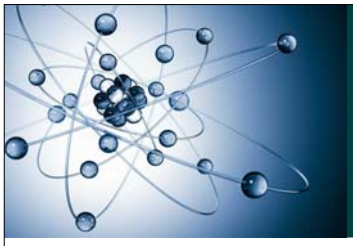
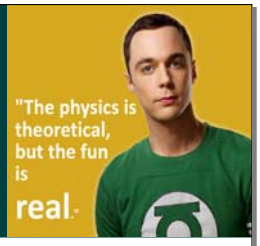


Physics 20

Essential Skills Review



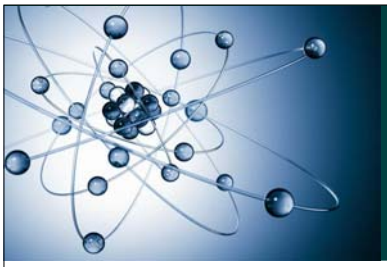
0.1 Measurement, Metric Prefixes, Scientific Notation, Sig Digs

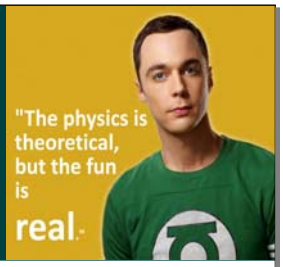
The Metric System

The Metric Systems has been used in most counties (with the exception being Liberia, Myanmar and the United States) since 1984.

There are seven base units in the metric system:

1) Metre - unit of length
2) Kilogram - unit of mass
3) Second - unit of time
4) Ampere - unit of electric current
5) Kelvin - unit of temperature
6) Candela - unit of luminous intensity
7) Mole - unit of amount of substance





When dealing with really large or really small values, we use prefixes in the metric system. They are summarized on your formula sheet:

Prefixes Used with SI Units

Prefix	Symbol	Exponential Value
atto	a	10^{-18}
femto	f	10^{-15}
pico	p	10^{-12}
nano	n	10^{-9}
micro	μ	10^{-6}
milli	m	10^{-3}
centi	c	10^{-2}
deci	d	10^{-1}
deka	da	10^{1}
hecto	h	10^{2}
kilo	k	10^{3}
mega	M	10^{6}
giga	G	10^{9}
tera	T	10^{12}

Ex.) Convert the following:

1.9 cm = 0.019 m

centi ..... c ..... 10^{-2}

this means move the decimal two places to the left (negative - left, positive - right)

Ex.) Converting from one prefix to another requires you to subtract exponents and move the decimal the resulting number of places:

32 km = 32 000 000 mm

32.000000

milli ..... m ..... 10^{-3}

kilo ..... k ..... 10^{3}

(3) - (-3) = 6

move the decimal 6 places to the right

Ex.) Convert the following:

a. 81 mm = 0.081 m 10^{-3}

b. 62 km = 620 000 dm 10^{3} 10^{-1}

c. 43 000 ng = .000043 dag 10^{-9} 10^{1}

d. 12.6 ML = 12600000 L 10^{6}

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mega	M	10^{6}
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tera	T	10^{12}

Scientific Notation

In real-life (AKA Physics), numbers are really big or really small. Rarely do we deal with "nice" numbers like 2. Scientific notation is in the form:

Calc

2nd)

2.73×10^{9}

must be between 1 and 10 ($1 \le x < 10$)

tells you to move the decimal (positive - right, negative - left)

2.73 E 9

Ex.) From formula sheet:

a. Radius of Earth: 6.37×10^{-11} m

b. Mass of Earth: 5.97×10^{24} kg

c. The speed of light: 3.00×10^{8} m/s

<u>Significant Digits</u>

We use significant digits (AKA "significant figures" if you're weird) because any measurement we take in physics has some amount of uncertainty (error). We want to make sure that the answer we end up getting isn't "more precise" than the numbers we measured to start with.

Significant Figures Video

You will have a recipe card that you can write all the rules of Sig Digs on and you may use it for all course work EXCEPT exams

Determining What Digits are Significant:

1) All nonzero digits are significant.	ie. 364.1 ⟶ 4 Sig Digs
2) Leading zeros are NOT significant.	ie. 0.059 ⟶ 2 Sig Digs
3) In between zeros are significant.	ie. 10.05 ⟶ 4 Sig Digs
4) Trailing zeros are significant.	ie. 43.00 ⟶ 4 Sig Digs

Ex.) How many Sig Digs are in each of the following:

a. 4.00 3 SD

b. 5.0278403 8 SD

c. 0.04582 4 SD

d. $\underline{5.37} \times 10^6$ 3 SD

Adding/Subtracting and Significant Digits:

Your answer needs to have the same number of Sig Digs after the decimal as the lowest number of Sig Digs after the decimal in the question.

Ex.) 3.75 + 8.0 = 11.75

2 SD 1 SD our answer must have 1 SD = 11.8

Multiplying/Dividing and Significant Digits:

Your answer needs to have the same total number of Sig Digs as the lowest total number of Sig Digs in the question.

Ex.) 7.6 x 1.24 = 9.424

2 SD 3 SD our answer must have 2 SD = 9.4