Precalculus

Hello future Honors Precalculus Students!

I am looking forward to working with you in Honors Precalculus next year. Honors Precalculus is designed to prepare you for AP Calculus AB or BC. Because Honors Precalculus is designed as a pre-AP class, it is more challenging than the average "Honors" class, and it will demand deeper critical thinking than math courses you have taken previously. You will be consistently required to transfer your understanding of the material to a variety of problems, and you may find yourself out of your "comfort zone" on occasion.

Within Pre-Calculus, we have a large amount of material to cover, leaving us with very little time to review. Therefore, it is up to you to work through this summer assignment diligently and independently. The summer assignment covers math concepts you should be familiar with. Given this material is pre-requisites for the course, I intend to cover a few of these topics during the school year.

The required assignment must be completed on paper and submitted on the first day of class in the coming school year. Your summer work will be graded based on completion. During the first week of school, you will be given a test that assesses your knowledge of the work in this packet. I will provide feedback by request over the summer (see below). You need to be prepared for the class to be successful.

Instructions:

1. Complete the **fifty** problems identified in Sections A – E in the attached packet. This will be collected in class on the first day and graded based on completion.
2. If you get stuck, there are a variety of resources available online to help you. Independent study is a major requirement for high-level honors work, so you should try using Google, Khan Academy, or YouTube as your first strategy.
3. Contact me via email should you have any remaining unanswered questions.

Thank you!
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A. H Precalculus Pre-requisites: P.1 Real Numbers

Instructions: Do problems #1 – 19 ODD

SECTION P.1 EXERCISES

Exercise numbers with a gray background indicate problems that the authors have designed to be solved *without a calculator*.

In Exercises 1–4, find the decimal form for the rational number. State whether it repeats or terminates.
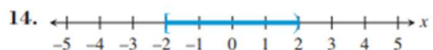
1. $-37/8$ 2. $15/99$

3. $-13/6$ 4. $5/37$

In Exercises 5–10, describe and graph the interval of real numbers.

5. $x \le 2$ 6. $-2 \le x < 5$

7. $(-\infty, 7)$ 8. $[-3, 3]$

9. x is negative.

10. x is greater than or equal to 2 and less than or equal to 6.

In Exercises 11–16, use an inequality to describe the interval of real numbers.
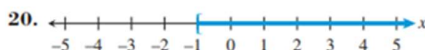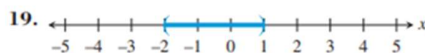
11. $[-1, 1)$ 12. $(-\infty, 4]$

13.

14.

15. x is between -1 and 2.

16. x is greater than or equal to 5.

In Exercises 17–22, use interval notation to describe the interval of real numbers.

17. $x > -3$ 18. $-7 < x < -2$

19.

20.

21. x is greater than -3 and less than or equal to 4.
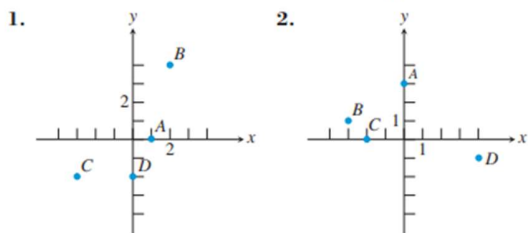
B. H Precalculus Pre-requisites: P.2 Cartesian Coordinate System

Instructions: Do problems #1 – 25 ODD

SECTION P.2 EXERCISES

Exercise numbers with a gray background indicate problems that the authors have designed to be solved *without a calculator*.

In Exercises 1 and 2, estimate the coordinates of the points.

1.

2.

In Exercises 3 and 4, name the quadrants containing the points.

3. (a) $(2, 4)$ (b) $(0, 3)$ (c) $(-2, 3)$ (d) $(-1, -4)$

4. (a) $\left(\frac{1}{2}, \frac{3}{2}\right)$ (b) $(-2, 0)$ (c) $(-1, -2)$ (d) $\left(-\frac{3}{2}, -\frac{7}{3}\right)$

In Exercises 5–8, evaluate the expression.

5. $3 + |-3|$ 6. $2 - |-2|$

7. $|(-2)3|$ 8. $\dfrac{-2}{|-2|}$

In Exercises 9 and 10, rewrite the expression without using absolute value symbols.

9. $|\pi - 4|$ 10. $|\sqrt{5} - 5/2|$

In Exercises 11–18, find the distance between the points.

11. $-9.3, 10.6$ 12. $-5, -17$

13. $(-3, -1), (5, -1)$ 14. $(-4, -3), (1, 1)$

15. $(0, 0), (3, 4)$ 16. $(-1, 2), (2, -3)$

17. $(-2, 0), (5, 0)$ 18. $(0, -8), (0, -1)$

In Exercises 19–22, find the area and perimeter of the figure determined by the points.

19. $(-5, 3), (0, -1), (4, 4)$

20. $(-2, -2), (-2, 2), (2, 2), (2, -2)$

21. $(-3, -1), (-1, 3), (7, 3), (5, -1)$

22. $(-2, 1), (-2, 6), (4, 6), (4, 1)$

In Exercises 23–28, find the midpoint of the line segment with the given endpoints.

23. $-9.3, 10.6$ 24. $-5, -17$

25. $(-1, 3), (5, 9)$

26. $(3, \sqrt{2}), (6, 2)$

27. $(-7/3, 3/4), (5/3, -9/4)$

28. $(5, -2), (-1, -4)$

C. H Precalculus Pre-requisites: P.3 Linear Equations & Inequalities

C.1. Instructions: Do problems #1 - 13 ODD

SECTION P.3 EXERCISES

Exercise numbers with a gray background indicate problems that the authors have designed to be solved *without a calculator*.

In Exercises 1–4, find which values of x are solutions of the equation.

1. $2x^2 + 5x = 3$

   (a) $x = -3$ (b) $x = -\dfrac{1}{2}$ (c) $x = \dfrac{1}{2}$

2. $\dfrac{x}{2} + \dfrac{1}{6} = \dfrac{x}{3}$

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

3. $\sqrt{1 - x^2} + 2 = 3$

   (a) $x = -2$ (b) $x = 0$ (c) $x = 2$

4. $(x - 2)^{1/3} = 2$

   (a) $x = -6$ (b) $x = 8$ (c) $x = 10$

In Exercises 5–10, determine whether the equation is linear in x.

5. $5 - 3x = 0$ 6. $5 = 10/2$

7. $x + 3 = x - 5$ 8. $x - 3 = x^2$

9. $2\sqrt{x} + 5 = 10$ 10. $x + \dfrac{1}{x} = 1$

In Exercises 11–24, solve the equation without using a calculator.

11. $3x = 24$ 12. $4x = -16$

13. $3t - 4 = 8$ 14. $2t - 9 = 3$

15. $2x - 3 = 4x - 5$ 16. $4 - 2x = 3x - 6$

17. $4 - 3y = 2(y + 4)$ 18. $4(y - 2) = 5y$

19. $\dfrac{1}{2}x = \dfrac{7}{8}$ 20. $\dfrac{2}{3}x = \dfrac{4}{5}$

C.2. Instructions: Do problems #35 - 39 ODD

Exercises 35–42, solve the inequality, and draw a number line graph the solution set.

35. $x - 4 < 2$ 36. $x + 3 > 5$

37. $2x - 1 \le 4x + 3$ 38. $3x - 1 \ge 6x + 8$

39. $2 \le x + 6 < 9$ 40. $-1 \le 3x - 2 < 7$

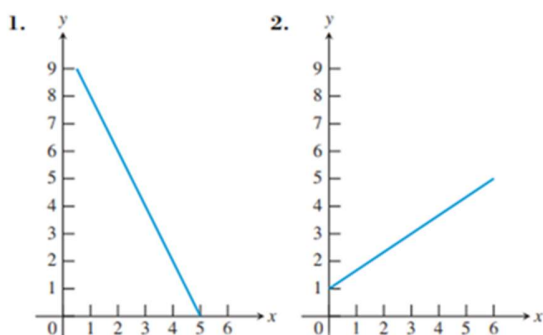41. $2(5 - 3x) + 3(2x - 1) \le 2x + 1$

42. $4(1 - x) + 5(1 + x) > 3x - 1$

D. H Precalculus Pre-requisites: Lines in the Plane

Instructions: Do problems #1 – 13 ODD

SECTION P.4 EXERCISES

Exercise numbers with a gray background indicate problems that the authors have designed to be solved *without a calculator*.

In Exercises 1 and 2, estimate the slope of the line.

1.

2.

In Exercises 3–6, find the slope of the line through the pair of points.

3. $(-3, 5)$ and $(4, 9)$ 4. $(-2, 1)$ and $(5, -3)$

5. $(-2, -5)$ and $(-1, 3)$ 6. $(5, -3)$ and $(-4, 12)$

In Exercises 7–10, find the value of x or y so that the line through the pair of points has the given slope.

	Points	Slope
7.	$(x, 3)$ and $(5, 9)$	$m = 2$
8.	$(-2, 3)$ and $(4, y)$	$m = -3$
9.	$(-3, -5)$ and $(4, y)$	$m = 3$
10.	$(-8, -2)$ and $(x, 2)$	$m = 1/2$

In Exercises 11–14, find a *point-slope form* equation for the line through the point with given slope.

	Point	Slope		Point	Slope
11.	$(1, 4)$	$m = 2$	12.	$(-4, 3)$	$m = -2/3$
13.	$(5, -4)$	$m = -2$	14.	$(-3, 4)$	$m = 3$

Instructions: Do problems #1 – 19 ODD

SECTION P.5 EXERCISES

In Exercises 1–6, solve the equation graphically by finding x-intercepts.
Confirm by using factoring to solve the equation.

1. $x^2 - x - 20 = 0$ **2.** $2x^2 + 5x - 3 = 0$

3. $4x^2 - 8x + 3 = 0$ **4.** $x^2 - 8x = -15$

5. $x(3x - 7) = 6$ **6.** $x(3x + 11) = 20$

In Exercises 7–12, solve the equation by extracting square roots.

7. $4x^2 = 25$ **8.** $2(x - 5)^2 = 17$

9. $3(x + 4)^2 = 8$ **10.** $4(u + 1)^2 = 18$

11. $2y^2 - 8 = 6 - 2y^2$ **12.** $(2x + 3)^2 = 169$

In Exercises 13–18, solve the equation by completing the square.

13. $x^2 + 6x = 7$ **14.** $x^2 + 5x - 9 = 0$

15. $x^2 - 7x + \dfrac{5}{4} = 0$ **16.** $4 - 6x = x^2$

17. $2x^2 - 7x + 9 = (x - 3)(x + 1) + 3x$

18. $3x^2 - 6x - 7 = x^2 + 3x - x(x + 1) + 3$

In Exercises 19–24, solve the equation using the quadratic formula.

19. $x^2 + 8x - 2 = 0$ **20.** $2x^2 - 3x + 1 = 0$

21. $3x + 4 = x^2$ **22.** $x^2 - 5 = \sqrt{3}x$

23. $x(x + 5) = 12$

24. $x^2 - 2x + 6 = 2x^2 - 6x - 26$