AP Precalculus Summer Assignment (2024-2025 School Year)

Name:_____

Welcome to AP Precalculus!

Going into AP Precalculus we will be building off prior concepts that you learned about in previous math courses. Sometimes this can be difficult if you have not reviewed these topics and are proficient in them. The college board has identified thirteen topics that you need proficiency in so that you may be successful in AP Precalculus. For your summer assignment, you will complete the following pages to review these topics. Try to work the problems on your own. If you are having issues with the questions, use the videos/solutions to help you understand/review the topic.

Each topic has a review video, posted solutions and a video of the solutions. They are linked on the pdf version of this document, and they are found at the following site: 2024 AP Precalculus Summer Assignment.

The summer assignment will be checked for completion on the first day of school. We will answer questions over the summer assignment during the first week of school in August and quiz over the summer assignment during that week as well.

We are excited about the opportunity for you to have success in an Advanced Placement class. We understand that for many of you this may be your first experience with an Advanced Placement class. We will spend a great deal of time preparing you for this throughout the year and are excited about this great opportunity! Please let us know if you have any questions or concerns.

-AP Precalculus Team

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Prerequisite #1: Linear Functions (Algebraic Manipulation):

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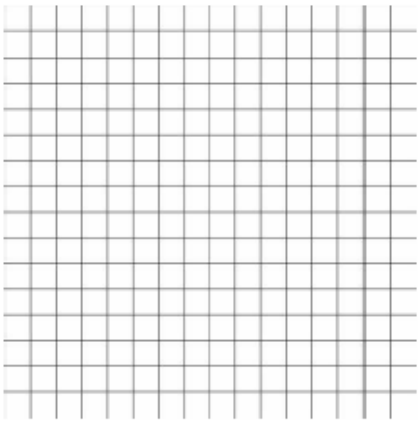
1. A line passes through $(7,4)$ and $(3,-4)$. Find the equation for the line in all three forms for linear equations

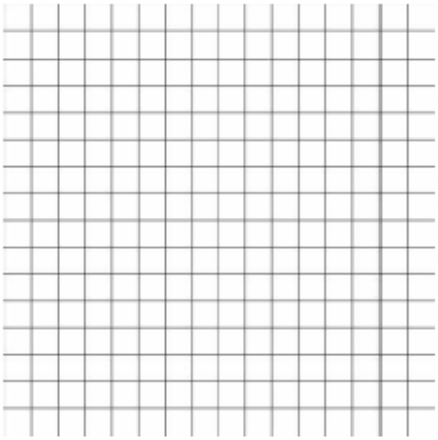
Slope-intercepts Form	Point-slope Form	Standard Form
$y = mx + b$	$y - y_1 = m(x - x_1)$	$Ax + By = C$

2. Sketch the graph of each line

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

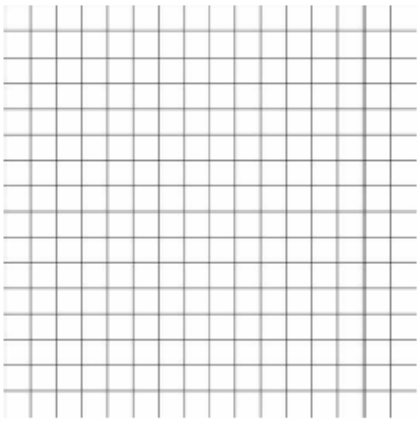


b. $y = -3x + 1$

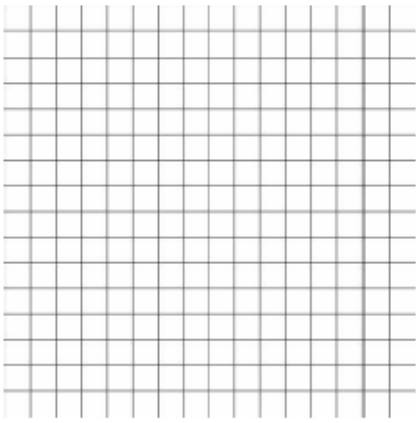


3. Sketch the graph of each line

a. $2x - 5y = 10$



b. $-4x + 3y = -24$



4. A recording studio charges a base fee for use for 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 question 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 the use of the studio?

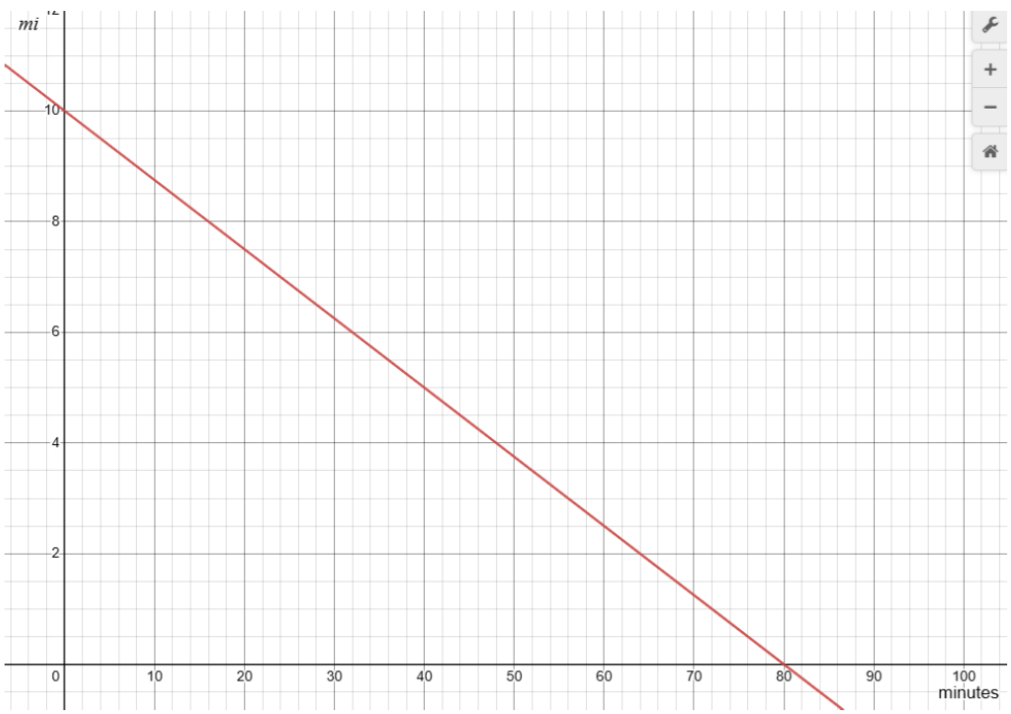
b. What is the base fee for the rental of the studio?

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.

How long did it take Jaden to reach the finish line? Explain.



How long (distance) was the race? Explain your reasoning.

Prerequisite Review #2: Linear Functions: Solving Equations and Inequalities

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1. Solve $4x - 9 < 7x + 15$	2. Solve $6(3x - 2) = -4(2x - 9)$
3. Solve $\frac{2}{3}x + 4 = \frac{4}{5}x - 3$	

Prerequisite Review #3: Polynomial Addition and Multiplication

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

Prerequisite Review #4: Factoring Quadratic Trinomials

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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. $15x^2 - 11x - 12$

Prerequisite Review #5: Solving Quadratic Equations and Inequalities (Scientific Calculator Allowed)

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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?

Prerequisite Review #6: Quadratic Functions: Algebraic Manipulations (Graphing Calculator is Allowed)

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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 the 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

Prerequisite Review #7: Solving Right Triangle Problems Using Trigonometry (Calculator Allowed)

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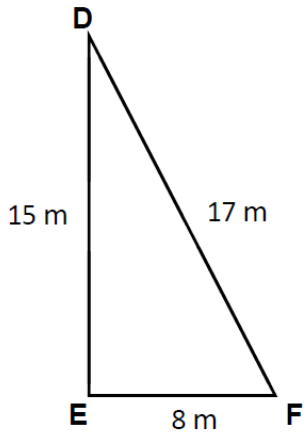
<table>
<tr><td rowspan="3">1. Use the diagram to identify each ratio.
 
</td><td>$sin\ F =$</td><td>$\sin D =$</td></tr>
<tr><td>$\cos F =$</td><td>$\cos D =$</td></tr>
<tr><td>$\tan F =$</td><td>$\tan D =$</td></tr>
<tr><td colspan="3">2. Using the diagram from #1 above, calculate the measure in degrees of $\angle F$.</td></tr>
<tr><td colspan="3">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?</td></tr>
<tr><td colspan="3">4. A kite is flying extended on 100 feet of string and is 30 feet high. What is the angle of elevation of the kite?</td></tr>
</table>

Prerequisite Review #8: Solving Systems of Equations in 2 or 3 Variables

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1. Solve $\begin{cases} x + 2y = 10 \\ y = 2x - 5 \end{cases}$	2. $\begin{cases} 5x + 7y = 6 \\ 10x - 3y = 46 \end{cases}$
3. $\begin{cases} 3x + y - 2z = -12 \\ 2x + 2y - 3z = -12 \\ 5x + 3y + 2z = 4 \end{cases}$	4. $\begin{cases} y = x^2 + 4x - 2 \\ y = 3x + 5 \end{cases}$

Prerequisite Review #9: Piecewise Functions

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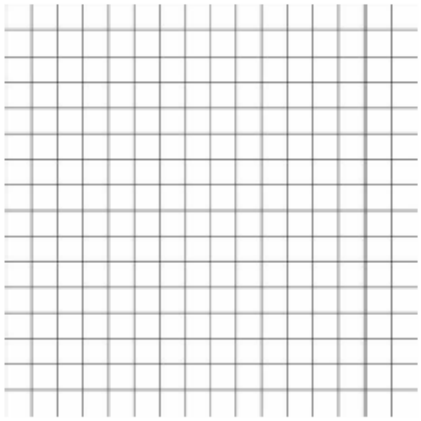
1. An electrician charges $250 for the first hour of work and $75 for each additional hour.

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.

Prerequisite Review #10: Exponential Functions (Calculator Allowed)

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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?

Prerequisite Review #11: Rules for Exponents

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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. $\frac{x^3y^4}{w^7z^{-2}} \cdot \frac{w^4y^{-3}}{x^5z^2}$

Prerequisite Review #12: Simplifying Radicals (square roots and cube roots) (Calculator Allowed)

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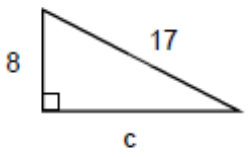
1. Evaluate each of the following. Write your answer as a decimal rounded to the 3 decimal places as needed.

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

Prerequisite Review #13: Complex Numbers

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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. $\frac{10-2i}{3+4i}$