Dynamic Calculations in the Alternative System of Units.

The customary system of units defines time in fundamental units, using the second [sec], and defines speed in derived units [metres per sec].

The alternative system of units defines speed in fundamental units, using the speed of light [c], and defines time in derived units [metres per c].

The following exercise shows that dynamic calculations involving Distance, Speed and Time, the alternative system of units (m, c & m/c) can be used in a similar way to the customary system of units (m, m/s & s).

Equivalents:

Speed:

1	m/sec	=	3.6	km/h	=
			2.2369	mile/h	=
			3.2808	ft/sec	
1	km/h	=	0.2778	m/sec	
1	mile/h	=	0.4470	m/sec	
2.9979E+08	m/sec	=	1.0793E+09	km/h	=
			6.7062E+08	mile/h	= **1** c

1	m/sec	=	3.3356E-09	c	=	3.3356 nc
0.2998	m/sec	=	1E-09	c	=	**1** nc
2.9979E+08	m/sec	=	**1**	c	=	1E+09 nc

Note: Units of nano-c [nc] are more convenient to use than units of [c].

1	km/h	=	9.2657E-10	c	=	0.9266 nc
1	mile/h	=	1.4912E-09	c	=	1.4912 nc
0.9836	ft/sec	=	1E-09	c	=	**1** nc

Time:

1	sec	=	**2.9979E+08**	m/c	=	0.2998 m/nc
3.3356	sec	=	1E+09	m/c	=	**1** m/nc
3.3356E-09	sec	=	**1**	m/c	=	1E+09 m/nc

Acceleration:

1	m/sec^2	=	1.1127E-17	c^2/m	=	11.127 nc^2/m
0.08987552	m/sec^2	=	1E-18	c^2/m	=	**1** nc^2/m
8.9876E+16	m/sec^2	=	**1**	c^2/m	=	1E+18 nc^2/m

Examples:

Example 1: A car travels at a constant speed of 48.5nc (52.344km/h) over a distance of 12 km.
How long will the journey take in units of seconds and m/nc?

Customary system	Time =	Distance / Speed	=	12 / 52.344	x 3600 =	**825.309**	sec
					(=	247.42	m/nc)
Alternative system	Time =	Distance / Speed	=	12 / 48.5	x 1000 =	**247.423**	m/nc
					(=	825.31	sec)

Example 2: A car travels at a constant speed of 46.328nc (50 km/h)
over a distance of 1 km.
How long will the journey take in units of seconds and m/nc?

Customary system	Time =	Distance / Speed	= 1 / 50.000	x 3600 =	**72.000**	sec
				(=	21.59	m/nc)
Alternative system	Time =	Distance / Speed	= 1 / 46.328	x 1000 =	**21.585**	m/nc
				(=	72.00	sec)

Example 3: A car travels with constant acceleration from a speed of 46.328nc
(50.000km/h) to a speed of 60.0nc (64.755km/h)
over a distance of 1.0 km.
How long will the journey take in units of seconds and m/nc?

Customary system	Accel. =	$V_2^2-V_1^2$ / 2 x Distance	$=(64.755^2-50.000^2)$ / (2 x 1.0 x 1000)	x $1000^2/3600^2$ =	**0.0653**	m/sec^2
	($V_2^2 = V_1^2 + 2.f.S$)			(=	0.7268	nc^2/m)
	Time =	V_2-V_1 / Acel.	= (64.755-50.000) / 0.0653	x 1000/3600 =	**62.7424**	sec
	($V_2 = V_1 + f.t$)			(=	18.8097	m/nc)
Alternative system	Accel. =	$V_2^2-V_1^2$ / 2 x Distance	$= (60.0^2-46.328^2)$ / (2 x 1.0 x 1000)	=	**0.7269**	nc^2/m
	($V_2^2 = V_1^2 + 2.f.S$)			(=	0.0653	m/sec^2)
	Time =	V_2-V_1 / Acel.	= (60.0-46.328) / 0.7269	=	**18.8097**	m/nc
	($V_2 = V_1 + f.t$)			(=	62.7425	sec)