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Make Flipped Learning Easy and Effective

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The Challenge:

Help students succeed

How can I improve student success?

Active learning increases student performance in science, engineering, and mathematics

Freeman et al. *Proc. Nat. Acad. Sci.* **2014** *111(23),* 8410-8415

Increased Structure and Active Learning Decrease Achievement Gap in Biology

Haak et al. *Science* **2011**, *332*, 1213-1216.
Eddy and Hogan. *CBE – Life Sci. Educ.* **2014**, *13*, 453-468

Reaching Students: What Research Says About Effective Instruction in Undergraduate Science and Engineering.

Kober, N. National Research Council, 2015.

Approaches to Active-Learning Environments

- POGIL
- Flipped Classrooms
- Peer-Led Team Learning

Traditional

In Class

Content Delivery

Outside Class

Practice

Flipped

In Class

Practice

Outside Class

Content Delivery

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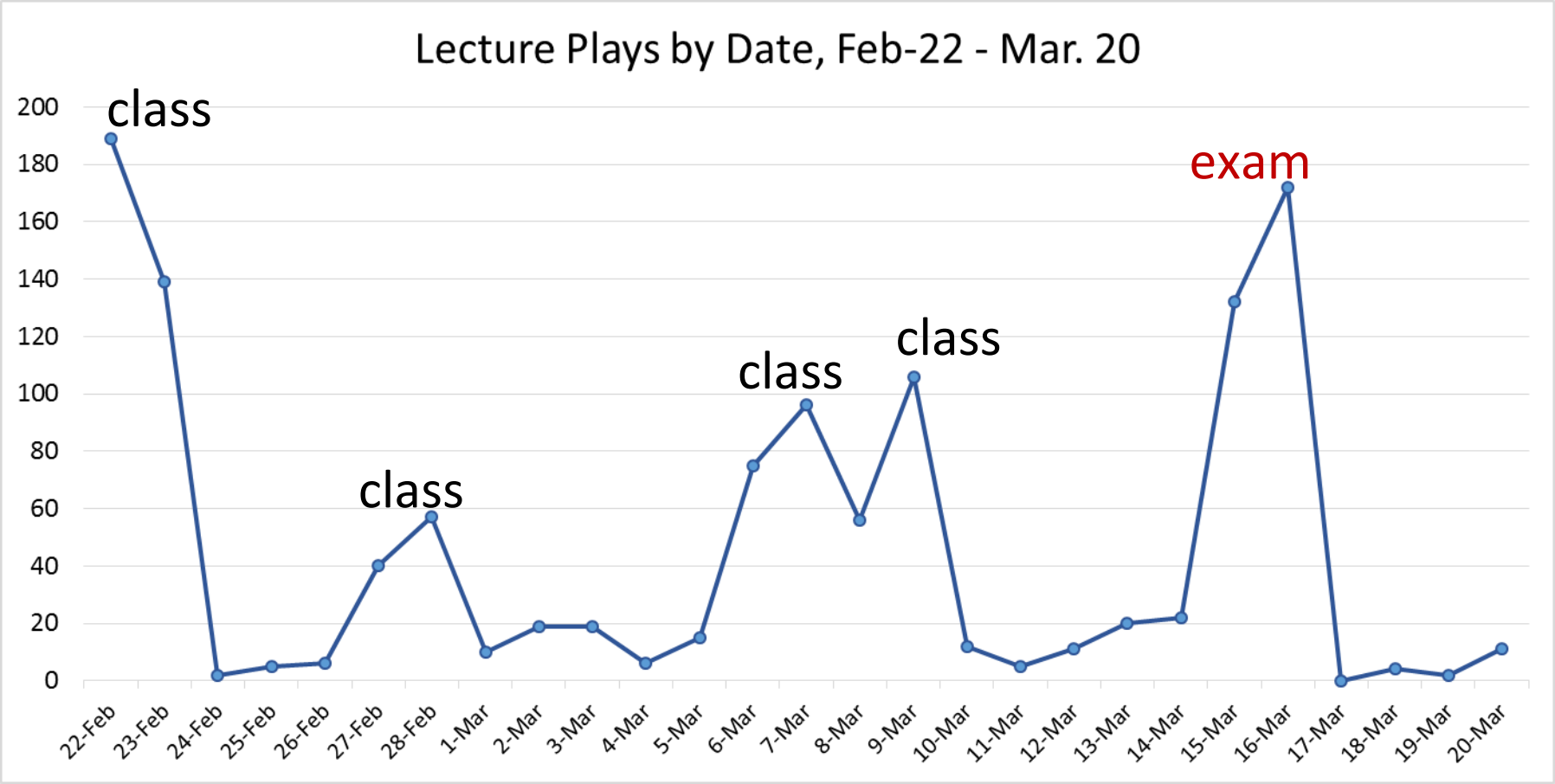
Traditional	Flipped
Before Class	Before Class Content Delivery
In Class Content Delivery	In Class Practice
After Class Practice	After Class Practice



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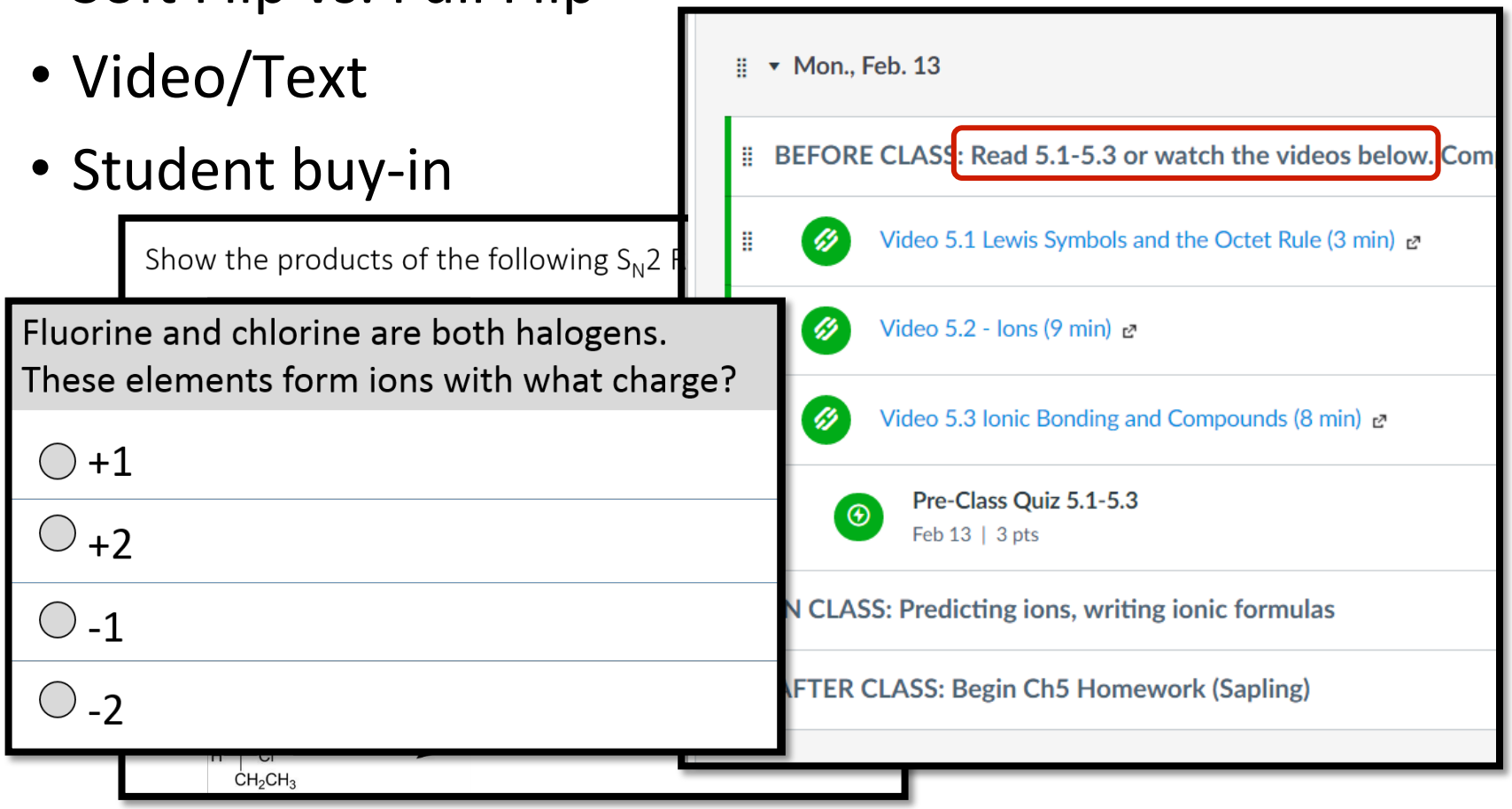
Three Big Questions

1. Course Design
2. In-Class Pedagogy
3. Video/Tech

1. Course Design

- Soft Flip vs. Full Flip
- Video/Text
- Student buy-in



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2. In-Class Pedagogy

- Big Classes or Small?
  - Course Level?
  - Teaching Assistants?
- Activities
  - Making pre-class and in-class mesh
  - In-class polling?
  - Group Work?

Organic 1

size: 40-50

- group problems
- activities
- speed drills

Intro Chem

size: 70-140

- polling (clickers/phones)
- group problems
- activities
- speed drills

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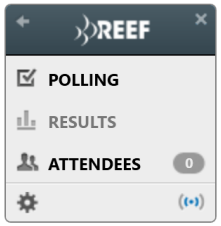
Polling Questions

- Varying Levels of Difficulty
- Multiple Choice or Numerical
- Typically Graded

Which two products will form in this reaction?

$CoCl_3(aq) + K_2SO_4(aq) \rightarrow$

a. $CoSO_4(s) + KCl_3(aq)$
b. $CoSO_4(aq) + KCl_3(s)$
c. $Co_3(SO_4)_2(aq) + KCl\ (s)$
d. $Co_2(SO_4)_3(aq) + KCl(aq)$
e. $Co_2(SO_4)_3(s) + KCl(aq)$



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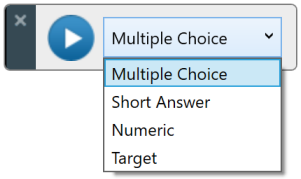

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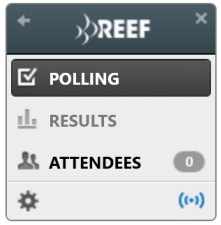
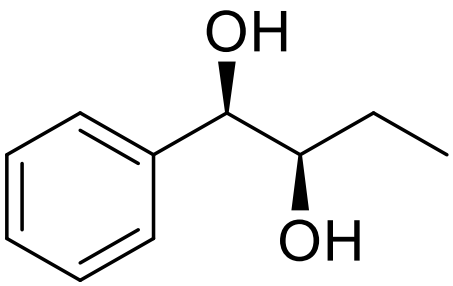
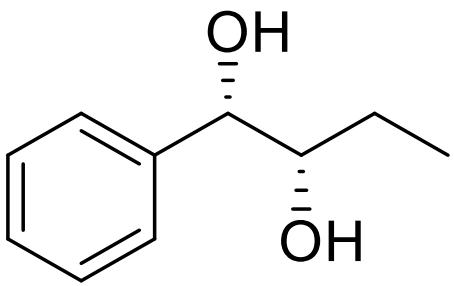


What is the relationship?





a. Identical Compounds
b. Constitutional Isomers
c. Enantiomers
d. Diastereomers
e. Not Isomers

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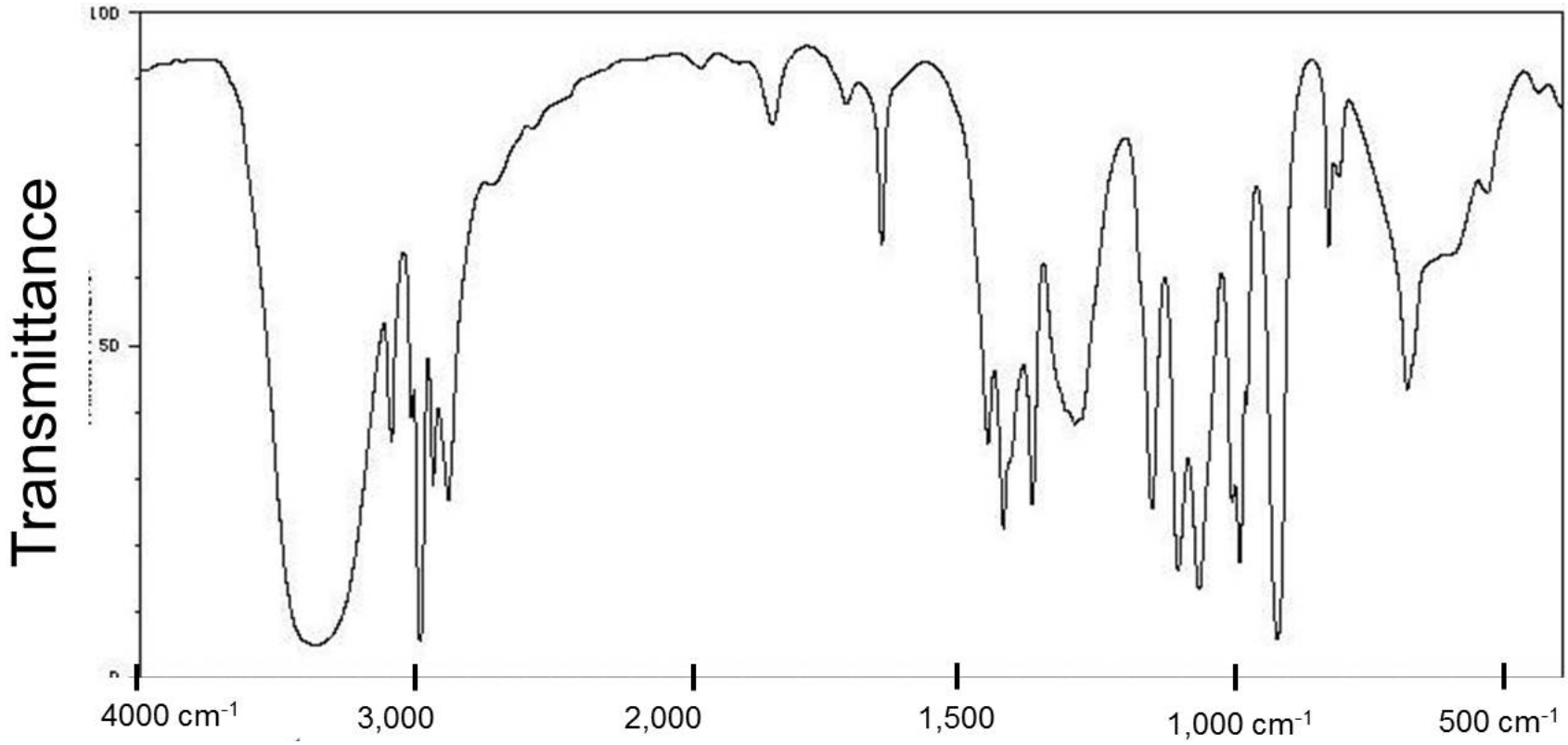
PCl_3 reacts with water according to the equation shown. How many moles of PCl_3 are required to produce 15.0 moles of HCl?

$$PCl_3 + 3H_2O \rightarrow H_3PO_3 + 3HCl$$

a. 1.0
b. 5.0
c. 10.0
d. 15.0
e. 45.0

$$15.0\ \cancel{\text{mol HCl}} \times \frac{1\ \text{mol } PCl_3}{3\ \cancel{\text{mol HCl}}} = 5.0\ \text{moles } PCl_3$$

Whch peak in this IR spectrum corresponds to an O-H stretch?



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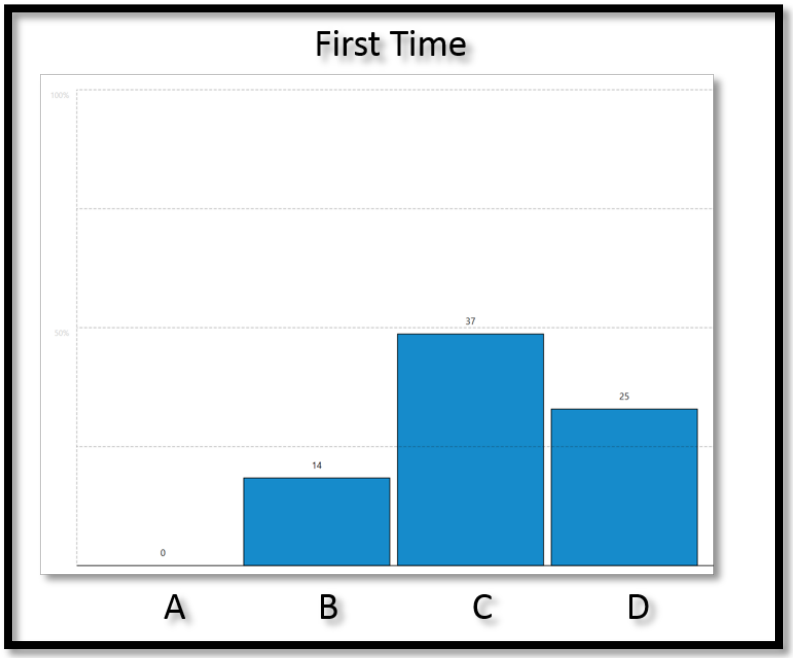
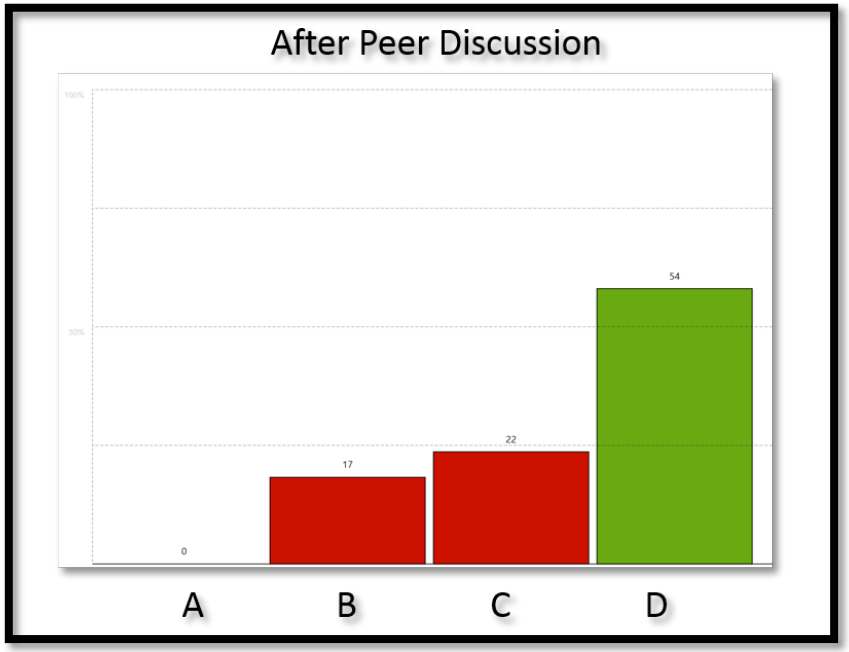
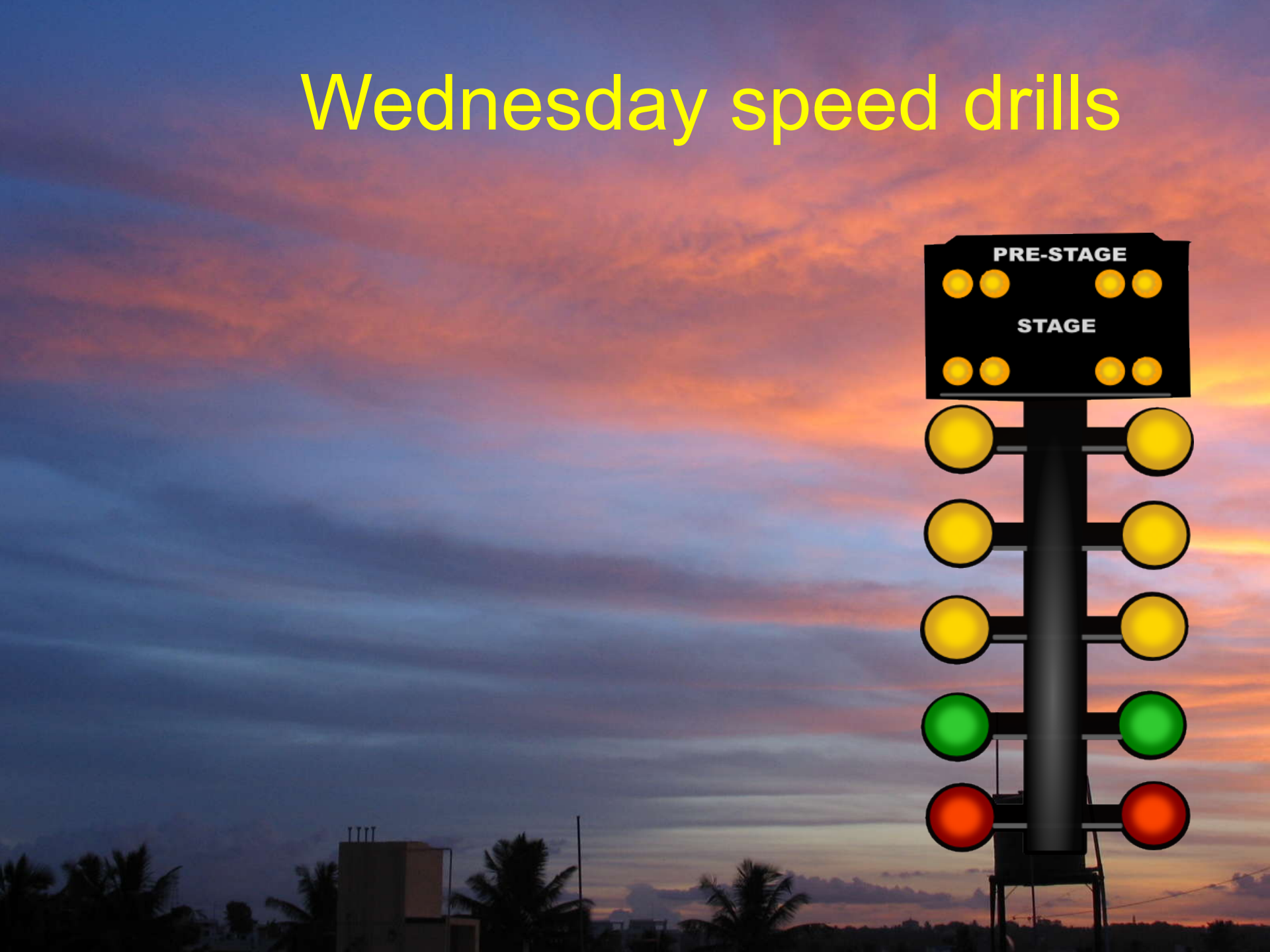
Copper has two major isotopes, ^{63}Cu (mass = 62.93 amu) and ^{65}Cu (mass = 64.93 amu). The average atomic mass of Cu is 63.55 amu. Which of these is the closest estimate for the natural abundance of copper isotopes?

a. 10% ^{63}Cu and 90% ^{65}Cu
b. 30% ^{63}Cu and 70% ^{65}Cu
c. 50% ^{63}Cu and 50% ^{65}Cu
d. 70% ^{63}Cu and 30% ^{65}Cu





Wednesday speed drills



Write the symbol and charge on the following ions:

1 copper(II)

2 calcium

3 fluoride

4 carbonate

5 nitrite

Write formulas for the following:

6 copper(II) sulfate

7 aluminum bromide

8 magnesium oxide

9 silver nitrate

10 calcium phosphate

Write formulas for the following:

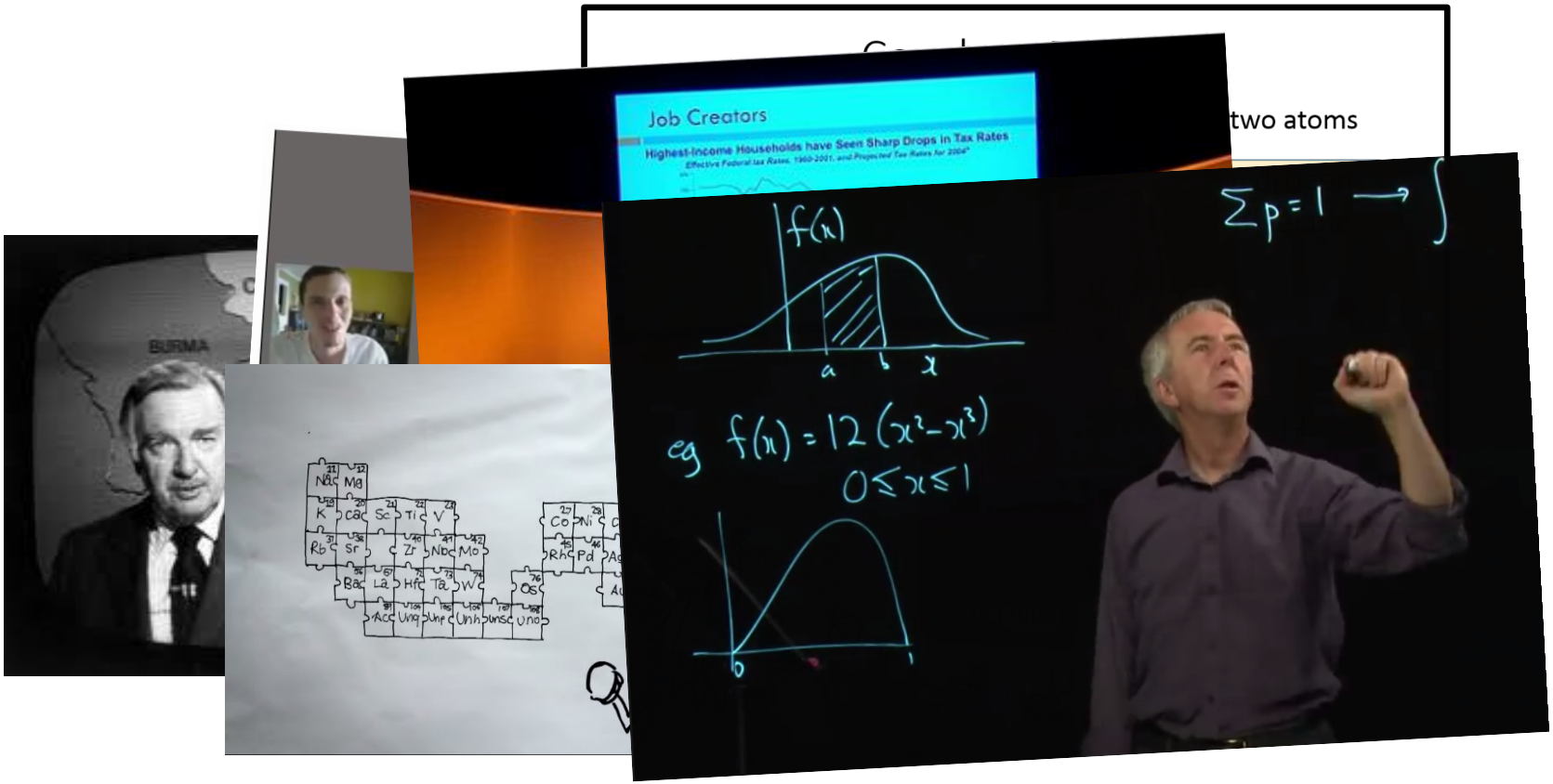
6	copper(II) sulfate	$CuSO_4$
7	aluminum bromide	$AlBr_3$
8	magnesium oxide	MgO
9	silver nitrate	$AgNO_3$
10	calcium phosphate	$Ca_3(PO_4)_2$

How many did you get correct?

a. Less than 3
b. 3-5
c. 5-7
d. 8-9
e. All 10, Baby.

3. Video/Tech

How can I make my video effective and engaging?



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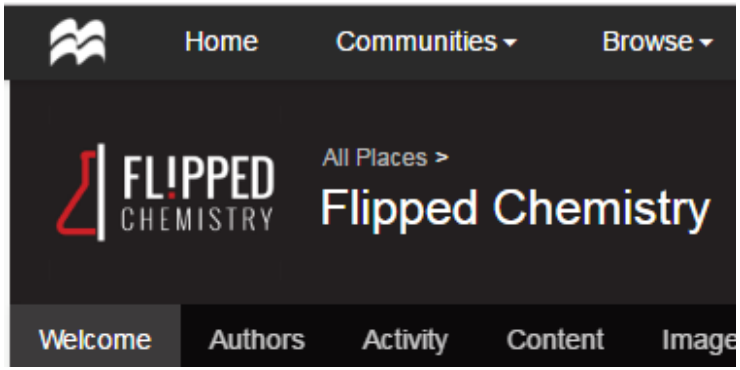
- What apps do I need?
  - Powerpoint Mix
  - Camtasia
  - Doceri
  - Record Everything
- What length is good?
  - 6-10 min
- Does it have to be perfect?

Where can I get more ideas?

- Macmillan Communities



- 2017 Flipped Learning Conference

  U. Northern Colorado

  June 14-16

Can we do this in small bites?

Absolutely.

Questions?