NAME: ________________________________  KP UiTM: ____________

QUIZ 1-2 Feb 11th 2010 (30 mins)

Answer ALL questions on the question paper. DO NOT use additional paper. Indicate your certainty response by writing the index in the CRI box. Use the following scale: 5=Very Certain; 4=Certain; 3=Almost Certain; 2=Uncertain; 1=Guessing; 0=No idea

1. Complete the following statement: When a glass rod is rubbed with wool, the rod becomes negatively charged because
(A) positive charges are transferred from the wool to the rod.
(B) positive charges are transferred from the rod to the wool.
(C) positive charges are created on the surface of the rod.
(D) negative charges are transferred from the rod to the wool
(E) negative charges are transferred from the wool to the rod.

2. There are three charged objects. Objects A and B attract one another. Objects B and C also attract one another, but objects A and C repel one another. Which one of the following table entries is a possible combination of the signs of the net charges on these three objects?

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A)</td>
<td>+</td>
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<tr>
<td>(B)</td>
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<td>+</td>
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<td>(C)</td>
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<td>(D)</td>
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<tr>
<td>(E)</td>
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</tbody>
</table>

3. Two uncharged, conducting spheres, A and B, are held at rest on insulating stands and are in contact. A positively charged rod is brought near sphere A as suggested in the figure. While the rod is in place, the two spheres are separated. How will the spheres be charged, if at all?

- Sphere A: (A) Positive (B) Positive (C) Negative (D) Negative (E) Zero
- Sphere B: (A) Positive (B) Negative (C) Positive (D) Negative (E) Zero

4. In the figure, point A is a distance r away from a point charge Q. Point B is a distance 2r away from charge Q. What is the ratio of the electric field at A to the electric field at point B, $E_A/E_B$?
(A) 4 (B) 2 (C) 1/2 (D) 1/4 (E) This cannot be determined since neither the value of Q nor the distance r is specified.

Show how you obtain your answer.

5. Complete the following statement:

The magnitude of the electric field at a point in space does not depend upon
(A) the distance from the charge causing the field.
(B) the magnitude of the charge causing the field.
(C) the sign of the charge causing the field.
(D) the force that a unit positive charge will experience at that point.
(E) the force that a unit negative charge will experience at that point.
6. A hollow metal sphere is electrically neutral (no excess charge). A small amount of negative charge is suddenly placed at one point, P, on this metal sphere. If we check on this excess negative charge a few seconds later we will find one of the following possibilities:

- (A) All of the excess charge remains right around P.
- (B) The excess charge has distributed itself evenly over the outside surface of the sphere.
- (C) Most of the charge is still at P, but some will have spread over the sphere.
- (D) The excess charge is evenly distributed over the inside and outside surface.
- (E) There will be no excess charge left.

7. A hollow sphere made out of electrically insulating material is electrically neutral (no excess charge). A small amount of negative charge is suddenly placed at one point, P, on the outside of this sphere. If we check on this excess negative charge a few seconds later we will find one of the following possibilities:

- (A) All of the excess charge remains right around P.
- (B) The excess charge has distributed itself evenly over the outside surface of the sphere.
- (C) Most of the charge is still at P, but some will have spread over the sphere.
- (D) The excess charge is evenly distributed over the inside and outside surface.
- (E) There will be no excess charge left.

For questions 8 -10:

Two small objects shown in Figure 1 each having a net charge of -Q exert a force of magnitude F on each other.

![Figure 1](image1)

We replace one of the objects with another object with net charge of +3Q as shown in Figure 2.

![Figure 2](image2)

8. The original magnitude of the force on the -Q charge was F. What is the magnitude of the force on the -Q now? Show how you obtain your answer.

- (A) 2F
- (B) F
- (C) zero
- (D) F/2
- (E) other

Next we move the -Q and -2Q charges so that their separation is now 3 times as far apart as they were before as shown in Figure 3.

![Figure 3](image3)

9. What is the magnitude of the force on the -Q now?

- (A) F/9
- (B) F/3
- (C) 4F/9
- (D) 4F/3
- (E) other

Show how you obtain your answer.
10. Which of the arrows is in the direction of the net force on charge B shown in Figure 4?

(a)  
(b)  
(c)  

(d)  
(e) None of these

11. Figure 5 shows a particle (labeled B) which has a net electric charge of +1 unit. Several centimeters to the left is another particle (labeled A) which has a net charge of -2 units. Choose the pair of force vectors (the arrows) that correctly compare the electric force on A (caused by B) with the electric force on B (caused by A).

<table>
<thead>
<tr>
<th>Force on A</th>
<th>Force on B</th>
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<tbody>
<tr>
<td>(A)</td>
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12. In Figure 6a, negative charges $q_2$ and $q_3$ exert on charge $q_1$ a net electric force that points along the +x axis. If a positive charge $Q$ is added at $(b, 0)$ as shown in Figure 6b, what will happen to the force on $q_1$? (All charges are fixed in their locations.)

(A) No change in the size of the net force since $Q$ is on the x-axis.
(B) The size of the net force will change but not the direction.
(C) The net force will decrease and the direction may change because of the interaction between $Q$ and the positive charge $q_2$ and $q_3$.
(D) The net force will increase and the direction may change because of the interaction between $Q$ and the positive charge $q_2$ and $q_3$.
(E) Cannot determine without knowing the magnitude of $q_1$ and/or $Q$.

13. In Figure 7a, the electric field at point P is directed downward along the y-axis. If a negative charge $-Q$ is added at a point along the y-axis as shown in Figure 7b, what happens to the field at P? (All charges are fixed in position)

(A) Nothing since $-Q$ is on the y-axis.
(B) The strength will increase because $Q$ is negative.
(C) The strength will decrease and the direction may change because of the interactions between $Q$ and the two negative $q$'s.
(D) The strength will increase and the direction may change because of the interactions between $Q$ and the two negative $q$'s.
(E) Cannot determine without knowing the force that $Q$ exerts on the two negative $q$'s.