

How Small is Really Small?

a lesson in estimating size

Your predictions should be completed from 1-10

As we go through the slides:

- Correct your answers
- Record the actual size

Biggest → **smallest**

Prefix	Symbol	Multiplication factor
yotta	Y	10^{24}
zetta	Z	10^{21}
exa	E	10^{18}
peta	P	10^{15}
tera	T	10^{12}
giga	G	$1,000,000,000$
mega	M	$1,000,000$
kilo	k	$1,000$
hecto	h	100
deka	da	10
deci	d	0.1
centi	c	0.01
milli	m	0.001
micro	μ	$0.000,001$
nano	n	$0.000,000,001$
pico	p	10^{-12}
femto	f	10^{-15}
atto	a	10^{-18}
zepto	z	10^{-21}
yocto	y	10^{-24}

Commonly Used Metric Units

1. The head of a pin or a period (.)



1,000,000 nm

2. Diameter of an average human hair




80,000 – 100,000 nm

3. Diameter of a red blood cell



8,000 nm

4. Length of an *E. coli* bacterium




2,500 nm

5. Length of a mitochondrion



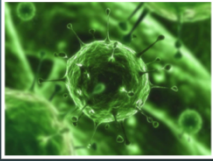
2,000 nm

6. Length of a lysosome



1,000 nm

7. Diameter of a virus



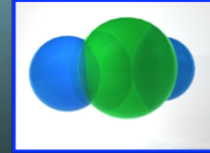
100 nm

8. Diameter of a DNA double helix



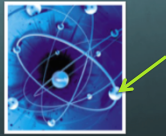
2.5 nm

9. Water molecule



0.1 nm

10. Diameter of an electron



$< 10^{-18}$ nm