

# Red Bank Regional High School

## Precalculus Summer Assignment

This assignment is for students enrolled in the regular Precalculus course for the 2011-12 school year.

All problems must be completed and the assignment submitted in your initial class in September.

**This work will be graded:**  $\frac{2}{3}$  on % of problems completed and  $\frac{1}{3}$  on answers to select problems. The grade will be an important part of your 1<sup>st</sup> marking period grade.

Any work that is done on a separate sheet must be attached.

The problems in this assignment will be reviewed as necessary during the 1<sup>st</sup> and/or 2<sup>nd</sup> class session.

You are expected to know this material, as it is necessary to the understanding of the topics to be covered during the course of the year. Time in class is usually not taken on review of Algebra II concepts.

Use of a TI-84 + or TI-89 calculator will be frequent during this course. You need to acquire at least a TI-84 for your personal use, particularly for homework. You should think about a TI-89 if you expect to take AP Calculus at RBR or Calculus in college.

Name: \_\_\_\_\_

September 2011

**Precalculus Summer Assignment**

Name:

Unless otherwise specified, final answers are to be written with simplified and reduced fractions and/or radicals. All work is to be completed in the space provided. If any part is placed on a separate paper, properly identify it with the section and problem number. Work is to be written with a only a pencil.

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**Section I: Radicals and Rational Exponents**

Find the simplified roots of each, without a calculator.

- |                      |                                  |                                 |
|----------------------|----------------------------------|---------------------------------|
| 1. Square root of 81 | 2. Fourth root of 81             | 3. Cube root of 64              |
| 4. Fifth root of 243 | 5. Square root of $1\frac{6}{9}$ | 6. Cube root of $-2\frac{7}{8}$ |
| 7. $\sqrt{144}$      | 8. $\sqrt{-16}$                  | 9. $\sqrt[3]{-216}$             |
| 10. $\sqrt[3]{216}$  | 11. $\sqrt[3]{-\frac{64}{27}}$   | 12. $\sqrt{\frac{64}{25}}$      |

Evaluate each expression, using a calculator if necessary.

- |                         |                         |                                     |
|-------------------------|-------------------------|-------------------------------------|
| 13. $\sqrt[4]{256}$     | 14. $\sqrt[5]{3125}$    | 15. $\sqrt[3]{15.625}$              |
| 16. $\sqrt{12.25}$      | 17. $81^{\frac{3}{2}}$  | 18. $16^{\frac{5}{4}}$              |
| 19. $32^{-\frac{2}{5}}$ | 20. $27^{-\frac{4}{3}}$ | 21. $(-\frac{1}{8})^{-\frac{1}{3}}$ |

Simplify each radical expression and rationalize the denominator in #'s 28 - 33.

- |                          |                          |                            |
|--------------------------|--------------------------|----------------------------|
| 22. $\sqrt{288}$         | 23. $\sqrt[3]{500}$      | 24. $\sqrt[4]{192}$        |
| 25. $\sqrt{2x^3y^4}$     | 26. $\sqrt{25a^6b^4}$    | 27. $\sqrt[5]{96x^{10}}$   |
| 28. $\frac{6}{\sqrt{2}}$ | 29. $\frac{1}{\sqrt{5}}$ | 30. $\frac{1}{\sqrt{x^3}}$ |

31.  $\frac{2}{\sqrt[4]{y^2}}$

32.  $\sqrt[3]{\frac{x^3}{y}}$

33.  $\sqrt[5]{\frac{a^3}{b^2}}$

Convert each expression to exponential form.

34.  $\sqrt{(a+2b)^3}$

35.  $\sqrt[5]{x^2 y^3}$

36.  $2x\sqrt[3]{x^2 y}$

37.  $xy^4\sqrt{xy^3}$

Convert each expression to radical form.

38.  $a^{3/4}b^{1/4}$

39.  $x^{2/3}y^{1/3}$

40.  $(xy)^{3/4}$

41.  $\left(\frac{x}{y}\right)^{-5/3}$

Simplify each exponential expression to a form without negative exponents.

42.  $\frac{a^5 b^3}{a^2 b^4}$

43.  $(x^2 y^4)^{1/2}$

44.  $(a^{5/3} b^{3/4})(3a^{1/3} b^{5/4})$

45.  $\left(\frac{x^{1/2}}{y^{2/3}}\right)^6$

46.  $\left(\frac{-8x^6}{y^{-3}}\right)^{2/3}$

47.  $\frac{(p^2 q^4)^{1/2}}{(27q^3 p^6)^{1/3}}$

48.  $\frac{(x^9 y^6)^{-1/3}}{(x^6 y^2)^{-1/2}}$

Simplify each radical expression.

49.  $\sqrt{9x^6 y^4}$

50.  $\sqrt{16y^8 z^{-2}}$

51.  $\sqrt[3]{\frac{4x^2}{y^2}} \cdot \sqrt[3]{\frac{2x^4}{y}}$

52.  $\sqrt[5]{9ab^6} \cdot \sqrt[5]{27a^4 b^{-1}}$

53.  $3\sqrt{48} - 2\sqrt{108}$

54.  $\sqrt{x^3} - \sqrt{4xy^2}$

55.  $2\sqrt{175} + 4\sqrt{28}$

56.  $\sqrt{18x^2 y} - \sqrt{2y^3}$

**Section II: Polynomials and Factoring**

Simplify each polynomial expression. Write your answer in **standard form** (exponents in decreasing order).

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

2.  $(-3x^2 - 5) - (x^2 + 7x + 12)$

3.  $(4x^3 - x^2 + 3x) - (x^3 + 12x - 3)$

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

5.  $2x(x^2 - x + 3)$

6.  $y^2(2y^2 + 3y - 4)$

7.  $-3u(4u - 1)$

8.  $(2 - x - 3x^2)(5x)$

9.  $3x(2x - 5x^2 + x^3)$

10.  $(1 - x^2 + x^4)(2x)$

Expand each product, writing the result in simplified standard form.

11.  $(x - 2)(x + 5)$

12.  $(2x + 3)(4x + 1)$

13.  $(3x - 5)(x + 2)$

14.  $(2x - 3)(2x + 3)$

15.  $(3x - y)(3x + y)$

16.  $(3 - 5x)^2$

17.  $(3x + 4y)^2$

18.  $(x - 1)^3$

19.  $(u + 3v)^3$

20.  $(2x^3 - 3y)(2x^3 + 3y)$

21.  $(x - 3)(x^2 + 3x - 2)$

22.  $(x - \sqrt{2})(x + \sqrt{2})$

23.  $(\sqrt{u} + \sqrt{v})(\sqrt{u} - \sqrt{v})$

24.  $(x - 2)(x^2 + 2x + 4)$

25.  $(x + 1)(x^2 - x + 1)$

Factor completely, looking for a common factor.

26.  $5x - 15$       27.  $5x^3 - 20x$       28.  $yz^3 - 3yz^2 + 2yz$       29.  $2x(x + 3) - 5(x + 3)$

Factor the difference of two squares.

30.  $z^2 - 49$       31.  $9y^2 - 16$       32.  $64 - 25y^2$       33.  $16 - (x + 2)^2$

Factor the perfect square trinomial.

34.  $y^2 + 8y + 16$       35.  $36x^2 + 12x + 1$       36.  $4z^2 - 4z + 1$       37.  $9x^2 - 24x + 16$

Factor the sum or difference of two cubes.

38.  $y^3 - 8$       39.  $z^3 + 64$       40.  $27x^3 - 8$       41.  $125 - y^3$

Factor the trinomial into two binomial factors.

42.  $x^2 + 9x + 14$       43.  $z^2 - 5z - 24$       44.  $6t^2 + 5t + 1$       45.  $10v^2 + 23v + 12$

46.  $12x^2 + 11x - 15$       47.  $2x^2 - 3xy + y^2$       48.  $6x^2 + 11xy - 10y^2$

Factor by grouping.

49.  $x^3 - 4x^2 + 5x - 20$       50.  $2x^3 - 3x^2 + 2x - 3$       51.  $x^6 + 2x^4 + x^2 + 2$

Factor the polynomial expression completely.

52.  $x^3 - x$       53.  $4y^3 - 20y^2 + 25y$       54.  $2x^3 - 16x^2 + 14x$

55.  $12x^2 + 22x - 20$       56.  $3x^4 + 24x$       57.  $2(5x + 1) - 18$

58.  $3x^2 + 13xy - 10y^2$       59.  $16y - y^3$       60.  $x^3 - 3x^2 - 4x + 12$

**Section III: Rational Expressions**

Reduce and simplify each expression.

1.  $\frac{18x^3}{15x}$

2.  $\frac{75y^2}{9y^4}$

3.  $\frac{x^3}{x^2 - 2x}$

4.  $\frac{2y^2 + 6y}{4y + 12}$

5.  $\frac{z^2 - 3z}{9 - z^2}$

6.  $\frac{x^2 + 6x + 9}{x^2 - x - 12}$

7.  $\frac{y^2 - y - 30}{y^2 - 3y - 18}$

8.  $\frac{y^3 + 4y^2 - 21y}{y^2 - 49}$

9.  $\frac{8x^3 - 1}{2x^2 + 5x - 3}$

Simplify each rational expression with only positive exponents.

10.  $\frac{3}{x-1} \cdot \frac{x^2 - 1}{9}$

11.  $\frac{x+3}{7} \cdot \frac{14}{2x+6}$

12.  $\frac{x+3}{x-1} \cdot \frac{1-x}{x^2-9}$

13.  $\frac{18x^2 - 3x}{3xy} \cdot \frac{12y^2}{6x-1}$

14.  $\frac{x^3 - 1}{2x^2} \cdot \frac{4x}{x^2 + x + 1}$

15.  $\frac{4x}{y} \div \frac{8y}{x}$

16.  $\frac{x^2 - 3x}{14y} \div \frac{2xy}{3y^2}$

17.  $\frac{7x - 7y}{4y} \div \frac{14x - 14y}{3y}$

18.  $\frac{\frac{1}{x} + \frac{1}{y}}{\frac{1}{x^2} - \frac{1}{y^2}}$

19.  $x^{-1} + y^{-1}$

**Section IV: Lines in the Plane**

Find the value of  $x$  or  $y$  so that the line through the pair of points has the given slope.

1. Points:  $(x, 3)$  and  $(5, 9)$ ; Slope:  $m = 2$ .
2. Points:  $(-2, 3)$  and  $(4, y)$ ; Slope:  $m = -3$ .
3. Points:  $(-3, 5)$  and  $(4, y)$ ; Slope:  $m = 3$ .
4. Points:  $(-8, -2)$  and  $(x, 2)$ ; Slope:  $m = \frac{1}{2}$ .

Find the slope-intercept form of the equation for the line ( $y = mx + b$ ).

5. The line through  $(0, 5)$  with slope  $m = -3$ .
6. The line through  $(1, 2)$  with slope  $m = \frac{1}{2}$ .
7. The line through the points  $(-4, 5)$  and  $(4, 3)$ .
8. The line through the points  $(4, 2)$  and  $(-3, 1)$ .
9. The line  $2x + 5y = 12$
10.  $7x - 12y = 96$

Find the values of  $x$  and  $y$  for which  $(x, 14)$  and  $(18, y)$  are points on the graph of each line.

11.  $y = 0.5x + 12$
12.  $y = -2x + 18$
13.  $3x + 4y = 26$

Find the equation of each line through the given point that is (a) parallel to and (b) perpendicular to the given line.

14. Point:  $(1, 2)$ ; Line:  $y = 3x - 2$

a.)

b.)

15. Point:  $(-2, 3)$ ; Line:  $y = -2x + 4$

a.)

b.)

16. Point:  $(3, 1)$ ; Line:  $2x + 3y = 12$

a.)

b.)

17. Point:  $(6, 1)$ ; Line:  $3x - 5y = 15$

a.)

b.)

**Section V: Linear and Quadratic Equations**

Solve each linear equation with an algebraic solution.

1.  $2x - 3 = 4x - 5$

2.  $4 - 3y = 2(y + 4)$

3.  $\frac{1}{3}x + \frac{1}{4} = 1$

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

5.  $\frac{2x - 3}{4} + 3 = 3x$

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

7.  $\frac{t - 1}{3} + \frac{t + 5}{4} = \frac{1}{2}$

8.  $\frac{t + 5}{8} - \frac{t - 2}{2} = \frac{1}{3}$

Solve the quadratic equation by extracting square roots. Simplify radicals without decimals.

9.  $4x^2 = 25$

10.  $2(x - 5)^2 = 17$

11.  $4(u + 1)^2 = 18$

12.  $2y^2 - 8 = 6 - 2y^2$

13.  $(2x + 3)^2 = 169$

Solve the quadratic equation by completing the square. Simplify radicals without decimals.

14.  $x^2 + 6x = 7$

15.  $x^2 + 5x - 9 = 0$

16.  $2x^2 - 7x + 9 = (x - 3)(x + 1) + 3x$

Solve the quadratic equation using the quadratic formula. Simplify radicals without decimals.

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

17.  $x^2 + 8x - 2 = 0$

18.  $2x^2 - 3x + 1 = 0$

19.  $3x + 4 = x^2$

20.  $x^2 - 5 = \sqrt{3}x$

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

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