

PRE-CALCULUS

Review UNIT

The collage features several educational documents:

- Topic A: Basic Parent Functions**: A worksheet with four coordinate planes for Linear, Absolute Value, Square Root, and Cube Root functions.
- Topic A: Graphs of Polynomial Functions**: A worksheet with two graphs of polynomial functions and instructions to identify their key characteristics.
- Graphing Trigonometric Functions**: A worksheet with a grid and a graph of $f(x) = -4 \cos \frac{1}{2}x$, with fields for Amplitude and Period.
- Pre-Calculus Review QUIZ 1**: A quiz with questions about minimum points on graphs and function transformations.
- Pre-Calculus Review QUIZ 2**: A quiz with questions about the graph of $f(x) = -5(x+2)^2(x-3)^2(x-1)^3$ and the zeros of $f(x) = x^3 + \dots$.
- Pre-Calculus Review QUIZ 3**: A quiz with questions about the graph of $f(x) = \sin x$ and the zeros of $f(x) = \csc x$.

END-OF-YEAR REVIEW

REVIEW PACKETS • MINI-QUIZZES

Created by: ALL THINGS ALGEBRA®

PRE-CALCULUS REVIEW PACKETS *(with Quizzes)*

Packet 1 (Functions, Transformations & Graphs)

- Transformations of Basic Functions (Linear, Absolute Value, Quadratic, Cubic, Square Root, Cube Root, Reciprocal, Greatest Integer)
- Symmetry; Even and Odd Functions
- Continuity
- Inverse Functions
- Piecewise Functions

Quiz 1

Packet 2 (Polynomial, Rational, Exponential, and Logarithmic Equations)

- Graphs of Polynomial Functions
- Zeros of Polynomial Functions
- Graphs of Rational Functions
- Graphs of Exponential & Logarithmic Functions
- Solving Exponential & Logarithmic Equations
- Applications (Exponential Growth & Decay, Logistic Function, Compound Interest, Continuous Compound Interest)

Quiz 2

Packet 3 (Trigonometric Functions)

- Sine, Cosine, and Tangent Graphs
- Reciprocal Function Graphs
- Translations of Trigonometric Graphs (Phase and Vertical Shifts)
- Inverse Trigonometric Functions
- Compositions of Trigonometric Functions
- Trigonometric Identities
- Trigonometric Expressions
- Solving Trigonometric Equations
- Law of Sines and Cosines, Applications

Quiz 3

Packet 4 (Vectors, Polar Equations, Parametric Equations)

- Vectors: Component Form, Linear Combination, Magnitude, Direction, Trigonometric Form
- Vector Operations
- Dot Products/Orthogonal Vectors
- Angle Between Vectors
- Vector Applications (Resultant Force and Velocity)
- Polar vs. Rectangular Coordinates
- Polar Graphs (Lines, Circles, Limacons, Roses, Lemniscates, Spirals)
- Polar vs. Rectangular Equations
- Polar Forms of Complex Numbers
- Operations with Complex Numbers in Polar Form (Multiply, Divide, Powers)
- Graphing Parametric Equations
- Writing Parametric Equations in Rectangular Form
- Applications of Parametric Equations (Projectile Motion)

Quiz 4

Packet 5 (Conic Sections, Systems of Equation & Matrices)

- Graphing Circles, Ellipses, Hyperbolas, and Parabolas in General Form
- Writing Equations of Conics (given graphs and other information)
- Conics in General Conic Form
- Applications of Conic Sections
- Nonlinear Systems of Equations
- Solving Three-Variable Linear Systems with Augmented Matrices

Quiz 5

Packet 6 (Sequences, Series, & Limits)

- Arithmetic & Geometric Sequences
- Arithmetic & Geometric Series
- Proof by Mathematical Induction
- Pascal's Triangle
- Binomial Theorem
- Limits
- Limits of Sequences

Quiz 6

Topic A: Basic Parent Functions and Transforms
 Directions: For each function family, give the parent function and describe its transformations.

Linear 	Absolute Value 	Quadratic
Square Root 	Cube Root 	Reciprocal

Pre-Calculus Review QUIZ 1
 Name: _____
 Date: _____ Per: _____

1. The minimum point on the graph of the function $f(x)$ is $(-4, -1)$. What is the minimum point on the graph of the function $f(x+2)$?

Name: _____ PRE-CALCULUS REVIEW: Packet #2

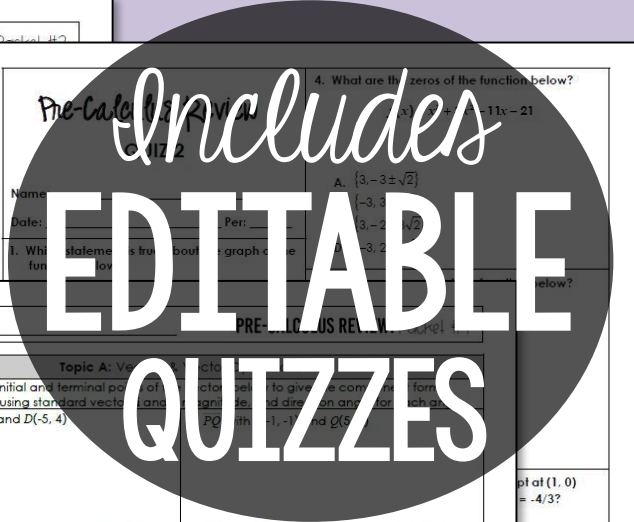
Topic A: Graphs of Polynomial Functions
 Directions: Given the graph of each polynomial function below, determine the sign of the leading coefficient and whether the function has an even or odd degree.

1.

2.

3.

Directions: Graph each function, then identify its key characteristics.
 $f(x) = 2x^3 + x^2 - 6x + 3$



Recall the following transformations (Shifts):

- $f(x+h)$ shifts left
- $f(x-h)$ shifts right
- $f(x)+k$ shifts up
- $f(x)-k$ shifts down

Directions: Describe the transformations for the function $f(x) = 3(x+7)^2 + 4$.

Name: _____ PRE-CALCULUS REVIEW: Packet #3

Topic A: Graphing Trigonometric Functions
 Directions: Graph each function and identify its key characteristics.

1. $f(x) = -4 \cos \frac{x}{2}$

2. $f(x) = \frac{1}{2} \cot x$

Pre-Calculus Review QUIZ 3
 Name: _____
 Date: _____ Per: _____

1. Which function has a period of 2π and an amplitude of 4?

4. The graph of the function $f(x)$ is a vertical stretch by a factor of $\pi/4$ radians to the right, a compression by a factor of 3, and a phase shift of $\pi/2$. Which of the following is true regarding the transformed function?

A. The y-intercept is $(0, 3)$.
 B. The function intersects the x-axis at $(\frac{\pi}{4} + k\pi, 0)$ where k is an integer.
 C. The period is 2π .
 D. The amplitude is 2.

Name: _____ PRE-CALCULUS REVIEW: Packet #4

Topic A: Vectors
 Directions: Use the initial and terminal points of each vector to give the component form, magnitude, and direction angle.

1. \vec{CD} with $C(-7, 5)$ and $D(-5, 4)$

Component Form:	Linear Combination:	Component Form:	Linear Combination:
Magnitude:	Direction Angle:	Magnitude:	Direction Angle:

Directions: For each of the following, find a , b , and c for the vector $\vec{c} = a\vec{i} + b\vec{j} + c\vec{k}$.

4. $2a + 3c$

5. $\frac{1}{3}c - \frac{5}{2}a$

Pre-Calculus Review QUIZ 4
 Name: _____
 Date: _____ Per: _____

1. Given $R(4, -1)$ and $S(-2, 7)$, give the magnitude and approximate direction angle for \vec{RS} .

A. $2\sqrt{10}$; 71.57°
 B. $2\sqrt{10}$; 108.43°
 C. 10 ; 126.87°
 D. 10 ; 143.13°

2. Vector a has a magnitude of 4 units and a direction of -30° . Vector b has a magnitude of 2 units and a direction of 90° . Which is the component form of vector c if $c = a + 2b$?

A. $(2, -2\sqrt{3})$
 B. $(-2, 2\sqrt{3})$
 C. $(-2\sqrt{3}, 2)$
 D. $(2\sqrt{3}, 2)$

3. Find the approximate measure of the angle formed between the vectors given below.
 $u = -i + 7j$; $v = 2i + 3j$

A. 37.78°
 B. 38.19°
 C. 41.82°
 D. 48.34°

Name: _____ PRE-CALCULUS REVIEW: Packet #5

Topic A: Graphing Conics
 Directions: Graph each conic, then identify its key characteristics.

1. $(x-4)^2 + (y+1)^2 = 36$

2. $8x^2 + 8y^2 = 480$

3. $\frac{(x+3)^2}{25} + \frac{(y+2)^2}{4} = 1$

4. $\frac{(x-2)^2}{49} - \frac{(y-1)^2}{64} = 1$

Center:	Vertices:	Center:
Radius:		Radius:
Center:	Co-vertices:	Center:
Foci:		Foci:
Eccentricity:		Eccentricity:

5. $(y+4)^2 - \frac{(x-1)^2}{4} = 1$

6. $\frac{(x-2)^2}{9} - \frac{(y-5)^2}{9} = 1$

Center:	Vertices:	Center:
Foci:	Co-vertices:	Foci:
Asymptotes:	Eccentricity:	Asymptotes:

Pre-Calculus Review QUIZ 5
 Name: _____
 Date: _____ Per: _____

1. Which is the graph of $16x^2 = 144 - 9y^2$?

A.

B.

C.

D.

2. Which graph represents the equation below?
 $-4x^2 + 25y^2 - 24x - 50y - 111 = 0$

A.

B.

C.

D.

3. An ellipse has a center located at $(2, 0)$, a horizontal major axis with a length of 40 units, and a focus located 16 units from its center. What is the equation of this ellipse?

A. $\frac{(x-2)^2}{1600} + \frac{y^2}{576} = 1$

B. $\frac{(x-2)^2}{400} + \frac{y^2}{144} = 1$

C. $\frac{(x-2)^2}{400} + \frac{y^2}{256} = 1$

D. $\frac{(x-2)^2}{1600} + \frac{y^2}{1296} = 1$

4. The equation $y^2 = x$ is reflected over the y-axis, translated 3 units left, then vertically stretched by a factor of 8. Which correctly gives the focus and directrix of this new equation?

A. focus: $(1, 0)$; directrix: $x = 5$
 B. focus: $(5, 0)$; directrix: $x = 1$
 C. focus: $(-5, 0)$; directrix: $x = -1$
 D. focus: $(-1, 0)$; directrix: $x = -5$

5. Which is the equation of a hyperbola with a center at $(1, 1)$, a vertex at $(1, -3)$, and a focal point at $(1, -4)$?

A. $\frac{(y-1)^2}{16} - \frac{(x-1)^2}{9} = 1$

B. $\frac{(x-1)^2}{16} - \frac{(y-1)^2}{9} = 1$

C. $\frac{(y-1)^2}{4} - \frac{(x-1)^2}{9} = 1$

D. $\frac{(x-1)^2}{4} - \frac{(y-1)^2}{9} = 1$

6. Which characteristic describes the graph of the equation below?
 $x^2 + 9y^2 - 2x - 90y + 190 = 0$

A. an ellipse with a major axis of 12 units
 B. an ellipse with a center at $(-1, 5)$
 C. a hyperbola with a transverse axis of 12 units
 D. a hyperbola with a vertex at $(6, 5)$

7. A snowplow with a parabolic cross section 3 feet wide at its opening. If the focus is located 4 inches from the vertex, find the depth of the snowplow at the vertex.

A. 18.75 inches
 B. 20.25 inches
 C. 21.8 inches
 D. 22.5 inches

8. A locket necklace in the shape of an ellipse 25 millimeters long. If the eccentricity of the locket is 0.6, find the width of the locket.

A. 15 millimeters
 B. 16 millimeters
 C. 18 millimeters
 D. 20 millimeters

Pre-Calculus Review QUIZ 6
 Name: _____
 Date: _____ Per: _____

1. A collection of nickels is arranged in a triangular array such that there are 21 nickels in the base row, 20 nickels in the next row, 19 nickels in the next, and so forth, with 1 nickel in the top row. Find the value of the coins in the collection.

A. \$11.55
 B. \$11.60
 C. \$11.65
 D. \$11.70

2. The first and fourth term of a geometric sequence are 4 and -13.5. Find the sum of the first seven terms.

A. $\frac{115}{4}$
 B. $-\frac{1261}{32}$
 C. $\frac{463}{16}$
 D. $-\frac{133}{8}$

3. Given the sequence below, if $S_n = -651,042$, find the value of n .
 $a_n = -2, 10, -50, 250, \dots$

A. 7
 B. 8
 C. 9
 D. 10

4. What is the sum of the series below?
 $\frac{1}{8} + \frac{1}{9} + \frac{2}{27} + \frac{4}{81} + \dots$

A. no sum
 B. $\frac{5}{9}$
 C. $\frac{2}{3}$
 D. $\frac{1}{2}$

5. What is the sum of $\sum_{k=1}^n 6 \cdot \left(\frac{1}{4}\right)^{k-1}$?

A. no sum
 B. $\frac{24}{5}$
 C. $\frac{2}{3}$
 D. $\frac{15}{2}$

6. The first term in an infinite geometric sequence is 4. If the sum of the sequence is -24, find the common ratio.

A. $\frac{1}{2}$
 B. $-\frac{1}{4}$
 C. $-\frac{3}{4}$
 D. $\frac{3}{4}$

7. Expand $(3x - y)^4$.

A. $81x^4 - 27x^3y + 9x^2y^2 - 3xy^3 + y^4$
 B. $81x^4 - 108x^3y + 54x^2y^2 - 12xy^3 + y^4$
 C. $81x^4 - 162x^3y + 54x^2y^2 - 12xy^3 + 4y^4$
 D. $81x^4 - 243x^3y + 162x^2y^2 - 9xy^3 + 4y^4$