PHYSICS HOMEWORK:
DIMENSIONAL ANALYSIS

Most physical quantities can be expressed in terms of combinations of five basic dimensions. These are **mass** (M), **length** (L), **time** (T), **electrical current** (I), and **temperature**, represented by the Greek letter theta (θ). These five dimensions have been chosen as being basic because they are easy to measure in experiments. Dimensions aren't the same as units. For example, the physical quantity, speed, may be measured in units of metres per second, miles per hour etc.; but regardless of the units used, speed is always a length divided a time, so we say that the dimensions of speed are length divided by time, or simply L/T. Similarly, the dimensions of area are L^2 since area can always be calculated as a length times a length.

Part A. On a sheet of size 2 paper, write the dimension and the unit of each of the following physical quantity. Refer to the example below.

Physical Quantity	**Dimension**	**Unit**
speed	L/T	m/s

1. volume
2. acceleration (velocity/time)
3. density (mass/volume)
4. force (mass × acceleration)
5. charge (current × time)
6. pressure (force/area)
7. $(\text{volume})^2$
8. electric field (force/charge)
9. work (in 1-D, force × distance)
10. energy (e.g., gravitational potential energy = mgh = mass × gravitational acceleration × height)
11. square root of area

Part B. *For each case below, write the corresponding special name of the SI unit.*

1. energy
2. power
3. $\text{kg}\cdot\text{m/s}^2$
4. charge
5. force
6. $\text{kg}\cdot\text{m}^2/\text{s}^2$
7. $\text{kg}\cdot\text{m}^2/\text{s}^3$
8. $\text{A}\cdot\text{s}$
9. $(\text{cycles})\cdot\text{s}^{-1}$
10. J/s
11. frequency

Reference: http://www.physics.uoguelph.ca/tutorials/dimanaly/index.html#quiz3

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