



Honors Algebra 2 to Honors Pre-Calculus

Summer Packet

Dear Students,

This packet is **optional, yet highly recommended**, because in Honors Precalculus, we do not review Chapters P and 1, which cover the necessary Algebra 1 and 2 material that you will need to be successful in this course. There are certain math skills that have been taught to you over the previous years that are necessary to be successful in Honors Pre-Calculus. Even though you may understand the Pre-Calculus concepts, without these skills you will consistently struggle to correctly solve problems next year. It can be frustrating for students when they are doing Pre-Calculus but are “tripped up” by the Algebra. This summer packet is intended to help you brush up and possibly relearn these topics.

If you get stuck, you can click on this [link](#), which will take you to some video lessons and note packets for Chapter P and Chapter 1. You can also use Khan Academy’s [“Get Ready for Precalculus”](#) program. They have a series of short quizzes that you can use to gauge your preparedness for precalculus topics, as well as videos and exercises to practice skills.

Don’t fake your way through these problems. We want to emphasize that the concepts in this packet will be used throughout the upcoming year and understanding these concepts will greatly aid in your success. We also recommend that you do not rely on your calculator. Almost all problems should be possible to solve using paper, pencil, and your brain.

Link to video lessons and note packets

<https://drive.google.com/drive/folders/1ILDfXNVWarvixfOLqByDkpukzxpGFR4n?usp=sharing>

Good Luck!

Mrs. Mackey, Mr. Hymes and Mrs. Kirsch

Topic #1 – Absolute Value

1) Use absolute value notation to describe: The distance between x and 16 is no more than 5.

Topic #2 – Exponents

For problems #2 & #3, simplify.

2) $\left(\frac{3x^2y^3}{xw^{-2}}\right)^3$ 3) $\left(\frac{x^{-5}y^2}{z^2}\right)^{-3}$

For problems #4 - #8, evaluate.

4) $4x^{-2}$ for $x = 3$ 5) $\frac{1}{81^{-1/2}}$ 6) $\left(\frac{8}{27}\right)^{-2/3}$ 7) $\left(\frac{1}{64}\right)^{-2/3}$ 8) $\frac{1}{27^{-1/3}}$

Topic #3 – Simplify Radicals

For problems #9 - #10, rationalize the denominator.

9) $\frac{3}{\sqrt{7}+2}$ 10) $\frac{5}{7-\sqrt{2}}$

For problems #11 - #12, simplify by rationalizing the denominator.

11) $\frac{2}{\sqrt[3]{2x}}$ 12) $\frac{4}{\sqrt[3]{x}}$

For problems #13 - #17, simplify.

13) $3\sqrt{\sqrt{3x+1}}$ 14) $3\sqrt[3]{4x^5y^3} + 7x\sqrt[3]{32x^2y^6}$ 15) $4\sqrt{9x} - 2\sqrt{4x} + 7$

16) $7\sqrt{25xy^2} - 4\sqrt{75xy^2} + 2\sqrt{12xy^2}$ 17) $2x^2y\sqrt[3]{2x} + 7x^2\sqrt[3]{2xy^3} - 4\sqrt[3]{16x^7y^3}$

Topic #4 – Polynomial Multiplication and Factoring

For problems #18 - #19, multiply.

18) $(x-2)(x+2)(x^2+4)$ 19) $[(x+1)-y][(x+1)+y]$

Expand.

20) $(3+2y)^3$

For problems #21 - #24, factor completely.

21) $y^3 - (x+1)^3$ 22) $2rs + 3rst - 8r - 12rt$ 23) $3rv - 2vt - 6rs + 4st$ 24) $3xz + 2yz - 6xw - 4yw$

For problems #25 - #27, factor completely. Eliminate negative exponents in the final answer.

25) $6x(2x+3)^{-4} - 24x^2(2x+3)^{-5}$ 26) $(3x+2)^{-3} - 9x(3x+2)^{-4}$ 27) $2x(4x-1)^{-2} + (4x-1)^{-1}$

Topic #5 – Operations with Rational Expressions

For problems #28 - #35, perform the indicated operation, then simplify if possible.

28) $\frac{x^2-5x+4}{x^2+4} \cdot \frac{x+2}{x^2+3x-4}$ 29) $\frac{x^2+4x+4}{x-2} \cdot \frac{2-x}{3x+6}$ 30) $\frac{4x-16}{5x+15} \div \frac{4-x}{2x+6}$ 31) $\frac{x^2-2x-63}{x+1} \div \frac{9-x}{x^2+x}$

32) $\frac{3}{x} - \frac{9}{x+1}$ 33) $\frac{4}{x+2} + \frac{7}{x-3}$ 34) $\frac{3}{x^2+2x+1} - \frac{1}{x+1}$ 35) $\frac{3}{x^2+x-2} + \frac{x}{x^2-x-6}$

Topic #6– Operations with Rational Exponents/Complex Fractions

For problems #36 - #41, simplify.

Eliminate negative exponents and rationalize the denominator in the final answer.

36)
$$\frac{(3x+5)^{1/3} - \frac{x}{(3x+5)^{2/3}}}{(3x+5)^{2/3}}$$

37)
$$\frac{(7x+2)^{1/3} - \frac{x}{(7x+2)^{2/3}}}{(7x+2)^{2/3}}$$

38)
$$\frac{\sqrt{1+x} - (x/\sqrt{1+x})}{1+x}$$

39)
$$\frac{(3/\sqrt{x+2}) - \sqrt{x+2}}{5\sqrt{x+2}}$$

40)
$$\frac{(5x-2)^{1/2}(2) - 2x\left(\frac{1}{2}\right)(5x-2)^{-1/2}(5)}{(\sqrt{5x-2})^2}$$

41)
$$\frac{4}{3}x^3(7x+1)^{-2/3} + (7x+1)^{1/3}(12x^2)$$

Topic #7– Solve EquationsFor problems #40 - #41, solve for x .

42) $\sqrt{15x+4} = 4 - \sqrt{2x+3}$

43) $|x^2 - 2x| = 2x - 3$

Topic #8– Solve Inequalities

For problems #42 - #44, solve the inequality. State the answer in interval notation.

44)
$$\frac{4}{x+1} \leq \frac{3}{x+2}$$

45)
$$\frac{2}{x-1} \leq \frac{3}{x+1}$$

46)
$$\frac{2}{x+2} \geq \frac{3}{x-1}$$

Topic #9– Function CompositionFor problems #47 - #50, find $(f \circ g)(x)$ using the given $f(x)$ and $g(x)$.

47) $f(x) = \frac{1}{x^2}, g(x) = \sqrt{x^2 + 4}$

48) $f(x) = x^2, g(x) = \sqrt{x^2 - 1}$

49) $f(x) = \frac{x}{\sqrt{x^2 + 1}}, g(x) = x^3$

50) $f(x) = \frac{x^2}{x^2 + 1}, g(x) = \sqrt{x^2 + 1}$

Topic #10– DomainFor problems #51 - #54, determine the domain of $f \circ g$. State the domain in interval notation.

51) $f(x) = \sqrt{x}, g(x) = x^2 + 4$

52) $f(x) = \frac{1}{x^2 - 1}, g(x) = x + 3$

53) $f(x) = \frac{1}{\sqrt{x}}, g(x) = x + 3$

54) $f(x) = \frac{1}{x^2 - 1}, g(x) = 1 - x$

Topic #11– Inverse and Function CompositionFor problems #55 - #62, use the given $f(x)$, find $f^{-1}(x)$ and state the domain of the inverse in interval notation.

55) $f(x) = \sqrt{2x - 1}$

56) $f(x) = 3x^3 - 1$

57) $f(x) = 2x^2 + 1$ for $x \geq 0$

58) $f(x) = 2x^5$

For problems #59 - #62, find the indicated quantity using the given $f(x)$ and $g(x)$.

- 59) $f(x) = x + 1$ and $g(x) = 1 - 2x$ Find $(g^{-1} \circ f^{-1})(x)$
- 60) $f(x) = 3 - x$ and $g(x) = x^3$ Find $(f^{-1} \circ g^{-1})(x)$
- 61) $f(x) = x + 1$ and $g(x) = 1 - 2x$ Find $(f^{-1} \circ g^{-1})(2)$
- 62) $f(x) = 3 - x$ and $g(x) = x^3$ Find $(g^{-1} \circ f^{-1})(-5)$

Additional Topics

63) Let the function f be defined by the equation $y = f(x)$, where x and $f(x)$ are real numbers. Find the domain of the function $f(x) = \sqrt{16x^2 - 4}$ (interval notation).

64) Find the difference quotient and simplify your answer.

Given: $f(y) = -4y^2 + 6y$, Find: $\frac{f(1+h) - f(1)}{h}, h \neq 0$

65) Use a graphing utility to graph the function and approximate (to two decimal places) any relative minimum or relative maximum values.

$$f(x) = x^3 + 3x^2 + x - 4$$

66) Determine whether the function is even, odd, or neither.

$$f(x) = 7x^{\frac{3}{4}}$$

67) The table shows the average monthly cost C (\$) of basic cable TV from 2000 to 2008, where t represents the year, with $t=0$ corresponding to 2000. Find the linear model for the data. Use the model to estimate in which year the average monthly cost will reach \$50.

| | | | | | | | | | |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| year | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| cost | 30.37 | 32.87 | 34.71 | 36.59 | 38.14 | 39.63 | 41.17 | 42.72 | 44.28 |

Honors Pre-Calculus Summer Packet

Key

Topic #1

1) $|x - 16| \leq 5$

Topic #2

2) $27w^6x^3y^9$ 3) $\frac{x^{15}z^6}{y^6}$ 4) $\frac{4}{9}$ 5) 9 6) $\frac{9}{4}$ 7) 16 8) 3

Topic #3

9) $\sqrt{7} - 2$ 10) $\frac{35 + 5\sqrt{2}}{47}$ 11) $\frac{\sqrt[3]{4x^2}}{x}$ 12) $\frac{4\sqrt[3]{x^2}}{x}$ 13) $\sqrt[6]{3x+1}$
 14) $(3+14y)xy\sqrt[3]{4x^2}$ 15) $8\sqrt{x} + 7$ 16) $35|y|\sqrt{x} - 16|y|\sqrt{3x}$ 17) $x^2y\sqrt[3]{2x}$

Topic #4

18) $x^4 - 16$ 19) $x^2 + 2x + 1 - y^2$ 20) $27 + 54y + 36y^2 + 8y^3$
 21) $(y-x-1)(y^2 + xy + y + x^2 + 2x + 1)$ 22) $r(s-4)(2+3t)$ 23) $(v-2s)(3r-2t)$
 24) $(3x+2y)(z-2w)$ 25) $\frac{-6x(2x-3)}{(2x+3)^5}$ 26) $\frac{-2(3x-1)}{(3x+2)^4}$ 27) $\frac{(6x-1)}{(4x-1)^2}$

Topic #5

28) $\frac{x^2 - 2x - 8}{(x^2 + 4)(x + 4)}$ 29) $-\frac{x+2}{3}$ 30) $-\frac{8}{5}$ 31) $-x(x+7)$ 32) $\frac{3(1-2x)}{x(x+1)}$
 33) $\frac{11x+2}{(x+2)(x-3)}$ 34) $\frac{2-x}{x^2+2x+1}$ 35) $\frac{x^2+2x-9}{(x-3)(x+2)(x-1)}$

Topic #6

36) $\frac{(2x+5)(3x+5)^{2/3}}{(3x+5)^2}$ 37) $\frac{(6x+2)(7x+2)^{2/3}}{(7x+2)^2}$ 38) $\frac{\sqrt{1+x}}{(1+x)^2}$ 39) $\frac{1-x}{5(x+2)}$
 40) $\frac{(5x-4)(5x-2)^{1/2}}{(5x-2)^2}$ 41) $\frac{4x^2(64x+9)(7x+1)^{1/3}}{3(7x+1)}$

Topic #7

42) $\frac{11}{169}$ 43) $\sqrt{3}, 3$

Topic #8

44) $(-\infty, -5] \cup (-2, -1)$ 45) $(-1, 1) \cup [5, \infty)$ 46) $(-\infty, -8] \cup (-2, 1)$

Topic #9

47) $\frac{1}{x^2+4}$ 48) $x^2 - 1$ 49) $\frac{x^3\sqrt{x^6+1}}{x^6+1}$ 50) $\frac{x^2+1}{x^2+2}$

Topic #10

51) $(-\infty, \infty)$ 52) $(-\infty, -4), (-4, -2), (-2, \infty)$ 53) $(-3, \infty)$ 54) $(-\infty, 0), (0, 2), (2, \infty)$

Topic #11

55) $\frac{1}{2}(x^2+1)$ 56) $\frac{\sqrt[3]{9(x+1)}}{3}$ 57) $f^{-1}(x) = \frac{\sqrt{2(x-1)}}{2}$ 58) $\frac{\sqrt[5]{16x}}{2}$
 $D: [0, \infty)$ $D: (-\infty, \infty)$ $D: [1, \infty)$ $D: (-\infty, \infty)$
 59) $\frac{2-x}{2}$ 60) $3 - \sqrt[3]{x}$ 61) $-\frac{3}{2}$ 62) 2

Additional Topics

63) $(-\infty, \frac{-1}{2}] \cup [\frac{1}{2}, \infty)$ 64) $-2-4h$ 65) Relative Max: -1.91 , Relative Min: -4.09
 66) neither 67) 2012