What is an Electric Field?

Worksheet

The electric field of a point charge Q at distance r is E = kQ/r, measured in newtons per coulomb (N/C); it points away from a positive charge and toward a negative charge.

Questions

1. The formula for the electric field of a point charge is:

A) E = kQ/r
B) E = mgh
C) E = IR
D) E = Q/t

2. What is the SI unit of electric field?

A) Coulomb
B) Newton
C) N/C
D) Watt

3. If the distance from a charge doubles, the field becomes:

A) 2 stronger
B) 2 weaker
C) 4 weaker
D) 4 stronger

4. Field lines around a negative point charge point:

A) Outward
B) Inward
C) In circles
D) Nowhere - no field exists

5. Find the electric field 2 m from a +6 C point charge.

6. A test charge of 2 C feels a force of 0.02 N in a field. What is the field strength?

7. How far from a +4 C charge is the field equal to 9000 N/C?

8. Define: What is an electric field?

9. Define: What is the unit of electric field?

10. Define: How is field related to force?

Answer Key

1. A) E = kQ/r - E = kQ/r gives the field of a point charge Q at distance r.
2. C) N/C - Electric field is measured in newtons per coulomb (N/C).
3. C) 4 weaker - E 1/r, so doubling r makes E four times weaker.
4. B) Inward - Field lines converge toward a negative charge.
5. E = k Q / r E = (8.9910)(610) / (2) E = 53940 / 4 13485 N/C
6. E = F / q E = 0.02 / (210) = 10000 N/C
7. E = k Q / r r = k Q / E r = (8.9910)(410) / 9000 r = 35960 / 9000 3.996 r 2 m
8. The region around a charge where another charge would experience a force; strength E = kQ/r for a point charge.
9. Newtons per coulomb (N/C), equivalently volts per metre (V/m).
10. E = F/q - the field is the force per unit positive test charge.