

Welcome to

Trigonometry & Functions

2019-2020

Welcome to Trigonometry and Functions College Preparatory! This course is the study of functions. The goal of this course is to prepare you to take Precalculus or Calculus for Business Majors in college, and success in Precalculus or Business Calculus depends on your knowledge of functions as well as very strong algebra skills.

About Your Summer Assignment

This summer, you will have the opportunity to sharpen your algebra skills and review linear functions. You will be expected to complete the REQUIRED summer assignment. This assignment is on a worksheet. The worksheet will review topics from Algebra 1 and 2 that you have already studied.

This assignment is DUE the first day of classes.

You will have TEST on this material during the first week of classes.

TRIGONOMETRY & FUNCTIONS SUMMER WORKSHEET 2019**YOU MUST SHOW YOUR WORK!****SECTION 1 SOLVING LINEAR EQUATIONS****STUDY THE FOLLOWING.**

LINEAR EQUATION - A Linear Equation (or first degree equation) is a Polynomial Equation with variables whose exponents are 1.

STEPS TO SOLVE A LINEAR EQUATION WITH ONE VARIABLE

1. Remove any fraction by **multiplying each term** in the equation by the **Least Common Denominator (LCD)**.
2. Use the Distributive Property to remove parentheses.
3. Combine any **like terms**.
4. **TRANPOSE (ADDITION PROPERTY)**
 - a) **Get all the variable terms on one side of the equation.**
 - b) **Get all the numbers on the other side.**

REMEMBER – “CHANGE SIDES; CHANGE SIGNS!”

5. Combine any **like terms**.
6. Use the **Division (Multiplication) Property** to get the variable **“BY ITSELF”**.

IDENTITY – An Identity is an equation that is true for all real number solutions of the variable. (EXAMPLE: $x + 3 = x + 2 + 1$)

INCONSISTENT EQUATION - An Inconsistent Equation has **NO SOLUTION**.
(EXAMPLE: $x = x + 7$)

In questions 1 to 20 solve the equation. If the equation is an IDENTITY, write **“IDENTITY”** on the answer line. If the equation has NO SOLUTION, write **“NO SOLUTION”** on the answer line.

1. $x + 115 = -27$

1. _____

2. $11 - (x - 7) = 0$

2. _____

3. $-\frac{1}{4}x = -8$

3. _____

4. $-15x - 5x = -40$

4. _____

5. $1 - 9x = 100$

5. _____

6. $-\frac{1}{3}x + 7 = -5$

6. _____

7. $6x - 2(x - 1) = -14$

7. _____

OVER

$$8. x + 21 - 2x = 12$$

$$9. x + 25 = 10$$

$$10. \frac{1}{13}x = 65$$

$$11. -112 = 16x$$

$$12. 12x - 7 = 113$$

$$13. \frac{2}{3}x + 6 = 16$$

$$14. \frac{3x + 90}{5} = 0$$

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. $-\frac{7}{8}(x - 16) = 70$

16. $\frac{3}{4}(8x - 4) = -3 + 6x$

17. $6(x - 1) = 6(x + 3)$

18. $2(5x + 4) = 10x - 6$

19. $6x - 12 + 2x = 3 + 8x - 15$

20. $7(x + 1) - 3x = 5 + 4(2x - 1)$

15. _____

16. _____

17. _____

18. _____

19. _____

20. _____

OVER

SECTION 2 SOLVING LINEAR INEQUALITY**STUDY THE FOLLOWING.****STEPS TO SOLVE A LINEAR INEQUALITIES WITH ONE VARIABLE**

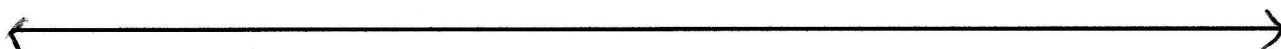
- 1, Follow the steps to solve a Linear Equation with one variable.
2. In the last step (**or any other step**), if both sides of the inequality are **DIVIDED** (or multiplied) by a **NEGATIVE NUMBER**, the **DIRECTION** of the **ARROW** must be **CHANGED**.
3. GRAPH the Linear Inequality on a NUMBER LINE.

STUDY PROBLEM 2 ON PAGE 77 OF TEXTBOOK.

In questions 1 to 7 SOLVE and GRAPH each Linear Inequality.

1. $x - 8 > -12$

1. SOLUTION _____



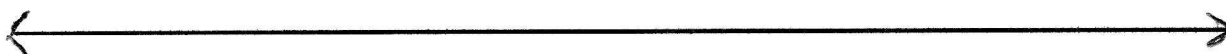
2. $-12x \geq -6$

2. SOLUTION _____



3. $-6x - 14 > -32$

3. SOLUTION _____



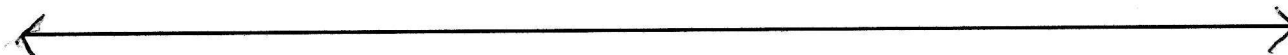
4. $-\frac{x}{4} \leq -7$

4. SOLUTION _____



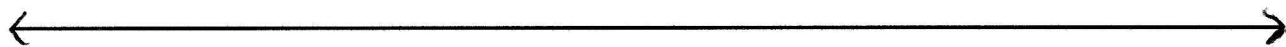
5. $\frac{x}{3} - 14 < -5$

5. SOLUTION _____



6. $-4(3x - 6) \geq 12$

6. SOLUTION _____



7. $\frac{9x + 5}{4} + 18 < 26$

7. SOLUTION _____



OVER

SECTION 3 RELATIONS AND FUNCTIONS

READ PAGES 128 TO 136 IN THE TEXTBOOK. STUDY ALL EXAMPLES! STUDY THE FOLLOWING DEFINITIONS.

RELATION - A Relation is a **set of ordered pairs**.

THREE WAYS TO DEFINE A RELATION - A Relation may be defined by a **SET (TABLE) OF ORDERED PAIRS**, a **GRAPH**, OR an **EQUATION**.

DOMAIN OF A RELATION - The Domain of a Relation is the set of all *x-coordinates* in the ordered pairs.

RANGE OF A RELATION - The Range of a relation is the set of all *y-coordinates* in the ordered pairs.

FUNCTION - A Function is an Equation (or rule), which assigns to each value of *x* ***exactly ONE*** value for *y*.

FUNCTION (second definition) - A Function is a **Set of Ordered Pairs** in which ***NO x-coordinate*** is repeated.

VERTICAL LINE TEST FOR A FUNCTION - If a VERTICAL LINE ***cuts a graph*** only ***once***, the graph represents a function.

ZEROS OF A FUNCTION - The ZEROS of a function are the *x-intercepts* of its graph.

EXAMPLES OF POLYNOMIAL FUNCTIONS

- | | | |
|----------------------|-----------------------|-------------------------------|
| 1. LINEAR FUNCTION | FORMULA: $y = mx + b$ | GRAPH: <i>slanted line</i> |
| 2. CONSTANT FUNCTION | FORMULA: $y = b$ | GRAPH: <i>horizontal line</i> |

QUESTIONS

1. State the domain and range for the following relations and state whether the relation is a function.

- | | |
|---|-----------------------------------|
| a) $\{(0, 4), (1, 5), (2, 6), (3, 7)\}$ | b) $\{(2, 4), (4, 8), (8, 16)\}$ |
| c) $\{(-1, 2), (-2, 5), (-2, 7)\}$ | d) $\{(2, 8), (3, 12), (4, 16)\}$ |

c) $\{(-1, 2), (-2, 5), (-2, 7)\}$

d) $\{(2, 8), (3, 12), (4, 16)\}$

2. Write a linear equation for the following functions.

a) $\{(0, 4), (1, 5), (2, 6), (3, 7)\}$

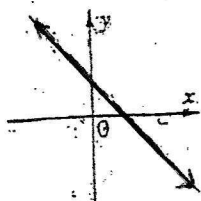
b) $\{(2, 4), (4, 8), (8, 16)\}$

c) $\{(1, -2), (2, -1), (4, 1), (5, 2)\}$

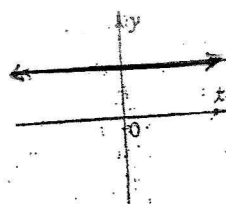
d) $\{(1, 7), (2, 8), (3, 9), (4, 10)\}$

3. Use the VERTICAL LINE TEST to determine which of the graphs are functions.

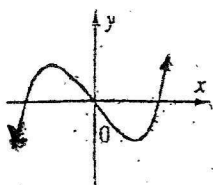
a)



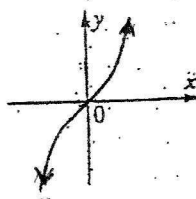
b)



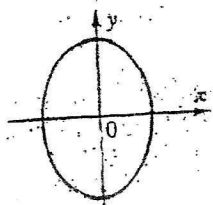
c)



d)



e)



OVER

SECTION 4 FUNCTIONAL NOTATION**STUDY THE FOLLOWING DEFINITION.**

FUNCTIONAL NOTATION - If an equation represents a function, the y in the equation may be replaced by $f(x)$, $g(x)$, $h(x)$, etc. $f(x)$ is read f of x .

STUDY THE FOLLOWING EXAMPLES.

EXAMPLE 1 Evaluate the function for the given value of x .

$$f(x) = 2x^2 - 3x + 1, \text{ find } f(-3)$$

SOLUTION $f(x) = 2x^2 - 3x + 1$

$$f(-3) = 2(-3)^2 - 3(-3) + 1$$

$$f(-3) = 2(9) + 9 + 1$$

$$f(-3) = 28$$

EXAMPLE 2 Evaluate the function for the given value of x .

$$g(x) = -4x - 7 \text{ find } g(a + 1)$$

SOLUTION $g(x) = -4x - 7$

$$g(a + 1) = -4(a + 1) - 7$$

$$g(a + 1) = -4a - 4 - 7$$

$$g(a + 1) = -4a - 11$$

QUESTIONS

Evaluate each function for the given value of x .

1. $f(x) = 5x - 9$ Find a. $f(3)$ b. $f(-3)$ c. $f(-8)$

2. $p(x) = 8 - 4x$ Find a. $p(2)$ b. $p(0)$ c. $p(-2)$

3. $h(x) = 3x - 2$ Find a. $h(4)$ b. $h(-5)$ c. $h(0)$

4. $F(x) = 3x - 12$ Find a. $F(-2)$ b. $F(0)$ c. $F(a - 1)$

SECTION 5 LINEAR FUNCTIONS AND SLOPE

STUDY THE FOLLOWING DEFINITIONS.

LINEAR FUNCTION - A Linear Function is a **Linear Equation** with two variables whose **exponents** are 1 (understood). A Linear Function may **NOT** have a **variable in the denominator**, a **variable under a radical**, or **two variables "stuck together"**. The **Graph** of a Linear Function is a **SLANTED LINE**.

QUESTIONS

In questions 1 to 5, state whether the function is a LINEAR FUNCTION.

- | | |
|----------------------------|----------|
| 1. $2x + y = 10$ | 1. _____ |
| 2. $f(x) = 4x^2$ | 2. _____ |
| 3. $-\frac{3}{x} + y = 15$ | 3. _____ |
| 4. $x = y + 8$ | 4. _____ |
| 5. $f(x) = \sqrt{x} + 3$ | 5. _____ |

STUDY THE FOLLOWING DEFINITION.

STANDARD FORMULA FOR A LINEAR EQUATION.

$Ax + By = C$ where A , B , and C are integers and **both** A and B may NOT be zero.

STUDY PROBLEM 3 ON PAGE 185.

In questions 6 to 8, write each equation in STANDARD FORM.

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

6. _____

OVER

7. $7x = -9 - y$

7. _____

8. $y = 4x + 7$

8. _____

STUDY THE FOLLOWING.

PROCEDURE TO FIND THE y -intercept A **SLANTED LINE**

1. **Change** the x in the equation to **zero**.
2. **SOLVE** the equation for y .

PROCEDURE TO FIND THE x -intercept OF A **SLANTED LINE**

1. **Change** the y in the equation to **zero**.
2. **SOLVE** the equation for x .

STUDY PROBLEM 4 ON PAGE 187.

In questions 9 to 13 Find the x -intercept and the y -intercept.

9 $x - 4y = -4$

x -intercept _____

y -intercept _____

10. $2x + 5y = -10$

x -intercept _____

y -intercept _____

11. $5x + 7y = 14$

x-intercept _____*y-intercept* _____

12. $-3x + 2y = 6$

x-intercept _____*y-intercept* _____

13. $y = 2x + 4$

x-intercept _____*y-intercept* _____OVER

STUDY THE FOLLOWING.**DEFINITION OF SLOPE OF A LINE**

rise or **fall** or **change in y**
run **run** **change in x**

FORMULA TO FIND THE SLOPE OF A LINE

The Slope of a line through POINTS A (x_1, y_1) and B (x_2, y_2) is given by the formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

The SLOPE of any HORIZONTAL LINE is ZERO.

The SLOPE of any VERTICAL LINE is UNDEFINED.

A Vertical Line has NO Slope.

STUDY PAGES 165 AND 166.

In questions 14 to 20 find the slope of a line that passes through the given points.

14. points (2, 7) and (-3, 11)

14. _____

15. points (1, 2) and (2, 3)

15. _____

16. points $(-4, -3)$ and $(7, 1)$

16. _____

17. points $(-5, -7)$ and $(0, 10)$

17. _____

18. points $(-2, -1)$ and $(8, -3)$

18. _____

19. points $(2, 1)$ and $(4, 1)$.

19. _____

20. points $(2, 7)$ and $(2, 11)$.

20. _____

OVER

STUDY THE FOLLOWING.

SLOPE-INTERCEPT FORMULA FOR A "SLANTED" LINE $y = mx + b$
 where m is the *slope* and b is the *y-intercept*.

STUDY PROBLEM2 ON PAGE 169.

In questions 21 to 23 write the equation of the line in *slope-intercept form*

21. $m = -5$ and *y-intercept* $(0, -7)$

21. _____

22. $m = \frac{5}{6}$ and *y-intercept* $(0, 12)$

22. _____

23. $m = -1$ and *y-intercept* $(0, -2)$

23. _____

STUDY PROBLEM 3A ON PAGE 170.

In questions 24 and 25 write the equation of the line in In questions 21 to 23 write the equation of the line in *slope-intercept form* and find the *slope* and *y-intercept* .

24. $5x + y = 4$

24. *slope-intercept form* _____

$m =$ _____ $b =$ _____

25. $-3x + 2y = 7$

25. *slope-intercept form* _____

$m =$ _____ $b =$ _____