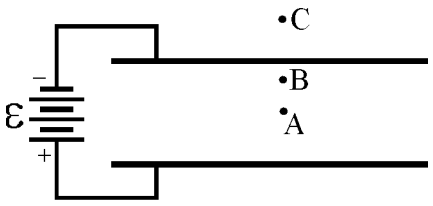
1. Base your answer to the following question on the diagram below which shows two large parallel conducting plates connected to a battery of emf ε.



A magnetic field is applied in the region in between the plates such that a particle traveling to the right in this region would feel no net force. What direction should this magnetic field point?

A) into the page

B) out of the page

C) towards the right

D) towards the left

E) towards the top of the page

2. Which combination of units can be used to express magnetic field strength?

A) $\frac{\text{kg•m}}{\text{s•C}}$

B) $\frac{\text{N•m}}{\text{C}}$

C) $\frac{\text{kg}}{\text{s•C}}$

D) $\frac{\text{N}}{\text{C}}$

E) $\frac{\text{kg•m}}{\text{C}}$

3. Which of the following explains why a magnetic field does no work on a moving charged particle?

A) The magnetic force is conservative.

B) The magnetic force depends on the speed of the particle.

C) The magnetic force is always perpendicular to the direction of motion.

D) There is always an electric field that cancels the work done by the magnetic field.

E) The magnetic force depends on the direction of motion of the particle.

4. A particle with a charge of +3 μC and mass 2×10^{-8} kg enters a 0.01 T magnetic field with a velocity of 5×10^5 m/s perpendicular to the field. The acceleration of this particle due to the magnetic force is

A) 1.5×10^5 m/s^2

B) 2.5×10^5 m/s^2

C) 4.5×10^5 m/s^2

D) 7.5×10^5 m/s^2

E) 9.5×10^5 m/s^2

5. A particle with a mass of 1.2×10^{-5} kg experiences an acceleration of 2×10^3 m/s^2 as it enters a magnetic field of 3 T with a velocity of 4×10^5 m/s at an angle of 30º with the magnetic field. The magnitude of the charge on the particle is

A) 0.04 μC

B) 0.4 μC

C) 4 μC

D) 40 μC

E) 80 μC

6. A particle with a charge of $+2 \times 10^{-7}$ C and a mass of 4×10^{-4} kg experiences an acceleration of 3.2 m/s^2 due a magnetic field of 8 T. The velocity of the particle may be

A) 400 m/s perpendicular to the magnetic field.

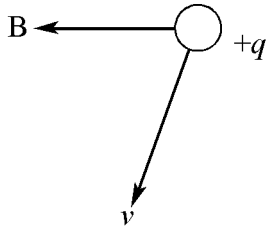
B) 400 m/s at an angle of 30º to the magnetic field.

C) 800 m/s parallel to the magnetic field.

D) 800 m/s at an angle of 30º to the magnetic field.

E) 800 m/s perpendicular to the magnetic field.

7.



In the figure above, what is the direction of the magnetic force vector?

A) To the left

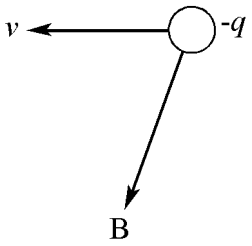
B) To the right

C) Upward in the plane of the page

D) Out of the page

E) Into the page

8.



In the figure above, what is the direction of the magnetic force vector?

A) To the right

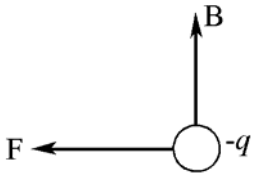
B) To the left

C) Downward, in the plane of the page

D) Out of the page

E) Into into the page

9.



In the figure above, what is the direction of the particle's velocity?

A) To the left

B) To the right

C) Upward, in the plane of the page

D) Into the page

E) Out of the plane of the page

10. A positron executes uniform circular motion due to the influence of a magnetic force within a uniform magnetic field *B*. If the positron's charge is *q*, and the linear momentum of the positron is *p*, find an expression for the radius of the positron's path.

A) $\frac{p}{qB}$

B) $\frac{p^2}{qB}$

C) $\frac{2p}{qB}$

D) $\frac{qB}{p}$

E) $\frac{qB}{p^2}$

11. A particle executes uniform circular motion with speed *v* due to the influence of a magnetic force within a uniform magnetic field *B*. If the particle's charge is *q*, and the radius of the path of the particle is *r*, find an expression for the mass of the particle.

A) $\frac{rqB}{v}$

B) $\frac{rqB}{v^2}$

C) $rqvB$

D) $\frac{v}{rqB}$

E) $\frac{v^2}{rqB}$

12. A proton traveling at 1.6×10^7 m/s enters a region with a uniform magnetic field of strength 4 T. If the proton's initial velocity vector makes an angle of 45º with the magnetic field, what is the speed of the proton 1 s after entering the magnetic field?

A) 2.4×10^6 m/s

B) 3.2×10^6 m/s

C) 1.6×10^7 m/s

D) 2.4×10^7 m/s

E) 3.2×10^7 m/s

Base your answers to questions **13** and **14** on the following.

Traveling at an initial speed of 1.2×10^6 m/s, a particle (mass = 6×10^{-10} kg, charge = 1.0×10^{-10} C) enters a region of uniform magnetic field with a strength of 300 T at an angle of 30º to the field.

13. What is the magnitude of the acceleration of the particle?

A) 9.0×10^{-3} m/s^2

B) 1.8×10^{-2} m/s^2

C) 3.0×10^7 m/s^2

D) 7.2×10^7 m/s^2

E) 3.0×10^{17} m/s^2

14. What is the speed of the particle after 1 s?

A) 6.0×10^5 m/s

B) 1.2×10^6 m/s

C) 3.0×10^6 m/s

D) 4.2×10^6 m/s

E) 5.4×10^6 m/s

15. An electron enters a uniform magnetic field *B* pointing out of the page while traveling at a velocity *v* to the right, perpendicular to the field. Which of the following best describes the path of the electron within the uniform magnetic field *B*?

A) The path of the particle is unchanged, but it speeds up.

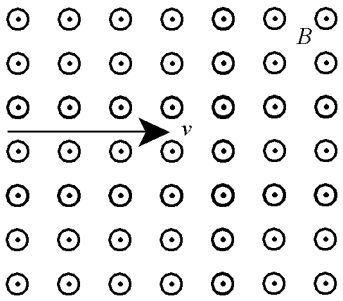
B) The path of the particle is unchanged, but it slows down.

C) A clockwise circular path.

D) A counterclockwise circular path.

E) The electron will come to rest.

16.



A particle with charge +*q* is traveling through a uniform magnetic field *B* that points out of the page in the direction indicated by the arrow in the plane of the page. In what direction is the force on the particle?

A) towards the bottom of the page

B) towards the top of the page

C) up out of the page

D) down into the page

E) towards the left of the page

17. In order for a magnetic field to exert a force on an object, which of the follow can be true?

I. The object is charged.
II. The object is moving parallel to the field.
III. The object is moving perpendicular to the field.

A) I only

B) II only

C) III only

D) I and II only

E) I and III only

18. A magnetic field exerts a non-zero force on a particle. Which of the following must be true?

A) The particle is negatively charged.

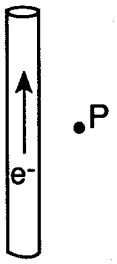
B) The particle is stationary.

C) The direction of the force is perpendicular to the magnetic field but parallel to the motion of the particle.

D) The direction of the force is parallel to the magnetic field but perpendicular to the motion of the particle.

E) The direction of the force is perpendicular to both the velocity of the particle and the magnetic field.

19. Base your answer to the following question on the diagram below.



If a positively charged particle is placed at point P, the force due to the magnetic field

A) increases with increasing charge

B) is opposite the direction of the magnetic field

C) is zero

D) is in the direction of the magnetic field

E) causes the particle to accelerate to the right

Answer Key
RC Circuit MC Questions [Mar 28, 2011]

1. B
2. C
3. C
4. D
5. A
6. E
7. E
8. E
9. D
10. A
11. A
12. C
13. C
14. B
15. D
16. A
17. E
18. E
19. C

Name _____ Class _____ Date _____

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