Math and Science:

Producing Quality Transcripts, *Consistently!*

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Math & Science Courses

- This presentation refers to classes where:
  - Students learn how to do mathematical problems
  - AND/OR students *apply* math to solve word problems and equations
- Examples of math and science courses:
  - College Algebra, Statistics, Trigonometry, Accounting, Finance, Economics, Biology, Organic Chemistry, Physics/Mechanics, Echocardiography...

What happens in a math class?

Lecture

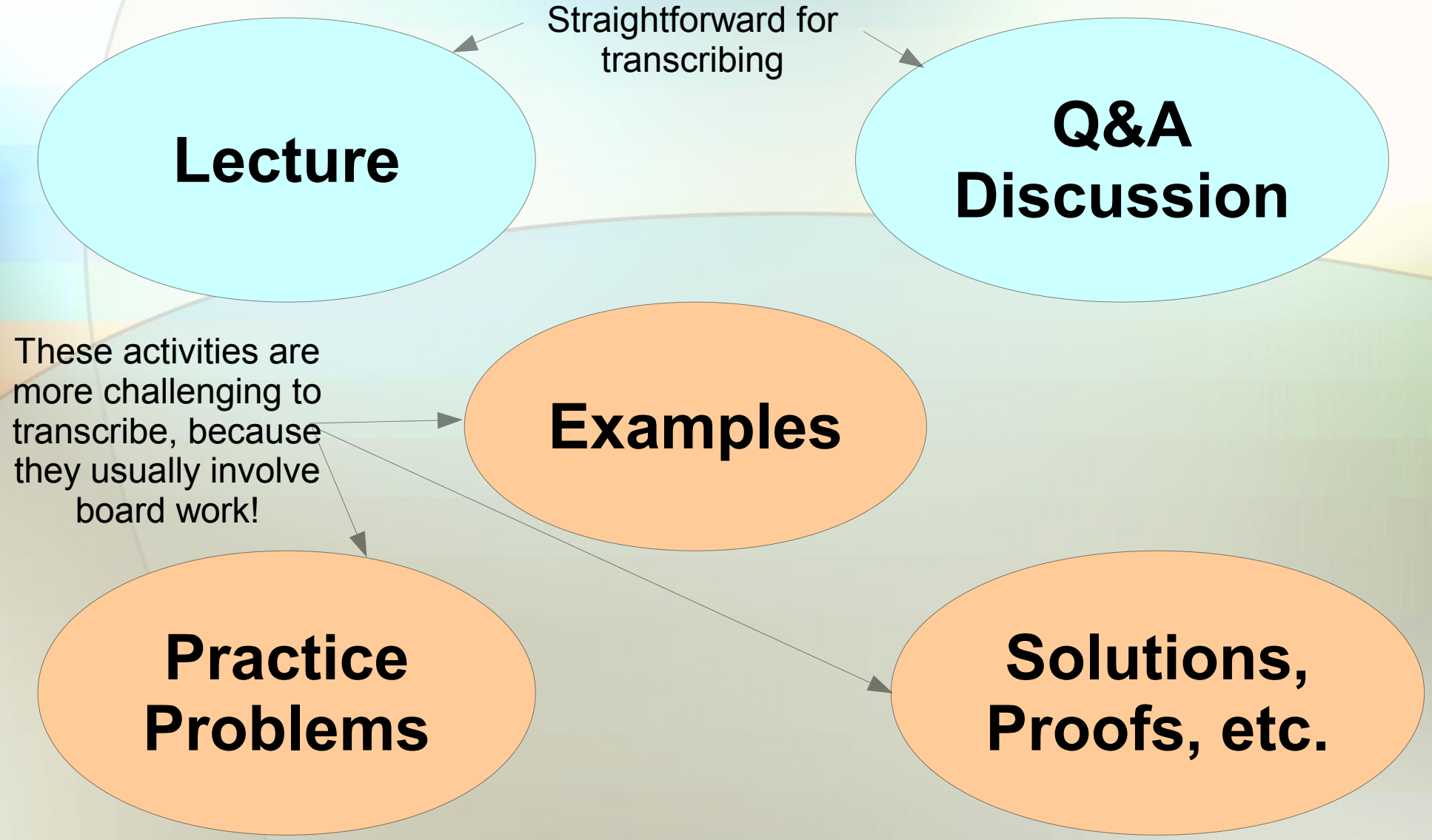
Q&A
Discussion

Examples

Practice
Problems

Solutions,
Proofs, etc.

What happens in a math class?



Goals for this Presentation

- How to *think* about math/science
  - What kinds of *content decisions* must a real-time transcriber make during a math class?
- Best practices for transcribing math
- Build confidence so you feel comfortable transcribing in a math setting!

Instructions for Practice Lectures

- Resize your browser and TypeWell windows.
  - Make sure you can see both windows on your screen!
- Read the lecture preview for background and review the target goals.
- Transcribe the lecture once through.
  - Use good quality headphones.
  - Glance at the video as needed, just as you would glance up at the board during a real math class.

Lecture preview: The teacher begins with a word problem written on the board, and explains how to re-write it as a math equation. He then solves for x.

Target skills: warm-up

Practice Lecture: "Math Games"

http://youtu.be/PwItFSm19mQ

Instructions for Self-Evaluation

- Use the self-evaluation checklist to analyze your work in these four areas:
  - Content, Grammar, Formatting, and Technical Skills
- *What can you improve?*
- Repeat the lecture once more.

Self-Evaluation for “Math Games”

- ✔ Content
  - Initial word problem
  - Verbal explanation of each step
  - Final answer
- ✔ Technical Skills
  - All numbers and variables transcribed accurately
- ✔ Formatting
  - White space
  - Indentation
- ✔ Grammar
  - Complete sentences
  - Punctuation

Example Transcript:

“Math Games”

30% of what number is 12?

We know that 30% means 30/100. "Of" means "times." "What number" means "x." "Is" means "equals." And 12 means 12.

30/100 can be reduced to 3/10. Rewrite the problem:

$$3x/10 = 12$$

To get rid of the fraction, multiply both sides by 10.

$$3x = 120$$

Divide both sides by 3:

$$x = 40$$

Now plug the answer back into the original question to make sure it makes sense. We know that 100% of 40 would be 40. So, 30% of 40 would be a lot less than 40. So, the answer 12 seems to make sense.

Lecture preview: This is a similar lecture, with a different teacher. An equation is written in sentence form. She rewrites the problem as a math equation and then solves for n.

Target skills: warm-up

Practice Lecture: "Writing Equations"

http://youtu.be/wFpd-__oeVU

Self-Evaluation for “Writing Equations”

✔ Content

- Initial equation
- Goal: solve for n
- Steps explained
- Final answer

✔ Technical Skills

- All numbers and variables transcribed accurately

✔ Formatting

- Quotes or italics for quoted words
- White space
- Formulas indented

✔ Grammar

- Complete sentences
- Punctuation

Example transcript:

"Writing Equations"

"Product" means "multiply." Read the problem from left to right. "Is" means "equals."

$6n = 12$

To solve the equation for n, we want to get n by itself on the left side of the equation. Divide both sides of the equation by 6.

Cancel the sixes on the left side of the equation. On the right side, 12 divided by 6 is 2. That leaves us with $n = 2$.

Check the answer by plugging 2 back into the original equation.

$6(2) = 12$

This is a true statement, so our answer is correct:

$n = 2$

Reading and Writing Math

- Transcribing math is challenging because it uses a specialized “language” with different syntax and notation
- Every equation *can* be translated into English, but that is often too tedious for communication access

Reading and Writing Math

- Mathematical notation is a language!
- An *equation* is a *sentence*

Algebraic Equation	Sentence
$x + 6 = 23$	A number increased by six is twenty-three. x plus 6 equals 23.
$2n = 14$	Twice a number is 14. 2n equals 14.
$4 = 5x - 16$	Four is sixteen less than five times a number. 4 equals 5x minus 16.
$\frac{12}{p} = 3$	Twelve divided by a number is three. 12 over p equals 3.

What works?

- Accurate content
- Quick readability
- Correct notation
- Clear explanation of board work

What hurts?

- Inaccuracies
- Cluttered format
- Confusing notation
- Missing explanations of board work

Formatting

- When you look at a transcript, formatting is one of the first things you notice.
- Formatting is also one of the easiest skills for a transcriber to improve.
- Always use adequate white space.
- Indentation of formulas and equations can make math transcripts easier to read.

What works?

Solve for c in this equation:

$$a(b-c)=3d$$

Since c is located inside a set of parentheses, I would first distribute the a through the parentheses on the left side of the equation:

$$ab-ac=3d$$

Next, isolate the c term ($-ac$) by subtracting ab from both sides of the equation:

$$-ac=3d-ab$$

Finally, to get c by itself, divide by $-a$ on both sides of the equation. Cancel the $-a$ on the left side. Then we have our answer:

$$c=\frac{3d-ab}{-a}$$

What hurts?

To solve for c - since c is in parentheses - distribute a through the parentheses. So we have a times b (ab) minus a times c (ac) equals 3d. [Missed.] [On board.] Finally to get c by itself, simply divide by negative a on both sides of the equation... -ac/-a = 3d – ab /-a Cancel the negative a's on the left. Then we have our answer. [On board.]

c = 3d - ab / -a

What works?

Solve for c in this equation:

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c = 3d - ab / -a

The transcript on the left shows good use of white space.

The transcriber switched into Math Mode to type equations.

For reading ease, the equations were indented using the Tab key.

Why use Math Mode?

- Switch into Math Mode *when appropriate*:
  - for special “mathy” font
  - for special characters and notation
  - to disable regular abbreviation expansions
  - to enable math expansions
- Review the section on spacing in the “Basics” chapter of the built-in Math Tutorial

Lecture preview: The instructor demonstrates how to solve an algebraic equation for *c*. You will probably want to toggle math mode on and off using the Caps Lock key. (Review how to type a fraction in TypeWell Math Mode: *frac*). Try to use *frac* to transcribe the final answer at the end of the lecture.

Target skills: formatting, toggling Math Mode on/off, fraction template (*frac*)

Practice Lecture: "How To Do Algebra"

http://youtu.be/BjgkVU-UEJI

Self-Evaluation

- ✔ Content
  - Initial equation
  - Steps explained
  - Final answer
- ✔ Technical Skills
  - Math mode
  - *frac*
- ✔ Formatting
  - White space
  - Indentation
- ✔ Grammar
  - Complete sentences
  - Punctuation

Example transcript:

"How to Do Algebra"

Solve for c in this equation:

$$a(b-c)=3d$$

Since c is located inside a set of parentheses, I would first distribute the a through the parentheses on the left side of the equation:

$$ab-ac=3d$$

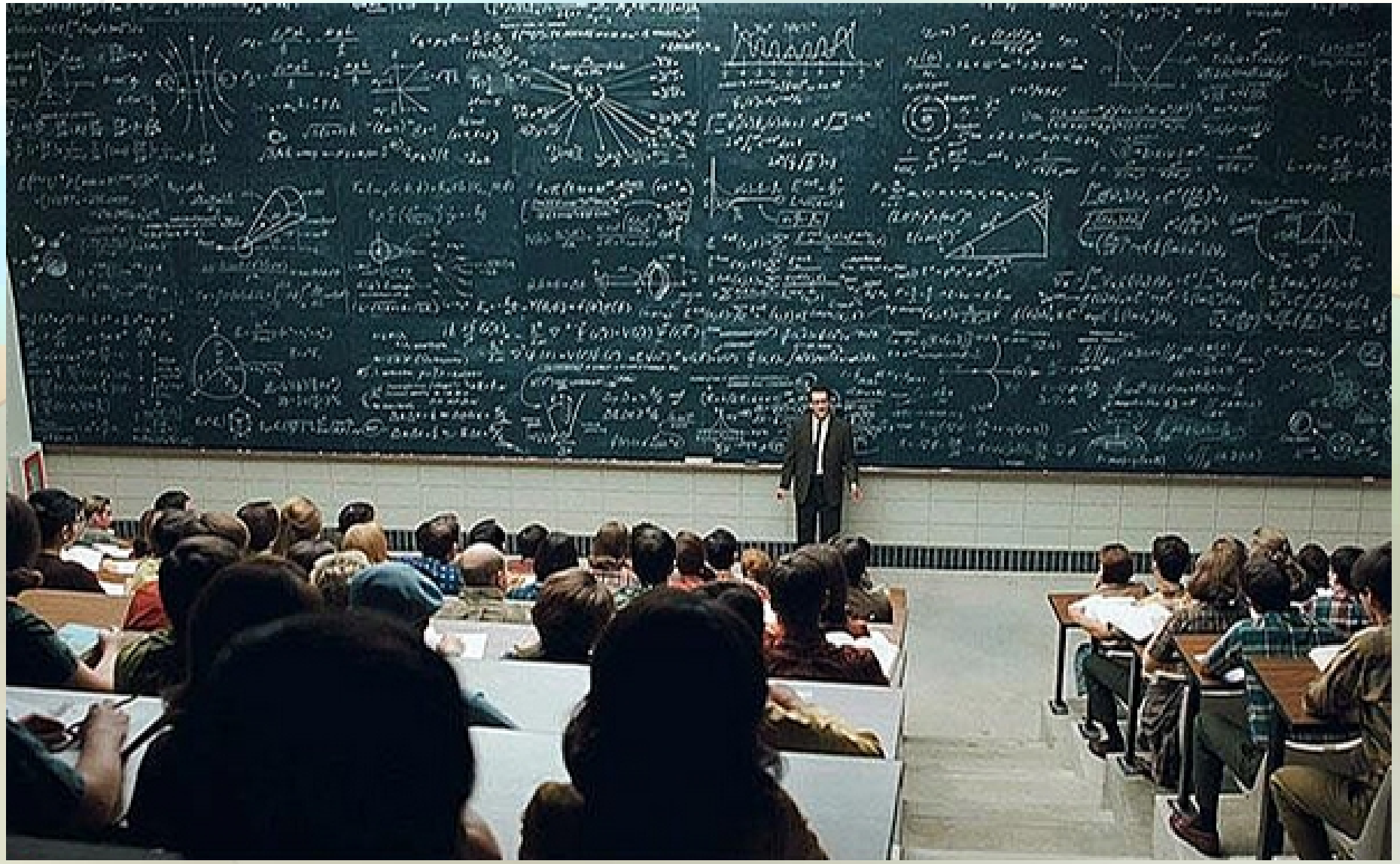
Next, isolate the c term ($-ac$) by subtracting ab from both sides of the equation:

$$-ac=3d-ab$$

Finally, to get c by itself, divide by $-a$ on both sides of the equation. Cancel the $-a$ on the left side. Then we have our answer:

$$c=\frac{3d-ab}{-a}$$

A note about notes…



A note about notes...

- What is expected of the math student?
  - Class time should be a balanced mixture of listening, thinking, questioning, and note taking.
  - Math is a set of skills that you LEARN BY DOING.
  - Math students should be able to reproduce most board work easily, on their own.
- What is expected of the math instructor?
  - Teachers use the board to communicate info that can't effectively be communicated verbally (e.g. the steps involved in solving an equation).

A note about notes...

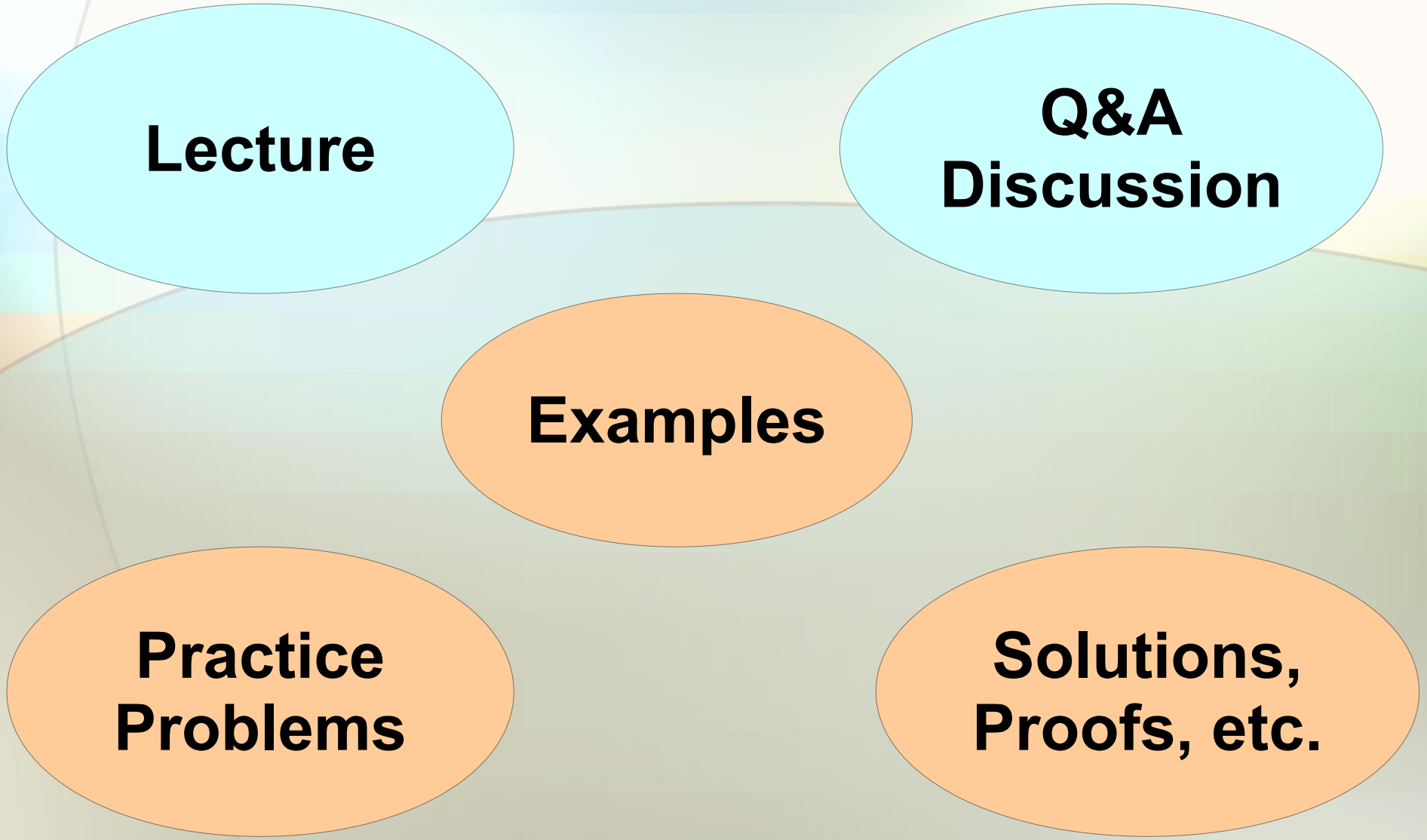
- What is expected of the math transcriber?
  - Board work helps students “follow along” and usually involves algebraic manipulations that students *already know how to do* .
  - A higher proportion of what the instructor *says* is important, versus what he or she *writes*.
  - It's more helpful to capture verbal explanations than to try to copy (transcribe) the board work.
- Focus on what the instructor is SAYING!

To type, or not to type

- The list on the right shows content you should transcribe during lecture and Q&A.
- Try to capture this kind of content ALWAYS.

- Definitions, formulas
- Proofs, reasons, exceptions
- Textual references
- Previews, summaries
- Relationships
- Cause & effect
- Questions asked of the class

What happens in a math class?



To type, or not to type

- The list on the right shows content you should transcribe during practice problems/solutions.
- Try to capture this kind of content ALWAYS.

- Verbal explanations
- Reader orientations
- *Some* board work
  - Initial problem
    -
    - (intermediate steps)
    -
  - Final answer

To type, or not to type

- The list on the right shows content you would *also* see and hear during problems/solutions.
- BUT, you should **only capture this content if time permits,** and if you can do so ***accurately.***

- *Intermediate* steps
- Diagrams, graphs
- Complex equations
- Mistakes/corrections
- *Everything* written on the board

Lecture preview: The instructor shows how to use a factor tree to simplify a radical. (Review the notation for "square root" in regular and Math Mode.)

Target skills: capturing verbal explanations, summarizing board work, square root notation

Practice Lecture: "Simplifying Radicals"

http://youtu.be/ucnKcrg5TrQ

Self-Evaluation

- ✔ Content
  - Goal
  - Important terms
  - Rule: identify *pairs* of factors in the tree
  - Explanation of each step in the solution
  - Final answer
- ✔ Technical Skills
  - Square root notation
- ✔ Formatting
  - White space for each new sub-topic
- ✔ Grammar
  - Sentence length
  - No unclear pronouns

Example transcript:

“Simplifying Radicals”

To simplify a square root, where the number inside the radical is not a perfect square, we start by making a factor tree.

[On board: Factor tree for √98]

If you know your perfect squares, you'll recognize 49 as 7 times 7.

In our factor tree, we are looking for pairs of factors that are the same. If a factor pairs up, it will come out of the radical. Otherwise, it stays inside the radical.

Since our 7s pair up, a 7 will come out of the radical. Since the 2 does not pair up, it stays inside the radical. Our answer is 7√2.

It helps to be able to recognize perfect squares as you make your factor tree. In the next example, we'll review the perfect squares for numbers between 1 and 15.

Lecture preview: The instructor gives a definition and then draws on the board. He then provides an example with "rules."

Target skills: capturing definitions of new terms, reader orientations, correct formatting (capitalization) of variables

Practice Lecture: "Slope of a Line"

http://youtu.be/9bm1_IJ00lQ

Self-Evaluation

✔ Content

- Definition of slope
- Phrase “rise over run”
- Reader orientation to the board
- “Any two points on the line”
- Use variable *m* to represent slope

✔ Formatting

- Capitalize A and B
- Lowercase *m*

✔ Technical Skills

- Simple fraction (control+space)

✔ Grammar

- No black font errors *verbal → variable*

In algebra, we use the word "slope" to describe how steep a line is. Slope can be found using the ratio "rise over run", between any two points on that line.

[On board.]

For the line you see here, use the points A and B to find its slope. To get from point A to point B, we would rise 2 units and run 3 units. So the slope of this line is:

$$\text{slope} = \text{rise} / \text{run} = {}^{2}\!/_{3}$$

The variable we use to represent slope is m.

$$m = {}^{2}\!/_{3}$$

No matter what two points you choose along this line, the slope (rise over run) can always be simplified to ${}^{2}\!/_{3}$.

Using the PAL Efficiently

- Always use a system, to avoid inconsistencies (this makes abbreviations easier to remember)
- Use the Regular PAL for common terms
- Use the Math PAL for formulas
- Edit your PAL during Prep Time
- Make on-the-fly PAL additions in class, when necessary: highlight, then *Control+a*

Using the PAL Efficiently

- Add the following phrase to your Regular PAL, using an abbrev you'll remember:

slope-intercept form

- Add the following (general formula for a line) to your Math PAL:

$$y = mx + b$$

Lecture preview: Instructor shows how to graph a line by converting an equation to slope-intercept form.

Target skills: Regular PAL and Math PAL

Practice Lecture: "Converting to Slope-Intercept Form and Graphing"

http://youtu.be/Zj-9Zc9yKYU

Self-Evaluation

✔ Content

- Equation and formula
- Goal: isolate y on left side
- Relationship between equation and formula
- Explanation of each step
- Answers to problem: slope of line *and* the y-intercept
- Reader orientation to board, to graph the line

✔ Formatting

- Math mode font

✔ Technical Skills

- Regular and Math PAL

✔ Grammar

- Complete sentences

To graph the line that has the equation $2x + 3y = 6$, first convert the equation to slope-intercept form ($y = mx + b$).

The y should be by itself on the left side of the equation. First, subtract 2x from both sides:

$$3y = -2x + 6$$

Notice that I put the x term first, on the right side of the equation. Continuing on, to get x by itself, divide both sides by 3:

$$y = -\frac{2}{3}x + 2$$

Now we have a setup just like the equations in the previous section. Our equation is written in $y = mx + b$ form, so we can graph the line. The slope of the line is m:

$$m = -\frac{2}{3}$$

The y-intercept is b:

$$b = 2$$

Plot the y-intercept on the y-axis. [On board.]

Then use the slope to plot the second point, B. Then graph the line. [On board.]

Prep Time

- Use prep time to become familiar with the content of the upcoming class
- Enter key terms into the Regular PAL
- Enter formulas into Math PAL
- Practice typing and formatting equations, by looking at practice problems in book

Example of Prep Material

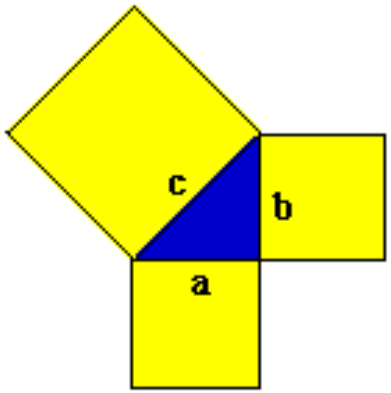
The Pythagorean theorem deals with the lengths of the sides of a right triangle.

It is often written in the form of the equation:

$$a^2 + b^2 = c^2$$

The theorem states that:

The sum of the squares of the lengths of the legs of a right triangle ('a' and 'b' in the triangle shown below) is equal to the square of the length of the hypotenuse ('c').



Lecture preview: Instructor solves for *x* (hypotenuse of a right triangle) using the Pythagorean Theorem. NOTE: In this practice lecture, the hypotenuse is labeled *x*, not *c*.

Target skills: use "prep time" to enter key terms and formulas into PAL (do this *before* starting the lecture, by reviewing the previous slide!)

Practice Lecture: "Pythagorean Theorem"

http://youtu.be/ku4rEwRxZOc

Self-Evaluation

✔ Content

- Pythagorean theorem (as a formula, *then* in sentence form)
- Define *a* and *b* as the legs of the triangle
- Define *c* as hypotenuse
- Equation from board
- Goal: solve for *x*
- Explanation of steps
- Answer: 10 = *x*

✔ Formatting

- Math mode

✔ Technical Skills

- PAL for theorem
- Square root notation

✔ Grammar

- Complete sentences

To find the value of x in this example, notice that we have a right triangle. We can use the Pythagorean theorem. This theorem states that the sum of the squares of the lengths of the legs of a right triangle is equal to the square of the length of the hypotenuse.

$a^2 + b^2 = c^2$ (Where a and b are the legs, and c is the hypotenuse)

Using the triangle on the board, we can set up this equation:

$(6)^2 + (8)^2 = (x)^2$

Solve for x:

$36 + 64 = x^2$

$100 = x^2$

Take the square root of both sides of the equation:

$\sqrt{100} = \sqrt{x^2}$

$10 = x$

Remember what works!

- ✔ Accurate content
- ✔ Quick readability
- ✔ Correct notation
- ✔ Clear explanation of board work

Summary of Best Practices

- Formatting
  - White space
  - Indentation
- Content
  - Initial/final equations
  - Explanation of steps
- Technical Skills
  - PAL, Math Mode
  - Practice transcribing the equations!
- Grammar
  - Clear wording
  - Complete sentences
  - Punctuation

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