AP Precalculus – Summer Assignment **Name:**

- The following links and QR codes can be used to access a series of videos released from the College Board that correspond to the 13 Prerequisites expected to be mastered or in development prior to taking AP Precalculus. Use the link or QR codes to access the videos as you need.

- The problems following the links below are expected to all be, at minimum, attempted by the first Friday of the first week of school. These problems will not be graded on accuracy, but you will be assessed within the first week of school based on the skills required to complete these problems.

- You are encouraged to use other resources and/or work together as needed. Please know, you are expected to be capable of completing these problems.

- It is recommended to work on these throughout the summer, not all at once.

- If you have any problems accessing the videos or completing specific problems, please contact Mr. Andrews at **nandrews@ccboe.com**.

Prerequisite 1: Linear Functions

bit.ly/Prereq1

Prerequisite 2: Solving Linear Equations and Inequalities

bit.ly/Prereq2

Prerequisite 3: Polynomial Addition and Multiplication

bit.ly/Prereq3

Prerequisite 4: Polynomials – Factoring Quadratic Trinomials

bit.ly/Prereq4

Prerequisite 5: Quadratic Functions (solving equations and inequalities)

bit.ly/Prereq5

Prerequisite 6: Quadratic Functions (algebraic manipulation)

bit.ly/Prereq6

Prerequisite 7: Solving Right Triangle Problems Using Trigonometry

bit.ly/Prereq7

Prerequisite 8: Solving systems of Equations in 2 and 3 Variables

bit.ly/Prereq8

Prerequisite 9: Piecewise Functions

bit.ly/Prereq9

Prerequisite 10: Exponential Functions

bit.ly/Prereq10

Prerequisite 11: Rules for Exponents

bit.ly/Prereq11

Prerequisite 12: Simplifying Radicals

bit.ly/Prereq12

Prerequisite 13: Complex Numbers

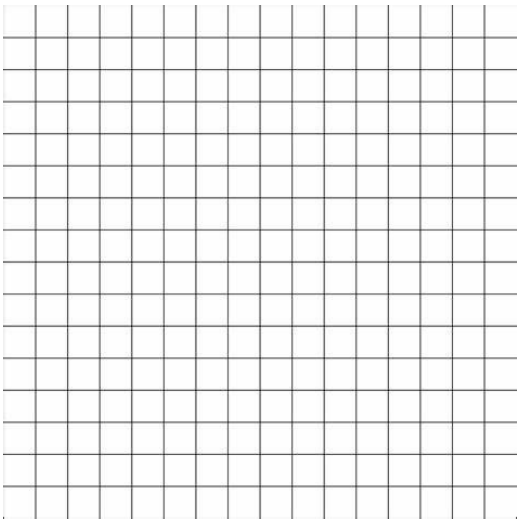
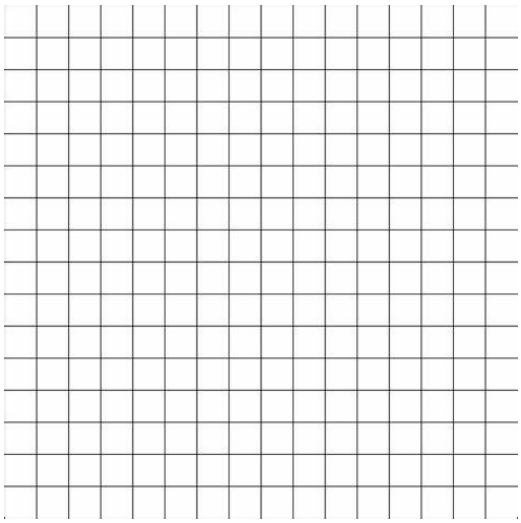
bit.ly/Prereq13

AP Precalculus
Prerequisites Review #1 – Algebraic Manipulation of Linear Functions

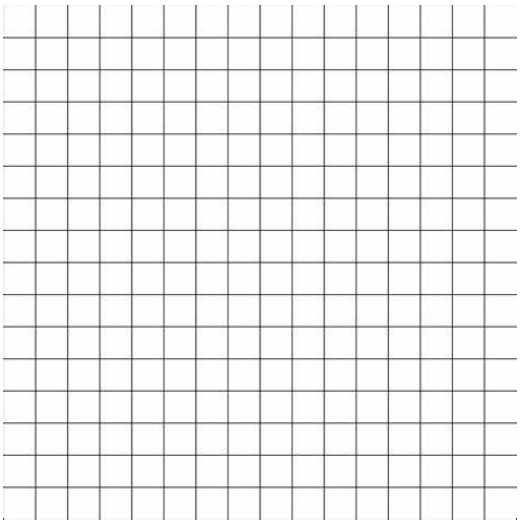
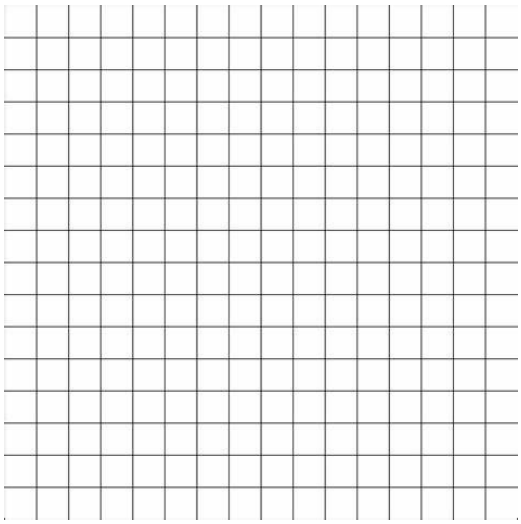
1. A line passes through (7,4) and (3,-4). Find an equation for the line in all three forms for linear equations.

Slope-intercept Form	Point-slope Form	Standard Form

2. Sketch the graph of each line.

a. $y = \frac{2}{3}x - 2$	b. $y = -3x + 1$
	

3. Sketch the graph of each line.

a. $2x - 5y = 10$	b. $-4x + 3y = -24$
	

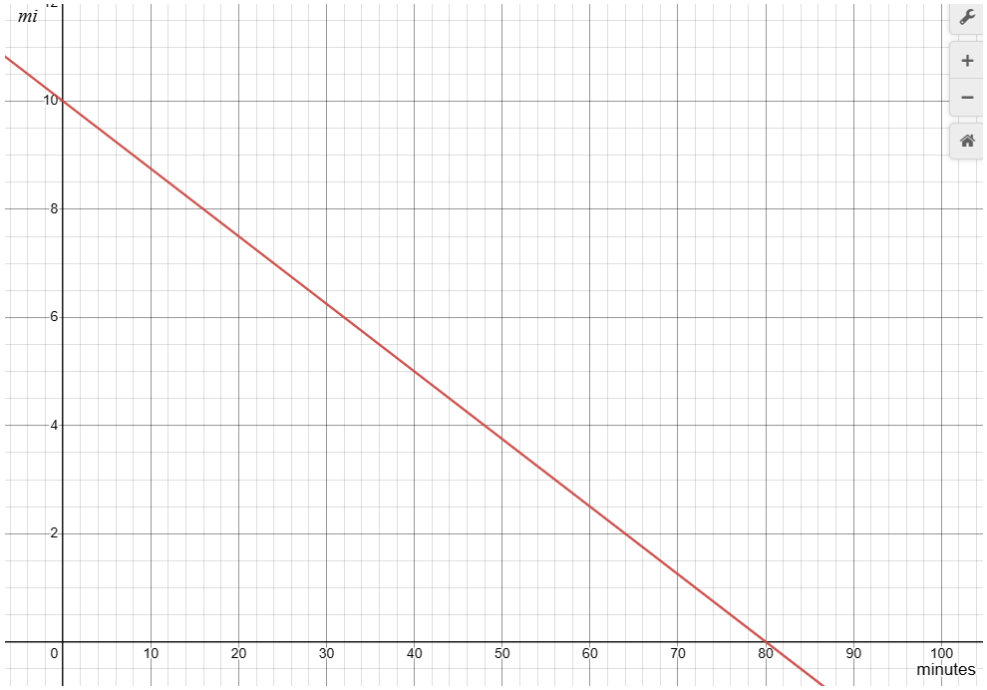
4. A recording studio charges a base fee for use of their facility plus a constant fee per hour of use. The table compares the number of hours the studio is used with the total cost, c, for use of the studio. Use the table to answer each of the questions below.

Hours of studio use (h)	2	4	6	8
Total cost to use the studio(C)	$450	$600	$750	$900

a. What is the fee charged per hour for use of the studio?	b. What is the base fee for rental of the studio?

c. Write a linear equation to model this situation.	d. Identify the domain and range for this function.

5. Jaden competes in a race, running at a constant pace from start to finish. The distance remaining in the race (in miles) as a function of time (in minutes) is shown in the graph. Use the graph to answer the following questions.



a. How long did it take Jaden to reach the finish line? Explain.	b. How long (distance) was the race? Explain your reasoning.

c. Write a linear equation to model this situation.	d. Identify the domain and range for this function.

AP Precalculus
Prerequisites Review #2 – Linear Functions: Solving Equations and Inequalities

1. Solve $4x - 9 < 7x + 15$

2. Solve $6(3x - 2) = -4(2x - 9)$

3. Solve $\frac{2}{3}x + 4 = \frac{4}{5}x - 3$

AP Precalculus
Prerequisites Review #3 – Polynomial Addition and Multiplication

1. Simplify the expression to a polynomial in standard form: $(4x^3 – 5x^2 – 3x + 7)(2x – 5)$.

2. Simplify the expression to a polynomial in standard form: $3(2x – 5)(x^2 – 4x + 2)$.

3. Simplify the expression to a polynomial in standard form: $(3x – 1)(-2x^2 + 4x – 7)$.

AP Precalculus
Prerequisites Review #4 – Factoring Quadratic Trinomials

Factor each quadratic trinomial.

1. $x^2 + 10x + 9$	2. $x^2 – 6x + 9$
3. $x^2 – 11x + 24$	4. $3x^2 – 5x – 12$
5. $4x^2 + 28x + 49$	6. $15x^2 – 11x - 12$

AP Precalculus
Prerequisites Review #5 – Solving Quadratic Equations and Inequalities

Solve each problem by factoring or using the quadratic formula. Round answers to the nearest hundredth as needed.

1. $x^2 + 4x + 3 = 0$	2. $x^2 - 5x = 6$
3. $3x^2 - 5x - 9 = x^2 + 3$	4. $4x^2 - 12x + 1 < 0$

5. $2x^2 + 8x = -7$	6. A ball is catapulted upward from the top of a building at a speed of 30 feet per second. The ball's height above the ground can be modeled as $H(t) = -16t^2 + 30t + 40$. How long does it take for the ball to reach a height of 50 feet?

AP Precalculus
Prerequisites Review #6 – Quadratic Functions: Algebraic Manipulation

1. A ball is launched straight up with a velocity of 40 feet per second. The ball's height above the ground can be modeled by $H(t) = -16t^2 + 40t + 5$. Use this information to answer the following questions.

a. How high is the ball when it is released? Explain your answer.	b. How long does it take the ball to reach its maximum height? Explain your answer.
c. What is the maximum height the ball reaches? Explain your answer.	d. How long is the ball in the air? Explain your answer.

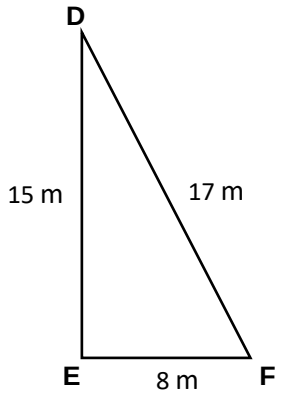
2. A child uses 36 legos to build the rectangular frame for the base of her lego castle. Write a quadratic function to model this situation and determine the length of the side of the castle and the largest possible area covered by the castle's base.

3. Does the table of values below represent a quadratic equation? Justify your decision.

x	f(x)
-1	4
0	6
1	11
2	19
3	32

AP Precalculus
Prerequisites Review #7 – Solving Right Triangle Problems Using Trigonometry

1. Use the diagram to identify each ratio.



a. $\sin F^\circ =$	b. $\sin D^\circ =$
c. $\cos F^\circ =$	d. $\cos D^\circ =$
e. $\tan F^\circ =$	f. $\tan D^\circ =$

2. Using the diagram from #1 above, calculate the measure in degrees of $\angle F$.

3. When a ladder leans against a wall, it reaches a height of 15 feet. The angle of incline is 60°. How far away from the wall is the base of the ladder?

3. A kite is flying extended on 100 feet of string and is 30 feet high. What is the angle of elevation of the kite?

AP Precalculus
Prerequisites Review #8 – Solving Systems of Equations in 2 and 3 Variables

1. Solve $\begin{cases} x + 2y = 10 \\ y = 2x - 5 \end{cases}$

2. Solve $\begin{cases} 5x + 7y = 6 \\ 10x - 3y = 46 \end{cases}$

3. Solve $\begin{cases} 3x + y - 2z = -12 \\ 2x + 2y - 3z = -12 \\ 5x + 3y + 2z = 4 \end{cases}$

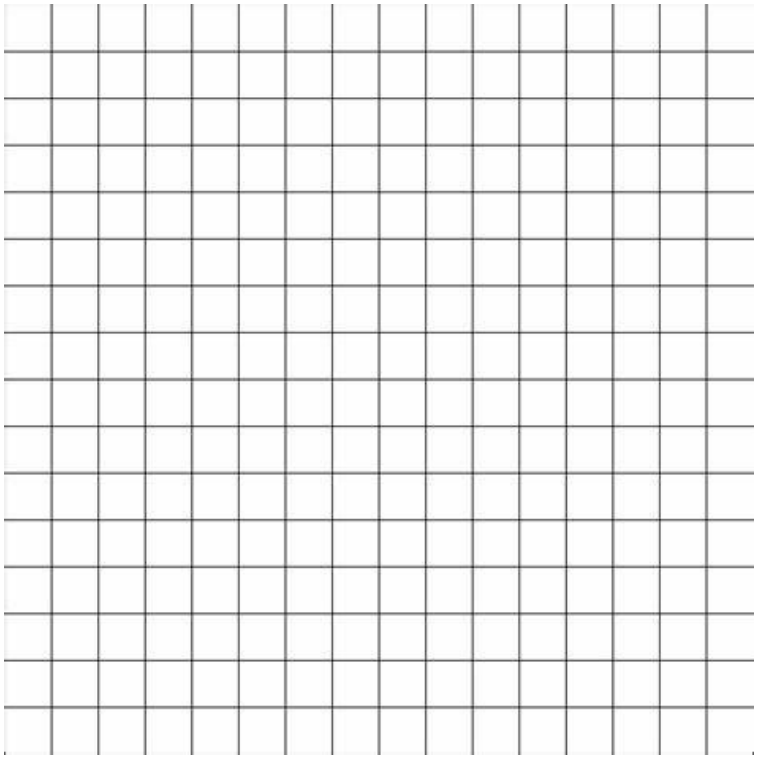
4. Solve $\begin{cases} y = x^2 + 4x - 2 \\ y = 3x + 5 \end{cases}$

AP Precalculus
Prerequisites Review #9 – Piecewise Functions

1. An electrician charges $250 for the first hour of work and $75 for each additional hour.

a. Generate the piecewise function to define the cost of hiring this electrician.

b. Graph the piecewise function that would illustrate this situation.



2. Find each of the following values given that f(x) = $\begin{cases} x^3 - 4 & when \quad x < -6 \\ 2x + 7 & when \quad -6 \leq x < 1 \\ \frac{x}{x^2+2} & when \quad x \geq 1 \end{cases}$

a. f(-6)	b. f(1)	c. f(6)	d. f(0)

3. Rewrite the function g(x) = |3x| + 2 as a piecewise function.

AP Precalculus
Prerequisites Review #10 – Exponential Functions

1. A certain bacteria population sample contains 500 bacteria and is known to grow by 20% every hour when left untreated.

   a. Write an equation to model the untreated bacteria population (y) after x hours.

   b. How many bacteria are in the sample after 5 hours? 7.5 hours?

AP Precalculus
Prerequisites Review #11 – Rules for Exponents

Simplify the following expressions. Write your answers with positive exponents only.

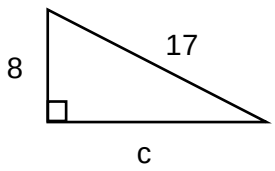
1. $(w^0x^5)^{-1}$	2. $c^{-3}(c^7)^4$
3. $(u^3v^5)^2(u^{-7}v^{-10})$	4. $\frac{x^3y^4}{w^7z^{-2}} * \frac{w^4y^{-3}}{x^5z^2}$

AP Precalculus
Prerequisites Review #12 – Radicals (square roots and cube roots)

1. Evaluate each of the following. Round to the nearest hundredth as needed.

a. $\sqrt{121}$	b. $\sqrt{175}$
c. $\sqrt[3]{125}$	d. $\sqrt[3]{8}$
e. $\sqrt[3]{36}$	

2. Solve for c.



3. Simplify each of the following expressions. Rationalize denominators as needed.

a. $\sqrt{50}$

b. $\frac{3\sqrt{6}}{4\sqrt{5}}$

c. $\sqrt{72a^5b^6}$

d. $3\sqrt{5} + 6\sqrt{20}$

e. $\frac{\sqrt{200x^{17}y^6}}{\sqrt{45x^{15}y^9}}$

AP Precalculus
Prerequisites Review #13 – Complex Numbers

Simplify the following expressions and rationalize denominators as needed.

1. $(3 + 7i) + (4 - 9i)$	2. $(3 + 7i) - (4 - 9i)$
3. $(3 + 7i)(4 - 9i)$	4. $\frac{10-2i}{3+4i}$