

AskDrCallahan

Algebra I

Teacher's Guide

5th Edition
rev01162012

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Welcome to AskDrCallahan Algebra 1

Start Here!

1. Make sure you have all of the following.

- Elementary Algebra , by Harold R. Jacobs. ISBN: 0716710471
- Solutions Manual for Elementary Algebra. ISBN: 0615315011
- Scientific calculator (TI-30 style or better)**
- DVD set of five (5) DVDs *

2. Course Introduction. Both the teacher and the student should put in the first DVD and play the course introduction. Watch this section together.

3. Review the syllabus. If you are new to using a syllabus, we have posted a Syllabus Tutorial on our website to help you navigate the syllabus format. You may also contact Homework Help for support. The syllabus is essentially an outline of pace and sequence for the course. The syllabus is also the place where we assign the homework problems for your student. Many parents find it useful to make a copy of the syllabus and add some dates to help you plan. The syllabus is designed like most college courses, so using it will be excellent preparation for further education.

4. Begin the student working in the Introduction and Chapter 1. Using the syllabus as a guide, allow the student to move at a comfortable pace making sure they understand the material. You may customize the syllabus and move faster or slower to achieve the optimal learning environment for your student.

5. You have FREE Homework Help! If you need help, start with a visit to the website at www.askdrcallahan.com and go to Homework Help. Click “Ask Questions Here” and submit the form with your questions. We respond within 24 hours, and have certified tutors on call for all your questions.

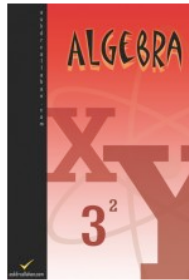
***The first disk in the dvd set is a cd rom. It contains pdfs of this guide.**

****Calculators should not be considered required for this course, but you will probably find a basic calculator quite useful. See pg. 8, “Calculators” for more information.**

Courses by AskDrCallahan



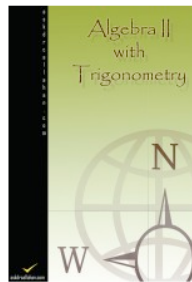
Pre-Algebra



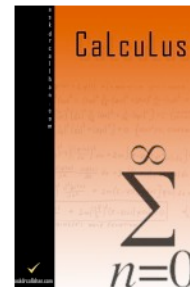
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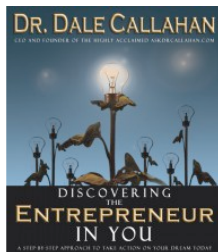
Geometry



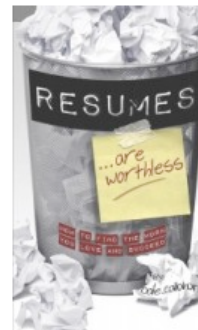
Algebra II with Trigonometry



Calculus 1



Discovering the Entrepreneur in You



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www.askdrcallahan.com

Contact us:

support@askdrcallahan.com

Table of Contents

Introduction & Getting Started	6
Calculators / Syllabus Key	8
Syllabus	9
Algebra 1 Test Grading Guide	13
Test Grade Sheets	16
Tests	24
Test Answer Keys	54
Problem Outline for Tests	123
Optional Activities	125

Introduction

Welcome to Algebra 1. This course is designed to introduce your student to high school math. We will start at the beginning and ease them into the more abstract thoughts that are algebra concepts. We suggest that you and your student read through the introductory materials together, and practice what may be new formats for your students, such as college level coursework, syllabus, and correcting their own work. Often things like being able to use the solutions manual on homework, is a new step for parents and students. It is important to make sure that you and your student are familiar with the new format, as you want to be able to tell the difference when moving through the course work itself as to what struggles are conceptual problems, and which hurdles are simply adjusting to a college level course. Note, too, that Algebra 1—particularly with this textbook—is a gentle course. Students who struggle severely here often only do so if they have not yet developed the logical/abstract abilities of their thinking skills. For many students the ability to think and reason abstractly develops by about age 14, but every student is unique and some will reach this point sooner, and others later, so make sure you evaluate your student before beginning Algebra 1. We have an **Algebra Readiness Exam** posted on our website to help you, and you can always contact our Homework Help service via phone or email to help you evaluate your student's individual situation. Lastly, remember, that as Dr. Callahan always says "If you are getting 100% on everything, you are in the wrong course." So don't reach for perfection in your grades, reach for excellence in your studies. Do your very best and learn all you can. Numbers are just numbers.

This manual outlines all of the steps to taking this course as well as grading and assigning homework, so whenever you need, you can always refer back to this manual to remember how things work. Remember, too, that if you bought our DVDs you have **FREE Homework Help** so if at any time you or your student are confused about a concept or a particular part of Algebra 1, we provide everything from an on-call tutor to video tutorials both on our website and through our Homework Help tutor-contact service. Simply send us an email and we will respond within 24 hours with help. Now that you know the basic tenants of how the course works, let's get started.

Getting Started

Here is an outline of how your math work should progress:

- Read the lesson.
- Watch the dvds, working the examples "along with" the video where appropriate.
- Work the example problems on your own; see if you get what the book shows for the lesson and that you understand what is being taught.
- Approach the homework. Use the syllabus and work assigned problems as opposed to trying to tackle everything available. You want to learn, not get overwhelmed by too much at once. Our problems are hand picked to deliver a healthy dose of conceptual practice, so if you can accurately navigate the assigned work, you can consider yourself well-done for the given lesson. Parents are encouraged to adjust homework as needed to fit the learning styles of your particular student, however, the assigned work does represent a complete work-load for Algebra 1 students on a college level.
- Once you have completed the homework, use your solutions manual to check your work. (Yes, students, you are grading your own work here. Part of stepping up to a college level course is learning to self-educate. Use your parents as a valuable resource in helping you, but start taking responsibility for your own education by grading, and correcting, your own homework.) As you grade your work, grade it right answer only. Which means that just because you got "most of it"

right, that's not an excuse to breeze over it. You want to spend some time here and make sure that for the ones you miss you are able to go back to them, rework them, and explain to yourself what you got wrong and why. Math builds on itself as you learn, and if you allow yourself to be ok with only "half right" then you will only be half prepared for later lessons, and that leads to confusion. So take your time, even allow several days if you need that long, but make sure you give just due to the homework. Your "reworking " of missed problems should be done without the solutions manual, and come back to the solutions manual when you need to check.

- Anything that you are not able to understand with the solutions manual's help (Or whenever the solutions manual is confusing, or you are not able to get what they show as the answer) Then contact us. We can help. ☺ Keeping track of difficult problems and then emailing Homework Help per lesson will allow you to stay on track and on schedule getting help when you need it without wasting any time.

You should never spend more than an hour a day on math. Set an egg timer if that helps you, but once your "math hour" is up, stop what you are doing and leave everything else to the next day. This will allow you to give focused effort to math, without overwhelming yourself, or taking time away from your other school work. Don't worry if you are not able to get through every single step in a single hour. There is more than one hour's worth of work here, and you may need to tackle a single lesson over a couple of days. You will notice on our syllabus that we allow a week for things like tests, just for this reason. The ultimate goal is effective learning, not rapid completion. Take the time you need and strive for excellence in all you do. You will find that as you move through the course you will start to complete things faster, but particularly at the beginning do not be shocked if it takes you a while to complete all these steps. Contact us when you need help, we are here when you need us.

Pace

The syllabus provided demonstrates the projected pace we would use if we taught this material in a college classroom. However, even in the classroom we will not always be on schedule since adjustments are always being made for holidays, inclement weather days, etc. You should not be overly concerned with following the schedule exactly – but use it as a guide. If you need to slow down – even significantly – to make sure the concepts are understood, you are doing the right thing. Conversely, do not be afraid to complete the course faster than the suggested pace. Some students are able to complete this course in less than one academic year, and that is perfectly acceptable. Contact us if you have questions or concerns about where your student is at in the course, or the pace at which you seem to be moving.

Suggested problem set

Math textbooks notoriously provide a wealth of problems for students. The provision of many problems should not be interpreted as a list of problems for students to complete. **DO NOT WORK EVERY PROBLEM AVAILABLE.** You will go insane, there are too many. We have gone through each lesson and hand-picked problems that identify and practice the key concepts per lesson. We have listed these problems under “Assigned Problems” on our syllabus. These assigned problems are what you can consider to be your student's homework for each lesson. If they can complete these problems, correct them, and identify their mistakes, they are moving at an excellent pace through the course. We encourage parents to use the remaining problems as test-preparation problems, practice problems, or supplemental work when students require extra attention on certain concepts.

What to do about Calculators:

Students will need a basic calculator on individual problems. Calculators should not be considered required for this course. Towards the end of the Algebra course, homework problems will incorporate large numbers that make it impractical to solve long hand. Once you reach this point in the course, we encourage parents to focus on the larger concepts at hand and allow students the use of a basic calculator when practical. When a problem is teaching students how to graph, for example, it is ok to allow them to use a basic calculator to crunch out the equation solving for the y-value. Contrary to popular belief, calculators cannot help you get problems correct if you do not understand the concepts, because a calculator only does what it is told. If a student does not understand what is being taught, they will inevitably enter in a wrong keystroke, or not recognize when the calculator delivers an incorrect answer. So parents need not worry about allowing a calculator in select instances. Note that in all of the later courses a calculator will be required, so some parents may find it beneficial to go ahead and purchase a scientific calculator for their Algebra student. We recommend a TI-30 style (or better) calculator.

As this course has a focal point around learning to graph accurately, we *discourage* the use of the graphing capability in the TI-89 or higher calculators. However, since the TI-89 is what we recommend for our Algebra II with Trig and Calculus I courses, rather than purchase 2 calculators, it is ok to go ahead and use a TI-89 or comparable calculator, but reserving the graphing function for checking answers after the student has tried the graph without a calculator. For more information on calculators, please visit:

www.askdrcllahan.com

Syllabus Key

We establish pace for the course by week. We list assignments based on what you should get done in a week of work (5 days, 1 hour a day). What each day looks like will vary by student.

Under "Assignment" is where we list homework problems. First we identify the Chapter Number, followed by the Lesson Number. For example, shown here is "1.1". This means, "Chapter 1, Lesson 1"

After we list the chapter and lesson, we identify individual problems for students to work for homework. "1-10" would imply they need to work every problem in that range. From number 1 to number 10. Where it simply has a single number, only that individual problem is to be worked with each problem being separated by a comma. Additionally, when problems contain multiple parts and we only want students to work certain parts, we will identify in parenthesis which parts to work. For example, shown here under "1.5" We tell students to only work letters b, d, e, f, and g, of number 16. We make this distinction by listing the specific letters assigned in parenthesis after 16.

Week	Student Action	Assignment
1	Review DVD: Introduction and 1.1-1.9 (Note: This week should be a lot of review so a lot of problems. Space out as needed)	Introduction 1.1: 1-10, 11, 13-16, 17, 19, 22 1.2: 1-10, 11-13, 16-17, 19, 22, 24 1.3: 1-12, 14, 15, 17, 19, 21 1.4: 1-11, 13, 15, 19, 22 1.5: 11, 12, 13, 15, 16 (b,d,e,f&g), 21(c,f,g-j) 1.6: 2, 4, 6, 7, 9 1.7: 4, 6, 7, 9, 14 1.8: 5, 7 (a, c, e, f, g, h), 8, 9 1.9: 6, 7, 9, 17
2	Review DVD: 2.1-2.3	2.1: 1-6, 10, 13-15 2.2: 1-17 2.3: 1-4, 6-7
3	Review DVD: 2.4-2.6	2.4: 4, 5, 7, 8, 9, 10, 13, 16 2.5: 2, 4, 6, 8, 9, 10, 15

Under "Student Action" is where we list what students should complete PRIOR to attempting homework. (These assignments are in addition to reading the textbook lessons).

Questions about the syllabus?
Contactus. We can help.
Support@askdrcllahan.com

Algebra I - Semester 1 Syllabus

Required Textbooks:

Elementary Algebra, by Harold R. Jacobs. ISBN: 0716710471
Solutions Manual for Elementary Algebra. ISBN: 0615315011

Study Points:

Math is a subject that takes practice. It is recommended that you study every day, reading and working problems.

*Need help with the syllabus? There is a key on pg. 8 of this manual, or you can contact us.
We can help! support@askdrcallahan.com*

Week	Student Action	Assignment
1	Review DVD: Introduction and 1.1-1.9 (Note: This week should be a lot of review, which means there are more problems assigned here than typical lessons. Adjust pace as needed.)	Introduction 1.1: 1-10, 11, 13-16, 17, 19, 22 1.2: 1-10, 11-13, 16-17, 19, 22, 24 1.3: 1-12, 14, 15, 17, 19, 21 1.4: 1-11, 13, 15, 19, 22 1.5: 11, 12, 13, 15, 16 (b,d,e,f&g), 21(e,f,g-j) 1.6: 2, 4, 6, 7, 9 1.7: 4, 6, 7, 9, 14 1.8: 5, 7 (a, c, e, f, g, h), 8, 9 1.9: 6, 7, 9, 17
2	Review DVD: 2.1-2.3	2.1: 1-6, 10, 13-15 2.2: 1-17 2.3: 1-4, 6-7
3	Review DVD: 2.4-2.6	2.4: 4, 5, 7, 8, 9, 10, 13, 16 2.5: 2, 4, 6, 8, 9, 10, 15 2.6: 3, 4, 6, 10, 13, 17
4	Review DVD: 3.1-3.5	3.1: 3, 4, 5, 10, 16 3.2: 3, 4, 5, 7, 10, 15 3.3: 7, 8, 10, 11 3.4: 1, 2, 6, 7, 8, 9, 14 3.5: 4, 7, 8, 10, 13, 14, 19
5	Review DVD: 3.6-3.7 Review for Test 1	3.6: 4, 7, 8, 12, 15 3.7: 2, 6, 8, 9, 14, 15 Take Test 1 Chapters 1-3
6	Review DVD: 4.1-4.3	4.1: 4, 7, 11, 13 4.2: 3, 7, 9, 11, 14 4.3: 4, 7, 11, 12, 17
7	Review DVD: 4.4-5.2	4.4: 2, 3, 6, 11, 14, 15 4.5: 3, 4, 6, 7, 10, 11, 12 5.1: 3, 4, 7, 8, 10

		5.2: 4,5,7,8,13,14
8	Review DVD: 5.3-5.5	5.3: 3,4,7,8,13,16 5.4: 1-5,10,13,14 5.5: 1-4,7,8,9,13
9	Review DVD: 5.6-5.8 Optional Activity 1 (back of TG*)	5.6: 2,3,4,5,6,7,9,14,15 5.7: 2,3,5,6,7,11,15 5.8: 2,4,5,7,8
10	Review DVD: 6.1-6.4 Optional Activity 2 (back of TG)	6.1: 4,5,8,10,11 6.2: 2,4,5,7,8,9,10,11,17,19 6.3: 4,5,6,7,8,9,11,15,16,17 6.4: 1,4,5,7,9,10,11,14,16
11	Review DVD: 6.5-6.6 Review for Test 2	6.5: 4,5,6,7,8,12,14,15 6.6: 1,2,4,5,7,8,12,13,14 Take Test 2 Chapters 4-6
12	Review DVD: 7.1-7.4	7.1: 3,4,6,8,15,20-25 7.2: 1-3,5,7,8-12,21-25 7.3: 6,7,8,10,12,19,21,23 7.4: 1,3,4-6,9,10,14,15,18,21
13	Review DVD: 7.5-8.1	7.5: 2,4,9,19,21,22,23 7.6: 2,3,8-11,14,16,26 7.7**: 3,4,7,9,11 8.1: 3,4,6,10,13,15,17,26,27
14	Review DVD: 8.2-8.5	8.2: 5,6,7,8,10,12,15,17 8.3: 3,4,5,8,10,13,14,16 8.4: 3,4,5,8,10,13 8.5: 3,5,7,9,10,12,13,14,24,25
15	Review DVD: 8.6-8.7 Review for Test 3	8.6: 4,6,8,9,12 8.7: 1,2,5,6,7,8,9,11,15 Take Test 3 Chapters 7-8

* TG = Teacher's Guide

** Be aware that section 7.7 is started on Disk 2 and then finished on Disk 3

Algebra I - Semester 2 Syllabus

Required Textbooks:

Elementary Algebra, by Harold R. Jacobs. ISBN: 0716710471

Solutions Manual for Elementary Algebra. ISBN: 0615315011

Study Points:

Math is a subject that takes practice. It is recommended that you study every day, reading and working problems.

*Need help with the syllabus? There is a key on pg. 8 of this manual, or you can contact us.
We can help! support@askdrcllahan.com*

Week	Student Action	Assignment
16	Review DVD: 9.1-9.4	9.1: 3,6,9,10,13,16 9.2: 4,6,8,9,13,15,17 9.3: 2,4,5,9,10,13 9.4: 3,7,8,11(a and c)
17	Review DVD: 9.5-9.7	9.5: 3,4,10,11 9.6: 1,2,5,9,16 9.7: 2,4,7,8,11,15
18	Review DVD: 10.1-10.5	10.1: 2,3,5,7,8,13 10.2: 3,4,6,9,10,12,15 10.3: 3,4,7,10,11,14,19 10.4: 4,6,8,10,15,17 10.5: 1,4,5,8,9,14,15
19	Review DVD: 10.6-10.8	10.6: 3,5,6,8,9,12,15,17 10.7: 3,6,7,8,12,13 10.8: 3,4,5,6,8,10,11,13
20	Review DVD: 11.1-11.5	11.1: 6,8,12,13,24 11.2: 2,5,7,9,12,14,17 11.3: 4,7,9 11.4: 3,6,11,15 11.5: 4,5,7,10,11
21	Review DVD: 11.6-11.8	11.6: 3,4,5,7,11,12 11.7: 1,5,7,8,11,13 11.8: 3,5,6,8,9
21	Review for Test 4	Take Test 4 Chapters 9-11
23	Review DVD: 12.1-12.4	12.1: 1,2,5,7,15,17 12.2: 4,6,11,13,17 12.3: 1,2,4,9,11,14,16 12.4: 1,5,9,13,15
24	Review DVD: 12.5-12.7	12.5: 1,3,4,8,10,12 12.6: 4,6,8,10,12,14,15,18 12.7: 4,7,10,12,13

25	Review DVD: 13.1-13.4	13.1: 4,6,9,11 13.2: 1,4,6,12,14,15 13.3: 3,4,6,8,9,10,11 13.4: 3,5,6,8
26	Review DVD: 13.5-13.7	13.5: 3,4,5,7,9,10,13,16,18 13.6: 3,4,5,8,9,10,11,13,15,16,17 13.7: 1,5,8,9,12,15,17
27	Review DVD: 13.8-13.9	13.8: 3,4,6,7,9,11,13,14 13.9: 4,6,7,9,11,13,14
28	Review DVD: 14.1-14.5	14.1: 2,5,7,8,10,14,16,17 14.2: 4,6,7,10,12,14 14.3: 3,5,6,7,9,13,14,15 14.4: 2,4,6,8,9,12,14,16 14.5: 3,5,6,10,12,14,17
29	Review DVD: 15.1-15.5	15.1: 3,4,5,9,10,11,13 15.2: 1,4,5,6,7,8,11 15.3: 3,5,7,8,10,11 15.4: 1,5,8,10,11,13 15.5: 1,3,4,6,10,11
30	Review for Test 5	Take Test 5 Chapters 12-15
31	OPTIONAL Review DVD: 16.1-16.4	16.1: 2,3,7,14,15 16.2: 1,4,5,7,8,11,14 16.3: 1,3,4,5,7,9,11 16.4: 1,3,6,7,8,10,13,15,17
32	OPTIONAL Review DVD: 17.1-17.4	17.1: 1,3,4,6,8,10,12,15 17.2: 1,4,6,7,8,9,11,16,17,20 17.3: 2,5,6,9,10,11,12,14,16,19,21 17.4: 4-8,11,14,17
33	Optional: Review Test 6	Take Test 6 Chapters 16-17

Algebra 1

~ Test Grading Guide ~

This test-grading guide is designed to make the grading of tests as easy as possible for the parent while at the same time encouraging learning by the student.

When to take the tests

The tests should be taken after the student has completed the sections covered by the test – as laid out on the syllabus. The syllabus indicates how we would deliver the tests in a classroom environment, but you can give the test whenever the student is ready.

How to take the tests

It is recommended that the tests be taken open book and open notes (The Student Edition text). In addition, you might find it best to allow the student to work the test over a few days. In a college environment the students would have about 2 hours to take these tests, and the decision on open vs. closed book tests would be a decision made by the individual professor. Dr. Callahan, as a university professor, chooses to offer open book/ open notes to his students and that's why our courses are structured this way. We encourage parents to adjust these allowances based on what they think is best for their student. If you do not allow the textbook, however, we suggest offering the use of 3 x 5 cards or notebook paper on which to write a formula sheet for use on the exam. It is more effective for students to learn how to use formulas than to spend time memorizing them. Many formulas will be memorized out of sheer frequency of use. However, the large volume of formulas being learned in this course makes memorization on the whole quite impractical. For more information on our thoughts about open/closed book tests as well as the time it takes for an exam, please contact us or visit our website for more information.

Calculators on Tests

For all tests, wherever the textbook indicates a calculator is needed, a calculator should be allowed for the test. The recommended version is a TI-30 style or better for this course. They will not need graphing capabilities (that is actually *discouraged* for this course) but they will need basic scientific functionality. (See more under "Calculators", pg. 8)

Test Format

- Each problem on the test has a recommended point value listed next to it in *italics*.

- Example:

- 1. (*2 points*) Solve each expression for x

- a. $2 + 4x = 14$

- b. $3 - 9x = x$

- This problem is slated to be worth 2 points because each letter (parts a and b) are each worth one point. In this way, you can grade right-answer-only on problems with multiple parts. (For a problem that does not have multiple parts, it is simply worth one point)

This set up was designed to make grading easier for the parents. The total number of points available on the test is written at the top of the exam. This is to aid you when grading. Each problem and/or sub-letter part of a problem is worth one point. Refer to the Test Grading Sheet (page 16) to see how to calculate the grade in percent.

For each test, an answer key has been provided and is listed by the corresponding test number. Also, since all questions are from the textbook we have provided a problem outline so that you can see where each problem is located in the book.

How to grade

You will find the sheets used to grade the test following these notes. We recommend the parent/teacher grade the test twice. The first time, you will mark up the test grading **CORRECT ANSWER ONLY**. You will then allow the student time to go back and re-work the problems that are missed. Using any resources they like (including the textbook, solutions manual, and Homework Help) the student should return to each missed problem, and not only re-work the problem, but explain what they missed and why. Then the parent/teacher will grade the test a second time, this time adding back a percentage value for each problem the student was able to correct.

Here's an outline of how test grading will work:

First – we deliver the test, then grade for correct answer only. We assign the student a grade based on this mark up. The problems are marked correct or incorrect, and a grade is given out of 100. The initial grades may be low, but this initial grade is not final, so do not panic. Also, do not consider the grade at this point to be reflective of a student's understanding. Keep reading.

Second – we allow the student to go back and attempt to correct the problems they missed. This method encourages them to learn from their mistakes. They should be allowed to use their book, their parents/teachers, tutors, and any outside resources they like to look up the concepts. Usually, a textbook is plenty. In addition to simply re-working the problem (and arriving at the right answer) they should also be asked to explain why they missed it the first time, and what they had to change to get it right on the re-work. This extra effort is rewarded when we then re-grade the problems they initially had wrong, giving partial credit for the accurate solutions. The process of having to re-work and explain to themselves what they missed helps solidify the concepts in their mind.

We have included an example grade sheet showing a student who got 48 of 53 problems correct on the first try. Then on the second grading round, they got the other five problems correct. We added back 50% of the original credit for their re-works and added that point value to the final grade.

Adjustments you can make

Your student may not need near the amount of time we allow. Adjust as needed.

You may want to allow the student to try a third or fourth time. This is not cheating – the goal is to learn!

You might also want to adjust the partial credit on the rework. To adjust, use another number on line “e” of the grade sheet. (Example: Using 80 instead of 50 would give 80% of the points for corrected problems.)

Filing and grade management

We know that each person has different filing requirements, so if you choose to not write the grades in this solutions book feel free to copy the grade sheets for easier filing. The grading sheets are also available at www.askdrcallahan.com

Parents seeking to count this course as anything other than a high school Algebra 1 credit should contact AskDrCallahan for more information. (We also have information about college credit and advanced placement on our website).

Feel free to contact us about any test formatting or grading questions. support@askdrcallahan.com

Test Grade Sheet

Student EXAMPLE

Course Algebra 1

Test Number 1

Attempt # 1

- | | | |
|----|---------------------------------|---|
| a. | Number of points earned | <u>48</u> |
| b. | Total number of points possible | <u>53</u> |
| c. | Grade ($100 \cdot a/b$) | <u>91</u> (round up to nearest integer) |

Attempt #2

- | | | |
|----|---------------------------------|--|
| d. | Number of points fixed | <u>5</u> |
| e. | Points added ($50 \cdot d/b$) | <u>5</u> (round up to nearest integer) |

Test Grade

- | | | |
|----|-------------------------|---|
| f. | Final Grade ($c + e$) | <u>96</u> (round up to nearest integer) |
|----|-------------------------|---|

Test Grade Sheet

Student _____

Course _____

Test Number _____

Attempt # 1

- a. Number of points earned _____
- b. Total number of points possible _____
- c. Grade ($100 \cdot a/b$) _____ (round up to nearest integer)

Attempt #2

- d. Number of points fixed _____
- e. Points added ($50 \cdot d/b$) _____ (round up to nearest integer)

Test Grade

- f. Final Grade ($c + e$) _____ (round up to nearest integer)

Test Grade Sheet

Student _____

Course _____

Test Number _____

Attempt # 1

- a. Number of points earned _____
- b. Total number of points possible _____
- c. Grade ($100 \cdot a/b$) _____ (round up to nearest integer)

Attempt #2

- d. Number of points fixed _____
- e. Points added ($50 \cdot d/b$) _____ (round up to nearest integer)

Test Grade

- f. Final Grade ($c + e$) _____ (round up to nearest integer)

Test Grade Sheet

Student _____

Course _____

Test Number _____

Attempt # 1

- a. Number of points earned _____
- b. Total number of points possible _____
- c. Grade ($100 \cdot a/b$) _____ (round up to nearest integer)

Attempt #2

- d. Number of points fixed _____
- e. Points added ($50 \cdot d/b$) _____ (round up to nearest integer)

Test Grade

- f. Final Grade ($c + e$) _____ (round up to nearest integer)

Test Grade Sheet

Student _____

Course _____

Test Number _____

Attempt # 1

- a. Number of points earned _____
- b. Total number of points possible _____
- c. Grade ($100 \cdot a/b$) _____ (round up to nearest integer)

Attempt #2

- d. Number of points fixed _____
- e. Points added ($50 \cdot d/b$) _____ (round up to nearest integer)

Test Grade

- f. Final Grade ($c + e$) _____ (round up to nearest integer)

Test Grade Sheet

Student _____

Course _____

Test Number _____

Attempt # 1

- a. Number of points earned _____
- b. Total number of points possible _____
- c. Grade ($100 \cdot a/b$) _____ (round up to nearest integer)

Attempt #2

- d. Number of points fixed _____
- e. Points added ($50 \cdot d/b$) _____ (round up to nearest integer)

Test Grade

- f. Final Grade ($c + e$) _____ (round up to nearest integer)

Test Grade Sheet

Student _____

Course _____

Test Number _____

Attempt # 1

- a. Number of points earned _____
- b. Total number of points possible _____
- c. Grade ($100 \cdot a/b$) _____ (round up to nearest integer)

Attempt #2

- d. Number of points fixed _____
- e. Points added ($50 \cdot d/b$) _____ (round up to nearest integer)

Test Grade

- f. Final Grade ($c + e$) _____ (round up to nearest integer)

**Algebra
Test 1
Chapters 1-3**
Total Points Possible: 65

Name: _____

Date: _____

Instructions: Work the following problems. Read directions carefully. Please note that where students are asked to fill in a given table for a function (as in number 7) they are allowed to draw their own table. Some students will want to use what's called a "t-chart" instead of a table, and this variance should be allowed. As long as students are using the x-value to find a y-value, however they want to write the table is fine.

You may find it helpful to write your answers on a separate sheet of paper. For some problems there may not be enough room on the actual test sheet. The test is open book, open notes.

1. (4 points) Find the value of the following expressions:

- a. $30 - 9 - 7$
- b. $30 - (9 - 7)$
- c. $1 + 4^3$
- d. $(1 + 4)^3$

2. (2 points) Mr. Bunyan is a lumberjack.

- a. If he can cut down 600 trees in an hour, how many trees can he cut down in x hours?
- b. If he can cut up x logs in a day, how many days would it take him to saw up 10,000 logs?

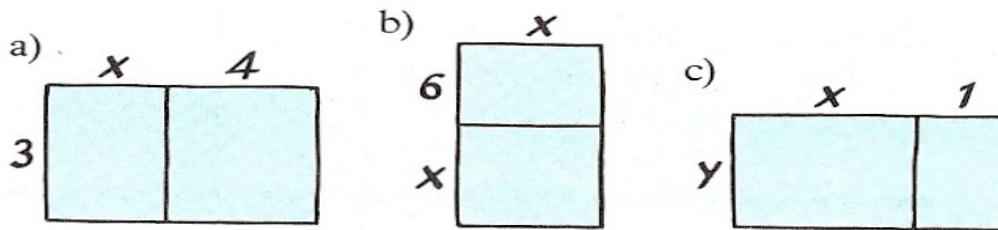
3. (4 points) Write a number for each of the following:

- a. The difference between a and 5
- b. The number b cubed
- c. The sum of 2 and c
- d. The quotient 1 and d

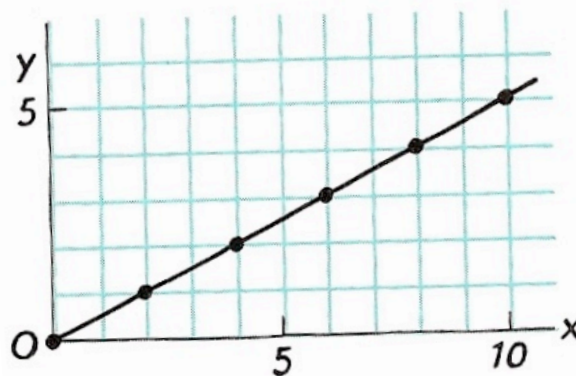
4. (2 points) During the month of July there were x shark attacks off the shore of Amity Beach.

- a. If 3 of the shark attacks were within 50 feet of the shore, how many were farther away?

- b. If 5 attacks occurred in August, how many were there in all?
5. (3 points) Write each of these products as a sum or difference:
- a. $8(v + 11)$ b. $(w-6)3$ c. $x(y+z)$
6. (3 points) Show how each of these figures illustrates the distributive rule by writing its area as BOTH a product and a sum.



7. (5 points) The graph of a certain function is shown here:



- a. Complete the following table for this function.

x	2	4	6	8	10
y					

- b. What happens to y if x is tripled?
- c. What kind of function is this?
- d. Write a formula for the function.
- e. Use your formula to find the value of y when $x = 30$
8. (3 points) Make a table of numbers for each of these functions, letting x equal 1,2,3,4. Graph each one.
- a. $y = x - 1$

b. $y = 2x + 3$

c. $y = \frac{8}{x}$

9. (3 points) A person's height is a function of his or her age. A formula with which to find the height of someone from the ages of 4 to 16 might be:

$$y = \frac{1}{4}x + 3$$

in which x represents the age and y represents the height in feet.

- a. Complete the following table for this function.

Age in years, x	4	8	12	16
Height in feet, y				

- b. Graph it.
- c. Does the height vary directly with his age for the ages graphed?
10. (1 point) Draw a pair of axes extending 8 units in each direction from the origin. Connect the points in the following list with straight-line segments in the order given to form a parallelogram. (7,5) (5,2) (0,1) (2,4) (7,5)
11. (3 points) As a prank, Davy Jones' friends decided to fill his gym locker with water, using a hose. The table shown here shows the height of the water in the locker as a function of time.

Time in seconds	0	10	20	30	40
Height of water (inches)	0	5	10	15	20

- a. Write a formula for this function, letting x represent the time in seconds and y represent the height of the water in inches.
- b. How does the water height vary with respect to the time?
- c. What would a graph of this function look like?
12. (4 points) The time that it takes a horse to run a race depends on how fast it runs. A typical formula for this function is:

$$y = \frac{180}{x}$$

in which x represents the horse's average speed in meters per second and y represents its time in seconds.

- a. Complete the following table for this function

Speed in meters	12	14	16	18	20
-----------------	----	----	----	----	----

per second, x					
Time in seconds, y		12.9			

- b. Graph it
- c. How do the horse's time and speed vary with respect to each other?
- d. Explain, mathematically, why we cannot figure out the horse's time if its speed is 0 meters per second.
13. (5 points) Which of these symbols: $>$, $=$, or $<$, should go in the blank in the problems below?
- $2 + -3$ ____ $2 - -3$
 - $-4 + 15$ ____ $-4(15)$
 - $0(-8)$ ____ $0 - 8$
 - $-45(39)$ ____ $45(-39)$
 - $(-708)^3$ ____ $(-78)^2$
14. (4 points) A point moves across a coordinate graph so that it's always 2 less than its x-coordinate.

- a. Complete this table of some of the points positions:

X	2	3	4	5
Y				

- b. Write a formula for y in terms of x.
- c. Plot the points, join them with a line, and extend it across a graph.
- d. Complete this table of some other positions of the point by referring to your graph.

X	-2	-1	0	1
Y				

15. (4 points) Simplify each of the following expressions.

a. $-\frac{24}{3}$ b. $-\frac{-35}{7}$ c. $-\frac{x}{-1}$ d. $-\frac{-x}{-x}$

16. (5 points) Find the values of the following expressions, given that $x = 2$ and $y = -5$

- $x - 3y$
- $11x + y$
- $-2(x + y)$
- $4 + xy$
- $x - y^2$

17. (5 points) Read each of the following statements carefully and tell whether it is true or false.

If you think a statement is false, give an example to explain why.

- a. Zero is an integer
- b. The sum of two negative integers is always negative
- c. If the x -coordinate of a point is negative, the point is below the x -axis
- d. The squares of some integers are negative
- e. The sum of a number and its opposite is zero

18. (3 points) Write each of the following statements in symbols, letting x represent the number.

- a. A certain number is less than negative four.
- b. Twice a certain number is equal to its square
- c. The quotient of a certain number and two is more than five

19. (2 points) Use repeated addition to show that each of the following equations is true.

- a. $5(-3) = -15$
- b. $4(-x) = -4x$

End of Test 1

Algebra
Test 2
Chapters 4-6
Total Points Possible: 56

Name: _____

Date: _____

Instructions: Work the following problems. Read directions carefully.

You may find it helpful to write your answers on a separate sheet of paper. For some problems there may not be enough room on the actual test sheet. The test is open book, open notes.

1. (5 points) Perform the operations indicated.
 - a. $8 + -0.3$
 - b. $-4.1 + -5.1$
 - c. $-2.7 - 0.9$
 - d. $-2.7(0.9)$
 - e. $2/-0.16$

2. (4 points) Make a table for each of the following functions and draw its graph. In each case, connect each point with a line or curve.
 - a. $y = -0.5x$ Let x vary from -6 to 6
 - b. $y = x^2 + 1$ Let x vary from -3 to 3
 - c. $y = 4x - 3$ Let x vary from -1 to 3
 - d. $y = \frac{-6}{x}$ Let x vary from -6 to 6

3. (5 points) Perform the operations indicated.
 - a. $6 + -0.7$
 - b. $-5.2 - -2.5$
 - c. $-2.8 - 0.4$
 - d. $-2.8(0.4)$
 - e. $-2.8/0.4$

4. (4 points) Find a number that can replace x to make each of the equations true. If you think no such number can be found, briefly explain why.
 - a. $x + 6 = -10$
 - b. $\frac{39}{x} = 3$
 - c. $x^2 = 64$
 - d. $2^x = 64$

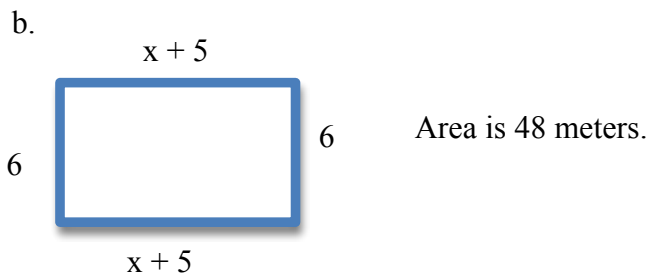
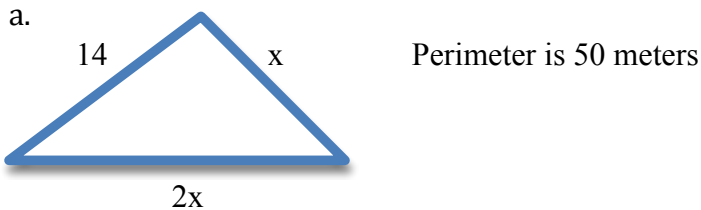
5. (3 points) Write a simpler expression for each of the following:

- a. $9x + 2x$
- b. $9(2x)$
- c. $9 + (2 + x)$

6. (2 points) Solve each equation for x

- a. $3.6x - 2.2x = 4.2$
- b. $4(0.2x + 3.7) = 0.7x - 6.7$

7. (2 points) Find the lengths of the sides in each figure.



8. (2 points) Please indicate what operations should be performed on each expression to give x as the solution

- a. $6(x+2)$
- b. $3x + y$

9. (3 points) Solve each equation for x.

- a. $3 + x = -4$
- b. $-4x = 3$
- c. $x/-8 = -9$

10. (3 points) Write a simpler expression equivalent to the one given.

- a. $4x + 5x$
- b. $4 + (5 + x)$
- c. $7(x)(x)$

11. (3 points) Minneapolis and Denver are 700 miles apart.
- Copy and Complete the following table to show how long it would take to fly from one city to another.

R	350	400	500
T			

- Write a formula for the table in part a. Let “r” represent the speed and “t” represent the time.
 - Using the information from parts a and b, how does the time vary with respect to the speed? (please use words to answer this question)
12. (5 points) In a horse race, Dog Biscuit is 30 feet ahead of the next horse, Beetlebaum. While Dog Biscuit is running at a speed of 46 feet per second, Beetlebaum speeds up to 50 feet per second. Find out how long it will take Beetlebaum to catch up by doing each of the following:
- If “x” represents the time it takes, what distance does each horse run during this time? (Give your answers in terms of x)
 - Draw a diagram to represent the problem
 - Use the information in your diagram to write an equation.
 - Solve the equation from part “a” for x.
 - How far did each horse run during this time?
13. (2 points) Solve each problem for the indicated variable.
- $3x = y + 7$ for x
 - $6x + y = 1$ for y
14. (3 points) The area of a triangle whose base has the length of “b” and whose altitude has a length “h” is given by the formula: $\text{Area} = \frac{1}{2} (b)(h)$
- Use the formula given above to find the area of a triangle whose base is 6 and whose altitude is 4.
 - Check your answer to part “a” by solving the original formula for h, and then solve letting $h = 4$ and $b = 6$.
 - Confirm your answer to part “a”, again, by solving the original area equation for b, then let $b = 6$ and $h = 4$.
15. (2 points) The Silver Shadow Car Rental Company charges for both the number of days that a car is rented and the number of miles that it is driven. A formula for the cost in dollars (represented by “c”), of renting the car from the company is: $c = 100(d) + 1.5(m)$, in which “d” represents the number of days and “m” represents the number of miles.
- Solve the formula above for d.
 - For how many days would a movie studio have rented a car if it had been driven 200 miles and the rental cost was \$700?
16. (1 point) Find the x and y intercepts of the line with the following equation:
- $$x + 6y = 0$$

17. (2 points) For each of the following points, plot the points on a coordinate graph, draw a line through each pair, and find its slope.
- a. (2,7) and (6,10)
 - b. (5,-3) and (-5,-3)

18. (1 point) Suppose a woman decided to go on a diet when she reached “x” pounds. A formula for her weight in pounds, “w”, while on the diet would be:

$$w = x - 3y$$

in which “x” represents her weight at the beginning of the diet and “y” is the number of weeks that she has been on the diet. Find the number of weeks she would have to stay on her diet in order to weigh 120 lbs, if she weighed 180 pounds at the beginning of her diet.

19. (2 points) Tell whether or not each of the following ordered pairs is a solution to the equation given.

a. $5x + y = 14$ (5, - 11)

b. $x^2 + y^2 = 9$ (-5, -4)

20. (2 points) Draw graphs of the following lines.
- a. The line through the origin having a slope of 2/5
 - b. The line through the origin having a slope of 5/2

End of Test 2

Algebra
Test 3
Chapters 7-8
Total Points Possible: 50

Name: _____

Date: _____

Instructions: Work the following problems. Read directions carefully.

You may find it helpful to write your answers on a separate sheet of paper. For some problems there may not be enough room on the actual test sheet. The test is open book, open notes.

1. (4 points) Tell whether or not each of the following ordered pairs are a solution of the given simultaneous equation.

$$\begin{aligned} 7x + 2y &= 12 \\ y &= 5x - 11 \end{aligned}$$

- a) (0,6)
b) (2,-1)

$$\begin{aligned} x^2 - 3y &= 16 \\ x + y^2 &= 4 \end{aligned}$$

- c) (4,0)
d) (2,-4)

2. (4 points) Write the equation that results from performing the indicated operations on these two equations: (each letter is worth one point.)

$$\begin{aligned} 2x + y &= 6 \\ 2x - 4y &= 10 \end{aligned}$$

- a) adding the two equations
b) subtracting the second equation from the first
c) Multiplying both sides of the first equation by four
d) Dividing both sides of the second equation by 2

3. (1 point) Solve these equations by substitution:

$$\begin{aligned} 2x + y &= -40 \\ 8y - 3 &= x \end{aligned}$$

4. (1 point) Solve these equations by substitution:

$$\begin{aligned} x + 6 &= y - 1 \\ 3(x + 3) &= 2y \end{aligned}$$

5. (3 points) Mr. Magoo's wife asked him to buy some 10 cent and 13 cent stamps for her. He couldn't read the numbers of each kind that she had written down but remembered that he was supposed to by ten dollars worth. If Mrs. Magoo wanted 85 stamps altogether, find out how many of each kind she wanted by doing the following:
- Let x and y represent the numbers of 10-cent and 13-cent stamps respectively. Write out a pair of simultaneous equations, one relating the numbers of stamps and the other relating their costs.
 - Solve the equations.
 - How many stamps of each kind did Mrs. Magoo want?

6. (5 points) Tell whether or not each of the following ordered pairs is a solution to the simultaneous equation given.

$$x - 6y = 21$$

$$4y = 1 - x$$

- a. (9, -2)
- b. (21, 0)

$$2x + y = -5$$

$$x^2 + y^2 = 25$$

- c. (0, -5)
- d. (-4, 3)
- e. (-1, -3)

7. (1 point) Solve these simultaneous equations:

$$5x + 4y = 53$$

$$x - 2y = 5$$

8. (1 point) Solve these simultaneous equations:

$$4x + 3y = 17$$

$$3x + 5y = 10$$

9. (3 points) On a fishing trip, Huckleberry Finn caught 31 fish. Some were bullheads averaging 1.5 pounds each and the rest were catfish averaging 5 pounds each. The entire catch weighed 92 lbs. Find out how many fish of each kind Huckleberry Finn caught by doing each of the following:
- a. Let x and y represent the numbers of bullheads and catfish respectively. Write a pair of equations, one relating the numbers of fish and the other relating their weights.
 - b. Solve the equations.
 - c. How many of each kind of fish did he catch?
10. (1 point) Write the number 220,000,000 in scientific notation.
11. (1 point) Write the number 22 in scientific notation
12. (1 point) What number is a number divided by when its decimal point is moved seven digits to the left?
13. (1 point) When you move the decimal point in a number seven digits to the left, how does the exponent of the 10 in scientific notation form of the number change?

14. (4 points) Write each of the following numbers in scientific notation:

- a. 700,000,000,000
- b. 412×10^5
- c. .002
- d. 10.002

15. (4 points) Write each of the following expressions without the parenthesis.

- a. $(4x)^3$
- b. $(7y)^{-1}$
- c. $(-5x^5)^2$
- d. $\left(\frac{x}{y^2}\right)^4$

16. (6 points) Find the value of "x" in each of the following equations.

- a. $3^4 * 3^6 = 3^x$
- b. $4^3 * 6^3 = x^3$
- c. $5^2 * 5^x = 5^8$
- d. $2^5 * x^5 = 8^5$
- e. $\frac{7^{12}}{7^3} = 7^x$
- f. $\frac{12^7}{3^7} = x^7$

17. (3 points) Write each of the following expressions as a single power of x.

- a. $x^{-4} * x^9$
- b. $(x^{-4})^9$
- c. $\frac{x^{-5}}{x}$

18. (3 points) Write an expression without parenthesis that is equivalent to the following:

a. $(2x)^5$

b. $(-3y^3)^4$

c. $\left(\frac{x^2}{y}\right)^3$

19. (3 points) Find the value for "x" in each of the following equations.

a. $5^2 * 5^4 = 5^x$

b. $3^x * 3^3 = 3^{12}$

c. $\frac{10^6}{2^6} = x^6$

End of Test 3

Algebra
Test 4
Chapters 9-11
Total Points Possible: 39

Name: _____

Date: _____

Instructions: Work the following problems. Read directions carefully.

You may find it helpful to write your answers on a separate sheet of paper. For some problems there may not be enough room on the actual test sheet. The test is open book, open notes.

1. (3 points) Find the value of each polynomial as indicated.
 - a. Find the value of $(x^4) - (x^2)$ if $x = 4$
 - b. Evaluate $(2x^3) + (3x^2)$ if $x = 2$
 - c. What does $x^4 - 2x^3 + 1$ equal if $x = 10$?
2. (3 points) Simplify and write your answers in descending powers of the variable.
 - a. $x(x + 4)$
 - b. $(x - 10)(x + 10)$
 - c. $(x^3 + 3)(x^3 - 3)$
3. (3 points) Perform the operations as indicated:
 - a. From $3x + x^4$ subtract $x^3 + 3x - 1$
 - b. Subtract $5x - 11y$ from $4y + 20x$
 - c. Divide $2x - 7$ into $2x^4 - 98x + x^3$
4. (4 points) Rewrite each of the following expressions as a polynomial in descending powers of the variable.
 - a. $8x - x^2 + x^8 - 2x$
 - b. $x^2(3x - 1) - (x^2 - x^3)$
 - c. $(6x - 1)(x - 3)$

- d. $(x^4 - 4)(x^4 + 4)$
5. (2 points) Perform the operations indicated
- Add $x^2 + 10x - 6$ and $x^4 - x^2 - 4$
 - From $6x - 5y + 4$, subtract $3y + 5x + 7$
6. (1 point) Find the product of $4x^2 - x - 2$ and $x + 5$
7. (4 points) Perform the operations indicated.
- $(7x - 2) + (3x - 8)$
 - $(7x - 2)(3x - 8)$
 - $(4x^2 - 9)(2x + 3)$
 - $(4x^2 - 9)/(2x + 3)$
8. (4 points) Find the missing term in these trinomials
- $16x^2 + 8x + \square$
 - $9x^2 - \square + 49$
 - $(\square)(-5x^3) = 20x^6$
 - $5x^2 + 23x - 10 = (\square)(x + 5)$
9. (4 points) Factor as completely as possible
- $6x - 21$
 - $x^2 - 49$
 - $x^2 + 2xy$
 - $x^2 - 2xy^2 + y^4$

10. (2 points) Find the Greatest Common Factor (GCF) for the following terms:

a. $6x$ and 8

b. x^6 and x^8

11. (1 point) Find the value of $(90 + 2)(90 - 2)$

12. (2 points) Factor these polynomials as completely as possible.

a. $x^2 + 9$

b. $49x^2 + 28x + 4$

c. $3x^2 + 16x + 5$

d. $2x^2 + x - 28$

13. (1 point) Tell whether the following equation is true for all allowable values of the variables. If the equation is not true, give an example in which it is not true.

$$\frac{x + 4}{y + 4} = \frac{x}{y}$$

14. (1 point) Find the following quotient as a polynomial or as a fraction in its simplest terms.

$$\frac{x^2 - y^2}{6} \div \frac{x - y}{2}$$

15. (1 point) If possible, reduce this fraction:

$$\frac{x^2 + 14x + 49}{x^2 - 49}$$

16. (1 point) Write this sum as a monomial or fraction in its simplest terms:

$$\frac{x - 1}{x^2} + \frac{1}{x}$$

17. (1 point) Write $\frac{3x - 7}{3x + 7}$ as the difference of two fractions.

18. (1 point) Simplify: $x + \frac{1}{2 + \frac{4}{x}}$

End of Test 4

Algebra
Test 5
Chapters 12-15
Total Points Possible: 75

Name: _____

Date: _____

Instructions: Work the following problems. Read directions carefully.

You may find it helpful to write your answers on a separate sheet of paper. For some problems there may not be enough room on the actual test sheet. The test is open book, open notes.

1. (2 points) List the square roots of these numbers:

a. $\sqrt{x^4}$

b. $\sqrt{6x^6}$

2. (2 points) Write each of the following expressions as a quotient without a square root in the denominator.

a. $\sqrt{\frac{5}{16}}$

b. $\sqrt{\frac{1}{x^3}}$

3. (2 points) Find the value of each of the following expressions. Round any approximate answers to the nearest tenth. (you may use the chart on page 563 if you need)

a. $\sqrt{40 - 4}$

b. $3\sqrt{7 + 2}$

4. (1 point) Simplify: $(54 + \sqrt{6}) + (6 + \sqrt{54})$

5. (2 points) Square as indicated:

a. $(5\sqrt{2})^2$

b. $(\sqrt{5} - 2)^2$

6. (1 point) Multiply and Simplify: $(4 + \sqrt{3})(2 + \sqrt{12})$

7. (1 point) Rationalize the denominator of this fraction: $\frac{60}{\sqrt{6}-1}$

8. (1 point) Write the following expression in simple radical form: $\sqrt{60,000}$

9. (1 point) Find the value of the following expression. Round any approximate answers to the nearest tenth. (you may use the chart on page 563 to help you if you need)

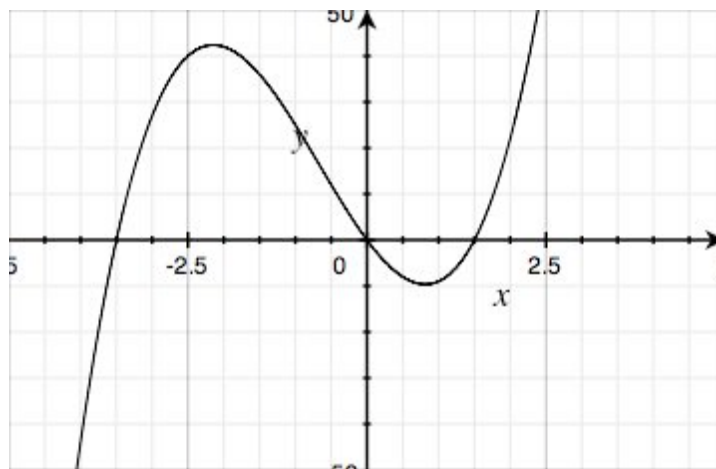
$$\sqrt{13} + \sqrt{17}$$

10. (1 point) Multiply and Simplify: $(\sqrt{x} + 12)(\sqrt{x} - 12)$

11. (1 point) Solve the following equations. Simplify where possible.

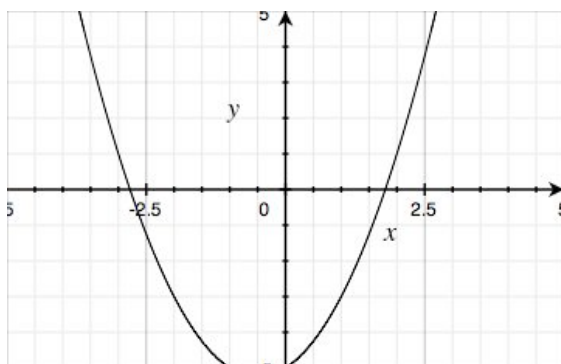
$$3\sqrt{x+1} = \sqrt{x+7}$$

12. (3 points) The Graph of the function $y = 4x^3 + 8x^2 - 21x$ is shown here.

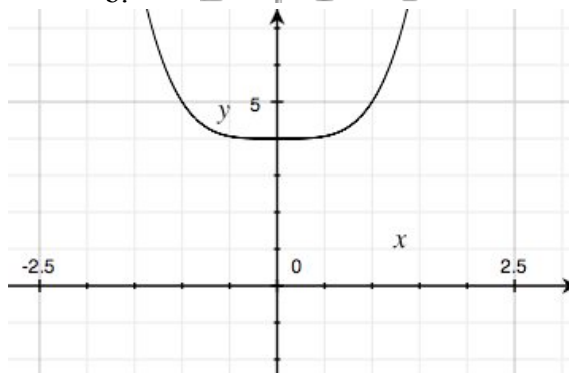


- Write an equation whose solutions can be estimated from this graph.
 - How many solutions does the equation have?
 - Estimate each of their values to the nearest tenth.
13. (1 point) Use these graphs to estimate the solutions of each equation:

a. $x^2 + x - 5 = 0$



b. $x^4 + 4 = 0$



14. (2 points) Solve the following quadratic equations by completing the square.

a. $x^2 + 10x = 11$

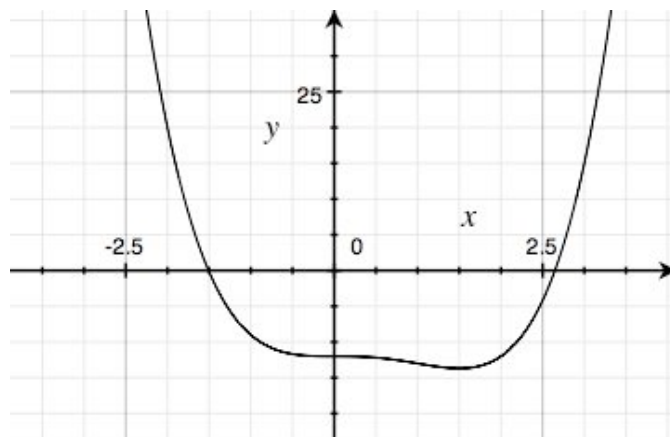
b. $x^2 - 6x + 4 = 0$

15. (2 points) Solve the following cubic and quartic equations by factoring.

a. $x^3 + x^2 = 12x$

b. $2x^4 - 10x^2 = 0$

16. (3 points) The graph of the function $y = x^4 - 2x^3 - 12$ is shown here:



- Write an equation whose solutions can be estimated from this graph.
- How many solutions does the equation have?
- Estimate each of their values to the nearest tenth.

17. (4 points) Solve each of the following quadratic equations by the factoring method.

a. $6x^2 - 5x = 0$

b. $x^2 - 36 = 0$

c. $x^2 + 8x = 33$

d. $(x + 5)(x + 6) = 2$

18. (3 points) Find the value of the discriminant for each of the following quadratic equations and use it to tell how many solutions the equation has:

a. $6x^2 - x + 3 = 0$

b. $3x^2 + 8x + 5 = 0$

c. $x^2 - 12x + 36 = 0$

19. (4 points) If possible, find the rational number represented by this expression, with the given value of x .

$$\frac{5x}{x - 2}$$

a. $x = 1$

b. $x = 2$

c. $x = 3$

d. $x = 4$

20. (4 points) A table listing some of the roots of 0.9 and 1.1 is shown here. Each root is rounded to the nearest thousandth.

$\underline{n}$	$\sqrt[n]{0.9}$	$\sqrt[n]{1.1}$
2	0.949	1.049
3	0.965	1.032
4	0.974	1.024
5	0.979	1.019
10	0.990	1.010
100	0.999	1.001

- a. What happens to $\sqrt[n]{0.9}$ as n gets larger?
- b. What number does $\sqrt[n]{0.9}$ get close to as n is very large?
- c. What happens to $\sqrt[n]{1.1}$ as n gets larger?
- d. What number does $\sqrt[n]{1.1}$ get very close to as n gets very large?

21. (3 points) The third century Chinese mathematician Liu Hui used the number $3\frac{7}{50}$ as an approximation of π .

- Write this number as the quotient of two integers.
- Change the result to decimal form.
- Is it smaller or larger than π ? ($\pi = 3.14159265\dots$)

22. (4 points) Change the following rational numbers to decimal form.

a. $\frac{10}{4}$

b. $\frac{7}{25}$

c. $\frac{44}{9}$

d. $\frac{2}{13}$

23. (4 points) If possible, find the rational number represented by $\frac{x^2 + 1}{x^2 - 1}$ for each of the following x-values.

a. $x = 0$

b. $x = 1$

c. $x = 2$

d. $x = 3$

e.

24. (1 point) Arrange the following numbers in order from smallest to largest.

$$0.027, 0.02\overline{7}, 0.0\overline{27}, 0.\overline{027}$$

25. (2 points) Simplify the following ratios:

a. $\frac{5x}{15x}$

b. $\frac{x + 12}{x + 2}$

26. (2 points) Express each of the following products as a polynomial in the simplest form.

a. $8\left(\frac{x}{8} - 2\right)$

b. $x\left(7 - \frac{3}{x}\right)$

27. (4 points) Solve the following equations:

a. $\frac{1}{x - 7} = 2$

c. $\frac{x - 3}{15} = \frac{1}{x + 3}$

b. $\frac{3x}{x - 1} = \frac{6x}{2x - 2}$

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

28. (2 points) The volume of a cone can be found by the formula:

$$v = \frac{\pi r^2 h}{3}$$

“r” represents the radius of its base and “h” represents its altitude.

- Find the exact volume of a cone for which $r=6$ and $h=15$ centimeters.
- Find the altitude of a cone for which $v=256\pi$ cubic centimeters and $r=8$ centimeters.

29. (2 points) Solve the following equations for x in terms of the other variables. Simplify your answers as much as possible.

a. $a^2x + a^2 = a$

b. $2\pi x = a\pi$

30. (1 point) A temperature in degrees Fahrenheit can be changed into degrees Celsius by using the formula:

$$C = \frac{5}{9}(F - 32)$$

Solve the formula for “F” in terms of “C”.

31. (2 points) The African board game called “Wari” is played with a set of bowls containing various stones. The number of stones in each bowl changes as the game is played. A picture of this game is shown:



- What is the ratio of the number of bowls containing stones to the total number of bowls?
- What is the ratio of the total number of bowls to the number of empty bowls?

32. (2 points) If possible, simplify the following ratios:

a. $\frac{2x + 10}{5x + 10}$

b. $\frac{x^2 + 1}{x^2 - 1}$

33. (2 points) Find each of the following products as a polynomial in simplest form.

a. $5(9 + \frac{x}{5})$

b. $14(\frac{x}{2} - \frac{1}{7})$

34. (2 points) Solve the following equations for x in terms of the other variables. Simplify your answers as much as possible.

a. $\frac{x}{a-b} = \frac{a+b}{b^2}$

b. $\frac{1}{x} - \frac{1}{a} = b$

35. (1 point) A temperature in degrees Fahrenheit can be changed to degrees Kelvin by using the following formula:

$$K = \frac{5}{9}(F + 460)$$

The freezing point of water is 32° F. Use the formula above to convert this temperature into Kelvin.

End of Test 5

**Algebra
Test 6
(Optional)
Chapters 16-17**
Total Points Possible: 50

Name: _____

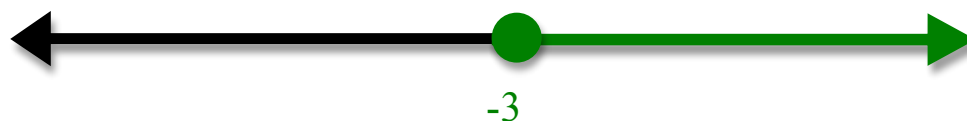
Date: _____

Instructions: Work the following problems. Read directions carefully.

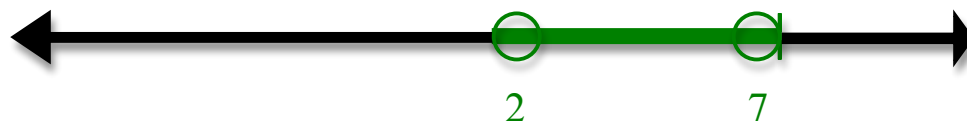
You may find it helpful to write your answers on a separate sheet of paper. For some problems there may not be enough room on the actual test sheet. The test is open book, open notes.

1. (4 points) Write an inequality in terms of x to represent each of the following figures:

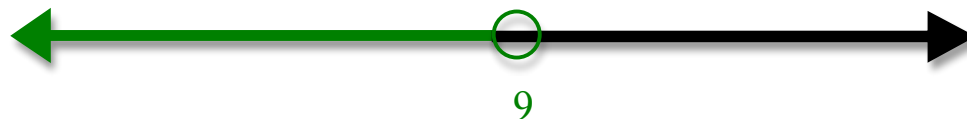
a.



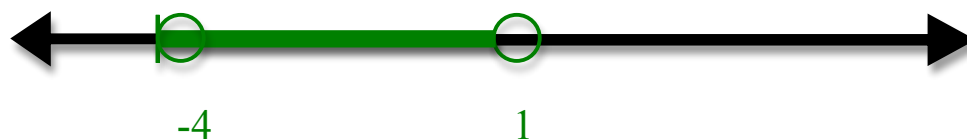
b.



c.



d.



2. (6 points) Solve each of the inequalities for x .

a. $x + 4 > 3$

b. $4x > 3$

c. $-2x < 16$

d. $9 - x \leq 1$

e. $-2 < x - 4 < 2$

f. $5x + 3 > -7$

3. (4 points) Solve the following inequalities for x in terms of the other variables.

a. $ax - b < 1$, if $a > 0$

b. $\frac{x}{a} > \frac{b}{c}$ if $a < 0$

c. $ax - bx \leq c$, if $a > b$

d. $0 < x - a < a + b$

4. (4 points) Solve each of the following inequalities for x:

a. $x + 5 < 2$

b. $5x < 2$

c. $-3x > 30$

d. $7 - x \geq 4$

5. (3 points) Solve the following inequalities for x in terms of the other variables.

a. $ax + b > 0$, if $a > 0$

b. $\frac{x}{b} < \frac{a}{c}$, if $b < 0$

c. $ax - bx \leq c$ if $a > b$

6. (2 points) Tell whether each of the following sequences is arithmetic, geometric, both or neither. If a sequence is arithmetic, tell the common difference. If it is geometric, tell the common ratio.

a. 1.5 6 24 96 ...

b. $\sqrt{10}$ $\sqrt{11}$ $\sqrt{12}$ $\sqrt{13}$...

7. (1 point) Write a formula for the nth term of the following sequences and use it to find the indicated term. :

4, 28, 196, 1372, 9604...6th term.

8. (4 points) Write the first four terms of the sequences having the following formulas for their n th terms.

a. $t_n = 3n - 1$

b. $t_n = n^4$

c. $t_n = 4^n$

d. $t_n = 5(n + 2)$

9. (3 points) Write a formula for the n th term of each of the following sequences and use it to find the indicated term.

a. $5, 6, 7, 8, 9 \dots ; 100^{\text{th}} \text{ term}$

b. $-2, -4, -6, -8, -10 \dots ; 15^{\text{th}} \text{ term}$

c. $5, 25, 125, 625, 3125, \dots ; 7^{\text{th}} \text{ term}$

10. (2 points) Use the formula for the sum of the terms of an arithmetic sequence to find each of the following sums.

a. $3 + 6 + 9 + 12 + \dots + 123$

b. $46 + 47 + 48 + 49 + \dots + 74$

11. (1 point) Use the formula for the sum of the terms of a geometric sequence and the table on page 801 to find the sum of the first six terms in this sequence: 12, -36, 108.....

12. (7 points) Find each of the following sums:

a. $1+3$

b. $1+3+5$

c. $1+3+5+7$

d. $1+3+5+7+9$

e. What type of numbers are all of the sums?

f. Write a formula for the n th term of the sequence: 1, 3, 5, 7, 9.... Simplify the formula as much as you can.

g. Write a formula for the sum of the first n terms of this sequence. Simplify the formula as much as you can.

13. (3 points) Tell whether each of the following sequences is arithmetic, geometric, both, or neither. If a sequence is arithmetic, tell the common difference. If it is geometric, tell the common ratio.
- a. -7, -1, 5, 11...
 - b. $1^3, 2^3, 3^3, 4^3 \dots$
 - c. 8, 20, 50, 125...
14. (3 points) Write the first four terms of the sequences having the following formulas for their n th terms.
- a. $t_n = n^3$
 - b. $t_n = 3^n$
 - c. $t_n = 5n + 6$
15. (3 points) Acute Alice bought a new houseplant that was 30 centimeters tall when she brought it home from the store. In each successive month, the plant grew by an amount equal to $\frac{2}{5}$ of its previous height.
- a. How *much taller* was it at the end of the first month?
 - b. How *tall* was it at the end of the first month?
 - c. At the rate of growth described, how long would it take the plant to become 60 centimeters tall. Justify your answer.

End of Test 6

ANSWER KEY

Algebra

Test 1

Total Points Possible: 65

Name: _____

Date: _____

Instructions: Work the following problems. Read directions carefully.

You may find it helpful to write your answers on a separate sheet of paper. For some problems there may not be enough room on the actual test sheet. The test is open book, open notes.

1. (4 points) Find the value of the following expressions:

- a. $30 - 9 - 7 = 14$
- b. $30 - (9 - 7) = 30 - 2 = 28$
- c. $1 + 4^3 = 1 + 64 = 65$
- d. $(1 + 4)^3 = (5)^3 = 125$

2. (2 points) Mr. Bunyan is a lumberjack.

- a. If he can cut down 600 trees in an hour, how many trees can he cut down in x hours?

$$\frac{600\text{trees}}{1\text{hour}} * \frac{x\text{hours}}{1} = \frac{600x\text{trees}}{1} = 600x\text{trees}$$

- b. If he can cut up x logs in a day, how many days would it take him to saw up 10,000 logs?

$$\frac{1\text{day}}{x\text{logs}} * \frac{10000\text{logs}}{1\text{s}} = \frac{10000}{x}\text{days}$$

3. (4 points) Write a number for each of the following:

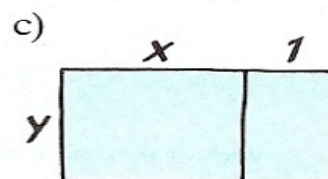
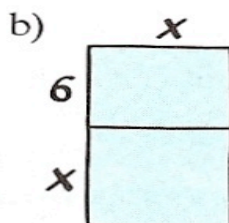
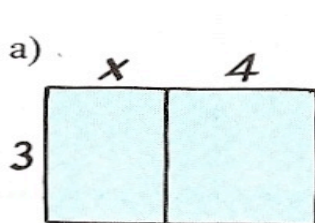
- a. The difference between a and 5 $a - 5$
- b. The number b cubed b^3
- c. The sum of 2 and c $2 + c$
- d. The quotient 1 and d $\frac{1}{d}$

4. (2 points) During the month of July there were x shark attacks off the shore of Amity Beach.

- a. If 3 of the shark attacks were within 50 feet of the shore, how many were farther away?

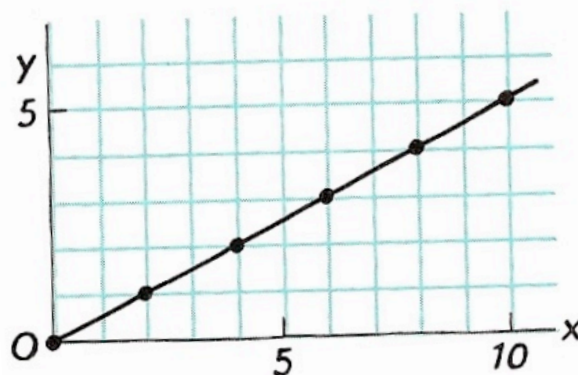
x represents the total amount of shark attacks. If three were within 50 feet, the rest were further out. So the math expression is $x - 3$

- b. If 5 attacks occurred in August, how many were there in all? $x + 5$
5. (3 points) Write each of these problems as a sum or difference:
- a. $8(v + 11)$ $8v + 88$
- b. $(w - 6)3$ $3w - 18$
- c. $x(y + z)$ $xy + xz$
6. (3 points) Show how each of these figures demonstrate the distributive rule by writing its area as both a product and a sum.



a) $3(x + 4) = 3x + 12$ b) $x(x + 6) = x^2 + 6x$
 c) $y(x + 1) = xy + y$

7. (5 points) The graph of a certain function is shown here:



- a. Complete the following table for this function.

X	2	4	6	8	10
---	---	---	---	---	----

Y	1	2	3	4	5
---	---	---	---	---	---

- b. What happens to y if x is tripled? **Y is tripled**
- c. What kind of function is this? **Linear**
- d. Write a formula for the function. **$y = \frac{1}{2}(x)$**
- e. Use your formula to find the value of y when $x = 30$ **$y = \frac{1}{2}(30) = 15$**

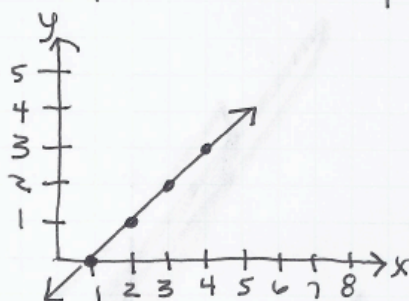
8. (3 points) Make a table of numbers for each of these functions, letting x equal 1,2,3,4. Graph each one.

Algebra Test 1
Number 8

a)

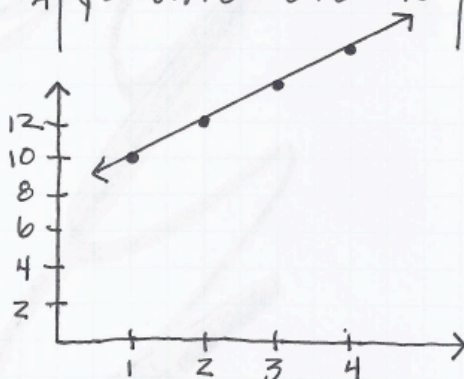
x	$y = x - 1$	(x, y)
1	$y = 1 - 1 = 1 - 1 = 0$	(1, 0)
2	$2 - 1 = 1$	(2, 1)
3	$3 - 1 = 2$	(3, 2)
4	$4 - 1 = 3$	(4, 3)

use these points
to graph function.



b)

x	$y = 2x + 8$	(x, y)
1	$y = 2(1) + 8 = 2 + 8 = 10$	(1, 10)
2	$y = 2(2) + 8 = 4 + 8 = 12$	(2, 12)
3	$y = 2(3) + 8 = 6 + 8 = 14$	(3, 14)
4	$y = 2(4) + 8 = 8 + 8 = 16$	(4, 16)

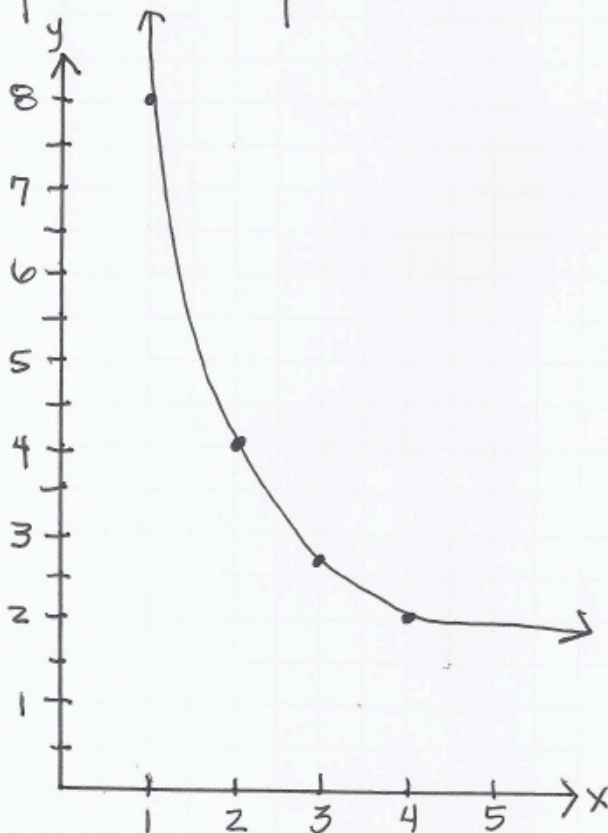


Algebra Test 1
Number 8 letter c

c)

x	$y = \frac{8}{x}$	(x,y)
1	$y = 8/1 = 8$	(1,8)
2	$y = 8/2 = 4$	(2,4)
3	$y = 8/3 = 2.7$	(3,2.7)
4	$y = 8/4 = 2$	(4,2)

★ Since one of your y-values is a decimal, be sure to leave room on your graph for that point ★



Notice in these graphing problems that our answer key is using what is called a t-chart, with three columns. Whatever tabular method your students want to use is fine. They should go with the format most comfortable to them.

9. (3 points) A person's height is a function of his or her age. A formula with which to find the height of someone from the ages of 4 to 16 might be:

$$y = \frac{1}{4}x + 3$$

in which x represents the age and y represents the height in feet.

- a. Complete the following table for this function.

Age in years, x	4	8	12	16
Height in feet, y	4	5	6	7

- b. Graph it.

Algebra I
Test 1

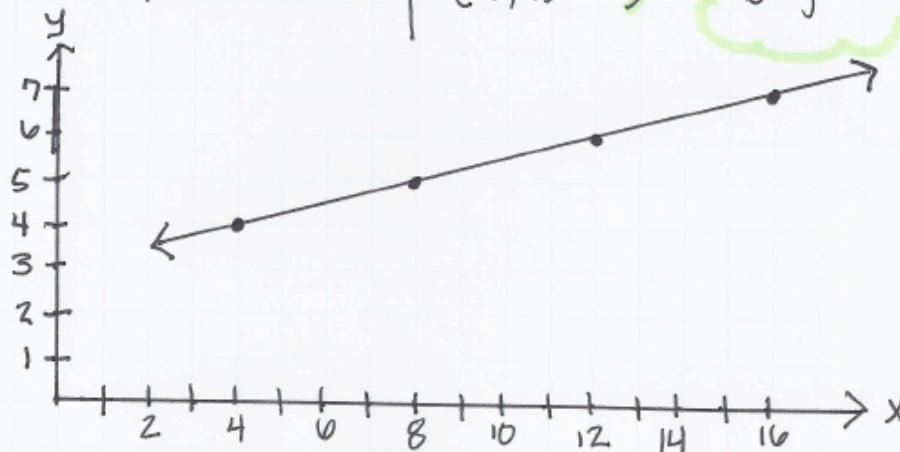
Number 9, letter b.

Use the chart from part a, or you can create a t -chart to identify the points.

x	y	(x, y)
4	$y = \frac{1}{4}(4) + 3 = \frac{4}{4} + 3 = 1 + 3 = 4$	(4, 4)
8	$y = \frac{1}{4}(8) + 3 = \frac{8}{4} + 3 = 2 + 3 = 5$	(8, 5)
12	$y = \frac{1}{4}(12) + 3 = \frac{12}{4} + 3 = 3 + 3 = 6$	(12, 6)
16	$y = \frac{1}{4}(16) + 3 = \frac{16}{4} + 3 = 4 + 3 = 7$	(16, 7)

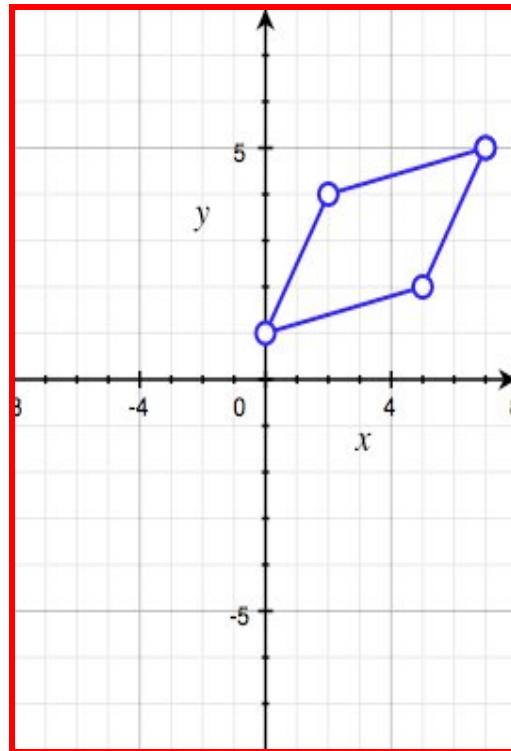
These are the individual points you use to graph the function.

Graph:



- c. Does the height vary directly with his age for the ages graphed? **No.** In mathematics, we are not talking about a direct relationship in the sense that one variable immediately effects the other. Instead, when we ask if it is varying directly, we mean "Does the formula for this relationship fit the formula for direct variation?" And the answer is no. You can tell both from the given function, as well as by the fact that this graph has a y -intercept. Direct variation equations will always go through the origin, and have no y -intercept.

10. (1 point) Draw a pair of axes extending 8 units in each direction from the origin. Connect the points in the following list with straight-line segments in the order given to form a parallelogram. (7,5) (5,2) (0,1) (2,4) (7,5)



11. (3 points) As a prank, Davy Jones' friends decided to fill his gym locker with water, using a hose. The table shown here shows the height of the water in the locker as a function of time.

Time in seconds	0	10	20	30	40
Height of water (inches)	0	5	10	15	20

- a. Write a formula for this function, letting x represent the time in seconds and y represent the height of the water in inches.

$$y = \frac{x}{2}$$

- b. How does the water height vary with respect to the time?
The water height varies directly with respect to the time.
- c. What would a graph of this function look like? A straight line going through the origin.

12. (4 points) The time that it takes a horse to run a race depends on how fast it runs. A typical formula for this function is:

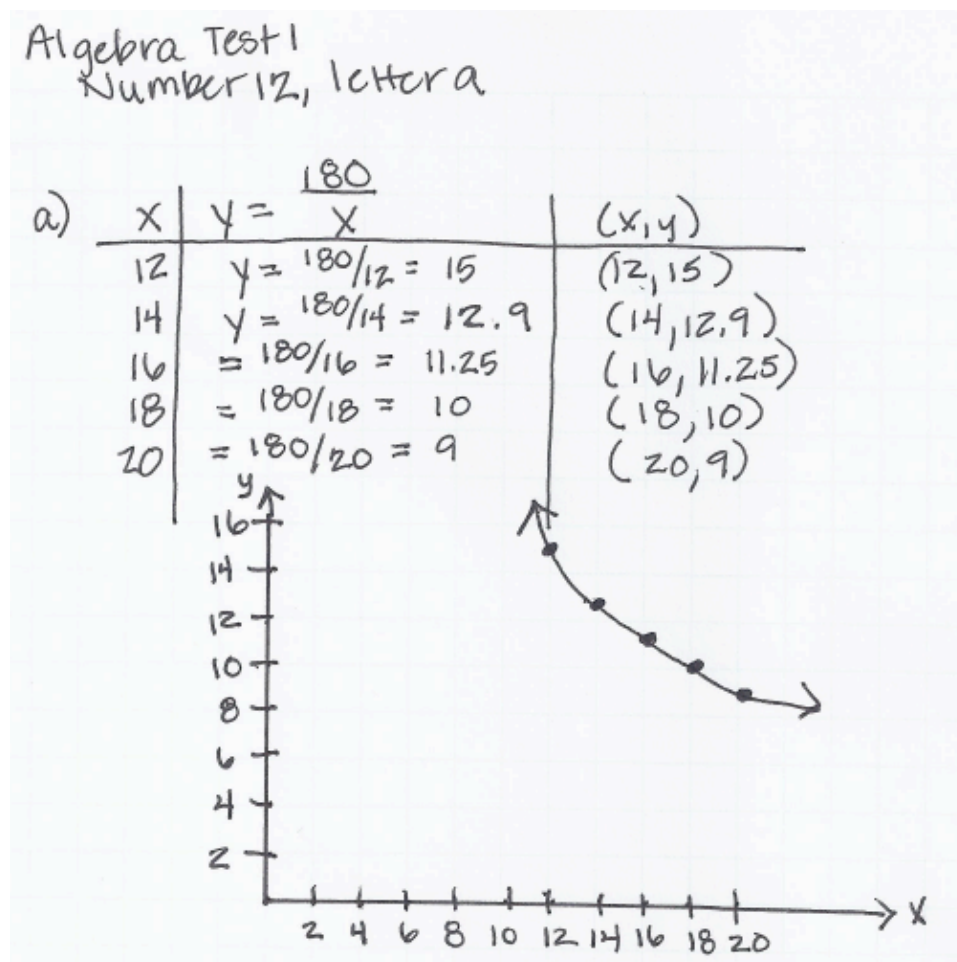
$$y = \frac{180}{x}$$

in which x represents the horse's average speed in meters per second and y represents its time in seconds.

- a. Complete the following table for this function

Speed in meters per second, x	12	14	16	18	20
Time in seconds, y	15	12.9	11.25	10	9

- b. Graph it



Note that this chart we label the columns as “x” and “y” whereas the given chart on the test includes the “speed in meters per second” and the “Time in seconds” whether or not you include the extra wordage, as long as students understand what “x” and “y” represent for this problem, it is acceptable for them to fill in their chart either way. In showing one method on the test, and another method here in the answer key, it is to demonstrate that both methods are correct. The number values are the same for both.

- c. How do the horse’s time and speed vary with respect to each other?

Inversely

- d. Explain, mathematically, why we cannot figure out the horse’s time if its speed is 0 meters per second.

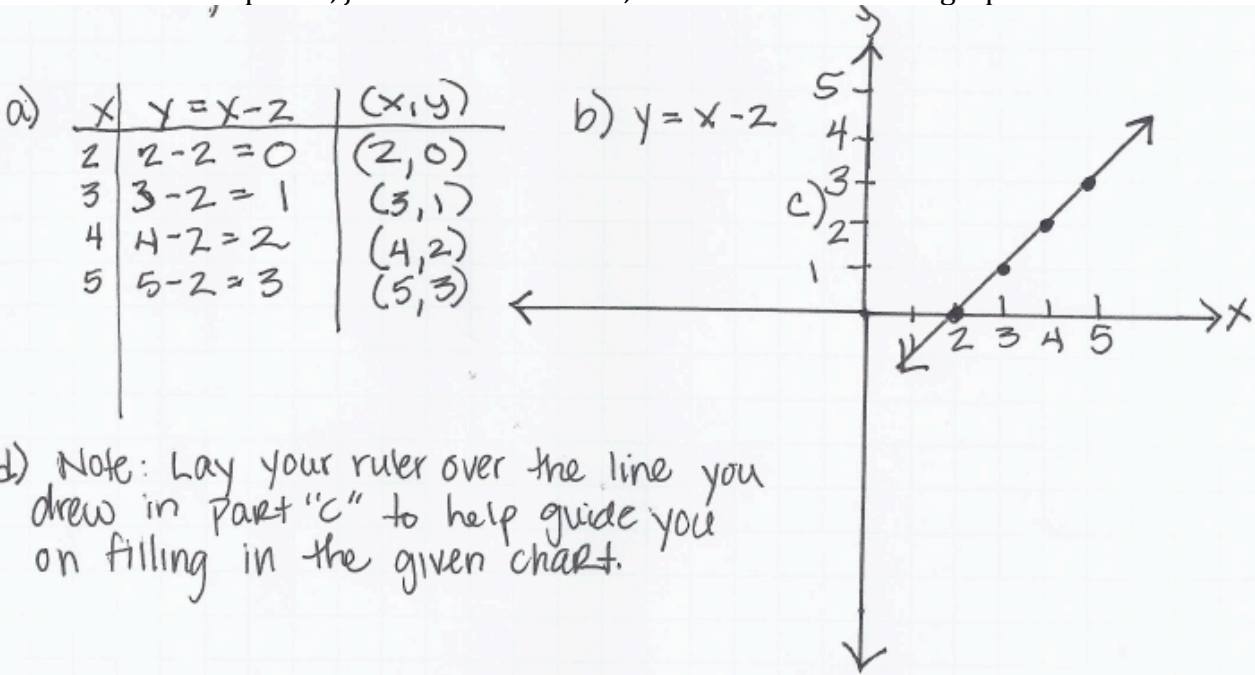
It is impossible to divide by zero.

13. (5 points) Which of these symbols: $>$, $=$, or $<$, should go in the blank in the problems below?

- a. $2 + -3$ $<$ $2 - -3$
 b. $-4 + 15$ $>$ $-4(15)$
 c. $0(-8)$ $>$ $0 - 8$
 d. $-45(39)$ $=$ $45(-39)$
 e. $(-708)^3$ $<$ $(-78)^3$

14. (4 points) A point moves across a coordinate graph so that its always 2 less than its x-coordinate.

- a. Complete this table of some of the points positions:
 b. Write a formula for y in terms of x.
 c. Plot the points, join them with a line, and extend it across a graph.



- d. Complete this table of some other positions of the point by referring to your graph.

X	-2	-1	0	1
Y	-4	-3	-2	-1

15. (4 points) Simplify each of the following expressions.

a. $-\frac{24}{3}$

b. $-\frac{-35}{7}$

c. $-\frac{x}{-1}$

d. $-\frac{-x}{-x}$

a) -8

b) 5

c) x

d) -1

16. (5 points) Find the values of the following expressions, given that $x = 2$ and $y = -5$

a. $x - 3y$

$$x - 3y = (2 - 3(-5)) = 2 - (-15) = 2 + 15 = 17$$

b. $11x + y$

$$11x + y = 11(2) + (-5) = 22 + (-5) = 22 - 5 = 17$$

c. $-2(x + y)$

$$-2(X + Y) = -2(2 + (-5)) = -2(2 - 5) = -2(-3) = 6$$

d. $4 + xy$

$$4 + xy = 4 + (2)(-5) = 4 + (-10) = 4 - 10 = -6$$

e. $x - y^2$

$$x - y^2 = 2 - (-5)^2 = 2 - 25 = -23$$

17. (5 points) Read each of the following statements carefully and tell whether it is true or false.

If you think a statement is false, give an example to explain why.

a. Zero is an integer **True**

b. The sum of two negative integers is always negative **True**

c. If the x-coordinate of a point is negative, the point is below the x-axis

False. The point (-3, 5) has a negative x value, but the point is above the x-axis.

d. The squares of some integers are negative **False**, nothing squared will equal a negative because a negative times a negative is always positive. For example:

$$-2(-2) = (-2)^2 = 4 \text{ NOT } -4$$

- e. The sum of a number and its opposite is zero **True**

18. (3 points) Write each of the following statements in symbols, letting x represent the number.

- a. A certain number is less than negative four.

$$x < -4$$

- b. Twice a certain number is equal to its square

$$2x = x^2$$

- c. The quotient of a certain number and two is more than five

$$\frac{x}{2} > 5$$

19. (2 points) Use repeated addition to show that each of the following equations is true.

- a. $5(-3) = -15$

$$-3 + -3 + -3 + -3 + -3 = -3 - 3 - 3 - 3 - 3 = -15$$

- b. $4(-x) = -4x$

$$-x + -x + -x + -x = -x - x - x - x = -4x$$

End of Test 1 Answer Key

ANSWER KEY
Algebra
Test 2
Chapters 4-6
Total Points Possible: 58

Name: _____

Date: _____

Instructions: Work the following problems. Read directions carefully.

You may find it helpful to write your answers on a separate sheet of paper. For some problems there may not be enough room on the actual test sheet. The test is open book, open notes.

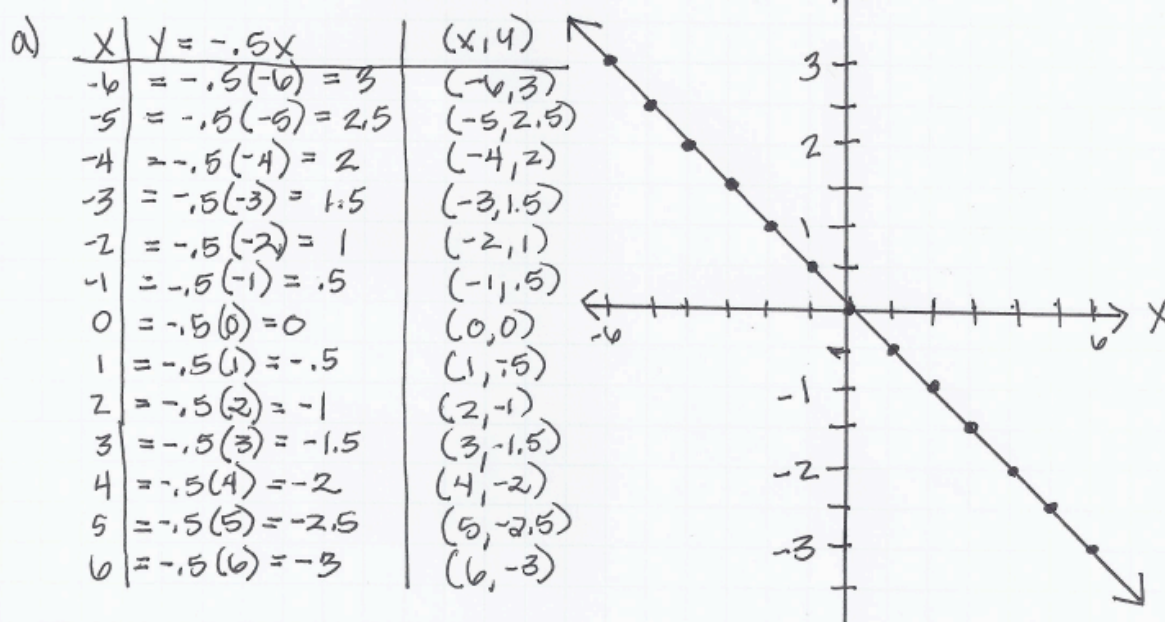
1. (5 points) Perform the operations indicated.

- a. $8 + -0.3$ **7.7**
- b. $-4.1 + -5.1$ **-9.2**
- c. $-2.7 - 0.9$ **-3.6**
- d. $-2.7(-0.9)$ **2.43**
- e. $2/-0.16$ **-12.5**

2. (4 points) Make a table for each of the following functions and draw its graph. In each case, connect each point with a line or curve.

- a. $y = -0.5x$ Let x vary from -6 to 6

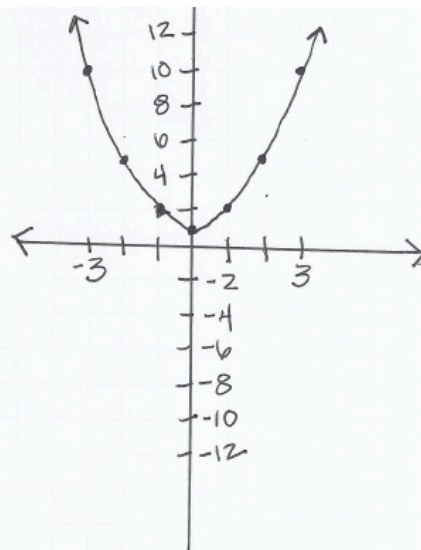
Algebra Test 2
 Number 2, lettera



b. $y = x^2 + 1$ Let x vary from -3 to 3

Algebra Test 1
Number 2, letter b

x	$y = x^2 + 1$	(x, y)
-3	$= (-3)^2 + 1 = 9 + 1 = 10$	(-3, 10)
-2	$= (-2)^2 + 1 = 4 + 1 = 5$	(-2, 5)
-1	$= (-1)^2 + 1 = 1 + 1 = 2$	(-1, 2)
0	$= (0)^2 + 1 = 0 + 1 = 1$	(0, 1)
1	$= (1)^2 + 1 = 1 + 1 = 2$	(1, 2)
2	$= (2)^2 + 1 = 4 + 1 = 5$	(2, 5)
3	$= (3)^2 + 1 = 9 + 1 = 10$	(3, 10)

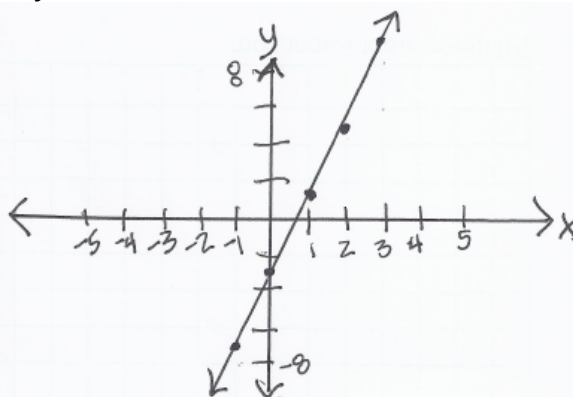


c. $y = 4x - 3$ Let x vary from -1 to 3

Algebra Test 2
Number 2, letter c

c)

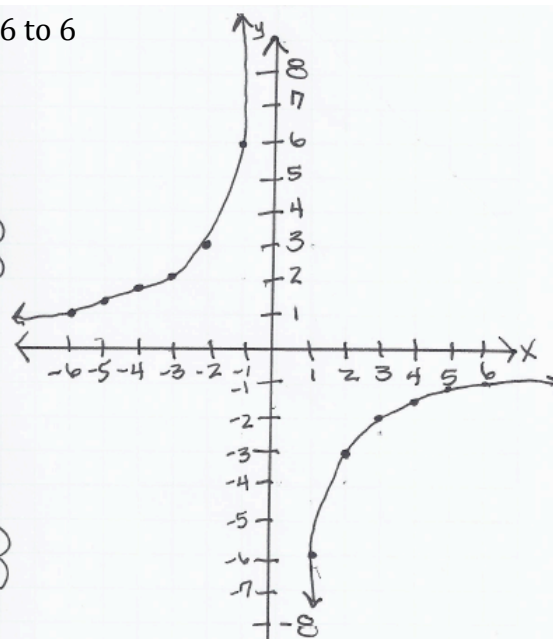
x	$y = 4x - 3$	(x, y)
-1	$= 4(-1) - 3 = -4 - 3 = -7$	(-1, -7)
0	$= 4(0) - 3 = 0 - 3 = -3$	(0, -3)
1	$= 4(1) - 3 = 4 - 3 = 1$	(1, 1)
2	$= 4(2) - 3 = 8 - 3 = 5$	(2, 5)
3	$= 4(3) - 3 = 12 - 3 = 9$	(3, 9)



d. $y = \frac{-6}{x}$ Let x vary from -6 to 6

Algebra Test 2
Number 2, letter d

x	$y = \frac{-6}{x}$	(x, y)
-6	$= -6 / -6 = 1$	(-6, 1)
-5	$= -6 / -5 = 1.2$	(-5, 1.2)
-4	$= -6 / -4 = 1.5$	(-4, 1.5)
-3	$= -6 / -3 = 2$	(-3, 2)
-2	$= -6 / -2 = 3$	(-2, 3)
-1	$= -6 / -1 = 6$	(-1, 6)
0	$= -6 / 0 = \text{undefined}$	N/A
1	$= -6 / 1 = -6$	(1, -6)
2	$= -6 / 2 = -3$	(2, -3)
3	$= -6 / 3 = -2$	(3, -2)
4	$= -6 / 4 = -1.5$	(4, -1.5)
5	$= -6 / 5 = -1.2$	(5, -1.2)
6	$= -6 / 6 = -1$	(6, -1)



3. (5 points) Perform the operations indicated.

- a. $6 + -0.7$ 5.3
- b. $-5.2 - -2.5$ -2.7
- c. $-2.8 - 0.4$ -3.2
- d. $-2.8(0.4)$ -1.12
- e. $-2.8/0.4$ -7

4. (4 points) Find a number that can replace x to make each of the equations true. If you think no such number can be found, briefly explain why.

a. $x + 6 = -10$

$$\begin{array}{r} x + 6 = -10 \\ -6 \quad -6 \\ \hline x = -10 - 6 = -16 \end{array}$$

b. $\frac{39}{x} = 3$

$$\frac{39}{x} = 3$$

$$x\left(\frac{39}{x}\right) = 3(x)$$

$$39 = 3(x)$$

$$\frac{39}{3} = \frac{3x}{3}$$

$$13 = x$$

c. $x^2 = 64$

$$x^2 = 64$$

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

$$x = \pm 8$$

d. $2^x = 64$ because $2*2*2*2*2*2=64$, for this problem, $x = 6$

5. (3 points) Write a simpler expression for each of the following:

- a. $9x + 2x$ $11x$
- b. $9(2x)$ $18x$
- c. $9 + (2 + x)$ $9+2+x = 11 + x$

6. (2 points) Solve each equation for x

a. $3.6x - 2.2x = 4.2$ $1.4x = 4.2$

$$\frac{1.4x}{1.4} = \frac{4.2}{1.4}$$

$$x = 3$$

b. $4(0.2x + 3.7) = 0.7x - 6.7$

$$4(0.2x + 3.7) = 0.7x - 6.7$$

Apply Distributive Property $.8x + 14.8 = 0.7x - 6.7$

Combine Like Terms $+6.7$ $+6.7$

$$.8x + 21.5 = 0.7x$$

$$-.8x \quad -.8x$$

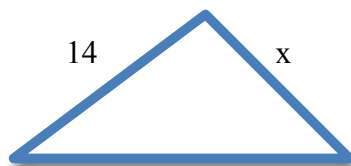
$$21.5 = -0.1x$$

Divide both sides by -0.1 to get x by itself

$$-215 = x$$

7. (2 points) Find the lengths of the sides in each figure.

a.



Perimeter is 50 meters

$$\begin{array}{r} 14 + x + 2x = 50 \\ 14 + 3x = 50 \\ -14 \quad -14 \\ \hline 3x = 36 \end{array}$$

$$\frac{3x}{3} = \frac{36}{3}$$

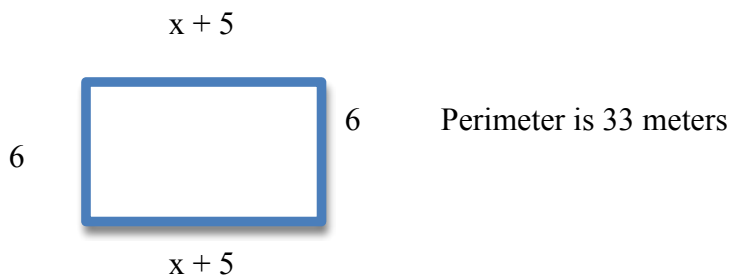
$$x = 12$$

Side 1 = 14 meters

Side 2 = 12 meters

Side 3 = $2(12)$ meters = 24 meters

b.



$$(x + 5) + (x + 5) + 6 + 6 = 33$$

$$x + x + 5 + 5 + 6 + 6 = 33$$

$$2x + 10 + 12 = 33$$

$$2x + 22 = 33$$

$$\begin{array}{r} -22 \\ -22 \end{array}$$

$$2x = 11$$

$$x = 5.5$$

Sides 1 and 2 are 6 meters each, which is given.

Sides 3 and 4 are $x+5$ meters each and since $x=5.5$ they are $5.5+5 = 10.5$ meters each.

8. (2 points) Please indicate what operations should be performed on each expression to give x as the solution.

a. $6(x+2)$

$$\frac{6(x + 2)}{6}$$

Divide by 6 6 Then Subtract 2 $x + 2 - 2 = x$

b. $3x + y$

Subtract y: $3x - y + y = 3x$ Then divide by 3: $\frac{3x}{3} = x$

9. (3 points) Solve each equation for x.

a. $3 + x = -4$

$$\begin{array}{r} 3 + x = -4 \\ -3 \quad -3 \end{array}$$

$$x = -7$$

b. $-4x = 3$

$$-4x = 3$$

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

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

c. $x/-8 = -9$

$$\frac{x}{-8} = -9$$

$$-8\left(\frac{x}{-8}\right) = (-9)(-8)$$

$$x = 72$$

10. (3 points) Write a simpler expression equivalent to the one given.

a. $4x + 5x$

$$9x$$

b. $4 + (5 + x)$

$$4 + 5 + x = 9 + x$$

c. $7(x)(x)$

$$7x^2$$

11. (3 points) Minneapolis and Denver are 700 miles apart.

a. Complete the following table to show how long it would take to fly from one city to another.

$$D = R(T) ; \quad 700 = 350t ; \quad 700 = 400t ; \quad 700 = 500t$$

r	350	400	500
t	2	1.75	1.4

- b. Write a formula for the table from part a. Let "r" represent the speed and "t" represent the time.

$$D = R(T)$$

$$\frac{700}{r} = \frac{x(t)}{x}$$

$$\frac{700}{r} = t$$

- c. Using the information from part a and b, how does the time vary with respect to the speed? (please use words to answer this question)

Inversely. The faster you travel, the sooner you get there. So as the speed is increasing, the time is decreasing. This question is a practical application of a math concept. In "math terms" here, you are identifying the type of function based on the formula. Since the formula in part b fits the format for inverse functions, we know this is varying inversely.

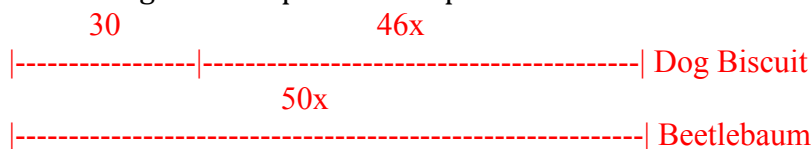
12. (5 points) In a horse race, Dog Biscuit is 30 feet ahead of the next horse, Beetlebaum. While Dog Biscuit is running at a speed of 46 feet per second, Beetlebaum speeds up to 50 feet per second. Find out how long it will take Beetlebaum to catch up by doing each of the following:

- a. In "x" represents the time it takes, what distance does each horse run during this time? (Give your answers in terms of x)

Distance = Rate (Time)

Dog Biscuit: $46x$ feet Beetlebaum: $50x$ feet

- b. Draw a diagram to represent the problem



- c. Use the information in your diagram to write an equation. $30 + 46x = 50x$
d. Solve the equation from number 39 for x. $x = 7.5$
e. How far did each horse run during this time? Dog Biscuit: 345 feet, Beetlebaum: 375 feet

$$46(7.5) = 345 \quad 50(7.5) = 375$$

13. (2 points) Solve each problem for the indicated variable.

a. $3x = y + 7$ for x

$$\frac{3x}{3} = \frac{y + 7}{3}$$

$$x = \frac{y + 7}{3}$$

Answer Key
Algebra Test 2

b. $6x + y = 1$ for y

$$\begin{array}{r} 6x + y = 1 \\ -6x \qquad -6x \\ \hline y = 1 - 6x \end{array}$$

14. (3 points) The area of a triangle whose base has the length of "b" and whose altitude has a length "h" is given by the formula: $\text{area} = \frac{1}{2}(b)(h)$

a. Use the formula given above to find the area of a triangle whose base was 6 and whose altitude was 4. **Whenever units are not explicitly given, we use the generic term "units".**

$$\text{area} = \frac{1}{2}(6)(4) = \frac{1}{2}(24) = 12 \text{ units}$$

b. Check your answer to number 44 by solving the original formula for h, and then solve letting $h = 4$ and $b = 6$

b)

$$\begin{array}{l} a = \frac{1}{2}(b)(h) \\ \frac{1}{2}(b) \quad \frac{1}{2}(b) \\ \hline \frac{a}{\frac{1}{2}(b)} = h \end{array}$$

$$\begin{array}{l} \frac{a}{\frac{1}{2}(b)} = a \div \frac{1}{2} \\ \qquad \qquad = a \div \frac{b}{2} \\ \qquad \qquad = \frac{a}{1} \cdot \frac{2}{b} = \frac{2a}{b} \end{array}$$

$$\boxed{h = \frac{2a}{b}}$$

check: $b\left(\frac{2a}{b}\right) = 4(6)$

$$\begin{array}{l} 2a = 24 \\ a = 12 \text{ units} \\ \checkmark \end{array}$$

Answer Key continues on next page.

- c. Check your answer to number 44 again by solving the original area equation for b, then let b=6 and h=4.

Algebra Test 2
Number 14, letter c

c) $a = \frac{1}{2}(b)(h)$

$$\frac{a}{\frac{1}{2}(h)} = \frac{\frac{1}{2}(b)(h)}{\frac{1}{2}(h)}$$

$$\frac{a}{\frac{1}{2}(h)} = \frac{h}{2}$$

$$a \div \frac{h}{2} = \frac{a}{1} \cdot \frac{2}{h} = \frac{2a}{h}$$

$$b = \frac{2a}{h}$$

check: $\frac{2a}{h} = \frac{2(12)}{4} = 6(4)$

$$2a = 24$$

$$a = 12 \text{ units}$$

✓

15. (2 points) The Silver Shadow Car Rental Company charges for both the number of days that a car is rented and the number of miles that it is driven. A formula for the cost in dollars (represented by "c"), of renting the car from the company is: $c = 100(d) + 1.5(m)$, in which "d" represents the number of days and "m" represents the number of miles.

- a. Solve the formula above for d.

$$c = 100(d) + 1.5(m)$$

$$-1.5m \quad -1.5m$$

$$c - 1.5m = 100(d)$$

$$\frac{c - 1.5m}{100} = \frac{100(d)}{100}$$

$$\frac{c - 1.5m}{100} = d$$

- b. For how many days would a movie studio have rented a car if it had been driven 200 miles and the rental cost was \$700? $d = ?$ $m = 200$ $c = 700$

$$d = \frac{c - 1.5m}{100}$$

$$d = \frac{700 - 1.5(200)}{100}$$

$$d = \frac{700 - 300}{100} = \frac{400}{100} = 4 \text{ days}$$

16. (1 point) Find the x and y intercepts of the line with the following equation: We start by finding the y-intercept, which is otherwise known as "Solving for y".

$$\begin{aligned} x + 6y &= 0 \\ 6y &= -x \\ y &= \frac{-x}{6} \end{aligned}$$

Y-intercepts are found by setting $x=0$ and solving:

$$y = \frac{-0}{6} = 0$$

You can use the equation you solved for x to find the x-intercept (shown here). However, if it is more comfortable for your learning style, you can solve the original equation for "x" then substitute "0" for y and solve for x.

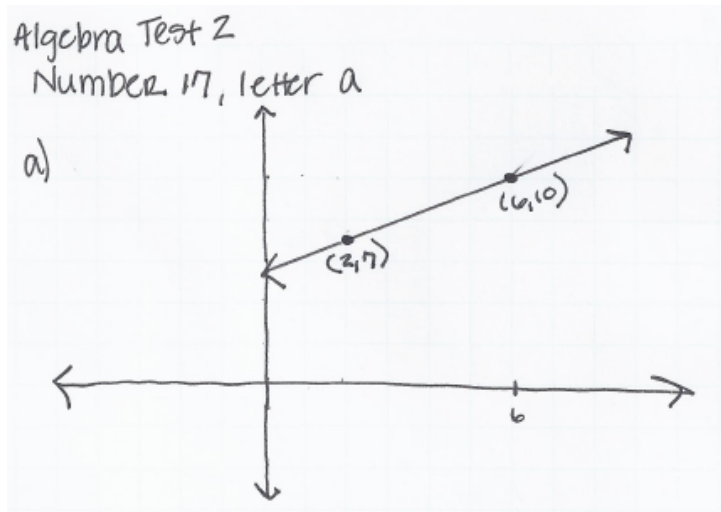
x-intercepts are found by setting $y=0$ and solving:

$$\begin{aligned} 0 &= \frac{-x}{6} \\ 0 &= -x \\ x &= 0 \end{aligned}$$

17. (2 points) For each of the following points, draw a line through each pair and find its slope.
a. (2, 7) and (6, 10)

Because this test is open book, students do not have to memorize the formula for slope. That slope formula is something they can be allowed to look up for this problem.
The formula is :

$$\begin{aligned} \text{Slope} &= \frac{\text{rise}}{\text{run}} = \frac{\text{change in } y}{\text{change in } x} = \frac{y_2 - y_1}{x_2 - x_1} \\ (2, 7) & \quad (6, 10) \\ (x_1, y_1) & \quad (x_2, y_2) \\ \text{slope} &= \frac{10 - 7}{6 - 2} = \frac{3}{4} \end{aligned}$$



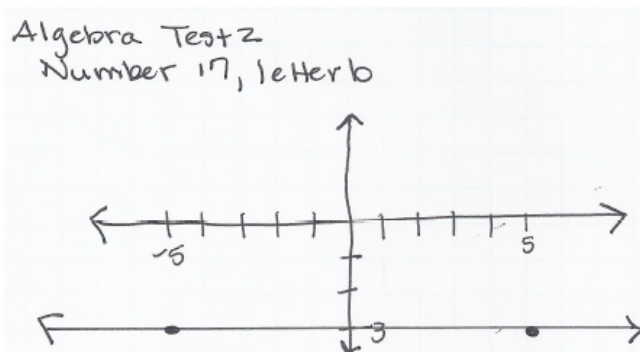
b. (5,-3) and (-5,-3)

$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{\text{change in } y}{\text{change in } x} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\begin{array}{cc} (5, -3) & (-5, -3) \\ (x_1, y_1) & (x_2, y_2) \end{array}$$

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - (-3)}{-5 - (+5)} = \frac{0}{-10} = 0$$

Note: All horizontal lines have a slope equal to zero.



18. (1 point) Suppose a woman decided to go on a diet when she reached "x" pounds. A formula for her weight in pounds, "w", while on the diet would be:

$$w = x - 3y$$

where "x" represents her weight at the beginning of the diet and "y" is the number of weeks that she has been on it. Find out how many weeks she would have to stay on her diet in order to weigh 120 lbs, if she weighed 180 pounds at the beginning of her diet.

The question tells you that $x = 180$, $w = 120$ and asks you to solve for y .

$$\begin{array}{r} 120 = 180 - 3y \\ -180 \quad -180 \end{array}$$

$$-60 = -3y$$

$$\frac{-60}{-3} = \frac{-3y}{-3}$$

$$y = 20 \text{ weeks}$$

19. (2 points) For each of the equations given, tell whether the point given with it is a solution to the equation

- a. For $5x + y = 14$, is $(5, -11)$ a solution? A point that is a solution to a given equation will cause both sides of that equation to equal each other. Therefore, to decide if a point is a solution, we plug in the x and y values of the point into the x and y values of the equation and solve to see if both sides equal the same value. If they do, then the point is a solution.

$$5(5) + (-11) = 14$$

$$25 - 11 = 14$$

$$14 = 14$$



Yes, $(5, -11)$ is a solution to $5x + y = 14$

- b. For, $x^2 + y^2 = 9$ is $(-5, -4)$ a solution?

$$(-5)^2 + (-4)^2 = 9$$

$$25 + 16 = 9$$

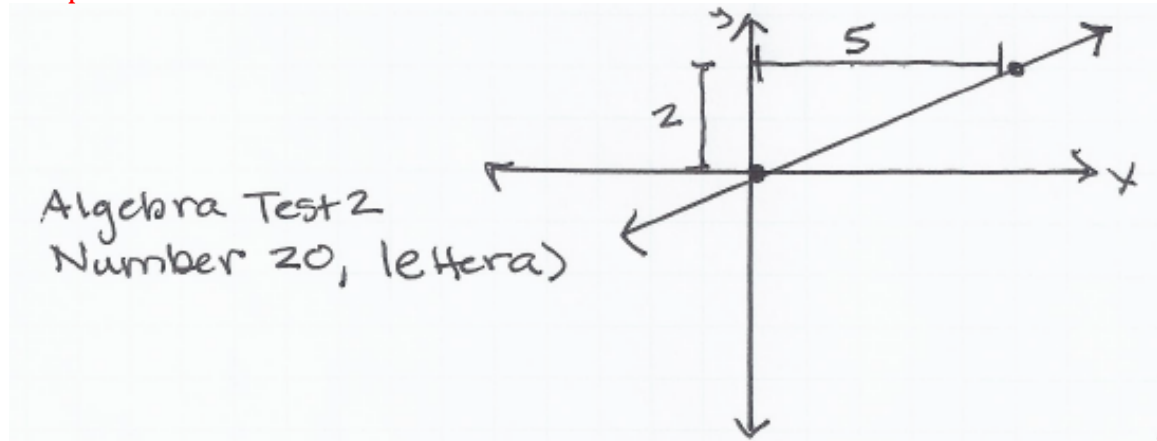
$$41 \neq 9$$

X NO, $(-5, -4)$ is NOT a solution to this equation.

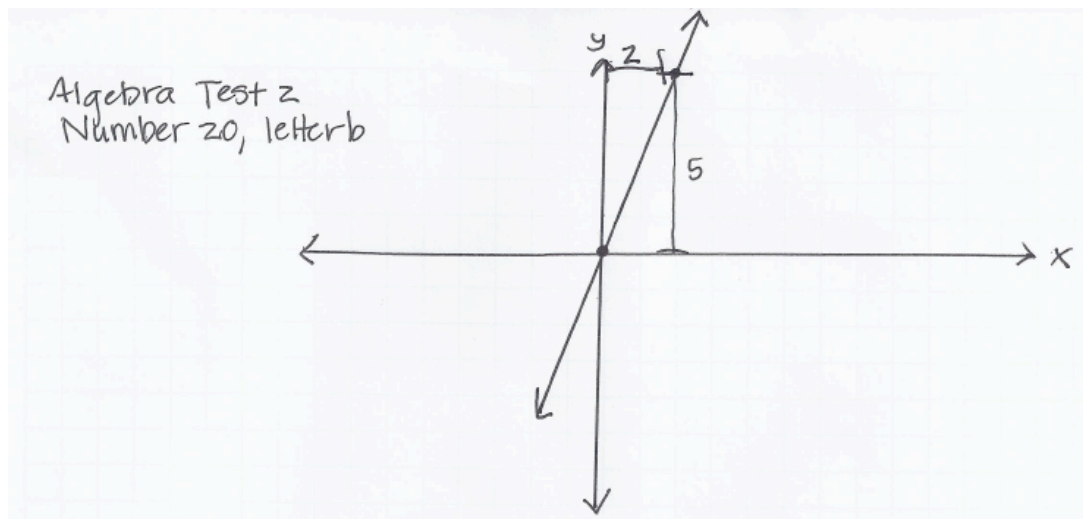
20. (2 points) For each of the following lines, draw their graphs.

- a. The line through the origin having a slope of $2/5$

Start by graphing the point $(0,0)$. You know to graph this point because the instructions say "through the origin". The origin is $(0,0)$. Then because you are told the slope, you can rise 2, and run 5, to arrive at a second point for this graph. Once you have two points you use a ruler to connect the points and form a line. Once you have the line, your graph is complete.



- b. The line through the origin having a slope of $5/2$ For this problem, you follow the same steps as for part a, except this one has a different slope. So you rise 5, and run 2.



End of Answer Key Test 2

ANSWER KEY
Algebra
Test 3
Chapters 7-8
Total Points Possible: 50

Name: _____

Date: _____

Instructions: Work the following problems. Read directions carefully.

You may find it helpful to write your answers on a separate sheet of paper. For some problems there may not be enough room on the actual test sheet. The test is open book, open notes.

1. (4 points) Tell whether or not each of the following ordered pairs are a solution of the given simultaneous equation.

$$7x + 2y = 12$$

$$y = 5x - 11$$

$$x^2 - 3y = 16$$

$$x + y^2 = 4$$

a) (0,6)

$$\begin{aligned} 7(0) + 2(6) &= 12 \\ 0 + 12 &= 12 \\ 12 &= 12 \end{aligned}$$

$$\begin{aligned} 6 &= 5(0) - 11 \\ 6 &= 0 - 11 \end{aligned}$$

$$6 \neq -11$$

X NO, this is not a solution.

c) (4,0)

$$\begin{aligned} (4)^2 - 3(0) &= 16 \\ 16 - 0 &= 16 \\ 16 &= 16 \end{aligned}$$

$$\begin{aligned} 4 + 0^2 &= 4 \\ 4 + 0 &= 4 \end{aligned}$$

$$4 = 4$$



Yes, this is a solution.

b) (2,-1)

$$\begin{aligned} 7(2) + 2(-1) &= 12 \\ 14 - 2 &= 12 \\ 12 &= 12 \end{aligned}$$

$$\begin{aligned} -1 &= 5(2) - 11 \\ -1 &= 10 - 11 \end{aligned}$$

$$-1 = -1$$



Yes, this is a solution.

d) (2,-4)

$$\begin{aligned} (2)^2 - 3(-4) &= 16 \\ 4 - (-12) &= 16 \\ 4 + 12 &= 16 \\ 16 &= 16 \end{aligned}$$

$$\begin{aligned} 2 + (-4)^2 &= 4 \\ 2 + 16 &= 4 \end{aligned}$$

$$18 \neq 4$$



NO, this is not a solution

2. (4 points) Write the equation that results from performing the indicated operations on these two equations:)

$$\begin{aligned} 2x + y &= 6 \\ 2x - 4y &= 10 \end{aligned}$$

- a) adding the two equations

$$\begin{array}{r} 2x + y = 6 \\ + \quad 2x - 4y = 10 \\ \hline 4x - 3y = 16 \end{array}$$

- b) subtracting the second equation from the first

$$\begin{array}{r} 2x + y = 6 \\ - \quad 2x - 4y = 10 \\ \hline 5y = -4 \end{array}$$

- c) Multiplying both sides of the first equation by four

$$\begin{array}{r} 4(2x + y = 6) \\ 8x + 4y = 24 \end{array}$$

- d) Dividing both sides of the second equation by 2

$$\begin{array}{r} 2x - 4y = 10 \\ \hline 2 \qquad \qquad 2 \\ \hline x - 2y = 5 \end{array}$$

3. (1 point) Solve these equations by substitution:

$$\begin{aligned} 2x + y &= -40 \\ 8y - 3 &= x \end{aligned}$$

Substituting $x = 8y - 3$ into the first equation, we get:

$$2(8y - 3) + y = -40$$

Then solve for y

$$16y - 6 + y = -40$$

$$17y - 6 = -40$$

$$17y = -34$$

$$y = -2$$

Plug back in this "y" value to solve for "x"

$$x = 8y - 3$$

$$x = 8(-2) - 3$$

$$x = -16 - 3$$

$$x = -19$$

Using the first equation to check:

$$2x + y = -40$$

$$2(-19) + (-2) = -40$$

$$-38 + -2 = -40$$

$$-38 - 2 = -40$$

$$-40 = -40$$

$$\checkmark x = -19 \quad y = -2$$

4. (1 point) Solve these equations by substitution:

$$x + 6 = y - 1$$

$$3(x + 3) = 2y$$

Solve the first equation for y:

$$x + 6 = y - 1$$

$$+1 \quad +1$$

$$x + 7 = y$$

Then Substitute "y" in the second equation:

$$3(x + 3) = 2(x + 7)$$

$$3x + 9 = 2x + 14$$

$$-9 \quad -9$$

$$3x = 2x + 5$$

$$-2x \quad -2x$$

$$x = 5$$

Now solve for y:

$$y = x + 7$$

$$y = 5 + 7$$

$$y = 12$$

Use the second equation to check:

$$3(5 + 3) = 2(12)$$

$$3(8) = 24$$

$$24 = 24$$



5. (3 points) Mr. Magoo's wife asked him to buy some 10 cent and 13 cent stamps for her. He couldn't read the numbers of each kind that she had written down but remembered that he was supposed to buy ten dollars worth. If Mrs. Magoo wanted 85 stamps altogether, find out how many of each kind she wanted by doing the following:

- a. Let x and y represent the numbers of 10-cent and 13-cent stamps respectively. Write out a pair of simultaneous equations, one relating the numbers of stamps and the other relating their costs.

$$\begin{aligned}x + y &= 85 \\ 10x + 13y &= 1000\end{aligned}$$

- b. Solve the equations

$$\begin{aligned}x + y &= 85 \\ x &= 85 - y \\ 10(85 - y) + 13y &= 1000 \\ 850 - 10y + 13y &= 1000 \\ 850 + 3y &= 1000 \\ -850 &\quad -850 \\ 3y &= 150 \\ y &= 50\end{aligned}$$

$$x = 85 - y$$

$$\begin{aligned}x &= 85 - 50 \\ x &= 35\end{aligned}$$

$$35 + 50 = 85 \quad \checkmark$$

- c. How many stamps of each kind did Mrs. Magoo want?
She wanted 35, 10-cent stamps and 50, 13-cent stamps.

6. (5 points) Tell whether or not each of the following ordered pairs is a solution to the simultaneous equation given.

$$x - 6y = 21$$

$$4y = 1 - x$$

a. (9,-2)

b. (21,0)

$$\begin{aligned}a) \quad 9 - 6(-2) &= 21 \\ 9 + 12 &= 21 \\ 21 &= 21\end{aligned}$$

$$\begin{aligned}4(-2) &= 1 - 9 \\ -8 &= -8\end{aligned}$$



Yes this is a solution

$$\begin{aligned}b) \quad 21 - 6(0) &= 21 \\ 21 - 0 &= 21 \\ 21 &= 21\end{aligned}$$

$$\begin{aligned}4(0) &= 1 - 21 \\ 0 &\neq -20\end{aligned}$$

X No this is not a solution

$$2x + y = -5$$

$$x^2 + y^2 = 25$$

c. (0, -5)

$$\begin{aligned} 2(0) + (-5) &= -5 \\ 0 - 5 &= -5 \\ -5 &= -5 \end{aligned}$$

$$\begin{aligned} 0^2 + (-5)^2 &= 25 \\ 0 + 25 &= 25 \\ 25 &= 25 \end{aligned}$$



Yes this is a solution

d. (-4, 3)

$$\begin{aligned} 2(-4) + 3 &= -5 \\ -8 + 3 &= -5 \\ -5 &= -5 \end{aligned}$$

$$\begin{aligned} (-4)^2 + (3)^2 &= 25 \\ 16 + 9 &= 25 \\ 25 &= 25 \end{aligned}$$



Yes, this is a solution

e. (-1, -3)

$$\begin{aligned} 2(-1) + (-3) &= -5 \\ -2 - 3 &= -5 \\ -5 &= -5 \end{aligned}$$

$$\begin{aligned} (-1)^2 + (-3)^2 &= 25 \\ 1 + 9 &= 25 \\ 10 &\neq 25 \end{aligned}$$

X No, this is not a solution

7. (1 point) Solve these simultaneous equations:

$$5x + 4y = 53$$

$$x - 2y = 5$$

$$x - 2y = 5$$

$$x = 5 + 2y$$

$$5(5 + 2y) + 4y = 53$$

$$25 + 10y + 4y = 53$$

$$25 + 14y = 53$$

$$\begin{array}{r} -25 \\ 14y = 28 \end{array}$$

$$y = 2$$

$$x = 5 + 2y$$

$$x = 5 + 2(2)$$

$$x = 9$$

Check:

$$5(9) + 4(2) = 53$$

$$45 + 8 = 53$$

$$53 = 53$$



Yes, this is a solution.

8. (1 point) Solve these simultaneous equations:

$$4x + 3y = 17$$

$$3x + 5y = 10$$

$$4x + 3y = 17$$

$$4x = 17 - 3y$$

$$x = \frac{17 - 3y}{4}$$

$$3\left(\frac{17 - 3y}{4}\right) + 5y = 10$$

$$\frac{51 - 9y}{4} + 5y = 10$$

$$4\left(\frac{51 - 9y}{4} + 5y = 10\right)$$

$$51 - 9y + 20y = 40$$

$$51 + 11y = 40$$

$$11y = -11$$

$$y = -1$$

$$x = \frac{17 - 3y}{4}$$

$$x = \frac{17 - 3(-1)}{4} = \frac{17 + 3}{4} = \frac{20}{4} = 5$$

Check:

$$\begin{array}{l} 3(5) + 5(-1) = 10 \\ 15 - 5 = 10 \\ 10 = 10 \end{array} \quad \begin{array}{l} 4(5) + 3(-1) = 17 \\ 20 - 3 = 17 \\ 17 = 17 \end{array}$$

✓ $x = 5 \quad y = -1$

9. (3 points) On a fishing trip, Huckleberry Finn caught 31 fish. Some were bullheads averaging 1.5 pounds each and the rest were catfish averaging 5 pounds each. The entire catch weighed 92 lbs. Find out how many fish of each kind Huckleberry Finn caught by doing each of the following:

- a. Let x and y represent the numbers of bullheads and catfish respectively. Write a pair of equations, one relating the numbers of fish and the other relating their weights.

$$\begin{array}{l} x + y = 31 \\ 1.5x + 5y = 92 \end{array}$$

- b. Solve the equations.

$$\begin{array}{l} x + y = 31 \\ x = 31 - y \\ x = 31 - 13 = 18 \end{array}$$

$$\begin{array}{l} 1.5(31 - y) + 5y = 92 \\ 46.5 - 1.5y + 5y = 92 \\ 46.5 + 3.5y = 92 \\ 3.5y = 45.5 \\ y = 13 \end{array}$$

Check:

$$\begin{array}{l} x + y = 31 \\ 18 + 13 = 31 \\ 31 = 31 \end{array}$$

$$\begin{array}{l} 1.5x + 5y = 92 \\ 1.5(18) + 5(13) = 92 \\ 27 + 65 = 92 \\ 92 = 92 \end{array}$$



- c. How many of each kind of fish did he catch?

18 bullheads and 13 catfish

10. (1 point) Write the number 220,000,000 in scientific notation.

$$2.2 \times 10^8$$

11. (1 point) Write the number 22 in scientific notation

$$2.2 \times 10^1$$

12. (1 point) What number is a number divided by when its decimal point is moved seven digits to the left? 10,000,000

13. (1 point) When you move the decimal point in a number seven digits to the left, how does the exponent of the 10 in scientific notation form of the number change?

It gets smaller by 7 digits.

14. (4 points) Write each of the following numbers in scientific notation:

- a. 700,000,000,000 7×10^{11}
- b. 412×10^{-4} 4.12×10^{-2}
- c. .002 2×10^{-3}
- d. 10.002 1.0002×10^1

15. (4 points) Write each of the following expressions without the parenthesis.

a. $(4x)^3$ $64x^3$

b. $(7y)^{-1}$ $\frac{1}{7y}$

c. $(-5x^5)^2$ $25x^{10}$

d. $(\frac{x}{y^2})^4$ $\frac{x^4}{y^8}$

16. (6 points) Find the value of "x" in each of the following equations.

a. $3^4 * 3^6 = 3^x$ $x = 10$

b. $4^3 * 6^3 = x^3$ $x = 24$

c. $5^2 * 5^x = 5^8$ $x = 6$

d. $2^5 * x^5 = 8^5$ $x = 4$

e. $\frac{7^{12}}{7^3} = 7^x$ $x = 9$

f. $\frac{12^7}{3^7} = x^7$ $x = 4$

17. (3 points) Write each of the following expressions as a single power of x.

a. $x^{-4} * x^9$ x^5

b. $(x^{-4})^9$ x^{-36}

c. $\frac{x^{-5}}{x}$ x^{-6}

18. (3 points) Write an expression without parenthesis that is equivalent to the following:

a. $(2x)^5$ $32x^5$

b. $(-3y^3)^4$ $81y^{12}$

c. $(\frac{x^2}{y})^3$ $\frac{x^6}{y^3}$

19. (3 points) Find the value for “x” in each of the following equations.

a. $5^2 * 5^4 = 5^x$ $x = 6$

b. $3^x * 3^3 = 3^{12}$ $x = 9$

c. $\frac{10^6}{2^6} = x^6$ $x = 5$

End of Answer Key Test 3

ANSWER KEY
Algebra
Test 4
Chapters 9-11
Total Points Possible: 39

Name: _____

Date: _____

Instructions: Work the following problems. Read directions carefully.

You may find it helpful to write your answers on a separate sheet of paper. For some problems there may not be enough room on the actual test sheet. The test is open book, open notes.

1. (3 points) Find the value of each polynomial as indicated.

- a. Find the value of $(x^4) - (x^2)$ if $x = 4$

$$4^4 - 4^2 = 256 - 16 = 240$$

- b. Evaluate $(2x^3) + (3x^2)$ if $x = 2$

$$2(2^3) + 3(2^2) = 2(8) + 3(4) = 16 + 12 = 28$$

- c. What does $x^4 - 2x^3 + 1$ equal if $x = 10$?

$$10^4 - 2(10^3) + 1 = 10000 - 2(1000) + 1 = 10000 - 2000 + 1 = 8000 + 1 = 8001$$

2. (3 points) Simplify and write your answers in descending powers of the variable.

- a. $x(x + 4) - x(x + 4) = x^2 + 4x$

- b. $(x - 10)(x + 10)$

$$x^2 + 10x - 10x - 100 = x^2 - 100$$

- c. $(x^3 + 3)(x^3 - 3)$

$$x^6 - 3x^3 + 3x^3 - 9 = x^6 - 9$$

3. (3 points) Perform the operations as indicated:

- a. From $3x + x^4$ subtract $x^3 + 3x - 1$

$$\begin{array}{r} 3x + x^4 \\ - (x^3 + 3x - 1) \\ \hline x^4 + 0x^3 + 0x^2 + 3x + 0 \\ - (0x^4 + x^3 + 0x^2 + 3x - 1) \\ \hline x^4 - x^3 + 1 \end{array}$$

- d. Subtract $5x - 11y$ from $4y + 20x$

$$\begin{array}{r} 4y + 20x \\ - (5x - 11y) \\ \hline 20x + 4y \\ - (5x - 11y) \\ \hline 15x + 15y \end{array}$$

e Divide $2x - 7$ into $2x^4 - 98x + x^3$

Part 1:

$$2x^4 - 98x + x^3 = 2x^4 + x^3 - 98x = 2x^4 + x^3 + 0x^2 - 98x + 0$$

Part 2:

Algebra Test 4
Number 3

$x^3 + 4x^2 + 14x$

1. $2x-7 \overline{) 2x^4 + x^3 + 0x^2 - 98x + 0}$

2. $\frac{2x^4}{2x} = x^3$

3. $x^3(2x-7) = -(2x^4 - 7x^3)$

4. $\begin{array}{r} x^3 + 4x^2 + 14x \\ 2x-7 \overline{) 2x^4 + x^3 + 0x^2 - 98x + 0} \\ \underline{-(2x^4 - 7x^3)} \\ 8x^3 + 0x^2 - 98x + 0 \end{array}$

5. $\frac{8x^3}{2x} = 4x^2$

6. $4x^2(2x-7) = -(8x^3 - 28x^2)$

7. $\begin{array}{r} x^3 + 4x^2 + 14x \\ 2x-7 \overline{) 2x^4 + x^3 + 0x^2 - 98x + 0} \\ \underline{-(2x^4 - 7x^3)} \\ 8x^3 + 0x^2 - 98x + 0 \\ \underline{-(8x^3 - 28x^2)} \\ 28x^2 - 98x + 0 \end{array}$

8. $\frac{28x^2}{2x} = 14x$

9. $14x(2x-7) = -(28x^2 - 98x)$

10. $\begin{array}{r} x^3 + 4x^2 + 14x \\ 2x-7 \overline{) 2x^4 + x^3 + 0x^2 - 98x + 0} \\ \underline{-(2x^4 - 7x^3)} \\ 8x^3 + 0x^2 - 98x + 0 \\ \underline{-(8x^3 - 28x^2)} \\ 28x^2 - 98x + 0 \\ \underline{-(28x^2 - 98x)} \\ 0 \end{array}$

Answer: $x^3 + 4x^2 + 14x$

Complex Problem!
Outlined in steps
(shown in pink)

Answer Key for Test 4 continues on next page.

4. (4 points) Rewrite each of the following expressions as a polynomial in descending powers of the variable.

Algebra Test 4 Number 4

a) $0x - x^2 + x^8 - 2x$

$$x^8 - x^2 - 2x + 8x = x^8 - x^2 + 6x$$

b) $x^2(3x-1) - (x^2 - x^3)$

$$3x^3 - x^2 - x^2 + x^3$$

$$3x^3 - 2x^2 + x^3$$

$$4x^3 - 2x^2$$

c) $(6x-1)(x-3)$

$$6x^2 - 18x - x + 3$$

$$6x^2 - 19x + 3$$

d) $(x^4 - 4)(x^4 + 4)$

$$x^8 + 4x^4 - 4x^4 - 16$$

$$x^8 - 16$$

5. (2 points) Perform the operations indicated

Algebra Test 4 Number 5

a) $0x^4 + 0x^3 + x^2 + 10x - 6$

$+ (x^4 + 0x^3 - x^2 + 0x - 4)$

$$x^4 + 0x^3 + 0x^2 + 10x - 10$$

$$x^4 + 10x - 10$$

b) $6x - 5y + 4$

$-(5x + 3y + 7)$

$$x - 8y - 3$$

6. (1 point) Find the product of $4x^2 - x - 2$ and $x + 5$

Algebra Test 4
Number 6

$$(4x^2 - x - 2)(x + 5) = 4x^3 + 20x^2 - x^2 - 5x - 2x - 10$$

$$= 4x^3 + 19x^2 - 7x - 10$$

7. (4 points) Perform the operations indicated.

Number 7

a) $(7x - 2) + (3x - 8) = 7x - 2 + 3x - 8 = 10x - 10$

b) $(7x - 2)(3x - 8) = 21x^2 - 56x - 6x + 16 = 21x^2 - 62x + 16$

c) $(4x^2 - 9)(2x + 3) = 8x^3 + 12x^2 - 18x - 27 =$

d) Divide $\frac{4x^2}{2x} = 2x$ $2x(2x + 3) = 4x^2 + 6x$ $\frac{-6x - 9}{2x} = -3$

$$\begin{array}{r} 2x - 3 \\ 2x + 3 \overline{) 4x^2 + 0x - 9} \\ \underline{-(4x^2 + 6x)} \\ -6x - 9 \\ \underline{-3(2x + 3) = (-6x - 9)} \\ 0 \end{array}$$

Answer: $2x - 3$

8. (4 points) Find the missing term in these trinomials

Number 8

a) $16x^2 + 8x + \underline{1}$

pg. 476 for $a^2 + 2ab + b^2$

$$a^2 = 16x^2 \quad 2ab = 8x$$

$$\sqrt{a^2} = \sqrt{16x^2} \quad \rightarrow 2(4x)(b) = 8x$$

$$a = 4x \quad \frac{8x(b)}{8x} = \frac{8x}{8x}$$

$$b = 1$$

The blank in this trinomial is " b^2 ", and we found that $b = 1$ so $b^2 = (1)^2 = 1$

b) $9x^2 - \underline{42x} + 49$; $a^2 + 2ab + b^2$

$$a^2 = 9x^2 \quad b^2 = 49$$

$$\sqrt{a^2} = \sqrt{9x^2} \quad \sqrt{b^2} = \sqrt{49}$$

$$a = 3x \quad b = 7$$

$$2ab = 2(3x)(7) = 14(3x) = 42x$$

Algebra Test 4
Number 8, letter C

$$\frac{(\square)(-5x^3)}{(-5x^3)} = \frac{20x^6}{(-5x^3)}$$

$$\square = -4x^3$$

Number 8, letter d

This problem is primarily trial and error. You use what you know to find what is missing.

With the trinomial

$$5x^2 + 23x - 10, \text{ you know that}$$

if you factor it you will end up with two binomials

$$(\quad + \quad)(\quad + \quad).$$

The problem tells us that one of the binomials is $x+5$. You know that the first two terms must multiply to get " $5x^2$ " & that you will need a negative to get "-10". So you try combinations until the binomials work.

The factors of $5x^2$ are $5x$ & x ; the factors of -10 are 5 & -2 ; so these four numbers are great to use in your test-combinations.

" $5x+2$ " seems like a good option, but it does not leave us with a negative 10. So we try " $5x-2$ ".

$$(5x-2)(x+5) = 5x^2 + 25x - 2x - 10 = 5x^2 + 23x - 10$$

It works! so " $5x-2$ " is the answer.

9. (4 points) Factor as completely as possible

a. $6x - 21$

$$(6x - 21) = 3(2x - 7)$$

b. $x^2 - 49$

difference of Two Squares theorem pg 470

$$a^2 - b^2 = x^2 - 49$$

$$\begin{array}{ll} a^2 = x^2 & b^2 = 49 \\ \sqrt{a^2} = \sqrt{x^2} & \sqrt{b^2} = \sqrt{49} \\ a = x & b = 7 \end{array}$$

therefore if $a^2 - b^2 = (a + b)(a - b)$ (pg.470)

then $x^2 - 49 = (x + 7)(x - 7)$

c. $x^2 + 2xy + y^2 = x(x + 2y)$

d. $x^2 - 2xy + y^2$

$$a^2 + 2ab + b^2 = (a + b)^2$$

$$\begin{array}{lll} a^2 = x^2 & b^2 = y^2 & \\ \sqrt{a^2} = \sqrt{x^2} & \sqrt{b^2} = \sqrt{y^2} & 2ab = 2(x)(y) \\ a = x & b = y & 2ab = 2xy \quad ** \end{array}$$

therefore applying the theorem: $(a + b)^2 = (x + y)^2$

***finding the "2ab" value to be true, functions as a checking method. Sometimes polynomials can have an "a" and a "b" value without being factorable. To be sure that the "(a+b)" part of the formula will work, you can check by making sure "2ab" equals the middle term on your polynomial.*

10. (2 points) Find the Greatest Common Factor (GCF) for the following terms:

a. $6x$ and 8 The only factors $6x$ and 8 have in common is 2. Therefore, GCF = 2

b. x^6 and x^8 The only factors these two monomials have in common are x's.

$x(x)(x)(x)(x)$ AND $x(x)(x)(x)(x)(x)(x)$ have 5 x's in common

Therefore, x^5 is the GCF

11. (1 point) Find the value of $(90 + 2)(90 - 2)$

$$(90 + 2)(90 - 2) = (a + b)(a - b) = (a^2 - b^2) = (90^2 - 2^2) = (8100 - 4) = 8096$$

12. (2 points) Factor these polynomials as completely as possible.

a. $x^2 + 9$ Not possible. The sum of two squares cannot be factored. See page 471

b. $49x^2 + 28x + 4$

$$a^2 + 2ab + b^2 = (a + b)^2$$

$$\begin{array}{lll} a^2 = 49x^2 & b^2 = 4 & \\ \sqrt{a^2} = \sqrt{49x^2} & \sqrt{b^2} = \sqrt{4} & \\ a = 7x & b = 2 & \end{array} \quad \begin{array}{l} \text{check} \\ 2ab = 2(7x)(2) \\ 2ab = 4(7x) = 28x \end{array}$$

$$(a + b)^2 = (7x + 2)^2$$

c. $3x^2 + 16x + 5$
options are $(3x + 5)(x + 1)$ AND $(3x + 1)(x + 5)$
trial and error shows that $(3x + 1)(x + 5)$ are the factors

d. $2x^2 + x - 28$
dividing up by factors the options are :
 $(2x - 4)(x + 7)$, $(2x + 7)(x - 4)$, $(2x - 28)(x + 1)$, $(2x - 1)(2x + 28)$, $(2x + 1)(x - 28)$
 $(2x - 14)(x + 2)$, $(2x - 2)(x + 14)$ and $(2x - 7)(x + 4)$
and trial and error shows that $(2x - 7)(x + 4)$ are the factors

13. (1 point) Tell whether the following equation is true for all allowable values of the variables.
If the equation is not true, give an example in which it is not true.

$$\frac{x + 4}{y + 4} = \frac{x}{y}$$

false, if $x = 6$ and $y = 1$
 $\frac{6 + 4}{1 + 4} \neq \frac{6}{1}$

14. (1 point) Find the following quotient as a polynomial or as a fraction in its simplest terms.

$$\frac{x^2 - y^2}{6} \div \frac{x - y}{2}$$

$$\frac{x^2 - y^2}{6} \cdot \frac{2}{x - y} = \frac{2(x^2 - y^2)}{6(x - y)}$$

$$= \frac{x^2 - y^2}{3(x - y)} \quad \text{applying the difference of squares}$$

$$x^2 - y^2 = (x + y)(x - y)$$

$$\text{therefore } \frac{(x + y)(x - y)}{3(x - y)} = \frac{x + y}{3}$$

15. (1 point) If possible, reduce this fraction:

$$\frac{x^2 + 14x + 49}{x^2 - 49}$$

$$x^2 + 14x + 49 = (x + 7)^2$$

$$x^2 - 49 = (x + 7)(x - 7)$$

$$\text{therefore } \frac{x^2 + 14x + 49}{x^2 - 49} = \frac{(x + 7)^2}{(x + 7)(x - 7)} = \frac{x + 7}{x - 7}$$

$$\frac{x - 1}{x^2} + \frac{1}{x}$$

16. (1 point) Write this sum as a monomial or fraction in its simplest terms:

$$\begin{aligned} & \frac{(x - 1)}{x^2} \cdot \frac{(x)}{(x)} + \frac{1}{x} \cdot \frac{(x^2)}{(x^2)} \\ &= \frac{x^2 - x}{x^3} + \frac{x^2}{x^3} = \frac{x^2 - x + x^2}{x^3} \end{aligned}$$

$$= \frac{2x^2 - x}{x^3} = \frac{x(2x - 1)}{(x)(x^2)} = \frac{2x - 1}{x^2}$$

$$\frac{3x - 7}{3x + 7}$$

17. (1 point) Write $\frac{3x - 7}{3x + 7}$ as the difference of two fractions.

$$\frac{ad}{bd} + \frac{bc}{bd} = \frac{ad + bc}{bd} \quad (\text{pg.514})$$

$$\text{then } "bd" = 3x + 7$$

$$"ad" = 3x \text{ and } "bc" = -7$$

$$\text{therefore } \frac{3x - 7}{3x + 7} = \frac{3x}{3x + 7} - \frac{7}{3x + 7}$$

Answer Key for Test 4 Continues on the next page.

18. (1 point) Simplify: $x + \frac{1}{2 + \frac{4}{x}}$

$$\begin{aligned} \frac{x}{1} + \frac{1}{2 + \frac{4}{x}} \cdot \frac{x}{x} &= \frac{x}{1} + \frac{x}{2x+4} \\ &= \frac{x}{1} \left(\frac{2x+4}{2x+4} \right) + \frac{x}{2x+4} \left(\frac{1}{1} \right) \\ &= \frac{2x^2 + 4x + x}{2x+4} = \frac{2x^2 + 5x}{2x+4} \end{aligned}$$

End of Answer Key Test 4

ANSWER KEY
Algebra
Test 5
Chapters 12-15
Total Points Possible: 55

Name: _____

Date: _____

Instructions: Work the following problems. Read directions carefully.

You may find it helpful to write your answers on a separate sheet of paper. For some problems there may not be enough room on the actual test sheet. The test is open book, open notes.

1. (2 points) List the square roots of these numbers:

a. $\sqrt{x^4}$ x^2 b. $\sqrt{6x^6}$ $x^3\sqrt{6}$

2. (2 points) Write each of the following expressions as a quotient without a square root in the denominator.

a. $\sqrt{\frac{5}{16}}$ $\frac{\sqrt{5}}{4}$ b. $\sqrt{\frac{1}{x^3}}$ $\frac{\sqrt{1}}{\sqrt{x^3}} \left(\frac{\sqrt{x}}{\sqrt{x}} \right) = \frac{\sqrt{x}}{\sqrt{x^4}} = \frac{\sqrt{x}}{x^2}$

3. (2 points) Find the value of each of the following expressions. Round any approximate answers to the nearest tenth. (you may use the chart on page 563 if you need)

a. $\sqrt{40 - 4}$ $\sqrt{36} = 6$
b. $3\sqrt{7 + 2}$ $3\sqrt{9} = 3(3) = 9$

4. (1 point) Simplify: $(54 + \sqrt{6}) + (6 + \sqrt{54})$

$$\begin{aligned} &(54 + \sqrt{6}) + (6 + \sqrt{54}) \\ &54 + \sqrt{6} + 6 + \sqrt{54} \\ &\sqrt{54} = \sqrt{9\sqrt{6}} = 3\sqrt{6} \\ &54 + 6 = 60 \\ &60 + 3\sqrt{6} + \sqrt{6} = 60 + (3+1)\sqrt{6} \\ &\quad \boxed{= 60 + 4\sqrt{6}} \end{aligned}$$

5. (1 point) Square as indicated:

a. $(5\sqrt{2})^2$ $5^2(\sqrt{2})^2 = 25(2) = 50$
b. $(\sqrt{5} - 2)^2$ $(\sqrt{5} - 2)(\sqrt{5} - 2) = 5 - 2\sqrt{5} - 2\sqrt{5} + 4$
 $= 5 + 4 - 4\sqrt{5} = 9 - 4\sqrt{5}$

6. (1 point) Multiply and Simplify: $(4 + \sqrt{3})(2 + \sqrt{12})$

$$(4 + \sqrt{3})(2 + \sqrt{12}) = 8 + 4\sqrt{12} + 2\sqrt{3} + \sqrt{36}$$

$$\sqrt{12} = \sqrt{4}\sqrt{3} = 2\sqrt{3}$$

$$\sqrt{36} = 6$$

Therefore:

$$= 8 + 6 + 4(2\sqrt{3}) + 2\sqrt{3} = 14 + 8\sqrt{3} + 2\sqrt{3}$$

$$= 14 + 10\sqrt{3}$$

7. (1 point) Rationalize the denominator of this fraction: $\frac{60}{\sqrt{6}-1}$

$$\frac{60}{\sqrt{6}-1}$$

$$\left(\frac{\sqrt{6}+1}{\sqrt{6}+1}\right)\left(\frac{60}{\sqrt{6}-1}\right) = \frac{60(\sqrt{6}+1)}{6-1} = \frac{60(\sqrt{6}+1)}{5}$$

$$= 12(\sqrt{6}+1) = \boxed{12\sqrt{6} + 12}$$

8. (1 point) Write the following expression in simple radical form: $\sqrt{60,000}$

$$\sqrt{60,000} = \sqrt{6}\sqrt{10,000} = 100\sqrt{6}$$

9. Find the value of the following expression. Round any approximate answers to the nearest tenth. $\sqrt{13} + \sqrt{17}$

$$3.606 + 4.123 = 7.729 \approx 7.7$$

10. Multiply and Simplify: $(\sqrt{x} + 12)(\sqrt{x} - 12)$

Algebra Test 5, Number 10

$$(\sqrt{x} + 12)(\sqrt{x} - 12) = x - 12\sqrt{x} + 12\sqrt{x} - 144$$

$$= \boxed{x - 144}$$

$$a^2 - b^2 = (a+b)(a-b)$$

$$a = \sqrt{x} \quad b = 12$$

$$(\sqrt{x} + 12)(\sqrt{x} - 12)$$

$$= (\sqrt{x})^2 - (12)^2$$

$$= x - 144$$

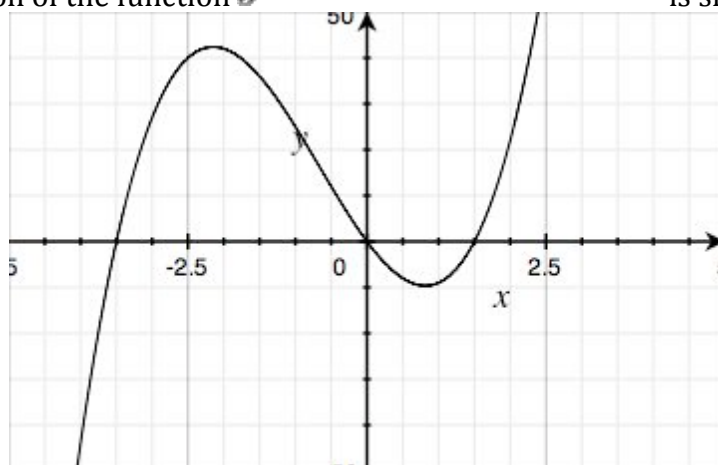
You can also use "Difference of Squares" for this problem:

11. Solve the following equations. Simplify where possible.

$$\begin{aligned}
 3\sqrt{x+1} &= \sqrt{x-7} \\
 (3\sqrt{x+1})^2 &= (\sqrt{x-7})^2 \\
 9(x+1) &= x-7 \\
 9x+9 &= x-7 \\
 8x+9 &= -7 \\
 8x &= -16 \\
 x &= -2
 \end{aligned}$$

If you plug $x = -2$ back into the original equation you get $3\sqrt{-1} = \sqrt{-8}$. Since these sides do not equal each other, it is a false equation and the problem is said to have "No Solutions".

12. The Graph of the function $y = 4x^3 + 8x^2 - 21x$ is shown here.



a. Write an equation whose solutions can be estimated from this graph.

$$4x^3 + 8x^2 - 21x = 0$$

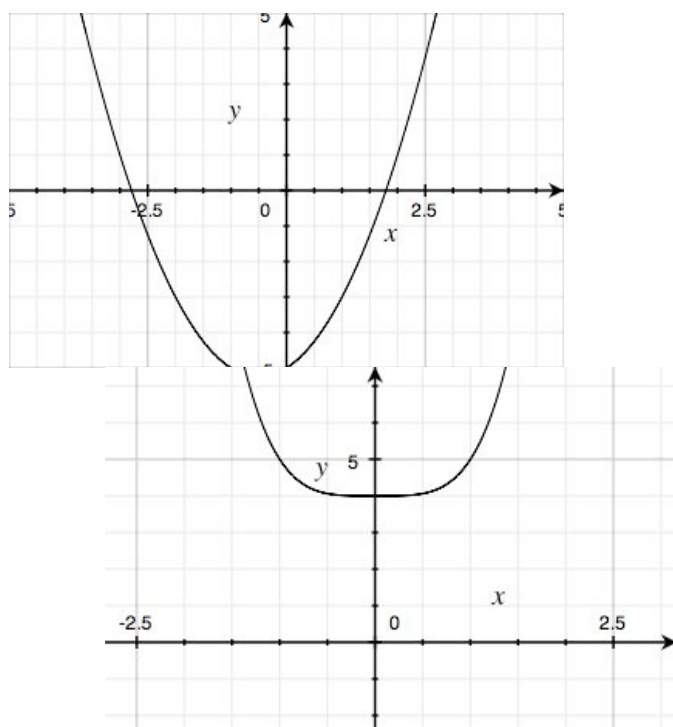
b. How many solutions does the equation have? 3 solutions (you know this because it crosses the x-axis three times)

c. Estimate each of their values to the nearest tenth. 3.5, 0, 1.5

13. Use these graphs to estimate the solutions of each equation:

a. $x^2 + x - 5 = 0$

b. $x^4 + 4 = 0$



- a. 1.8, -2.8 The nature of the question asks you to estimate, so if your student guesses between 1.5 and 2 for the first point and between -2.5 and 3 for the second point you should consider their answer correct.
b. There are no solutions to this equation since the graph never crosses the x-axis.

14. Solve the following quadratic equations by completing the square.

a. $x^2 + 10x = 11$
 $x^2 + 10x = 11$
 $+ (\frac{10}{2})^2 + (\frac{10}{2})^2$
 $x^2 + 10x + 25 = 11 + 25$
 $(x + 5)^2 = 36$
 $\sqrt{(x + 5)^2} = \sqrt{36}$
 $x + 5 = \pm 6$
 $x = \pm 6 - 5$
 $x = 1 \quad x = -11$

b. $x^2 - 6x + 4 = 0$
 $x^2 - 6x + 4 = 0$
 $-4 \quad -4$
 $x^2 - 6x = -4$
 $+ (-6/2)^2 + (-6/2)^2$
 $x^2 - 6x + 9 = -4 + 9$
 $x^2 - 6x + 9 = 5$
 $(x - 3)^2 = 5$
 $\sqrt{(x - 3)^2} = \sqrt{5}$

$$x - 3 = \sqrt{5}$$

$$x = \pm\sqrt{5} + 3$$

15. Solve the following cubic and quartic equations by factoring.

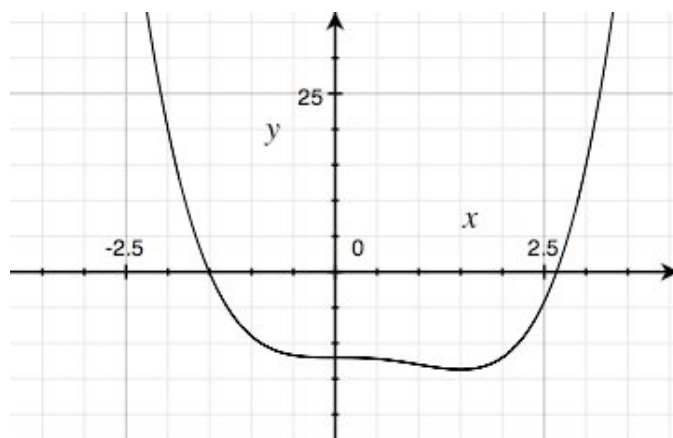
a. $x^3 + x^2 = 12x$

$$\begin{aligned} & x^3 + x^2 - 12x = 0 \\ & x(x^2 + x - 12) = 0 \\ & x(x + 4)(x - 3) = 0 \\ & x = 0 \\ & x + 4 = 0, \quad x = -4 \\ & x - 3 = 0, \quad x = 3 \end{aligned}$$

b. $2x^4 - 10x^2 = 0$

$$\begin{aligned} & 2x^2(x^2 - 5) = 0 \\ & 2x^2 = 0 \quad (x^2 - 5) = 0 \\ & x^2 = 0 \quad \sqrt{x^2} = \sqrt{5} \\ & x = 0 \quad x = \pm\sqrt{5} \end{aligned}$$

16. The graph of the function $y = x^4 - 2x^3 - 12$ is shown here:



a. Write an equation whose solutions can be estimated from this graph.

$$x^4 - 2x^3 - 12 = 0$$

b. How many solutions does the equation have?

2 solutions because the graph crosses the x axis twice.

c. Estimate each of their values to the nearest tenth.

-1.5 and 2.6

Grading Note: The question asks you to estimate the values. The graph crosses the x-axis at $x = -1.5$ pretty directly. However, with the second value of $x = 2.6$, because the line is between the two labeled points, answers should be considered correct as long as the student chooses a value between 2.5 and 3.

17. Solve each of the following quadratic equations by the factoring method.

Answer Key
Algebra Test 5

a. $6x^2 - 5x = 0$
 $x(6x - 5) = 0$
 $x = 0$ $6x - 5 = 0$
 $+5$ $+5$
 $6x = 5$
 $x = \frac{5}{6}$

b. $x^2 - 36 = 0$
 $(x + 6)(x - 6) = 0$
 $(x + 6) = 0$ $(x - 6) = 0$
 $x = -6$ $x = 6$

c. $x^2 + 8x = 33$
 $x^2 + 8x - 33 = 0$
 $(x + 11)(x - 3) = 0$
 $(x + 11) = 0$ $(x - 3) = 0$
 $x = -11$ $x = 3$

d. $(x + 5)(x + 6) = 2$
 $x^2 + 11x + 30 = 2$
 -2 -2
 $x^2 + 11x + 28 = 0$
 $(x + 4)(x + 7) = 0$
 $x + 4 = 0$ $x + 7 = 0$
 $x = -4$ $x = -7$

18. Find the value of the discriminant for each of the following quadratic equations and use it to tell how many solutions the equation has:

a. $6x^2 - x + 3 = 0$
 $b^2 - 4ac = (-1)^2 - 4(6)(3) = 1 - 72 = -71$
 Since the discriminant is negative, there are no solutions to this quadratic equation.

b. $3x^2 + 8x + 5 = 0$
 $b^2 - 4ac = (8)^2 - 4(3)(5) = 64 - 60 = 4$
 Since the discriminant is positive, there are two solutions to this equation.

c. $x^2 - 12x + 36 = 0$
 $b^2 - 4ac = (-12)^2 - 4(1)(36) = 144 - 144 = 0$
 Since the discriminant is zero, the quadratic equation has one solution.

19. If possible, find the rational number represented by this expression $\frac{5x}{x-2}$

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

b) $x=2$
 $\frac{5(2)}{(2)-2} = \frac{10}{0} = \text{Not possible}$
 (division by zero is not allowed in math)

c) $x=3$
 $\frac{5(3)}{(3)-2} = \frac{15}{1} = 15$

d) $x=4$
 $\frac{5(4)}{(4)-2} = \frac{20}{2} = 10$

20. (4 points) A table listing some of the roots of 0.9 and 1.1 is shown below. Each root is rounded to the nearest thousandth.

$\sqrt[n]{}$	$\sqrt[n]{0.9}$	$\sqrt[n]{1.1}$
2	0.949	1.049
3	0.965	1.032
4	0.974	1.024
5	0.979	1.019
10	0.990	1.010
100	0.999	1.001

- e. What happens to $\sqrt[n]{0.9}$ as n gets larger? It gets larger.
- f. What number does $\sqrt[n]{0.9}$ get close to as n is very large? 1
- g. What happens to $\sqrt[n]{1.1}$ as n gets larger? It gets smaller.
- h. What number does $\sqrt[n]{1.1}$ get very close to as n gets very large? 1

21. (3 points) The third century Chinese mathematician Liu Hui used the number $3\frac{7}{50}$ as an approximation of π .

$$\frac{157}{50}$$

- a. Write this number as the quotient of two integers. $\frac{157}{50}$
- b. Change the result to decimal form. 3.14
- c. Is it smaller or larger than π ? ($\pi = 3.14159265\dots$) Smaller ($3.14000\dots < 3.14159\dots$)

22. (4 points) Change the following rational numbers to decimal form.

a. $\frac{10}{4} = 2.5$

b. $\frac{7}{25}$ 0.28

c. $\frac{44}{9}$ $\overline{4.8}$

d. $\frac{2}{13}$ $\overline{0.153846}$

23. (4 points) If possible, find the rational number represented by $\frac{x^2 + 1}{x^2 - 1}$ for each of the following x-values.

Algebra Test 5, Number 23

a) $\frac{(0)^2 + 1}{(0)^2 - 1} = \frac{0 + 1}{0 - 1} = \frac{1}{-1} = -1$

b) $\frac{(1)^2 + 1}{(1)^2 - 1} = \frac{1 + 1}{1 - 1} = \frac{2}{0} = \text{undefined}$

c) $\frac{(2)^2 + 1}{(2)^2 - 1} = \frac{4 + 1}{4 - 1} = \frac{5}{3} = 1.\overline{7}$

d) $\frac{(3)^2 + 1}{(3)^2 - 1} = \frac{9 + 1}{9 - 1} = \frac{10}{8} = 1.25$

Expressing
★ Answers in decimal
form is optional. ★

24. (1 point) Arrange the following numbers in order from smallest to largest.

$0.0\overline{27}, 0.02\overline{7}, 0.\overline{027}, 0.\overline{027}$

$0.0\overline{27}, 0.\overline{027}, 0.\overline{027}, 0.02\overline{7}$

25. Simplify the following ratios:

a. $\frac{5x}{15x} = \frac{1}{3}$

b. $\frac{x+12}{x+2}$ Not possible

26. Express each of the following products as a polynomial in the simplest form.

a. $8\left(\frac{x}{8} - 2\right) = x - 16$

b. $x\left(7 - \frac{3}{x}\right) = 7x - 3$

27. Solve the following equations:

a. $\frac{1}{x-7} = 2$

$$\begin{aligned}\frac{1}{x-7} &= 2 \\ 1 &= 2(x-7) \\ 1 &= 2x-14 \\ 2x &= 15 \\ x &= 7.5\end{aligned}$$

b. $\frac{3x}{x-1} = \frac{6x}{2x-2}$

$$\begin{aligned}3x(2x-2) &= 6x(x-1) \\ 6x^2 - 6x &= 6x^2 - 6x \\ 0 &= 0\end{aligned}$$

Since the problem does not lead to a number value for x, you have to examine the problem itself. In this case we have denominators that contain x. We know denominators cannot be equal to zero. The only x value that would make the denominator equal to zero is when x = 1. For this reason, we say that x can be any number except x = 1.

c. $\frac{x-3}{15} = \frac{1}{x+3} \quad (x-3)(x+3) = 1(15)$

$$\begin{aligned}x^2 - 9 &= 15 \\ x^2 &= 24 \\ x^2 &= \pm\sqrt{24} = \pm 2\sqrt{6}\end{aligned}$$

d. $2 - \frac{4}{3x+1} = x \quad 2(3x+1) - 4 = x(3x+1)$

$$\begin{aligned}6x + 2 - 4 &= 3x^2 + x \\ 6x - 2 &= 3x^2 + x \\ -2 &= 3x^2 - 5x \\ 0 &= 3x^2 - 5x + 2 \\ 0 &= (3x-2)(x-1)\end{aligned}$$

$$\begin{aligned}(3x-2) &= 0 \\ 3x &= 2 \\ x &= \frac{2}{3}\end{aligned}$$

$$\begin{aligned}(x-1) &= 0 \\ x &= 1\end{aligned}$$

28. The volume of a cone can be found by the formula:

$$v = \frac{\pi r^2 h}{3}$$

“r” represents the radius of its base and “h” represents its altitude.

- a. Find the exact volume of a cone for which $r = 6\text{cm}$ and $h = 15\text{ cm}$.

$$v = \frac{\pi r^2 h}{3} = \frac{\pi(6)^2(15)}{3} = \frac{36\pi(15)}{3} = 180\pi \text{ cm}^3$$

The fact that the question asks for the “exact” volume lets you know that you should leave your answer in terms of pi. Since $\pi = 3.14$ is an approximate value for pi, multiplying out by 3.14 would be an approximate answer. Also, do not forget to include the units. A problem without units should be considered incorrect.

- b. Find the altitude of a cone for which $v = 256\pi$ cubic centimeters and $r = 8$ centimeters.

Finding the “altitude” tells us we need to solve for “h”.

Solving the original volume equation for “h”, we get:

$$h = \frac{3v}{\pi r^2}, \text{ plugging in the given values we can solve for “h”}.$$

$$h = \frac{3v}{\pi r^2} = \frac{3(256\pi)}{\pi(8)^2} = 12\text{cm}$$

29. Solve the following equations for x in terms of the other variables. Simplify your answers as much as possible.

a. $a^2x + a^2 = a$

$$a^2x = a - a^2$$

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

- b.

$$2\pi x = a\pi$$

$$\frac{2\pi x}{2\pi} = \frac{a\pi}{2\pi}$$

$$x = \frac{a}{2}$$

30. A temperature in degrees Fahrenheit can be changed into degrees Celsius by using the formula:

$$C = \frac{5}{9}(F - 32)$$

Solve the formula for “F” in terms of “C”.

$$\begin{aligned}\frac{9}{5} * C &= \frac{5}{9}(F - 32) * \frac{9}{5} \\ \frac{9C}{5} &= (F - 32) \\ +32 &+ 32 \\ \frac{9C}{5} + 32 &= F\end{aligned}$$

31. The African board game called “Wari” is played with a set of bowls containing various stones. The number of stones in each bowl changes as the game is played. A picture of this game is shown here: *Please note that if you are using the Problem-by-Problem key (pg. 123 of this manual) to answer these problems, this particular image is different from what is shown in the book, therefore the numbers are varying slightly. For this problem, use what is written here as the “correct” answer to this problem, as the answer in the book does not match.*



- a. What is the ratio of the number of bowls containing stones to the total number of bowls?

$$\frac{\text{bowls with stones}}{\text{total bowls}} = \frac{10}{12} = \frac{5}{6}$$

Grading Note: Ratios should be reduced as much as possible. Unreduced ratios should be considered incorrect.

- b. What is the ratio of the total number of bowls to the number of empty bowls?

$$\frac{\text{total}}{\text{empty bowls}} = \frac{12}{2} = \frac{6}{1}$$

Grading Note: A ratio is not a ratio unless it is written in ratio form, therefore even though 12/2 reduces to 6, students should express their answers to this problem as “6/1” OR 6:1

32. (2 points) If possible, simplify the following ratios:

a. $\frac{2x + 10}{5x + 10} = \frac{2(x + 5)}{5(x + 2)} = \text{not reduceable}$

b. $\frac{x^2 + 1}{x^2 - 1} = \frac{x^2 + 1}{(x+1)(x-1)} = \text{Not possible}$

33. (2 points) Find each of the following products as a polynomial in simplest form.

a. $5(9 + \frac{x}{5}) = 45 + \frac{5x}{5} = 45 + x$

b. $14(\frac{x}{2} - \frac{1}{7}) = \frac{14x}{2} - \frac{14}{7} = 7x - 2$

34. (2 points) Solve the following equations for x in terms of the other variables. Simplify your answers as much as possible.

a. $\frac{x}{a - b} = \frac{a + b}{b^2}$

$$x(b^2) = (a - b)(a + b)$$

$$x(b^2) = (a^2 - b^2)$$

$$x = \frac{(a^2 - b^2)}{(b^2)}$$

Algebra Test 5, Number 34, letter "b"

b. $\frac{1}{x} - \frac{1}{a} = b$

$$\frac{1}{x}(\frac{a}{a}) - \frac{1}{a}(\frac{x}{x}) = b$$

$$\frac{a}{ax} - \frac{x}{ax} = b$$

$$\frac{a - x}{ax} = b$$

$$ax(\frac{a - x}{ax}) = b(ax)$$

$$a - x = b(ax)$$

$$a = abx + x$$

$$a = x(ab + 1)$$

$$\frac{a}{(ab + 1)} = \frac{x(ab + 1)}{(ab + 1)}$$

$$x = \frac{a}{(ab + 1)}$$

35. (1 point) A temperature in degrees Fahrenheit can be changed to Kelvin by using the following formula: Some number variation on this problem means that the Problem-byProblem key tells you this problem comes from a certain place in the textbook. However, since we have changed some of the numbers within this problem the solutions manual will not show the correct answer here. Use only the answer shown below to grade this problem.

$$K = \frac{5}{9}(F + 460)$$

The freezing point of water is 32°F . Use the formula above to convert this temperature into Kelvin.

$$K = \frac{5}{9}(32 + 460) = \frac{5}{9}(492) = 273.3 \text{ K}$$

Grading Note: the Kelvin temperature scale does not use the degree notation that is used by Fahrenheit and Celsius. For example, we might say 273°F or 273°C , but when using the Kelvin scale you read it as “two hundred and seventy three Kelvin”. That is why the above answer does not use the degree symbol.

End of Answer Key Test 5

ANSWER KEY
Algebra
Test 6
(Optional)
Chapters 16-17
Total Points Possible: 50

Name: _____

Date: _____

Instructions: Work the following problems. Read directions carefully.

You may find it helpful to write your answers on a separate sheet of paper. For some problems there may not be enough room on the actual test sheet. The test is open book, open notes.

1. (4 points) Write an inequality in terms of x to represent each of the following figures:

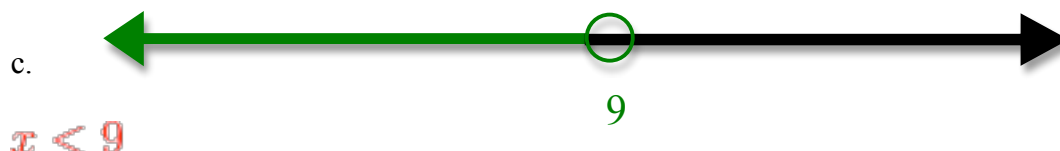
a.



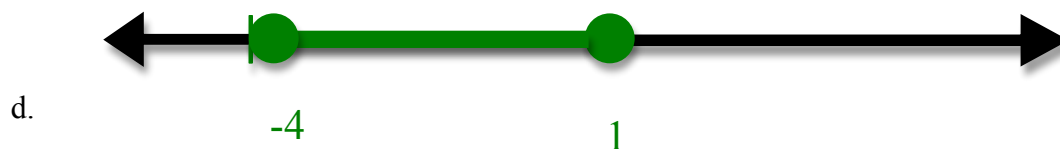
b.



c.



d.



Answer Key to Test 6 continues on next page.

2. (6 points) Solve each of the inequalities for x.

Number 2

a) $x + 4 > 3$
 $\begin{array}{r} x + 4 > 3 \\ -4 \quad -4 \\ \hline x > -1 \end{array}$

b) $\frac{3}{4}x > \frac{3}{4}$
 $\begin{array}{r} \frac{3}{4}x > \frac{3}{4} \\ \frac{4}{4} \quad \frac{4}{4} \\ \hline x > \frac{3}{4} \end{array}$

c) $-\frac{2}{3}x < \frac{16}{-2}$
 $\begin{array}{r} -\frac{2}{3}x < \frac{16}{-2} \\ \frac{-3}{-3} \quad \frac{-3}{-3} \\ \hline x > -8 \end{array}$

d) $9 - x \leq 1$
 $\begin{array}{r} 9 - x \leq 1 \\ -9 \quad -9 \\ \hline -x \leq -8 \\ \frac{-1}{-1} \quad \frac{-1}{-1} \\ \hline x \geq 8 \end{array}$

3. (4 points) Solve the following inequalities for x in terms of the other variables.

Algebra Test 6
 Number 3

a) $ax - b < 1$
 $\begin{array}{r} ax - b < 1 \\ +b \quad +b \\ \hline ax < b + 1 \\ \frac{a}{a} \quad \frac{a}{a} \\ \hline x < \frac{b+1}{a} \end{array}$

b) $\frac{a}{c}x > \frac{b}{c}(a)$
 $\begin{array}{r} \frac{a}{c}x > \frac{b}{c}(a) \\ \frac{c}{c} \quad \frac{c}{c} \\ \hline x > \frac{ab}{c} \end{array}$

c) $ax - bx \leq c$
 $\begin{array}{r} ax - bx \leq c \\ x(a-b) \leq c \\ \frac{x(a-b)}{(a-b)} \leq \frac{c}{(a-b)} \\ \hline x \leq \frac{c}{a-b} \end{array}$

Note: You know not to switch the sign here because you are told "a > b" if "a" is larger than "b", then subtracting "a-b" will yield a positive answer. So dividing by "a-b" is dividing by a positive number.

Algebra Test 6
Number 3, letter d

$$0 < x - a < a + b$$

$$\begin{array}{r} 0 < x - a \\ +a \quad +a \\ \hline a < x \end{array}$$

$$\begin{array}{r} x - a < a + b \\ +a \quad +a \\ \hline x < 2a + b \end{array}$$

$$a < x < 2a + b$$

Note: on inequalities with three terms, you have to split it up to solve them. Break it into two smaller inequalities that you solve individually, then write your answer all on one line combining the two solutions.

4. (4 points) Solve each of the following inequalities for x:

Number 4

a) $\begin{array}{r} x + 5 < 2 \\ -5 \quad -5 \\ \hline \end{array}$

$$x < -3$$

Be careful here! You only switch the inequality sign when you divide by a negative - all other uses of negatives are OK & the sign stays the same.

b) $\begin{array}{r} \cancel{5}x < 2 \\ \cancel{5} \quad 5 \\ \hline \end{array}$

$$x < 2/5$$

c) $\begin{array}{r} \cancel{-3}x > 30 \\ \cancel{-3} \quad -3 \\ \hline \end{array}$

$$x < -10$$

Because we divided by a negative we switch the sign.

d) $\begin{array}{r} 7 - x \geq 4 \\ -7 \quad -7 \\ \hline \end{array}$

$$\begin{array}{r} -x \geq -3 \\ \cancel{-1} \quad -1 \\ \hline \end{array}$$

$$x \leq 3$$

5. (3 points) Solve the following inequalities for x in terms of the other variables.

Algebra Test
Number 5

a) $ax + b > 0$

$$\begin{array}{r} -b \quad -b \\ \hline ax > -b \\ \frac{ax}{a} > \frac{-b}{a} \end{array}$$

$$x > -\frac{b}{a}$$

b) $\frac{x}{b} < \frac{a}{c} (b)$

$$x < \frac{ab}{c}$$

c) $ax - b \geq cx$

$$\begin{array}{r} +b \quad +b \\ \hline ax \geq cx + b \\ -cx \quad -cx \end{array}$$

$$\begin{array}{r} ax - cx \geq b \\ \hline x(a-c) \geq b \\ \frac{x(a-c)}{(a-c)} \geq \frac{b}{a-c} \end{array}$$

$$x \geq \frac{b}{a-c}$$

These lines are drawn to separate steps for you. They are not division lines.

here we are dividing both sides by "a-c" which is positive. we know "a-c" is positive because we are told "a > c."

6. (2 points) Tell whether each of the following sequences is arithmetic, geometric, both or neither. If a sequence is arithmetic, tell the common difference. If it is geometric, tell the common ratio.

a. 1.5 6 24 96 ... Geometric, common ratio is 4

b. $\sqrt{10}$ $\sqrt{11}$ $\sqrt{12}$ $\sqrt{13}$... Neither

7. (1 point) Write a formula for the nth term of the following sequences and use it to find the indicated term: **4 8 96 , 372 9,604... 6th term**

Algebra Test 6

Number 7

4, 28, 196, 1372, 9604, ...

The ratio is 7 because $4(7) = 28$
 $28(7) = 196$
 $196(7) = 1372$
 $1372(7) = 9604$

so the relationship between terms - the ratio - is 7.
Students are allowed to use their books on their exam so the formula for Geometric sequences is not something they need to have memorized. They can find the formula on pg. 811 or in Chapter 17, Lesson 3 (pg. 793).

The formula is $t_n = t_1 \cdot r^{n-1}$

Where "n" represents a specific term in the sequence. For this problem, we are looking for the 6th term, so $n=6$.

$t_1 \Rightarrow$ the first term in the sequence

$r \Rightarrow$ the ratio between terms.

To establish the formula for the sequence, we simply plug in the known values into our formula: $n=6$, $t_1=4$, $r=7$

$$t_6 = 4 \cdot 7^{6-1} = 4 \cdot 7^5$$

Then we solve the formula to find the 6th term.

$$t_6 = 4 \cdot 7^5 = 4 \cdot 16807 = 67,228$$

$$t_6 = 67,228$$

8. (4 points) Write the first four terms of the sequences having the following formulas for their n th terms.

a) $t_n = 3n - 1$

So to find the first four terms, we replace "n" with 1, 2, 3, & 4, and solve the equation with each one. The answers are the first four terms.

$$t_1 = 3(1) - 1 = 3 - 1 = 2$$

$$t_2 = 3(2) - 1 = 6 - 1 = 5$$

$$t_3 = 3(3) - 1 = 9 - 1 = 8$$

$$t_4 = 3(4) - 1 = 12 - 1 = 11$$

2, 5, 8, 11

b) $t_n = n^4$

1, 16, 81, 256

$$t_1 = (1)^4 = 1$$

$$t_2 = (2)^4 = 2 \cdot 2 \cdot 2 \cdot 2 = 4 \cdot 4 = 16$$

$$t_3 = (3)^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 9 \cdot 9 = 81$$

$$t_4 = (4)^4 = 4 \cdot 4 \cdot 4 \cdot 4 = 16 \cdot 16 = 256$$

c) $t_n = 4^n$

$$t_1 = 4^1 = 4$$

$$t_2 = 4^2 = 16$$

$$t_3 = 4^3 = 4 \cdot 4 \cdot 4 = 16 \cdot 4 = 64$$

$$t_4 = 4^4 = 4 \cdot 4 \cdot 4 \cdot 4 = 16 \cdot 16 = 256$$

4, 16, 64, 256

d) $t_n = 5(n+2)$

$$t_1 = 5(1+2) = 5(3) = 15$$

$$t_2 = 5(2+2) = 5(4) = 20$$

$$t_3 = 5(3+2) = 5(5) = 25$$

$$t_4 = 5(4+2) = 5(6) = 30$$

15, 20, 25, 30

9. (3 points) Write a formula for the n th term of each of the following sequences and use it to find the indicated term.

Algebra Test 6
Number 9

Remember that these tests are open book so the initial formula to use in this problem is not something students have to memorize. They can look up the formula for Arithmetic Sequences in Chapter 17, lesson 2 OR on pg. 810 in the Summary + Review. They know to use Arithmetic Sequence instead of Geometric because the number sequence is one where each successive term is found by adding the same number. (See definitions on pg. 777)

$$t_n = t_1 + (n-1)d$$

t_n = the n th term

t_1 = first number in sequence

n = the n value of n th term

(in this problem, $n=100$

because we are looking for the 100th term - NOT the same numeric value as $\overline{t_n}$)

d = difference between successive terms.

This problem's final answer has two parts, shown below in pink.

Now, we fill in the formula using the terms we know.

t_n = unknown for now - this is the value we are trying to find.

$$t_1 = 5, n = 100, d = 1$$

$$t_n = 5 + (n-1)d$$

$$= 5 + (n-1)(1)$$

$$= 5 + n - 1 = 5 - 1 + n = 4 + n \text{ OR } n + 4$$

$$t_n = n + 4$$

for $n = 100$

$$t_{100} = 100 + 4 = 104$$

We know $d=1$ because

$$6-5=1 \quad 8-7=1$$

$$7-6=1 \quad 9-8=1$$

see pg. 810
OR 17.2
for more info

This is the formula for this sequence
we can find any term by replacing " n ".

Algebra Test 6

Number 9, letter b

This problem begins using the same formula as letter a. ~~see~~ see the notes there on where this formula comes from. (pg. 810 + 17-2)

$$-2-2=-4 \quad -4-2=-6 \quad -6-2=-8 \quad -8-2=-10$$

therefore, "d" = -2

$$t_n = t_1 + (n-1)d$$

$$t_n = -2 + (n-1)(-2)$$

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

$$t_n = -2 + -2n + 2$$

$$t_n = \cancel{-2+2} + -2n$$

$$t_n = -2n$$

The problem asks us to find the 15th term in this sequence so we replace "n" with "15" and solve.

$$t_{15} = -2(15) = -30$$

The 15th term is -30

Number 9, letter c

This problem uses a geometric sequence formula & you know to use geometric because each term is found by multiplying the same number.
(see definitions pg. 777)

$$t_n = t_1 \cdot r^{n-1}$$

t_n = value of n^{th} term

t_1 = first term in sequence

r = difference between terms

n = the number term you want

start by inserting the values you know:

$$t_n = 5 \cdot 5^{n-1} = 5^{(1+(n-1))} = 5^{n-1+1} = 5^n$$

$$t_n = 5 \cdot 5^{7-1} = 5 \cdot 5^6 = 78,125$$

10. (2points) Use the formula for the sum of the terms of an arithmetic sequence to find each of the following sums. **Part a:**

Algebra Test b
Number 10

The sum of the first " n " terms of an arithmetic sequence is a formula found both in lesson 17-2 and pg. 811. Students are allowed to look this up in their books while taking the exam and do not have to memorize these formulas.

$$S_n = \frac{(t_1 + t_n)n}{2}$$

$$t_1 = 3; t_n = 123$$

$$\begin{aligned} S_n &= \frac{(3 + 123)(41)}{2} \\ &= \frac{(126)(41)}{2} \\ &= 2,583 \end{aligned}$$

use the n^{th} term formula for arithmetic sequences to find " n " so you can finish the summation formula.

$$\begin{aligned} t_n &= t_1 + (n-1)d \\ 123 &= 3 + (n-1)(3) \\ 123 &= 3 + 3n - 3 \\ \frac{123}{3} &= \frac{3n}{3} \\ n &= 41 \end{aligned}$$

$$\begin{aligned} t_n &= 123 \\ d &= 3 \\ t_1 &= 3 \end{aligned}$$

This is coincidence that d & t_1 are the same. You do not find " d " with the t_1 value.

Part b:

Number 10, letter b

See notes on Number 10, letter a, for tips & suggestions for working this problem.

$$S_n = \frac{(t_1 + t_n)n}{2}$$

$$S_n = \frac{(46 + 74)(29)}{2}$$

$$= \frac{(120)(29)}{2}$$

$$= \frac{3480}{2} = 1740$$

$$t_n = t_1 + (n-1)(d)$$

$$t_n = 74$$

$$t_1 = 46$$

$$d = 1$$

$$74 = 46 + (n-1)(1)$$

$$74 = 46 + n - 1$$

$$74 = 45 + n$$

$$\begin{array}{r} -45 \quad -45 \\ \hline 29 = n \end{array}$$

11. (1 point) Use the formula for the sum of the terms of a geometric sequence and the table on page 801 to find the sum of the first six terms in this sequence: 12, -36, 108.....

Algebra Test b
Number 11

pg. 811 & Lesson 17-3
tell students the formula for the sum of the first n terms in a geometric sequence.

Remember to allow students access to the textbook while taking the test. This problem in particular cannot be solved without using the reference pages given in the problem.

$$S_n = \frac{t_1(r^n - 1)}{r - 1}$$

The chart on pg. 801 allows you to evaluate $(-3)^6$ without a calculator

To find "r" remember that geometric sequences multiply each term by the same value. To get "-36" after 12, we have to multiply by "-3"; when we try $-36 \cdot -3$ we get 108, and thus confirm that for this sequence, $r = -3$. We are also told that we are looking for the 6th term, so $n = 6$. We plug-in these values to solve.

$$S_n = \frac{12((-3)^6 - 1)}{(-3) - 1} = \frac{12((-3)^6 - 1)}{-4} = \frac{-12((-3)^6 - 1)}{-4} = -3((-3)^6 - 1)$$

$$= -3(729 - 1) = -3(728) = -2184$$

12. (7 points) Find each of the following sums:

- a. $1+3$ **4**
- b. $1+3+5$ **9**
- c. $1+3+5+7$ **16**
- d. $1+3+5+7+9$ **25**

e. What type of numbers are all of the sums? **Squares**

f. Write a formula for the n th term of the sequence: 1,3,5,7,9.... Simplify the formula as much as you can. **$t_n = 2n - 1$**

g. Write a formula for the sum of the first n terms of this sequence. Simplify the formula as much as you can. **$S_n = n^2$**

13. (3 points) Tell whether each of the following sequences is arithmetic, geometric, both, or neither. If a sequence is arithmetic, tell the common difference. If it is geometric, tell the common ratio.

a. -7, -1, 5, 11... **Arithmetic. Common difference = 6**

b. $1^3, 2^3, 3^3, 4^3$... **Neither**

c. 8, 20, 50, 125... **Geometric. Common ratio = 2.5**

14. (3 points) Write the first four terms of the sequences having the following formulas for their n th terms.

For #14 letters a-c, you can refer back to the solutions for number 4 to give you more tips + suggestions for solving this type of problem.

a) $t_n = n^3$
 $t_1 = (1)^3 = 1$
 $t_2 = (2)^3 = 2 \cdot 2 \cdot 2 = 4 \cdot 2 = 8$
 $t_3 = (3)^3 = 3 \cdot 3 \cdot 3 = 9 \cdot 3 = 27$
 $t_4 = (4)^3 = 4 \cdot 4 \cdot 4 = 16 \cdot 4 = 64$

1, 8, 27, 64

b) $t_n = 3^n$
 $t_1 = 3^1 = 3$
 $t_2 = 3^2 = 9$
 $t_3 = 3^3 = 3 \cdot 3 \cdot 3 = 9 \cdot 3 = 27$
 $t_4 = 3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 9 \cdot 9 = 81$

3, 9, 27, 81

c) $t_n = 5n + 6$
 $t_1 = 5(1) + 6 = 5 + 6 = 11$
 $t_2 = 5(2) + 6 = 10 + 6 = 16$
 $t_3 = 5(3) + 6 = 15 + 6 = 21$
 $t_4 = 5(4) + 6 = 20 + 6 = 26$

11, 16, 21, 26

15. (3 points) Acute Alice bought a new house plant that was 30 centimeters tall when she brought it home from the store. In each successive month, the plant grew by an amount equal to $\frac{2}{5}$ of its previous height.

a) Plant is 30cm now and grows $\frac{2}{5}$ of its' previous height per month.

so in the first month: $\frac{2}{5}(30) = \frac{60}{5} = 12\text{cm}$ of growth

b) This question is asking for a total height at the end of month 1, so we add $30 + 12$ to get 42cm .

c) To find the plant's height we use the method from parts a + b. We repeat these steps until we arrive at 60cm.

Month 1: $30 + \frac{2}{5}(30) = 30 + 12 = 42\text{cm}$

Month 2: $42 + \frac{2}{5}(42) = 42 + 16.8 = 58.8\text{cm}$

Month 3: $58.8 + \frac{2}{5}(58.8) = 58.8 + 23.52 = 82.32\text{cm}$

From this data, we see that the plant reaches 60cm after the end of month 2, and before the end of month 3. Since the height difference is great between months 2 + 3 along with noticing the end of month two is very close to our 60cm target, we conclude that the plant reaches 60cm shortly after the end of the second month.

Parents + Teachers: Your students do not have to write out the extensive steps + explanation that is shown in this manual. We provide extra information to aid your student in learning + navigating hard concepts. The "right answer" you are looking for from your student is shown inside the pink box. If your student comes up with the answer shown in that box, the problem is to be considered correct.

End of Answer Key Test 6

Problem Outlines for Algebra 1 Tests

All Test Questions come straight from the textbook. Here is a problem-by-problem list of where each test problem is located in the text. *Note: the letters in parenthesis represent which parts of that problem were used on the exam.*

Algebra Test 1: Chapters 1-3 Review Sections

Chapter 1 Review

1. 8 pg. 61 (a-d)
2. 11 pg. 62 (a-b)
3. 3 pg. 62 (a-d)
4. 5 pg. 62 (a-b)
5. 11 pg. 63 (a-c)
6. 12 pg. 63 (a-c)

Chapter 2 Review

7. 5 pg. 104 (a-e)
8. 6 pg. 104 (a-c)
9. 8 pg. 105 (a, b, d)
10. 1 pg. 106
11. 7 pg. 107 (a-c)
12. 9 pg. 107-108 (a-d)

Chapter 3 Review

13. 7 pg. 146 (a-e)
14. 8 pg. 146 (a-d)
15. 10 pg. 146 (a-d)
16. 13 pg. 146 (a-e)
17. 1 pg. 147 (a-e)
18. 3 pg. 147 (a-c)
19. 5 pg. 147 (a-b)

Algebra Test 2: Chapters 4-6 Review Sections

Chapter 4 Review

1. 4 pg. 177 (a,c,g,h,i)
2. 9 pg. 178 (a-d)
3. 4 pg. 179 (a,d,g,h,i)

Chapter 5 Review

4. 2 pg. 233 (a,b,e,f)
5. 8 pg. 233 (a-c)
6. 10 pg. 233 (a,d)
7. 12 pg. 234 (a,c)
8. 4 pg. 235 (a,c)
9. 5 pg. 235 (a,c,e)
10. 8 pg. 235 (a,b,d)
11. 14 pg. 236 (a-c)
12. 16 pg. 237 (a-e)

Chapter 6 Review

13. 4 pg. 278 (a,d)
14. 5 pg. 279 (c,d,e)
15. 6 pg. 279 (c,d)
16. 9 pg. 279 (c)
17. 10 pg. 279 (a,c)
18. 6 pg. 281 (d)
19. 2 pg. 280 (c,f*)
20. 11 pg. 281 (a,b)

* For test question number 19, we changed the problem to addition. The original (pg. 280 number 2 letter f) has subtraction. The test solution for number 19 reflects what the answer should be with addition.

Algebra Test 3: Chapters 7-8 Review Sections

Chapter 7 Review

1. 1 pg. 335 (a-d)
2. 2 pg. 335 (a-d)
3. 15 pg. 335
4. 16 pg. 335
5. Set I 20 pg. 336 (a-c)
6. 1 pg. 336 (a-e)
7. 7 pg. 336
8. 8 pg. 336
9. 20 pg. 337 (a-c)

Chapter 8 Review

10. 2 pg. 383 (a)
11. 2 pg. 383 (b)
12. 2 pg. 383 (c)
13. 2 pg. 383 (d)
14. 4 pg. 384 (a-d)
15. 8 pg. 385 (a,c,d)
16. 11 pg. 385 (a,c,f)

Algebra Test 4: Chapters 9-11 Review Sections

Chapter 9 Review

1. 3 pg. 439 (a,c*,f)
2. 7 pg. 439 (a,j,l)
3. 8 pg. 439 (b,d,h)
4. 6 (b,d) & 7 (d, L)
pg. 440
5. 7 pg. 440 (d,l)
6. 8 pg. 440 (f)
7. 11 pg. 441 (a,b,g,h)

Chapter 10 Review

8. 7(a, b) & 8(b, g) pg. 494
9. 9 (a, c) & 10 (a, f) pg. 494
10. 5 pg. 495 (a,c)
11. 6 pg. 495 (b)
12. 9 pg. 496 (i,j,k,l)

Chapter 11 Review

13. 2 pg. 552 (a)
14. 11 pg. 553 (c)
15. 4 pg. 553 (f)
16. 6 pg. 553 (c)
17. 7 pg. 553 (b)
18. 12 pg. 553 (d)

* Note on Test Question 1, what is shown on the test differs slightly from the matching problem from the textbook. Our test and our test solutions match, but the problem in the book has a "2" exponent, where our test questions has a "3".

Algebra Test 5: Chapters 12-15 Review Sections

Chapter 12 Review

1. 5 pg. 601 (b,c)
2. 6 pg. 601 (a,d)
3. 7 pg. 602 (a,d)
4. 9 pg. 602 (b)
5. 10 pg. 602 (a,c)
6. 11 pg. 602 (f)
7. 12 pg. 602 (c)
8. 4 pg. 602 (d)
9. 7 pg. 603 (b)
10. 11 pg. 603 (g)
11. 14 pg. 603 (g)

Chapter 13 Review

12. 3 pg. 662 (a-c)
13. 4-5 pg. 662 (a,b)
14. 8 pg. 662 (a,b)
15. 11 pg. 662 (a-b)
16. 3 pg. 663 (a-c)
17. 6 pg. 662 (a-d)
18. 9 pg. 663 (a-c)

Chapter 14 Review

19. 5 pg. 699 (a-d)
20. 9 pg. 700 (a-d)
21. 10 pg. 700 (a-c)
22. 2 pg. 701 (a-d)
23. 5 pg. 701 (a-c)
24. 6 pg. 701

Chapter 15 Review

25. 2 pg. 738 (a, c)
26. 3 pg. 738 (a,b)
27. 4 pg. 739 (b,c,h,j,)
28. 5 pg. 739 (a,c)
29. 6 pg. 739 (b,c)
30. 7 pg. 739 (b)
31. 1 pg. 740 (a,c)
32. 2 pg. 740 (b,d)
33. 3 pg. 740 (a,b)
34. 6 pg. 741 (a,c)
35. 7 pg. 741 (a)

* Note on Algebra Test 6: test question 1, the test was changed to have open circles on letter d where the textbook's original version had closed circles. The test solutions key reflects the correct answer for letter d based on the open circles shown on the test.

Algebra Test 6 : Chapter 16-17 Review Sections.

Chapter 16 Review

1. 2 pg. 771 (a-d*)
2. 6 pg. 771 (a-f)
3. 7 pg. 771 (a-d)
4. 6 pg. 772 (a-d)
5. 7 pg. 773 (a-c)

Chapter 17 Review

6. 1 pg. 812 (a, c)
7. 5 pg. 812 (f)
8. 4 pg. 812 (a-d)
9. 5 pg. 812 (a-c)
10. 6 pg. 812 (c-d)
12. 11 pg. 813 (a-g)
13. 1 pg. 814 (a-c)
14. 4 pg. 814 (a-c)
15. 13 pg. 816 (a-c)
11. 7 pg. 813 (c)

Optional Activity 1

Finding the Area of your house



Applicable Lesson: 5.6

Difficulty Level: Easy

Time Required: 15-20 minutes

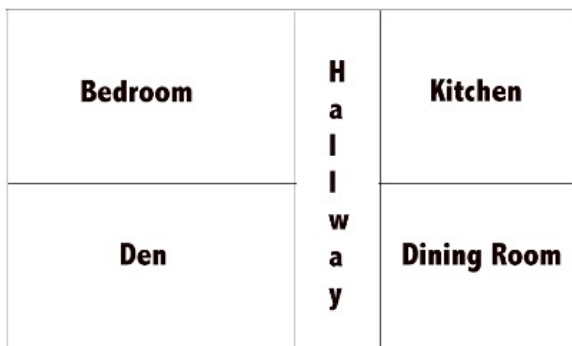
Supplies Needed:

- Tape Measure
- Partner to hold tape measure (optional)
- Paper to write on
- Pen/Pencil
- Harold Jacob's Elementary Algebra Textbook

Activity

Step 1: Draw a basic outline of your house. It is not necessary to be totally accurate. Try to choose rooms that are shaped as squares or rectangles. Estimate if needed. Label each room.

Example:

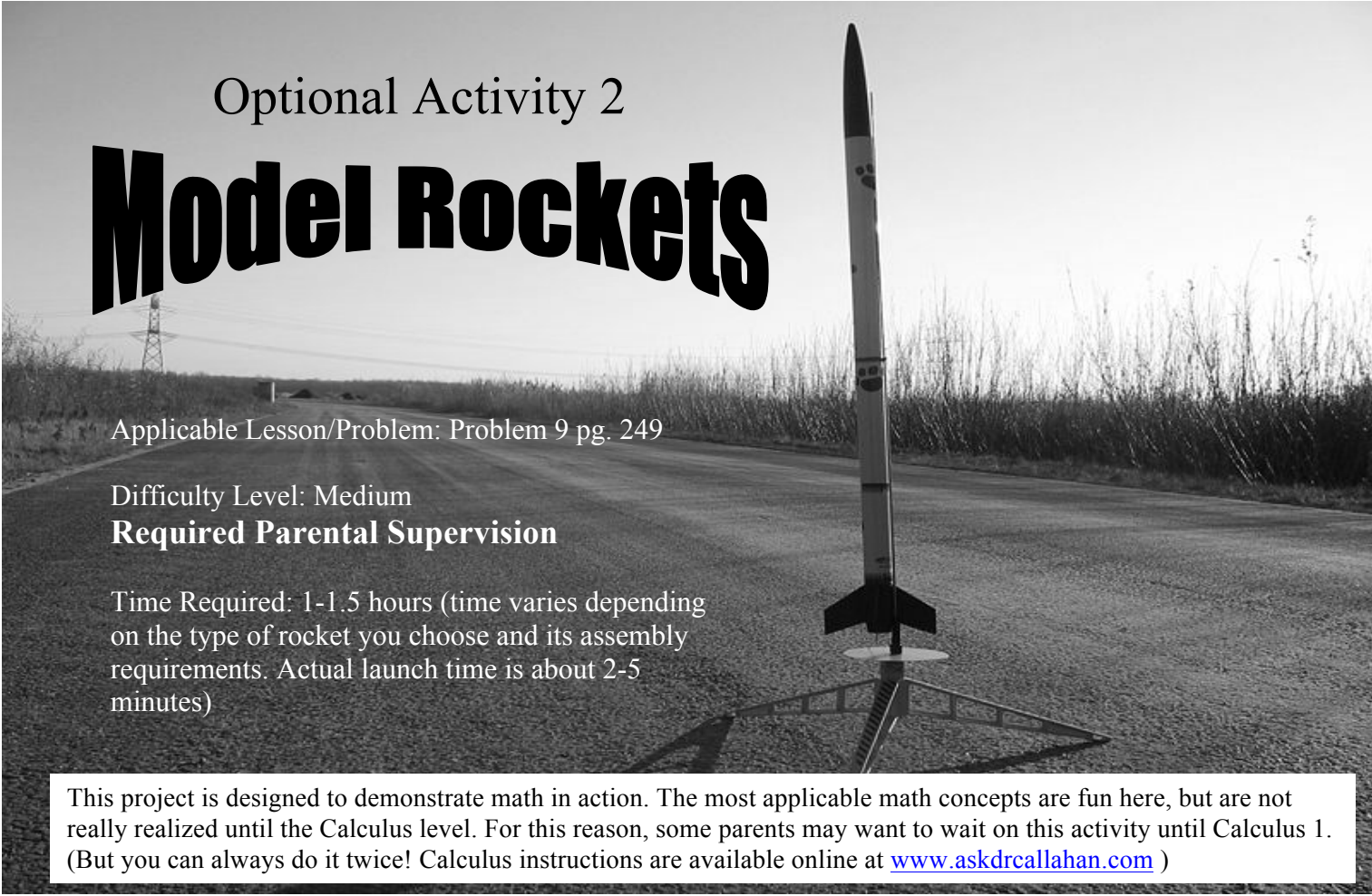


Step 2: Using a tape measure, measure both the length and width of each room. Write these measurements down.

Example: Dining Room: Length = 15 ft Width = 12 ft

Step 3: Calculate the area of each room (Area = Length x Width) *Example: Area of Dining Room = $15(12) = 180 \text{ ft}^2$*

Step 4: Add together each area (Dining Room Area + Bedroom Area + Kitchen Area, etc). This sum represents the approximate square footage of your house.

A black and white photograph of a model rocket standing on a launch pad in a field. The rocket is tall and slender with a pointed nose cone and a small finned base. It is positioned on a gravel or dirt surface. In the background, there is a line of tall grass and a power line tower under a clear sky.

Optional Activity 2

Model Rockets

Applicable Lesson/Problem: Problem 9 pg. 249

Difficulty Level: Medium

Required Parental Supervision

Time Required: 1-1.5 hours (time varies depending on the type of rocket you choose and its assembly requirements. Actual launch time is about 2-5 minutes)

This project is designed to demonstrate math in action. The most applicable math concepts are fun here, but are not really realized until the Calculus level. For this reason, some parents may want to wait on this activity until Calculus 1. (But you can always do it twice! Calculus instructions are available online at www.askdrclallahan.com)

Supplies Needed:

- PARENTAL SUPERVISION
- 1 Rocket Kit (or Build your own) (Build your own instructions/links available at www.askdrclallahan.com)
- Paper/pen
- Harold Jacob's Elementary Algebra Textbook

Activity

Step 1: Work problem 9 pg. 249. Discuss how the math concepts demonstrated there apply to launching a rocket.

Step 2: Along with a parent, read and Follow the instructions for assembling your rocket. Be sure and read the instructions about appropriate weather conditions and important safety measures concerning rocket launches.

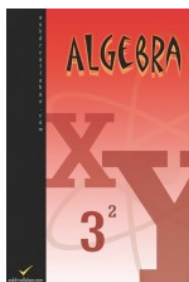
Step 3: Launch the rocket! ☺ Discuss how the real rocket launch compared to the problem in the book. For more information on rocket clubs and model rocket competitions, please visit our website: www.askdrclallahan.com

Suggested Activity Enhancement: For a project alternative, have your student research real rockets. Discover who builds them, why they are built, and where. The student could then put their research together in a binder, or on a poster. Consider having them use rockets to explain why math is relevant and important.

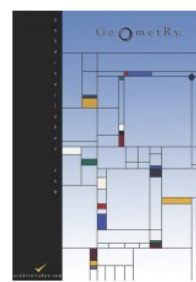
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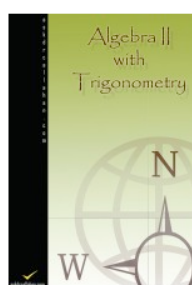
Pre-Algebra



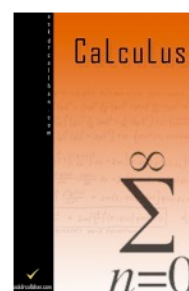
Algebra I



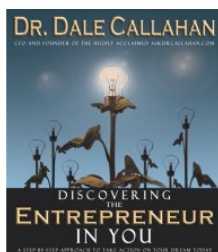
Geometry



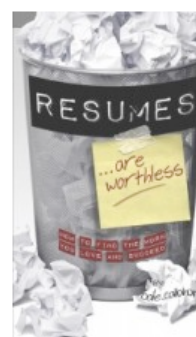
Algebra II with Trigonometry



Calculus 1



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