

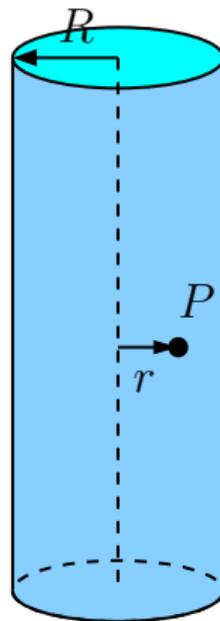
## Where can you go to get help?

- Pooled office hours!
- Drop-in help sessions Wednesday & Sunday from 8-10 PM in Olin 264
- TLC study groups. Registration begins today at noon:  
[my.bucknell.edu/StudyGroups](https://my.bucknell.edu/StudyGroups)
- TLC Tutoring  
[bucknell.edu/bookTLCtutoring](https://bucknell.edu/bookTLCtutoring)

## Lecture 3 — Concept Test 1

Without doing any calculations, what is the direction of the electric field near the middle of the cylinder (i.e., away from the ends) but not on the axis?

1. Radially outward
2. To the left everywhere
3. Downward everywhere
4. To the right everywhere
5. Upward everywhere
6. Not enough info



## Step-by-Step Method for Gauss's Law Problems

1. Write down Gauss's Law:  $\Phi_E = q_{\text{enc}}/\epsilon_0$ .
2. Draw an appropriate Gaussian surface that contains the point  $P$ . Look for a surface where  $\vec{E} \cdot d\vec{A}$  is 0 or a constant everywhere.
3. Work on the left side: express  $\Phi_E$  in terms of  $E$ .
4. Work on the right side: find  $q_{\text{enc}}$  in terms of the given charge.
5. Plug the left side and the right side into Gauss's Law and solve for  $E$  (magnitude).

## Lecture 3 — Concept Test 2

**(a)** What is the flux  $\Phi_E^{\text{caps}}$  for the end caps of the cylinder in terms of the unknown electric field magnitude  $E$ ?

1. 0

3.  $2\pi R^2 E$

5.  $\pi R^2 E$

2.  $2\pi r^2 E$

4.  $\pi r^2 E$

6.  $2\pi r h E$

**(b)** What is the flux  $\Phi_E^{\text{round}}$  for the round part of the cylinder in terms of the unknown electric field magnitude  $E$ ?

1. 0

3.  $2\pi R^2 E$

5.  $\pi R^2 E$

2.  $2\pi r^2 E$

4.  $\pi r^2 E$

6.  $2\pi r h E$

## Lecture 3 — Concept Test 3

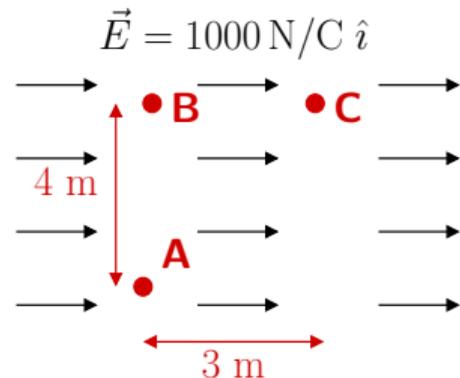
What is the potential energy difference  $\Delta U$  when moving a  $+0.1\text{ C}$  charge from ...

(a) From point A to point B?

1. 0 J
2. 300 J
3. -300 J
4. 400 J
5. -400 J

(b) From point B to point C?

1. 0 J
2. 300 J
3. -300 J
4. 400 J
5. -400 J

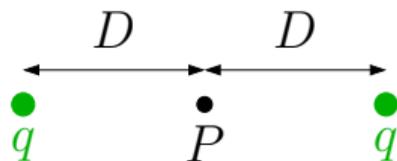


(c) From point A to point C?

1. 0 J
2. -300 J
3. -400 J
4. -500 J
5. -700 J

## Lecture 3 — Concept Test 4

What is the potential at a point half-way between two equal charges, as in the sketch?



1. 0
2.  $kq/D$
3.  $-kq/D$
4.  $2kq/D$
5.  $-2kq/D$
6. There's not enough information to answer this