C1 *Units of Measurement* Activities

Activities

C1.1 Conversions of Units

C1.1a Conversion Sheet

Notes for Solutions

© CIMT, Plymouth University

ACTIVITY C1.1 *Conversions of Units*

There are numerous different systems of measurement in use throughout the world; this situation is gradually changing as countries move towards a single system,

le Système International d'Unités (or SI)

but progress is slow and uneven.



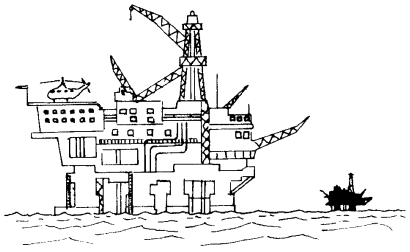
Plenary session

Even when a single system is used, there will still be some exceptions. For instance, in the UK the only legal system of measures since 1 January 2000 has been that of SI with 4 exceptions:

• miles, yards, etc. • pints • acres • troy weights (a system used for weighing precious metals and gems)

and each of those may be used only for certain specified purposes. Activity Sheet C1.1a gives information about units and their values for conversion purposes.

In conversion problems you need to isolate each part of the question, taking it stage by stage as demonstrated in the first question below.



1. An oilfield has an output of 200 barrels per hour. How many cubic metres are produced each day?

   The problem can be solved in four stages:

   (a) How many *barrels* of oil are produced in one day?

   (b) How many *US gallons* of oil are produced in one day?

   (c) Convert your answer to litres.

   (d) Change litres to cubic metres.

Solve the following conversion problems: read each question carefully and think about the required stages *before* actually starting on the calculations.

2. Fuel is sold in litres. However, fuel consumption figures are often still quoted in miles per gallon. How many miles per litre should you expect to get from a car for which the fuel consumption is given as 50 mpg?

3. In order to help with exports, a business based in Miami, USA, wishes to open an office in Jamaica. The office manager is instructed to find suitable premises. To help her make comparisons, she wants to know what the equivalent rent would be for her own office. Her current Miama rent is $20 per square foot. What would be the equivalent in JS$ per square metre? (Take the rate of exchange as J$64 to $1.)

4. A farmer has a 17-acre field on which fertilizer has to be spread at the rate of 850 kg per hectare. How many tonnes of fertilizer will be needed?

5. Fuel consumption of a vehicle is sometimes stated in miles per gallon and at other times in litres per 100 km – that is, the number of litres of fuel needed to travel 100 km. Change a fuel consumption of 40 mpg into litres/100 km.

© CIMT, Plymouth University

ACTIVITY C1.1a — *Conversion Sheet*

= means *exactly* equal to
≈ means *approximately* equal to
* indicates the defining measure from which all others in the table are derived

Measures of *WEIGHT*
(UK and USA)

437.5	grains	=	1	ounce
480	grains	=	1	troy ounce
7000	grains	=	1	pound
16	ounces	=	1	pound
14	pounds	=	1	stone
In UK				
112	pounds	=	1	hundredweight
20	cwt	=	1	ton (long ton)
2240	pounds	=	1	ton (long ton)
In USA				
100	pounds	=	1	hundredweight
20	cwt	=	1	ton (short ton)
2000	pounds	=	1	ton (short ton)
* 1	pound	=	0.453 592 37 kg	

Measures of *LENGTH*
(UK and USA)

12	inches	=	1	foot
3	feet	=	1	yard
22	yards	=	1	chain
10	chains	=	1	furlong
8	furlongs	=	1	mile
5280	feet	=	1	mile
1760	yards	=	1	mile
* 1	yard	=	0.9144 metres	

Measures of *AREA*
(UK and USA)

144	sq. inches	=	1	sq. foot
9	sq. feet	=	1	sq. yard
4840	sq. yards	=	1	acre
640	acres	=	1	sq. mile

Measures of *CAPACITY*
(UK)

20	fluid ounces	=	1	pint
4	gills	=	1	pint
2	pints	=	1	quart
8	pints	=	1	gallon
* 1	gallon	=	4.546 09 litres	

Measures of *WEIGHT*
(Metric)

1000	grams	=	1	kilogram
1000	kg	=	1	tonne

USA *DRY MEASURES*

2	pints	=	1	quart
8	quarts	=	1	peck
4	pecks	=	1	bushel
* 1	bushel	=	2150.42 cubic inches	
		≈	35.239 070 litres	

USA *LIQUID MEASURES*

16	fluid ounces	=	1	pint
4	gills	=	1	pint
2	pints	=	1	quart
4	quarts	=	1	gallon
42	gallons	=	1	barrel
* 1	gallon	=	231 cubic inches	
		=	3.785 411 784 litres	

Useful *CONVERSION FACTS*

1	inch	=	2.54	cm
1	foot	=	30.48	cm
1	mile	=	1.609 344	km
1	sq. yard	≈	0.836 127	sq. metres
1	acre	≈	0.404 686	hectares
1	sq. mile	≈	2.589 988	sq. km
1	pint (UK)	≈	0.568 261	litres
1	cubic foot	≈	28.316 847	litres
1	ounce	≈	28.349 523	grams
1	cm	≈	0.393 701	inches
1	metre	≈	3.280 840	feet
1	km	≈	0.621 371	miles
1	hectare	≈	2.471 054	acres
1	litre	≈	1.759 754	pints (UK)
		≈	0.219 969	gallons (UK)
		≈	61.023 744	cubic inches
1	kg	≈	2.204 623	pounds

© CIMT, Plymouth University

ACTIVITY C1.1 *Notes for Solutions*

Notes and solutions given only where appropriate.

1. (a) 4800 barrels per day

   (b) 201 600 US gallons per day

   (c) 763 139 litres (nearest litre)

   (d) 763 cubic metres per day (nearest cubic metre)

2. 50 mpg is 11.0 miles per litre (1 d.p.)

3. 1 square foot $= (0.3048)^2$ square metres

   $\approx$ 0.0929 square metres

   1 square metre $\approx \dfrac{1}{0.0929}$ square feet

   $\approx$ 10.7639 square feet

   So 1 square metre would cost $\$20 \times 10.7639 = \$215.278$

   $= J\$215.278 \times 64$

   $\approx J\$17778$

4. 6.88 hectares need 5848 kg or 5.85 tonnes (2 d.p.)

5. 7.06 litres per 100 km (2 d.p.)

© CIMT, Plymouth University