Class_01 Sep 8 - Starting Out

Wednesday, September 7, 2022 3:13 PM

Welcome to PreCalculus 12 fall 2022

- **Tuesdays & Thursdays, 6:30-9:30 p.m.**
- **September 8 - December 13**
- **Meets in Portable #26**
- **Instructor: Susana Egolf**

As we work together for student success through LEARNING, ENGAGEMENT, and CONNECTION to inspire all learners (including ourselves) to reach their full potential and create a positive legacy for the future, we do so on the traditional, unceded territory of the Matsqui, Kwantlen, Katzie, and Semiamhoo first nations

Tonight's Class:

- **Getting Started - student info sheet, review questions**
- **Graphing Review**
- **Starting transformations**

Do you need a textbook, or need to see the office for something else?

Regular Office Hours:

Mon/Tue/Th	9:30am-4:30pm
Wed	11:30am-6:30pm
Fri	9:30am-~~2:00~~ 2:30 pm (closed 12:00-1:00pm)

Course Outline

PREC 12 Outline sep_2022

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Pre-Calculus 12 Course Outline

Teacher: Susana Egolf segolf@sd35.bc.ca
Website: egolfmath.weebly.com

Meets in P-26
Tues/Thurs
6:30-9:30 PM
(27 classes)

Big Ideas

- Transforming functions and relations
- Using inverses to solve equations and find relationships between functions
- Understanding characteristics of functions

Curricular Competencies
Reason and model
Understand and solve
Communicate and represent
Connect and reflect

Content

- Transforming functions and relations
- Polynomial functions and equations
- Trigonometric functions, equations and identities
- Exponential functions and equations
- Logarithmic operations, functions and equations
- Rational functions
- Geometric sequences and series

Unit 1: Transformations and Polynomial Functions
Function Transformations; Polynomial Functions
Unit 2: Trigonometry
Trigonometry & the Unit Circle;
Trigonometric Functions and Graphs;
Trigonometric Identities and Equations
Unit 3: Exponential and Logarithmic Functions
Exponential Functions; Logarithmic Functions
Unit 4: Rational Functions and Geometric Sequences & Series
Rational Functions; Geometric Sequences and Series

Evaluation

Assignments	**10%**
Chapter Tests **5 chapter tests, 5% each**	**25%**
Unit Tests **Units 1, 3, and 4 = 15% each** **Unit 2 = 20%**	**65%**

Letter grades are assigned in accordance with provincial guidelines:

86-100%	A	73-85%	B	67-72%	C+
60-66%	C	50-59%	C-	0-49%	F

About the Course

Time. Students from previous years have said they needed to spend 6-12 hours a week on the class, outside of class time.

Assignments. There will be an assignment for each chapter. It will be marked based on completion. Doing these math questions helps you become more confident with the math ideas we are learning. Partial solutions to these assignments will be posted on the class website, **egolfmath.weebly.com**

In-Class Notes. You will receive notes packages which we use together with the textbook. You may find it helps you to write out class examples clearly. You will also be able to access filled-in notes on the class website.

Organization. Bring these to every class:
-textbook -graphing calculator
-notes packages -pencils, erasers, paper
Keep this outline, notes packages and classwork organized in a binder. This makes it easier to prepare for tests

Chapter Tests. There will be five chapter tests. These are done in class and are closed book, they consist of multiple-choice and written questions. I will hand back your tests for you to look over in the classroom; however, you may not take them home! Be sure to prepare well for each one, as there are **NO chapter test re-writes**.

Unit Tests. There will be four unit tests. They are similar in format to the chapter tests but are longer. You will have the option to re-take each unit test one time, so long as you write the original test as scheduled. Re-writes are done outside of class time, at times set by your teacher. If you rewrite a test, only the higher mark of the two attempts will be recorded towards your final grade.

There is no final exam for this course.

Approximate dates for Chapter Tests and Unit Tests
Please note, these dates may change during the semester!

	Topic	Test Date
	Function Transformations (Ch 1)	Tuesday, Sep 20
Unit 1	**Transformations & Polynomial Functions**	**Thursday, Sep 29**
	Trigonometry & the Unit Circle (Ch 4)	Tuesday, Oct 11
	Trig Functions & Graphs (Ch 5)	Tuesday, Oct 25
Unit 2	**Trigonometry**	**Tuesday, Nov 1**
	Exponential Functions (Ch 7)	Tuesday, Nov 8
Unit 3	**Exponential & Logarithmic Functions**	**Tuesday, Nov 22**
	Rational Functions (Ch 9)	Thursday, Dec 1
Unit 4	**Rational Functions and Geometric Sequences & Series**	**Thursday, Dec 8**

Attendance

You are encouraged to attend every class so long as you are in good health. If your health keeps you home, look on the class website for the in-class notes. If you must miss class, please let me know through email.

Withdrawing

If for some reason your plans change and you decide to withdraw from the course, please do two things:

1) Let the LEC office know, in person or phone: (604) 534-7155
2) Let me know, in person or by an email.

Advice from students, from earlier semesters

- show up, do worksheets, ask questions
- study/work on practice questions before tests
- don't drift off in class
- do the homework, refer to solutions on questions you struggle with
- schedule your time carefully
- take time off from work if you need to
- watch lesson videos
- put time into concepts you don't understand

Expectations

- If in good health, attend every class, arriving on time.
- If you must miss a class, read the online notes for the class you missed and complete the assigned work.
- **NO SMOKING IS PERMITTED ON SCHOOL PROPERTY.**
- Show consideration and courtesy. Please:
  - Be attentive and focused when class is in session.
  - Silence your electronic devices, so everyone can concentrate on learning.
  - Use in-class time productively and participate in group activities.
- If you are struggling, watch the video for that section. Video links are provided on the class website for every section in the textbook.
- Ask for help with questions you find difficult.
- Set aside extra time to prepare for tests.
- Check your email regularly while enrolled in this course, as I may send class emails with information everyone needs to know.

Wireless access:
SD35 – Visitors, password is VisitorSD35

SD35-Secured-Students
Username: pupil number
Password: as shown at right

Class website:
http://egolfmath.weebly.com/

Think about why you are taking this course and what kind of mark you would like to earn. Take steps to help you reach your goal. Set aside enough time to work on this class.

Class website
https://egolfmath.weebly.com/

LEC CODE OF CONDUCT

PURPOSE, EXPECTATIONS AND CONSEQUENCES

The conduct of students at LEC should at all times contribute to a safe, orderly and positive learning environment. Each student is expected to respect the rights and property of others and to behave appropriately at school, while going to/from school, and while taking part in any school-related function at any location. Unacceptable behaviour includes, but is not limited to, conduct described in the following paragraphs.

Bullying and fighting are inappropriate behaviours in any educational setting. It is our expectation that students are here to learn in a safe and cooperative environment. Our counsellor is available to assist students with personal and inter-personal problems at school.

Weapons and other potentially dangerous devices or materials such as laser pointers, fireworks and explosives are strictly prohibited on or around the school premises and at any school function.

Students may not be under the influence of or have in their possession any prohibited substances, controlled substances such as alcohol or any potentially dangerous drugs as defined by provincial and federal law.

The severity and frequency of unacceptable conduct as well as a student's age and maturity are all considered in determining corrective or restorative action. The consequence for failure to abide by the above expectations may be suspension or expulsion from courses at our school. In some circumstances, it may be necessary for school officials to advise other parties of serious breaches of LEC's Code of Conduct.

CELL PHONES DURING CLASS TIME

Talking or texting on a cell phone, or receiving an audible pager signal, can be disruptive; therefore, cell phones and pagers are to be **turned off in the classroom**. In an emergency, the school's main office can be contacted at 604-534-7155. If the office is closed and if a special circumstance applies, a student can make prior arrangements with the teacher for the appropriate use of a cell phone or pager during class time. Students with cell phones capable of recording and/or taking pictures may be required to hand them in before beginning tests and exams or at a teacher's request.

DRESS CODE

Like all public schools, LEC recognizes that personal taste in clothing varies widely from one student to the next. We allow for individual differences, but we ask our students to show their respect for this school and for other students by choosing clothing which is appropriate for the school setting. Clothing which advertises alcohol or drugs is inappropriate. Equally unacceptable is clothing which pictures foul/profane language or sexually graphic/exploitive situations. Students whose clothing is inappropriate for school will be invited to join us in finding a reasonable solution.

PARKING

Students who want to park their vehicle at LEC's location (paved area east of LSS) will need to purchase a $10.00 yearly parking tag at the main office. In order to identify yourself as an LEC student, please display your tag on the car's rearview mirror. **Note: parking stalls marked "STAFF" are reserved for LEC staff.**

SMOKING

Smoking or using any tobacco product on school property is prohibited by law in BC. According to the Tobacco Control Act, "...a person must not smoke or use tobacco, or hold... tobacco, in or on school property." LEC is a health-promoting school, and we value our tobacco-free environment. If you have not yet made the decision to quit smoking, you are expected to be ***completely off school district property*** before lighting a cigarette or using a tobacco product. School district property at this location includes all land and buildings within the area bordered by 56th Avenue, 216th Street, 57A Avenue and 213A Street.

TB, page 2

Unit 1

Transformations and Functions

Functions help you make sense of the world around you. Many ordinary measuring devices are based on mathematical functions:

- Car odometer: The odometer reading is a function of the number of rotations of the car's transmission drive shaft.
- Display on a barcode reader: When the screen displays the data about the object, the reader performs an inverse function by decoding the barcode image.

Many natural occurrences can be modelled by mathematical functions:

- Ripples created by a water droplet in a pond: You can model the area spanned by the ripples by a polynomial function.
- Explosion of a supernova: You can model the time the explosion takes to affect a volume of space by a radical function.

TB, page 4

CHAPTER 1

Function Transformations

Mathematical shapes are found in architecture, bridges, containers, jewellery, games, decorations, art, and nature. Designs that are repeated, reflected, stretched, or transformed in some way are pleasing to the eye and capture our imagination.

In this chapter, you will explore the mathematical relationship between a function and its transformed graph. Throughout the chapter, you will explore how functions are transformed and develop strategies for relating complex functions to simpler functions.

Did You Know?

Albert Einstein (1879–1955) is often regarded as the father of modern physics. He won the Nobel Prize for Physics in 1921 for "his services to Theoretical Physics, and especially for his discovery of the law of the photoelectric effect." The Lorentz transformations are an important part of Einstein's theory of relativity.

Key Terms

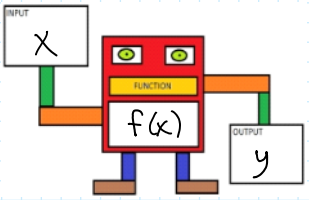
transformation
mapping
translation
image point
reflection
invariant point
stretch
inverse of a function
horizontal line test

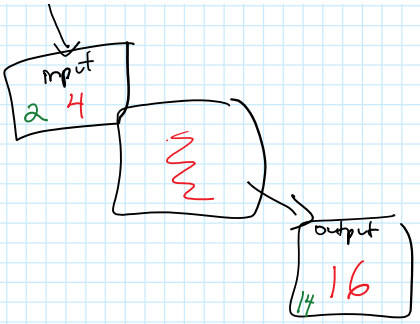
4 MHR • Chapter 1

What is a function - what do you know about functions?

- ~~nothing~~
- vertical line test
- f of x f(x)

function: any input, x, can have only one output



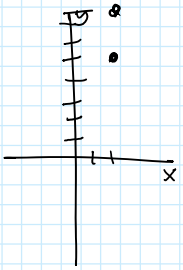


ordered pair

$(2, 8)$

x (input)

y (output)



$(2, 5)$

Same x cannot have two different y's

Chapter 1: Function Transformations

1.0 Review

A ***relation*** is a set of ordered pairs (x, y).

For example: {(−1, 6) (2, 8) (5, 10) (8, 12)}

A ***function*** is a special type of relation.

- A function is like a machine. For each x-value, the function follows a rule to create exactly ONE y-value that goes with that x-value.
- **Vertical Line Test:** Function graphs contain NO points that are directly above one another.

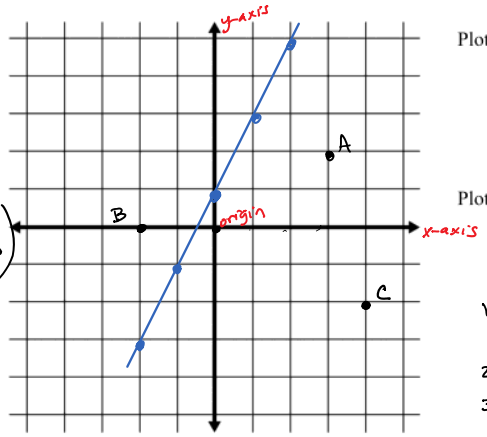
  For example, a function CANNOT contain both $(2,8)$ and $(2,5)$

Graphing

Ordered pairs are graphed on a coordinate system: (x, y)

x*-coordinates** tell how far to move left or right from the ***origin, $(0,0)$

***y*-coordinates** tell how far to move up or down from the origin.



Cartesian coordinate system

René Descartes

Plotting points.

A = (3, 2)
B = (−2, 0)
C = (4, −2)

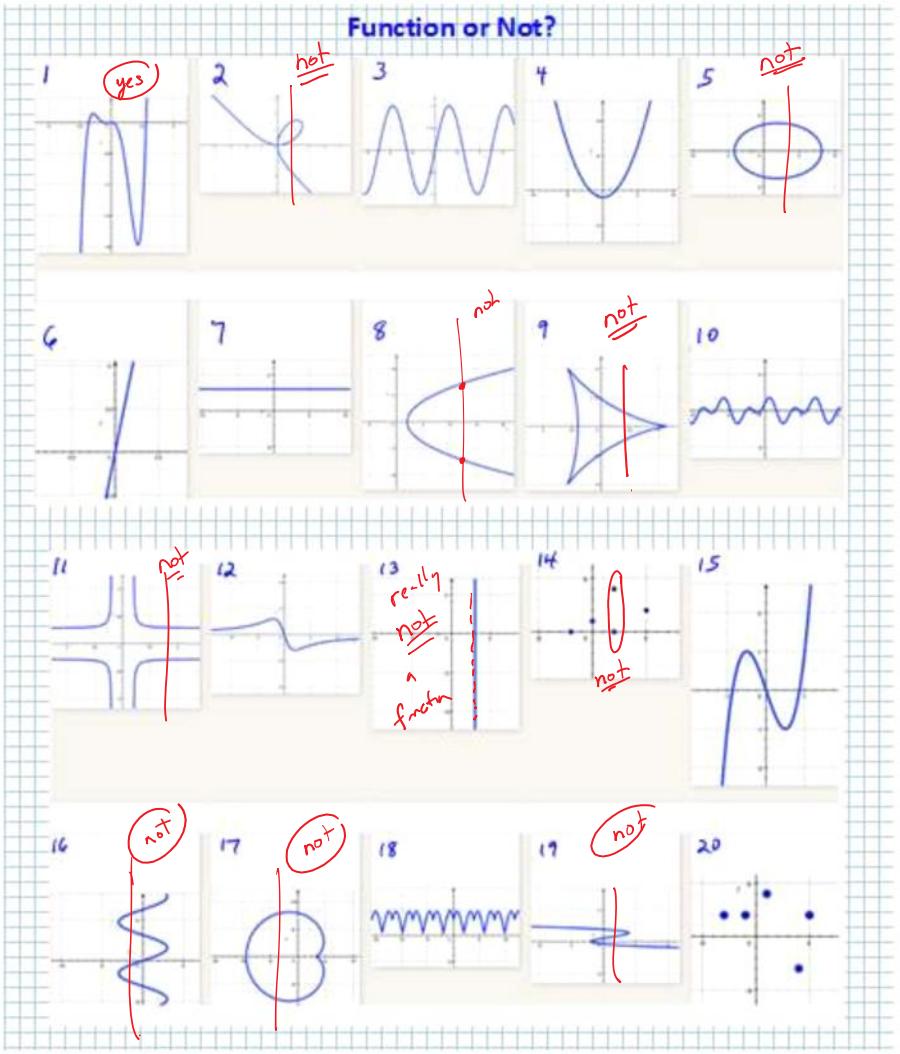
Plotting graphs,

$y = 2x + 1$

1) make a table of values
2) choose x-values
3) substitute each one into the equation, to get a y-value
4) plot points

x	y
−2	2(−2)+1 = −3
−1	−1
0	1
1	3
2	5

**On this page we use the vertical line test to decide whether or not the pictured graphs are functions.



Function Notation

$y = f(x)$

- means y is a function of x, so the y-value depends on the x-value we choose
- is read "y equals f of x"

To Try

1) Given the function $f(x) = 3 - 4x$, find the value of $f(-4)$

BEDMAS

$f(-4) = 3 - 4(-4)$
$= 3 - -16$
$= 3 + 16 = 19$

2) Given the function $g(x) = -2x^2 + 5$, find the value of $g(2)$

$g(2) = -2(2^2) + 5$
$= -2(4) + 5$
$= -8 + 5 = -3$

Domain set of all allowable input values (x values)

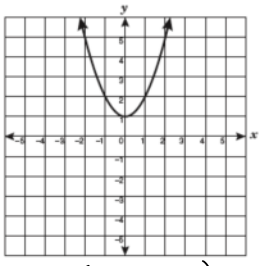
Function is defined, makes sense, for all x-values in the domain

* 1) don't divide by zero
2) don't take square root of negative numbers

Range set of output values (y values)

Find the domain and range for each graph below, and write it using set notation.

a)



domain: $(-\infty, \infty)$

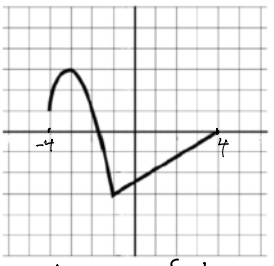
$\{x \mid x \in \mathbb{R}\}$

"such that" means: all real numbers

x is an element of the real numbers

range: $\{y \mid y \geq 1, y \in \mathbb{R}\}$

b)



domain: $\{x \mid -4 \leq x \leq 4, x \in \mathbb{R}\}$

range: $\{y \mid -3 \leq y \leq 3, y \in \mathbb{R}\}$

We can find domain restrictions even without graphing, by looking at a function's equation.

Remember, we:

- **Can't divide by zero**
- **Can't take square-roots of negatives**

$f(x) = \frac{x+2}{3x+7}$ or $y = \frac{x+2}{3x+7}$

$3x + 7 = 0$
$3x = -7$

$\{x \mid x \neq -7/3, x \in \mathbb{R}\}$

$f(x) = \frac{5}{x}$ domain? $\{x \mid x \neq 0, x \in \mathbb{R}\}$

$g(x) = \frac{5}{x-2}$ $\{x \mid x \neq 2, x \in \mathbb{R}\}$

$y = \sqrt{5+x}$

$5 + x \geq 0$

$\{x \mid x \geq -5, x \in \mathbb{R}\}$

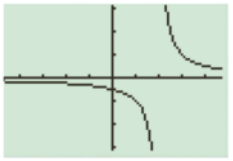
[Whiteboards - domain & range]

To Try

We can use technology to create the graph of a function.

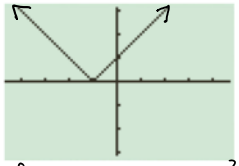
- Use a graphing calculator to graph the following functions. Your graphs should match the graphs shown below.
- Determine the ***domain*** and ***range*** for each one.

a) $f(x) = \dfrac{1}{x-2}$



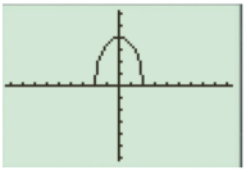
$\{x \mid x \neq 2, x \in \mathbb{R}\}$
$\{y \mid y \neq 0, y \in \mathbb{R}\}$

b) $f(x) = |x+1|$



$\{y \mid y \geq 0, y \in \mathbb{R}\}$
$\{x \mid x \in \mathbb{R}\}$

c) $f(x) = \sqrt{16-4x^2}$



Used [-9.4, 9.4] [-6.2, 6.2]

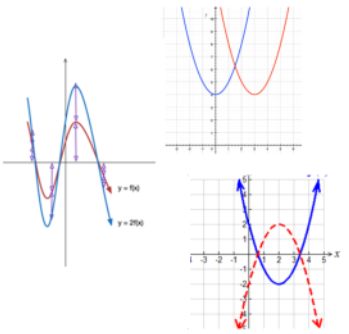
$\{x \mid -2 \leq x \leq 2, x \in \mathbb{R}\}$
$\{y \mid 0 \leq y \leq 4, y \in \mathbb{R}\}$

$|-8| = 8$
$|2| = 2$
$|0| = 0$

Transformations

We often sketch the graphs of functions. If we change a function's equation, the new equation produces a new, TRANSFORMED, graph.

Transformations include:
- translations
- reflections
- stretches



When a graph is transformed, each point on the graph is affected by the transformation.

Suppose that the x-coordinates for all the points on a graph are increased by three units. Here is a way to show how the points are changed.

MAPPING $(x, y) \rightarrow (\underline{x+3}, \underline{y})$

each x-value we had on the original increases by 3

mapping

- the relating of one set of points to another set of points so that each point in the original set corresponds to exactly one point in the image set

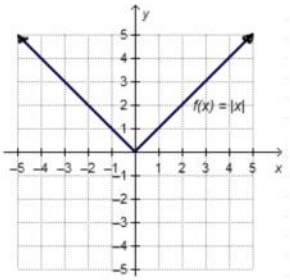
(Textbook, page 7)

This is a nice online calculator, good for seeing how changes in equation affect the graphs:
https://www.desmos.com/calculator

Next class….

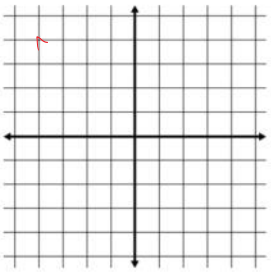
1.1 Horizontal and Vertical Translations

The graph of the base absolute value function is shown at right, and below are three transformed equations.

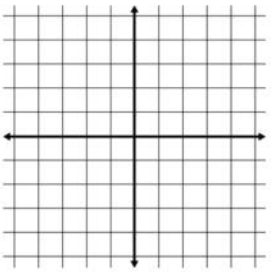


For each one:
- Sketch its graph on the grid.
- Describe, in words, the transformation that happened.
- Describe the transformation by giving its ***mapping***.
- State the domain and range.

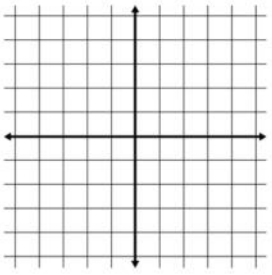
$f(x)=|x-4|$



$f(x)=|x|+3$



$f(x)=|x+2|-4$



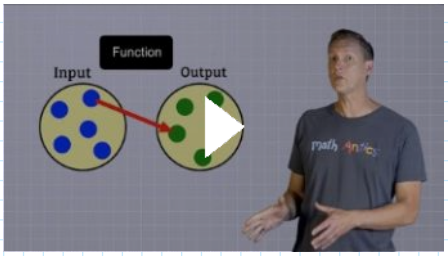
Points on an original graph correspond with points on a transformed graph, often called the ***image graph***. We say that each original point is ***mapped*** to an ***image point***.

$y-k=f(x-h)$ (Horizontal translation; Vertical translation)

Often equations are arranged with the "y" term isolated:

$y=f(x-h)+k$ (Horizontal translation; Vertical translation)

Want more explanation about functions, domain and range? Watch this:
Algebra Basics: What Are Functions? - Math Antics



Big ideas tonight:

- What is a function
- Finding domain and range from a graph
- Finding what domain is using the equation.
  - Can't divide by zero
  - Can't square root negative numbers

Before next class

1) Expect to get an email from me - answer it!
2) Check out the class website
3) Complete
   - "First Night Review Questions worksheet"
   - "Common Graphs" worksheet, BASE GRAPHS only
4) After you're done, check the solutions, posted on the website.