## 2023 Dual Enrollment College Algebra and Trigonometry Summer Packet

Greetings Upcoming Fayette Academy (FA) Dual Enrollment (DE) Mathematics Students,

I hope you enjoy your summer vacation and am looking forward to having you in my class.

Our Math DE classes are composed of 2 University of Tennessee Courses:
MAT 140, "Precalculus College Algebra", offered this Fall 2023
MAT 170, "Precalculus Trigonometry", offered the following Spring 2024

UT Martin's MAT 140 published syllabus begins with Chapter 3 (Chapter R through Chapter 2 topics were covered in Honors PreCalculus and Honors Algebra 2)

UTM Old Math 140 Precalculus College Algebra Syllabus
UTM Math 170 Precalculus Trigonometry Syllabus

Our FA syllabus incorporates UT's requirements and includes additional details about MAT 140 for Fall.

To help ensure your success in rigorous college-level mathematics, you have mandatory Summer work and preliminary preparations which must be completed prior to the first day of class, August 7, 2023.

- Options for purchase for required online access at least **11-months** Sullivan's Algebra and Trigonometry Enhanced with Graphing Utilities 8th Edition.
  Your Summer work utilizes the online component.
- MyLab Math Registration Instructions are on the next page.

**__Mandatory__ Dual Enrollment Summer Work due 8/7/2023: This is a review of Algebra II concepts:

- If you have access to a computer, please use MyLab Math.
- Complete Chapter O MLM Homework
- Summer Packet Read Chapter R, MLM Homework
- Summer Packet Read Chapter 1, MLM Homework
- Summer Packet Read Chapter 2, MLM Homework

- If you do not have access to a computer, you must complete the DE – Summer Packet by hand. This is also on Google Classroom.
- MAT 140 Summer Packet 1 from Chapter R
- MAT 140 Summer Packet 2 from Chapter 1
- MAT 140 Summer Packet 3 from Chapter 2

Helpful Web sites: for Algebra http://www.purplemath.com/modules/index.htm
for Trig: https://www.khanacademy.org/math/trigonometry
Learning Success
https://www.mathway.com
https://photomath.net/en/ Shows steps on how to work mathematics
http://www.themathpage.com/

If you have any questions, please email me at adavis@favikings.org

Cordially,
Annita Davis, Ph.D.

## 2023 Dual Enrollment College Algebra and Trigonometry Summer Packet

Pearson

| MyLab | Math

Student Registration Instructions

## 2023 Dual Enrollment College Algebra and Trigonometry Summer Packet

**To register for 2023 Dual Enrollment Precalculus:**

1. Go to https://mlm.pearson.com/enrollment/davis99966.
2. Under Register, select **Student**.
3. Confirm you have the information needed, then select **OK! Register now**.
4. Enter your instructor's **course ID**: **davis99966** and **continue**.
5. Enter your existing Pearson account **username** and **password** to **Sign In**.
   You have an account if you have ever used a MyLab or Mastering product.
   - **»** If you don't have an account, select **Create** and complete the required fields.
6. Select an available access option.
   - **»** Enter the access code that came with your textbook or that you purchased separately from the bookstore.
   - **»** Or,
     - Buy instant access using a credit card or PayPal.
     - Select Get temporary access without payment for 14 days.
7. Select **Go To My Course**.
8. From My Courses, select **2023 Dual Enrollment Precalculus** to start your work.

If you **contact Pearson Support**, give them the course ID: **davis99966**

**To sign in later:**

1. Go to https://mlm.pearson.com.
2. Select **Sign In**.
3. Enter your Pearson account **username** and **password,** and **Sign In**.
4. From My Courses, Select **2023 Dual Enrollment Precalculus**.

**To upgrade temporary access to full access:**

1. Go to https://www.pearson.com/mylab.
2. Select **Sign In**.
3. Enter your Pearson account **username** and **password,** and **Sign In**.
4. Select **Upgrade access** for **2023 DE Precalculus**.
5. Enter an access code or buy access with a credit card or PayPal.



## 2023 Dual Enrollment College Algebra and Trigonometry Summer Packet

**R. Review Basics**

**R.1 Real Numbers: Learning Objectives:** 1. Work with sets
R.1 Video: Work with Sets 2. Classify numbers
R.1 Video: Evaluate Numerical Expressions 3. Evaluate numerical expressions 4. Work with properties of real numbers

**R.1 Exercise # 11, 21, 29, 69, 77, 89, 97.**

## Skill Building

*In Problems 11–22, use $U$ = universal set = $\{0,1,2,3,4,5,6,7,8,9\}$, $A = \{1,3,4,5,9\}$, $B = \{2,4,6,7,8\}$, and $C = \{1,3,4,6\}$ to find each set.*

| | | | |
|---|---|---|---|
| **11.** $A \cup B$ | **12.** $A \cup C$ | **13.** $A \cap B$ | **14.** $A \cap C$ |
| **15.** $(A \cup B) \cap C$ | **16.** $(A \cap B) \cup C$ | **17.** $\overline{A}$ | **18.** $\overline{C}$ |
| **19.** $\overline{A \cap B}$ | **20.** $\overline{B \cup C}$ | **21.** $\overline{A} \cup \overline{B}$ | **22.** $\overline{B} \cap \overline{C}$ |

*In Problems 29–40, approximate each number (a) rounded and (b) truncated to three decimal places.*

| | | | | |
|---|---|---|---|---|
| **29.** 18.9526 | **30.** 25.86134 | **31.** 28.65319 | **32.** 99.05249 | **33.** 0.06291 |

*In Problems 51–88, evaluate each expression.*

| | | | |
|---|---|---|---|
| **51.** $9 - 4 + 2$ | **52.** $6 - 4 + 3$ | **53.** $-6 + 4 \cdot 3$ | **54.** $8 - 4 \cdot 2$ |
| **55.** $4 + 5 - 8$ | **56.** $8 - 3 - 4$ | **57.** $4 + \frac{1}{3}$ | **58.** $2 - \frac{1}{2}$ |
| **59.** $6 - [3 \cdot 5 + 2 \cdot (3 - 2)]$ | **60.** $2 \cdot [8 - 3(4 + 2)] - 3$ | **61.** $2 \cdot (3 - 5) + 8 \cdot 2 - 1$ | **62.** $1 - (4 \cdot 3 -$ |
| **63.** $10 - [6 - 2 \cdot 2 + (8 - 3)] \cdot 2$ | | **64.** $2 - 5 \cdot 4 - [6 \cdot (3 - 4)]$ | |
| **65.** $(5 - 3)\frac{1}{2}$ | **66.** $(5 + 4)\frac{1}{3}$ | **67.** $\frac{4 + 8}{5 - 3}$ | **68.** $\frac{2 - 4}{5 - 3}$ |
| **69.** $\frac{3}{5} \cdot \frac{10}{21}$ | **70.** $\frac{5}{9} \cdot \frac{3}{10}$ | **71.** $\frac{6}{25} \cdot \frac{10}{27}$ | **72.** $\frac{21}{25} \cdot \frac{100}{3}$ |
| **73.** $\frac{3}{4} + \frac{2}{5}$ | **74.** $\frac{4}{3} + \frac{1}{2}$ | **75.** $\frac{5}{6} + \frac{9}{5}$ | **76.** $\frac{8}{9} + \frac{15}{2}$ |
| **77.** $\frac{5}{18} + \frac{1}{12}$ | **78.** $\frac{2}{15} + \frac{8}{9}$ | **79.** $\frac{1}{30} - \frac{7}{18}$ | **80.** $\frac{3}{14} - \frac{2}{21}$ |

*In Problems 89–100, use the Distributive Property to remove the parentheses.*

| | | |
|---|---|---|
| **89.** $6(x + 4)$ | **90.** $4(2x - 1)$ | **91.** $x(x - 4)$ |
| **93.** $2\left(\frac{3}{4}x - \frac{1}{2}\right)$ | **94.** $3\left(\frac{2}{3}x + \frac{1}{6}\right)$ | **95.** $(x + 2)(x + 4)$ |
| **97.** $(x - 2)(x + 1)$ | **98.** $(x - 4)(x + 1)$ | **99.** $(x - 8)(x - 2)$ |





**R.2 Algebra Essentials Learning Objectives:** 1. Graph inequalities
R.2 Video Laws of Exponents 2. Find distance on the real number line R.2 Video Square Roots I 3. Evaluate algebraic expressions R.2 Video Square Roots II 4. Determine the domain of a variable 5. Use the laws of exponents

6. Evaluate square roots
7. Use a calculator to evaluate exponents
8. Use scientific notation

**R.2 Exercises # 17, 21, 61, 65, 69, 85, 89, 145**

*In Problems 15–24, replace the question mark by <, >, or =, whichever is correct.*

**15.** $\frac{1}{2}$ ? 0 **16.** 5 ? 6 **17.** $-1$ ? $-2$

**20.** $\sqrt{2}$ ? 1.41 **21.** $\frac{1}{2}$ ? 0.5 **22.** $\frac{1}{3}$ ? 0.33

*In Problems 59–66, determine which of the values (a) through (d), if any, must be excluded from the domain of the variable in ea expression.*

(a) $x = 3$ (b) $x = 1$ (c) $x = 0$ (d) $x = -1$

**59.** $\frac{x^2 - 1}{x}$ **60.** $\frac{x^2 + 1}{x}$ **61.** $\frac{x}{x^2 - 9}$ **62.** $\frac{x}{x^2 + 9}$

**63.** $\frac{x^2}{x^2 + 1}$ **64.** $\frac{x^3}{x^2 - 1}$ **65.** $\frac{x^2 + 5x - 10}{x^3 - x}$ **66.** $\frac{-9x^2 - x + 1}{x^3 + x}$

*In Problems 67–70, determine the domain of the variable x in each expression.*

**67.** $\frac{4}{x - 5}$ **68.** $\frac{-6}{x + 4}$ **69.** $\frac{x}{x + 4}$ **70.** $\frac{x - 2}{x - 6}$

*In Problems 75–86, simplify each expression.*

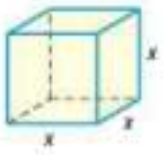
**75.** $(-4)^2$ **76.** $-4^2$ **77.** $4^{-2}$ **78.** $-4^{-2}$ **79.** $3^{-6} \cdot 3^4$ **80.** $4^{-2} \cdot 4^3$

**81.** $(3^{-2})^{-1}$ **82.** $(2^{-1})^{-3}$ **83.** $\sqrt{25}$ **84.** $\sqrt{36}$ **85.** $\sqrt{(-4)^2}$ **86.** $\sqrt{(-3)^2}$

*In Problems 87–96, simplify each expression. Express the answer so that all exponents are positive. Whenever an exponent is 0 or negative, we assume that the base is not 0.*

**87.** $(8x^3)^2$ **88.** $(-4x^2)^{-1}$ **89.** $(x^2y^{-1})^2$ **90.** $(x^{-1}y)^3$ **91.** $\frac{x^2y^3}{xy^4}$

**145. Volume of a Cube** The volume $V$ of a cube is the cube of the length $x$ of a side.




**R.3 Geometry Essentials Learning Objectives:** 1. Use the Pythagorean Theorem and its converse
R.3 Video: Pythagorean Theorem 2. Know geometry formulas
3. Understand congruent triangles and similar triangles

**R.3 Exercises #: 19, 25, 31, 33, 47, 51.**

**47.** How many feet has a wheel with a diameter of 16 inches traveled after 4 revolutions?

**R.4 Polynomials Learning Objectives:** 1. Recognize monomials
R.4 Video Monomials 2. Recognize polynomials
R.4 Video: Polynomials 3. Add and subtract polynomials
R.4 +/- Polynomials 4. Multiply polynomials
R.4 Video Multiplying Polynomials 5. Know formulas for special products
R.4 Special Products (FOIL) 6. Divide polynomials using long division R.4 More Special Products 7. Work with polynomials in two variables R.4 Video: Polynomial Long Division
**R.4 Exercises #: 37, 47, 69, 83, 95**

**R.5 Factoring Polynomials- Factor the following**

**Learning Objectives:** 1. Factor the difference of 2 squares and the sum and difference of 2 cubes R.5 Video: Difference of 2 Squares 2. Factor perfect squares R. 5 Video + or - of 2 Cubes 3. Factor a second-degree polynomial: R.5 Video: Perfect Squares 4. Factor by grouping R.5 2nd Degree Polynomial Intro 5. Factor a second-degree polynomial: R.5 Video: Factor by Grouping 6. Complete the square R.5 Video: Factor a 2nd Degree Polynomial by Grouping

R.5 Video: Complete the Square

**R.5 Exercises #: 25, 29, 55, 81, 87, 91, 103, 115.**

$x^2 + Bx + C$

$Ax^2 + Bx + C, A \neq 1$

**R.6 Synthetic Division Learning Objectives:** 1. Divide polynomials using synthetic division R.6 Video: Divide Polynomials Using Synthetic Division

**R.6 Exercise #: 19.**



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**R.7 Rational Expressions Learning Objectives:** 1. Reduce a rational expression to lowest terms R.7 Video: Reduce to Lowest Terms 2. Multiply and divide rational expressions R.7 Video Multiply Rational Expressions 3. Add and subtract rational expressions R.7 Divide Rational Expressions 4. Use the Least Common Multiple Method R.7 + & - Rational Expressions 5. Simplify complex rational expressions R.7 Video: Least Common Denominator

R.7 Video: +/- Rational Expressions Using LCM

R.7 Video: Simplify Complex Rational Expressions

**R.7 Exercise #: 63, 69, 69, 73, 75, 77.**

**R.8 nth Roots; Rational Exponents Learning Objectives:**
R.8 Video Work with nth Roots 1. Work with *n*th roots
R.8 Video: Simplify Radicals I 2. Simplify radicals
R.8 Video: Simplify Radicals II 3. Rationalize denominators R.8 Video: Simplify Rational Exponents 4. Simplify expressions with rational exponents **R.8 Exercises #: 55, 59, 63, 77, 103, 111**





**1. Graphs, Equations, & Inequalities**
**1.1 Graphing Utilities; Introduction to Graphing Equations:**
**Learning Objectives:** 1. Graph Equations by Plotting Points
1.1 Video Plot Points 2. Graph Equations Using a Graphing Utility 1.1 Video Graphing Utility 3. Use a Graphing Utility to Create Tables 1.1 Video: Tables 4. Find Intercepts from a Graph 1.1 Video Intercepts I 5. Use a Graphing Utility to Approximate Intercepts 1.1 Video: Intercepts II
1.1 Video: Intercepts III
**1.1 Exercises: # 33, 37, 39, 43, 45, 47, 63.**

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**1.2 Solve Equations Using a Graphing Utility; Linear & Rational Equations**

**Learning Objectives:** 1. Solve Equations Using a Graphing Utility
1.2 Solv Equations with a Grapher I 2. Solve Linear Equations
1.2 Solv Equations with a Grapher II 3. Solve Rational Equations
1.2 Linear Equations 4. Solve Problems That Can Be Modeled by Linear Equations 1.2 Rational Equations I
1.2 Equations with Rational Expressions

**1.2 Exercises: 15, 17, 19, 49, 65, 89, 93**





**1.3 Quadratic Equations Learning Objectives:** 1. Solve quadratic equations by factoring 1.3 Solve by Factoring 2. Solve quadratic equations by the square root method 1.3 Square Root Method 3. Solve quadratic equations by completing the square 1.3 Solve by Complete the Square 4. Solve quadratic equations using the quadratic formula 1.3 Quadratic Formula I 5. Solve problems that can be modeled by quadratic equations 1.3 Quadratic Formula II

**1.3 Exercises: # 13, 21, 33, 51, 61**

**1.4 Complex Numbers; Quadratic Equations in the Complex Number System**

**Learning Objectives:** 1. Add, subtract, multiply, and divide complex numbers
1.4 Add or Subtract Complex Numbers 2. Solve quadratic equations in the complex number system 1.4 Multiply Complex Numbers
1.4 Divide Complex Numbers
1.4 Evaluate the Powers of i

1.4 Complex Numbers
1.4 Quadratic Equations with Complex Solutions
**1.4 Exercises: # 13, 25, 33, 35, 37, 43, 59, 65, 71**

**1.5 Radical Equations; Equations Quadratic in Form; Absolute Value Equations; Factorable Equations Learning Objectives:** 1. Solve radical equations
1.5 Solve Radical Equations I 2. Solve equations quadratic in form
1.5 Solve Equations Quadratic in Form 3. Solve absolute value equations
1.5 Solve 2-Radical Equations 4. Solve equations by factoring
1.5 Solve Absolute Value Equations
1.5 Solve Equations by Factoring
**1.5 Exercises: 19, 33, 47, 55, 71, 73, 81, 85, 93, 95**





**1.6 Problem solving: Interest, Mixture, Uniform Motion, Constnt Rate Job Applications Learning Objectives:** 1. Translate verbal descriptions into mathematical expressions 1.6 Solve Interest Problems 2. Solve interest problems
1.6 Solve Mixture Problems 3. Solve mixture problems
1.6 Solve Uniform Motion Problems 4. Solve uniform motion problems
1.6 Model & Solve Work Problems 5. Solve constant rate job problems
**1.6 Exercises: 25, 37, 41**

**1.7 Solving Inequalities**

**Learning Objectives:** 1. Use interval notation 1.7 Use Interval Notation 2. Use properties of inequalities 1.7 Properties of Inequalities 3. Solve linear inequalities algebraically and graphically 1.7 Solve Inequalities 4. Solve combined inequalities algebraically and graphically 1.7 Solve Absolute Value

Inequalities 5. Solve absolute value inequalities algebraically and graphically **1.7 Exercises: 67, 83 103**

**2. Graphs**

**2.1 The Distance & Midpoint Formulas: Learning Objectives:** 1. Use the Distance Formula 2.1 Video Distance Formula 2. Use the Midpoint Formula 2.1 Midpoint Formula

**2.1 Exercises: # 13, 15, 35, 61**



**2.2 Intercepts; Symmetry; Graphing Key Equations**

**Learning Objectives:** 1. Find intercepts algebraically from an equation 2.2 Find Intercepts from an Equation 2. Test for an equation for symmetry 2.2 Symmetry 3. Know how to graph key equations **2.2 Exercises: # 37, 41, 61, 63, 67,69,70**

**2.3 Lines <u>Learning Objectives</u>:** 1. Calculate and interpret the slope of a line 2.3 Video Slope of a Line 2. Graph lines given a point and the slope 2.3 Video Graph Lines w a Point and Slope 3. Find the equation of a vertical line 2.3 Point-Slope Form; Horizontal Lines 4. Use the point-slope form of a line; identify horizontal lines 2.3 Slope – Intercept form 5. Write the equation of a line in slope-intercept form 2.3 Equation of a line w 2 points 6. Find the equation of a line given two points 2.3 General Form of a Line 7. Graph lines written in general form using intercepts 2.3 Equations of Parallel Lines 8. Find equations of parallel lines 2.3 Equations of Perpendicular Lines 9. Find equations of perpendicular lines

**2.3 Exercises # 13, 21, 27, 29, 49, 51, 53, 57, 63, 67, 73, 97, 125**

**2.4 Circles <u>Learning Objectives</u>:** 1. Write the standard form of the equation of a circle 2.4 Standard Equation of a Circle 2. Graph a circle by hand and by using a graphing utility 2.4 Graph A Circle 3. Work with the general form of the equation of a circle 2.4 General Equation of a Circle
**2.4 Exercises # 15, 19, 21, 23, 29, 33, 37**



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**2.5 Variation <u>Learning Objectives</u>:** 1. Construct a model using direct variation 2.5 No Videos 2. Construct a model using inverse variation 3. Construct a model using joint variation or combined variation
**2.5 Exercises # 23,**

**Read Ch 3.1**