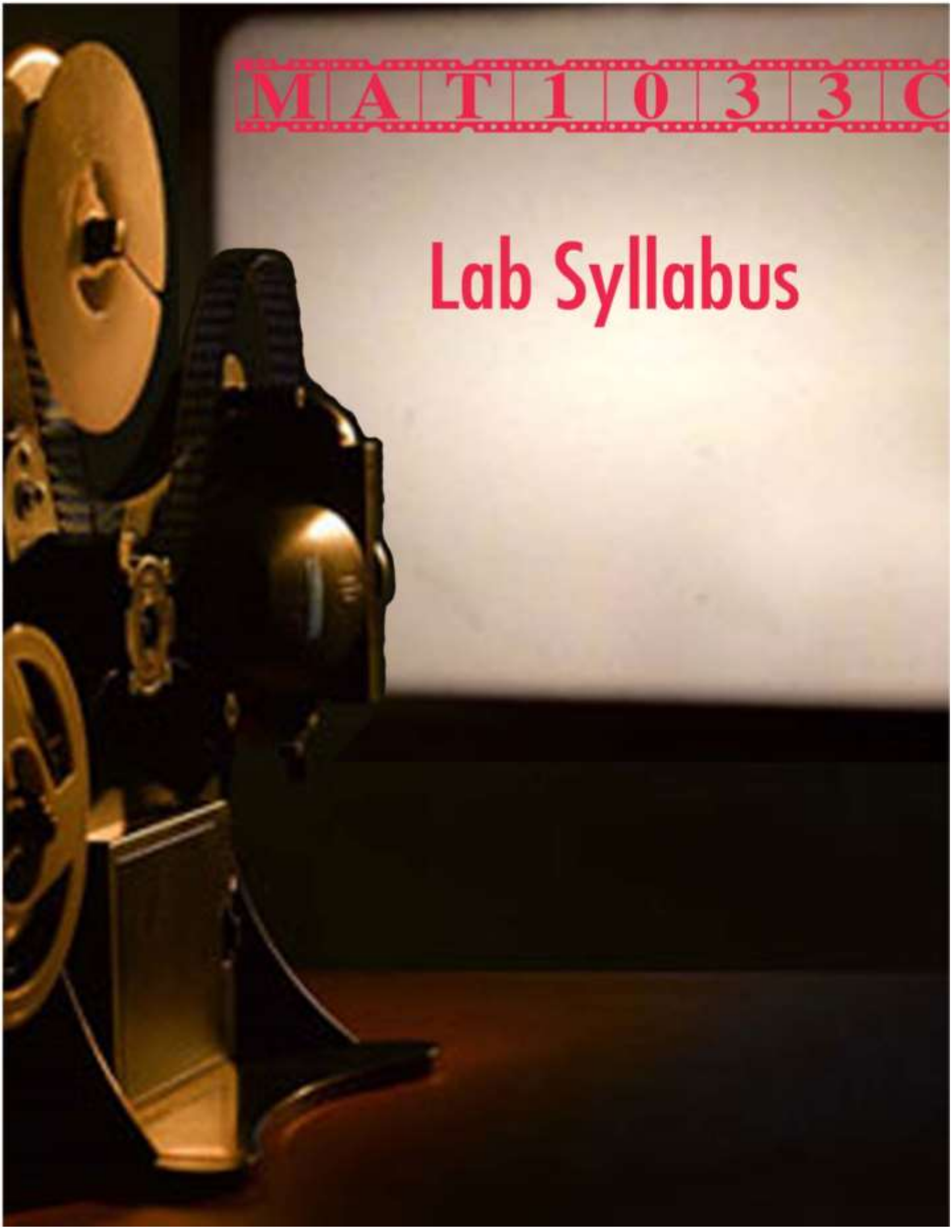

MAT1033C
Lab Syllabus

Table of Contents

Welcome to the MAT 1033C Math Lab

Valencia College, West Campus

This lab is designed to enhance your learning experience as you master the algebraic skills needed to successfully complete MAT 1033C. Each chapter that you learn from your textbook is accompanied by a lab activity.

Grading

Your Lab Grade will be worth 10 – 15% of your total course grade. The Lab grade itself is comprised of two components:

1) Attendance Requirement

2) Lab Assignment Requirement

Attendance Requirements

Each student must spend a required amount of time (see below) each week in the Math Lab as well as any additional time needed during open lab hours to work on Lab assignments. It should take 1-3 weeks to complete each Lab assignment.

Fall & Spring Semesters
Full term: 50 minutes per week
TWK: 60 minutes per week

Summer Semester
Full term: 60 minutes per week
Summer A or B: 120 minutes per week

Lab Activity Steps

Access your lab activity by logging into MyMathLab. After selecting your course, click on "Lab Materials & Assignments," then click on the appropriate chapter.

By printing this syllabus you will have printed all necessary lab worksheets, however each chapter's worksheet can be found within MyMathLab as well.

Step 1: Introduction

- ***Icebreaker Video***
  This is a clip from a movie or TV show that relates to your lab.
- ***Concept Videos and Animations***
  Three to four concept videos or animations from each section should be viewed. The videos or animations are reviewing course material that you will need to know in order to complete the worksheet portion of the lab successfully.

Step 2: Lab Worksheet

- ***Lab Worksheet***
  Complete the lab worksheet, which will ask a series of questions from the material you learned in the course and apply it to real-life scenarios.
- ***Worksheet Help Video***
  It is recommended, though not required, that you begin working on the worksheet before coming into the Math Lab to better utilize your time while there. To aid you in this, a help video for each lab has been provided in MyMathLab. You can also complete the worksheets while in the West Math Center (7-241), Math Connections (7-255), or Hands-On (7-256).

Step 3: Worksheet Self-Check

- Take your completed worksheets to Valencia West Math Center (7-241) and have your work reviewed in Hands-On (7-256) or Math Connections (7-255).
- The Worksheet Self-Check will give you feedback to your answers. Upon successful completion of the worksheet, a Math Center instructor will stamp and sign it.
- **This component is graded as complete or incomplete and comprises 50% of the lab assignment grade.**

Repeat steps 1, 2, and 3 until you feel confident with the material. No minimum score is required for the project self-check for you to move onto the next step, but the better you understand the material on the above steps, the better you should do with the assessment in step 4.

Step 4: Lab Assessment

- Complete the Chapter Lab Assessment while in Valencia West Math Center (7-241). Bring your signed and stamped worksheet and a valid ID *(Student ID or Driver's License)* to be able to take the assessment. **The assessment is password protected, and must be taken at West Math Center.**
- The Lab Assessment will quiz you on the material you learned from the previous steps. **No assistance is permitted during the Lab Assessment!**
- Once the Lab Assessment is complete, you must ask a Math Center Instructor to record the respective grade on your worksheet.
- You will have 3 attempts to complete this assessment with the required (70%) or desired score. A Math Center Instructor must sign each attempt.
- This component is graded by your score on the assessment and comprises 50% of the lab assignment grade.

Lab Attendance Documentation Sheet

Lab Attendance Requirements:

Fall & Spring Semester
Full term students: 50 minutes per week
TWK students: 60 minutes per week

Summer Semester
Full term students: 60 minutes per week
Summer A or B: 120 minutes per week

Name: _____

Instructor: _____

Course CRN or Date/Time of meeting: _____

Week #	Week Dates (Mon – Sat)	Total Time for the Week	Requirement Completed?
1			*Yes or No*
2			*Yes or No*
3			*Yes or No*
4			*Yes or No*
5			*Yes or No*
6			*Yes or No*
7			*Yes or No*
8			*Yes or No*
9			*Yes or No*
10			*Yes or No*
11			*Yes or No*
12			*Yes or No*
13			*Yes or No*
14			*Yes or No*
15			*Yes or No*

Total Number of Weeks that Requirements were Completed: _____

Total Number of Weeks Possible*: _____

****Your instructor can tell you how many weeks you are required to attend lab.***

Lab Grade Recording Summary Sheet

Points per activity for all chapters

Project Self-Check: 50 points *(Completed- 50 pts; Not Completed- 0 pts)*
Project Assessment: 50 points *(multiply your % grade in MyMath Lab by 0.5)*
Total Points: 100 points

Chapter 2		% in MML	Points
Project Self-Check	Completed		50
	Not Completed		0
Activity Assessment	_____*0.5 =		
Total Points	xxxxx		

Chapter 3		% in MML	Points
Project Self-Check	Completed		50
	Not Completed		0
Activity Assessment	_____*0.5 =		
Total Points	xxxxx		

Chapter 6			
Project Self-Check	Completed		50
	Not Completed		0
Activity Assessment	_____*0.5 =		
Total Points	xxxxx		

Chapter 7			
Project Self-Check	Completed		50
	Not Completed		0
Activity Assessment	_____*0.5 =		
Total Points	xxxxx		

Chapter 8			
Project Self-Check	Completed		50
	Not Completed		0
Activity Assessment	_____*0.5 =		
Total Points	xxxxx		

Chapter 4			
Project Self-Check	Completed		50
	Not Completed		0
Activity Assessment	_____*0.5 =		
Total Points	xxxxx		

Total Points Overall: _____ out of a maximum of 600 points

NAME: _____ DUE DATE: _____

Orientation Lab Project – Basic Algebra

Step 1: Introduction. *View the Icebreaker video, the concept videos and animations in MyMathLab, under Lab Materials & Assignments.*

Step 2: Lab Worksheet. *Complete the questions below. If you need help, view the help video in MyMathLab under Lab Materials & Assignments, or go to the West Campus Math Center, Math Connections or Hands-On Learning (7-241).*

Answer the following questions dealing with basic algebra.

1) If Victor Oladipo scores 12 points in the first quarter of a basketball game, and he continues to score in this manner for the entire game, how many points in total will he score?

2) If Victor scores *x* points in the first quarter, and he continues to score in this manner for the entire game, how many points in total will he score?

3) If Victor scores y points in the first quarter, and increases his quarterly score by 4 points in each of the remaining quarters, how many points in total will he score?

Step 3: Worksheet Self-Check. *Take your completed worksheets to Valencia West Math Center (7-241) and have your work reviewed in Hands-On Learning (7-256) or Math Connections (7-255). A Math Center Instructor will stamp and date the lines below after successful completion of the questions above.*

Math Center Stamp: _____ Date: _____

Math Center Signature: _____

Step 4: Lab Assessment. *Take this signed and stamped worksheet, and a valid ID* ***(Student ID or Driver's License)*** *to Valencia West Math Center (7-241). Ask a Math Center Instructor to give you access to the Lab Assessment in MyMathLab.*

Upon completion of the Lab Assessment, have a Math Center Instructor sign, date, and record your score below.

1st attempt grade _____ Math Center Instructor _____Date _____

2nd attempt grade _____ Math Center Instructor _____Date_____

3rd attempt grade _____ Math Center Instructor _____Date _____

NAME: _____ DUE DATE: _____

Chapter 2 Lab Project – Simple and Compound Interest *[Section 2.3]*

Step 1: Introduction. *View the Icebreaker video, the concept videos and animations in MyMathLab, under Lab Materials & Assignments.*

Step 2: Lab Worksheet. *Complete the questions below. If you need help, view the help video in MyMathLab under Lab Materials & Assignments, or go to the West Campus Math Center, Math Connections or Hands-On Learning (7-241).*

Simple Interest Formula: (Interest is only earned on principal)	**Compound Interest Formula:** (interest is earned on principal and any accumulated interest)
$I = PRT$	$A = P\left(1 + \frac{r}{n}\right)^{nt}$
I = amount of interest earned	A = amount in the account, including interest and principal
P = principal or amount of loan	P = principal or amount of loan or investment
R = annual interest rate, decimal form	r = annual interest rate, decimal form
T = time, in years	n = number of compounds per year
	t = time, in years

Use the given formulas to answer the following questions.
(You may get help from Math Center instructors, a tutor, or watch helpful hints videos in Blackboard while working on this.)

1) If $5000 is deposited into an account earning *simple interest* at an annual interest rate of 4% for 3 years, how much interest was earned?

2) For the situation in question #1, how much money is now in the account?

3) Solve the simple interest formula, $I = PRT$, for P.

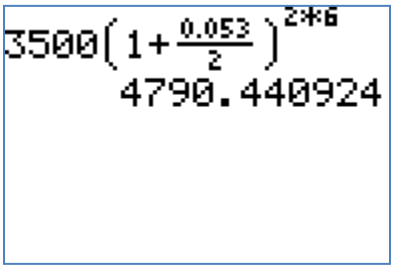
4) If $5000 is deposited into an account earning compound interest at an annual interest rate of 4% for 3 years, and it is compounded quarterly (thus 4 times per year), how much money is in the account at the end of the 3 years?
Since the final answer is money, you will either answer with 0 or 2 decimals. If you are NOT told to round to the nearest dollar, you must leave 2 decimal places in your answer.

<u>Use the TI-84+ Tutorial for help on how to use the calculator</u>:

Consider the following scenario.

You deposit $3500 into an account where interest is compounded semi-annually at an annual rate of 5.3% for 6 years. How much money is in the account at the end of the 6 years?
Therefore P = $3500; r = 5.3% = 0.053; n = 2 (because semiannually means two times per year); t = 6 years.
The expression you want to evaluate is: $A = 3500\left(1+\frac{0.053}{2}\right)^{2(6)}$.

If you have a **TI-84** graphing calculator, it will follow order of operations so you can enter the entire expression into your calculator exactly as it appears in the formula:



To bring up the fraction use:
ALPHA F1 (above the y= button), then 1: n/d
OR
you can just use the division button 0.053/2

To get an exponent you use ^ symbol (above the division button)

If you do not have a graphing calculator or you want to evaluate it step-by-step, you can do the following:

1) Division inside the (): 0.053/2 =0. 0265
2) Add 1 to previous answer: 1+0.0265 = 1.0265
3) Multiply the factors in the exponent: 2 (6) = 12
4) Evaluate the base raised to the exponent: $1.0265^{12} \approx 1.368697407$ (Keep at least 5 or 6 decimals if rounding is necessary so you will have a more accurate answer in the end.)
5) Finally, complete the multiplication: 3500*1.368697407 ≈ 4790.440925

Final Answer: $4790. 44

5) For problem #4, how much interest was earned?

6) Sara would like to go on a vacation in 5 years and she expects her total costs to be $4500. If she invests $3700 into a savings account for those 5 years at 4.5% interest, compounding semi-annually, will she be able to go on vacation?

7) Compare and contrast the simple and compound interest formulas. Which one of the following statements is correct?

   a. Simple interest formula yields only interest, which you must add to the principal to get the final amount; Compound interest formula yields principal plus interest, so you must subtract the principal to get the amount of interest.
   b. Simple interest formula yields principal plus interest, so you must subtract the principal to get the amount of interest; Compound interest formula yields only interest, which you must add to the principal to get the final amount.
   c. Simple interest and compound interest formulas both yield principal plus interest, so you must subtract the principal to get the amount of interest.
   d. Simple interest and compound interest formulas both yield only interest, which you must add to the principal to get the final amount.

8) Compare the interest earned from #1 (where simple interest was used) to #5 (where compound interest was used). The principal, annual interest rate, and time were all the same; the only difference was that for #5, interest was compounded quarterly. Does the difference in interest earned make sense? Select one of the following statements.

   a. Yes, because more money was earned when compounded quarterly. For compound interest you earn interest on interest, not just on the amount of principal.
   b. Yes, because more money was earned through simple interest. For simple interest you earn interest on interest, not just on the amount of principal.
   c. No, because more money was earned through simple interest. For simple interest you earn interest on interest, not just on the amount of principal.
   d. No, because more money was earned when compounded quarterly. For compound interest you earn interest on interest, not just on the amount of principal.

9) Find the price of a car online that you would like to purchase. (This can be as realistic as possible, a car that you've always dreamed of owning, or just a random car that you see online.) How much does it cost?

Use the simple interest formula to determine what your monthly payment would be if you take a loan out to pay for the car. Assume that you do not have a down payment, you are taking the loan out for 5 years, and the annual interest rate is 7%. (You do NOT have to include any tax.)

Some questions to answer to help you solve this problem:

- What is the total amount that you will need to repay?

- How many months will you be paying for the car?

- How much per month will you need to pay?

Step 3: Worksheet Self-Check. *Take your completed worksheets to Valencia West Math Center (7-241) and have your work reviewed in Hands-On Learning (7-256) or Math Connections (7-255). A Math Center Instructor will stamp and date the lines below after successful completion of the questions above.*

Math Center Stamp: _____ Date: _____

Math Center Signature: _____

Step 4: Lab Assessment. *Take this signed and stamped worksheet, and a valid ID* ***(Student ID or Driver's License)*** *to Valencia West Math Center (7-241). Ask a Math Center Instructor to give you access to the Lab Assessment in MyMathLab.*

Upon completion of the Lab Assessment, have a Math Center Instructor sign, date, and record your score below.

1st attempt grade _____ Math Center Instructor _____Date _____

2nd attempt grade _____ Math Center Instructor _____Date_____

3rd attempt grade _____ Math Center Instructor _____Date _____

NAME: _____ **DUE DATE: _____**

Chapter 3 Lab Project – Linear Functions *[Sections 3.1 – 3.5]*

Step 1: Introduction. *View the Icebreaker video, the concept videos and animations in MyMathLab, under Lab Materials & Assignments.*

Step 2: Lab Worksheet. *Complete the questions below. If you need help, view the help video in MyMathLab under Lab Materials & Assignments, or go to the West Campus Math Center, Math Connections or Hands-On Learning (7-241).*

Modeling Real-Life Data

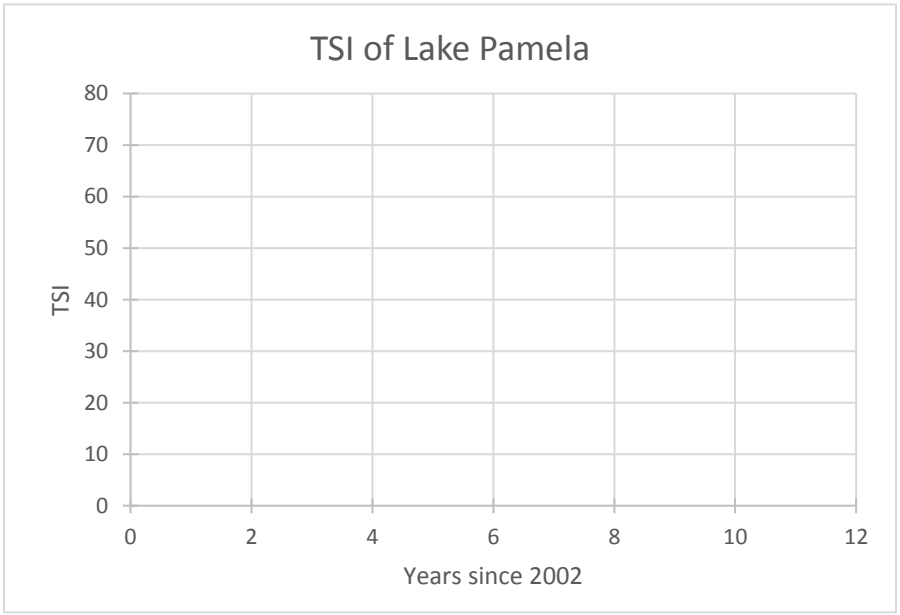
Information about social and physical events is often obtained by gathering data. Once the data is gathered, further exploration of the event can be done when a mathematical model describing the data is determined. A mathematical model is an equation (or function) that represents the data either exactly or approximately, by incorporating the pattern of the data when creating the model. The purpose of this project is for you to create a mathematical model (function) that best approximates this data. This model will then allow you to answer questions about the given data, even for years where the data is not on this table.

Lake Pamela is the large lake that you see on Valencia West Campus as you enter the school from Kirkman Road. From about 1996 to 2000, vegetation was taken out around the lakeshore to make it look more cosmetically pleasing. The water quality quickly declined due to increased nutrient flow into the lake, making the lake unhealthy. Around 2000, the vegetation removal and cutting of the grass down to the shoreline stopped, and more trees were planted. Lake Pamela's TSI (trophic state index) data is given in the table below (the maximum value for each year is used). The TSI of a lake measures the biological condition of the lake, or how healthy it is. Generally speaking, the lower the TSI, the healthier a lake is.
(http://www.hillsborough.wateratlas.usf.edu/shared/learnmore.asp?toolsection=lm_tsi)

TSI (trophic state index) of Lake Pamela

Years since 2002, *x*	**TSI,** *y=f(x)*
0	45.2
2	47.1
4	41
6	44.6
8	42.5
10	37.6

Plot the data on the graph below



1) Is TSI (*y*) a function of years (*x*)? How do you know this?

2) While the data does not form a single straight line, the shape of the data suggests a linear pattern. Pick any two data points so that when a straight line is drawn through those two points, it is a line that best fits the data. Draw your line of best-fit through your two chosen data points on the graph. Then, state your two chosen data points, as ordered pairs, below.
(Hint: Your two points may be found through trial and error. Draw a straight line connecting any two data points and see if the line is a good approximation for the data; if not, try two other data points. They do NOT have to be consecutive data points.)

3) What is the slope of the line containing the two points you chose in #2? Round to the nearest hundredth if necessary.

   The TSI of Lake Pamela is decreasing over this time period. Does your slope reflect this? Why?

4) Find a linear equation for the line that passes through the two points you chose in #2, using the slope you found in #3. Round to the nearest hundredth if necessary. Express the answer as a linear function, **f(x)**.
(Hint: Find the equation of the line in slope-intercept form (y=mx+b) and replace y with f(x).)

5) The function you found in #4 is the mathematical model you found for the set of data. Using this function, find the value of **f(11)**. Write your answer as a sentence, including what calendar year *x = 11* represents. Round your answer to the nearest tenth.

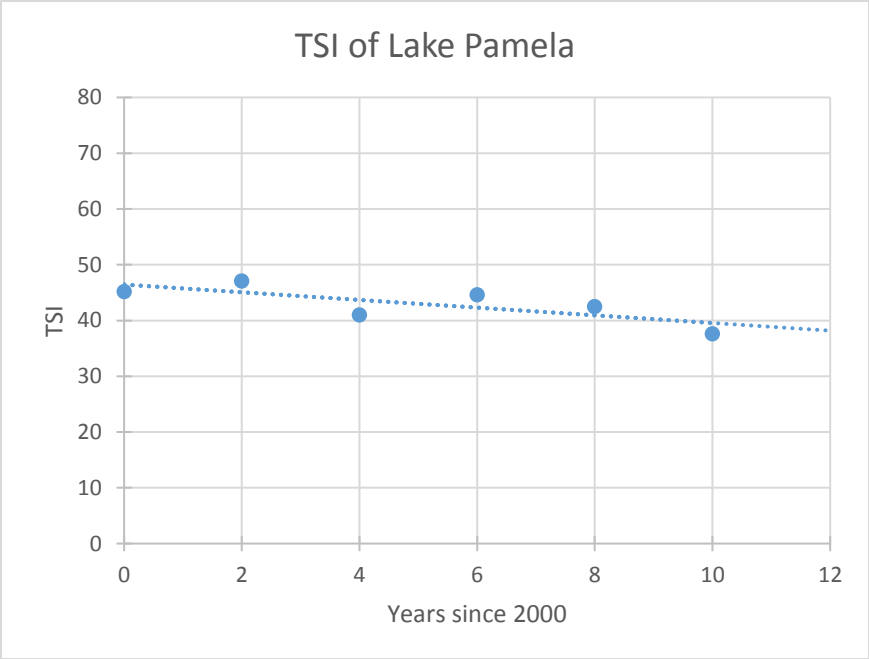
6) Plot the data point you found in #5 on the graph on the first page of this project. Does this point fall on the line you drew as the line of best fit?
If your point does not fall on the line you drew, figure out why not.

7) Using your mathematical model (the function found in #4), in what year would you expect the TSI of Lake Pamela to be 35? Round your answer to the nearest year.
(Hint: TSI is the *y=f(x)* variable, so plug 35 into the appropriate place in your function.)

8) You can use a calculator to find the (precise and accurate) equation for the line of best-fit or mathematical model of a set of data. The actual mathematical model for this set of data is:

$$f(x) = -0.69x + 46.44$$

Refer to the graph below for how this function approximates the data points given.



Rewrite the model (function) you found in #4 below. Now, compare (or contrast) the *slope* and the *y-intercept* for the model above with the model you found.

Step 3: Worksheet Self-Check. *Take your completed worksheets to Valencia West Math Center (7-241) and have your work reviewed in Hands-On Learning (7-256) or Math Connections (7-255). A Math Center Instructor will stamp and date the lines below after successful completion of the questions above.*

Math Center Stamp: _____ Date: _____

Math Center Signature: _____

Step 4: Lab Assessment. *Take this signed and stamped worksheet, and a valid ID* ***(Student ID or Driver's License)*** *to Valencia West Math Center (7-241). Ask a Math Center Instructor to give you access to the Lab Assessment in MyMathLab.*

Upon completion of the Lab Assessment, have a Math Center Instructor sign, date, and record your score below.

1st attempt grade _____ Math Center Instructor _____Date _____

2nd attempt grade _____ Math Center Instructor _____Date_____

3rd attempt grade _____ Math Center Instructor _____Date _____

NAME: _____ **DUE DATE: _____**

Chapter 6 Lab Project – Work Problems ***[Section 6.6]***

Step 1: Introduction. *View the Icebreaker video, the concept videos and animations in MyMathLab, under Lab Materials & Assignments.*

Step 2: Lab Worksheet. *Complete the questions below. If you need help, view the help video in MyMathLab under Lab Materials & Assignments, or go to the West Campus Math Center, Math Connections or Hands-On Learning (7-241).*

In the movie *Little Big League*, Billy asks other baseball players to help him with his math homework. The problem states, "Joe can paint a house in three hours, and Sam can paint the same house in five hours. How long does it take for them to do it together?"

Let's take a look at how to solve this problem algebraically together. (Note – there are various approaches to take when solving work problems. This project outlines just a few of them.)

Express the painting rates of each person:

Joe can paint 1/3 of the house in an hour.
Sam can paint 1/5 of the house in an hour.
So, working together they can paint 1/3 + 1/5 of the house in an hour.

Set up the equation to solve for the unknown.

Add the rates to get the combined rate.

$\frac{1}{a}+\frac{1}{b}=\frac{1}{x}$ or $\frac{1}{Joe}+\frac{1}{Sam}=\frac{1}{x}$ or $=\frac{1}{3}+\frac{1}{5}=\frac{1}{x}$

There are many ways to simplify this, but one way is to find the LCD and clear the fractions

$$x=\frac{15}{8}=1\frac{7}{8}\ hours$$

In the movie clip, one of the baseball players explains that to solve the problem, all you need is the formula : $x=\frac{ab}{a+b}$.

Does that formula work for the given example?

a = 3 and b = 5, so x = $\frac{3*5}{3+5}=\frac{15}{8}=1\frac{7}{8}$ *hours! Yes, it works!!*

1) Solve the equation $\frac{1}{a} + \frac{1}{b} = \frac{1}{x}$ for *x*. Show your work.

   You should get $x = \frac{ab}{a+b}$. This will prove that the formula given on the previous page works for all cases *a* and *b*.

2) Tom can paint a fence in 8 hours. Huck can paint the same fence in 5 hours. How long would it take to put ***two*** coats of paint on the fence if Tom and Huck work together? Leave your answer in improper fraction form.
   (Hint: Make sure you factor in 2 coats of paint.)

3) Kim and Josh can clean a house together in 4 hours. If it takes Kim 7 hours to clean the house by herself, how long would it take Josh to clean the house alone? Leave your answer in improper fraction form.

4) Jack can mow the baseball grounds in 6 hours; Mike can mow the same grounds in 5 hours; and Chris can mow the grounds in 4 hours. How long will it take to mow the baseball grounds if Jack, Mike, and Chris work together? (Set up an equation like the example on p. 21 but with three people instead of two.)
Leave your answer in improper fraction form.

5) A formula for solving work problems involving two people was shown in the movie clip and proven in #1. Is there a formula for three people?

a) You cannot assume the product of the rates divided by the sum will work for 3 or more people. Using the rates from question #4, show that the amended formula below does not give you the same answer as question #4.

$$x = \frac{abc}{a + b + c}$$

b) Take the formula $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=\frac{1}{x}$ and solve for x.

(Hint: This is similar to what you did in question #1. This formula will not match the formula in part 5a)

c) Using the new formula, verify the solution of question #4. Leave your answer in improper fraction form.

Step 3: Worksheet Self-Check. *Take your completed worksheets to Valencia West Math Center (7-241) and have your work reviewed in Hands-On Learning (7-256) or Math Connections (7-255). A Math Center Instructor will stamp and date the lines below after successful completion of the questions above.*

Math Center Stamp: _____ Date: _____

Math Center Signature: _____

Step 4: Lab Assessment. *Take this signed and stamped worksheet, and a valid ID* ***(Student ID or Driver's License)*** *to Valencia West Math Center (7-241). Ask a Math Center Instructor to give you access to the Lab Assessment in MyMathLab.*

Upon completion of the Lab Assessment, have a Math Center Instructor sign, date, and record your score below.

1st attempt grade _____ Math Center Instructor _____Date _____

2nd attempt grade _____ Math Center Instructor _____Date_____

3rd attempt grade _____ Math Center Instructor _____Date _____

NAME: _____ **DUE DATE:** _____

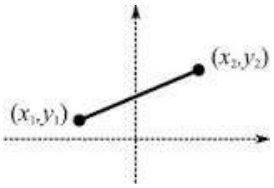
Chapter 7 Lab Project - Distance and Midpoint Formulas and the Pythagorean Theorem *[Sections 7.3, 7.6]*

Step 1: Introduction. *View the Icebreaker video, the concept videos and animations in MyMathLab, under Lab Materials & Assignments.*

Step 2: Lab Worksheet. *Complete the questions below. If you need help, view the help video in MyMathLab under Lab Materials & Assignments, or go to the West Campus Math Center, Math Connections or Hands-On Learning (7-241).*

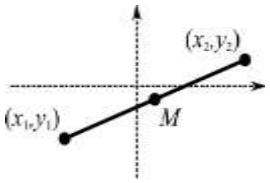
Distance Formula

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$



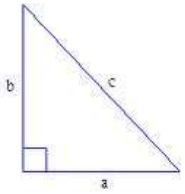
Midpoint Formula

$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$



Pythagorean Theorem

$a^2 + b^2 = c^2$

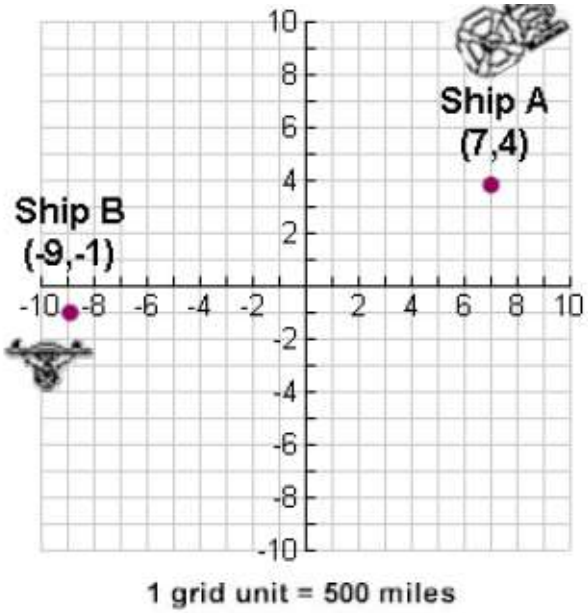


Application of Distance and Midpoint Formulas

Star Trek Holodeck:
In a holodeck simulation, the Starship Enterprise at point A is traveling to meet the Excelsior Transport Ship at point B. The ship at point B is transporting an alien ambassador who must board the Enterprise but cannot use the transporter. The ships have agreed to meet at the midpoint of the line segment connecting the two ships' current positions.

a) Find the holodeck grid coordinates of the meeting location? Which of the formulas above is useful?

b) Find the holodeck distance between the ships' current positions, to the nearest hundredth of a grid unit.



c) The distance found in part (b) is measured in grid units, not miles. If each grid unit in the holodeck represents 500 actual miles, find the distance to the nearest mile between the ships' current positions. Use your rounded answer from (b).

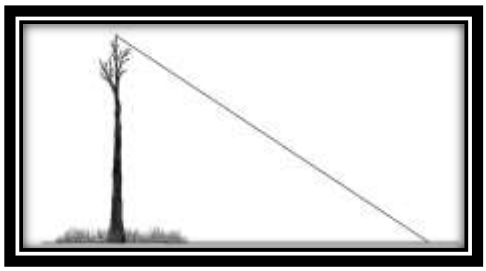
Applications of the Pythagorean Theorem:

The Pythagorean Theorem states that the square of the length of the hypotenuse of a right triangle is equal to the sum of the squares of the lengths of the two remaining sides. It is important to remember that the theorem applies **only to right triangles**. It is also helpful to note that **c (the hypotenuse) must be the longest side**.

Cutting down a tree:

You need to remove a tree from your front yard. You have climbed the tree and trimmed off the branches, and you are now ready to chop down the trunk. It is very important that the tree falls in the right direction… away from your house. You have attached a wire to the top of the trunk. You will attach the other end of the wire to the ground and pull it tightly so that when the trunk begins to fall, the wire will pull it in the right direction. The trunk is 36 feet tall and you are going to attach the wire to the ground 15 feet away from the base of the trunk.

a) How long must your wire be to reach the ground?

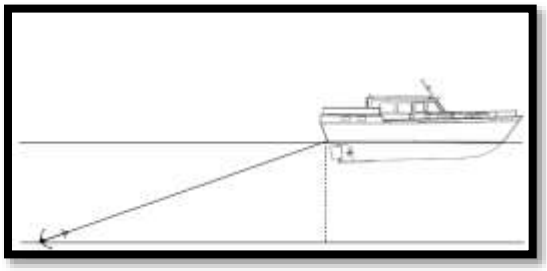


b) What assumption about the tree and the ground did we need to make here? Why did we need to make it?

Measuring the depth of a lake:

You need to measure the depth of a large lake. Since the sonar equipment is very expensive, you decide to use your friend's boat. The boat has an anchor on a 90ft line. You take the boat out to the middle of the lake on a windy day. You drop the anchor and let the wind push the boat until the anchor line is tight. Your GPS tells you that the boat has moved 82 feet.

Assuming the bottom of the lake is flat, what is the depth of the lake? Simplify your answer, then round it to the nearest foot.



Is the foundation square?

You have hired a contractor to build a house. The rectangular foundation (the concrete slab that the house is built on) has just been finished. You want to make sure that the construction is done well and the foundation is square, so you decide to see if the corners are right angles. You measure the width of the foundation to be 40 feet, the length to be 75 feet and the diagonal to be 85 feet.

Did the company build the foundation with right angles? Prove your answer (show your work).

Step 3: Worksheet Self-Check. *Take your completed worksheets to Valencia West Math Center (7-241) and have your work reviewed in Hands-On Learning (7-256) or Math Connections (7-255). A Math Center Instructor will stamp and date the lines below after successful completion of the questions above.*

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3rd attempt grade _____ Math Center Instructor _____Date _____

NAME: _____ **DUE DATE: _____**

Chapter 8 Lab Project – Quadratic Functions ***[Sections 8.2, 8.6]***

Step 1: Introduction. *View the Icebreaker video, the concept videos and animations in MyMathLab, under Lab Materials & Assignments.*

Step 2: Lab Worksheet. *Complete the questions below. If you need help, view the help video in MyMathLab under Lab Materials & Assignments, or go to the West Campus Math Center, Math Connections or Hands-On Learning (7-241).*

Vertex

$\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$

Quadratic Formula

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

The movie *October Sky* is the true story of Homer Hickam, a coal miner's son in 1950 West Virginia, who was inspired by the first Sputnik launch to take up rocketry against his father's wishes. As Homer and his friends experiment with building rockets, they experience various mishaps and are accused of setting a fire. The group of young inventors competes for a National Science Award which will provide them with college scholarships. Homer Hickam went on to become a NASA engineer.

Please round all of your answers for the this lab project to the nearest tenth.

When explaining why his rocket did not set the fire, Homer used the formula, $S = \frac{1}{2}at^2$ **(S=height, a=acceleration, t=time).** This equation could also be written as $d = 16t^2$ **(d=distance to fall, t=time).**

You will use these equations while completing this lab project.

1. Homer states that his rocket fell for 14 seconds and ***estimates*** that the rocket's altitude was 3000 feet. Use the formula to find the ***actual*** distance, in feet, that the rocket fell during that time.

2. Let's look at another one of Homer's rocket launches. It was launched from ground level with an initial velocity of 208 feet per second. Its distance in feet from the ground after t seconds is given by $S(t) = -16t^2 + 208t$.

   What is the maximum altitude (height) the rocket will attain during its flight?

   (Think about where the maximum value of a parabola occurs.)

Let's look at another scenario.

The vertical height of a projectile affected only by gravity near the earth's surface is modeled by a quadratic function. While the following equations do not take air resistance into account, they are, nevertheless, good models.

METERS: After t seconds, the height of a projectile with an initial upward velocity of v_0 meters per second and an initial height h_0 meters is given by $y = h(t) = -4.9t^2 + v_0t + h_0$ meters.

FEET: When the initial height is measured in feet and the initial velocity is measured in feet per second, the height of the object is given by $y = h(t) = -16t^2 + v_0t + h_0$ feet

3. According to the National Association of Rocketry, the current model rocket altitude record in the "F Altitude" event for Ages 14-18 division is 1430 meters. From this record-setting altitude, the rocket is motionless as it begins its free-fall descent back to the ground. Using the equation, $h(t) = -4.9t^2 + v_0t + h_0$, find how long it will take for the rocket to hit the ground after reaching its high point.

   (Hint: motionless implies $v_0 = 0$ and hitting the ground implies $h(t) = 0.$)

4. You arrive at a model rocket competition only to discover that you left your small solid fuel engines at home. In a fit of anger, you throw the engine-less rocket straight up in the air. The rocket leaves your hand (h_0) 6 feet above the ground with an initial throw velocity (v_0) of 45 feet per second. Realizing that you will need the rocket for future competitions, you catch the rocket when it falls back to a height $(h(t))$ of 5 feet. For how many seconds was the rocket in the air? What formula gives us this information? (Note: velocity and height are in feet.)

5. You throw the rocket from problem #4 straight up in the air with an initial velocity (v_0) of 50 feet per second, and the rocket leaves your hand (h_0) 6 feet above the ground. If you catch it when it falls back to a height $(h(t))$ of 5 feet, how long was the rocket in the air? Does the increase in initial velocity increase or decrease the air time of the rocket?

6. You arrive at another model rocket competition and you have remembered to bring your small solid fuel engines. Your rocket is launched from rest and the solid fuel engine delivers a constant acceleration of 8.2 m/s^2 for 5 seconds, after which the fuel is used up.
   (Remember altitude = S, acceleration = a, velocity = v,
   a. Using Homer's formula, $S = \frac{1}{2}at^2$, find the altitude of the rocket when the engine shuts down.

   b. Using the formula $v = at$, find the velocity (m/s) when the engine shuts down.

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NAME: _____ **DUE DATE: _____**

Chapter 4 Lab Project – Systems of Linear Equations ***[Section 4.1]***

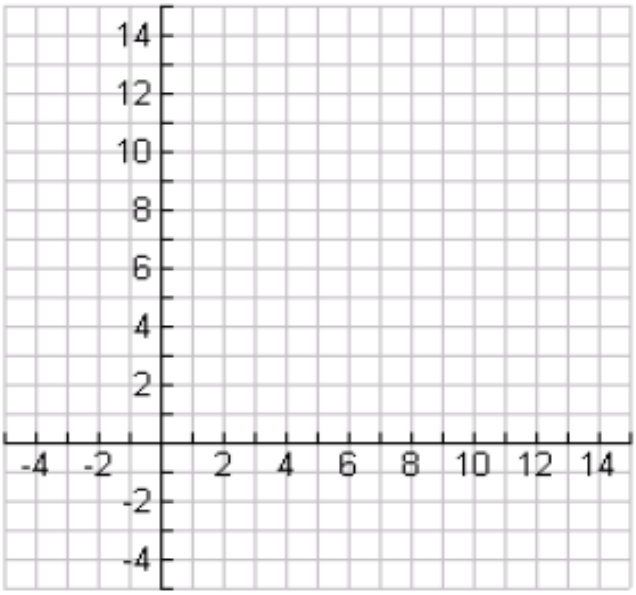
Step 1: Introduction. *View the Icebreaker video, the concept videos and animations in MyMathLab, under Lab Materials & Assignments.*

Step 2: Lab Worksheet. *Complete the questions below. If you need help, view the help video in MyMathLab under Lab Materials & Assignments, or go to the West Campus Math Center, Math Connections or Hands-On Learning (7-241).*

Our setting today is from the movie *Pirates of the Caribbean*. Captain Jack Sparrow is the captain of the *Black Pearl*. He is happily sailing the open sea with treasure map in hand, searching for his next big reward. Unbeknownst to him, another ship is searching for him. That ship is the *Flying Dutchman* whose captain is none other than the infamous Davy Jones. Captain Jack has debts to pay Captain Jones, and Davy Jones will stop at nothing to collect them. Captain Jones has just discovered the whereabouts of the *Black Pearl*, and he has set his course to intercept the unsuspecting Captain Jack Sparrow.

1. The *Black Pearl* is following a course that is represented by the equation $x - y = 3$. The interception course of the Flying Dutchman is represented by the equation $\frac{1}{2}x + y = 3$

   a) Use the graphing method to determine the coordinate point that the two ships' paths meet?

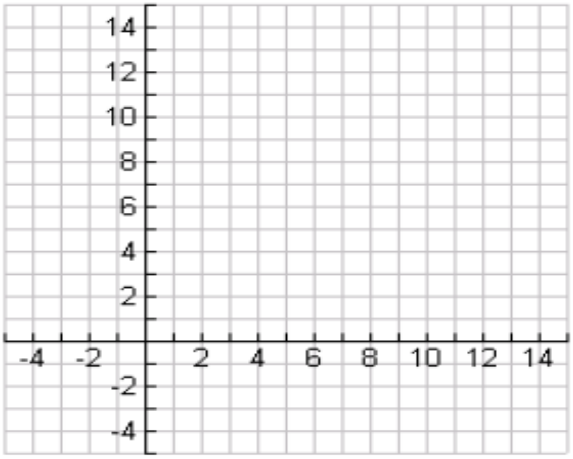


b) Solve the same system of equations using either the substitution or elimination method.

c) Did you find the same solution in parts (a) and (b)? If your answer from part a (the intersection point on your graph) differed from your answer in part b, why do you think that occurred?

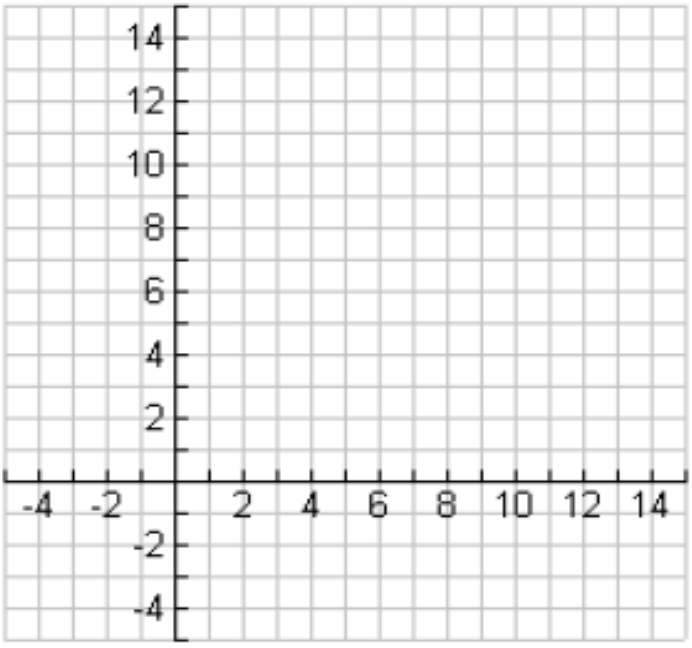
2. The *Black Pearl* is now following a course that is represented by the equation $2x = 3y - 5$, and the course of the *Flying Dutchman* is represented by the equation $-4x + 6y = -7$.

a) Use the graphing method to determine the coordinate point that the two ships' paths meet?



b) Solve the same system of equations using either the substitution or elimination method.

3. The ship, the *Flying Dutchman*, has an ability that most ships do not. It can travel underwater. Captain Jones likes having the element of surprise when he his pursuing other ships, so he has decided to sail his ship beneath the surface of the water following the course -4y = - x + 2. Captain Jack Sparrow and the *Black Pearl* are following the course 4x - 16y = 8.
   a) Use the graphing method to determine the coordinate point that the two ships' paths meet?



b) Solve the system of linear equations using the graphing method and one other method (either substitution or elimination). What do you observe about the courses of the two ships?

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