Book Problems:

Chapter 20 29, 33, 39, 61, 63

Chapter 21 7, 23, 25

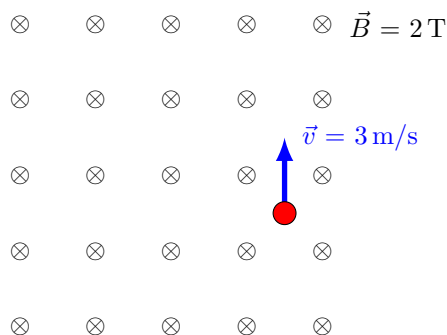**Chapter 22** 13, 19, 21

Chapter 23 17, 21, 29, 33

My Problems:

1. The two vectors below describe the electric and magnetic parts of an electromagnetic wave at a particular point in time:

$$\vec{E} = \langle 10, 0, -5 \rangle \,\text{V/m}$$
$$\vec{B} = B_0 \langle 4, 2, a \rangle \,\text{nT}$$

   (a) What are the values of B_0 and a?

   (b) What is the magnitude of the Poynting vector at this time?

2. The positive $(q = 1\,\text{mC})$ particle $(m = 30\,\text{g})$ below is given an initial velocity as shown.

$$\otimes \quad \otimes \quad \otimes \quad \otimes \quad \otimes \quad \vec{B} = 2\,\text{T}$$

$$\otimes \quad \otimes \quad \otimes \quad \otimes \quad \otimes$$

$$\vec{v} = 3\,\text{m/s}$$

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   (a) In what direction will the particle turn?

   (b) What is the radius of the circle the particle will travel in?

   (c) How long will it take the particle to complete one full revolution?

3. The system below is comprised of a larger solenoid (L=15 cm) with 4 turns hooked to a voltage source that is supplying a current as seen in the graph to the right. Inside this solenoid is a smaller solenoid (r=1 cm) with 20 turns which is attached only to a voltage meter.
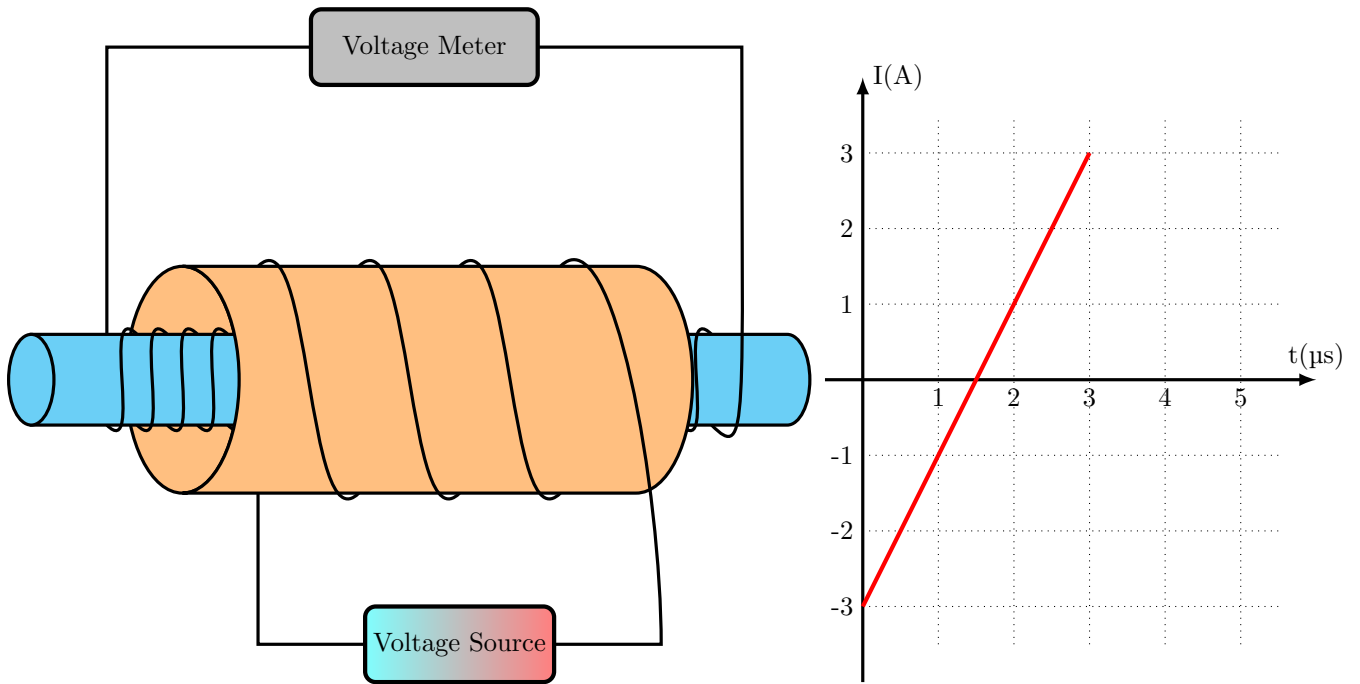
(a) Is the current flowing right to left or left to right through the voltage meter?

(b) What is the magnitude of the measured voltage in the voltage meter?

4. Each of the Gaussian surfaces below has the same flux passing through it. What are the charges of particle A, B, and C?
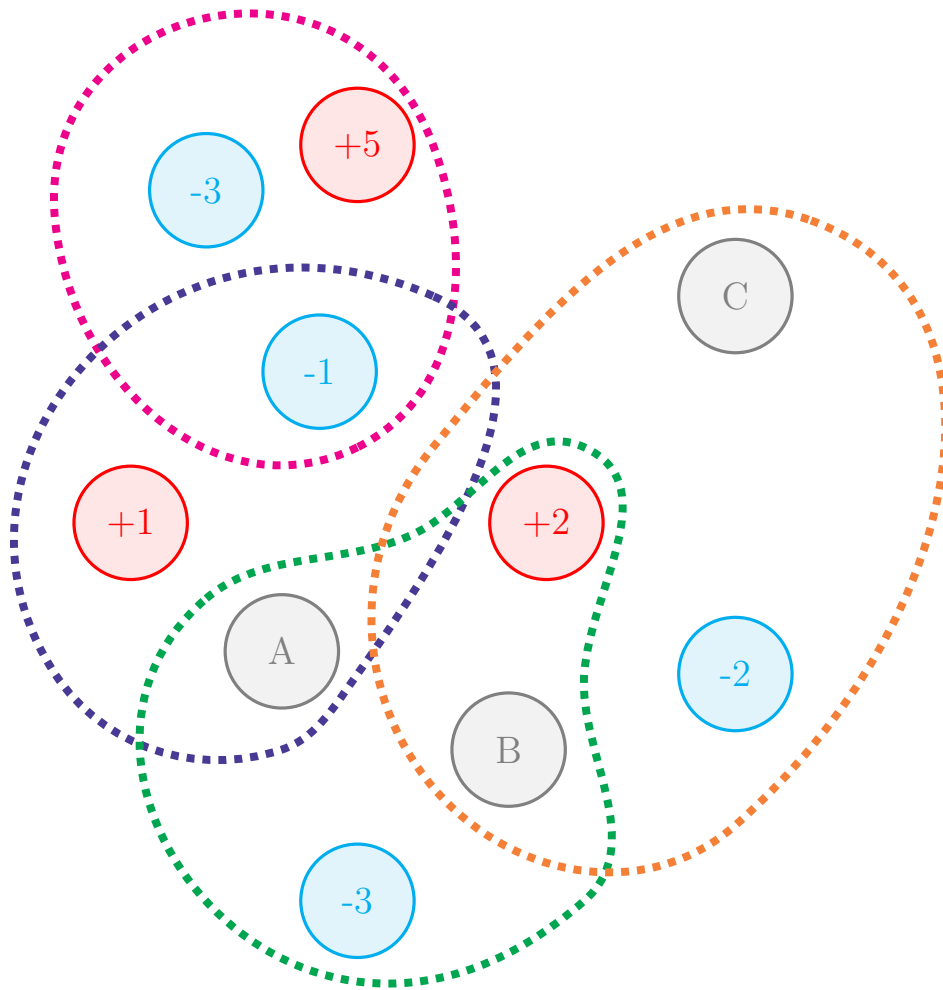
Solutions:

1. Problem 1

    (a) $a = 8$, $B_0 = 4.066$ (Check given units if confused on B_0!)

    (b) $0.332 \, \text{W/m}^2$

2. Problem 2

    (a) Left

    (b) $45 \, \text{m}$

    (c) $94.25 \, \text{s}$

3. Problem 3

    (a) Left to Right

    (b) $0.42 \, \text{V}$

4. Problem 4

    (a) 1

    (b) 1

    (c) 0