

Outline

- 1 Lessons Learned Last Year
 - Fall 2014 and Spring 2015
- 2 Course Organization
 - Before Class
 - During Class
 - After Class
- 3 Video Lectures
 - Lectures
 - Examples
 - Explorations

Lessons Learned Last Year

Challenges

- Class time goes by quickly
- Students do not like being “forced” to comment
- Problem solving confidence can suffer

Surprises

- Immediate video comments are far richer than “muddiest point” comments
- 50% of students use Khan Academy (even in traditional sections)
- Textbook usage is significantly reduced in flipped sections

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Before Class

- Read assigned sections from textbook?
- Watch video lectures (~2 hr per week)
- Take a short concept quiz

In Class

- Review material based on results of comments on *Classroom Salon*
- Use demonstrations and clicker questions to reinforce concepts
- Practice problem solving

After Class

- Read assigned material from the textbook?
- Re-watch portions of video lectures?
- Complete a concept-rich group problem and follow-up group quiz in recitation
- Complete weekly homework

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Lectures

- Annotated PowerPoint with voice-over
- All figures hand-drawn
- Most videos ~5 minutes long (15 min max)

All Videos

- Recorded using Active Presenter (free version)
- Hosted on YouTube (free)
- Presented using Classroom Salon (free)

File Custom

Text Box Bullets Table Shapes New Slide

Insert

Shape Style

Abc Abc Abc Abc Abc Abc Abc

Pen Highlighter Stroke Eraser Small Eraser Medium Eraser

Write

Pens

Color Thickness

Select Objects Convert to Shapes to Back Undo Select

Slides Outline

1 Charge is Quantized

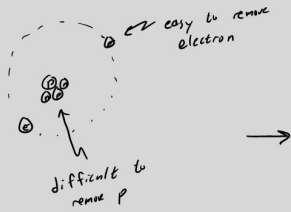
2 Charge is Quantized

Charge is Quantized

Charge always comes in multiples of e , the quantum of charge

$$e = 1.60 \times 10^{-19} \text{ C}$$

| particle | symbol | charge |
|----------|--------|--------|
| proton | p | $+e$ |
| neutron | n | 0 |
| electron | e^- | $-e$ |



- Negative net charge caused by extra electrons
- Positive net charge caused by missing electrons

Click to Audio 1 Video: 29.46 fps 00:00:07

Press Ctrl+Alt+C to cancel

Examples

- Same style as lectures
- Length widely variable depending on difficulty of problem (~minutes long)
- Questions from the textbook
- Quantity and difficulty similar to assigned homework

Explorations

- Interactive simulations
- Video demonstrates usage, file posted for students to play with
- Created using GeoGebra (free)
- Annotated with Ink2Go (\$20)

exploration 2ggg

File Edit View Options Tools Window Help

Signed in as Dave Hero

Graphics

Spreadsheet

Show:

- Field Lines
- Field Strength
- Field Vector

Presets:

Random

Dipole

Ring

Line

Field Lines

Field Strength

Field Vector

Random

Dipole

Ring

Line

| | A | B | C | D |
|----|---|----|----|---------|
| 1 | x | y | q | point |
| 2 | 9 | 8 | -4 | (9, 8) |
| 3 | 6 | 5 | 1 | (6, 5) |
| 4 | 2 | 4 | 3 | (2, 4) |
| 5 | 9 | 8 | -4 | (9, 8) |
| 6 | 5 | 6 | -5 | (5, 6) |
| 7 | 1 | 3 | 0 | (1, 3) |
| 8 | 6 | 7 | -5 | (6, 7) |
| 9 | 2 | 8 | 0 | (2, 8) |
| 10 | 4 | 4 | 2 | (4, 4) |
| 11 | 8 | -4 | -4 | (8, -4) |

Input:

$q_1 = -4 \mu\text{C}$ $q_2 = -4 \mu\text{C}$ $q_3 = -5 \mu\text{C}$ $q_{10} = -4 \mu\text{C}$
 $q_4 = 1 \mu\text{C}$ $q_5 = -5 \mu\text{C}$ $q_6 = 0 \mu\text{C}$ $q_{11} = -2 \mu\text{C}$
 $q_7 = 3 \mu\text{C}$ $q_8 = 0 \mu\text{C}$ $q_9 = 2 \mu\text{C}$ $q_{12} = 1 \mu\text{C}$

Audio Video: 22.34 fps 00:00:10

Press Ctrl-End to stop

Sample Videos

<http://www.classroomsalon.com/salons/view.aspx?id=2736>