









Useful numbers (people)		
Numbers		
Number of people on the earth	~7 billion (7 x 10 <sup>9</sup> )	
Number of people in the USA	~ 300 million (3 x 10 <sup>8</sup> )	
Number of people in the state of Maryland	~ 5 million (5 x 10 <sup>6</sup> )	
Number of students in a large state university	~30-40 thousand (3 x 10 <sup>4</sup> )	

Useful numbers	(distances)
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Macro Distances	
Circumference of the earth	~24,000 miles (1000 miles/ time zone at the equator)
Radius of the earth*	2/π x 10 <sup>7</sup> m
Distance across the USA	~3000 miles
Distance across DC	~10 miles
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Bio Scales	
Size of a typical animal cell	~10-20 microns (10 <sup>-5</sup> m)
Size of a bacterium, chloroplast, or mitochondrion	~1 micron (10 <sup>-6</sup> m)
Size of a medium-sized virus	~0.1 micron (10 <sup>-7</sup> m)
Thickness of a cell membrane	~5-10 nm (10⁻ <sup>8</sup> m)



















- Objects respond only to influences acting upon them at the instant that those influences act. (Object egotism) [Newton 0]
- 2. All outside effects on an object being equal, the object maintains its velocity (including direction). The velocity could be zero, which would mean the object is at rest. (Inertia) [Newton 1]
- 3. Every change in velocity an object experiences is caused by the object interacting with some other object **forces**. (Interactions)

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Kinds of Forces		
<ul> <li>Forces how objects influence each other trying to change velocity.</li> </ul>		
• Types of	f forces	
– Spring	, Normal, Tension Force	N, T $T = k\Delta L$
– Frictio	n Force f	$f \leq \mu N$
– Weigh	t Force W	$\vec{W} = m\vec{g}$
• Notation convention. $\vec{F}^{\text{type of force}}$		
$F_{\text{(object causing force)} \rightarrow \text{(object feeling force)}}$		
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