LSU Dual Enrollment Program for Math
Algebra I COURSE PROFILE with LMS 7-12-2022

ETEXT: ***Algebra I in MyMathLab,*** **Elayn Martin-Gay, with contributions from Robert Blitzer**
HIGH SCHOOL COURSE CODE: 160321

CHAPTERS
1 – Review of Real Numbers
2 – Solving Equations and Problem Solving
3 – Graphs and Functions
4 – Solving Inequalities and Absolute Value Equations and Inequalities
5 – Solving Systems of Linear Equations and Inequalities
6 – Exponents and Polynomials
7 – Factoring Polynomials
9 – Roots, Radicals, and Trigonometric Ratios
10 – Quadratic Equations

The number in parentheses indicates the number of homework exercises on that topic in MyLab Math.

Chapter 1: Review of Real Numbers

Section 1.9 Properties of Real Numbers (45)

LMS: A-SSE.A.2
Vocabulary and Readiness Check
Use the commutative and associative properties
Use the distributive property
Name the properties illustrated by the statements

Chapter 2: Solving Equations and Problem Solving

Section 2.1 Simplifying Algebraic Expressions (51)

LMS: A-APR.A.1, A-SSE.A.1a, 6.EE.A.2, 6.EE.A.3, 7.EE.A.1
Combine like terms
Use the distributive property to remove parentheses
Write word phrases as algebraic expressions
Name the properties illustrated by the statements

Sections 2.2 and 2.3 Properties of Equality (35)

LMS: A-REI.A.1, A-REI.B.3
Use the addition property of equality to solve linear equations
Simplify an equation and then use the addition property of equality
Use the multiplication property of equality to solve linear equations

Use addition and multiplication properties of equality to solve linear equations

Section 2.4 Solving Linear Equations (39)

LMS: A.REI.A.1, A-REI.B.3, 8.EE.C.7a

Apply a general strategy for solving a linear equation
Solve equations containing fractions

Section 2.5 Introduction to Problem Solving (28)

LMS: A-REI.B.3, A-CED.A.1

Solve problems involving direct translations
Solve problems involving relationships among unknown quantities
Solve problems involving consecutive integers

Section 2.6 Formulas and Problem Solving (35)

LMS: N-Q.A.1, A-CED.A.1, A-CED.A.4, A-REI.B.3

Substitute values into a formula and solve for the unknown variable
Solve a formula for one of its variables
Use formulas to solve problems

Section 2.8 Mixture and Distance Problem Solving (17)

LMS: N-Q.A.1, A-CED.A.1, A-CED.A.3, A-REI.B.3

Solve mixture problems
Solve uniform motion problems

Chapter 3: Graphs and Functions

Section 3.1 Reading Graphs and the Rectangular Coordinate System (34)

LMS: S-ID.C.7, 8.SP.A.1, 6.EE.B.5, A-REI.D.10

Define the rectangular coordinate system and plot ordered pairs of numbers
Graph paired data to create a scatter diagram
Determine whether an ordered pair is a solution of an equation in two variables
Find missing coordinate of an ordered pair solution given one coordinate of the pair
Interpret information given in a scatter plot

Section 3.2 Graphing Linear Equations (32)

LMS: A-REI.D.10, F-IF.C.7a

Identify linear equations
Graph an equation by finding and plotting ordered pair solutions
Solve application problems

Section 3.3 Intercepts (28)

LMS: A-REI.D.10, F-IF.C.7a

Identify intercepts of a graph
Graph a linear equation by finding and plotting intercepts
Identify and graph vertical and horizontal lines

Section 3.4 Slope and Rate of Change (34)

LMS: F-IF.B.6, F-LE.B.5, S-ID.C.7, A-REI.D.10

Find the slope of a line given points on the line
Find the slopes of horizontal and vertical lines
Find the slope of a line given its equation
Slope as a rate of change

Section 3.5 Equations of a Line (34)

LMS: A-CED.A.2, F-LE.A.1b, F-LE.A.2, F-LE.B.5
Use the slope-intercept form to write an equation of a line
Use the slope-intercept form to graph a linear equation
Use the point-slope form to find equation of line given slope and a point on the line
Use the point-slope form to find an equation of a line given two points on the line
Use the point-slope form to solve problems
Find equations of vertical and horizontal lines

Section 3.6 Functions (31)

LMS: F-IF.A.1, F-IF.A.2, F-IF.B.5
Identify relations, domains, and ranges
Identify functions
Use the vertical line test
Use function notation

Section 3.7 Graphing Linear Functions (18)

LMS: F-IF.C.7a
Graph linear functions
Graph linear functions by finding intercepts
Graph vertical and horizontal lines
Decide whether a situation describes a linear function

Section 3.8 Graphing Piecewise Defined Functions; Shifting/Reflecting Graphs (18)

LMS: F-IF.A.2, F-IF.C.7ab, F-BF.A.1a, F-BF.B.3, A-REI.D.10
Use vertical and horizontal shifts to graph a function
Use function notation
Graph nonlinear equations
Vertical and horizontal shifts

Chapter 4: Solving Inequalities and Absolute Value Equations and Inequalities

Section 4.1 Linear Inequalities and Problem Solving (33)

LMS: A-CED.A.1, A-REI.B.3
Graph inequalities on number lines
Solve inequalities
Solve inequality applications statements

Section 4.2 Compound Inequalities (33)

LMS: A-REI.B.3

Solve compound inequalities involving or
Solve compound inequalities involving and

Section 4.3 Absolute Value Equations (27)

LMS: A-REI.B.3

Solve absolute value equations

Section 4.4 Absolute Value Inequalities (26)

LMS: A-REI.B.3

Solve absolute value inequalities of the form $|x| > a$

Solve absolute value inequalities of the form $|x| < a$

Section 4.5 Graphing Linear Inequalities in Two Variables (30)

LMS: A-REI.D.12

Determine ordered pairs that are solutions to linear inequalities in two variables
Graph linear inequalities in two variables

Chapter 5: Solving Systems of Linear Equations and Inequalities

Section 5.1 Solving Systems of Linear Equations by Graphing (23)

LMS: A-REI.C.6

Determine if an ordered pair is a solution of a system of equations in two variables
Solve a system of linear equations by graphing

Section 5.2 Solving Systems of Linear Equations by Substitution (20)

LMS: A-REI.C.6

Use the substitution method to solve a system of linear equations

Section 5.3 Solving Systems of Linear Equations by Elimination (23)

LMS: A-REI.C.6

Use the addition method to solve a system of linear equations

Section 5.4 Systems of Linear Equations and Problem Solving (22)

LMS: A-REI.C.6, A-CED.A.2, A-CED.A.3

Choose a solution that satisfies the given conditions
Write a system of equations to describe a situation
Use a system of equations to solve problems

Section 5.5 Systems of Linear Inequalities (16)

LMS: A-REI.C.6, A-CED.A.3

Solve systems of linear inequalities
Use mathematical models involving linear inequalities

Section 5.7 Mean, Median, and Mode (17)

LMS: S-ID.A.1, S-ID.A.2, S-ID.A.3

Calculate mean, median, and mode
Determine effects of linear transformations of data
Work with box plots
Use box plots to discuss and compare data sets
Determine the median, first and third quartiles, and interquartile range of a data set
Work with measures of central tendency

Chapter 6: Exponents and Polynomials

Section 6.1 Exponents (39)

LMS: 8.EE.A.1
Evaluate exponential expressions
Use the product rule for exponents
Use the power rules for products and quotients
Use the quotient rule for exponents, and define a number raised to the 0 power
Decide which rule(s) to use to simplify an expression

Section 6.2 Adding and Subtracting Polynomials (45)

LMS: A-SSE.A.1a, A-APR.A.1
Vocabulary and Readiness Check
Define polynomial, monomial, binomial, trinomial, and degree
Find the value of a polynomial given replacement values for the variables
Simplify a polynomial by combining like terms
Add and subtract polynomials

Section 6.3 Multiplying Polynomials (41)

LMS: A-APR.A.1
Use the distributive property to multiply polynomials

Section 6.4 Special Products (28)

LMS: A-APR.A.1, A-SSE.A.2
Square a binomial
Multiply the sum and difference of two terms

Section 6.5 Negative Exponents (32)

LMS: 8.EE.A.1, 8.EE.A.4
Simplify expressions containing negative exponents
Use all the rules and definitions for exponents to simplify exponential expressions

Section 6.6 Graphing Exponential Functions and Using the Compound Interest Formula (30)

LMS: F-BF.B.3, F-LE.A.2, F-IF-C.7e, A-SSE.B.3c
Graph exponential functions
Graph transformations of exponential functions
Use the compound interest formula

Section 6.7 Exponential Growth and Decay Functions (10)

LMS: F-LE.A.1c, A-SSE.A.1b

Model exponential growth
Model exponential decay
Model exponential decay with half-life

Appendix F Arithmetic and Geometric Sequences (27)

LMS: F-IF.A.3, F-LE.A.2

Identify arithmetic sequences and their common differences
Identify geometric sequences and their common ratios
Determine if a sequence is arithmetic or geometric

Chapter 7: Factoring Polynomials

Section 7.1 Greatest Common Factor and Factoring by Grouping (29)

LMS: A-SSE.A.1, A-SSE.A.2

Find the greatest common factor of a list of integers
Factor out the greatest common factor from a polynomial
Factor a polynomial by grouping

Section 7.2 Factoring Trinomials of the Form x^2+bx+c (40)

LMS: A-SSE.A.1a, A-SSE.A.2

Factor trinomials of the form x^2+bx+c
Factor out greatest common factor and factor a trinomial of the form x^2+bx+c

Section 7.3 Factoring Trinomials of the Form ax^2+bx+c and Perfect Square Trinomials (47)

LMS: A-SSE.A.1a, A-SSE.A.2

Factor trinomials of the form ax^2+bx+c, where *a* is not equal to 1
Factor out a GCF before factoring a trinomial of the form ax^2+bx+c
Use the grouping method to factor trinomials of the form ax^2+bx+c
Factor perfect square trinomials

Section 7.5 Factoring Binomials (24)

LMS: A-SSE.A.2

Factor the difference of two squares
Factor other binomials

Section 7.6 Solving Quadratic Equations by Factoring (25)

LMS: A-SSE.A.1a, A-SSE.A.2, A-SSE.B.3a, A-APR.B.3, A-REI.B.4b

Use the zero factor theorem
Solve quadratic equations by factoring
Solve equations with degree greater than 2 by factoring

Section 7.7 Solving Quadratic Equations and Problem Solving (26)

LMS: A-CED.A.1, A-REI.B.4b

Solve problems that can be modeled by quadratic equations

Chapter 9: Roots, Radicals, and Trigonometric Ratios

Sections 9.2 and 9.4 Simplifying Square Roots and Rationalizing Denominators (21)

LMS: None

Use the product rule to simplify square roots
Use the quotient rule to simplify square roots
Rationalize denominators

Chapter 10: Quadratic Equations

Section 10.1 Solving Quadratic Equations by the Square Root Property (27)

LMS: A-REI.B.4b, A-SSE.A.2

Use the square root property to solve quadratic equations
Solve problems modeled by quadratic equations

Section 10.2 Solving Quadratic Equations by Completing the Square (13)

LMS: A-SSE.B.3b, A-REI.B.4

Write perfect square trinomials
Solve quadratic equations of the form $x^2+bx+c=0$ by completing the square
Solve quadratic equations of the form $ax^2+bx+c=0$ by completing the square

Section 10.3 Solving Quadratic Equations by the Quadratic Formula (26)

LMS: A-REI.4b, A-CED.A.3

Use the quadratic formula to solve quadratic equations
Approximate solutions to quadratic equations
Determine the number of solutions of a quadratic equation using the discriminant
Solve geometric problems modeled by quadratic equations

Section 10.4 Quadratic Functions and Their Graphs (49)

LMS: A-SSE.B.3b, F-IF.B.4, F-IF.C.7a, F-IF.C.8a, F-BF.B.3

Graph quadratic functions of the form $f(x)=a(x-h)^2+k$
Write quadratic functions in the form $f(x)=a(x-h)^2+k$
Use the vertex formula to help graph quadratic functions of the form $f(x)=ax^2+bx+c$

LMS for Algebra I that are ***not*** reflected in *MyLab Math* course exercises:

LMS #	Standard Description
N-RN.B.3	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
A-REI.C.5	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
A-REI.D.11	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $y = f(x)$ and/or $y = g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
F-IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
F-LE.A.1a	Distinguish between situations that can be modeled with linear functions and with exponential functions. a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
F-LE.A.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
S-ID.B.5	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
S-ID.B.6	Represent data on two quantitative variables on a scatter plot and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and quadratic models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
S-ID.C.8	Compute (using technology) and interpret the correlation coefficient of a linear fit.
S-ID.C.9	Distinguish between correlation and causation.

LSU Dual Enrollment Program for Math
Algebra I Supplemental Activities

Standard # and Description	N-RN.B.3 Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
Source	Illustrative Mathematics https://www.illustrativemathematics.org/content-standards/HSN/RN/B

Operations with Rational and Irrational Numbers

Experiment with sums and products of two numbers from the following list to answer the questions that follow:

$$5, \frac{1}{2}, 0, \sqrt{2}, -\sqrt{2}, \frac{1}{\sqrt{2},} \pi$$

Based on the above information, conjecture which of the statements is ALWAYS true, which is SOMETIMES true, and which is NEVER true?

a. The sum of a rational number and a rational number is rational.
b. The sum of a rational number and an irrational number is irrational.
c. The sum of an irrational number and an irrational number is irrational.
d. The product of a rational number and a rational number is rational.
e. The product of a rational number and an irrational number is irrational.
f. The product of an irrational number and an irrational number is irrational.

Rational or Irrational?

In each of the following problems, a number is given. If possible, determine whether the given number is rational or irrational. In some cases, it may be impossible to determine whether the given number is rational or irrational. Justify your answers.

a. $4+\sqrt{7}$

b. $\dfrac{\sqrt{45}}{\sqrt{5}}$

c. $\dfrac{6}{\pi}$

d. $\sqrt{2}+\sqrt{3}$

e. $\dfrac{2+\sqrt{7}}{2a+\sqrt{7a^2}}$, where a is a positive integer

f. $x+y$, where x and y are irrational numbers

Standard # and Description	N-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. N-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Source	Illustrative Mathematics https://www.illustrativemathematics.org/content-standards/HSN/Q/A/2

Weed Killer A liquid weedkiller comes in four different bottles, all with the same active ingredient. The accompanying table gives information about the concentration of the active ingredient in the bottles, the size of the bottles, and the price of the bottles. Each bottle's contents is made up of the active ingredient and water.

Concentration	Amount in Bottle	Price of Bottle
A: 1.04%	64 fluid ounces	$12.99
B: 18.00%	32 fluid ounces	$22.99
C: 41.00%	32 fluid ounces	$39.99
D: 1.04%	24 fluid ounces	$5.99

a. You need to apply a 1% solution of the weed killer to your lawn. Rank the four bottles in order of best to worst buy. How did you decide what made a bottle a better buy than another?
b. The size of your lawn requires a total of 14 fluid ounces of active ingredient. Approximately how much would you need to spend if you bought only the A bottles? Only the B bottles? Only the C bottles? Only the D bottles? If you can only buy one type of bottle, which type should you buy so that the total cost to you is the least for this particular application?

Standard # and Description	A-REI.C.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
Source	Louisiana Student Standards: Companion Document for Teachers (Algebra I) https://www.louisianabelieves.com/docs/default-source/teacher-toolbox-resources/algebra-i---teachers-companion-document-pdf

Use the system $\begin{cases} 2x+y=13 \\ x+y=10 \end{cases}$ to explore what happens graphically with different combinations of the linear equations.

a. Graph the original system of linear equations. Describe the solution of the system and how it relates to the solutions of each individual equation.
b. Add the two linear equations together and graph the resulting equation. Describe the solutions to the new equation and how they relate to the system's solution.
c. Explore what happens with other combinations such as
    i. Multiply the first equation by 2 and add to the second equation.
    ii. Multiply the second equation by -2 and add to the first equation.
    iii. Multiply the second equation by -1 and add to the first equation.
    iv. Multiply the first equation by -1 and add to the second equation.
d. Are there any combinations that are more informative than others?
e. Make a conjecture about the solution to a system and any combination of the equations.

Standard # and Description	A-REI.D.11 Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $y = f(x)$ and/or $y = g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
Source	Louisiana Student Standards: Companion Document for Teachers (Algebra I) https://www.louisianabelieves.com/docs/default-source/teacher-toolbox-resources/algebra-i---teachers-companion-document-pdf

1. The functions $f(m) = 18 + 0.4m$ and $g(m) = 11.2 + 0.54m$ give the lengths of two different springs in centimeters, as mass is added in grams, *m*, to each separately.
   a. Graph each equation on the same set of axes.
   b. What mass makes the springs the same length?
   c. What is the length at that mass?
   d. Write a sentence comparing the two springs.
2. Find the approximate solution(s) to each equation by graphing. Give your answers to the nearest tenth if necessary.
   a. $3(2^x) = 6x - 7$
   b. $10x + 5 = -x + 8$
3. Given the following equations determine the x-value(s) that result in an equal output for both functions.

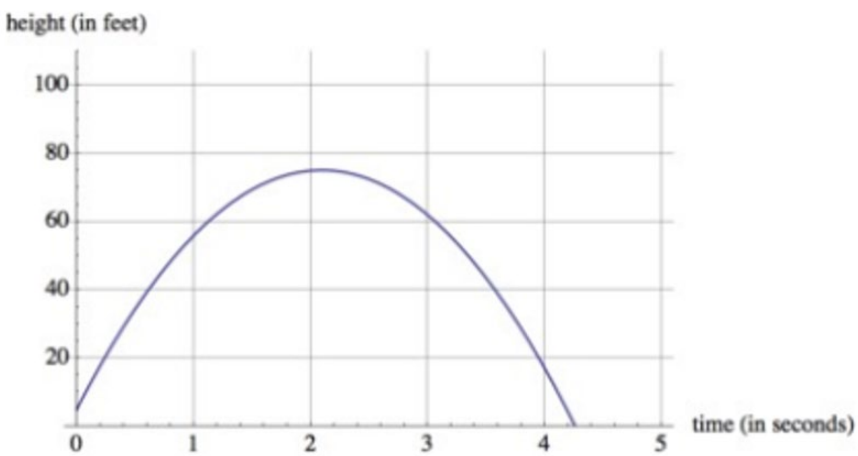
   $$f(x) = 3x - 2$$
   $$g(x) = (x+3)^2 - 1$$
4. Graph the functions f and g using a graphing utility and approximate the solution(s) to the equation $f(x) = g(x)$.

   $$f(x) = \frac{x+4}{2-x}$$
   $$g(x) = x^3 - 6x^2 + 3x + 10$$

Standard # and Description	F-IF.C.9 Compare properties of two functions (linear, quadratic, piecewise linear (to include absolute value) or exponential) each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum*.
Source	Illustrative Mathematics https://www.illustrativemathematics.org/content-standards/HSF/IF/C/9/tasks/1279

Throwing Baseballs

Suppose Brett and Andre each throw a baseball into the air. The height of Brett's baseball is given by $h(t) = -16t^2 + 79t + 6$, where *h* is in feet and *t* is in seconds. The height of Andre's baseball is given by the graph below:



Brett claims that his baseball went higher than Andre's and Andre says that his baseball went higher.

a. Who is right?
b. How long is each baseball airborne?
c. Construct a graph of the height of Brett's throw (if not done already) and explain how this can confirm your claims to parts (a) and (b).

Standard # and Description	F-LE.A.1a Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
Source	Illustrative Mathematics https://www.illustrativemathematics.org/HSF-LE.A.1

Equal Differences over Equal Intervals 1

1. Complete the table. In the third column, show your work as demonstrated. What do you notice about the third column?

x	$y = 2x + 5$	Δy
1	$y = 2(1) + 5 = 7$	n/a
2	$y = 2(2) + 5 = 9$	$9 - 7 = 2$
3		
4		
5		

2. Complete the table, showing your work as above. What do you notice about the third column? What is the graphical interpretation of this?

x	$y = ax + b$	Δy
1	$y = a(1) + b = a + b$	n/a
2	$y = a(2) + b = 2a + b$	$2a + b - (a + b) = a$
3		
4		
5		

3. Let $y = ax + b$. Let x_0 be any particular x-value. Show that if x_0 is increased by 1, the corresponding Δy is a constant that does not depend on x_0. What is this constant?
4. Does (1) serve as an example of the result in (3)? Explain.

Equal Factors over Equal Intervals

1. Complete the table below. Is Δx a constant? If so, what constant is it? What do you notice about the third column of the table?

x	$f(x)=128\left(\frac{1}{2}\right)^x$	**Successive quotients**
0	$f(0)=128\left(\frac{1}{2}\right)^0=128$	n/a
1	$f(1)=128\left(\frac{1}{2}\right)^1=64$	$\frac{f(1)}{f(0)}=\frac{64}{128}=\frac{1}{2}$
2		$\frac{f(2)}{f(1)}=$
3		
4		

2. Complete the table below. Is Δx a constant? If so, what constant is it? What do you notice about the third column of the table?

x	$f(x)=128\left(\frac{1}{2}\right)^x$	**Successive quotients**
0	$f(0)=128\left(\frac{1}{2}\right)^0=128$	n/a
2	$f(2)=128\left(\frac{1}{2}\right)^2=32$	$\frac{f(2)}{f(0)}=\frac{32}{128}=\frac{1}{4}$
4		$\frac{f(4)}{f(2)}=$
6		
8		

3. Let $f(x)=a\cdot b^x$. Let x_0 be any particular x-value. Show that if x_0 is increased by a constant, Δx, the successive quotient $\frac{f(x_0+\Delta x)}{f(x_0)}$ is always the same no matter what x_0 is.
4. Is (2) an example of the result of (3)? Explain.

Standard # and Description	F-LE.A.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
Source	Louisiana Student Standards: Companion Document for Teachers (Algebra I) https://www.louisianabelieves.com/docs/default-source/teacher-toolbox-resources/algebra-i---teachers-companion-document-pdf

1. Compare the values of the functions $f(x) = 2x$, $g(x) = 2^x$, and $h(x) = x^2$ for $x \geq 0$.
2. Kevin and Joseph each decide to invest $100. Kevin decides to invest in an account that will earn $5 every month. Joseph decided to invest in an account that will earn 3% interest every month.
    a. Whose account will have more money in it after two years?
    b. After how many months will the accounts have the same amount of money in them?
    c. Describe what happens as the money is left in the accounts for longer periods of time.

Standard # and Description	S-ID.B.5 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
Source	Illustrative Mathematics https://www.illustrativemathematics.org/content-standards/HSS/ID/B/5/tasks/2044

Support for a Longer School Day?

Each student in a random sample of students at a local high school was categorized according to gender (male or female) and whether they supported a proposal to increase the length of the school day by 30 minutes (oppose, support, or no opinion). The following table summarizes the data for this sample.

Gender	Oppose	Support	No Opinion	Total
Male	50	40	20	110
Female	40	40	10	90
Total	90	80	30	200

a. What proportion of the students in this sample are male?
b. What proportion of the students in this sample support the proposal?
c. What proportion of the males in this sample support the proposal?
d. What proportion of the students in this sample who support this proposal are male?
e. Interpret the following joint relative frequency in the context of this problem: 10/200
f. Interpret the following marginal relative frequency in the context of this problem: 30/200
g. Interpret the following conditional frequency in the context of this problem: 50/110
h. Interpret the following conditional frequency in the context of this problem: 20/110
i. Interpret the following conditional frequency in the context of this problem: 20/30

Standard # and Description	S-ID.B.6 Represent data on two quantitative variables on a scatter plot and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and quadratic models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association
Source	Illustrative Mathematics http://tasks.illustrativemathematics.org/content-standards/HSS/ID/B/6/tasks/941

Jane wants to sell her Subaru Forester but doesn't know what the listing price should be. She checks on craigslist.com and finds 22 Subarus listed. The table below shows age (in years), mileage (in miles), and listed price (in dollars) for these 22 Subarus. (Collected on June 6th, 2012, for the San Francisco Bay Area.)

Age	Mileage	Price
8	109428	12995
5	84804	14588
3	55321	20994
3	57474	18991
1	11696	19981
13	125260	6888
10	67740	9888
11	97500	6950
6	36967	19700
12	148000	3995
2	29836	18990
3	32349	21995
10	161460	5995
4	68075	12999
3	30007	22900
8	66000	13995
10	93450	8488
3	35518	22995
3	30047	20850
8	107506	11988
11	89207	8995
13	141235	5977

a. Make appropriate plots with well-labeled axes that would allow you to see if there is a relationship between price and age and between price and mileage. Describe the direction, strength and form of the relationships that you observe. Does either mileage or age seem to be a good predictor of price?
b. If appropriate, describe the strength of each relationship using the correlation coefficient. Do the values of the correlation coefficients agree with what you see in the plots?
c. Pick the stronger relationship and use the data to find an equation that describes this relationship. Make a residual plot and determine if the model you chose is a good one. Write a few sentences explaining why (or why not) the model you chose is appropriate.
d. If Jane's car is 9 years old with 95000 miles on it, what listing price would you suggest? Explain how you arrived at this price.

Standard # and Description	S-ID.B.6 Represent data on two quantitative variables on a scatter plot and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and quadratic models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
Source	Louisiana Student Standards: Companion Document for Teachers (Algebra I) https://www.louisianabelieves.com/docs/default-source/teacher-toolbox-resources/algebra-i---teachers-companion-document-pdf

A study was done to compare the speed x in miles per hour with the mileage y in miles per gallon of an automobile. The results are shown in the table.
(source: Federal Highway Administration)

Speed, x (miles per hour)	15	20	25	30	35	40	45	50	55	60	65	70	75
Mileage, y (miles per gallon)	22.3	25.5	27.5	29.0	28.8	30.0	29.9	30.2	30.4	28.8	27.4	25.3	23.3

a. Use your calculator to make a scatter plot of the data.
b. Use the regression feature to find a model that best fits the data.
c. Approximate the speed at which the mileage is the greatest.

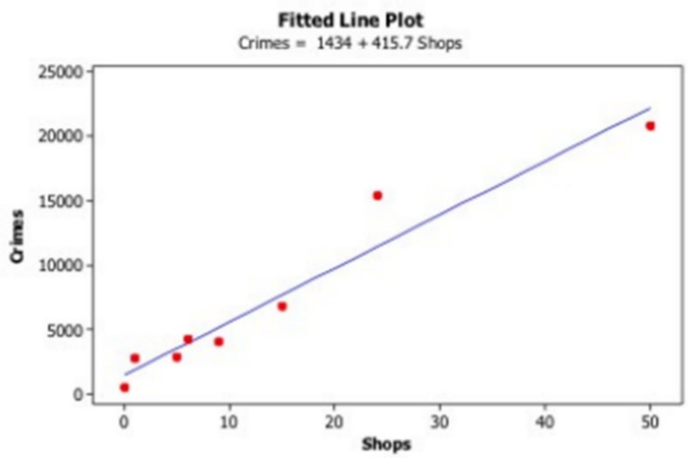
Standard # and Description	S-ID.B.6 Represent data on two quantitative variables on a scatter plot and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and quadratic models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. S-ID.C.8 Compute (using technology) and interpret the correlation coefficient of a linear fit. S-ID.C.9 Distinguish between correlation and causation.
Source	Illustrative Mathematics https://www.illustrativemathematics.org/content-standards/HSS/ID/C/8/tasks/1307

Coffee and Crime

Many counties in the United States are governed by a county council. At public county council meetings, county residents are usually allowed to bring up issues of concern. At a recent public county council meeting, one resident expressed concern that 3 new coffee shops from a popular coffee shop chain were planning to open in the county, and the resident believed that this would create an increase in property crimes in the county. (Property crimes include burglary, larceny-theft, motor vehicle theft, and arson according to information from 2010 found at www.fbi.gov.)

To support this claim, the resident presented the following data and scatterplot (with the least squares line shown) for 8 counties in the state:

County	Number of Coffee "Shops"	Number of "Crimes"
A	9	4000
B	1	2700
C	0	500
D	6	4200
E	15	6800
F	50	20800
G	5	2800
H	24	15400



The scatterplot shows a positive linear relationship between "Shops" (the number of coffee shops of this particular chain in the county) and "Crimes" (the number of annual property crimes for the county). In other words, counties with more of these coffee shops tend to have more property crimes annually.

a. Does the relationship between Shops and Crimes appear to be linear? Would you consider the relationship between Shops and Crimes to be strong, moderate, or weak?
b. Compute the correlation coefficient. Does the value of the correlation coefficient support your choice in part (a)? Explain.
c. The equation of the least-squares line for this data is
   $\text{Predicted Crimes} = 1432 + 415.7(\text{Shops})$
   Based on this line, what is the estimated number of additional annual property crimes for a given county that has 3 more coffee shops than another county?
d. Does this data support the claim that building 3 additional coffee shops will necessarily *cause* an increase in property crimes? What other variables might explain the positive relationship between the number of coffee shops for this coffee shop chain and the number of annual property crimes for these counties?
e. If the following two counties were added to the data set would you still consider using a line to model the relationship? If not, what other types (forms) of model would you consider?

County	Number of Coffee "Shops"	Number of "Crimes"
I	25	36900
J	27	24100