSTRIAL ARTS** -- Measure the standard pieces of lumber such as a 2x4, 1x6, etc., in metric units. What would the nominal dimensions be in the Metric System? Develop a set of plans for a birdhouse, etc., and then build the item, using only metric measuring devices.

14. DRIVER'S TRAINING -- Convert mileage, distances, and highway signs to metric units. Research what conversion the Department of Transportation now accepts. Write questions that could be included in a state driver's test to evaluate a driver's knowledge of the metric units that are used in motoring.
15. ME IN METRIC – Ask the students to explore how metric measurements relate to their own bodies.

Check out the United States Metric Association Web-site at www.metric.org where you will find many links to metric information. One of the best would be the "Metric Guide" for teachers which can be found about halfway down the home page in the teacher/educators section.

**Check out the National Institute of Standards (NIST) Metric Programs at www.nist.gov/kids
It will be FUN!**

Did you know that..?

- Metric minimizes the likelihood of error.
- Metric does not have the numerous conversion factors of other systems.
- Metric has one unit for a quantity.
- Metric is legal, logical and preferred.
- *Six months to two years of elementary arithmetic could be eliminated with the adoption of SI-Metric.*
- IBM during metric conversion reduced fastener part numbers from 38,000 to 4,000.
- One bottling industry reduced its container sizes from 53 to 7.
- You would weigh 82 kilograms instead of 180 pounds.
- Public Law 103-227 of March 31, 1994, asserts that mathematics and science education, including the metric system of measurement, will be strengthened throughout the system, especially in the early grades.
- All major science and education organizations have encouraged the United States to fully adopt the metric system as the language of measurement.
- The National Association of Academies of Science and the United States Metric Association support our efforts promoting the metric system and metric training for teachers.

METRIC FACTS

***English is the international language of business.
Metric is the international language of measurement.***

☺ *The Metric System – How to teach young people what they need to know!*

1. Teach using only the Metric System.
2. Use rulers and measuring tools that have only metric scale units.
3. Teach measurement and physical quantities using materials and examples that students can see and touch.
4. Select, estimate, compare and use appropriate units to measure:
length (meter/centimeter); mass (kilogram/gram); volume (liter/milliliter); temperature (degree Celsius)
5. Teach by actively involving the students in measuring activities.
6. **Universities and Colleges** that educate elementary school teachers **should teach the system** and how to use it. Very little time should be given to the Customary System. Teachers must know how to teach the Metric System and feel confident by doing so.
7. The change to the metric system is **for all people** and all disciplines (not just science, engineering and math).

What South Carolina Needs:

A Certified Metric Specialist in each of the over 1,500 Schools in South Carolina.

See http:www.artsandsciences.sc.edu/cse click on programs then Metric for more information

If you want to know how to become a Certified Metric Specialist, write or email

**Dr. Don M. Jordan / Center for Science Education / College of Arts & Science / Sumwalt Rm. 323 / USC
Columbia, SC / 29208 djordan@sc.edu / 803 777 7007**

Mark your calendars now for October 6 - 12, 2013, and incorporate Metric Week Activities into your teaching year-round!

Metric Week in South Carolina is sponsored by the
**South Carolina Academy of Science, Founded in 1924 &
The Center for Science Education at USC**

Going Metric is easy and is seeping into the U.S. language. Metric is here to stay.

By Don M. Jordan, University of South Carolina

“In truth, metrics has seeped into the U.S vernacular beyond the plastic soda bottle” (says Edward M. Eveld, Knight Ridder Newspapers). It is perfectly acceptable to speak of the 100 meter racer in the Olympics or the local 5K run for cancer research. People are happy to buy 35 mm film and talk about the 4.0 liter engine in their car. Fat and fiber come in grams, sodium in milligrams, computer speeds in megahertz, and even wine and spirits come in metric sizes only. Watts, volts, and amperes are metric units. The metric system is the language of science and medicine. If you want to go to college, you better take chemistry in high school.. Chemistry is 100% metric.

Soon you may see product labeling only in metric.

Like Olivia Newton-John, “Let`s Get Physical”.

One can make a relationship between each everyday metric units and something physical. For example: Centimeter: the diameter of the colored part of your eye. Meter: the height of a door knob in your home, the length of a baseball bat. Gram: a little more than the weight of a paper clip, three raisins, or Sweet`N Low packet. Decimeter: The length of an ordinary wall receptacle. Square Decimeter: the size of a slice of bread. And so on ...Note: No relationship to the customary units is made. You do not want to mix the units. So I would never say a meter is about a yard.

The Four Main Reasons Why the US Should GO METRIC.

1. The SI Metric System was scientifically developed.

Example: All units stem from seven basic units. {(1) Meter - length, (2) Kilogram - mass, (3) Second - time, (4) Ampere – electric current, (5) Kelvin or Celsius - temperature, (6) Mole – amount of substance, (7) Candela – luminous intensity

2. Ease of computation. Try converting 29 mi to rods to yards to feet to inches - compare with converting 29 km to hectometers to meters to decimeters to centimeters.

The metric system is based on decimal arithmetic, just like dollars and cents. Once learned, it’s simpler to use and *less prone to error*. Adopting the metric system is a good deal for Education. Metrication increases both efficiency and quality and will help ensure that American students stay technologically competitive with their foreign counterparts.

3. **Economic & Trade reasons.**

Most major U. S. industries - including the automobile, construction equipment, machine tool, electronics, soft drink, liquor, pharmaceutical and health care industries - are primarily or completely metricated.

Since 1994, billions of dollars of federal, state and local metric construction projects of all kinds have been built using the metric system. We only need to make the change once. The benefits are perpetual.

4. This is a METRIC WORLD (Universal Language) If the US completely adopts the Metric System, it will be the first time since the dawn of civilization that the world will have one language of measurement. Imagine if we could do this with English or Spanish. The metric system is the international system of measurement - 94 percent of the people on earth use it all the time.

Note: In 1988, Congress made the metric system the preferred system of measurement in the United States.

Dr. Don Jordan, University of South Carolina, Eastern Director of the United States Metric Association.

Note at the site: <http://www.artsandsciences.sc.edu/cse> you can find the following: click on programs then under Metric then see Puzzles and games:

Measurement Word Search; Measurement Crossword puzzler; Vocabulary Challenge; NIST Metric Pyramid; The Big Match Up; My Name Card; , Metric Book Mark. These are the same as found at www.nist.gov/kids. Many others.

Test
Measurement & Nanotechnology
Grades 6 - 12

Answer the following True or False: **Circle One**

1. A liter contains 1,000 smaller units called milliliters.

True or False

2. A liter has a Volume of 1,000 cubic centimeters.

True or False

3. If we convert 6 543,219 meters, to kilometers we get 6 543 219 km.

True or False

4. Nanoscience is the study and development of materials and structures in the range of 1 nm (10^{-9} m) to 100 nanometers (100×10^{-9} m = $10^2 \times 10^{-9}$ = 10^{-7}) and the unique properties that arise at that scale.

True or False

5. An angstrom X is within the nanoscale but not the subatomic scale.

True or False

End of True/False

Answers: 1. T 2. T 3. F 4. T 5. F 6. (c) 7. (d) 8. (b) 9. (e) 10 (c)

Answer the following Multiple Choice Questions:
Circle One answer for each question.

6. A vitamin C tablet has a mass of 500 mg. That is the same as ____.

(a) 5 g (b) 0.05 g (c) 0.5 g (d) 0.5 kg (e)

7. The length of a pencil would probably best be measured in ____.

(a) milligrams (b) meters (c) decameters
(d) centimeters e) micrometers

8. The unit of volume that is the same as one cubic decimeter is the ____.

(a) meter (b) liter (c) gram
(d) hectometer (e) none of these

9. Determine the order of magnitude difference in the sizes of the radii for Atoms (10^{-10} meter) compared with neutrons (10^{-15} meter).

(a) Order 4 (b) Order 2 (c) order 12
(d) Order 6 (e) none of these

10. How long has it been legal to use the metric system in the U.S.?

(a) 1958.
(b) 1975
(c) 1866
(d) 1921.
(e) None of these.
The end

SI (pronounced ess-EYE) is the abbreviation for the *Système International d'Unités*, the modernized version of the metric system that the U.S. and other nations have agreed to use. (Do *not* abbreviate it as S.I.)



This list is provided to point out the correct way to use the metric system and to show many of the incorrect examples of its usage that may be given on package labels and in other printed matter. These correct ways to use SI are set by the international standards that define the SI.

Important in SI-metric:

1. The short forms for SI units (such as mm for millimeter) are **symbols**, *not* abbreviations.
2. SI symbols *never end with a period* unless they are the last word in a sentence.
 - **RIGHT:** 20 mm, 10 kg
 - **WRONG:** 20 mm., 10 kg.
3. SI symbols should be preceded by digits and *a space must separate the digits from the symbol*.
 - **RIGHT:** It was 300 mm wide. The millimeter width was given.
 - **WRONG:** It was 300mm wide. The mm width was given.
4. Symbols *always are written in the singular form* (even when more than one is meant).
 - **RIGHT:** 1 mm, 500 mm, 1 kg, 36 kg
 - **WRONG:** 500 mms, 36 kgs
 - **BUT:** It is correct to pluralize written-out metric unit names: 25 kilograms, 250 milliliters
5. The symbol for a compound unit that is *a quotient of two units is indicated by a solidus* or by a negative exponent.
 - **RIGHT:** km/h or km·h⁻¹ (for kilometers per hour)
 - **WRONG:** kmph or kph (do *not* use p as a symbol for "per".)
 - **BUT:** It is correct to say or write "kilometers per hour".
6. The meaning of an SI symbol can be changed if you substitute a capital letter for a lower case letter.
 - **RIGHT:** mm (for millimeter, which means 1/1000 of a meter)
 - **WRONG:** MM or Mm (M is the prefix for mega, which means one million; a megameter is a million meters)

The **symbol for liter** (or litre) may be either a capital el (L) or a lowercase el (l); both are correct. In the U.S., Canada, and Australia, the capital el (L) is preferred, but most other nations use the lowercase el (l).

More information for students and teachers can be found at

www.metric.org

Examples of incorrect SI-metric usage:

Correct Usage	Examples of Incorrect Usage	For
km	Km, km., KM, kms, K, k	kilometer
m	M, m.	meter
mm	Mm, mm., MM	millimeter
L or l	L., l.	liter
mL or ml	ML, MI, mL., ml., mls	milliliter
kg	KG, KG., Kg, Kg., kgr, kgs, kilo	kilogram
g	G, G., g., gr, gm, GR, GM, GRM, grms	gram
µg	mcg ¹	microgram
h	hr, hrs, HR, h., HR., HRS.	hour
s	sec, S, SEC, sec., s., S.	second
cm ³	cc	cubic centimeter
km/h	KPH, kph, kmph, km/hr	kilometer per hour
kHz	KHz, KHZ, Khz	kilohertz
MHz	MHZ, Mhz	megahertz
hPa	HPa, HPA, Hpa, mb	hectopascal
kPa	KPa, KPA, Kpa	kilopascal
°C	C, deg C, ° C, C°	degree Celsius
K	°K, deg K	kelvin

¹Because the handwritten symbol "µg" looks almost exactly like "mg" and is therefore a frequent cause of overdoses, the abbreviation "mcg" is preferred in the medical field. See [The Joint Commission recommendations](#).

Some explanations:

The **spellings** of meter and metre [or liter and litre] are both correct. In the U.S., the meter and liter spellings are used most often; but the English-spellings used in most other nations are metre and litre.

In a strict sense, spelling and pronunciation are matters of language and are *not* set by the international standards that define SI. But, in keeping with the pronunciation of the other SI units involving prefixes, which all accent the first syllable, the USMA-preferred **pronunciation** of the word, kilometer, is KILL-oh-meet-ur, (*not* kill-AHM-it-ur).

NIST

National Institute of Standards and Technology

SI Teacher Kits Available for Educators

September 2013

Attention Teachers! Did you know that you can obtain a free set of metric education resources for use in your classroom? Contact the NIST Metric Program:

Email:

TheSI@nist.gov and include your name, school, subject, grade level, phone number, and mailing address. The NIST SI Teacher Kit a classroom set of metric rulers (300 mm ruler), laminated metric conversion cards ,SI Education CD, and other measurement resources.

Our [website www.nist.gov/metric](http://www.nist.gov/metric) has numerous educational materials that can be downloaded and freely reproduced. These resources are helpful to students as they become familiar with the SI, develop reference points or that innate understanding of how much a quantity is, and learn more about SI basics. Your students may find [Everyday Estimation](#) and [Becoming Familiar with the SI](#) helpful. In addition, there are several [Unit Conversion](#) resources available.

Popular Links: •[Education Resources](#); •[Becoming Familiar with the SI](#) •[Everyday Estimation](#)

Please not the following Recommendation from NIST:

FAQ: My students are having difficulty using dual measurement unit tools, such as rulers that use both inches and centimeters. They keep mixing up the units! What can I do to improve their learning experience?

One recommended education best practice is to teach the SI by using the SI. Students must build proficiency and confidence working with metric measurements before they can effectively make comparisons with other measurement systems. Use single system measurement tools whenever possible. Using dual unit measuring equipment can confuse learners because it is easy to select and use the wrong scale. When possible, acquire metric measuring devices (meter sticks, kilogram or gram scales, and Celsius thermometers). If dual unit measurement tools are used (e.g., those using U.S. customary units), block the non-metric units from view. For example, use opaque tape, an index card, or paint to cover up inches on a dual unit ruler.

FAQ: How do I get a metric ruler?

Metric rulers are available from many retail vendors, which can be identified by using search terms such as "metric rule," "meter stick," or "metric stick." [Printable rulers](#) such as the centimeter [Color-square rules](#), can be color printed on to overhead transparency sheets to make inexpensive metric rulers. You may also be interested in similar printable teaching aids that create a [liter cube](#) or a [cubic decimeter box](#), which are easily constructed using cardstock.

The National Institute of Standards and Technology (NIST) is an agency of the [U.S. Department of Commerce](#).



Learn more about us from our video, [Making Connections](#).

The National Institute of Standards and Technology (NIST) Summer Institute for Middle School Science Teachers is a two-week workshop for middle school science teachers featuring hands-on activities, lectures, tours, and visits with NIST scientists and engineers in their laboratories.

Teachers who participate in the NIST Summer Institute gain:

- Increased understanding of the subjects they teach
- Increased understanding of how scientific research is performed
- Materials and resources to implement what they learned at NIST in their classrooms
- Increased enthusiasm for science
- A network of scientists and engineers at NIST with whom to consult
-

Teachers finish the NIST Summer Institute with a wealth of new knowledge about core topics such as forensics and materials science, and materials to integrate these topics into their classroom while meeting curriculum standards.

For more information:

Our website www.nist.gov/metric has numerous educational materials that can be downloaded and freely reproduced. These resources are helpful to students as they become familiar with the metric system (e.g., developing reference points or that innate understanding of how much a quantity is) and learn more about SI basics. There are several **Unit Conversion** resources on our website (<http://www.nist.gov/pml/wmd/metric/unit-conversion.cfm>). Your students may find **Everyday Estimation** (<http://www.nist.gov/pml/wmd/metric/estimation.cfm>) and **Becoming Familiar with the SI** (<http://www.nist.gov/pml/wmd/metric/si-familiar.cfm>) helpful.

<http://www.nist.gov/iaao/teachlearn/index.cfm>

Testimonials about NIST Summer Institute

"This is a remarkable experience and I can't really put into words how much fun I am having."

"This program has opened up so many doors and has rejuvenated my passion and love of teaching science."

The [NIST Research Experience for Teachers](#) is a follow-on program that provides two local middle school science teachers with six weeks of real-world research experience at NIST. Completion of the NIST Summer Institute is a prerequisite for participating in the Research Experience for Teachers.

The National Institute of Standards and Technology (NIST) is an agency of the [U.S. Department of Commerce](#).