Summer Work for Mr. Killheffer's Precalculus Classes

The following pages are a review of the materials covered in Algebra I and Algebra II.

You need to have a handle on this material prior to starting Precalculus.

If you have signed up for Precalculus Honors, do all of the problems.

If you have signed up for Precalculus CP do just the odd-numbered problems.

Please use the Internet as a resource if you do not know how to do any of the problems. A couple of resources you may find helpful are

Khanacademy.org

Larsonprecalculus.com

but feel free to use any site you find helpful. There are also many helpful Youtube videos out there. Youtube is also a great resource to find out how to do anything you want to do on your graphing calculator.

In all of my classes, I expect that if you don't know how to do something that you do something to get it. You have many resources to find solutions. Over the summer your primary resource is the Internet.

The summer work is due the first day of class. I will spend a day or two answering questions and then we will have a test to see how well prepared you are for the class.

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2.2 Properties of Exponents

Evaluate each expression.

1. $\left(\frac{4}{5}\right)^2$ _____
2. $(5 \cdot 2)^2$ _____
3. 7^0 _____
4. 7^{-2} _____
5. $\left(\frac{-2}{3}\right)^3$ _____
6. $\left(\frac{1}{5}\right)^{-3}$ _____
7. $36^{\frac{3}{2}}$ _____
8. $125^{\frac{4}{3}}$ _____
9. $-(4 \cdot 5)^2$ _____
10. $(6^2)^{\frac{-3}{2}}$ _____
11. $64^{\frac{-2}{3}}$ _____
12. $100^{\frac{-5}{2}}$ _____
13. $(-3 \cdot 2^2)^2$ _____
14. $(3^0 \cdot 5^{-1})^{-3}$ _____

Simplify each expression, assuming that no variable equals zero. Write your answer with positive exponents.

15. $(-a)^3(-a)^5(-a^4)$ _____
16. $\frac{x^{-3}y^{-1}}{y^2}$ _____
17. $(5r^3s^4)(-3rs^2)(-rs)$ _____
18. $x^{\frac{2}{3}} \cdot x^{\frac{4}{9}}$ _____
19. $\left(x^{\frac{3}{7}}\right)^{14}$ _____
20. $\left(x^{\frac{1}{3}}\right)^{\frac{-3}{5}}$ _____
21. $\left(\frac{x^{\frac{-4}{3}}}{x^{\frac{-2}{3}}}\right)^4$ _____
22. $\left(\frac{3a^{-2}b^3}{2a^4b^5}\right)^{-5}$ _____
23. $\left((100x^5)^{\frac{-1}{2}}\right)^{-4}$ _____
24. $\left(\frac{m^{-3}n^{-4}}{m^{-2}n^{-5}}\right)^{\frac{-2}{3}}$ _____
25. $(r^4s^2)(r^2s^3)^5$ _____
26. $x^2(6x^3 + 3x^{-2} - x + 10)$ _____
27. $(x^{-6})^2(-x^2)^{-3}$ _____
28. $a^{-2}y^{-2}(ay)^4$ _____
29. $\left(\frac{20x^5}{x^3}\right)^{-2}$ _____
30. $\left[y^{\frac{10}{5}} \cdot y^{\frac{3}{5}}\right]^{-10}$ _____

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1.3 Linear Equations In Two Variables

Write an equation for the line containing the indicated points.

1. $\left(4, \frac{1}{2}\right)$ and $\left(0, \frac{5}{2}\right)$ _____

2. $(-2, -4)$ and $(-1, -8)$ _____

3. $\left(\frac{3}{4}, \frac{-2}{3}\right)$ and $\left(\frac{1}{2}, \frac{4}{3}\right)$ _____

4. $\left(\frac{-1}{5}, 0\right)$ and $(-6, 0)$ _____

Write an equation in slope-intercept form for the line that has the indicated slope, m, and contains the given point.

5. $m = -5$ and $(-2, -1)$ _____

6. $m = \frac{3}{4}$ and $(-15, 5)$ _____

7. $m = \frac{-1}{2}$ and $\left(\frac{2}{3}, 0\right)$ _____

8. $m = 0$ and $\left(\frac{7}{4}, \frac{-11}{4}\right)$ _____

9. $m =$ undefined and $(-2, 1)$ _____

10. $m =$ undefined and $(0, 0)$ _____

Write the equations in slope-intercept form for the line that contains the given point and is (a) parallel and (b) perpendicular to the given line.

11. $(5, 0)$; $x - 3y = 6$ _____ _____

12. $(3, -1)$; $x - y = 4$ _____ _____

13. $(2, 1)$; $2x + 2y = 5$ _____ _____

14. $\left(0, \frac{-1}{2}\right)$; $2x - 3y = 12$ _____ _____

Write an equation for the line that is perpendicular to each equation.

15. $3x + 2y = 8$ at the y-intercept

_____

16. $-2x + 5y = -20$ at the x-intercept

_____

Use the slope to determine whether the following lines are parallel, perpendicular or neither.

17. l_1 contains $(2, 1)$ and $(-1, 4)$
l_2 contains $(3, -2)$ and $(1, 0)$

_____

18. l_1 contains and $\left(\frac{1}{2}, 2\right)$ and $\left(\frac{1}{2}, -3\right)$
l_2 contains $(0, -4)$ and $(1, 1)$

_____

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1.5 Scatter Plots and Least-Squares Lines

For each question, state whether the statement is true or false.

1. A correlation coefficient can be equal to -2. _____

2. If the slope of a least-squares line is negative, the correlation coefficient is negative. _____

3. A data set with a correlation coefficient of -0.72 has a stronger linear relationship than a data set with a correlation coefficient of 0.64. _____

Use a graphing calculator to create a scatter plot of the data in each table. Describe the correlation as positive, negative, or no correlation. Then find an equation for the least-squares line.

4.

x	4	3	5	6	8	8	5	2	1	7	9	7	2	1	3	4	7	5	2	1
y	6	5	9	10	13	14	10	3	2	12	17	11	4	1	5	7	11	9	2	1

_____

5.

x	8	10	6	2	5	10	3	9	12	10	10	8	6	1	2	4	3	3	5	8
y	1	10	2	2	6	1	9	8	7	7	7	5	4	2	3	6	8	11	8	10

_____

6. The average points per game for Larry Bird for a 10-year period is shown below.

1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
21.3	21.2	22.9	23.6	24.2	28.7	25.8	28.1	29.9	19.3

a. Enter the data in a graphics calculator and find the equation of the least-squares line. _____

b. Find the correlation coefficient, r, to the nearest hundredth. _____

c. Use the least-squares line to predict Bird's scoring average in 1990. _____

d. Explain using the correlation coefficient whether your prediction for Bird's 1990 scoring average is accurate or inaccurate, given the fact that Bird's actual scoring averages was 24.3 points per game in 1990.

_____

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1.6 Introduction to Solving Equations

Solve each equation.

1. $7n + 10 = 3n + 2$ _____
2. $2(y + 1) = y - 8$ _____
3. $3(m - 2) - 5 = 6 - 2(m - 4)$ _____
4. $2x - \frac{2}{3} = -3x + \frac{7}{3}$ _____
5. $6(a + 2) - 8a = 10a + 9$ _____
6. $\frac{1}{3}x - \frac{7}{3} = \frac{1}{6}$ _____
7. $\frac{m}{6} + \frac{m}{4} + \frac{m}{3} = 1$ _____
8. $24 + 2(x + 4) = 2(x + 3)$ _____

Solve each equation by graphing. Give answers to the nearest hundredth.

9. $6.46 + 2.3x = 1.24x - 7$

_____

10. $-2.05x + 1.8(x - 3) = 6.2$

_____

11. $0.38 - 0.66x + 0.72x - 0.54 = 0$

_____

12. $1.84 - 0.23x = 0.5(-0.46x + 3.68)$

_____

Solve each literal equation for the variable indicated.

13. $A = \frac{1}{2}h(b_1 + b_2)$ for b_1

_____

14. $P = 2l + 2w$ for l

_____

15. $A = P(1 + RT)$ for T

_____

16. $V = V_o + b(s + s_o)$ for s

_____

17. $A = 2\pi r(r + h)$ for h

_____

18. $A = \frac{1}{2}d_1 d_2$ for d_1

_____

Write and solve an appropriate equation for each situation.

19. The measure of one complementary angle is 20° more than twice the measure of angle x. Find the measure of angle x. _____

20. Carson charges $18.75 per hour to fix computers, plus a flat service fee of $30. Carson billed Miss Belkis $255 for a job. How many hours did Carson spend fixing her computer? _____

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5.3 Factoring Quadratic Expressions

Factor each expression.

1. $-12 - 3x$ _____
2. $-5x^2 - 10x$ _____
3. $6x^3 - 18x^2$ _____
4. $2x(3x + 4) - 3(3x + 4)$ _____
5. $-2x^2 - 5x$ _____
6. $-2x(x + 7) - (x + 7)$ _____

Factor each quadratic expression.

7. $x^2 + 5x + 4$ _____
8. $x^2 + x - 6$ _____
9. $x^2 + 3x - 18$ _____
10. $x^2 - 12x + 35$ _____
11. $x^2 - x - 2$ _____
12. $x^2 + 11x + 10$ _____
13. $x^2 - 25x + 100$ _____
14. $x^2 + 10x - 24$ _____
15. $x^2 - 12x + 32$ _____
16. $x^2 + 21x + 54$ _____
17. $2x^2 - x - 15$ _____
18. $3x^2 + 11x - 4$ _____
19. $8x^2 + 10x - 3$ _____
20. $25x^2 + 10x - 3$ _____
21. $9x^2 - 15x - 14$ _____
22. $12x^2 + 17x - 5$ _____

Solve each equation by factoring and applying the Zero-Product Property.

23. $x^2 - 225 = 0$ _____
24. $x^2 - 5x + 6 = 0$ _____
25. $x^2 + 7x = -10$ _____
26. $x^2 = 14x + 5$ _____
27. $-x^2 + 3x = -4$ _____
28. $x^2 - 8x = -16$ _____
29. $2x^2 - 32 = 0$ _____
30. $2x^2 + 14x + 20 = 0$ _____
31. $x^2 - 64 = 0$ _____
32. $4x^2 - 16 = 0$ _____

16. Joel and Wyatt toss a baseball. The height in feet, of the baseball, above the ground is given by $h(t) = -16t^2 + 55t + 6$, where t represents the time in seconds after the ball is thrown. How long is the ball in the air? _____

17. A rocket is launched into the air. The height in feet, of the rocket, above the ground is given by $h(t) = -4.9t^2 + 220t$, where t represents the time in seconds after the launch.

    a. How long is the rocket in the air? _____

    b. When is the rocket at its highest point? _____

    c. How high is the rocket at its highest point? _____

18. A 15-inch by 28-inch poster is to be framed using a border of uniform width. To make the framing visually appealing, the border should have an area equal to 60% of the area of the poster. How wide should the border be? _____

A baseball player throws a ball. The table shows the height, *h*, of the ball, *t*, seconds after it is thrown.

Time (in seconds)	Height (in feet)
1	21
3	25
5	10
6	1

11. Use regression to find a quadratic model for the data.

    _____

12. What was the maximum height reached by the ball? _____

13. How long did it take the ball to reach maximum height? _____

14. Determine the height of the ball 1.5 seconds after it was thrown. _____

15. Determine how many seconds it took for the ball to hit the ground. _____

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5.4 Completing the Square

Complete the square for each quadratic expression to form a perfect-square trinomial. Then write the new expression as a binomial squared.

1. $x^2 + 12x$

2. $x^2 - 14x$

3. $x^2 + 26x$

4. $x^2 + 5x$

5. $x^2 - 3x$

6. $x^2 + x$

Solve each equation by completing the square. Give exact solutions. Then give answers rounded to the nearest hundredth, if necessary.

7. $x^2 + 8x + 2 = 0$

9. $x^2 + 6x = 0$

11. $x^2 - 3x + 9 + 6 = 0$

Write each quadratic function in vertex form. Give the coordinates of the vertex and the equation of the axis of symmetry.

13. $f(x) = x^2 + 4x + 3$

15. $f(x) = x^2 + 2x + 5$

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8.3 Multiplying and Dividing Rational Expressions

Simplify each expression.

1. $\dfrac{x^2 + 6x + 8}{x^2 + x - 12}$

3. $\dfrac{x^2 - x - 12}{x^2 + 5x + 6}$

5. $\dfrac{x^{12}}{5} \cdot \dfrac{15}{x^4} \cdot \dfrac{x^3}{9}$

7. $\dfrac{6x^2 + 18x - 108}{x^2 + 4x - 12} \cdot \dfrac{x + 4}{10x - 30}$

9. $\dfrac{x^2 + 4x - 5}{18} \div \dfrac{x^2 - x}{6}$

11. $\dfrac{x^4 + 2x^3}{x^2 + 3x + 2} \cdot \dfrac{x^2 - 1}{5x - 5}$

13. $\dfrac{\dfrac{x^2 + x - 6}{x + 5}}{\dfrac{3x^2 - 12}{3x + 15}}$

15. $\dfrac{\dfrac{5x - 35}{3x + 9}}{\dfrac{5x^2 + 15x}{x^2 + 6x + 9}}$

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8.4 Adding and Subtracting Rational Expressions

Write each expression as a single rational expression in simplest form.

1. $\frac{4}{x} + \frac{6}{x}$

3. $\frac{7x}{12} - \frac{3x}{4}$

5. $\frac{4x - 2}{10} - \frac{3x - 2}{6}$

7. $\frac{5x}{x + 5} + \frac{-8x}{x - 7}$

9. $\frac{x - 2}{x^2 + 8x} + \frac{x + 5}{x - 3}$

11. $\frac{4x}{x^2 - 16} + \frac{6}{x - 4}$

13. $\frac{x}{x^2 - 9} + \frac{x}{x^2 + 6x - 27}$

15. $\frac{x}{x^2 + 4x + 4} + \frac{5}{x^2 - 4}$