Honors Algebra II Prerequisite Packet 2019-2020

Name:_________________

Period:_____

Rationale: The following topics and problems are prerequisites for Honors Algebra II. All these topics have been covered in your previous math classes, mainly Algebra I. Due to the year gap between Algebra I and Algebra II, because of Geometry, it may have been a while since you have seen these types of problems. Our hope is, that by reviewing this packet you will remember the skills you mastered in Algebra I. As you begin the school year, these skills will be the building blocks to success in Honors Algebra II.

Directions: Bring the completed problems to class to discuss and review the solutions. Please record your work in a manner that you can reference your solution process easily. If you get stuck, forgot or need more help on a topic, please visit https://cpm.org/cca-additional-resources#parentguide Each topic is listed by a chapter and section number. Within each section there are definitions, sample problems (with solutions) and additional practice.

Ch.3: Laws of Exponents (3.1.1 and 3.1.2)

Simplify each expression. Final answers should contain no parentheses or negative exponents.

1. $y^5 \bullet y^7$
2. $\dfrac{m^8}{m^3}$
3. $\dfrac{15x^2y^5}{3x^4y^5}$
4. $\left(\dfrac{4}{x^2}\right)^3$
5. $\left(\dfrac{6x^8y^2}{12x^3y^7}\right)^2$
6. $(2x)^{-3}$
7. $\left(\dfrac{2x}{3}\right)^{-2}$
8. $\dfrac{(2x^5y^3)^3(4xy^4)^2}{8x^7y^{12}}$

Ch.3: Multiplying Binomials (3.2.2 through 3.2.4)

Multiply

1. $(3x+2)(2x+7)$
2. $(2x)(x-1)$
3. $(3x-5)(3x+5)$
4. $(4x+1)^2$
5. $(x+2)(x+y-2)$

Ch.3: Solving Equations (3.3.1)

Solve each equation for the indicated variable.

1. $(x+3)(x+4)=(x+1)(x+2)$ for *x*.
2. $|3-2x|=7$ for *x*.
3. $V=\pi r^3$ for *r*.
4. $3x-2y=12$ for *y*.

Ch. 4: Solving Systems (4.1.1, 4.2.1, 4.2.3 through 4.2.5)

1. $y=-3x$, $4x+y=2$
2. $3x+5y=23$, $y=x+3$
3. $y=2x-3$, $-2x+y=1$
4. $a=2b+4$, $b-2a=16$
5. $y-x=4$, $2y+x=8$
6. $-4x+6y=-20$, $2x-3y=10$
7. $6x-y=4$, $6x+3y=-16$
8. $3x+2y=12$, $5x-3y=-37$

Ch. 5: Sequences (5.1.1 through 5.1.3, and 5.2.1 through 5.2.3)

Part I

1. For this sequence each term is $\frac{1}{5}$ of the previous one. Work forward and backward to find the missing terms:

$$\_\_\_\_\_ , \_\_\_\_\_\_\_, \frac{2}{3}, \_\_\_\_\_\_\_, \_\_\_\_\_\_\_$$

2. The 30th term of a sequence is 42. If each term in the sequence is four greater than the previous number, what is the first term?

3. Davis loves to ride the mini-cars at the amusement park but riders must be no more than 125 cm tall. If on his fourth birthday he is 94 cm tall and grows approximately 5.5 cm per year, at what age will he no longer be able to go on the mini-car ride?

Part II

(4 & 5) Identify each of the following sequences as arithmetic or geometric. Then write the equation that gives the terms of the sequence.

4. 43 , 39, 35, 31, 27, ...

5. $\frac{2}{3}, \frac{1}{2}, \frac{3}{8}, \frac{9}{32}, \frac{27}{128}$

6. Every year since 1548, the average height of a human male has increased slightly. The new height is 100.05% of what it was the previous year. If the average male's height was 54 inches in 1548, what was the average height of a male in 2008?

Ch. 7: Exponential Functions (7.1.1 through 7.1.6)

Write an equation that represents the function in each table.

1.

# Years	House's value
1	138000
2	126960
3	116803.20
4	107458.94
5	98862.23
6	90953.25
7	83676.99
8	76982.83
9	70824.20

2.

Week	Weight of Bacterial Culture (g)
1	756.00
2	793.80
3	833.49

Ch. 7: Curve Fitting (7.2.2 through 7.2.3)

For each of the following pairs of points, find the equation of an exponential function with an asymptote $y = 0$ that passes through them.

1. (1,12) and (3,48)

2. (-2, 351.5625) and (3,115.2)

Ch. 8: Factoring Quadratics (8.1.1 through 8.1.5)

Use **generic rectangles** and not the Quadratic Formula, to completely factor each quadratic expression.

1. $x^2 + 7x - 30$

2. $x^2 - 15x + 56$

3. $12x^2 - 19x + 5$

4. $3x^2 + 21x + 36$

Although most factoring problems can be done with generic rectangles, there are two special factoring patterns that, if recognized, can be done by sight. The two patterns are known as the **Difference of Squares** and **Perfect Square Trinomials**. The general patterns are as follows:

Difference of Squares: $a^2x^2 - b^2y^2 = (ax + by)(ax - by)$

Perfect Square Trinomial: $a^2x^2 + 2abxy + b^2y^2 = (ax + by)^2$

Attempt to factor the following quadratic expressions without a generic rectangle but utilizing the note above.

5. $9x^2 - 121$

6. $36x^2 - 60x + 25$

Ch. 8: Zero Product Property (8.2.2 through 8.2.3)

The graph of a quadratic function, a parabola, is a symmetrical curve. Its highest or lowest point is called the vertex. The graph is created by using the equation $y = ax^2 + bx + c$. Students have been graphing parabolas by substituting values for x and solving for y. This can be a tedious process, especially if an appropriate range of x-values is not known. If only a quick sketch of the parabola is needed, one possible method is to find the x-intercepts first, then find the vertex and/or the y-intercept. To find the x-intercepts, substitute 0 for y and solve the quadratic equation, $0 = ax^2 + bx + c$. Students will learn multiple methods to solve quadratic equations in this chapter and in Chapter 9. One method to solve quadratic equations uses the Zero Product Property, that is, solving by factoring. This method uses two ideas:

(1) When the product of two or more numbers is zero, then one of the numbers must be zero.

(2) Some quadratic expressions can be factored into the product of two binomials.

For additional information see the Math Notes box in Lesson 8.2.2.

Find the x-intercepts of each of the following quadratic functions.

1. $y = x^2 + 6x + 8$

2. $f(x) = 2x^2 + 7x - 15$

Solve for x.

3. $2 + 9x = 5x^2$

4. $2x^2 - 5x = 3$

Ch. 8: Completing the Square (8.2.5)

In Lesson 8.2.3, students found that if the equation of a parabola is written in **graphing form**: $f(x) = (x - h)^2 + k$ then the vertex can easily be seen as (h, k). For example, for the parabola $f(x) = (x + 3)^2 - 1$ the vertex is $(-3, -1)$. Students can then set the function equal to zero to find the x-intercepts: solve $0 = (x + 3)^2 - 1$ to find the x-intercepts. For help in solving this type of equation, see the Lesson 8.2.3 Resource Page, available at www.cpm.org. Students can set $x = 0$ to find the y-intercepts: $y = (0 + 3)^2 - 1$.

When the equation of the parabola is given in standard form: $f(x) = x^2 + bx + c$, then using the process of **completing the square** can be used to convert standard form into graphing form. Algebra tiles are used to help visualize the process.

For additional examples and practice with graphing quadratic functions, see the Checkpoint 11 materials at the back of the student textbook.

Complete the square to write each equation in graphing form. Then state the vertex.

1. $f(x) = x^2 + 6x + 7$

2. $f(x) = x^2 + 10x + 2$

Ch. 9: The Quadratic Formula (9.1.2 and 9.1.3)

When a quadratic equation is not factorable, another method is needed to solve for x. The Quadratic Formula can be used to calculate the roots of a quadratic function, that is, the x-intercepts of the parabola. The Quadratic Formula can be used with any quadratic equation, factorable or not. There may be two, one, or no solutions, depending on whether the parabola intersects the x-axis twice, once, or not at all.
The solution(s) to any quadratic equation $ax^2 + bx + c = 0$ are:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

The $\pm$ symbol is read as "plus or minus." It is shorthand notation that tells you to calculate the formula twice, once with + and again with – to get both x-values.

To use the formula, the quadratic equation must be written in *standard form*: $ax^2 + bx + c = 0$. This is necessary to correctly identify the values of a, b, and c. Once the equation is in standard form and equal to 0, a is the coefficient of the x^2-term, b is the coefficient of the x-term and c is the constant term.

For additional information, see the Math Notes boxes in Lessons 9.1.1 through 9.1.4 and 10.2.4.

Solve each equation by using the Quadratic Formula.

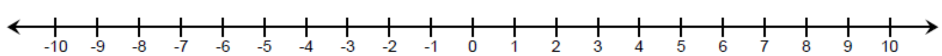
1. $x^2 - 5x + 3 = 0$

2. $7x = 10 - 2x^2$

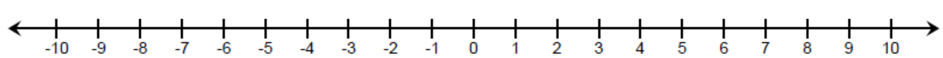
Ch. 9: Solving one-variable inequalities (9.2.1 and 9.2.2)

Solve each inequality.

1. $2x - 7 \leq 5 - 4x$



2. 2. $3(5 - x) > 7x - 1$

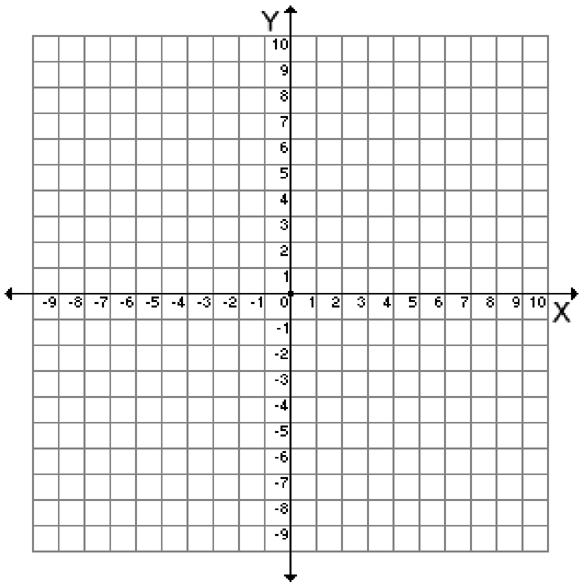


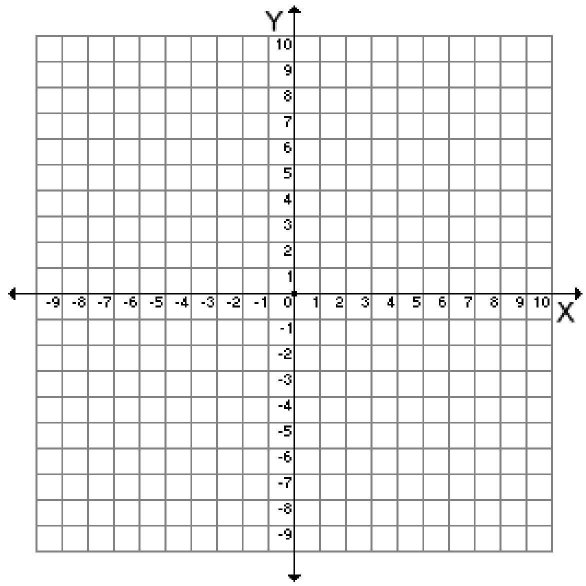
Ch. 9: Solving two-variable inequalities (9.3.1 and 9.3.2)

Graph the solutions to each of the following inequalities on a separate set of axes.

1. $y > \frac{2}{3}x + 8$

2. $3x + 2y \geq 12$





Ch. 9: Solving systems of inequalities (9.4.1 and 9.4.3)

Graph the solutions to each of the following pairs of inequalities on a separate set of axes.

1. $y < -x + 5$
   $y \geq x^2 + 1$

2. $y < -x^2 + 5$
   $y \geq |x| - 1$