

Metric Olympics!

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Cindy Kroon
Montrose High School
cindy.kroon@k12.sd.us

October 10 has been officially designated as Metric Day. (10-10 get it??!) Use this opportunity to reinforce metric measurement, estimation, and also to have a lot of fun!

Set up ten stations (spread out as much as possible) around the room. Students work in teams of two or three to complete and score each Metric Olympic event.

Important: All students on a team must: (1) complete the event, (2) estimate, then (3) measure ***in that order***. Students should be encouraged to discuss metric measurements with others in their group.

The goal is to be the team or individual with the lowest score (closest to actual metric measurement.) But when we learn, we are ALL winners!

Materials needed for a class of 20 (or so):

Paper towels (1 roll)
Masking tape (1 roll)
Meter sticks (4)
Cotton balls (25)
Plastic or paper straws (10)
Sponge (3)
Ice cream pail or similar container (4)
Graduated cylinder, 100 ml (3)
Marbles or floral weights (several hundred)
Soup bowl or similar (6)
Triple-beam balance (3)
Circles cut out of colored paper (flimsy) 20 cm in diameter (6)
Ice cream pail lid with center cut out (1)
Post-it notes (20-30)
Thermometer (digital instant-read is nice) (1)
Cm ruler (something flimsy for golf club) (1)
Centimeter/millimeter ruler (to measure) (1)



Metric Olympics Event Guidelines/ Score sheet (20)

Metric Olympics Event Guidelines

1. Standing Long Step

From the starting line, take one giant step.

Estimate and record the distance from the starting line to heel in meters.

Measure the distance from starting line to heel in centimeters. Record.

2. Cotton Ball Put

From the starting line, put the cotton ball.

Estimate and record the distance from the starting line to the cotton ball in centimeters.

Measure the distance from the starting line to the cotton ball in centimeters. Record.

3. Straw Javelin Throw

From the starting line, hurl a straw.

Estimate and record the distance from the starting line to the leading tip of the straw in centimeters.

Measure the distance in centimeters from the starting line to the leading tip of the straw. Record.

4. Swimming Sponge Squeeze

Hold a saturated sponge over a container.

Using only one hand, squeeze as much water as possible out of the sponge.

Estimate and record the volume of water that was squeezed from the sponge in milliliters.

Measure the volume of water to the nearest milliliter. Record.

5. Weight-Lifting Marble Grab

Reach into a container with one hand and remove as many marbles as possible.

Estimate and record the mass in grams of the marbles you were able to remove.

Measure the mass of the marbles in grams. Record.

6. Discus Throw

From the starting line, hurl the discus.

Estimate the distance in centimeters from the starting line to the nearest edge of the discus.

Measure the distance from the starting line to the nearest edge of the discus in centimeters. Record.

7. Basketball

From the starting line, toss the cotton ball through the hoop.

Estimate and record the distance from the target to the cotton ball in millimeters.

Measure the distance from the target to the cotton ball in millimeters. Record.

8. High Jump

From a standing start, jump as high as you can. (No running starts). Use a post-it note to mark the height of your leap. Estimate and record the distance from the floor to the highest edge of the paper in meters.

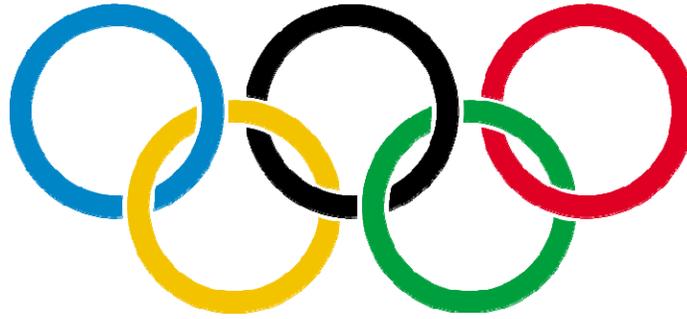
Measure the distance in meters. Record.

9. Temperature Diving

Immerse your hand in the water. Estimate the temperature of the water in degrees Celsius. Your score for the event is the difference between your estimate and the actual temperature.

10. Golf

Use the ruler to putt the cotton ball toward the hole. Estimate and record the distance in millimeters from the leading edge of the cotton ball to the nearest edge of the hole.



Metric Olympics Score Sheet

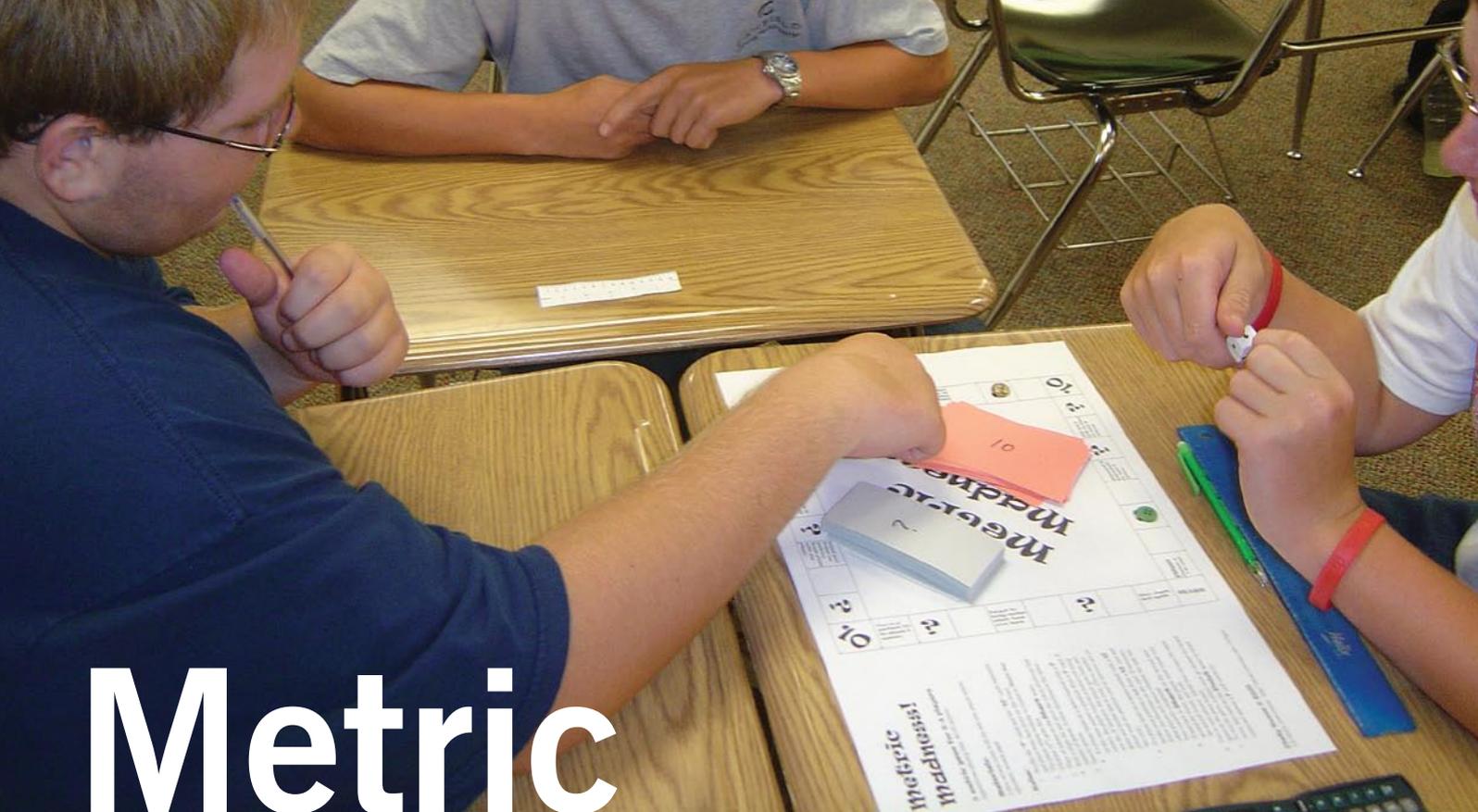
Name _____ Team _____

Team Score (average of individual scores) _____

1. Each member of the team competes in every event.
2. Each member gets only **one try.** No practice!
3. Each member of the team must make an estimate and record the estimate **before** measuring. An estimate is your best guess. All members attempt and estimate **before** any measuring is done. After all estimates have been recorded, measure accurately and record.
4. Your score for each event is the difference between estimate and measurement.

Event	Estimate	Actual	Difference
1. Long Jump (m)			
2. Shot Put (cm)			
3. Javelin (cm)			
4. Swimming (ml)			
5. Weight-Lifting (g)			
6. Discus (cm)			
7. Basketball (mm)			
8. High Jump (m)			
9. Diving (Celsius)			
10. Golf (mm)			

Total Difference _____



Metric

Madness

Cindy D. Kroon

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What student could resist a rousing game of “metric madness”? Not only is it entertaining, it is also educational. While students are playing, they are also reviewing metric system vocabulary, measurements, and calculations.

According to the Measurement Standard in *Principles and Standards for School Mathematics*, “In grades 6–8 all students should understand both metric and customary systems of measurement” and “understand relationships among units and convert from one unit to another within the same system” (NCTM 2000, p. 240). Additionally, South Dakota’s Measurement Standard for Grade 7 states that students will apply measurement concepts in practical

applications. All students should be able to “select, use, and convert appropriate unit of measurement for a situation” (South Dakota Department of Education 2004; doe.sd.gov/contentstandards/math/standards.asp). “Metric madness” is a mathematical game that furthers the intent of both NCTM’s and South Dakota’s Standards.

Officially, Metric Week is the week in October that contains the calendar date 10/10, and Metric Day is celebrated on October 10. The game “metric madness” was created for use with algebra and geometry students during a Metric Day Celebration. Students look forward to Metric Day each year and are enthusiastic about playing

Cindy Kroon, cindy.kroon@k12.sd.us, teaches ninth- through twelfth-grade mathematics at Montrose High School in Montrose, SD 57048. She is interested in using music to teach mathematics and in integrating mathematics and science.

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Fig. 1 “Metric madness” game board

10	?		Helped your friend use metrics: Trade places with any player.	?	Sleeping in class: Lose your turn.	?		Take the right-angle shortcut.	10
You're a perfect 10! Go ahead 5 spaces.									?
?								Restroom break: Lose your turn.	?
									?
Forgot to bring meter-stick: Lose your turn.									
									Caught using English units. Go back to start.
?									?
Slow start: Roll again.									
START	FINISH (Answer a ? to win!)			?		Measured in Fahrenheit. Go back 5 spaces.	?	Shh! Don't talk in class. Go back 3 spaces.	?

“metric madness.” They are by turns competitive and supportive as they play the game. All students are engaged, whether completing calculations as part of their own turns, or checking the accuracy of answers calculated by their opponents. Playing time is approximately twenty to thirty minutes.

Although created for Metric Day, this game would constitute a good class activity whenever the metric system is reviewed or taught. Varying the difficulty of the game’s questions and tasks can make the game easier or more difficult. The game board is shown in **figure 1**, and the rules are

listed in **figure 2**. The question cards are shown in **figure 3**, and task cards in **figure 4**. Note: Question and task cards will be more durable and easier to use if printed on heavy card paper or card stock. For ease of play, use a different color for each set of “10” and “?” cards.

As a follow-up writing assignment, students critiqued the game and suggested improvements. Here are a few comments by students:

I liked the game. It was fun to roll the dice and play a game in math. It was the most fun when I landed on a 10 or a question. Some of the questions were difficult but I knew most of them. This is my opinion of the game.

I thought that the game was awesome and I hope we can play it again soon. The only thing I didn't like as much is that some questions were hard, but hey we need to extend our knowledge. I liked the questions where you have to figure it out because that's how I learn best.

I really liked the game Metric Madness. It was fun and educational at the same time. Metric Madness was a clever way to help learn the metric terms and was really fun to do a hands-on activity. I do not have many suggestions for the game but I would suggest the questions be multiple choice. I noticed it was a little difficult for some students, as some of us were clueless to the metric system lingo.

I thought Metric Madness was really fun. I liked that the questions were actually challenging. I also liked that the directions were not very hard. I think the "10" cards could be harder than they were. All around I really liked the game and thought it was fun.

I thought Metric Madness was pretty fun. You work on your math but you also do some science. The question cards really make you think about the answers. The other thing I like is you get to see how much you can remember about science and your math skills. That is what I liked about the game.

The assignment also required

Fig. 2 "Metric madness" official rules

A metric game for 2–4 players
Approximate playing time: 20–30 minutes

Materials

2 dice, a ruler or meterstick with centimeters and millimeters, player pieces (buttons, coins, etc., one for each player), calculator, pencil, scratch paper

Rules

1. Shuffle the question "?" cards and the "10" cards separately and place them facedown on the board.
2. The player whose birthday is closest to Metric Day (October 10) goes first.
3. Place all tokens on the Start space.
4. Roll a single die and move the token clockwise that number of spaces. Follow the directions in the space.
5. If landing on special spaces:
 - A space marked with a question mark: The player must answer a question from a ? card. If correct, the player can roll one die as a bonus roll. If incorrect, the player goes back one space, and the turn is over. (Have another player read the question card, since the answers are on the card.)
 - A space marked with a 10: The player must perform a task from a 10 card and follow the directions on the card. If necessary, other players will assess whether the task has been correctly completed. If correct, follow the instructions on the card. If incorrect, the player goes back one space, and the turn is over.
 - If sent back to Start on the second time around the board, the player must repeat only the second round, not both.
6. Two or more players' tokens may occupy the same space on the game board.
7. To win the game, a player must go around the board twice, landing on the Finish space by exact count, and answer a ? card correctly.

submission of three problems (with solutions) suitable for inclusion in a subsequent question set: one task for a 10 card and two items for use on a question card. According to NCTM's Communication Standard, "Instructional programs from prekindergarten through grade 12 should enable all students to—organize and consolidate their mathematical thinking through communication; communicate their mathematical thinking coherently and clearly to peers, teachers, and others; analyze and evaluate the mathematical thinking and strategies of others" (NCTM 2000, p. 268).

Using a board-game format can

be an effective method of reviewing content. Students are enthusiastic and engaged while learning. Everybody wins.

REFERENCES

- National Council of Teachers of Mathematics (NCTM). *Principles and Standards for School Mathematics*. Reston, VA: NCTM, 2000.
- South Dakota Department of Education. "Office of Curriculum, Technology, and Assessment: Measurement Strand Standards, 6–8." doe.sd.gov/content/standards/math/standards.asp.
- U.S. Metric Association (USMA). "U.S. Metric Association." lamar.colostate.edu/~hillger. ●

Fig. 3 Question cards

<p>? What does the metric prefix <i>centi</i> represent? 1/100</p>	<p>? What does the metric prefix <i>kilo</i> represent? 1000</p>
<p>? What does the metric prefix <i>milli</i> represent? 1/1000</p>	<p>? What does the metric prefix <i>micro</i> represent? 1/1,000,000</p>
<p>? What does the metric prefix <i>deca</i> represent? 10</p>	<p>? What does the metric prefix <i>giga</i> represent? 1,000,000,000</p>
<p>? What does the metric prefix <i>hecto</i> represent? 100</p>	<p>? What is the basic metric unit for length? meter</p>
<p>? What is the basic metric unit for mass? kilogram</p>	<p>? What is the basic metric unit for temperature? Degrees Celsius</p>

Fig. 3 Question cards (continued)

<p style="text-align: center;">?</p> <p style="text-align: center;">What is the basic metric unit for weight?</p> <p style="text-align: center;">Newton</p>	<p style="text-align: center;">?</p> <p style="text-align: center;">What is the basic metric unit for volume?</p> <p style="text-align: center;">liter</p>
<p style="text-align: center;">?</p> <p style="text-align: center;">In what country did the metric system originate?</p> <p style="text-align: center;">France</p>	<p style="text-align: center;">?</p> <p style="text-align: center;">How many centimeters are in 1 inch?</p> <p style="text-align: center;">2.54</p>
<p style="text-align: center;">?</p> <p style="text-align: center;">What is the temperature in degrees Celsius for the freezing point of water?</p> <p style="text-align: center;">0°C</p>	<p style="text-align: center;">?</p> <p style="text-align: center;">What is the temperature in degrees Celsius for the boiling point of water?</p> <p style="text-align: center;">100°C</p>
<p style="text-align: center;">?</p> <p style="text-align: center;">What is the temperature in degrees Celsius for a comfortable room temperature?</p> <p style="text-align: center;">20°C (accept ±5)</p>	<p style="text-align: center;">?</p> <p style="text-align: center;">What is the temperature in degrees Celsius of a normal human body temperature?</p> <p style="text-align: center;">37°C (accept ±5)</p>
<p style="text-align: center;">?</p> <p style="text-align: center;">What is the temperature in degrees Celsius of a cup of hot coffee?</p> <p style="text-align: center;">75°C (accept ±20)</p>	<p style="text-align: center;">?</p> <p style="text-align: center;">What is the temperature in degrees Celsius of a hot summer day?</p> <p style="text-align: center;">35°C (accept ±10)</p>

Fig. 3 Question cards (continued)

<p style="text-align: center;">?</p> <p>Name one of the three countries that <i>does not</i> use the metric system as an official system of measure.</p> <p style="text-align: center;">United States, Liberia, Myanmar</p>	<p style="text-align: center;">?</p> <p>Which metric unit would be most appropriate to measure the mass of a concrete block?</p> <p style="text-align: center;">kilogram</p>
<p style="text-align: center;">?</p> <p>Which metric unit would be most appropriate to measure the mass of a paper clip?</p> <p style="text-align: center;">gram</p>	<p style="text-align: center;">?</p> <p>Which metric unit would be most appropriate to measure the amount of gas in a car's gas tank (when full)?</p> <p style="text-align: center;">liter</p>
<p style="text-align: center;">?</p> <p>Which metric unit would be most appropriate to measure the correct dose of cough syrup to give an individual?</p> <p style="text-align: center;">milliliter</p>	<p style="text-align: center;">?</p> <p>Which metric unit would be most appropriate to measure the length of your foot?</p> <p style="text-align: center;">centimeter</p>
<p style="text-align: center;">?</p> <p>Which metric unit would be most appropriate to measure the thickness of pencil lead?</p> <p style="text-align: center;">millimeter</p>	<p style="text-align: center;">?</p> <p>Which metric unit would be most appropriate to measure the distance to the state capitol?</p> <p style="text-align: center;">kilometer</p>
<p style="text-align: center;">?</p> <p>Which metric unit would be most appropriate to measure your mass?</p> <p style="text-align: center;">kilogram</p>	<p style="text-align: center;">?</p> <p>Which metric unit would be most appropriate to measure the dimensions of the school building?</p> <p style="text-align: center;">meter</p>

Fig. 3 Question cards (continued)

<p style="text-align: center;">?</p> <p style="text-align: center;">Which is larger, 1 liter or 1 gallon?</p> <p style="text-align: center;">1 gallon</p>	<p style="text-align: center;">?</p> <p style="text-align: center;">Which is longer, 1 yard or 1 meter?</p> <p style="text-align: center;">1 meter</p>
<p style="text-align: center;">?</p> <p style="text-align: center;">Which is larger, 1 centimeter or 1 inch?</p> <p style="text-align: center;">1 inch</p>	<p style="text-align: center;">?</p> <p style="text-align: center;">Which is heavier (on Earth), 1 kilogram or 1 pound?</p> <p style="text-align: center;">1 kilogram</p>
<p style="text-align: center;">?</p> <p style="text-align: center;">In what year did the United States Congress pass the Metric Conversion act?</p> <p style="text-align: center;">1975 (accept ± 10 years)</p>	<p style="text-align: center;">?</p> <p style="text-align: center;">In what year did the United States adopt the metric system as the official system of weights and measures?</p> <p style="text-align: center;">(Trick question!) The United States has never officially adopted the metric system.</p>
<p style="text-align: center;">?</p> <p style="text-align: center;">Which is heavier (on Earth), 1 gram or 1 ounce?</p> <p style="text-align: center;">1 ounce</p>	<p style="text-align: center;">?</p> <p style="text-align: center;">Which of the following is closest to your height—1 meter, 2 meters, or 3 meters?</p> <p style="text-align: center;">(Probably) 2 meters</p>
<p style="text-align: center;">?</p> <p style="text-align: center;">Which would be the most appropriate metric unit to measure the dimensions of the classroom?</p> <p style="text-align: center;">meter</p>	<p style="text-align: center;">?</p> <p style="text-align: center;">How many kilograms are in a metric ton?</p> <p style="text-align: center;">1000</p>

Fig. 3 Question cards (continued)

<p style="text-align: center;">?</p> <p>In what year was the metric system created?</p> <p style="text-align: center;">1793 (accept ± 20 years)</p>	<p style="text-align: center;">?</p> <p>What is the metric prefix for 1/10?</p> <p style="text-align: center;">deci</p>
<p style="text-align: center;">?</p> <p>What was the original definition of a meter?</p> <p style="text-align: center;">1 ten-millionth of the distance from the equator to the Earth's pole</p>	<p style="text-align: center;">?</p> <p>What is the metric prefix for 1/100?</p> <p style="text-align: center;">centi</p>
<p style="text-align: center;">?</p> <p>How many countries in the world do <i>not</i> use the metric system as an official unit of measure?</p> <p style="text-align: center;">3</p>	<p style="text-align: center;">?</p> <p>What is the metric prefix for 1/1000?</p> <p style="text-align: center;">milli</p>
<p style="text-align: center;">?</p> <p>What is the official name of the metric system?</p> <p style="text-align: center;">International System of Units, or SI</p>	<p style="text-align: center;">?</p> <p>What does the metric prefix <i>deci</i> represent?</p> <p style="text-align: center;">1/10</p>
<p style="text-align: center;">?</p> <p>What is 2 liters converted to milliliters?</p> <p style="text-align: center;">2000 ml</p>	<p style="text-align: center;">?</p> <p>What is 6000 grams converted to kilograms?</p> <p style="text-align: center;">6 kg</p>

Fig. 4 The 10 cards

10

Roll 2 dice. The sum is a length in centimeters.
Convert the length to inches, round to the nearest unit,
and move that many spaces forward.

10

Move forward 2 spaces,
or move every player back one space.

10

Count the number of spaces you are from the finish line.
If fewer than 10, go back 2 spaces. If more than 10, go
forward 2 spaces. If equal to 10, stay where you are.

10

If you are wearing anything labeled
with a metric unit, take a bonus roll.

10

Move forward 2 spaces, or move
another player back 5 spaces.

10

Send any player back to Start.
Say you're sorry, even if you're not.

10

Measure to the nearest millimeter the dimensions
of the 10 square your token is on.
If correct, move forward 2 spaces.

10

Roll 2 dice. The product is a length in millimeters.
Round to the nearest centimeter,
and move that many spaces forward.

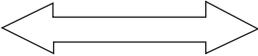
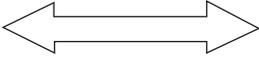
10

Roll 1 die. This is a length in millimeters.
Round to the nearest centimeter, and
move that many spaces backward.

10

Compute the area of this card in square centimeters.
If correct, advance 2 spaces.

Fig. 4 The 10 cards (continued)

<p>10 Roll 2 dice. If the sum is 10, go to the next ? space. Follow directions on the ? card.</p>	<p>10 Measure the width of the game board in centimeters. If correct, advance 2 spaces.</p> 
<p>10 Measure the width of this card in millimeters. If correct, advance 2 spaces.</p> 	<p>10 Measure the height of the game board in centimeters. If correct, advance 2 spaces.</p> 
<p>10 Measure the height of this card in millimeters. If correct, advance 2 spaces.</p> 	<p>10 Compute the area of this card in square millimeters. If correct, advance 2 spaces.</p>
<p>10 Roll 2 dice. Subtract 10, and move that many spaces forward. If a negative number, move back that number.</p>	<p>10 Roll 1 die three times. Add the numbers, subtract 10, and move ahead that number. If a negative number, move back that number.</p>
<p>10 If an opponent has an October birthday, move ahead 5.</p>	<p>10 Roll 2 dice. If the sum is 10, move ahead 5.</p>

Metric Day Writing Assignment:

1. Discuss the Metric Olympics in paragraph form. Include your impressions of the activity. Consider the following items in your discussion.

- What was your favorite event? Why?
- Which event was the most difficult? Why?
- Which event was the easiest? Why?
- Critique the Metric Olympics. What could be done to make them better, etc.?

2. Propose a new event for next year's Metric Olympics.

- Your event must use the metric system for scoring.
- It must be possible to complete in the classroom.
(not too messy, not too noisy, consider space available)
- The event may not involve food.
- Include supply list, event rules, and scoring guidelines.

Cindy Kroon's official Metric Day page with photos and event guidelines

<http://ck022.k12.sd.us/specialevents/metricday.htm>

Metric Day sources and ideas

<http://www.uark.edu/~k12info/teacher/workshops/AIMS-lessons/mini-metrics.pdf>

<http://lamar.colostate.edu/~hillger/ideas.html>

<http://www.sciencespot.net/Pages/classmetric.html#Anchor-General-49575>

<http://www.nctm.org/meetings/metric-week.htm>

http://www.nist.gov/public_affairs/kids/metric.htm