Mississippi SATP2 Algebra I
Student Review Guide

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by
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Table of Contents

What is New in this Edition?

This edition has been revised to reflect the changes made to the Algebra I framework as given in the 2007 Mississippi Mathematics Framework Revised. Some teaching material that dealt specifically with competencies and objectives that were removed from the new framework has been removed in this edition. Other material has been added for competencies and objectives that were added to the new framework. The level of difficulty for problems has been adjusted to reflect the correct depth of knowledge (DOK) as indicated by the new framework.

The Author

Jerald D. Duncan has been involved with education for the past 30 years. He has been a classroom teacher at the Middle School and High School levels, the assistant to the Vocational Director, Cobb County Schools, the Apprenticeship Coordinator, Cobb County Schools, and a curriculum materials author.

He is a graduate of Emmanuel College, Franklin Springs, GA and Georgia State University in Atlanta.

Jerald is a nationally recognized Curriculum Development facilitator with curriculum projects completed in Alabama, Georgia, Michigan, and Pennsylvania. He has also conducted more than 40 teacher training workshops in over a dozen states in the areas of Applied Mathematics, Academic and Vocational Integration, Cooperative Learning, and Reading Across the Curriculum. He is also a CORD certified trainer in the areas of Applied Math, CORD Algebra, CORD Geometry, and Principles of Technology. Jerald is a frequent presenter at the SREB summer conferences and has presented at the Regional NCTM Conference.

Jerald has previously authored resource materials for Applied Math, CORD Algebra, CORD Geometry, Applied Biology/Chemistry, and Principles of Technology, and *Student Review Guide: Math*, and *Student Review Guide: Social Studies,* Alabama High School Graduation Exam.

Acknowledgments

I would like to thank my wife, Susan, and my children, Josh, Will and Matt, for their encouragement, understanding, and sacrifices while most of my waking moments were devoted to revising this book. I would also like to thank Julie Sawyer and Laura Silvernale for their editorial work and Kelly Berg who keeps us all straight, somehow. Without the encouragement from my family and help from friends and colleagues, this book would have never happened.

Preface

The ***Mississippi SATP2 Algebra I Student Review Guide*** is written to help students review the skills needed to pass the Algebra I end-of-course test in Mississippi. This comprehensive guide is based on the 2007 Mississippi Algebra I Framework (Revised) Competencies as correlated by the Mississippi State Department of Education.

How To Use This Book

Students:
The Algebra I end-of-course test is required for graduation. You must pass the state end-of-course test, which contains 65 multiple-choice questions. This book is a review for the Algebra I end-of-course test.

① Take the pre-test at the front of this book. The pre-test covers the Algebra I skills as they will be tested on the end-of-course test. The pre-test is designed to identify areas that you need to review.

② Score the pre-test. Using the pre-test evaluation chart, circle the questions that you answered incorrectly.

③ For each question that you missed on the pre-test, review the corresponding sections in the book. Read the instructional material, do the practice exercises, and take the section review tests at the end of each section.

④ After reviewing the skills, take the two practice tests (also provided as separate booklets). These practice tests are written to look similar to the actual Algebra I end-of-course test, so they will give you practice in taking the test.

⑤ After taking Practice Test 1 and/or Practice Test 2, use the practice test evaluation charts, which are found directly after each practice test, to identify areas for further review and practice. The practice test evaluation charts can be used in the same way as the pre-test evaluation charts.

Teachers:
This review guide is also intended to save you, the teacher, time in the classroom. It can be used for classroom instruction or for individual student review. Since this student guide offers review for ALL of the Mississippi Curriculum Framework for the Algebra I course, you, the teacher, have one consolidated resource of materials to help your students prepare for the end-of-course test.

① When teaching or tutoring individual students, use the strategy outlined above for students. By taking the pre-test, students can identify areas that need improvement. The pre-test evaluation chart directs the student to the sections they need to review for instruction and additional practice.

② For classroom study, use this guide to supplement lesson plans and to give additional review for skills required by the Algebra I Framework Competencies. Purchase a class set of guides for use in the classroom or assign guides to students for out-of-classroom work.

③ Assign the practice tests (provided in separate booklets) as comprehensive review tests.

④ Use the practice test evaluation charts found after each practice test to identify areas needing further review.

⑤ To establish benchmarks, you may want to use one of the practice tests (provided in separate booklets) as a pre-test. Then, after the students have completed all the exercises in the workbook, use the second practice test to gauge progress. You should see marked improvement between the initial and final benchmarks. (You may also want to use the pre-test in this book to get an initial score, but the question distribution for each competency in the pre-test does not necessarily match the state-specified blueprint.)

⑥ Please **DO NOT** photocopy materials from this guide, the pre-test booklet, or the practice test booklets. These materials are intended to be used as student workbooks, and individual pages should not be duplicated by any means without permission from the copyright holder. To purchase additional or specialized copies of sections in this book, please contact the publisher at 1-800-745-4706.

Competency Correlation Chart (Teacher's Edition)

The chart below correlates each Algebra I Framework Competency as specified by the Mississippi State Department of Education to the student guide. The Text Section column gives the section numbers in the text where each competency is reviewed. The Pretest and Practice Test columns give the question number(s) in that test that correlates to each competency.

Framework Competency	Text Section(s)	Pre-Test	Practice Test 1	Practice Test 2
1a	1.1–1.4, 2.1–2.3, 3.1–3.5, 10.1–10.5, 11.1–11.3	5,7,10,54,62	1,35,43,57,63,64	5,9,15,29,32
1b	23.1–23.4	11,16,48,53	27,41,56	1,22,30
2a	4.1–4.6, 5.1–5.3, 6.1–6.7, 7.6–7.8, 8.1–8.5	1,15,29,31	15,26,52,55	2,11,16,23,41
2b	9.1–9.5	4,9,13	2,9,13	3,14,60,65
2c	25.1–25.4	8,37,42,55	37,48,58,62	8,10,18
2d	21.2, 26.4	19,35	24,45	7,50
2e	4.3, 18.1–18.5, 20.2, 20.3, 20.5–20.7, 21.4, 21.6, 22.1–22.3, 25.5	23,34,39,57	3,11,18,22,60	13,21,51,55
2f	24.2– 24.6	21,26	10,42	17,20
2g	10.1–10.6, 11.1–11.3, 13.6, 14.1–14.3	3,17,64	4,20,25	38,43
2h	13.1–13.4	49,59	6,53	42,52
2i	15.1–15.3, 16.1–16.3, 26.1	25,45,56	23,32,46	4,24,36
2j	13.1–13.5, 15.4	20	17	54
2k	16.4, 26.1–26.3	18,22,33	5,21,33	19,45,57
2l	19.1–19.3	12,41	29	40,47
3a	22.4–22.6, 24.1	24,50,51,65	30,38,39	25,33,35,46,62
3b	20.1, 20.4, 21.1–21.6	14,27,30,46	8,16,28,31,65	12,34,37,53
4a	4.2, 7.1–7.4, 7.6, 7.8	2,28,43	44,61	26,48
4b	7.5, 17.1–17.5, 20.1, 20.2	38,44,47,63	12,47,49	27,44.61
4c	12.1–12.5, 14.3	6,32,60,61	7,19,50	6,28,56
5a	27.1–27.3	40,58	34,40,54	31,39,49,58,
5b	27.2, 27.3	36,52	14,36,51,59	59,63,64

Algebra I
Pre-Test
Introduction

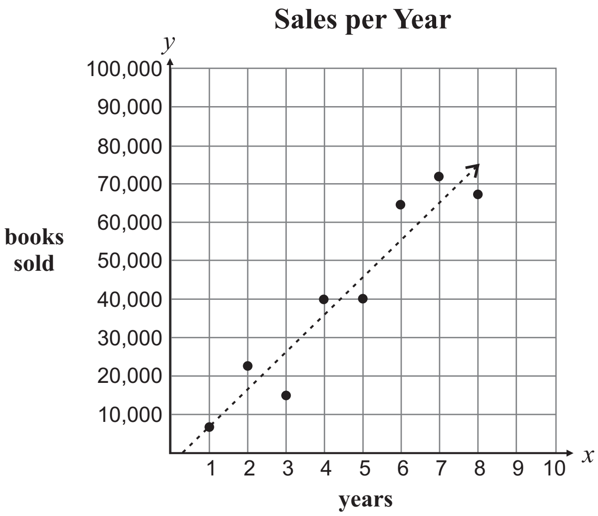
Introduction
The pre-test that follows is designed to identify areas where you can improve your skills before or after taking the Algebra I end-of-course test. This pre-test will be similar in format to the end of course SATP2 test for Algebra I.

Directions
Read the directions on the following page. These directions should be similar to what you will see on the actual SATP2 for Algebra I. Once you have completed this pre-test, circle the questions you answered incorrectly on the pre-test evaluation chart on page 26. For each question that you missed on the pre-test, review the corresponding sections in the book as given in the evaluation chart. Read the instructional material, do the practice exercises, and take the section review tests at the end of each section.

Purpose of the Pre-Test
The following pre-test can be used as practice for the actual SATP2 Algebra I test, but it is primarily a diagnostic tool to help you identify which skills you can improve in order to prepare better for the actual test. Any pre-test question answered incorrectly may identify a skill needing improvement or mastery. Review the corresponding skill(s) indicated in the Pre-Test Evaluation Chart by reading the instructional material on the given pages and completing the practice exercises and reviews. By reviewing each skill, you will improve mastery of the material to be tested on the SATP2 Algebra I test and potentially increase the score you receive on that test. (The practice tests, which are given in separate booklets, are provided to give you additional practice taking tests similar to the actual SATP2 Algebra I test.)

Scoring on the Actual SATP2 for Algebra I
The actual test that you will take to pass the Algebra I course will consist of 65 multiple-choice questions. Out of these 65 multiple-choice questions, only 53 questions will be scored. The scorable questions are pre-determined. The other 12 multiple-choice questions embedded throughout the test are field-test questions that will not be scored. You will not know which questions will be scored and which ones will not, so you should answer each and every question as if it will be scored.

58. **A growing publishing company plots the number of books sold each year for its first 8 years in business. The data is shown on the scatter plot below.**



Based on the trend shown in the line-of-best fit, which is the closest to the expected number of books sold in the tenth year?

A 75,000
B 82,000
C 94,000
D 97,000

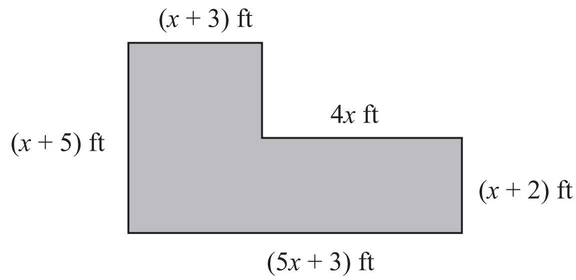
Ⓐ Ⓑ Ⓒ Ⓓ

59. **Which of the following is a factor of $6x^2 + 7x - 5$?**

A $(2x - 1)$
B $(2x + 1)$
C $(3x - 5)$
D $(6x + 1)$

Ⓐ Ⓑ Ⓒ Ⓓ

60. **The figure below is made up of two rectangles.**



What is the total area, in square feet, of the figure?

A $12x + 16$
B $5x^2 + 23$
C $5x^2 + 8x + 15$
D $5x^2 + 16x + 15$

Ⓐ Ⓑ Ⓒ Ⓓ

61. **If the area of a square is $x^2 - 6x + 9$, then what is the length of one of the sides in terms of x?**

A $x + 3$
B $x - 3$
C $x - 6$
D $x - 9$

Ⓐ Ⓑ Ⓒ Ⓓ

62. **Which of the following is equivalent to the expression shown below?**

$$\frac{16a^{-1}b^3c^2}{24a^{-3}b^{-1}c^5}$$

A $\frac{2a^2b^4}{3c^3}$

B $\frac{2b^4}{3a^4c^3}$

C $\frac{2a^2}{3b^2c^3}$

D $\frac{2a^4b^4}{3c^7}$

Ⓐ Ⓑ Ⓒ Ⓓ

63. **Line segment $\overline{UV}$ has a midpoint of $\left(\frac{5}{2}, 8\right)$ on a coordinate plane. If point U is located at (1, 5), then which ordered pair represents the location of point V?**

A (2, 11)

B (4, 11)

C (4, –1)

D $\left(\frac{3}{2}, 11\right)$

Ⓐ Ⓑ Ⓒ Ⓓ

64. **Which of the following is equivalent to the expression below?**

$$\frac{3x^2y - xy + 2xy^2}{xy}$$

A $3x + 2y$

B $3x^3y^2 - x^2y^2 + 2x^2y^3$

C 5

D $3x - 1 + 2y$

Ⓐ Ⓑ Ⓒ Ⓓ

65. **Which of these pairs of linear equations represent two lines that are perpendicular?**

A $y = \frac{2}{5}x + 4$ and $y = \frac{5}{2}x - 2$

B $y = -\frac{1}{3}x + 2$ and $y = \frac{1}{3}x + 2$

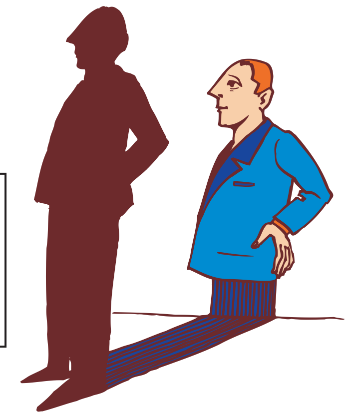
C $y = \frac{2}{3}x - 4$ and $y = -\frac{3}{2}x + 3$

D $y = 3x + 1$ and $y = 3x + 4$

Ⓐ Ⓑ Ⓒ Ⓓ

Exponents and Roots

Section 3.3
Negative Exponents



One way to think of negative exponents is to rewrite the power as a rational number (fraction) with one as the numerator and the power as the denominator. Or you could say that positive exponents go in the numerator and negative exponents move to the denominator and change their sign to positive. (A negative exponent in the denominator would move to the numerator.)

Rule for Negative Exponents

$$a^{-m} = \frac{1}{a^m}$$

Example 1: **Simplify the expression $(3)^{-3}$.**

Using the rule for negative exponents, the power is moved to the denominator. Then, the exponent can be simplified.

$$3^{-3} \longrightarrow \frac{1}{3^3} = \frac{1}{27}$$

If you have a multiplication problem to simplify, move factors with negative exponents into the denominator and keep factors with positive exponents in the numerator. Then you can simplify. Example 2 below shows how.

Example 2: **Simplify the expression $3^{-2} \bullet 6^2$.**

Keep the 6^2 in the numerator since it has a positive exponent, but move the 3^{-2} to the denominator and change the negative exponent to a positive one. Then do the math.

$$6^2 \bullet 3^{-2} \longrightarrow 6^2 \bullet \frac{1}{3^2} = \frac{6^2}{3^2} = \frac{\overset{4}{\cancel{36}}}{\underset{1}{\cancel{9}}} = 4$$

shortcut

Now let's look at a couple of division problems. When a division problem is written with a "÷" sign, you can rewrite it as a fraction in two different ways. Choose the way that makes the most sense to you.

Example 3: **Simplify the expression $a^{-4} \div a^{-3}$.**

Step 1: First, write each factor in fraction form.

Step 2: Remember, dividing by a fraction is the same as multiplying by its inverse.

Step 3: Simplify by using the rules of exponents.

$$a^{-4} \div a^{-3} \longrightarrow \frac{1}{a^4} \div \frac{1}{a^3}$$

$$\frac{1}{a^4} \bullet \frac{a^3}{1} = \frac{a^3}{a^4} = \frac{1}{a}$$

Example 4: **Simplify the expression $2a^{-3} \div 3a^{-5}$.**

Step 1: The "÷" sign can be replaced with a fraction bar. Rewrite as a fraction before changing the negative exponents. You may see problems written as fractions this way instead of with a "÷" sign.

Step 2: For any variable that has a negative exponent, move it to the other side of the fraction bar and change the exponent to a positive. **Be careful: only move the variables and not the coefficients!**

Step 3: Now simplify using the rules of exponents.

$$2a^{-3} \div 3a^{-5} \longrightarrow \frac{2a^{-3}}{3a^{-5}}$$

$$\frac{2\,\boxed{a^{-3}}}{3\,\boxed{a^{-5}}} \longrightarrow \frac{2a^5}{3a^3}$$

$$\frac{2a^2}{3} \text{ or } \frac{2}{3}a^2$$

Inequalities

Section 8.5
Understanding Averages

Working with averages is another real-world situation that may require the use of inequalities. When it comes to averages, the one that students are most aware of is the grades they get for school work. Sounds like a good place to begin.

Average
$\dfrac{\text{sum of item}}{\text{number of items}}$

You can figure out your grade point average by adding all your test scores and then dividing by the total number of tests. You use this same process to find any average. An average is the sum of items divided by the number of items.

Let's start with finding a current average. Suppose you have taken five tests this semester. Your scores are 88, 75, 91, 77, and 80.

$$\{ 88 , 75, 91, 77, 80 \}$$

Calculate your current average by totaling the current grades and dividing by five. Round to the nearest whole number. With these grades, your average is 82.

$$\frac{88 + 75 + 91 + 77 + 80}{5} = 82$$

Example 1: **You have an A average. Your grades are 90, 95, 92, 97, and 93. There is a test scheduled on Friday before spring break. If you miss the test, you cannot make it up. How much damage can one zero do to your average if your family decides to leave early for spring break?**

Step 1: Calculate the current average.

$$\frac{90 + 95 + 92 + 97 + 93}{5} = 93$$

Step 2: Add one zero and recalculate the average.

$$\frac{90 + 95 + 92 + 97 + 93 + 0}{6} = 78$$

Step 3: How much difference did the zero make? Original average minus the new average is fifteen.

$$93 - 78 = 15$$

One zero made a 15 point difference. You have gone from an A to a C! If there had been fewer grades, the difference would have been even more drastic.

Now let's say you have a test coming up and you want to know what grade you need to maintain your average. Since you probably don't mind if your average goes up, your calculation becomes an inequality. You want to know the minimum grade, but any grade higher than that will also work!

Example 2: **Your first five test grades are 88, 75, 91, 77, and 80. What grade do you need to make on the sixth test to maintain your average?**

Step 1: First, calculate your current average by totaling the current grades, and then divide by five. From above, you've already seen that these grades average to 82.

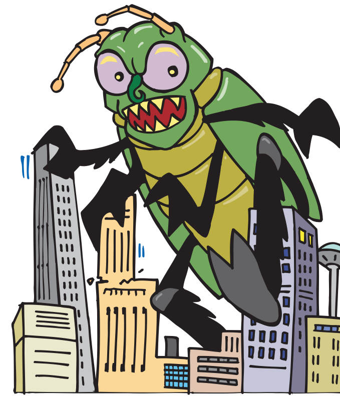
$$\frac{88 + 75 + 91 + 77 + 80}{5} = 82$$

Step 2: To calculate your average after test six, you would add a variable, *T*, to stand for the test you haven't taken yet and divide by six.

$$\frac{88 + 75 + 91 + 77 + 80 + T}{6}$$

Rational Expressions

Section 11.2
Negative Exponents



So far all the division of monomials you have seen has been with positive exponents. What happens when the rational expression has negative exponents? You pray. Just kidding. Negative exponents aren't really that bad. You just have to pay attention — very careful attention. Let's start with a short review of what you already know about negative exponents.

Rules for Negative Exponents

$$y^{-7} \rightarrow \frac{1}{y^7}$$

You've already seen that you can make a negative exponent positive by making it the denominator of a fraction. But what if you already have a rational expression and the negative exponents are in the numerator or denominator? You move them. Here's how.

$$\frac{x^{-3}y^2}{y^2} \rightarrow \frac{y^2}{x^3y^2}$$

$$\frac{x^2}{x^3y^{-2}} \rightarrow \frac{x^2y^2}{x^3}$$

If the negative exponent is in the numerator, you *move* it to the denominator. If the negative exponent is in the denominator, move it to the numerator. It's just that simple. When you move negative exponents, they become positive.

$$\frac{2x^{-2}y^{-2}}{3x^{-3}y^{-4}} \rightarrow \frac{2x^3y^4}{3x^2y^2}$$

If you have all negative exponents in the numerator and the denominator, the variables swap places. Make sure you don't swap the coefficients; they already have a positive exponent. They're raised to the power of +1.

Negative Exponents in Rational Expressions

If a rational expression has negative exponents, use the rules above to make them positive. Once you make the exponents positive, you can simplify the rational expression by canceling common factors. Take a look at these examples.

Example 1: **Simplify the expression** $\frac{16x^{-3}y^4z^{-2}}{12x^2y^2z^3}$.

Since there are negative exponents in the numerator, you *move* them to the denominator. Once all the exponents are positive, you can add the exponents that have the same base.

$$\frac{16x^{-3}y^4z^{-2}}{12x^2y^2z^3}$$

Step 1: Move the negative exponents to the denominator and make them positive. Remember to move both the base and the exponent. Don't move just the exponent.

$$\frac{16y^4}{12x^2x^3y^2z^3z^2}$$

Step 2: Add the exponents with the same bases.

$$\frac{16y^4}{12x^{2+3}y^2z^{3+2}} \rightarrow \frac{16y^4}{12x^5y^2z^5}$$

Step 3: Factor the coefficients if you can.

$$\frac{\cancel{4}\cdot 4\cancel{y^4}^{\,y^2}}{\cancel{4}\cdot 3x^5\cancel{y^2}z^5}$$

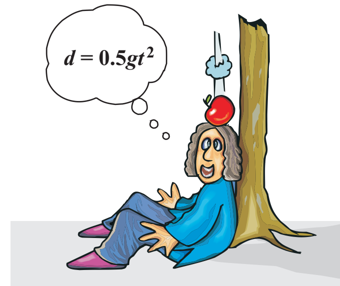
Step 4: Cancel the common factors in the coefficients and use the shortcut to cancel exponents.

$$\frac{4y^2}{3x^5z^5}$$

Step 5: After cancelling, regroup what's left.

Quadratic Applications

Section 16.3
Quadratic Word Problems: Motion Applications



The very mention of the word physics is enough to strike fear in the heart of the average high school student. It's not because the concepts are all that hard — it's because the math is so *scugly*! That's scary and ugly all rolled into one. The good news is that many of the formulas used to solve physics applications are quadratics. And you know how to solve quadratics, right? Well, by now you should.

This won't be a physics lesson, but there are a few *scugly* application problems that you should see. Have courage! You can do the math. And you won't even have to come up with the equation; we'll give you that. All you have to do is decide how to solve it and find the right answer.

According to some, Sir Isaac Newton, noted mathematician, was sitting under an apple tree when an apple fell. Because of Newton's contributions to the field of science, you now know that the force that caused the apple to fall is called gravity. The speed of the apple is caused by the acceleration due to gravity.

Example 1: **Let's say Newton saw an apple begin to fall from the top of a tree 11 meters above his head. How long did he have to move out of the way before the apple would have hit him in the head? Use the formula below.**

$$d = 0.5gt^2$$

d = 11 meters (distance the apple fell)
g = 9.8 m/s^2 (acceleration due to gravity)
t = time in seconds for the apple to fall

Step 1: Substitute the values you know into the formula *including the units*.

$$d = 0.5gt^2$$
$$11 \text{ m} = 0.5\,(9.8 \text{ m/s}^2)\,t^2$$

Step 2: Do the math. Multiply the 0.5 and the 9.8 m/s^2.

$$11 \text{ m} = (4.9 \text{ m/s}^2)\,t^2$$

Step 3: Divide by sides by 4.9 m/s^2. The "m/s^2" is a rate, so treat the units like a fraction. Remember that when you divide by a fraction, you reverse the numerator and denominator. The meters cancel. Round to the nearest hundredth.

$$\frac{11 \cancel{\text{m}}}{4.9} \cdot \frac{\text{s}^2}{\cancel{\text{m}}} = t^2$$

$$2.24 \text{ s}^2 = t^2$$

Step 4: Now you can take the square root of both sides to solve for *t*. Notice that when you take the square root of s^2, you get just seconds. It takes the apple about 1.5 seconds to fall 11 meters, so Newton has only 1.5 seconds to get out of the way!

$$1.5 \text{ s} = t$$

Example 1 is a fairly easy one. The motion is in only one direction. But if you start throwing things up in the air, they come back down at the same rate as the apple. Now, you have two directions: first up with the speed you threw it and then down with the speed due to gravity. When something goes up and then comes back down, its movement is called projectile motion.

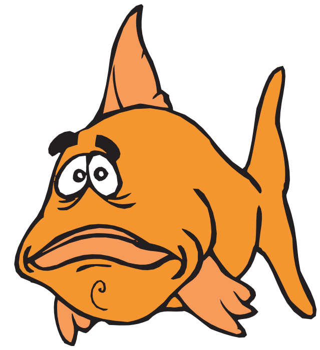
Let's say you threw a rock straight up into the air at 8 m/s from a height of 1.5 meter. How long, in seconds, will it take before the rock hits the ground, or $h = 0$? Without getting too technical, the 8 and the 1.5 go into the projectile motion equation as shown on the right. If you set $h = 0$, that's all you need to know to solve a problem like this one.

$$h = -4.9t^2 + 8t + 1.5$$

$$0 = -4.9t^2 + 8t + 1.5$$

Non-linear Functions

Section 26.2
Quadratic Equations From Graph and Tables



Now that you know how to find the information about quadratic functions from a graph or a table, let's see what you can do with it.

Let's say you have a graph or a table and need to match it to its equation. To match a graph or table to a quadratic equation, you need to check at least three points. You could take each set of integer coordinates from the graph or table, substitute them for *x* and *y* values in the quadratic equation, and then simplify. If the two sides are equal for each set of points, the graph or table matches the equation. The easiest points to pick, if they are integers, are the two *x*-intercepts and the *y*-intercept, but any three points will do.

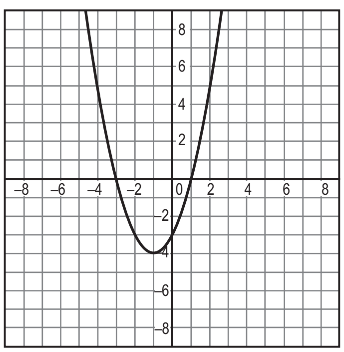
Substituting three different points into an equation to see if the equation is true can be time consuming. It would really be helpful to get an equation from looking at a graph or a table. You can do just that if you memorize the vertex form of a quadratic equation as given on the right. It's called the "vertex" form because it uses the values for the vertex, *h* and *k*. As long as you can identify the vertex from a graph or a table and have one additional point, you can use this formula to find the equation of the quadratic.

"Vertex" Formula for a Quadratic Equation

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

Quadratic Equations From Graphs

Let's start with a graph. Find the equation for the quadratic function graphed below.



This is a three step process:

First, you will need to find the coordinates of the vertex and one other coordinate from the graph. The *y*-intercept is a good one to use. Label the *x*-coordinate of the vertex as ***h*** and the *y*-coordinate ***k*** — you'll see why in a minute. Also, label the coordinates of the other point as *x* and *y*.

vertex = $(\overset{h}{-1}, \overset{k}{-4})$ ***y*-intecept =** $(\overset{x}{0}, \overset{y}{-3})$

Next, you'll need the "vertex" form of a quadratic equation. It may look weird, but it's the quadratic function written in terms of the *x* and *y* values of the vertex (*h*, *k*). Substitute the values you labeled into the equation and solve for *a*. Now, you know two things about your equation: the coefficient of the x^2 term is 1 and the constant term is –3. How do you get the rest of the quadratic? Glad you asked.

$$y = a(x - h)^2 + k$$
$$-3 = a(0 - (-1))^2 + (-4)$$
$$-3 = a(1)^2 - 4$$
$$-3 = a - 4$$
$$1 = a$$

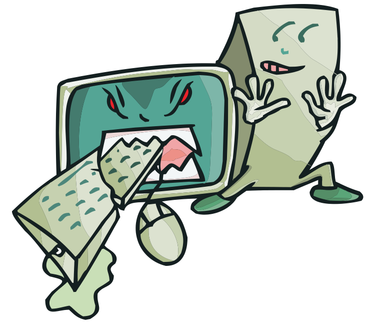
$$y = a(x - h)^2 + k$$
$$y = 1(x - (-1))^2 - 4$$
$$y = (x + 1)^2 - 4$$
$$y = (x + 1)(x + 1) - 4$$
$$y = x^2 + 2x + 1 - 4$$
$$y = x^2 + 2x - 3$$

Finally, take the "vertex" form of the equation and substitute the values of *a*, *h*, and *k*. Simplify and you have the quadratic function that matches the graph.

That wasn't so bad, was it? It would be well worth your time to memorize this "vertex" formula. You'll find it very useful if you need to match a graph to a quadratic equation.

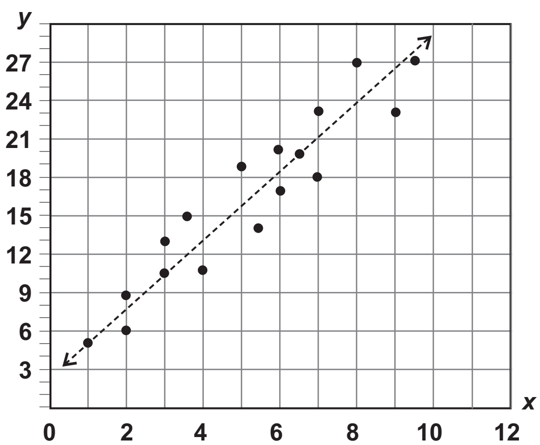
Scatter Plots

Section 27.2
Determining Data Trends



When scatter plots have a definite trend, you can actually draw a line that "fits" the data. If you *eyeball* the relationship, it's called a trend line. If you do a statistical analysis (which is what your calculator does), it's called a **line-of-best fit**. A trend line is just a guess based on observation. The line-of-best fit is a calculation based on statistical analysis. Both are still best guesses, but the line-of-best fit is a better guess

Trend Lines



Finding a trend line by hand is tricky business. But there are a few guidelines you can use to make the attempt a little easier.

You'll need a straight edge — something that won't cover up the data like a string or a stick of spaghetti (uncooked of course; you need a straight line — not a curve).

Try to place the spaghetti, or whatever you're using, on the graph so that there are the same number of points above the line as below the line. Resist the temptation to place the line through both the first and last points. That's usually not a good fit.

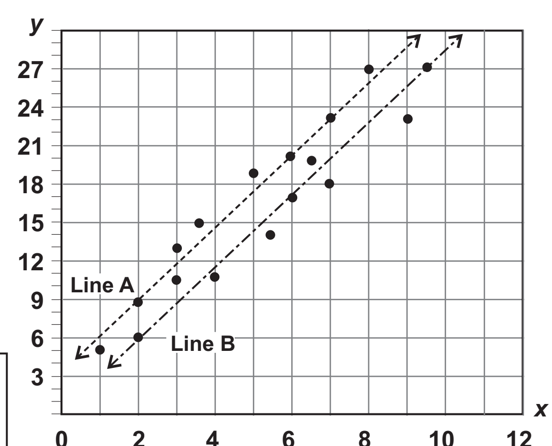
It's okay to have points on the line, and you don't count those when you average points above and below the line.

Move the line so that as many points as possible are as close as you can get them to the line. It may take a bit of trial and error to make that happen. When you have it, mark the beginning and end of your spaghetti line and draw the pencil line between the two points.

That's your trend line. Check it out to see how well you did. When you count the points above and below the line, you get seven above and seven below. So far, so good. It also looks like you have the distance of the dots above and below the line about equal — some are close and some are not, but all-in-all, they are about the same. That's a good trend line, but it's not the *only* trend line.

Let's say you laid out your spaghetti to look like line A on the graph below. Isn't this a trend line, too? Sure it is. But is it the best one? Count the dots above and below the line. Four above and ten below is not very close to equal, is it?

Look at the dots. The spacing of the dots above and below the line aren't too even either. The dots above the line are a lot closer to the line than the dots below it. So even though it is a trend line, it's probably not the **best** trend for the data.



Line B has the same problem. It's a trend line, but it's just not the best one given the description above.

If you are given choices of which trend line is best, choose according to the following guidelines:

Good Trend Lines

- Same number of points above and below the line
- Points as close to the line as possible
- Equal average distances for points above and below the line

Mississippi SATP Algebra I Revised Student Review Guide:

Practice Test

1

Mississippi
2007 Mathematics Framework
Revised

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23. **What is the solution set to the equation below?**

$$3x^2 - x = 2$$

A $\{-\frac{2}{3}, 1\}$

B $\{-\frac{2}{3}, -1\}$

C $\{2, 3\}$

D $\{-3, 2\}$

Ⓐ Ⓑ Ⓒ Ⓓ

24. **If $\frac{x}{4} + \frac{y}{3} = 2$, which statement best explains how the value of y changes each time x is increased by 1 unit?**

A The value of y increases $\frac{3}{4}$ units.

B The value of y decreases $\frac{3}{4}$ units.

C The value of y increases $\frac{4}{3}$ units.

D The value of y decreases $\frac{4}{3}$ units.

Ⓐ Ⓑ Ⓒ Ⓓ

25. **Which of the following is equivalent to the algebraic expression below?**

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

A $-6x^2y - x$

B $18x^2y - 17x$

C $6x^2y - 17x + 24$

D $-6x^2y - x + 24$

Ⓐ Ⓑ Ⓒ Ⓓ

26. **For routine plumbing services, Flush-Rite Plumbing charges its customers a flat rate of $75 plus a labor charge of $130 per hour. If the company bills a customer for $400, how many hours of labor were billed?**

A 2 hours

B 2.5 hours

C 3.25 hours

D 5 hours

Ⓐ Ⓑ Ⓒ Ⓓ

27. **Matrix Y is the result when matrix X is multiplied by a scalar.**

$$X = \begin{bmatrix} 48 & -24 \\ -8 & 36 \end{bmatrix} \qquad Y = \begin{bmatrix} a & -18 \\ -6 & 27 \end{bmatrix}$$

What is the value of a in matrix Y?

A −36

B −64

C 36

D 64

Ⓐ Ⓑ Ⓒ Ⓓ

28. **Which of the following linear equations when graphed on the same coordinate grid is closest to horizontal?**

A $y = 2x$

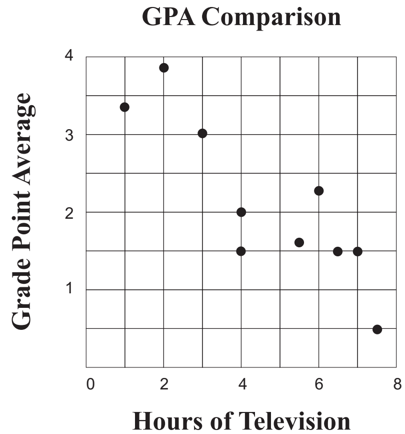
B $y = \frac{2}{3}x - 1$

C $y = x + 1$

D $y = \frac{1}{2}x + 5$

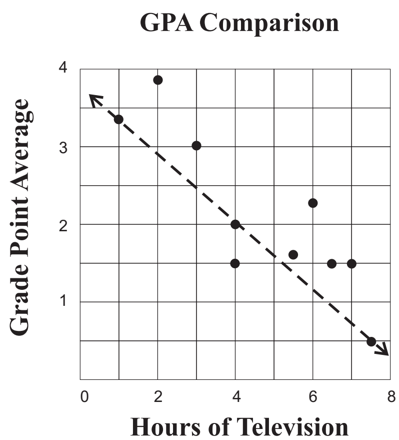
Ⓐ Ⓑ Ⓒ Ⓓ

59. **A school counselor picked 10 students at random and took a survey to find the average hours of television watched each day after school. She compared each answer to the student's grade point average and plotted the results below.**

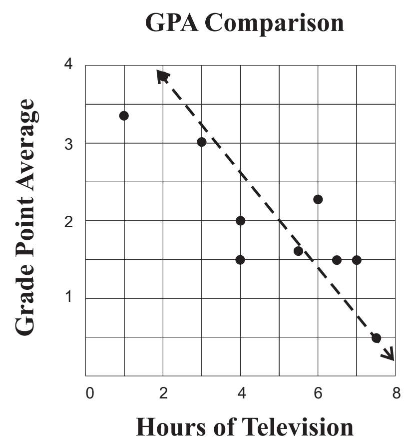


Which line below represents the best trend line for the data?

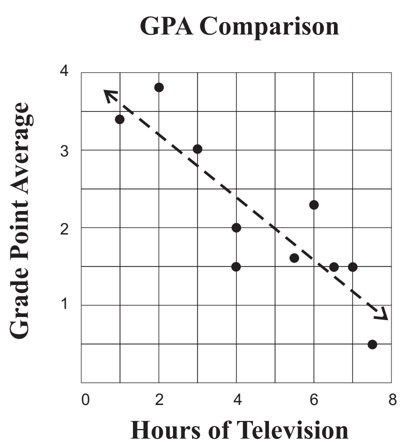
A



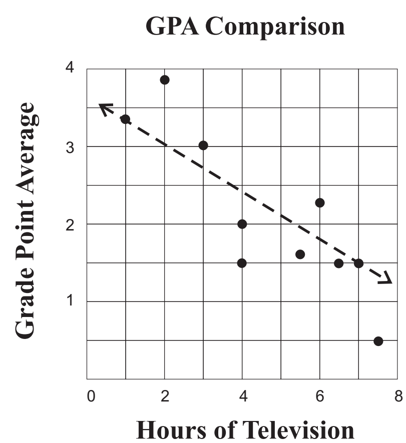
C



B



D



Ⓐ Ⓑ Ⓒ Ⓓ

Algebra I
Practice Test 1
Evaluation Chart

If you missed question #:	Go to section(s):	If you missed question #:	Go to section(s):
1	1.2, 3.1, 3.3, 11.1, 11.2	36	27.2
2	4.1, 4.2, 4.3, 8.4	37	25.3
3	17.1, 20.1, 20.2, 20.3, 20.6, 20.7	38	20.3, 22.4
4	13.1, 14.1	39	20.1, 20.3, 22.5
5	13.4, 15.1, 16.4	40	27.2
6	1.1, 13.1, 13.5, 15.4	41	23.1, 23.2
7	7.2, 10.4, 10.6, 12.2	42	4.1, 24.2, 24.3, 24.6
8	20.1, 20.3, 20.4	43	2.1, 10.1, 10.3, 10.4, 10.5
9	5.2, 5.3, 6.1, 6.2, 9.1	44	7.2
10	18.2, 19.1, 19.2, 20.3, 24.1, 24.4, 24.5	45	7.2, 10.6, 26.4
11	20.1, 20.2, 20.3, 20.6, 20.7, 21.3, 21.4	46	15.2
12	4.1, 7.5	47	17.1, 17.2, 17.5
13	9.1, 9.3	48	25.1
14	27.2	49	17.1, 17.4, 17.5
15	8.1, 8.2, 8.3	50	10.4, 12.1
16	21.2	51	27.2
17	1.1, 13.4, 13.5	52	8.4, 8.5
18	20.1, 20.2, 20.3, 20.6, 20.7	53	13.4
19	13.2, 13.6	54	27.1
20	10.1, 10.4	55	8.1, 8.2
21	26.1, 26.2	56	23.1, 23.3
22	20.1, 20.6	57	1.4
23	13.4, 15.1	58	25.1, 25.4
24	21.2	59	27.2
25	2.1, 10.1, 10.2, 10.3, 10.4, 10.5	60	21.2, 21.6
26	4.1, 4.2, 4.3, 6.7	61	7.1, 7.5
27	23.1, 23.4	62	10.1, 13.4, 14.2, 14.3
28	20.1, 20.3, 20.4	63	2.1
29	19.1, 19.2	64	1.3, 1.4, 2.1, 2.2, 2.3
30	22.4, 22.5, 22.6, 24.1	65	21.2, 21.5, 22.1, 22.2
31	21.2, 21.6		
32	26.1		
33	26.3		
34	27.3		
35	2.1, 10.1, 10.3, 10.4, 10.5		