Conversions of Length, Mass, Capacity in Metric Units

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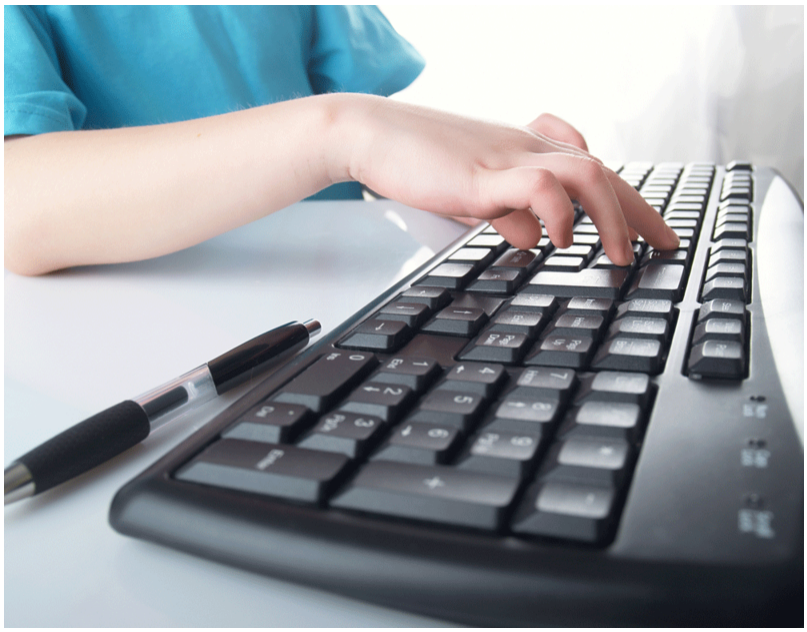
CONCEPT 1

Conversions of Length, Mass, Capacity in Metric Units

Here you'll learn to convert metric units of length, mass or capacity.

Have you ever tried to figure out something on the computer? Sometimes you will enter an incorrect answer, but because computers don't talk, you don't know why your answer is wrong. This is exactly what happened to Caleb. Take a look.



Before leaving the science museum, Caleb found a really cool computer game all about metrics. Caleb had been practicing his metric conversions while playing at the Metric Playground, but now it was time for him to apply what he had learned. The object of the game is to move the mountain climber up the mountain by solving problems involving metric lengths, weights and liquids. Each time a correct answer is given, the mountain climber moves up the mountain. You keep playing until the climber reaches the top. At the beginning of the game, Caleb sees this problem on the computer screen. It is a problem that requires Caleb to use greater than or less than symbols to compare values.

5.5 grams _____ 4500 mg

Caleb is unsure of the correct answer. He decides to skip this problem by pushing the NEXT button on the computer. Here is Caleb's second problem.

6.7 Liters $\times$ 10 = _____

Caleb thought that the answer was 6700 so he entered that answer into the computer. TRY AGAIN popped up on his screen. Finally Caleb decided to try one more problem.

_____ kilograms is one hundred times lighter than 1550 kilograms

Caleb is stuck again. **You can help Caleb. In this Concept you will learn all about comparing metric units of length, mass and capacity. You will also learn to convert units using powers of ten.**

Guidance

This Concept combines a couple of different skills. Previously we worked on metrics and how to convert metric units of length, mass and capacity. We have also learned how to multiply decimals using powers of ten such as 10, 100, 1000.

How can we put these two skills together?

We can put them together by converting metric units using powers of ten. This will require us to move the decimal point as we did in earlier Concepts.

Convert 150 cm into mm by multiplying by a power of ten.

We know that there are 10 mm in 1 cm. When we go from a larger unit to a smaller unit we multiply. Therefore, we are going to multiply 150 cm by 10.

150 cm $\times$ 10 = _____ mm

We know that when we multiply by 10 we move the decimal point one place to the right. The decimal point in a whole number is after the number. So we need to add a zero placeholder to 150.

150 cm = 1500 mm

We can do this when we convert from a smaller unit to a larger unit too. Let's look at this one involving capacity.

1250 milliliters = _____ L

We know that there are 1000 milliliters in one liter. We need to divide 1250 milliliters by 1000. To do this, we will move the decimal point three places to the left. The decimal point is after the number in a whole number.

1250 milliliters = 1.25 Liters

We can complete this with any unit of measure as long as we know the conversion equivalents and remember how to use powers of ten to move the decimal point to the left or to the right.

Here are some equivalence charts that you will need.

Metric Units of Capacity

1 liter (L) = 1000 milliliters (mL)

Equivalent Units of Mass - Metrics

1 kilogram (kg) = 1000 grams (g)

1 gram = 1000 milligrams (mg)

$1\ km \quad 1000\ m$
$1\ m \quad 100\ cm$
$1\ cm \quad 10\ mm$

Here are a few conversions for you to try on your own.

Example A

1340 ml = _____ Liters

Solution: 1.34 Liters

Example B

66 grams = _____ mg

Solution: .066

Example C

1123 m = _____ km

Solution: 1.123 km

Now back to the original problem. We are going to help Caleb answer all three questions. Let's start with the first one.

5.5 grams _____ 4500 mg

There are 1000 mg in 1 gram. Therefore, if we change the 4500 milligrams to grams by moving the decimal point three places to the left, we end up with 4.5 grams. 5.5 is greater than 4.5.

5.5 grams >4500 mg

The second problem requires multiplying by powers of ten.

6.7 liters $\times$ 10 = _____

To multiply by a power of ten we move the decimal point to the right. Here we are multiplying by 10, so we move the decimal point one place to the right.

6.7 liters $\times$ 10 = 67 liters

Our final problem involves division by powers of ten.

_____ kilograms is one hundred times lighter than 1550 kilograms

We want to make 1550 kg 100 times lighter. To do this, we divide by 100. To divide by 100, a power of 10, we move the decimal point two places to the left.

15.5 kg is our answer.

Vocabulary

Metric System
a system of measurement

Length
the measurement of a object or distance from one end to the other

Millimeter
the smallest common metric unit of measuring length, found on a ruler

Centimeter
a small unit of measuring length, found on a ruler

Meter
approximately 3 feet, measured using a meter stick

Kilometer
a measurement used to measure longer distances, the largest common metric unit of measuring length

Mass
the weight of an object

Capacity
the amount of liquid an object or item can hold

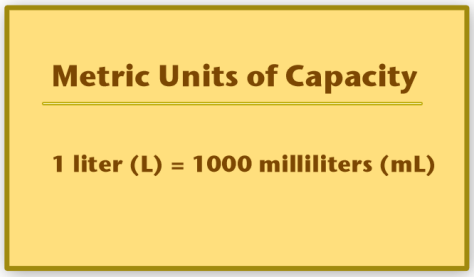
Guided Practice

Here is one for you to try on your own.

12,350 mL = _____ L

Answer

To figure this out, we can use the chart on equivalent metric units of capacity.

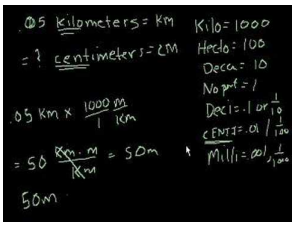


Next we divide by 1000.

$12,350 \div 1000 = 12.35$

Our answer is 12.35 Liters.

Video Review



MEDIA

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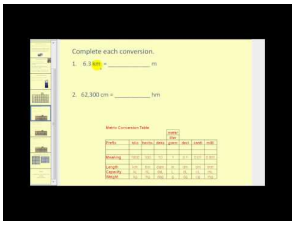
KhanAcademyUnit Conversion



MEDIA

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James Sousa Metric Unit Conversion

Practice

Directions: Convert each measurement using powers of ten.

1. 5.6 km = _____ m
2. 890 m = _____ km
3. 9230 m = _____ km
4. 40 cm = _____ mm
5. 5000 mm = _____ cm
6. 500 cm = _____ m
7. 7.9 m = _____ cm
8. 99 m = _____ cm
9. 460 cm = _____ m
10. 34 cm = _____ m
11. 4.3 km = _____ m
12. 760 m = _____ km
13. 4300 m = _____ km
14. 5000 g = _____ kg
15. 560 mL = _____ L
16. 6210 mL = _____ L
17. 8900 mL = _____ L
18. 7.5 L = _____ mL
19. .5 L = _____ mL