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*Discussion date: 23 September 2015*

**Exercise 1: The basics**

*As a warm up, we remind ourselves of some of the basics.*

Give an overview of Maxwells equations. Can you write them down in both SI units and cgs? Remind yourself of the quantities  $\mathbf{E}$ ,  $\mathbf{D}$ ,  $\mathbf{P}$ ,  $\rho$ ,  $\mathbf{B}$ ,  $\mathbf{H}$ ,  $\mathbf{M}$ ,  $\mathbf{J}$ .

**Exercise 2: Magnetic fields**

*The difference between  $\mathbf{H}$  and  $\mathbf{B}$  is tricky. Some prefer  $\mathbf{H}$  and some prefer  $\mathbf{B}$ , so being able to use both is very useful.*

- (a) What are the units of  $\mathbf{H}$  and  $\mathbf{B}$ , and the flux  $\Phi$ , in both the SI and the cgs-Gaussian unit systems and how do they convert?
- (b) Could you find and give some orders of magnitude for them, for a few different cases?
- (c) Describe the meaning of  $\mathbf{H}$  and  $\mathbf{B}$ .