

Metric Conversion (part 1)



Theory and examples

Learning Skills

Introduction:

We use metric conversions to convert one unit to another. To understand metric conversions you first need to understand place value and decimals which can be found in our [number](#) and [decimal](#) document. Explanations of some of the terms that have been used in this document can be found in the [glossary](#) on our website. [Part 2](#) of this document contains exercises to practise

This sheet will teach you to:

- Recognise SI units 1
- Understand the prefixes used with units 2
- Determine when to multiply or divide 2
- Convert units other than time 2
- Convert time 3

1. SI table of units

Quantity	Name of unit	Symbol	Value
length	millimetre	mm	1000mm = 1m
	centimetre	cm	100cm = 1m 10mm = 1cm
	metre	m	base unit
	kilometre	km	1000m = 1km
mass	gram	g	1000g = 1kg
	kilogram	kg	base unit
	tonne	t	1000kg = 1t
capacity	millilitre	mL	1000mL = 1L
	litre	L	base unit
	kilolitre	kL	1000L = 1kL
time	second	s	base unit
	minute	min	60s = 1min
	hour	h	60min = 1h
	day	d	24h = 1d

2. Prefixes

The prefixes used for the units in the above table have the following meaning:

kilo means 1000 of something

milli means 1 thousandth or $\frac{1}{1000}$

centi means 1 hundredth or $\frac{1}{100}$

Note

The conversion factor for a lot of the units is 1000. To convert from one unit to another requires either dividing by 1000 or multiplying by 1000 (or by whatever the conversion factor is).

3. When to multiply or divide

If you are going from a bigger unit to a smaller unit you multiply, ie going from cm to mm

If you are going from a smaller unit to a bigger unit you divide, ie mL to L

4. Examples other than time

Convert the following

a) 5cm to mm

1cm = 10mm. cm is a bigger unit than mm so multiply

$$5 \times 10 = 50\text{mm}$$

b) 2850g to kg

1000g = 1kg. g is a smaller unit than kg so divide

$$2850 \div 1000 = 2.850\text{kg}$$

c) 7.2km to m

1km = 1000m. km is a bigger unit than m so multiply

$$7.2 \times 1000 = 7200\text{m}$$

d) 27568mL to L

1000mL = 1L. mL is smaller unit than L so divide

$$27568 \div 1000 = 27.568\text{L}$$

Note

To divide by 1000 we move the decimal place 3 places to the left

Note

To multiply by 1000 we move the decimal place 3 places to the right

5. Converting time

Time is more difficult to convert because it is not based on 10. Seconds to minutes and minutes to hours are based on units of 60. Days are based on units of 24.

Because a calculator works in decimals, that is, in base 10, then using a calculator is not very helpful when dealing with time.

Develop a ready reckoner to help with all time conversions.

Hours to minutes	Days to hours
1h = 60min	1 day = 24h
2h = 120min	2 day = 48h
3h = 180min	3 day = 72h
4h = 240min	4 day = 96h
5h = 300min	5 day = 120h
6h = 360min	6 day = 144h
7h = 420min	7 day = 168h
8h = 480min	8 day = 192h
9h = 540min	9 day = 216h
10h = 600min	10 day = 240h
11h = 660min	11 day = 264h
12h = 720min	12 day = 288h

6. Examples of time

a) 165min to h

$$120\text{min} = 2 \text{ hours} \quad 165 - 120 = 45$$

so 165min = 2h and 45 min

b) 9h and 16 min to min

$$9\text{h} = 540\text{min}$$

$$9\text{h and } 16 \text{ min} = 540 + 16 = 556\text{min}$$

c) 6.5 days to h

$$6.5 \text{ days} = 144 + 12\text{h} = 156\text{h}$$

d) add together 4 h and 50 min and 7 h and 30 min

$$\text{total the minutes first: } 50 \text{ min} + 30 \text{ min} = 80 \text{ min} = 1 \text{ h and } 20 \text{ min}$$

$$\text{total the hours: } 1 \text{ h and } 20 \text{ min} + 4 \text{ h} + 7 \text{ h} = 12 \text{ h and } 20 \text{ min}$$

e) how much time elapses between 8:40am and 6:20pm?

between 8:40 and 9am = 20 min

between 9am and 12pm = 3 h

between 12pm and 6:20pm = 6 h and 20 min

total minutes = 20 min + 20 min = 40 min

total time = 40 min + 3 h + 6 h = 9 h and 40 min

f) how much time elapses between 3:25pm on Monday and 8:40am on Thursday

between 3:25pm and 4pm = 35 min

between 4pm Monday and 4pm Wednesday = 2 days = 48 h

between 4pm Wednesday and 4am Thursday = 12 h

between 4am and 8:40am = 4 h and 40 min

total minutes = 35 min + 40 min = 75 min = 1h and 15 min

total time = 1 h and 15 min + 48 h + 12 h + 4 h = 65 h and 15 min

7. For more information

Visit our Learning Skills website at <http://www.csu.edu.au/division/studserv/maths>

Part 2 of this document for exercises relating to this topic can be found at <http://www.csu.edu.au/division/studserv/maths/teachered.htm>

Copyright

© Learning Skills, Charles Sturt University, July 2009