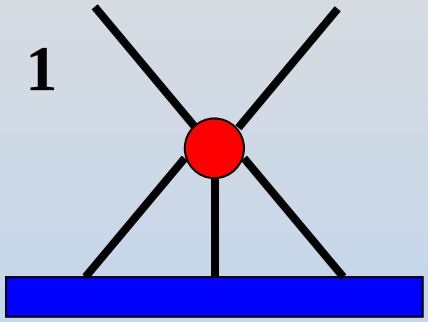
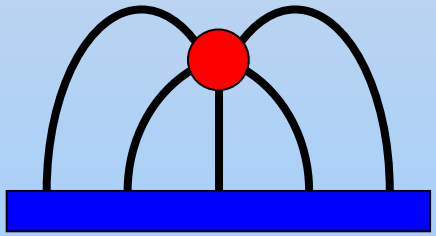
Concept Question: Equipotential

The circle is at +5 V relative to the plate. Which of the below is the most accurate **equipotential map**?

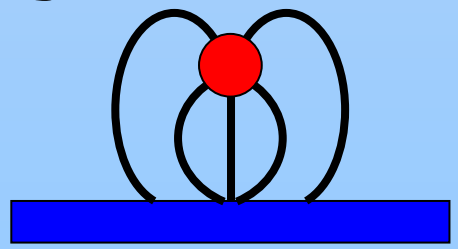
1



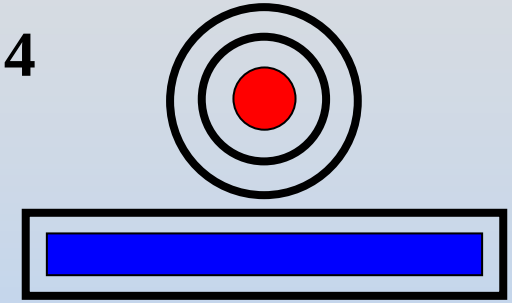
2



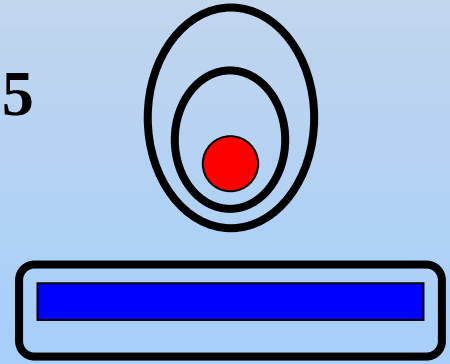
3



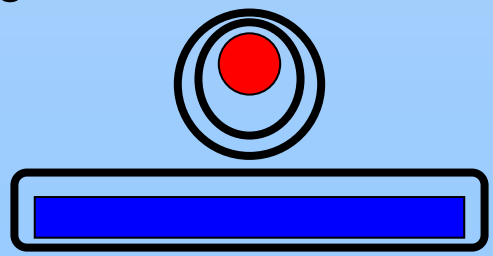
4



5

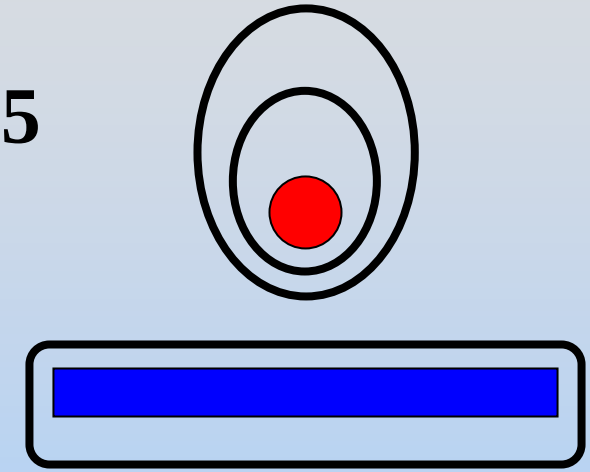


6



Concept Question Answer: Equipotential

Answer: 5

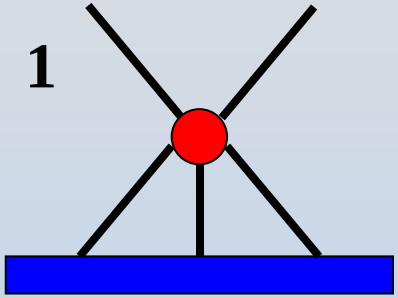


The electric field is stronger between the plate and circle than on either outer side, so the equipotential lines must be spaced most closely in between the two conductors.

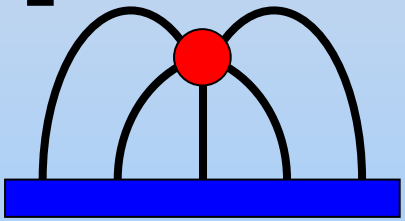
Concept Question: Field Lines

The circle is at +5 V relative to the plate. Which of the below is the most accurate **electric field line map?**

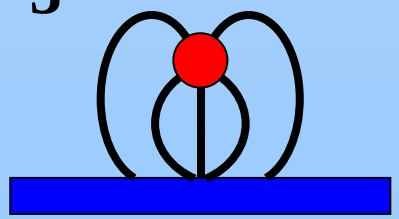
1



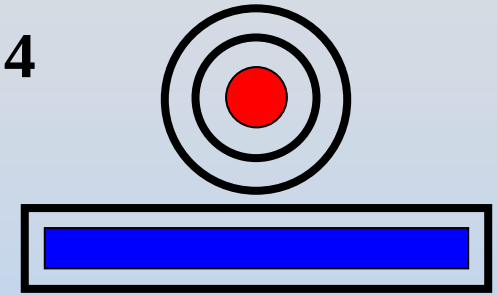
2



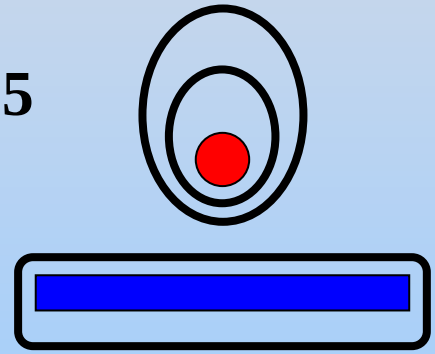
3



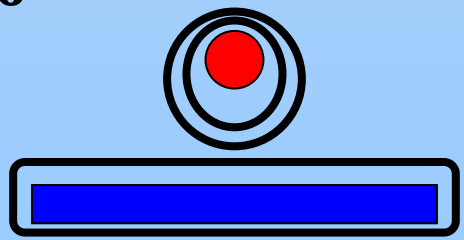
4



5

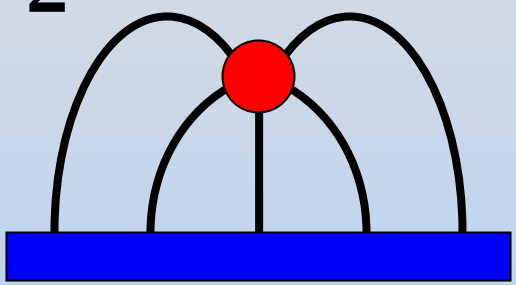


6



Concept Question Answer: Field Lines

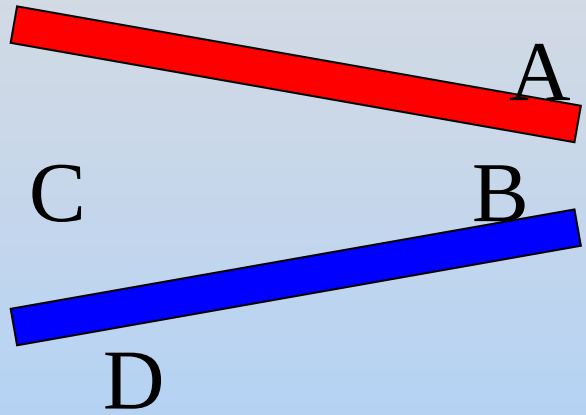
Answer: **2**



Field lines must be perpendicular to equipotential surfaces, including the conductors themselves.

Concept Question: Lab Summary: Potentials

Holding the red plate at +5 V relative to the ground of the blue plate, what is true about the electric potential at the following locations:

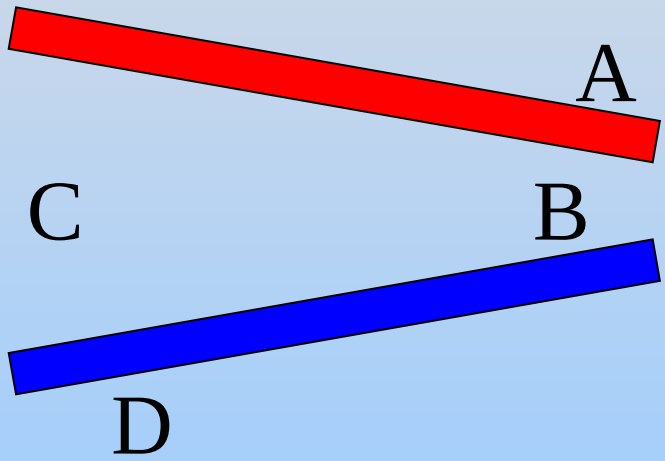


1. V(A) > V(B) > V(C) > V(D)
2. V(A) > V(B) ~ V(C) > V(D)
3. V(A) ~ V(B) > V(C) ~ V(D)
4. V(D) > V(C) ~ V(B) > V(A)
5. V(B) > V(C) > V(D) ~ V(A)
6. V(A) > V(D) ~ V(C) > V(B)

Concept Question Answer: Potentials

Holding the red plate at +5 V relative to the ground of the blue plate…

Answer: 2. V(A) > V(B) ~ V(C) > V(D)



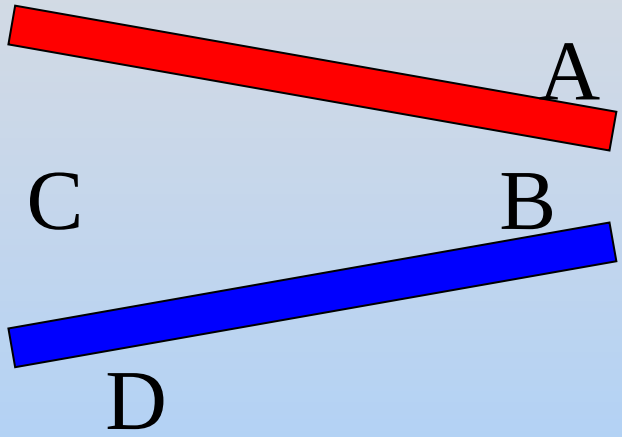
The potential at A is nearly +5 V.

The potential at B & C ~ 2.5 V (they are both halfway).

The potential at D is about 0 V.

Concept Question: Lab Summary: E Field

Holding the red plate at +5 V relative to the ground of the blue plate, what is true about the electric field at the following locations:

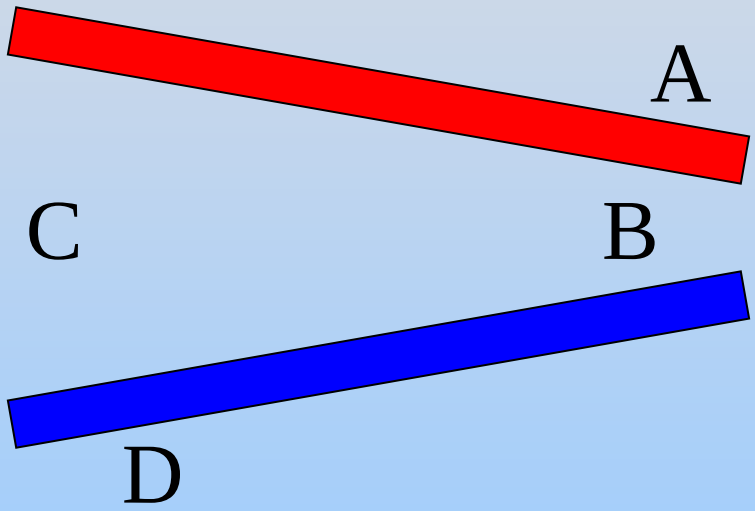


1. E(A) > E(B) > E(C) > E(D)
2. E(A) > E(B) ~ E(C) > E(D)
3. E(A) ~ E(B) > E(C) ~ E(D)
4. E(D) > E(C) ~ E(B) > E(A)
5. E(B) > E(C) > E(D) ~ E(A)
6. E(A) > E(D) ~ E(C) > E(B)

Concept Question Answer: E Fields

Holding the red plate at +5 V relative to the ground of the blue plate…

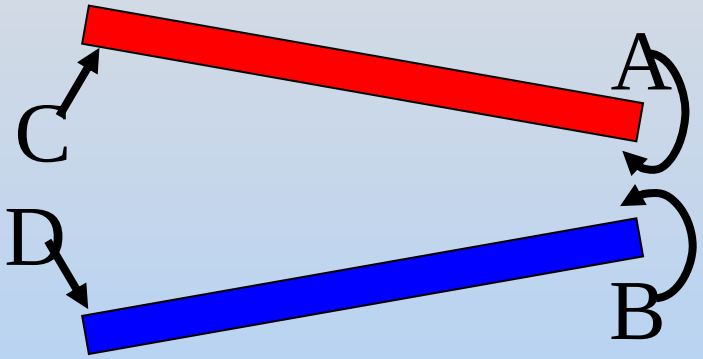
Answer: 5. E(B) > E(C) > E(D) ~ E(A)



The potential changes most rapidly (and hence E is largest) at B. It also changes at C, but not as fast. The potential is very uniform outside, so the E field out there is nearly zero.

Concept Question: Lab Summary: Charge

Holding the red plate at +5 V relative to the ground of the blue plate, what is true about the amount of charge near the following points:

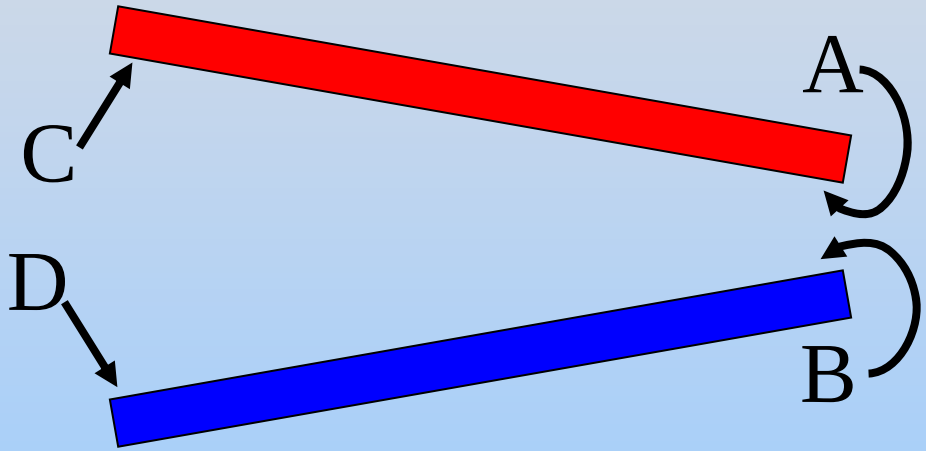


1. |Q(A)| ~ |Q(C)| > |Q(B)| ~ |Q(D)|
2. |Q(A)| > |Q(B)| ~ |Q(C)| > |Q(D)|
3. |Q(A)| ~ |Q(B)| > |Q(C)| ~ |Q(D)|
4. |Q(D)| ~ |Q(C)| > |Q(B)| ~ |Q(A)|
5. |Q(B)| ~ |Q(D)| > |Q(A)| ~ |Q(C)|
6. |Q(A)| > |Q(D)| ~ |Q(C)| > |Q(B)|

Concept Question Answer: Charge

Holding the red plate at +5 V relative to the ground of the blue plate…

Answer: 3. |Q(A)| ~ |Q(B)| > |Q(C)| ~ |Q(D)|



Charges go where the field is highest (higher field → more field lines → more charges to source & sink). Field at A & B is the same, so Q is as well. Higher than at C & D.

8.02SC Physics II: Electricity and Magnetism

Fall 2010