

Name: \_\_\_\_\_

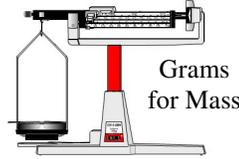
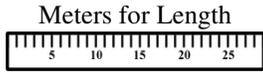
Period: \_\_\_\_\_

# Metrics

## Metric System

For everyday measuring in the United States, we use the British system of pounds, gallons, and feet. The rest of the world and science uses the easier metric system.

## Basic Units



### *British System*

### A Simpler System: Metric Prefixes

### *Metric System*

**Bigger or smaller quantities require different units:**

Increasing distance?  
Convert inches to feet.

**Hard: Inches to Feet**

$$\frac{15 \text{ in}}{1} \left( \frac{1 \text{ ft}}{12 \text{ in}} \right) = 15/12 = 1.25 \text{ ft}$$

**Bigger or smaller quantities use same units, but different prefixes.**

Increasing Length?  
Convert centimeters to meters

**Conversions require calculations, since conversion use difficult numbers:**

12 in = 1 ft; 16 oz = 1 pound

**Easy: Centimeters to Meters**

$$\frac{265 \text{ cm}}{1} \left( \frac{1 \text{ m}}{100 \text{ cm}} \right) = 265/100 = 2.65 \text{ m}$$

**Conversions can be done in your head or on paper: or just move the decimal.**

100 cm = 1 m; 1 liter = 0.001 kiloliter

## Most Common Prefixes

Mega-    Kilo-    *Base unit*    Centi-    Milli-    Micro-

*There are other prefixes, but these are the most common ones used in science.*

(M) Mega = 1,000,000	So, 1 Megaliter (ML) = 1,000,000 liters
(k) Kilo = 1000	So, 1 Kilogram (kg) = 1000 grams
(c) Centi = 1/100th	So, 100 Centimeter (cm) = 1 meter
(m) Milli = 1/1000th	So, 1000 Milliliter (ml) = 1 liter
(μ) Micro = 1/1,000,000th	So, 1,000,000 Micrometer (μm) = 1 meter

### Using Conversion Ratios

*Conversion Ratio = to 1* (Find at left)

$$\frac{75 \text{ Mm}}{1} \left( \frac{1,000,000 \text{ m}}{1 \text{ Mm}} \right) = 75,000,000 \text{ m}$$

*to* (points to 1,000,000 m)  
*from* (points to 1 Mm)

*The units must cancel, so the "from" must be on the bottom. This is from Mm to m.*

## A Decimal System

You can convert between metric units by simply moving the decimal the correct number of places.

*Just move the decimal!*



**REMEMBER:**  
"Left for Larger"

**Larger Prefix: Move the Decimal Left.**

*Notice how many times the decimal moves between each prefix.*

1	megameter (Mm) =
1000.0	kilometer (km) =
1000000.0	meters (m) =
100000000.0	centimeters (cm) =
1000000000.0	millimeters (mm) =
1000000000000.0	micrometers (μm)

## How Big Are They?

*It's important to have a sense of these units so we are not just talking numbers. A good scientist knows if a number makes sense.*

### Volume

1 liter = just bigger than a quart  
1 mL = volume of a small marble



1 quart



1 liter

### Mass

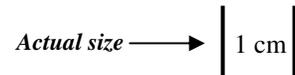
1 kg = 2.2 pounds  
1 gram = 1 dollar bill

1 gram



### LENGTH

1 mm = width of a fingernail  
1 cm = width of your pinky  
1 meter = 3.3 ft (just bigger than a yard)  
1 kilometer = 0.6 miles



Name: \_\_\_\_\_

Period: \_\_\_\_\_

1. Liter 2. Metric System 3. Gram 4. British System 5. Meter	A. Used by science and the rest of the world. B. Basic metric unit of volume. C. Basic metric unit of length. D. System of pounds, feet, and gallons. E. Basic metric unit of mass.	6. Centi- 7. Mega- 8. Milli- 9. Micro- 10. Kilo-	A. Means "one hundredth" (1/100). B. Means "one million" (x 1,000,000). C. Means "one millionth." (1/1,000,000). D. Means "one thousandth" (1/1,000). E. Means "one thousand" (x 1,000).
<p style="text-align: center;"><b>Which would you Use: Meters, Liters, or Grams?</b></p> 18. To measure how much water is in a pool? _____ 19. To measure the mass of an ice cream cone? _____ 20. To measure the width of a table? _____ 21. To measure the distance a car traveled? _____ 22. To measure how much acid to pour into a beaker? _____ 23. To measure how much powder to put into water? _____			
<p style="text-align: center;"><b>Which is bigger? (circle it)</b></p> 24. A centimeter or a megameter? 25. A liter or a microliter? 26. A megagram or a kilogram? 27. A megameter or a micrometer? 28. A milliliter or a microliter? 29. A milligram or a centigram?		<p style="text-align: center;"><b>Which Direction Does the Decimal Move? (L or R)</b></p> 30. From centimeters to meters? 31. From megameters to meters? 32. From kilometers to millimeters? 33. From micrometers to millimeters? 34. From millimeters to kilometers?	
<p style="text-align: center;"><b>How Far and What Direction Does the Decimal Move?</b></p> 35. <i>Ex: From kilometers to meters? Ans: Right 3 places</i> 36. From meters to centimeters? 37. From micrometers to millimeter? 38. From centimeters to kilometers? 39. From micrometers to megameters? 40. From kilometers to centimeters? 41. How many cents in a dollar? 42. How many years in a century? 43. How many years in a millennium? 44. How many centimeters in a meter? 45. How many millimeters in a meter? 46. How many microliter in a liter? 47. How many meters in a kilometer? 48. How many grams in a megagram?			
49. To change from centimeters to meters, how do you move the decimal?  50. Convert 435 centimeters to meters.  51. To change from liters to milliliters, how do you move the decimal?  52. Convert 12 liters to milliliters.  53. To change from megameters to meter, how do you move the decimal?  54. Convert 3 megameters to meters.		55. ( <i>Remember: the "from" goes on the bottom.</i> ) Write the conversion factor from liter to milliliters.  56. Convert 0.25 liters to milliliters.  57. Write the conversion ratio (factor) from megameters to meters.  58. Use this conversion factor to convert from 1.2 Mm to m.	