

WORKSHEET 2A: Charge Distributions

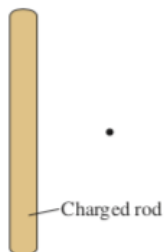
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1 Conceptual Questions

- (a) Give examples of symmetric shapes and non-symmetric shapes.
- (b) When is the dipole approximation valid?
- (c) Describe the dynamics of a dipole placed in a **uniform** electric field.
 - Does it experience a force?
 - Does it move? If so, how?
- (d) At the dot, in what direction does the electric field point?



- (e) What are ways to increase the magnitude of the electric field at the dot?



- (f) Draw the electric field lines for the positively charged rod above.
- (g) How much faster does the \vec{E} field of a point charge decay compared to the \vec{E} field of a charged-thin wire?

2 Thin Charged Wire

Show that the electric field \vec{E} at point p a distance d above an infinite wire with total charge Q is:

$$\vec{E}(p) = \frac{1}{4\pi\epsilon} \int_{-\infty}^{\infty} dx \frac{\lambda x}{(d^2 + x^2)^{\frac{3}{2}}} \hat{y}$$

