2015

$x = 10^n$

Fermi Quiz

Aim To estimate the values of various quantities.

Method

- For each of the questions listed on the sheet, give the ***integer*** closest to the ***base 10 logarithm*** of the answer (i.e., if the answer is 10^n, give n to the nearest integer).
- The mark given to each question will be the difference between the value given and the correct value.

Conditions

- The answer must be given in the units specified.
- For those quantities that must be guessed, the judge's decision is final (i.e., the judge is always right, even when he's wrong).
- No access to electronic information storage allowed.
- No crib sheets.

Time Limit To be completed by the end of the fourth event.

Ranking The ranking order will be determined by the sum of the marks for all of the questions (lowest mark = highest rank).

Do not write below this line

Physical Constants

Speed of light in vacuum	c	=	$3.00 \times 10^{8}\ ms^{-1}$
Permeability of vacuum	μ_0	=	$4\pi \times 10^{-7}\ Hm^{-1}$
		=	$4\pi \times 10^{-7}\ VsA^{-1}m^{-1}$
Permittivity of vacuum	ε_0	=	$8.85 \times 10^{-12}\ Fm^{-1}$
		=	$8.85 \times 10^{-12}\ AsV^{-1}m^{-1}$
Elementary charge	e	=	$1.60 \times 10^{-19}\ C$
Planck constant	h	=	$6.63 \times 10^{-34}\ Js$
Avogadro constant	N_A	=	$6.02 \times 10^{23}\ mol^{-1}$
Boltzmann constant	k	=	$1.38 \times 10^{-23}\ JK^{-1}$
Gas constant	R	=	$8.31\ JK^{-1}mol^{-1}$
Unified atomic mass constant	m_u	=	$1.66 \times 10^{-27}\ kg$
		=	$931.5\ MeVc^{-2}$
Electron mass	m_e	=	$9.11 \times 10^{-31}\ kg$
Proton mass	m_p	=	$1.67 \times 10^{-27}\ kg$
Gravitational constant	G	=	$6.67 \times 10^{-11}\ Nm^{2}kg^{-2}$
Acceleration due to gravity	g	=	$9.8\ ms^{-2}$