

SIT Session Lesson Plan

Week/Chapter: Week 1

Course Assistant: _____

Course: College Algebra

Instructor: _____

Objective: What are the one or two most difficult concepts that the students need to work on today? Parallel and Perpendicular Lines

Beginning reminders:

1. Arrange seats in a circle
2. Make sure everyone has signed in
3. Review lesson plan with group
4. Remember to relax and be flexible!

Content to Cover:	Processes to Use*:	Time:
Introduction	Icebreaker: Have the students stand up and stretch. Review the expectations of SIT sessions for the semester	5 min
Chapter P Review	Encourage students to outline Chapter P from their textbooks and become familiar with the important terms and procedures that will be covered in Chapter 1.	10 min
Textbook, Calculator and Homework	Explain to students how to use their calculators and access their textbook and homework. (Make sure they know of the free 10-Day trial offered by Web-Assign.)	10-15 min
Parallel and Perpendicular Lines	Give the students two problems on the board. Let two students come up to the board and algebraically and graphically determine whether the lines are parallel or perpendicular.	10-15 min
Check for understanding/Review	Go around the room and have each student say one or two things they learned or better understand from today's session.	5 min
Tutoring Q & A		5 – 10 min

After session comments/thoughts:

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Equations used:

1) $y = 8x + 5$; $-x - 8y = 33$ (Perpendicular)

2) $y = \frac{1}{3}x - 4$; $y = \frac{3}{9}x + 15$ (Parallel)

References

Larson, Ron. (2011). *Algebra and Trigonometry: Real Mathematics, Real People* (6th Ed). Boston, MA: Cengage Learning.

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SIT Session Lesson Plan

Week/Chapter: Week 2

Course Assistant: _____

Course: College Algebra

Instructor: _____

Objective: What are the one or two most difficult concepts that the students need to work on today? Piecewise Functions; Even and Odd Functions

Beginning reminders:

1. Arrange seats in a circle
2. Make sure everyone has signed in
3. Review lesson plan with group
4. Remember to relax and be flexible!

Content to Cover:	Processes to Use*:	Time:
Warm Up	One minute paper - Ask students to write how their first week went. Have them state any concerns about class.	5 min
Sections 1.3 and 1.4	Note review. (Check for understanding before moving on.)	5-10 min
Piecewise Functions	Turn to your partner - The students will pair up and be given two problems on the board. Working together, the students will work the problems and then go up to the board to show their work.	15 min
Even and Odd Functions	Divide and conquer - Students will be given two problems. Half of the students will be asked to solve to find the if problems are odd and the other half will be asked to solve if the problems are even.	5-10 min
Tutoring Q & A		5 – 10 min

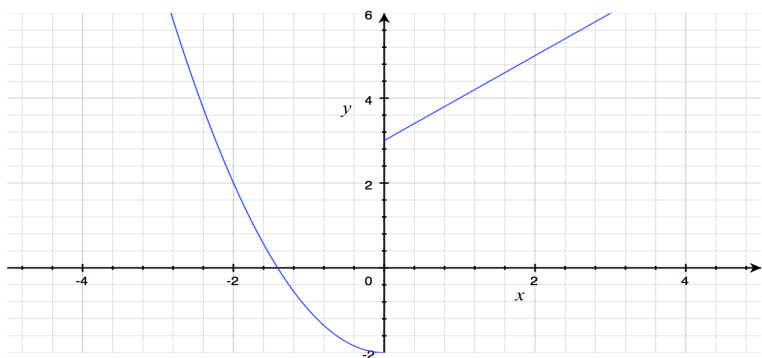
After session comments/thoughts:

Turn to your partner:

$$1) f(x) = \begin{cases} x^2 - 2, & x < 0 \\ x + 3, & x \geq 0 \end{cases}$$

Graph the problem.

(a) $f(-2)$ (b) $f(3)$



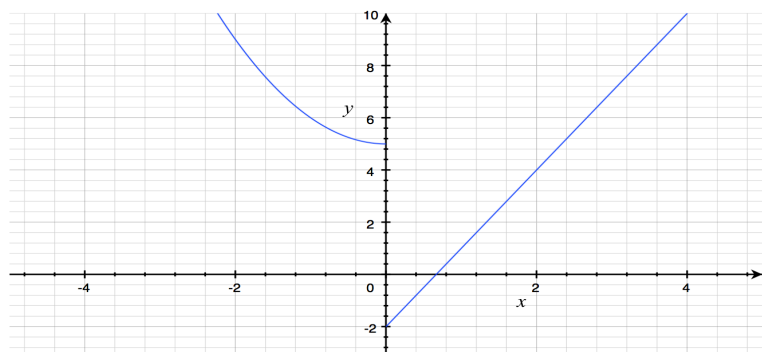
(a) $f(-2) = (-2)^2 - 2 = \boxed{2}$

(b) $f(3) = (3) + 3 = \boxed{6}$

$$2) f(x) = \begin{cases} x^2 + 5, & x < 0 \\ 3x - 2, & x \geq 0 \end{cases}$$

Graph the problem.

(a) $f(-1)$ (b) $f(1)$



(a) $f(-1) = (-1)^2 + 5 = \boxed{6}$

(b) $f(1) = 3(1) - 2 = \boxed{1}$

Divide and conquer:

(1) $g(x) = 2x^4 - x$

$$g(-x) = 2(-x)^4 - (-x) = 2x^4 + x$$

neither

(2) $p(x) = x^3 - 4$

$$p(-x) = (-x)^3 - 4 = -x^3 - 4$$

neither

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SIT Session Lesson Plan

Week/Chapter: Week 3

Course Assistant: _____

Course: College Algebra

Instructor: _____

Objective: What are the one or two most difficult concepts that the students need to work on today? Transformations (Ch.1 Sect. 5); Composition Functions

Beginning reminders:

1. Arrange seats in a circle
2. Make sure everyone has signed in
3. Review lesson plan with group
4. Remember to relax and be flexible!

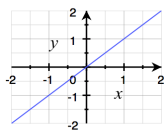
Content to Cover:	Processes to Use*:	Time:
Parent Functions	Intro/Verbal Volleyball - Students will sit in a circle and say all the parent functions. They will also use their arms to demonstrate how the graph looks.	5 min
Transformations	Students will be given two problems on the board. One by one, students will be asked to draw arrows of different colors from each part of the problem and write what it means.	10 min
Composition Functions	Group Tic-Tac-Toe - The students will be divided into two groups. One group will be X and the other O. After determining which group goes first, they will pick a space on the blank tic-tac-toe board on the white board. Each space corresponds to two functions. In order to put their X or O in the space, they must find the $(f \circ g)(x)$ and the $(g \circ f)(x)$ of the functions. The group will work together and may use their notes. If the group is unable to agree upon the correct answer or answers the question incorrectly, the other group has a chance to steal the space (provided they know the correct answer). All work should be shown. The first group to get three X's or O's in a row, wins the game.	25 min
Tutoring Q & A	Homework Help	5 – 10 min

After session comments/thoughts:

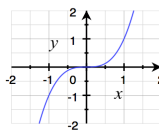
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Parent Functions:

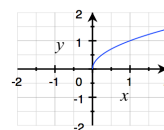
$$y = x \Rightarrow$$



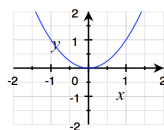
$$y = x^3 \Rightarrow$$



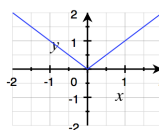
$$y = \sqrt{x} \Rightarrow$$



$$y = x^2 \Rightarrow$$



$$y = |x| \Rightarrow$$



Example Equations for Board Work:

(1) $h(x) = -2|x - 5| - 3$ shift down

vertical shrink

shift to the right

(2) $f(x) = 3(x - 1)^2 + 3$ shift up

vertical stretch

shift to the right

Tic-Tac-Toe:

(1) $f(x) = \frac{1}{3}x - 3$ $g(x) = 3x + 9$	(2) $f(x) = \sqrt[3]{x+1}$ $g(x) = x^3 - 1$	(3) $f(x) = x^2$ $g(x) = 1 - x$
(4) $f(x) = x^3$ $g(x) = \frac{1}{x}$	(5) $f(x) = \frac{4}{x^2}$ $g(x) = 5x + 2$	(6) $f(x) = \frac{1}{4}(x - 1)$ $g(x) = 4x + 1$
(7) $f(x) = x^2 + 2x$ $g(x) = x + 4$	(8) $f(x) = \sqrt{x+6}$ $g(x) = x^2 - 5$	(9) $f(x) = \frac{6}{3x-5}$ $g(x) = -x$

*The students will not know the functions until they choose the space.

Answers to Tic-Tac-Toe:

(1) $(f \circ g)(x) = \boxed{x}$	$(g \circ f)(x) = \boxed{x}$
(2) $(f \circ g)(x) = \boxed{x}$	$(g \circ f)(x) = \boxed{x}$
(3) $(f \circ g)(x) = \boxed{2x^2 - 2x + 1}$	$(g \circ f)(x) = \boxed{1 - x^2}$
(4) $(f \circ g)(x) = \boxed{\frac{1}{x^3}}$	$(g \circ f)(x) = \boxed{\frac{1}{x^3}}$
(5) $(f \circ g)(x) = \boxed{\frac{4}{25x^2 + 20x + 4}}$	$(g \circ f)(x) = \boxed{\frac{20}{x^2} + 2}$
(6) $(f \circ g)(x) = \boxed{x}$	$(g \circ f)(x) = \boxed{x}$
(7) $(f \circ g)(x) = \boxed{x^2 + 10x + 24}$	$(g \circ f)(x) = \boxed{x^2 + 2x + 4}$
(8) $(f \circ g)(x) = \boxed{\sqrt{x^2 + 1}}$	$(g \circ f)(x) = \boxed{x + 1}$
(9) $(f \circ g)(x) = \boxed{\frac{-6}{3x - 5}}$	$(g \circ f)(x) = \boxed{\frac{-6}{3x - 5}}$

References

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SIT Session Lesson Plan

Week/Chapter: Week 4

Course Assistant: _____

Course: College Algebra

Instructor: _____

Objective: What are the one or two most difficult concepts that the students need to work on today? Chapter 1 Review

Beginning reminders:

1. Arrange seats in a circle
2. Make sure everyone has signed in
3. Review lesson plan with group
4. Remember to relax and be flexible!

Content to Cover:	Processes to Use*:	Time:
Warm-Up	Equation review - Give the students 30-45 seconds to write as many equations from Chapter 1 as they can remember. Remind the students about the importance of each equation while discussing when each equation can be utilized.	5-10 min
Chapter 1 Review	Incomplete outline - Students will be given a handout with important formulas and terms listed. Using their notes and each other, they will fill out the definitions and what the formulas are used for.	30 min
Tutoring Q & A		5 – 10 min

After session comments/thoughts:

Important Terms and Formulas to Remember:

- Solution: Any (x, y) point that satisfies the equation in question.
- Equation of a Circle: $(x - h)^2 + (y - k)^2 = r^2$, where (h, k) = center and r = radius.
- Slope Formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$, where m = slope, (x_1, y_1) represents initial point, and (x_2, y_2) represents final point.
- Undefined Slope: $m = \frac{\text{any number}}{0}$
- Zero Slope: $m = \frac{0}{\text{any number}}$
- Y-Intercept Form: $y = mx + b$, where b = y -intercept.
- Vertical Line: $x = \text{some constant}$
- Horizontal Line: $y = \text{some constant}$
- Point-Slope Formula: $y - y_1 = m(x - x_1)$
- X-Intercept: Set $y = 0$ and solve for x .
- Y-intercept: Set $x = 0$ and solve for y .
- Parallel: Two lines are considered parallel when their slopes are equal.
- Perpendicular: Two lines are considered perpendicular when their slopes are opposite reciprocals of each other.
- Function: A relation from a set of inputs (x -values) to a set of possible outputs (y -values) where each input is related to exactly one output. A function can be determined using the Vertical Line Test.
- Domain: All x -values the graph of an equation pertains to.
- Range: All y -values the graph of an equation pertains to.
- Even Functions: Functions that are symmetric about the y -axis. To test if a function is even, set $f(-x) = f(x)$. If the outcome produces a true statement, the function is even.
- Odd Functions: Functions that are symmetric about the x -axis. To test if a function is odd, set $f(-x) = -f(x)$. If the outcome produced is the original function with all opposite signs, the function is odd.
- Parent Functions: Functions that have not been transformed in any way. These functions are:

$y = x$	$y = x^2$
$y = x^3$	$y = \sqrt{x}$
$y = x $	$y = c$
- Vertical Stretch: When a parent function is multiplied by a constant.

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- Horizontal Stretch: When a parent function is divided by a constant.
- Vertical Reflection: A reflection of a function over the x -axis.
- Horizontal Reflection: A reflection of a function over the y -axis.
- Shifts: Shifts occur when a constant is either added to or subtracted from a function.

Example:

$$\begin{array}{ll} \text{Vertical Shift Upward : } (\uparrow) & f(x) = x^2 + c \\ \text{Vertical Shift Downward : } (\downarrow) & f(x) = x^2 - c \\ \text{Horizontal Shift Left : } (\leftarrow) & f(x) = (x + c)^2 \\ \text{Horizontal Shift Right : } (\rightarrow) & f(x) = (x - c)^2 \end{array}$$

- Finding Inverse: Switch the x and y of a function, then solve for y .
- One-to-One: A function is considered one-to-one if the function and its inverse are both functions.
- Horizontal Line Test: Tests whether the inverse of a function is a function itself. (No “ y ” can have more than one “ x ”.)
- Piecewise Functions: A function containing restrictions on “ x ”. (Note: $<$ and $>$ are open circles \circ , while \leq and \geq are closed circles \bullet)
- Composite Functions: Combined functions where the output from one function becomes the input for another function.

Example:

$$(f \circ g)(x) \implies \text{Substitute } g(x) \text{ wherever there is an } x \text{ in } f(x).$$

$$(g \circ f)(x) \implies \text{Substitute } f(x) \text{ wherever there is an } x \text{ in } g(x).$$

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SIT Session Lesson Plan

Week/Chapter: Week 5

Course Assistant: _____

Course: College Algebra

Instructor: _____

Objective: What are the one or two most difficult concepts that the students need to work on today? Solving Equations (finding LCD); Solving for a variable

Beginning reminders:

1. Arrange seats in a circle
2. Make sure everyone has signed in
3. Review lesson plan with group
4. Remember to relax and be flexible!

Content to Cover:	Processes to Use*:	Time:
Introduction Chapter 2, Sect. 1	Identify the big idea - Students will be asked to look through Chapter 2, Section 1 and identify major concepts. Students should understand the concepts and what is being asked.	5-10 min
Solving Equations (Finding LCD)	Send a problem - Students will be divided into groups and each group will be given a handout containing three problems. (If there are less than 5 students in the session, then there is no need to separate them.) The students will then solve the given problems. However, each student may only solve one part of the problem at a time and then pass it to their neighbor to solve the next part, until the problem is complete. Each student will check the work already done for accuracy before doing their part. If there are any disagreements, the group should try discussing the steps of the problem until they are able to agree on a solution. Once all groups have finished the problems on the handout, they will compare answers.	20 min
Check for understanding/Review	Go around the room and have each student say one or two things they learned or better understand from today's session.	10 min
Tutoring Q & A		5 – 10 min

After session comments/thoughts:

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Solve the equation (if possible).

$$(1) \frac{2(z-4)}{5} + 5 = 10z$$

$$(2) \frac{1}{x} + \frac{2}{x-5} = 0$$

$$(3) \frac{3x}{2} + \frac{1}{4}(x-2) = 10$$

.....

$$(1) \frac{2(z-4)}{5} + 5 = 10z$$

Step 1

$$\frac{2(z-4)}{5} + \cancel{5} = 10z - 5$$

$$\phantom{\frac{2(z-4)}{5}} - \cancel{5}$$

$$\frac{2(z-4)}{5} = 10z - 5$$

Step 2

$$\frac{\cancel{5}2(z-4)}{\cancel{5}} = 10z - 5$$

$$2(z-4) = 50z - 25$$

Step 3

$$2(z-4) = 50z - 25$$

$$\begin{array}{c} \uparrow \quad \uparrow \quad \uparrow \\ \boxed{} \end{array}$$

$$2z - 8 = 50z - 25$$

Step 4

$$\cancel{2}z - 8 = 50z - \cancel{25}$$

$$\cancel{-2}z + 25 - 2z + \cancel{25}$$

$$17 = 48z$$

Step 5

$$\frac{17}{48} = \frac{\cancel{48}z}{\cancel{48}}$$

$$z = \frac{17}{48}$$

Step 6

Plug your solution into the original equation to check your answer.

$$(2) \frac{1}{x} + \frac{2}{x-5} = 0$$

Step 1: Finding the LCD

$$(x)(x-5)$$

Step 2

$$\frac{1(x-5)}{x(x-5)} + \frac{2(x)}{(x-5)(x)} = 0$$

$$\frac{x-5+2x}{(x)(x-5)} = 0$$

Step 3

$$\frac{3x-5}{(x)(x-5)} = 0$$

Step 4

$$\cancel{(x)}\cancel{(x-5)} \frac{3x-5}{\cancel{(x)}\cancel{(x-5)}} = 0(x)(x-5)$$

$$3x-5=0$$

Step 5

$$3x - \cancel{5} = 0 + 5$$

$$+ \cancel{5}$$

$$\cancel{3}x = \frac{5}{\cancel{3}}$$

$$x = \frac{5}{3}$$

Step 6

Plug your solution into the original equation to check your answer.

$$(3) \frac{3x}{2} + \frac{1}{4}(x-2) = 10$$

Step 1

$$\frac{3x}{2} + \frac{1}{4}\overbrace{(x-2)}^{+} = 10$$

$$\frac{3x}{2} + \frac{x}{4} - \frac{1}{2} = 10$$

Step 2: Finding the LCD

$$4$$

Step 3

$$\frac{3x}{2} \frac{(2)}{(2)} + \frac{x}{4} - \frac{1}{2} \frac{(2)}{(2)} = 10$$

$$\frac{6x}{4} + \frac{x}{4} - \frac{2}{4} = 10$$

$$\frac{-6x+x-2}{4} = 10$$

$$\frac{-5x-2}{4} = 10$$

Step 4

$$\cancel{(4)} \frac{-5x-2}{\cancel{4}} = 10(4)$$

$$-5x-2=40$$

Step 5

$$-5x - \cancel{2} = 40 + 2$$

$$+ \cancel{2}$$

$$\frac{\cancel{-5}x}{\cancel{-5}} = \frac{42}{-5}$$

$$x = -\frac{42}{5}$$

Step 6

Plug your solution into the original equation to check your answer.

References

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SIT Session Lesson Plan

Week/Chapter: Week 6

Course Assistant: _____

Course: College Algebra

Instructor: _____

Objective: What are the one or two most difficult concepts that the students need to work on today? Solving graphically (Chap. 2 Sect. 2); Complex Numbers (Chap. 2 Sect. 3)

Beginning reminders:

1. Arrange seats in a circle
2. Make sure everyone has signed in
3. Review lesson plan with group
4. Remember to relax and be flexible!

Content to Cover:	Processes to Use*:	Time:
Introduction	Note Review (going over key concepts) - Have the students take their notes for 2.2 and 2.3 and quickly review. Students should know that finding a zero is the same as finding an x -intercept. They should also know how to do this. Make sure the students have an understanding of i .	5 min
Intersections and Zeros	Divide and Conquer - (calculator skills exercise) Students will be paired up and given two problems. One student will find the zeros of the first problem, and the other student will find the point of intersection. Students will then explain to their partners how they did the problem. Then for the second equation, the students will switch responsibilities and, again, explain how they did the problem to their partners. (The work for these two problems will be done on the students' calculators.)	10 min
Using Conjugates to Simplify	Scribe - Students will be given two problems to solve, One student will be chosen to go to the board and be the scribe for the group. The scribe may not speak and must only take direction on how to do the problems from the other students of the group (even if the directions given are incorrect). If the scribe believes an answer given is incorrect, then (s)he may give up his/her scribe position to another student and give his/her opinion.	15-20 min
Tutoring Q & A	Homework questions	10-15 min

After session comments/thoughts:

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Finding Intersections and Zeros

(1)

$$f(x) = x^3 - 6x^2 + 5x$$

zeros : 0, 5, 1

(0, 0) (5, 0) (1, 0)

(2)

$$f(x) = x - 3 - \frac{10}{x}$$

zeros : -2, 5

(-2, 0) (5, 0)

Using Conjugates to Simplify Complex Numbers

Find the conjugate and simplify to $a + bi$ form.

(1)

$$\frac{8 - 7i}{1 - 2i}$$

Conjugate : $1 + 2i$

$$\frac{8 - 7i}{1 - 2i} * \frac{1 + 2i}{1 + 2i} = \frac{8 - 7i + 16i - 14i^2}{1 - \cancel{2i} + \cancel{2i} - 4i^2}$$

$$\frac{8 + 9i - 14(-1)}{1 - 4(-1)} = \frac{22 + 9i}{5}$$

$$= \boxed{\frac{22}{5} + \frac{9}{5}i}$$

(2)

$$\frac{2}{4 - 5i}$$

Conjugate : $4 + 5i$

$$\frac{2}{4 - 5i} * \frac{4 + 5i}{4 + 5i} = \frac{8 - 10i}{16 - \cancel{20i} + \cancel{20i} - 25i^2}$$

$$\frac{8 + 10i}{16 - 25(-1)} = \frac{8 + 10i}{41}$$

$$= \boxed{\frac{8}{41} + \frac{10}{41}i}$$

References

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SIT Session Lesson Plan

Week/Chapter: Week 7

Course Assistant: _____

Course: College Algebra

Instructor: _____

Objective: What are the one or two most difficult concepts that the students need to work on today? Solving Quadratic Equations (focus on radicals); Solving Inequalities

Beginning reminders:

1. Arrange seats in a circle
2. Make sure everyone has signed in
3. Review lesson plan with group
4. Remember to relax and be flexible!

Content to Cover:	Processes to Use*:	Time:
Introduction/Warm-up	Order of Operations Discussion: What are they? Why are they important? Special Acronym? (PEMDAS – Please Excuse My Dear Aunt Sally)	5 min
Solving Quadratic, Radicals, and Absolute Value Equations	Think Pair Share – Encourage students to show every step involved to ensure accuracy of their answer. Make sure students understand how to obtain both the positive and the negative answer.	20 min
Solving Inequalities	Go around the circle and ask students to recall the steps involved with solving an inequality. Practice proper utilization of the steps with an example (send scribe to the board). Make sure to review the properties of inequalities.	10 min
Checking for Understanding	Without looking at the notes, have students write down the quadratic equation, and discuss where to find a, b, c variables.	5 min
Tutoring = Q & A		5-10 min

After session comments/thoughts:

Think Pair Share Problems:

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1. Solve by factoring:

$$x^2 - 16x + 64 = 0$$

Check:

$$(x - 8)(x - 8) = 0$$

$$8^2 + 16(8) + 64$$

$$x - 8 = 0 \quad x - 8 = 0$$

$$64 - 128 + 64 = 0$$

$$x = 8 \quad x = 8$$

$$0 = 0 \checkmark \text{ True}$$

2. Solve using the Quadratic Formula (no radical):

$$2x^2 - 9x + 9 = 0$$

$$a = 2, b = -9, c = 9$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

*Recognize the variables before moving forward

$$x = \frac{-(-9) \pm \sqrt{(-9)^2 - 4(2)(9)}}{2(2)}$$

$$\text{*Remember: } ax^2 + bx + c = 0$$

$$x = \frac{9 \pm \sqrt{81 - 72}}{4}$$

$$x = \frac{9 + \sqrt{9}}{4}, x = \frac{9 - \sqrt{9}}{4}$$

$$x = 3, x = \frac{3}{4}$$

3. Solve Equation Involving Radical:

$$\sqrt[3]{2x + 5} + 3 = 0$$

Check:

$$\sqrt[3]{2x + 5} = -3 \quad \text{*Remember to isolate the radical}$$

$$\sqrt[3]{2(-16) + 5} + 3 = 0$$

$$(\sqrt[3]{2x + 5}) = (-3)^3$$

$$\sqrt[3]{-32 + 5} + 3 = 0$$

$$2x + 5 = -27$$

$$0 = 0 \checkmark \text{ True}$$

$$2x = -32$$

$$x = -16$$

4. Solving an Absolute Value Equation:

$$|3x + 2| = 8$$

$$3x + 2 = 8$$

$$3x + 2 = -8$$

$$3x = 6$$

$$3x = -10$$

$$x = 2$$

$$x = \frac{-10}{3}$$

Recalling Steps:

1. Solve the Inequality and Graph on a Number Line:

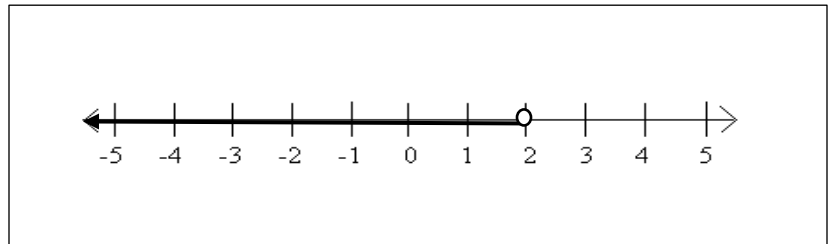
$$4x + 7 < 3 + 2x$$

$$4x + 7 < 3 + 2x$$

$$-2x - 7 < -7 - 2x$$

$$2x = -4$$

$$x = -2 \rightarrow x < 2$$



$$0 < -2 \text{ (False)}$$

$$-4 < -2 \text{ (True)}$$

*Did not divide by a negative, therefore, the sign does not change.

2. Solve the Inequality (with Absolute Value):

$$|x - 7| < 6$$

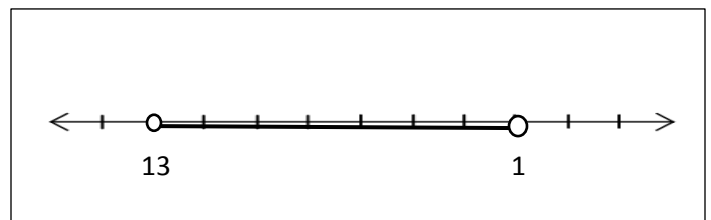
$$\begin{array}{r} x - 7 < 6 \\ + 7 \quad + 7 \end{array}$$

or

$$\begin{array}{r} x - 7 > -6 \\ + 7 \quad + 7 \end{array}$$

$$x < 13$$

$$x > 1$$



$$|14 - 7| < 6$$

$$\text{b. } |5 - 7| < 6$$

$$\text{c. } |0 - 7| < 6$$

$$7 < 6 \text{ (False)}$$

$$2 < 6 \text{ (True)}$$

$$7 < 6 \text{ (False)}$$

Interval: (1, 13)

References

Larson, Ron. (2011). *Algebra and Trigonometry: Real Mathematics, Real People* (6th Ed). Boston, MA: Cengage Learning.

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SIT Session Lesson Plan

Week/Chapter: Week 8

Course Assistant: _____

Course: College Algebra

Instructor: _____

Objective: What are the one or two most difficult concepts that the students need to work on today? Review of Chapter 2 (Due to the limited amount of time, students will asked which sections to focus on first, second, and so on.)

Beginning reminders:

Beginning reminders:

1. Arrange seats in a circle
2. Make sure everyone has signed in
3. Review lesson plan with group
4. Remember to relax and be flexible!

Content to Cover:	Processes to Use*:	Time:
Introduction (Icebreaker)	Have Students say their names, their majors, and also why they've decided to study this major. If they are undecided at the moment, ask them what their interests are.	5 min
Section 2.1; 2.2 (Solving linear equations and problem solving; Finding specific points on the calculator.)	Note Review: Have students review their 2.1 and 2.2 notes (specifically 2.2 because it deals with the calculator). Students will be given example problems to review the concept of the section.	10 min
Section 2.3 (Introduction to Complex Numbers)	Scribe Activity: Have a Student be a scribe for the group. The student may not work on the problem him/herself. The other students need to tell the scribe what to write.	10 min
Section 2.4 (Solving Quadratic Functions)	Divide and Conquer: Students will be given a problem on the board, and two students will be chosen. One student will solve the quadratic using one method, and the other using another method.	10 min
Section 2.5; 2.6 (Solving other functions; Solving Inequalities.)	Send a Problem: Students will be paired up. One student will begin the problem, and after one line of the problem is done, the other student will work on the problem, and so on.	10 min
Tutoring Q & A		5-10 min

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After session comments/thoughts:

Note Review Problems:

$$1. \frac{2}{x+5} + \frac{4}{x-5} = \frac{10}{x-5} \quad \text{LCD: } (x-5)(x+5)$$

$$2(x-5) + 4(x+5) = 10(x+5)$$

$$2x - 10 + 4x + 20 = 10x + 50$$

$$6x + 10 = 10x + 50$$

$$-4x = 40$$

$$x = -10$$

$$2. A = \frac{3(a+b)}{c} \quad \text{*Solve for b}$$

$$Ac = 3(a+b)$$

$$\frac{Ac}{3} = a + b$$

$$\frac{Ac}{3} - a = b$$

$$b = \frac{Ac}{3} - a$$

Scribe Problems:

$$1. \frac{7i-4}{3-i} \quad \text{Conjugate : } 3+i$$

$$\frac{7i-4}{3-i} * \frac{3+i}{3+i} = \frac{21i+7^2-12-4i}{9-i^2}$$

$$\frac{-12+17i+7i^2}{9-i^2} = \frac{-19+17i}{9-i^2} = \frac{-19+17i}{10}$$

$$\frac{-19}{10} + \frac{17}{10}i$$

$$2. \sqrt{-45} * \sqrt{-80}$$

$$\sqrt{45}i * \sqrt{80}i$$

$$3\sqrt{5}i * 4\sqrt{5}i$$

$$12(5)(i^2) = 60(-1) = -60$$

$$3. x^4 + 2x^2 - 24 = 0$$

$$(x^2 + 6)(x^2 + 4) = 0$$

$$x^2 + 6 = 0$$

$$x^2 + 4 = 0$$

$$\sqrt{x^2} = \sqrt{-6}$$

$$\sqrt{x^2} = \sqrt{4}$$

$$x = \pm\sqrt{6}i$$

$$x = \pm 2$$

$$4. \frac{2}{x^2} + \frac{6}{x} - 12 = 0 \quad \text{LCD: } x^2$$

$$(x^2)\left(\frac{2}{x^2} + \frac{6}{x} - 12\right) = 0(x^2)$$

$$(-1)(2 + 6x - 12x^2) = 0(-1)$$

$$12x^2 - 6x - 2 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(12)(-2)}}{2(12)}$$

$$x = \frac{6 \pm \sqrt{122}}{24}$$

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References

Larson, Ron. (2011). *Algebra and Trigonometry: Real Mathematics, Real People* (6th Ed). Boston, MA: Cengage Learning.

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SIT Session Lesson Plan

Week/Chapter: Week 9

Course Assistant: _____

Course: College Algebra

Instructor: _____

Objective: What are the one or two most difficult concepts that the students need to work on today? Quadratic functions – Finding the Vertex; Other Functions – Multiplicity and Leading Coefficient Test

Beginning reminders:

1. Arrange seats in a circle
2. Make sure everyone has signed in
3. Review lesson plan with group
4. Remember to relax and be flexible!

Content to Cover:	Processes to Use*:	Time:
Introduction (Icebreaker)	Discussing Exam 2: The Course Assistant will ask students how they felt about the exam in general. What areas did they feel less confident in? Is there any topic (no specific questions from the exam) that needs reviewing?	5 min
Finding the Vertex	Hand Out: Students will be given a hand out that includes the important concepts of this section. They may use notes to finish the hand out, since it is for their benefit and for practice. They may want to get out another sheet of paper for scratch work.	15 min
Understanding the Leading Coefficient Test and Multiplicities of Zeros	Assigned Discussion Leader: Students will be separated into groups. In each group, students will choose a group leader. The group leader will explain the concept(s) by using the problem the course assistant gives them. The other students in the group will then ask questions to the group leader about anything he/she is confused about.	10 min
Tutoring Q & A		5 – 10 min

After session comments/thoughts:

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Section 3.1 and 3.2 Overview and Examples

1. The vertex can be found by which equation? If you do not use the equation, list the steps you take to find the vertex.
2. What is the standard form of a quadratic function in which (a) does not equal 0?

For Numbers 3 – 5, use the function: $f(x) = -2x^2 + 16x - 31$

3. Find the vertex of the function:
4. Write the standard (graphing) form of the function.
5. Find all the x - intercepts of the function.

Answers to the Section 3.1 and 3.2 Overview and Examples

$$1. \quad \frac{-b}{2a}$$

$$2. \quad f(x) = a(x - h)^2 + k$$

$$3. \quad f(x) = -2x^2 + 16x - 31$$

$$x = \frac{-b}{2a} \quad x = \frac{-16}{2(-2)} \quad x = -4$$

$$f(-4) = -2(-4)^2 + 16(-4) - 31$$

$$f(-4) = 1 \quad \text{vertex: } (4,1)$$

4. Find a point to use to find standard form:

$$f(2) = -2(2)^2 + 16(2) - 31$$

$$\text{point: } (2, -7)$$

$$f(x) = a(x - h)^2 + k$$

$$-7 = a(2 - (-4))^2 + 1$$

$$-7 = a(-2)^2 + 1$$

$$-7 = 4a + 1 - 8 = 4a \quad a = -2$$

$$f(x) = -2(x - 4)^2 + 1$$

$$5. \quad 0 = -2(x - 4)^2 + 1$$

$$-1 = -2(x - 4)^2$$

$$\frac{1}{2} = (x - 4)^2$$

$$\sqrt{\frac{1}{2}} = \sqrt{(x - 4)^2}$$

$$\sqrt{\frac{1}{2}} = x - 4$$

$$4 \pm \frac{1}{\sqrt{2}} = x \quad \frac{1}{\sqrt{2}} * \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$x = 4 \pm \frac{\sqrt{2}}{2}$$

Assigned Discussion Leader Problems:

Multiplicity:

1. Zeros given:

$$x = 0, -2, 3$$

$$x = 0 \quad x = -2 \quad x = 3$$

$$x = 0 \quad x + 2 = 0 \quad x - 3 = 0$$

$$(x)(x + 2)(x - 3)$$

$$(x^2 + 2x)(x - 3)$$

$$x^3 - x^2 - 6x$$

2. Zeros given:

$$x = -7 \quad x = 2$$

$$x + 7 = 0 \quad x - 2 = 0$$

$$(x + 7)(x - 2)$$

$$x^2 + 7x - 2x - 14$$

$$x^2 + 5x - 14$$

Leading Coefficient Test:

3. Describe the graph behavior of this graph:

$$f(x) = 2x^4 - 3x + 1$$

The leading coefficient is positive

The leading exponent is even

The graph will be rising to both
the left and right.

4. Describe the graph behavior of this graph:

$$f(x) = -9x^7 + 5x - 12$$

The leading coefficient is negative

The leading exponent is odd

The graph will be rising on the left and
falling on the right.

References

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SIT Session Lesson Plan

Week/Chapter: Week 10

Course Assistant: _____

Course: College Algebra

Instructor: _____

Objective: What are the one or two most difficult concepts that the students need to work on today? Finding zeros of polynomials; Finding asymptotes and holes in rational functions

Beginning reminders:

1. Arrange seats in a circle
2. Make sure everyone has signed in
3. Review lesson plan with group
4. Remember to relax and be flexible!

Content to Cover:	Processes to Use*:	Time:
Introduction (Icebreaker)	Two Truths and a Lie: Students will sit in a circle facing one another, and write down two truths and a lie about themselves. The course assistant will pick a student to start, and he/she will read the statements he/she wrote down. The other students will try to guess which one of the statements is a lie. The game ends when all of the students have shared their statements.	5 min
Fundamental Theorem of Algebra	Explaining the Definition: Students will take out their notes, and give (in their own words), a definition of the fundamental theorem of algebra. They will be given a problem, and will use the definition to solve the problem and explain why the answer is the answer.	10 min
Finding asymptotes and holes in rational functions	Summarize Lecture: Students will be given a problem and be asked to list the steps needed to solve the problem. This is a cookie-cutter type problem, so the steps should be very similar to one another even though 2 different problems will be given.	20 min
Tutoring Q & A		5 – 10 min

After session comments/thoughts:

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Explaining the Definition Problems:

Fundamental Theorem of Algebra: If $f(x)$ is a polynomial of degree n , where $n > 0$, then f has at least one zero in the complex number system (Larson 2011).

A complex number is always in the form $a \pm bi$.

Note: This does not mean that every polynomial will contain an imaginary answer, as integers can be complex numbers because b can equal zero.

$$1. f(x) = x^2 + 64$$

$$-64 = x^2$$

$$\sqrt{-64} = \sqrt{x^2}$$

$$\pm 8i = x \text{ or } x = \pm 8i$$

$$2. f(x) = x^2 - 12x - 13$$

$$(x - 13)(x + 1)$$

$$x = 13 \quad x = -1$$

$$3. x^4 + 10x^2 + 9$$

$$(x^2 + 9)(x^2 + 1)$$

$$x^2 + 9 = 0 \quad x^2 + 1 = 0$$

$$x^2 = -9 \quad x^2 = -1$$

$$x = \pm 3i \quad x = \pm i$$

Summarizing the Lecture Problems:

$$1. f(x) = \frac{x^2 - 25}{x + 5}$$

Vertical Asymptote: Set the denominator to zero.

$$f(x) = \frac{(x+5)(x-5)}{x+5(x)}$$

Horizontal Asymptote: Use the rules (the ones regarding exponents) to find the horizontal asymptote.

Hole at $x = -5$ New function: $f(x) = \frac{(x-5)}{(x)}$

Hole: $(-5, 2)$

Vertical Asymptote: $x = 0$

Horizontal Asymptote: $y = 1$

$$2. f(x) = \frac{x-6}{2x+1}$$

Vertical Asymptote: Set the denominator to zero.

Horizontal Asymptote: Use the rules (the ones regarding exponents) to find the horizontal asymptote.

Hole: None

Vertical Asymptote: $x = -\frac{1}{2}$

Horizontal Asymptote: $y = \frac{1}{2}$

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References

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SIT Session Lesson Plan

Week/Chapter: Week 11

Course Assistant: _____

Course: College Algebra

Instructor: _____

Objective: What are the one or two most difficult concepts that the students need to work on today? Review of Chapter 3 (Due to the limited amount of time, students will asked which sections to focus on first, second, and so on.)

Beginning reminders:

1. Arrange seats in a circle
2. Make sure everyone has signed in
3. Review lesson plan with group
4. Remember to relax and be flexible!

Content to Cover:	Processes to Use*:	Time:
Introduction (Ice Breaker)	Would You Rather: Students will sit in a formation where they can see one another. The course assistant will then ask "would you rather" questions to the entire group. Students will interact with one another as they explain why they chose the option that they chose.	5 min
Reviewing Chapter 3 in its entirety	Tic Tac Toe Game: The course assistant will draw a tic tac toe board and will number each space. Each numbered space will represent a problem the students will have to do in order to claim that space for their team. The students will be divided into two groups (x's and o's). The rest of the tic tac toe rules apply (i.e. how to win the game).	20 min
Reviewing Chapter 3 formulas and terms	Formula Flash Cards: Students will be given blank flashcards (or if the student has some already, he/she can use those. Students will go through their own notes and write down any important formulas. They will write the formula on the front, and how it is used on the back. These flash cards can be used to understand terms and definitions as well. If the students do not finish before the session ends, they may take the flash cards and finish at home.	10 min
Tutoring Q and A		5- 10 min

After session comments/thoughts:

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Tic Tac Toe Game Problems:

Formula Flash Cards:

Topics the students may want to put on their flash cards:

Vertex formula: $x = \frac{-b}{2a}$

Standard form of a quadratic: $a(x - h)^2 + k$

Leading Coefficient Test: Check the leading coefficient. Is it positive or negative? Check the leading degree. Is it even or odd? Depending on these two factors, the graph will either rise or fall on the left or right side. Take into consideration which quadrants it falls and rises at.

Synthetic Division: What is something that you must always remember about it?

Remainder Theorem: If a polynomial is divided by $x - k$, then the remainder is $r = f(k)$

Factor Theorem: If a polynomial has a factor $x - k$ if and only if $f(k) = 0$

Linear Factors: The factors (in linear form) that multiply together to form the original polynomial.

Rational Zero Test: This is used to find the possible zeros in a polynomial. Take the factors of the constant or the factors of the leading coefficient ($\frac{p}{q}$).

Vertical Asymptote: Set the denominator equal to zero.

Horizontal Asymptote: Check the degrees of the rational function. Depending on whether or not one is bigger than the other determines what the horizontal asymptote is. If they are the same degree, take the ratio of the two leading coefficient, and that will be the horizontal asymptote.

Holes: Anything that can be factored out of the rational function. Set it equal to zero, and that should be the x value of your hole. The y value can be found by substituting the x value into the new function.

References

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SIT Session Lesson Plan

Week/Chapter: Week 12

Course Assistant: _____

Course: College Algebra

Instructor: _____

Objective: What are the one or two most difficult concepts that the students need to work on today? Understanding Logarithmic and Exponential Functions (Graphing Wise and Algebraically)

Beginning reminders:

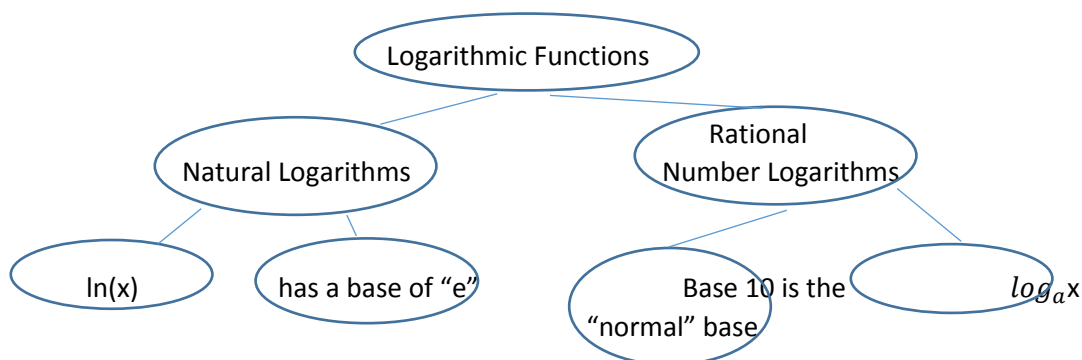
1. Arrange seats in a circle
2. Make sure everyone has signed in
3. Review lesson plan with group
4. Remember to relax and be flexible!

Content to Cover:	Processes to Use*:	Time:
Introduction (Ice Breaker)	Category Game: Students will be paired up (the course assistant can pick partners for each student) and will turn to face one another. The course assistant will call out a category (movies, colors, animals, etc.) and the students will begin saying words relating to the category. If one of the students (out of each pair) cannot think of any more words relating to the category, the student must go find another partner and start over. The game ends after 2 rounds.	5 min
Remembering the Logarithmic (and natural logarithmic) function rules	Building a Web: Students will build a web using what they've learned about logarithmic functions. They will start with the term "logarithmic function" and the web will get bigger as the students contribute to it. One student should be at the board writing what the others say and also contributing him/herself.	15 min
Understanding exponential and base e functions	Handout (Mini Quiz): Students will be given a handout to work during the session. Students may use their notes and also help one another while completing this hand out. The more students teach one another, the more students will get a better understanding of this section.	20 min
Tutoring Q & A		5 – 10 in

After session comments/thoughts:

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Building a Web (example): a



Handout (Mini Quiz) Problem Answers:

Use your calculator to determine the answer:

1. $f(x) = 1.2^x$ $x = 1/3$ \rightarrow 1.063
2. $g(x) = 8.6^x$ $x = -\sqrt{2}$ \rightarrow 9220.217
3. $h(x) = e^{-x}$ $x = -3/4$ \rightarrow 2.117
4. $p(x) = 5.5^x$ $x = 200$ \rightarrow -7.611×10^{-37}

Describe the Transformations:

5. $f(x) = -2^x$ $g(x) = 5 - 2^x$ Right shift of 5 units
6. $f(x) = 4^x$ $g(x) = 4^{x-2} - 3$ Right shift of 2 units, downward of 3

Write the following in exponential form:

7. $\log_4 64 = 3$ $4^3 = 64$

Write the following in logarithmic form:

8. $16^{3/4} = 8$ $\log_{16} 8 = \frac{3}{4}$

Calculate the following:

9. $f(x) = \log_{16} x$ $x = \frac{1}{4}$ \rightarrow $-\frac{1}{2}$

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$$10. f(x) = \log_{10} x \quad x = 10,000 \quad \rightarrow \quad 4$$

$$11. f(x) = \ln x \quad x = 18.31 \quad \rightarrow \quad -2.907$$

$$12. f(x) = 3 \ln x \quad x = 0.75 \rightarrow -0.863$$

Sections 4.1 and 4.2 Hand Out

Use your calculator to determine the answer:

1. $f(x) = 1.2^x$ $x = 1/3$

2. $g(x) = 8.6^x$ $x = -\sqrt{2}$

3. $h(x) = e^{-x}$ $x = -3/4$

4. $p(x) = 5.5^x$ $x = 200$

Describe the Transformations:

5. $f(x) = -2^x$ $g(x) = 5 - 2^x$

6. $f(x) = 4^x$ $g(x) = 4^{x-2} - 3$

Write the following in exponential form:

7. $\log_4 64 = 3$

Write the following in logarithmic form:

8. $16^{3/4} = 8$

Calculate the following:

9. $f(x) = \log_{16} x$ $x = \frac{1}{4}$

10. $f(x) = \log_{10} x$ $x = 10,000$

11. $f(x) = \ln x$ $x = 18.31$

12. $f(x) = 3 \ln x$ $x = 0.75$

References

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SIT Session Lesson Plan

Week/Chapter: Week 13

Course Assistant: _____

Course: College Algebra

Instructor: _____

Objective: What are the one or two most difficult concepts that the students need to work on today? Reviewing Exponential and Logarithmic Functions

Beginning reminders:

1. Arrange seats in a circle
2. Make sure everyone has signed in
3. Review lesson plan with group
4. Remember to relax and be flexible!

Content to Cover:	Processes to Use*:	Time:
Introduction	Two Truths and a Lie - Go around the room and have students give two truths and one lie and let the group guess which is the lie.	5 min
Rules for Logarithmic and Natural Logarithmic Functions	Reviewing the Rules for log and natural log functions – Have a volunteer scribe go to the board. Allow students to name some of the rules for log and natural log functions, while the scribe writes them in their respective columns. If some of the rules are forgotten, allow the students to review their notes or textbooks to fill in the missing rules.	10-15 min
Sections 4.3 and 4.4	Informal Quiz - Each student will choose one or two problems from the textbook for everyone to work. The students will be given time to work on the problems on their own and then the problems/solutions will be discussed as a group.	20-25 min
Tutoring Q & A		5 – 10 min

After session comments/thoughts:

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SIT Session Lesson Plan

Week/Chapter: Week 14

Course Assistant: _____

Course: College Algebra

Instructor: _____

Objective: What are the one or two most difficult concepts that the students need to work on today? Final Exam Review

Beginning reminders:

1. Arrange seats in a circle
2. Make sure everyone has signed in
3. Review lesson plan with group
4. Remember to relax and be flexible!

Content to Cover:	Processes to Use*:	Time:
Introduction	Meditation - Have students take a few deep breaths.	2 min
Study Tools Notes, handouts provided by professor, old exam reviews,	Study Tools Notes, handouts provided by professor, old exam reviews,	5 min
Open Questions Allow students to lead the review. Go through each chapter	Open Questions Allow students to lead the review. Go through each chapter	35-40 min
Tutoring Q & A		5 – 10 min

After session comments/thoughts:

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