WebAssign
CH24-HW02-FALL2010 (Homework)

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PHYS 272-FALL 2012, Fall 2012
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Current Score : 16 / 16 **Due :** Friday, December 7 2012 11:59 PM EST

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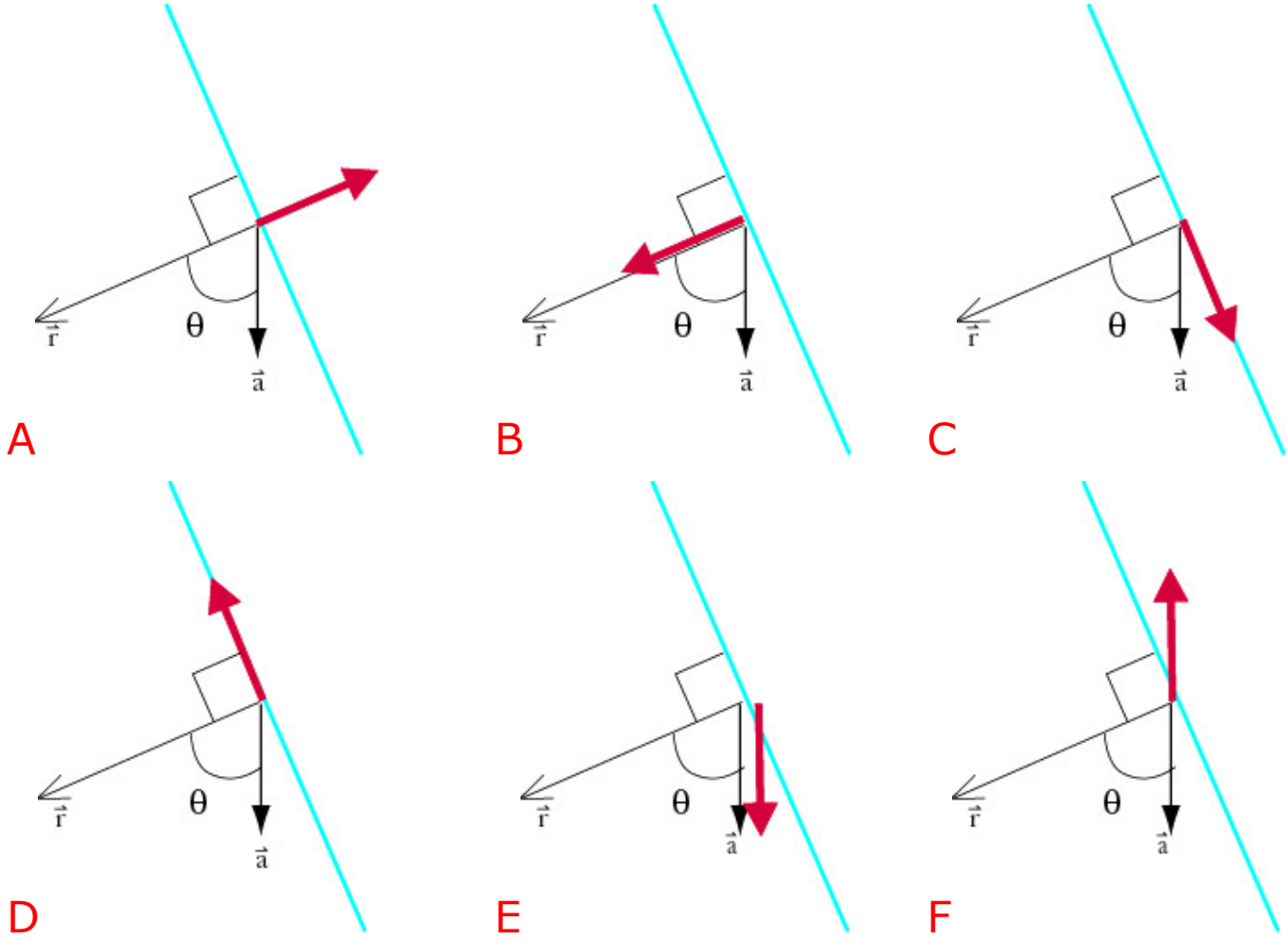
1. 1/1 points | Previous Answers MI3 24.3.X.033

A proton is accelerated in the direction shown by the arrow labeled $\vec{a}$. You want to calculate the magnitude and direction of the radiative electric field which will be observed at the location shown by the vector $\vec{r}$. In which of the following diagrams is the vector $\vec{a}_{\perp}$ correctly shown by the red arrow?

C ✓



- *Read the eBook*
- Section 24.3

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2. 1/1 points | Previous Answers MI3 24.3.X.006

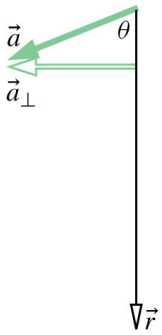
An electric field of 10^6 N/C acts on an electron, resulting in an acceleration of 1.6×10^{17} m/s^2 for a short time. What is the magnitude of the radiative electric field observed at a location a distance of 4 cm away along a line perpendicular to the direction of the acceleration?

6.4e-8 ✓ N/C

- *Read the eBook*
- Section 24.3

3. 5/5 points | Previous Answers MI3 24.3.X.030

A proton is briefly accelerated in the direction of the arrow labeled $\vec{a}$. At an observation location indicated by the vector $\vec{r}$ on the diagram, $\vec{a}_\perp$ is shown in red.



(a) If θ = 64 degrees, and the magnitude of the acceleration is 1.8e+17 m/s^2, what is the magnitude of $\vec{a}_\perp$?

1.62e17 ✔ m/s^2

(b) What is the magnitude of the *radiative* electric field at the indicated observation location, if the magnitude of $\vec{r}$ is 0.018 m?

1.44e-7 ✔ N/C (c) What is the direction of the *radiative* electric field at the observation location?

- ○ opposite to $\vec{r}$
- ○ same direction as $\vec{a}$
- ○ same direction as $\vec{a}_\perp$
- ○ same direction as $\vec{r}$
- ◉ opposite to $\vec{a}_\perp$
- ○ opposite to $\vec{a}$

✔

(d) What is the direction of the *ordinary Coulomb* electric field at the observation location, due to the proton?

- ○ same direction as $\vec{a}$
- ○ opposite to $\vec{a}_\perp$
- ◉ same direction as $\vec{r}$
- ○ same direction as $\vec{a}_\perp$
- ○ opposite to $\vec{r}$
- ○ opposite to $\vec{a}$

✔

(e) What is the direction of the *radiative* magnetic field at the observation location?

- into the page
- out of the page ✓

- *Read the eBook*
- Section 24.3

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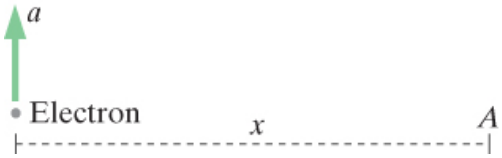
4. 6/6 points | Previous Answers MI3 24.5.P.041

An accelerated electron

An electron is initially at rest. At time $t_1 = 0$ it is accelerated upward with an acceleration of $a = 1 \times 10^{18}$ m/s^2 for a very short time (this large acceleration is possible because the electron has a very small mass). We make observations at location A, $x = 16$ meters from the electron (see the figure).



(a) At time $t_2 = 6$ ns (10^{-9} s), what is the magnitude and direction of the electric field at location A due to the electron?

magnitude: 5.625e-12 ✓ N/C

direction:

- to the left ✓
- zero field
- downwards
- to the right
- upwards

(b) At what time t_3 does the electric field at location A change?

5.33e-8 ✓ seconds

(c) What is the direction of the electric field at location A at time t_3?

- to the left
- downward
- to the right
- upward ✓
- zero field

(d) What is the magnitude of this electric field?

1e-9 ✔ N/C

(e) A positively charged particle was initially at rest at location A. It is released from rest just after time t_3. Which of the following are true just after time t_3? (Select all that apply.)

- [x] There is a magnetic force to the right on the positive charge.
- [x] The positive charge begins to move because there is a force on it due to the radiative electric field.
- [x] The radiative *magnetic* field at location A is out of the page.
- [ ] The electric force on the positive charge is toward the electron.
- [ ] The positive charge will never be affected by the radiative magnetic field, since the positive charge is always at rest.
- [x] The electric force on the positive charge due to the radiative electric field is upward.

✔

- *Read the eBook*
- Section 24.5

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5. 3/3 points | Previous Answers MI3 24.3.X.034

A proton located at the origin is accelerated in the -y direction for a brief time.

(a) How much time passes before a detector located at <0.25, 0, 0> m detects a radiative electric field?

8.33e-10 ✔ s

(b) What is the direction of the radiative electric field observed at this location?

+y ✔

(c) If the accelerated particle had been an electron instead of a proton, what would have been the direction of the radiative electric field at this location?

-y ✔

- *Read the eBook*
- Section 24.3