Algebra 1, Part 1

Name _____ Date _____

PURPOSE

Learn to use the basic rules of algebra
to solve equations of medium complexity.

HOW TO DO THIS COURSE: Do the steps in order. Initial and date each when done. Where there are two sign-off lines, get the step checked and initialed on the second line by another student or, if stated, by the academic supervisor. All written work is turned in to the supervisor.

ESTIMATED TIME: 35 hours.

BOOKS AND REFERENCES:
Algebra 1 Companion Text, Heron Books
Algebra 1 Student Text, Math-U-See
Algebra 1 Instruction Manual, Math-U-See
Algebra 1 Test Booklet, Math-U-See
Algebra 1 Instruction DVD, Math-U-See

NOTES:
- Use a math notebook for all your work on this course, labeling each problem set so you and your supervisor can review your work at any time.

- You may use calculators and graphing websites, such as Desmos.com, during this course, but make sure you have the ability to do the math without having to rely on them.

A. PRECISION IN MATH

1. READ: Read this simple definition:

   algebra: a type of mathematics that uses letters and symbols in place of numbers. _____

2. DEMONSTRATION: Find some interesting information about the uses of algebra. _____

3. DEFINE (using a good dictionary): precision _____

4. READ: *Algebra 1 Companion Text* (CT), Chapter 1 Precision in Math. _____

5. PRACTICAL APPLICATION: With paper and pen, go outside and spot something man-made that required a lot of precision to build or make. Write it down. Then spot something that required very little or no precision to build or make. Write it down. Repeat these two steps, back and forth, until you have found ten of each. Bring this list to your supervisor and discuss a few of them, including which you think required the most precision. **Supervisor pass**. ____ ____

6. READ: Read this definition that applies to precision:

   to: used in showing a degree of accuracy, amount or completeness. *She is the one who knew the date that Barack Obama started work as President of the United States* to *the day.* (In other words, she knew it was January 20th, 2009, instead of only knowing that it was in 2009 or January of 2009.) _____

7. DEFINE (using a good dictionary): significant. _____

8. READ: CT, Chapter 2 Significant Digits. _____

9. DRILL: With paper and pencil, go out of the classroom and estimate the length of something, then measure it. Repeat this until you've done it for 10 things. Show this to your supervisor and discuss how often your guess was correct to *one* significant digit. **Supervisor pass**. ____ ____

B. INTRODUCTION TO ALGEBRA 1

1. READ: *Algebra 1 Companion Text,* Chapter 3 What Is Algebra? _____

2. DEMONSTRATION: Demonstrate the following:

   a) Algebra is simply a type of mathematics that uses letters and symbols in place of numbers. ___

   b) It is a system of rules that helps us find unknowns. ___ _____

3. DRILL: Using the Math-U-See *Algebra 1 Student Text*, take the "Algebra 1 Readiness Test" starting on p. 3 (skip question 34). Discuss with your supervisor whether an assignment is needed. (Note: If you are unfamiliar with the symbols in #44, this is fully explained at the bottom of page 16 in the *Math-U-See Instruction Manual* and at the end of the Lesson 2 video. You may skip the problem.) ____ ____

4. READ: CT, Chapter 4 How to Do the Algebra 1 Series. ____ ____

5. DEMONSTRATION: Look over these resources to get familiar with them.

   - *Math-U-See Instruction Manual* lessons
   - *Math-U-See Instruction DVD*, chapter reviews
   - *Math-U-See Student Text*
   - Lesson Practice
   - Systematic Reviews
   - Honors Lessons
   - Lesson Tests
   - Mastery Problems
   - Kahnacademy.org (Algebra 1 section)
   - White board _____

C. SOME ALGEBRA PROPERTIES

1. READ: *Algebra 1 Companion Text,* Chapter 5 The New Look of Multiplication. _____

2. READ: Using one or more of the following resources, learn about commutative and associative properties:

   - Lesson 1, *Instruction Manual* (IM)
   - Lesson 1, *Instruction DVD*
   - Any other resources you can find _____

3. READ: CT, Chapter 6 Negative Signs, to section "Whiteboard Drill: Negative Signs." _____

4. DRILL: With a coach who has completed this drill, do section "Whiteboard Drill: Negative Signs." Before you start, you and the coach should read the Purpose and Drill Description. ____ ____

5. READ and DRILL: Do *Student Text* (ST) Lesson Practice 1A Quick Review, p. 7. _____

6. DRILL: Do ST Lesson 1A problems 5–15. Answers are in IM, p. 155. Do more problems like these as needed. _____

7. READ: CT, Chapter 7 Learning Algebra: How to Win. _____

8. READ: Chapter 8 Basic Words and Definitions, to section "Basic Algebra Terms." _____

9. DEMONSTRATION: At a whiteboard, demonstrate each term you just studied to another student, including making examples of each. ____ ____

10. READ: Basic Words and Definitions, section "Basic Algebra Terms." _____

11. DEMONSTRATION: At a whiteboard, demonstrate each term you just studied to another student, including making examples of each. ____ ____

12. READ: Basic Words and Definitions, section "Expression and Term." _____

13. DEMONSTRATION: At a whiteboard, demonstrate each term you just studied to another student, including making examples of each. ____ ____

14. READ: Basic Words and Definitions, section "Evaluate, Simplify and Solve." _____

15. DEMONSTRATION: At a whiteboard, demonstrate each term you just studied to another student, including making examples of each. ____ ____

16. READ: Chapter 9 Introduction to the Distributive Property. _____

17. DRILL: Take each of these expressions and write them out both ways, as was done at the end of Chapter 9:

   $2(3 + 4)$ $5(1 + 2)$ $5(3 + 7)$ $100(2 + 5)$ _____

18. READ: Chapter 10 Combining Like Terms to section "Definition of Subtraction." _____

19. DRILL: In full display, combine these terms with factoring out (reverse distribution) and addition:

   $3x + 8x$ $5y + 2y$

   Supervisor pass. (Supervisor writes out two more simple examples as needed until a pass is achieved.) ____ ____

20. READ: Combining Like Terms, section "Definition of Subtraction." _____

21. DRILL: In full display, combine these terms with the definition of subtraction, factoring out (reverse distribution) and addition.

    12x – 5x   4y – 6y

    Supervisor pass.   ____ ____

22. READ: Combining Like Terms, section "Multiplying by 1" to section "Bigger Problems." _____

23. DRILL: In full display, combine these terms with identity property, definition of subtraction, factoring out (reverse distribution) and addition.

    6x – x   –y – 2y

    Supervisor pass.   ____ ____

24. READ: Combining Like Terms, section "Bigger Problems" through section "Summary." _____

25. DRILL: With a coach who has completed this drill, do section "Whiteboard Drill: Combining Like Terms." Before you start, you and the coach should read the Purpose and Drill Description. ____ ____

26. DRILL: Do ST Lesson 1B problems 1-4. Answers are in IM, p. 155. _____

27. DRILL: Do ST Lesson 1B problems 5 and 6 in full display in your math notebook. The focus here is on correct understanding of the rules and how they work. **Supervisor pass**. (Ensure that every step has a property correctly labeled and no shortcuts were taken. If needed, have the student repeat the drill with problems 7 and 8, and then 9 and 10, etc., until the student can show how the basic rules of algebra allow one to combine like terms.) ____ ____

28. DRILL: Do ST Lesson 1B problems 13–15. Answers are in IM, p. 155. _____

29. DRILL: Now that you understand the underlying fundamentals to combining like terms, you are free to do this set of problems *not* in full display.

    a) Do ST Lesson 1C, problems 1–4 and check them. If you missed any, do problems 5–8 for further practice. ___

    b) Do ST Lesson 1C, problems 9–20. ___

c) Do ST Lesson 1D, problems 9–20. ___

d) Do ST Lesson 1E. ___

Answers are in IM, starting on p. 155.   _____

30. DRILL: Honors Lesson. Do ST Lesson 1H. Answers are in IM, p. 313.   _____

31. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 1
in the *Math-U-See Test Booklet*, with no reference to the materials. Do
your best work. Then check your answers in IM, p. 329, and note how
many you missed here: _____ If you missed more than one, do more
study before the Mastery Problems.   _____

32. DRILL: Mastery Problems. See your supervisor to do the Mastery
Problems for Lesson 1. Do them with your supervisor observing.
Explain the math rules you are using to your supervisor as you move
through the problems. If you or your supervisor find that mastery
hasn't been fully achieved, go back and sort it out. When you are ready,
return to the supervisor to do the Mastery Problems again. You pass the
Mastery Problems when you have demonstrated to the satisfaction of
your supervisor and yourself that you have fully mastered the concepts
studied in this section. **Supervisor pass**.   ____ ____

D. ORDER OF OPERATIONS AND ABSOLUTE VALUE

1. READ: Using one or more of the following resources, learn about order
of operations and absolute value:

   • Lesson 2, IM

   • Lesson 2, DVD

   • Any other resources you can find   _____

2. READ: *Algebra 1 Companion Text*, Chapter 11 Order of Operations.   _____

3. READ: Chapter 12 Grouping Symbols, to section "Whiteboard Drill:
Order of Operations."   _____

4. DRILL: With a coach who has completed this drill, do section
"Whiteboard Drill: Order of Operations." Before you start, you and the
coach should read the Purpose and Drill Description.   ____ ____

5. DRILL: Gain a mastery of the types of problems in ST Lessons 2A and 2B. Use other sources of problems as needed. _____

6. DRILL: Systematic Review. In ST Lesson 2C, select problems from 1–8 and do them in full display until you have 10 rule applications. You may find you only need to work two problems before you have applied the 10 rules. Answers are in IM, p. 159. **Supervisor pass**. (Check for full display and understanding of the rules.) ____ ____

7. DRILL: Systematic Review. Do ST Lesson 2C, problems 9–20. Answers are in IM, p. 159. _____

8. DRILL: Systematic Review. In ST Lesson 2D, select problems from 1–8 and do them in full display until you have 20 rule applications. Answers are in IM, p. 159. **Supervisor pass**. (Check for full display and understanding of the rules.) ____ ____

9. DRILL: Systematic Review. Do ST Lesson 2D, problems 9–20. Answers are in IM, starting on p. 159. _____

10. DRILL: Systematic Review. In ST Lesson 2E, select problems from 1–8 and do them in full display until you have 10 rule applications. Answers are in IM, p. 160. **Supervisor pass**. (Check for full display and understanding of the rules.) ____ ____

11. DRILL: Systematic Review. Do ST Lesson 2E, problems 9–20. Answers are in IM, starting on p. 160. _____

12. DRILL: In *Algebra 1 Companion Text*, do Chapter 13 Additional Drills for Part 1. _____

13. READ: Chapter 14 Additional Words and Definitions. _____

14. DRILL: Honors Lesson. Do ST Lesson 2H. Answers are in IM, starting on p. 313. _____

15. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 2 (skipping #11) in the *Test Booklet*, with no reference to the materials. Do your best work. Then check your answers in IM, p. 329, and note how many you missed here: _____ If you missed more than one, do more study before the Mastery Problems. _____

16. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 2. Do them with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to your supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass**.   ____ ____

E. SOLVE FOR UNKNOWN WITH ONE VARIABLE

1. READ: *Algebra 1 Companion Text*, Chapter 15 The Equals Sign to section "Examples." (The remainder of the chapter is optional.)   _____

2. DEMONSTRATION: Show your understanding of the equals sign, equations and how doing the same thing to both sides works. **Supervisor pass**. (If there are any difficulties, the student should read the optional section of Chapter 15 and then return to this step).   ____ ____

3. DRILL: Using one or more of the following resources, learn about solving for one unknown variable:

   • Lesson 3, IM

   • Lesson 3, DVD

   • Any other resources you can find

   Note: For this lesson the video is required because it covers how to use the Math-U-See manipulatives, which are very useful in this section.   _____

4. DRILL: Gain a mastery of the types of problems in ST Lessons 3A and 3B. Use other sources of problems as needed.   _____

5. DRILL: Systematic Review. Do ST Lesson 3C, problems 1–8, using manipulatives to demonstrate them to another student. Answers are in IM, p. 164.   ____ ____

6. DRILL: Systematic Review. Do ST Lesson 3C, problems 9–20. Answers are in IM, starting on p. 164.   _____

7. DRILL: Systematic Review. Do ST Lesson 3D, problems 1–8, using manipulatives to demonstrate them to another student. Note: to use the manipulatives to show negative numbers, turn them over. This way the holes can represent that the number is negative. Answers are in IM, p. 165.   ____ ____

8. DRILL: Systematic Review. Do ST Lesson 3D, problems 9–20. Answers are in IM, starting on p. 165.   _____

9. DRILL: Systematic Review. Do ST Lesson 3E, problems 1–20. Answers are in IM, p. 166.   _____

10. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 3 in the *Test Booklet*, with no reference to the materials. Do your best work. Then check your answers in IM, starting on p. 329, and note how many you missed here: _____ If you missed more than one, do more study before the Mastery Problems.   _____

11. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 3. Do them with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problem. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass**.   ____ ____

F. DISTRIBUTIVE PROPERTY

1. READ: Using one or more of the following resources, learn about the distributive property:

   • Lesson 4, IM

   • Lesson 4, DVD

   • Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems in ST Lessons 4A and 4B. Use other sources of problems as needed.   _____

3. DRILL: Systematic Review.

   a) Do ST Lesson 4C. ___

   b) Do ST Lesson 4D. ___

   c) Do ST Lesson 4E. ___

   Answers are in IM, starting on p. 168.   _____

4. READ: *Algebra 1 Companion Text*, Chapter 16 The Basic Rules of Algebra to section "Whiteboard Drill: Understanding Basic Algebra Rules."   _____

5. DEMONSTRATION: On paper, write two examples of applying each rule from Chapter 16 The Basic Rules of Algebra. Make one simple (such as $3 + 4 = 4 + 3$) and one very complex (such as $54{,}000xyz + 30 \cdot 300 \cdot 30 = 30 \cdot 300 \cdot 30 + 54{,}000xyz$). Have another student check your work.   ____ ____

6. DRILL: With a coach who has completed this drill, do section "Whiteboard Drill: Understanding Basic Algebra Rules." Before you start, you and the coach should read the Purpose and Drill Description.   ____ ____

7. DRILL: In CT, do Chapter 17 Additional Drills for Part 1.   ____ ____

8. DRILL: Honors Lesson. Do ST Lesson 4H. Answers are in IM, p. 314.   _____

9. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 4 in the *Test Booklet* with no reference to the materials. Do your best work. Then check your answers starting on p. 330, and note how many you missed here: _____ If you missed more than one, do more study before the Mastery Problems.   _____

10. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 4 of the course. Do them with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problem. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass**.   ____ ____

G. MENTAL MATH

(This section is optional but highly encouraged—estimated time 4 hours.)

1. READ: *Algebra 1 Companion Text*, Chapter 18 Mental Arithmetic to section "General Approach to Mental Math." _____

2. DRILL: In Chapter 19 Mental Math Drills, do drill a. Repeat this drill until it is easy for you to do the exercises mentally. For the pass, have someone give you some of these or similar addition problems, then you give the answer by doing the addition mentally.

   Coaching instructions (use as needed for this and other mental math drills below): If the student has difficulty getting a pass, he or she may be coached through the drill with the following steps:

   a) The coach gives two numbers. The student may write the numbers down, but nothing else. The student should say the mental steps out loud while going through them to get the answer. For example, if the coach gives "27 + 39" the student might say, "Round 39 to 40, 27 + 40 is 67, 1 fewer is 66." The coach checks the answer with a calculator. Continue drilling this way until it is easy. ___

   b) Coach continues as in a), but the student writes nothing down and does the mental math silently. Continue drilling this way until the student gives the answers quickly. ___ ____ ____

3. PRACTICAL APPLICATION: Now that you've practiced some mental arithmetic, turn back to the beginning of Chapter 18 Mental Arithmetic and see if you can solve the first example mentally in under 30 seconds. _____

4. READ: Chapter 18 Mental Arithmetic sections "General Approach to Mental Math" and "Subtraction." _____

5. DEMONSTRATION: Go through the examples in the "Subtraction" section of Chapter 18 and spot the 1 to 2 steps of the general approach in each one. _____

6. DRILL: In Chapter 19 Mental Math Drills, do drill b. Repeat this drill until it is easy for you to do the exercises mentally. For the pass, have someone give you some of these or similar subtraction problems, then you give the answer by doing the subtraction mentally as covered in the coaching instructions in step 2 above. If you need more practice at mental subtraction, try picking 2- or 3-digit numbers at random,

then subtracting them from 100 or 1,000. This is good practice for the "trick" mentioned in the chapter. 　　　　____ ____

7. READ: Chapter 18 Mental Arithmetic section "Multiplication." 　　_____

8. DRILL: In Chapter 19 Mental Math Drills, do drill c. Repeat this drill until it is easy for you to do the exercises mentally. For the pass, have someone give you some of these or similar multiplication problems, then you give the answer by doing the multiplication mentally. 　____ ____

9. READ: Chapter 18 Mental Arithmetic section "By 10" to section "Division." 　_____

10. DRILL: In *Algebra 1 Companion Text*, Chapter 19 Mental Math Drills, do drill d. Repeat this drill until it is easy for you to do the exercises mentally. For the pass, have someone give you some of these or similar multiplication problems, then you give the answer by doing the multiplication mentally. 　____ ____

11. READ: Chapter 18 Mental Arithmetic sections "Division" and "Summary." 　_____

12. DRILL: In Chapter 19 Mental Math Drills, do drill e. Repeat this drill until it is easy for you to do the exercises mentally. For the pass, have someone give you some of these or similar division problems, then you give the answer by doing the division mentally. 　____ ____

13. ESSAY: Make up an example of a practical situation where you have the problem in Drill e #12 and explain how you would make a good mental estimate of the answer for that situation. 　____ ____

I have completed the steps of this course. I understand what I studied and can use it.

Student _____ Date_____

The student has completed the steps of this course and knows and can apply what was studied.

Academic supervisor _____ Date_____

The student has passed the exam for this course.

Examiner _____ Date_____

Algebra 1, Part 2

NAME _____ DATE _____

PURPOSE
Learn to represent equations in a graphical form.

HOW TO DO THIS COURSE: Do the steps in order, initialing and dating each when done. Where there are two sign-off lines, get the step checked and initialed on the second line by another student or, if stated, by the academic supervisor. All written work is turned in to the supervisor.

ESTIMATED TIME: 25 hours.

BOOKS AND REFERENCES:
Algebra 1 Companion Text, Heron Books
Algebra 1 Student Text, Math-U-See
Algebra 1 Instruction Manual, Math-U-See
Algebra 1 Test Booklet, Math-U-See
Algebra 1 Instruction DVD, Math-U-See

NOTES:
- Use a math notebook for all your work on this course, labeling each problem set so you and your supervisor can review your earlier work at any time.

- You may use calculators and graphing websites, such as Desmos.com, during this course, but make sure you have the ability to do the math without having to rely on them.

A. NUMBER LINES AND CARTESIAN COORDINATES

1. READ: Using one or more of the following resources, learn about number lines and Cartesian coordinates:

   - Lesson 5, Instruction Manual (IM). Note: there is a glossary at the back of the text for unfamiliar terms. There are symbols in this lesson that are defined in the video.

   - Lesson 5, Instruction DVD (highly recommended)

   - Any other resources you can find

   - Note: The following is stated in IM but was missed in the video:
     "The point where the two lines intersect, (0, 0), is called the origin.

When counting over and up to find the coordinates of a point, always begin at the origin." _____

2. DRILL: Gain a mastery of the types of problems in Student Text (ST) Lessons 5A and 5B. Use other sources of problems as needed. _____

3. DRILL: Systematic Review.

   a) Do ST Lesson 5C, problems 1–10. ___

   b) Do ST Lesson 5C, problems 11–16 in full display until you have applied 10 rules. ___

   c) Do ST Lesson 5C, problems 17–20. ___

   d) Do ST Lesson 5D, problems 1–10. ___

   e) Do ST Lesson 5D, problems 11–16 in full display until you have applied 10 rules. ___

   f) Do ST Lesson 5D, problems 17–20. ___

   g) Do ST Lesson 5E, problems 1–12. ___

   Answers are in IM, starting on p. 171. _____

4. DRILL: Systematic Review. Do ST Lesson 5E, problem 13 in full display. Answer is in IM, p. 173. **Supervisor pass.** (If the student doesn't pass, the student should do problem 14 in full display.) ____ ____

5. DRILL: Honors Lesson. Do ST Lesson 5H. Answers are in IM, p. 314. _____

6. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 5 in the Math-U-See Test Booklet, with no reference to the materials. Do your best work. Then check your answers in IM, starting on p. 331, and note how many you missed here: _____ If you missed more than one, do more study before the Mastery Problems. _____

7. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for this section of the course. Do them with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to your supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.** ____ ____

B. GRAPHING A LINE

1. READ: Using one or more of the following resources, learn about graphing a line:

   - Lesson 6, IM

   - Lesson 6, DVD (highly recommended)

   - Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems in ST Lessons 6A and 6B. Use other sources of problems as needed.   _____

3. PRACTICAL APPLICATION:

   a) Find eight people of very different heights and measure in centimeters their height and arm span (distance from fingertip to fingertip). The height will be the "x" value and the arm span will be the "y" value for each person. Collect the data as given in the example below. ___

	height (x)	arm span (y)
Lucy	71	78
Linus	101	99
Charlie	189	197

   b) Type the data you found into Desmos.com. For example if you were using the "Lucy" data, you would type in (71, 78), including the parentheses, directly into the top box on the left on Desmos. You will have to zoom out to see this point plotted on the Cartesian coordinate system. The + and – buttons on the upper right hand edge of the graph do this. You can also zoom out with the scroll wheel on a mouse. Repeat this for the other seven pairs of numbers, each one in a new box. This should produce eight points on the graph. ___

   c) In a new box, type "y=mx+b." It will ask if you want to "add sliders." Click "yes" to this question. Now, adjust the sliders until you feel your line best "fits" your points. It's unlikely you will be able to get the line to actually touch all eight points, but adjust it until you feel that it is the best fit possible.

   Show your screen to your supervisor. **Supervisor pass.**   ____ ____

4. DRILL: Systematic Review.

   a) Do ST Lesson 6C, problems 1–10. ___

   b) Do ST Lesson 6C, problem 13 in full display. You will need a new page in your notebook. ___

   c) Do ST Lesson 6C, problems 14–20. ___

   d) Do ST Lesson 6D, problems 1–10. ___

   e) Do ST Lesson 6D, problem 13 in full display. You will need a new page in your notebook. ___

   f) Do ST Lesson 6D, problems 17–20. ___

   g) Do ST Lesson 6E, problems 1–10. ___

   h) Do ST Lesson 6E, problem 13 in full display. You will need a new page in your notebook. ___

   i) Do ST Lesson 6E, problems 17–20. ___

   Answers are in IM, starting on p. 175.   _____

5. DRILL: Honors Lesson. Do ST Lesson 6H. Answers are in IM, p. 315.   _____

6. DRILL: Lesson Test. Once you feel you are ready, answer questions 1-10 in Lesson Test 6 in the Test Booklet, with no reference to the materials. Do your best work. Then check your answers in IM, starting on p. 331, and note how many you missed here: _____ If you missed more than one, do more study before the Mastery Problems.   _____

7. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for this section of the course. Do them with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to your supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**   ____ ____

C. SLOPE-INTERCEPT FORMULA

1. READ: Using one or more of the following resources, learn about the slope-intercept formula:

   - Lesson 7, IM

   - Lesson 7, DVD (highly recommended)

   - any other resources you can find

   - Note: Here is an alternative to using the memory tricks given in the video for positive and negative slopes. Think of any graph as a real graph, such as the income of a company or the population of a country. If it's increasing (like the graph below which slants upward left-to-right), then it is positive.

   _____
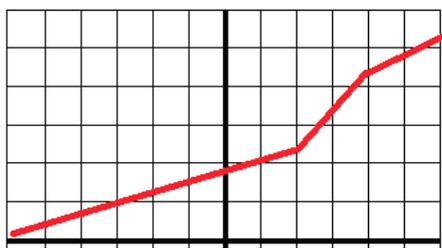
2. DRILL: Gain a mastery of the types of problems in ST Lessons 7A and 7B. Use other sources of problems as needed.

   _____

3. PRACTICAL APPLICATION:

   a) Choose the following activity that is most interesting to you and check the box to the left. Then do it. ____

   ☐ Place a meter stick on a desk and anchor it so one end sticks out over the edge of the desk horizontally about 85cm. Take a careful measurement of the height between the stick and the floor at the end that sticks out. Place two pennies as weights on the free end of the stick and then measure the new height—it should have gone down a little. Repeat this seven times using different numbers of pennies and record the data.
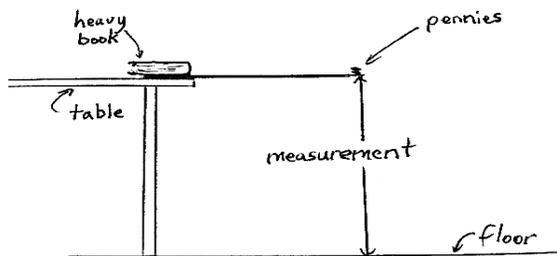
☐ In the lab, put water in a pot on a burner with a thermometer. Record the temperature every 30 seconds for 10 minutes.

☐ In the lab, put water in a pot with a thermometer. Cool the pot in an ice bath, refrigerator or freezer and record the temperature every 30 seconds for 10 minutes.

☐ Find a shadow of a tall, stationary object, like a flagpole or the corner of a building (over one story tall, preferably). Mark the location of the shadow. Every minute, for 10 minutes, record the distance from the shadow to its original location.

b) When you have your data, plot all the data on Desmos.com. You can click the little "wrench" icon in the upper left corner if you need the x scale to be much bigger than the y scale, or vice versa.___

c) Looking at the dots and envisioning the line through them, decide on the y-intercept that looks best and the slope that seems right (by calculating "rise over run"). Type in this y = mx + b equation and see how well your points fit your line. Some error is okay (it is unlikely that the points you recorded fit an exact line), but make a few adjustments of your m and b until your line fits pretty well. ___

Show your screen to your supervisor. **Supervisor pass.** ____ ____

4. DRILL: Systematic Review.

a) Do ST Lesson 7C, problems 1–12. ___

b) In ST Lesson 7C, select problems from 13–16 and do them in full display until you have 10 rule applications. You may find you only need to work one and a half problems before you have applied the 10 rules. ___

c) Do ST Lesson 7D, problems 1–12. ___

d) In ST Lesson 7D, select problems from 17–20 and do them in full display until you have 10 rule applications. ___

e) Do ST Lesson 7E, problems 1–12. ___

Answers are in IM, starting on p. 178. _____

5. DRILL: Systematic Review. Do ST Lesson 7E, problem 17 in full display—including fully breaking down adding like terms by reverse distribution. Answer is in IM, p. 180. **Supervisor pass.** (If more practice is needed, problem 18 can be used.)   ____ ____

6. DRILL: Honors Lesson. Do ST Lesson 7H. Answers are in IM, p. 315.   _____

7. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 7 in the Test Booklet, with no reference to the materials. Do your best work. Then check your answers in IM, p. 332, and note how many you missed here: _____ If you missed more than one, do more study before the Mastery Problems.   _____

8. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for this section of the course. Do them with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to your supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**   ____ ____

D. DISTRIBUTING WITH SUBTRACTION AND DIVISION

1. READ: *Algebra 1 Companion Text,* Chapter 20 Distributing with Subtraction to section "Whiteboard Drill: Distributing Subtraction."   _____

2. DRILL: Apply the definition of subtraction, then the distributive property to this expression:

   $100 – 2(dinner + movie – $5 + popcorn)

   Supervisor pass.   ____ ____

3. DRILL: With a coach who has completed this drill, do section "Whiteboard Drill: Distributing Subtraction." Before you start, you and the coach should read the Purpose and Drill Description.   ____ ____

4. READ: Chapter 21 Distributing with Division to section "Whiteboard Drill: Distributing with Subtraction and Division."   _____

5. DRILL: With a coach who has completed this drill, do section "Whiteboard Drill: Distributing with Subtraction and Division." Before you start, you and the coach should read the Purpose and Drill Description.   ____ ____

E. GRAPHING A LINE FROM THE SLOPE-INTERCEPT FORMULA

1. READ: Using one or more of the following resources, learn about graphing a line directly from the slope and intercept:

   • Lesson 8, IM

   • Lesson 8, DVD (highly recommended, especially the last ten minutes or so)

   • Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems in ST Lessons 8A and 8B. Use other sources of problems as needed.   _____

3. DRILL: Systematic Review.

   a) Do ST Lesson 8C, problems 1–10 and 17–20. ___

   b) Do ST Lesson 8D, problems 1–10 and 17–20. ___

   c) Do ST Lesson 8E, problems 1–10 and 17–20. ___

   Answers are in IM, starting on p. 182.   _____

4. DRILL: Systematic Review. Do ST Lesson 8C, problems 13, 15 and 16 in full display. Answers are in IM, p. 183. **Supervisor pass.** (If more practice is needed, there are very similar problems in 8D and 8E.)   ____ ____

5. DRILL: Honors Lesson. Do ST Lesson 8H. Answers are in IM, p. 315.   _____

6. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 8 in the Test Booklet, with no reference to the materials. Do your best work. Then check your answers in IM, p. 332, and note how many you missed here: _____ If you missed more than one, do more study before the Mastery Problems.   _____

7. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 8. Do them with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery

hasn't been fully achieved, go back and sort it out. When you are ready, return to your supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**   ____ ____

F. GRAPHING PARALLEL LINES AND THE STANDARD EQUATION OF A LINE

1. READ: Using one or more of the following resources, learn about parallel lines and how their graphs relate to each other:

   - Lesson 9, IM

   - Lesson 9, DVD

   - Any other resources you can find

   - Note about standard form: An equation such as $-2X + 3Y = 4$ is in standard form. Often math books will multiply both sides by one so the X term is positive: $2x - 3Y = -4$. Both forms are correct; it is a matter of preference.   _____

2. DRILL: Gain a mastery of the types of problems in ST Lessons 9A and 9B. Use other sources of problems as needed.   _____

3. DRILL: Systematic Review.

   a) Do ST Lesson 9C, problems 1–10. ____

   b) Do ST Lesson 9C, problems 11–14 in full display until you have applied 8 rules. ____

   c) Do ST Lesson 9C, problems 15–20. ____

   d) Do ST Lesson 9D, problems 1–10. ____

   e) Do ST Lesson 9D, problems 11–14 in full display until you have applied 8 rules. ____

   f) Do ST Lesson 9D, problems 15–20. ____

   g) Do ST Lesson 9E, problems 1–10. ____

   h) Do ST Lesson 9E, problems 11–14 in full display until you have applied 8 rules. ____

   i) Do ST Lesson 9E, problems 15–20. ____

   Answers are in IM, starting on p. 188.   _____

4. DRILL: Honors Lesson. Do ST Lesson 9H. Answers are in IM, p. 316. _____

5. DRILL: Lesson Test. Once you feel you are ready, take the Lesson Test 9 in the Test Booklet with no reference to the materials. Do your best work. Then check your answers in IM, starting on p. 332, and note how many you missed here: _____ If you missed more than one, do more study before the Mastery Problems. _____

6. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 9. Do them with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to your supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.** ____ ____

G. GRAPHING PERPENDICULAR LINES

1. READ: Using one or more of the following resources, learn about perpendicular lines and how their slopes relate, as well as the standard form of a line:

   • Lesson 10, IM

   • Lesson 10, DVD

   • Any other resources you can find _____

2. DRILL: Gain a mastery of the types of problems in ST Lessons 10A and 10B. Use other sources of problems as needed. _____

3. DRILL: Systematic Review.

   a) Do ST Lesson 10C, problems 1–10. ___

   b) Do ST Lesson 10C, problems 11–14 in full display until you have applied 8 rules. ___

   c) Do ST Lesson 10C, problems 15–20. ___

   d) Do ST Lesson 10D, problems 1–10. ___

   e) Do ST Lesson 10D, problems 11–14 in full display until you have applied 8 rules. ___

f) Do ST Lesson 10D, problems 15–20. ___

g) Do ST Lesson 10E, problems 1–7. ___

h) Do ST Lesson 10E, problems 8–11 in full display until you have 8
    rule applications. ___

i) Do ST Lesson 10E, problems 12–17. ___

Answers are in IM, starting on p. 191.   _____

4. DRILL: Honors Lesson. Do ST Lesson 10H. Answers are in IM, p. 316.   _____

5. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 10
   in the Test Booklet, with no reference to the materials. Do your best
   work. Then check your answers in IM, p. 333, and note how many you
   missed here: _____ If you missed more than one, do more study before
   the Mastery Problems.   _____

6. DRILL: Mastery Problems. See your supervisor to do the Mastery
   Problems for Lesson 10. Do them with your supervisor observing.
   Explain the math rules you are using to your supervisor as you move
   through the problems. If you or your supervisor find that mastery
   hasn't been fully achieved, go back and sort it out. When you are ready,
   return to your supervisor to do the Mastery Problems again. You pass
   the Mastery Problems when you have demonstrated to the satisfaction
   of your supervisor and yourself that you have fully mastered the
   concepts studied in this section. **Supervisor pass.**   ____ ____

H. FINDING THE SLOPE-INTERCEPT FORMULA WITH DIFFERENT GIVENS

1. READ: Using one or more of the following resources, learn about
   finding the equation of a line from two points or from one point and
   the slope:

   • Lesson 11, IM

   • Lesson 11, DVD

   • Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems in ST Lessons 11A and
   11B. Use other sources of problems as needed.   _____

3. DRILL: Systematic Review.

    a) Do ST Lesson 11C. ___

    b) Do ST Lesson 11D. ___

    c) Do ST Lesson 11E, problems 1–10. ___

    d) Do ST Lesson 11E, problems 11–14 in full display until you have applied 8 rules. ___

    e) Do ST Lesson 11E, problems 15–18. ___

    Answers are in IM, starting on p. 195.   _____

4. DRILL: Honors Lesson. Do ST Lesson 11H. Answers are in IM, starting on p. 316.   _____

5. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 11 in the Test Booklet, with no reference to the materials. Do your best work. Then check your answers in IM, starting on p. 333, and note how many you missed here: _____ If you missed more than one, do more study before the Mastery Problems.   _____

6. DEMONSTRATION: For review, on a blank page of your math notebook, write an example of each rule in *Algebra 1 Companion Text,* Chapter 22 The Basic Rules of Algebra Review. **Supervisor pass.**   ____ ____

7. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 11. Do them with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to your supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**   ____ ____

I. GRAPHING INEQUALITIES

1. READ: *Algebra 1 Companion Text,* Chapter 23 Inequalities in Life.   _____

2. DEMONSTRATION: Think of an inequality in life regarding money, such as "a gift for my friend should be between 10 and 30 dollars," and

express it in a mathematical inequality statement and on a number line.

$10 < x < 30$
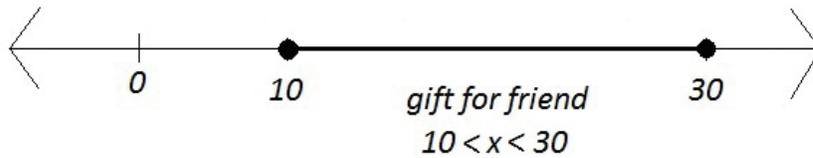
Repeat this for two more inequalities regarding money. Pick two other subjects other than money and make three examples for each of those subjects (a total of six more inequalities). Show and explain these to another student.   ____ ____

3. READ: Using one or more of the following resources, learn about graphing inequalities of a line from two points or from one point and the slope:

   • Lesson 12, IM

   • Lesson 12, DVD

   • Any other resources you can find   _____

4. DRILL: Gain a mastery of the types of problems in ST Lessons 12A and 12B. Use other sources of problems as needed.   _____

5. DRILL: Systematic Review.

   a) Do ST Lesson 12C. ____

   b) Do ST Lesson 12D. ____

   c) Do ST Lesson 12E. ____

   Answers are in IM, starting on p. 199.   _____

6. DRILL: Honors Lesson. Do ST Lesson 12H. Answers are in IM, p. 317.   _____

7. DRILL: Lesson Test. Once you feel you are ready, take the Lesson Test 12 in the Test Booklet, with no reference to the materials. Do your best work. Then check your answers in IM, starting on p. 335, and note how many you missed here: _____ If you missed more than one, do more study before the Mastery Problems.   _____

8. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 12. Do them with your supervisor observing. Explain the math rules you are using to your supervisor as you move

through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to your supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**   ____ ____

J. REVIEW SECTION

1. DRILL: With a coach who has completed this drill, in *Algebra 1 Companion Text,* Chapter 24 Basic Algebra Review do Whiteboard Drill: Part 2 Basics Review. Before you start, you and the coach should read the Purpose and Drill Description.   ____ ____

I have completed the steps of this course. I understand what I studied and can use it.

Student _____ Date_____

The student has completed the steps of this course and knows and can apply what was studied.

Academic supervisor _____ Date_____

The student has passed the exam for this course.

Examiner _____ Date_____

FOR FACULTY

ADDITIONAL RESOURCES AT HERONBOOKS.COM
Mastery Problems for Algebra 1, Part 2
Exam and answers
Materials list

Algebra 1, Part 3

Name _____ Date _____

PURPOSE
Learn about functions and how they're used.

HOW TO DO THIS COURSE: Do the steps in order, initialing and dating each when done. Where there are two sign-off lines, get the step checked and initialed on the second line by another student or, if stated, by the academic supervisor. All written work is turned in to the supervisor.

ESTIMATED TIME: 6 hours.

BOOK:
Algebra 1 Companion Text, Heron Books

A. INTRODUCTION

1. READ: *Algebra 1 Companion Text* (CT), Chapter 25 What Is a Function? _____

2. PRACTICAL APPLICATION: Explain to another student how the "prom table" function works until you are certain the student understands it. Then, give the student a few numbers of guests and have the student calculate the number of tables needed for each one. ____ ____

3. DEMONSTRATION: Tell another student examples (at least ten) of something being "a function of" something else until you are comfortable with using the words this way. Examples to get you started: The amount of lemonade we should purchase for the lemonade stand is a function of how hot it will be on Saturday. The proper house for a family is a function of their income and family size. ____ ____

B. FUNCTIONS AND COMPUTERS

1. READ: *Algebra 1 Companion Text*, Chapter 26 Functions in the Modern World to section "Evolution of Programming." _____

2. DEMONSTRATION:

   a) Sketch a household two-switch light circuit in pencil and show another student how the circuit works by drawing the switches in different positions. ___

   b) (If available) With another student, go to a place with a two-switch light circuit, such as a stairway, hallway, or a room with two entrances. Play with the switches and write words in these sentences to make true statements of that particular circuit: "When _____, the light is on. When _____, the light is off." ___   ____ ____

3. READ: Chapter 26 Functions in the Modern World section "Evolution of Programming."   _____

4. READ AND DEMONSTRATION: Section "A Simple Program in BASIC." As you read, create the program using the Applesoft BASIC website: http://www.calormen.com/jsbasic.   _____

5. READ: Chapter 26 section "Functions in Computing."   _____

6. READ and DEMONSTRATION: Chapter 27 Programming Real Life Functions, section "Calculating the Number of Tables for an Event." As you read, do the programming actions using the Applesoft BASIC website.   _____

7. READ and DEMONSTRATION: Chapter 27 Programming Real Life Functions, section "Calculating Income Tax." As you read, create the program and do the programming actions using the Applesoft BASIC website. Show your functioning income tax program to your supervisor and explain a little bit about how it works. **Supervisor pass**.   ____ ____

8. READ: Chapter 27 Programming Real Life Functions, section "Summary."   _____

9. PRACTICAL APPLICATION: Think of your own example of a simple function in life. It could be as simple as the number of cookies you eat determines a certain number of calories. Make a simple program that asks for an input, does this function, and gives an output. (Refer to the first part of the tax program in Chapter 27, section "Calculating Income Tax" for examples of input and output statements.) **Supervisor pass**.   ____ ____

10. ESSAY: Think of some complex process in life that you could imagine being broken down into functions that a computer or robot could do, and describe this in writing. ____ ____

C. FUNCTIONS AND SPREADSHEETS

1. READ: *Algebra 1 Companion Text*, Chapter 28 Spreadsheets. _____

2. PRACTICAL APPLICATION: In any spreadsheet software, recreate the simple sales invoice (with "cat food", etc.) in the chapter. All of the boxes from D2 to D8 should be functions. Enter "=B2*C2" in box D2 (the asterisk "*" symbol means multiplication, and ":" as noted below means "through"). From this simple format, you should be able to figure out the rest of the functions, but if you need help, here are the rest of the functions for each box:

D3	=B3*C3
D4	=B4*C4
D6	=D2+D3+D4 or sum(D2:D4)
D7	=D6*.07
D8	=D6+D7

   Show your supervisor that your spreadsheet is functional.
   Supervisor pass. ____ ____

3. DEMONSTRATION: Talk to adults until you have found three tasks they do using a spreadsheet program. Ask them if their spreadsheet has any built-in math function and if so, ask for a simple demonstration of it. _____

4. READ and DEMONSTRATION: Chapter 29 Advanced Functions in Spreadsheets. As you read, follow the instructions to create your own spreadsheets. Show your final spreadsheet to your Supervisor. **Supervisor pass**. ____ ____

D. FUNCTIONS IN HIGHER MATH

1. READ: *Algebra 1 Companion Text*, Chapter 30 Functions in Algebra to section "Independent and Dependent Variables." _____

2. DEMONSTRATION: Show another student how y = 2x + 3 is a function, while 10 = 2x + 3 is an equation to solve for an unknown. ____ ____

3. READ: Chapter 30 section "Independent and Dependent Variables." _____

4. DRILL:

   a) Write five simple functions on paper. Then, for each function, write three inputs and outputs. Below is an example:

   $f(x) = 2x + 1$

   $f(4) = 2(4) + 1 = 9$

   $f(-1) = 2(-1) + 1 = -1$

   $f(0) = 2(0) + 1 = 1$

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

   $g(3) = (3 - 1)^2 = 4$

   etc. $f(x) = 2x + 1$

   You should have 20 lines total. ___

   b) Show your work to another student and explain what each line means and how you would say it. This is to give you practice communicating about functions in algebra in speech. While no definite wording is required, "f(x)" is stated as "f of x" (rather than something like "f x"), and " " is "x squared."

   Ensure you are explaining each line instead of merely reading it. The first two lines would be something like this: "Here we are defining the function f with f of x equals two x plus one. Then we can compute the f of 4, which would be four times two plus one, which is 9. So f of 4 equals 9." Describe each of your 20 lines fully in this way. ___

   The drill is passed when you can show that you understand function notation and can easily say it correctly. This may take more than five functions. ____ ____

5. DRILL: In Chapter 31 Worksheet for Part 3 do Drill #1. Check your answers at the end of the chapter. _____

6. DRILL: In each of these pairs, put "I" over the independent variable, and "D" over the dependent variable.

- How much money you make / How much you should spend on a house
- How cold it is outside / how many layers you should wear
- How much dog food you should buy for a week / how many dogs you have
- How much water you should bring / how long your hiking trip is
- How many days you worked / how much you got paid
- The fire danger in a forest in August / how much it rained from March to July
- The battery capacity of a new drone / how long it will fly
- The profits of a business / the number of sales _____ _____

7. READ: Chapter 30 Functions in Algebra section "Domain and Range" to the end. _____

8. DRILL: For each of the independent and dependent variables you labeled in item #6 above, decide what would be a sensible domain and range for each and discuss with another student. If you don't know enough about the subject (such as "battery capacity") to know the units that would apply, you can express it any way you want, such as "the domain of the batteries in a drone would be from 5 iPhone batteries to 100 iPhone batteries and the range would be it could fly from 10 minutes to 150 minutes." _____ _____

9. DRILL: In Chapter 31 Worksheet for Part 3 do Drill #2. **Supervisor pass**. (Answers at the end of the chapter.) _____ _____

10. READ: Chapter 32 Inverse Functions. _____

11. DRILL: In Chapter 31 Worksheet for Part 3 do Drill #3. Check your answers at the end of the chapter. _____

E. FINAL APPLICATION SECTION

1. PRACTICAL APPLICATION: This is a true story. Create a function to solve this problem yourself. You can do it on paper, in a program or in a spreadsheet.

   I was working at an auto glass shop where we replaced car windshields. The shop had a policy that said we would match any competitor's price, but our total would include the sales tax. Every job consisted of these factors: 1) the price we assigned to the actual piece of glass, 2) the 8.6% tax we had to charge on the glass, and 3) the cost of the labor ($55). (The state did not require sales tax on labor.)

   For instance, if we quoted $359 for a particular car to a client, but the client said, "Well, your competitor told me they would do it for $325 plus tax" then we would reply with, "Okay. Then we will do it for $325 tax included."

   To work this out, we would adjust the glass cost, because by reducing that we would also reduce the sales tax. My co-workers would have to go through this rather long process of trying different prices for the glass and fully calculating the total, until by trial-and-error they arrived exactly at, in this example, $325. It took a lot of calculating and a lot of time—every time.

   Using my knowledge of basic algebra, I worked out a simple function that could be used in every case. Being able to use the function to quickly come up with the glass cost saved the employees so much time, the company rewarded me with a car to use for an entire year.

   After you've created a function, test it on these client calls and determine what you'll have to charge for the glass:

   I have a 2006 BMW Z1, and I was just quoted $325 plus tax by your competitor. ___

   Hello. I have a 2016 Nissan Altima, and I was just quoted $298 plus tax by your competitor. What will you do it for? ___

   How much to replace the windshield on a 2017 Ford Explorer? I was quoted $399 plus tax by your competitor. ___

   (See the back of the study guide for the answers.)

   Supervisor pass on the function.   ____ ____

I have completed the steps of this course. I understand what I studied and can use it.

Student _____ Date_____

The student has completed the steps of this course and knows and can apply what was studied.

Academic Supervisor_____ Date_____

The student has passed the exam for this course.

Examiner _____ Date_____

Answers to item E.1:

Below are some hints, but try not to use them. After all, the person in the story didn't have them!

Function: *glass cost total* $=\dfrac{\text{total} -55}{1.086}$

BMW	325	248.62
NISSAN	298	223.76
FORD	399	316.76

Hints: First make the usual function that gives the customer's total as a function of the cost of the piece of glass. Test out your function with a glass cost of $100 and see if your answers make sense to you. Then, make sure you have simplified your function fully (like terms in your function can be added). Finally, isolate your variable for glass cost.

Algebra 1, Part 4

NAME _____ DATE _____

PURPOSE

Learn to solve a "system" of equations (two equations that
work together), and learn some simple ways to apply systems
of equations to real concepts.

HOW TO DO THIS COURSE: Do the steps in order, initialing and dating each when done. Where there are two sign-off lines, get the step checked and initialed on the second line by another student or, if stated, by the academic supervisor. All written work is turned in to the supervisor.

ESTIMATED TIME: 12 hours.

BOOKS AND REFERENCES:
Algebra 1 Companion Text, Heron Books
Algebra 1 Student Text, Math-U-See
Algebra 1 Instruction Manual, Math-U-See
Algebra 1 Test Booklet, Math-U-See
Algebra 1 Instruction DVD, Math-U-See

NOTES:

- Use a math notebook for all your work on this course, labeling each problem set so you and your supervisor can review your earlier work at any time.

- You may use calculators and graphing websites, such as Desmos.com, during this course, but make sure you have the ability to do the math without having to rely on them.

A. PRECISION GAME

1. READ and DRILL: *Algebra 1 Companion Text* (CT), Chapter 33 Precision
   Game 1 (the activity needs to be done with a partner).
   Supervisor pass.   ____ ____

B. SOLVING SIMULTANEOUS EQUATIONS BY GRAPHING

1. DEFINE: simultaneous. _____

2. READ: *Algebra 1 Companion Text*, Chapter 34 Graphing Simultaneous Equations. _____

3. READ: Using one or more of the following resources, learn about solving simultaneous equations by graphing:

    *   Lesson 13, IM (Note: In the text on page 76, the first "Figure 3" is mislabeled and should be labeled "Figure 2" and the math for point E is written as "(4)=2(2)-3" but should be "(1)=2(2)-3".

    *   Lesson 13, DVD

    *   Any other resources you can find _____

4. READ and DRILL: Chapter 35 Review Drills for Part 4: Drill A. ____ ____

5. DRILL: Gain a mastery of the types of problems in the Math-U-See Student Text (ST) Lessons 13A and 13B. Use other sources of problems as needed. _____

6. DRILL: Systematic Review.

    a) Do ST Lesson 13C, problems 1–10 and 17–20. ___

    b) Do ST Lesson 13D, problems 1–10 and 17–20. ___

    c) Do ST Lesson 13E, problems 1–10 and 17–20. ___

    d) Select problems from 11–16 in any of the above sections and do them in full display until you have 20 rule applications. You may find you only need to work two-and-a-half problems before you have applied the 20 rules. **Supervisor pass** on full display.

    Answers are in IM, starting on p. 202. ____ ____

7. DRILL: Honors Lesson. Do ST Lesson 13H problems 1-6. Answers are in IM, starting on p. 317. _____

8. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 13 in the Math-U-See Test Booklet, with no reference to the materials. Then check your answers in IM, starting on p. 336, and note how many you missed here: _____ If you missed more than one, do more study before the Mastery Problems. _____

9. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 13. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**   ____ ____

C. SOLVING SIMULTANEOUS EQUATIONS BY SUBSTITUTION

1. READ: *Algebra 1 Companion Text*, Chapter 36 Solving Simultaneous Equations by Substitution.   _____

2. READ: Using one or more of the following resources, learn about solving simultaneous equations by substitution:

   • Lesson 14, IM

   • Lesson 14, DVD. The video is highly recommended. While the first examples are very simple, they are useful in helping understand the last, more complex example.

   • Any other resources you can find   _____

3. DRILL: Gain a mastery of the types of problems in ST Lessons 14A and 14B. Use other sources of problems as needed.   _____

4. DRILL: Systematic Review.

   a) Do ST Lesson 14C. ___

   b) Do ST Lesson 14D. ___

   c) Do ST Lesson 14E. ___

   Answers are in IM, starting on p. 207.   _____

5. DRILL: Honors Lesson. Do ST Lesson 14H. Answers are in IM, p. 318.   _____

6. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 14 in the Math-U-See Test Booklet, with no reference to the materials. Then check your answers in IM, starting on p. 336, and note how many you

missed here: _____ If you missed more than one, do more study before
the Mastery Problems.

_____

7. DRILL: Mastery Problems. See your supervisor to do the Mastery
Problems for Lesson 14. Do this with your supervisor observing.
Explain the math rules you are using to your supervisor as you move
through the problems. If you or your supervisor find that mastery
hasn't been fully achieved, go back and sort it out. When you are
ready, return to the supervisor to do the Mastery Problems again.
You pass the Mastery Problems when you have demonstrated to
the satisfaction of your supervisor and yourself that you have fully
mastered the concepts studied in this section. **Supervisor pass.**

_____ _____

D. SOLVING SIMULTANEOUS EQUATIONS BY ELIMINATION

1. READ: Using one or more of the following resources, learn about
solving simultaneous equations by elimination (also called "the
addition/subtraction method"):

   • Lesson 15, IM

   • Lesson 15, DVD

   • Any other resources you can find

_____

2. DRILL: Gain a mastery of the types of problems in ST Lessons 15A and
15B. Use other sources of problems as needed.

_____

3. DRILL: Systematic Review.

   a) Do ST Lesson 15C. ____

   b) Do ST Lesson 15D. ____

   c) Do ST Lesson 15E. ____

   Answers are in IM, starting on p. 212.

_____

4. READ and DRILL: Chapter 37 Review Drills for Part 4: Drill B.

_____ _____

5. DRILL: Honors Lesson. Do ST Lesson 15H. Answers are in IM,
p. 319.

_____

6. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 15 in
the Math-U-See Test Booklet, with no reference to the materials. Then

check your answers in IM, starting on p. 337, and note how many you missed here: _____ If you missed more than one, do more study before the Mastery Problems. _____

7. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 15. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.** ____ ____

E. COIN PROBLEMS

1. READ: *Algebra 1 Companion Text*, Chapter 38 Word Problems in Beginning Algebra. _____

2. READ: Chapter 39 Word Problem Strategies. _____

3. READ: Using one or more of the following resources, learn about solving coin problems:
   - Lesson 16, IM
   - Lesson 16, DVD
   - Any other resources you can find _____

4. DRILL: Gain a mastery of the types of problems in ST Lessons 16A and 16B. Use other sources of problems as needed. _____

5. DRILL: Systematic Review.
   a) Do ST Lesson 16C. ___
   b) Do ST Lesson 16D. ___
   c) Do ST Lesson 16E. ___
   Answers are in IM, starting on p. 215. _____

6. READ and DRILL: Chapter 40 Review Drills for Part 4: Drill C. ____ ____

7. DRILL: Honors Lesson. Do ST Lesson 16H. Answers are in IM, p. 319. _____

8. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 16 in the Math-U-See Test Booklet, with no reference to the materials. Then check your answers in IM, starting on p. 338, and note how many you missed here: _____ If you missed more than one, do more study before the Mastery Problems. _____

9. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 16. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.** ____ ____

F. SIMPLIFYING TERMS

1. READ: *Algebra 1 Companion Text*, Chapter 41 Multiplying and Dividing Fractions to section "Whiteboard Drill: Simplifying Any Term. _____

2. DRILL: With a coach who has completed this drill, do section "Whiteboard Drill: Simplifying Any Term." Before you start, you and the coach should read the Purpose and Drill Description. ____ ____

G. CONSECUTIVE INTEGERS

1. DEFINE: consecutive ___ _____

2. READ: Using one or more of the following resources, learn about solving consecutive integer problems:

   • Lesson 17, IM

   • Lesson 17, DVD

   • Any other resources you can find _____

3. DRILL: Gain a mastery of the types of problems in ST Lessons 17A and 17B. Use other sources of problems as needed. _____

4. DRILL: Systematic Review.

   a) Do ST Lesson 17C. ___

   b) Do ST Lesson 17D. ___

   c) Do ST Lesson 17E. ___

   Answers are in IM, starting on p. 219. _____

5. READ and DRILL: *Algebra 1 Companion Text*, Chapter 42 Review Drills for Part 4: Drill D. ____ ____

6. DRILL: Honors Lesson. Do ST Lesson 17H. Answers are in IM, starting on p. 319. _____

7. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 17 in the Math-U-See Test Booklet, with no reference to the materials. Then check your answers in IM, starting on p. 339, and note how many you missed here: _____ If you missed more than one, do more study before the Mastery Problems. _____

8. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 17. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out.

   When you are ready, return to the supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.** ____ ____

I have completed the steps of this course. I understand what I studied and can use it.

Student _____ Date_____

The student has completed the steps of this course and knows and can apply what was studied.

Academic Supervisor_____ Date_____

The student has passed the exam for this course.

Examiner _____ Date_____

Algebra 1, Part 5

NAME _____ DATE _____

PURPOSE

Learn how to work with variables with exponents, such as x^2.
Understand how these concepts apply to real-world finance
situations.

HOW TO DO THIS COURSE: Do the steps in order, initialing and dating each when done. Where there are two sign-off lines, get the step checked and initialed on the second line by another student or, if stated, by the academic supervisor. All written work is turned in to the supervisor.

ESTIMATED TIME: 27 hours

BOOKS AND REFERENCES:
Algebra 1 Companion Text, Heron Books
Algebra 1 Student Text, Math-U-See
Algebra 1 Instruction Manual, Math-U-See
Algebra 1 Test Booklet, Math-U-See
Algebra 1 Instruction DVD, Math-U-See

NOTES:

- Use a math notebook for all your work on this course, labeling each problem set so you and your supervisor can review your earlier work at any time.

- You may use calculators and graphing websites, such as Desmos.com, during this course, but make sure you have the ability to do the math without having to rely on them.

A. PRECISION IN MATH

1. PRACTICAL APPLICATION: Using a meter stick to measure, create four clay lines that add up to 222.2mm long. Use a different color of clay for each place value. Because .2mm will be impossible to make with any accuracy, just represent it as best you can. Label each segment with the length it represents. To another student, explain any ideas you have for how one could create a piece of something .2mm thick with some accuracy. Then, both of you give each other ideas about things which might be .002mm thick. (Notice this is two place values smaller than .2mm). ____ ____

2. READ and DRILL: Carry out *Algebra 1 Companion Text* (CT), Chapter 43 Precision Game 2 with a partner.   **Supervisor pass.**   ____ ____

B. MULTIPLICATION AND DIVISION WITH EXPONENTS

1. READ: Using one or more of the following resources, learn about multiplication and division of exponents:

   • Lesson 18, IM

   • Lesson 18, DVD. The video is highly recommended.

   • Any other resources you can find   _____

2. READ: *Algebra 1 Companion Text,* Chapter 44 Combining Exponents.   _____

3. DRILL: Gain a mastery of the types of problems in the Math-U-See Student Text (ST) Lessons 18A and 18B. Use other sources of problems as needed.   _____

4. DRILL: Systematic Review.

   a) Do ST Lesson 18C. ____

   b) Do ST Lesson 18D. ____

   c) Do ST Lesson 18E. ____

   Answers are in IM, starting on p. 222.   _____

5. DRILL: Honors Lesson. Do ST Lesson 18H. Answers are in IM, starting on p. 320.   _____

6. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 18 in the Test Booklet, with no reference to the materials. Then check your answers in IM, on p. 339, and note how many you missed here: _____ If you missed more than one, do more study before the Mastery Problems.   _____

7. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems Lesson 18. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of

your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**

____ ____

C. EXPONENTS, NEGATIVE AND RAISING TO A POWER

1. READ: Using one or more of the following resources, learn about negative exponents and exponents raised to exponents such as $(x^3)^4$:

   • Lesson 19, IM

   • Lesson 19, DVD

   • Any other resources you can find

_____

2. DRILL: Gain a mastery of the types of problems in ST Lessons 19A and 19B. Be sure to use the manipulatives while doing thse exercises. Use other sources of problems as needed.

_____

3. DRILL: Systematic Review.

   a) Do ST Lesson 19C. ___

   b) Do ST Lesson 19D. ___

   c) Do ST Lesson 19E. ___

   Answers are in IM, starting on p. 225.

_____

4. DRILL: Honors Lesson. Do ST Lesson 19H. Answers are in IM, p. 321.

_____

5. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 19 in the Test Booklet, with no reference to the materials. (Note: Problem 13 has a typo. It should be N^2 instead of B^2 in the denominator) Then check your answers in IM, on p. 339, and note how many you missed here: _____ If you missed more than two, do more study before the Mastery Problems.

_____

6. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 19. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**

____ ____

D. ADDITION AND MULTIPLICATION OF POLYNOMIALS

1. READ: Using one or more of the following resources, learn about adding and multiplying polynomials:

    - Lesson 20, IM

    - Lesson 20, DVD

    - Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems in ST Lessons 20A and 20B. Use other sources of problems as needed.   _____

3. DEMONSTRATION: Use the Math-U-See manipulatives to show $(x + 3) \cdot (x - 4)$ $(x + 3) \cdot (x - 4)$. **Supervisor pass.**   ____ ____

4. DRILL: Systematic Review.

    a) Do ST Lesson 20C. ____

    b) Do ST Lesson 20D. ____

    Answers are in IM, starting on p. 229.   _____

5. DRILL: Systematic Review. Do ST Lesson 20E, problems 1–6, using the Math-U-See manipulatives to demonstrate them to another student.   ____ ____

6. DRILL: Honors Lesson. Do ST Lesson 20H. Answers are in IM, starting on p. 321.   _____

7. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 20 in the Test Booklet, with no reference to the materials. Then check your answers in IM, p. 340, and note how many you missed here: _____ If you missed more than two, do more study before the Mastery Problems.   _____

8. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 20. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**   ____ ____

E. MATH APPLICATIONS IN PERSONAL FINANCE

1. READ: *Algebra 1 Companion Text,* Chapter 45 Savings and Interest. _____

2. DEMONSTRATION:

    a) interest ___

    b) compound interest ___

    c) the effect of inflation on savings ___   _____

3. READ: Chapter 46 Interest Formulas, section "Computation of Simple Interest." _____

4. DEMONSTRATION: Show the formulas for simple interest "I" and the total "T." _____

5. DRILL: Do Drill 1a in Chapter 49 Drills for Savings, Interest and Taxes (answers are in the back of the chapter). _____

6. DEMONSTRATION: Estimate mentally the simple interest on $650 at 9% for 3 years. Write your estimate here. _____
Then check it. _____

7. READ: Chapter 46 Interest Formulas, section "Compound Interest (Compounded Annually)." _____

8. DEMONSTRATION: Show the formula for compound interest. _____

9. DRILL: Do Drill 1b in Chapter 49 Drills for Savings, Interest and Taxes. _____

10. DEMONSTRATION: Estimate mentally the interest on $700 at 10% for 3 years, compounded annually. Write your estimate here. _____ (Remember, the purpose of practicing mental arithmetic is so you can quickly get useful answers "on your feet" when you need to. It is okay to jot down a few intermediate results if that helps.) _____

11. READ: Section "Compound Interest (Compounded Other Than Annually)." _____

12. DEMONSTRATION: Show the formula for compound interest compounded other than annually. _____

13. DRILL: Do Drill 1c in Chapter 49. _____

14. DEMONSTRATION: Estimate mentally the interest on $600 at 4% for 3 years, compounded semi-annually. Write your estimate here. _____ _____

15. READ: Section "Compound Interest with Savings Added Annually." _____

16. DEMONSTRATION: Show the formula for compound interest with savings added annually for n = 3. _____

17. DRILL: Do Drill 1d in Chapter 49. _____

18. DEMONSTRATION: Estimate mentally the total interest on savings deposits of $100 a year at 5% for 3 years, compounded annually. Write your estimate here. _____ _____

19. READ: Section "Compound Interest with Savings Added Monthly" to the end of the chapter. _____

20. DEMONSTRATION: Show the formula for compound interest with savings added monthly for n = 2. _____

21. READ: Chapter 47 Borrowing Money to section "Installment Loans." _____

22. DEMONSTRATION: The formula for interest on a simple loan. Give an example of when you might use it. _____

23. READ: Sections "Installment Loans" and "Finance Charges, Disclosure." _____

24. DEMONSTRATION: Show the reasoning behind the two rules for borrowing money. _____

25. READ: Section "Loan Formulas, and Computing Amount of Payments" to the end of the chapter. _____

26. DEMONSTRATION: Show the formulas for computing interest on installment loans for some small n. Make it a real example of a loan you might take out. _____

27. DRILL: Do Drill 2 in Chapter 49. _____

28. READ: Chapter 48 Taxes. _____

29. PRACTICAL APPLICATION:

    a) Find out what the property tax rate is in your area, how it is stated and where it is paid. ___

    b) Find out what the sales tax is in your area and on what types of items it must be paid. (If there is no sales tax where you live, find out about another place that has one and what it is there.) ___ _____

30. DRILL: Do Drill 3 Chapter 49. _____

31. DEMONSTRATION: You are at the checkout counter of a store with a $10 bill in your hand and an item priced at $9.87 you want to purchase. Estimate mentally how much change you must have in your pocket to cover a sales tax of 4%, 5%, and 6%.

    Write your estimates here.

    4%_____ 5%_____ 6%_____ _____

32. (Optional if you have previously filled out and filed a real W-4 form of your own) PRACTICAL APPLICATION: Get a copy of a W-4 income tax withholding form and fill it out. Do whatever research you find necessary in order to understand how to do it. Assume you earn an annual salary of $12,500 and will be paid monthly. (You may substitute your own real income data if you wish.) _____

33. (Optional if you have previously filled out and filed a real federal income tax form of your own) PRACTICAL APPLICATION: Find an online copy of the 1040EZ federal income tax form and instructions for the tax year most recently ended.

    a) Read the instructions and enter the data below in the proper place on the form. (You may substitute your own real data if you have it.) ___

        • Filing Status: single

        • Exemptions: one (yourself)

        • Dependents: none

        • W-2 taxable income: $12,500

        • Taxable Interest (income from savings): $237

        • Amount of Income Tax Withheld: $1,452

b) Following the instructions, compute your tax based on the above. Assume other income lines on the form, such as business income, capital gains, etc., do not apply to you. Take the standard deduction. Assume you have no other taxes or tax credits to report. Decide if you must pay more or are owed a refund. ___

Supervisor pass.   ____ ____

F. FACTOR POLYNOMIALS

1. READ: Using one or more of the following resources, learn about factoring polynomials:

   • Lesson 21, IM

   • Lesson 21, DVD (highly recommended, as is using the Math-U-See blocks to solve the problems. The video uses the word "addend," which means "a number that is added to another." In 2 + 3 = 5, 2 and 3 are the "addends" and 5 is the sum.)

   • Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems on ST Lessons 21A and 21B. The use of the blocks as instructed is highly recommended. Use other sources of problems as needed.   _____

3. DRILL: Systematic Review.

   a) Do ST Lesson 21C. Use the blocks as instructed. ___

   b) Do ST Lesson 21D. Use the blocks as instructed. ___

   c) Do ST Lesson 21E. Use the blocks as instructed. ___

   Answers are in IM, starting on p. 235.   _____

4. DRILL: Do Drill A in *Algebra 1 Companion Text,* Chapter 50 Additional Drills for Part 5.   _____

5. DRILL: Honors Lesson. Do ST Lesson 21H. Answers are in IM, p. 322.   _____

6. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 21 in the Test Booklet, with no reference to the materials. Then check your answers in IM, starting on p. 340, and note how many you missed here: _____ If you missed more than two, do more study before the Mastery Problem.   _____

7. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 21. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**   ____ ____

G. FACTORING TRINOMIALS WITH COEFFICIENTS

1. READ: Using one or more of the following resources, learn about factoring trinomials with coefficients:

   • Lesson 22, IM

   • Lesson 22, DVD

   • Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems on ST Lessons 22A and 22B. Use other sources of problems as needed.   _____

3. DRILL: Systematic Review.

   a) Do ST Lesson 22C. Use the Math-U-See blocks as instructed. ___

   b) Do ST Lesson 22D. Use the Math-U-See blocks as instructed. ___

   c) Do ST Lesson 22E. Use the Math-U-See blocks as instructed. ___

   Answers are in IM, starting on p. 242.   _____

4. DRILL: Honors Lesson. Do ST Lesson 22H. Answers are in IM, p. 322.   _____

5. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 22 in the Test Booklet, with no reference to the materials. Then check your answers in IM, p. 341, and note how many you missed here: _____ If you missed more than two, do more study before the Mastery Problem.   _____

6. DRILL: Mastery Problem. See your supervisor to do the Mastery Problem for Lesson 22. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problem. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready,

return to the supervisor to do the Mastery Problem again. You pass the Mastery Problem when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**   ____ ____

H. FACTORING TRINOMIALS WITH NEGATIVE NUMBERS

1. READ: Using one or more of the following resources, learn about factoring trinomials with negative signs:

    • Lesson 23, IM

    • Lesson 23, DVD

    • Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems on ST Lessons 23A and 23B. Use other sources of problems as needed.   _____

3. DRILL: Systematic Review.

    a) Do ST Lesson 23C. Use the Math-U-See blocks as instructed. ___

    b) Do ST Lesson 23D. Use the Math-U-See blocks as instructed. ___

    c) Do ST Lesson 23E. Use the Math-U-See blocks as instructed. ___

    Answers are in IM, starting on p. 249.   _____

4. DRILL: Honors Lesson. Do ST Lesson 23H. Answers are in IM, p. 323.   _____

5. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 23 in the Test Booklet, with no reference to the materials. Then check your answers in IM, starting on p. 341, and note how many you missed here: _____ If you missed more than two, do more study before the Mastery Problem.   _____

6. DRILL: Mastery Problem. See your supervisor to do the Mastery Problem for Lesson 23. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problem again. You pass the Mastery Problem when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**   ____ ____

I. SQUARE ROOTS AND DIVIDING POLYNOMIALS

1. READ: Using one or more of the following resources, learn about taking square roots of polynomials and dividing polynomials:

    • Lesson 24, IM

    • Lesson 24, DVD

    • Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems on ST Lessons 24A and 24B. Use other sources of problems as needed.   _____

3. DRILL: Systematic Review.

    a) Do ST Lesson 24C. Use the Math-U-See blocks if helpful. ___

    b) Do ST Lesson 24D. Use the Math-U-See blocks if helpful. ___

    c) Do ST Lesson 24E. Use the Math-U-See blocks if helpful. ___

    Answers are in IM, starting on p. 256.   _____

4. DRILL: Honors Lesson. Do ST Lesson 24H. Answers are in IM, starting on p. 323.   _____

5. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 24 in the Test Booklet, with no reference to the materials. Then check your answers in IM, starting on p. 343, and note how many you missed here: _____ If you missed more than two, do more study before the Mastery Problems.   _____

6. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for this section of the course. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**   ____ ____

J. DIFFERENCE OF TWO SQUARES AND ORIENTAL SQUARES

1. READ: Using one or more of the following resources, learn about factoring a difference (a subtraction) of two squares. (An example of this would be $x^2 - 16$.)

   - Lesson 25, IM

   - Lesson 25, DVD

   - Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems on ST Lessons 25A and 25B. (Note: The Math-U-See materials have erroneously labeled these as "Honors Lessons," but they are just "Lesson Practice"). Use other sources of problems as needed.   _____

3. DRILL: Systematic Review.

   a) Do ST Lesson 25C. ____

   b) Do ST Lesson 25D. ____

   c) Do ST Lesson 25E. ____

   Answers are in IM, starting on p. 261.   _____

4. DRILL: Honors Lesson. Do ST Lesson 25H. Answers are in IM, p. 324.   _____

5. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 25 in the Test Booklet, with no reference to the materials. Then check your answers in IM, p. 344, and note how many you missed here: _____ If you missed more than two, do more study before the Mastery Problem.   _____

6. DRILL: Mastery Problem. See your supervisor to do the Mastery Problem for Lesson 25. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problem again. You pass the Mastery Problem when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**   ____ ____

K. REPEATED FACTORING OF POLYNOMIALS

1. READ: Using one or more of the following resources, learn about factoring expressions that can be factored and then factored again:

   • Lesson 26, IM

   • Lesson 26, DVD

   • Any other resources you find   _____

2. DRILL: Gain a mastery of the types of problems on ST Lessons 26A and 26B. Use other sources of problems as needed.   _____

3. DRILL: Systematic Review.

   a) Do ST Lesson 26C. ____

   b) Do ST Lesson 26D. ____

   c) Do ST Lesson 26E. ____

   Answers are in IM, starting on p. 265.   _____

4. DRILL: Honors Lesson. Do ST Lesson 26H. Answers are in IM, p. 324.   _____

5. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 26 in the Test Booklet, with no reference to the materials. Then check your answers in IM, starting on p. 344, and note how many you missed here: _____ If you missed more than two, do more study before the Mastery Problem.   _____

6. DRILL: Mastery Problem. See your supervisor to do the Mastery Problem for Lesson 26. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problem. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problem again. You pass the Mastery Problem when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**   ____ ____

L. SOLVING EQUATIONS WITH FACTORING

1. READ: Using one or more of the following resources, learn about solving equations with factoring:

    • Lesson 27, IM

    • Lesson 27, DVD

    • Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems on ST Lessons 27A and 27B. Use other sources of problems as needed.   _____

3. DRILL: Systematic Review.

    a) Do ST Lesson 27C. ___

    b) Do ST Lesson 27D. ___

    c) Do ST Lesson 27E. ___

    Answers are in IM, starting on p. 269.   _____

4. DRILL: Honors Lesson. Do ST Lesson 27H. Answers are in IM, starting on p. 324.   _____

5. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 27 in the Test Booklet, with no reference to the materials. Then check your answers in IM, p. 345, and note how many you missed here: _____ If you missed more than two, do more study before the Mastery Problems.   _____

6. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 27. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass.**   ____ ____

M. FINAL SECTION

1. DRILL: Do Drill B in *Algebra 1 Companion Text,* Chapter 50 Additional
   Drills for Part 5. **Supervisor pass.**   _____ _____

I have completed the steps of this course. I understand what I studied and can use it.

Student _____ Date_____

The student has completed the steps of this course and knows and can apply what was studied.

Academic Supervisor_____ Date_____

The student has passed the exam for this course.

Examiner _____ Date_____

FOR FACULTY

ADDITIONAL RESOURCES AT HERONBOOKS.COM
Mastery Problems for Algebra 1, Part 5
Exam and answers
Materials list

Algebra 1, Part 6

NAME _____ DATE _____

PURPOSE

Learn how to use units of measurement with algebra, to use
exponents that are fractions, and how to use scientific notation.

HOW TO DO THIS COURSE: Do the steps in order, initialing and dating each when done.
Where there are two sign-off lines, get the step checked and initialed on the second line by
another student or, if stated, by the academic supervisor. All written work is turned in to the
supervisor.

ESTIMATED TIME: 17 hours

BOOKS AND REFERENCES:
Algebra 1 Companion Text, Heron Books
Algebra 1 Student Text, Math-U-See
Algebra 1 Instruction Manual, Math-U-See
Algebra 1 Test Booklet, Math-U-See
Algebra 1 Instruction DVD, Math-U-See

NOTES:
• Use a math notebook for all your work on this course, labeling each problem set so you and
  your supervisor can review your earlier work at any time.

• You may use calculators and graphing websites, such as Desmos.com, during this course,
  but make sure you have the ability to do the math without having to rely on them.

A. UNIT MULTIPLIERS

1. READ: Using one or more of the following resources, learn about
   changing one unit to another using a multiplier:

   • Lesson 28, IM

   • Lesson 28, DVD (highly recommended)

   • Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems in the Math-U-
   See Student Text (ST) Lessons 28A and 28B. Use other sources of
   problems as needed.   _____

3. DRILL: Systematic Review.

    a) Do ST Lesson 28C. ___

    b) Do ST Lesson 28D. ___

    c) Do ST Lesson 28E. ___

    Answers are in IM, starting on p. 274.   _____

4. DRILL: Honors Lesson. Do ST Lesson 28H. Answers are in IM, starting on p. 325.   _____

5. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 28 in the Test Booklet, with no reference to the materials. Then check your answers in IM, p. 346, and note how many you missed here: _____ If you missed more than two, do more study before the Mastery Problems.   _____

6. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 28. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass**.   ____ ____

B. SQUARE UNIT MULTIPLIERS

1. READ: Using one or more of the following resources, learn about changing one square unit to another:

    • Lesson 29, IM

    • Lesson 29, DVD

    • Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems in ST Lessons 29A and 29B. Use other sources of problems as needed.   _____

3. DRILL: Systematic Review.

   a) Do ST Lesson 29C. ___

   b) Do ST Lesson 29D. ___

   c) Do ST Lesson 29E. ___

   Answers are in IM, starting on p. 278.   _____

4. DRILL: Do Drill A in *Algebra 1 Companion Text* (CT), Chapter 51
   Additional Drills for Part 6: Drills A & B.   _____

5. DRILL: Honors Lesson. Do ST Lesson 29H. Answers are in IM, p. 326.   _____

6. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test
   29 in the Test Booklet, with no reference to the materials. Then
   check your answers in IM, p. 346, and note how many you missed
   here: _____ If you missed more than two, do more study before the
   Mastery Problem.   _____

7. DRILL: Mastery Problem. See your supervisor to do the Mastery
   Problem for Lesson 29. Do this with your supervisor observing.
   Explain the math rules you are using to your supervisor as you
   move through the problem. If you or your supervisor find that
   mastery hasn't been fully achieved, go back and sort it out. When
   you are ready, return to the supervisor to do the Mastery Problem
   again. You pass the Mastery Problem when you have demonstrated
   to the satisfaction of your supervisor and yourself that you have fully
   mastered the concepts studied in this section. **Supervisor pass**.   ____ ____

C. METRIC CONVERSIONS

1. READ: Using one or more of the following resources, learn about
   changing customary units to metric units:

   • Lesson 30, IM

   • Lesson 30, DVD

   • Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems on ST Lessons 30A
   and 30B. Use other sources of problems as needed.   _____

3. DRILL: Systematic Review.

   a) Do ST Lesson 30C. ___

   b) Do ST Lesson 30D. ___

   c) Do ST Lesson 30E. ___

   Answers are in IM, starting on p. 282.   _____

4. DRILL: Do Drill B in *Algebra 1 Companion Text,* Chapter 51 Additional
   Drills for Part 6: Drills A & B.   _____

5. DRILL: Honors Lesson. Do ST Lesson 30H. Answers are in IM, p. 326.   _____

6. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 30
   in the Test Booklet, with no reference to the materials. Then check
   your answers in IM, starting on p. 346, and note how many you
   missed here: _____ If you missed more than two, do more study
   before the Mastery Problems.   _____

7. DRILL: Mastery Problems. See your supervisor to do the Mastery
   Problems for Lesson 30. Do this with your supervisor observing.
   Explain the math rules you are using to your supervisor as you move
   through the problems. If you or your supervisor find that mastery
   hasn't been fully achieved, go back and sort it out. When you are
   ready, return to the supervisor to do the Mastery Problems again.
   You pass the Mastery Problems when you have demonstrated to
   the satisfaction of your supervisor and yourself that you have fully
   mastered the concepts studied in this section. **Supervisor pass**.   ____ ____

D. UNITS MADE OF OTHER UNITS

1. READ: *Algebra 1 Companion Text,* Chapter 52 Units Made of Other Units.   _____

2. READ: *C*hapter 53 Converting Compound Units to section "Drills for
   Converting Compound Units."   _____

3. DRILL: Do Chapter 53 section "Drills for Converting Compound
   Units," and check your answers.   _____

E. FRACTIONAL EXPONENTS

1. READ: Using one or more of the following resources, learn about working with exponents that are fractions:

    • Lesson 31, IM

    • Lesson 31, DVD

    • Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems in ST Lessons 31A and 31B. Use other sources of problems as needed.   _____

3. DRILL: Systematic Review.

    a) Do ST Lesson 31C. ____

    b) Do ST Lesson 31D. ____

    c) Do ST Lesson 31E. ____

    Answers are in IM, starting on p. 286.   _____

4. DRILL: Do Drill C in *Algebra 1 Companion Text,* Chapter 54 Additional Drills for Part 6: Drills C, D & E.   _____

5. DRILL: Honors Lesson. Do ST Lesson 31H. Answers are in IM, p. 327.   _____

6. DRILL: Lesson Test. Once you feel you are ready, take Lesson Test 31 in the Math-U-See Test Booklet, with no reference to the materials. Then check your answers in IM, p. 347, and note how many you missed here: _____ If you missed more than two, do more study before the Mastery Problems.   _____

7. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 31. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass**.   ____ ____

F. SIGNIFICANT DIGITS AND SCIENTIFIC NOTATION

1. READ: Using one or more of the following resources, learn about significant digits and scientific notation:

   - Lesson 32, IM

   - Lesson 32, DVD

   - Any other resources you can find   _____

2. DRILL: Gain a mastery of the types of problems on ST Lessons 32A and 32B. Use other sources of problems as needed.   _____

3. DRILL: Systematic Review.

   a) Do ST Lesson 32C. ____

   b) Do ST Lesson 32D. ____

   c) Do ST Lesson 32E. ____

   Answers are in IM, starting on p. 290.   _____

4. DRILL: Honors Lesson. Do ST Lesson 32H. Answers are in IM, p. 327.   _____

5. DRILL: Lesson Test. (Note, the answers given have many significant digit errors in them. Ignore this.) Once you feel you are ready, take Lesson Test 32 in the Math-U-See Test Booklet, with no reference to the materials. Then check your answers in IM, starting on p. 347, and note how many you missed here: _____ If you missed more than two, do more study before the Mastery Problems.   _____

6. DRILL: Mastery Problems. See your supervisor to do the Mastery Problems for Lesson 32. Do this with your supervisor observing. Explain the math rules you are using to your supervisor as you move through the problems. If you or your supervisor find that mastery hasn't been fully achieved, go back and sort it out. When you are ready, return to the supervisor to do the Mastery Problems again. You pass the Mastery Problems when you have demonstrated to the satisfaction of your supervisor and yourself that you have fully mastered the concepts studied in this section. **Supervisor pass**.   ____ ____

G. FINAL APPLICATION SECTION

1. DRILL: Do Drill D in *Algebra 1 Companion Text,* Chapter 54 Additional
   Drills for Part 6: Drills C, D & E.
   Supervisor pass on 40 rule applications   ____ ____

2. DRILL: Do Drill E in Chapter 54 Additional Drills for Part 6:
   Drills C, D & E. **Supervisor pass** on 20 rule applications   ____ ____

I have completed the steps of this course. I understand what I studied and can use it.

Student _____ Date_____

The student has completed the steps of this course and knows and can apply what was studied.

Academic Supervisor_____ Date_____

The student has passed the exam for this course.

Examiner _____ Date_____

FOR FACULTY

ADDITIONAL RESOURCES AT HERONBOOKS.COM
Mastery Problems for Algebra 1, Part 6
Exam and answers
Materials list