

Name _____

Date _____

Ms. Adler

Honors Calculus

Summer Assignment for Students Entering Honors Calculus

Dear Students and Parents,

Today the summer assignment for Honors Calculus was distributed. It is imperative that students complete this assignment to be enrolled in Honors Calculus. The purpose of the assignment is to identify and reinforce the concepts that are essential for students to have mastered in order to be successful in a Calculus course. The assignment covers topics ranging from middle school math through precalculus and it is expected that students have mastered these concepts coming into Calculus at the beginning of the year.

Due to the intensity of the Calculus curriculum, and the importance of having these concepts mastered on day one, any student who does not show up on the first day of class with this assignment fully complete, will not be allowed to take the Honors Calculus course. Additionally, because it is pertinent that students have mastered the concepts prior to beginning Honors Calculus, this assignment will count as their first quiz grade of the quarter and there will be a quiz on the material covered in the assignment within the first 3 days of school.

Just a few notes to students about completing the assignment:

- Do not begin this assignment until a couple of weeks before school starts.
- Give yourself time to identify and relearn the concepts that you are unable to do on your own.
- Feel free to work with a classmate, tutor, sibling, parent etc. on this assignment. Just be aware that you will be quizzed on the information so you really want to make sure you have mastered the material.
- Please do all of your work on the packet provided and leave answers in the space provided. If you need extra paper, label clearly that you have used additional paper and label the problem number clearly on your extra paper.

Have a fantastic summer and I look forward to seeing you in September.

Ms. Adler

Simplifying, Multiplying and Dividing Rational Expressions

Simplify the following expressions

$$1) \frac{x^2 + 2x - 15}{x^2 - 2x - 3}$$

$$2) \frac{2x^2 + 5x - 12}{3x^2 + 13x + 4}$$

$$3) \frac{9 - 4x^2}{8x^3 - 10x^2 - 3x}$$

$$4) \frac{x^3 - 8}{x^2 - 6x + 8}$$

$$5) \quad \frac{x^4 + x^2 - 20}{x^2 + 4x + 4}$$

$$6) \quad \frac{8x^3 + 20x^2 - 12x}{4x^4 + 14x^3 + 6x^2}$$

Find the product. Write your answer in simplest form.

$$7) \quad \frac{6x^2y^3}{2x^2y^2} \bullet \frac{10x^3y^4}{18y^2}$$

$$8) \quad \frac{9x^3y}{3x^2y^3} \bullet \frac{12x^4y^5}{27y^2}$$

$$9) \quad \frac{3x - 27x^3}{3x^2 - 2x - 1} \bullet \frac{3x^2 - 4x + 1}{3x}$$

$$10) \quad \frac{4x - 2x^2}{x^2 - 5x + 6} \bullet \frac{x^2 - 4x + 3}{2x}$$

$$11) \quad \frac{x + 2}{27x^3 + 8} \bullet (9x^2 - 6x + 4)$$

$$12) \quad \frac{x - 3}{64x^3 - 1} \bullet (16x^2 + 4x + 1)$$

Find the quotient. Write your answer in simplest form.

$$13) \quad \frac{3}{4x-8} \div \frac{x^2+3x}{x^2+x-6}$$

$$14) \quad \frac{8x^2+10x-3}{4x^2} \div (4x^2-x)$$

$$15) \quad \frac{6x^2+7x-3}{x-1} \div (3x-1)$$

$$16) \quad (x^2+6x-27) \div \frac{3x^2+27x}{x+5}$$

Simplify the expression.

$$17) \quad \frac{x}{x-2} \bullet (2x+3) \div \frac{4x^2 - 9}{x-2}$$

$$18) \quad \frac{x}{x+3} \bullet (4x+1) \div \frac{16x^2 - 1}{x+3}$$

$$19) \quad \frac{10x^2y}{x^2 + xy} \bullet \frac{(x+y)^2}{2x} \div \frac{x^2 - y^2}{5y^2}$$

$$20) \quad \frac{x^2 + 2x}{x^2 + 2x - 15} \bullet \frac{2x - 6}{4} \div \frac{x^2 + x - 2}{x^2 + 4x - 5}$$

Fractional Exponents and Exponential Equations

Write the expression in exponential form.

21) $\sqrt[4]{x}$

22) $-\sqrt{x}$

23) $\sqrt[5]{x^6}$

Write the expression in radical form.

24) $x^{\frac{1}{5}}$

25) $-x^{\frac{2}{3}}$

26) $x^{\frac{4}{3}}$

27) $x^{-\frac{3}{7}}$

Simplify each of the following.

28) $343^{\frac{5}{3}}$

29) $128^{-\frac{5}{3}}$

30) $-36^{\frac{5}{2}}$

31) $81^{-\frac{1}{3}}$

32) $\sqrt[4]{x} \cdot x^{\frac{3}{2}}$

33) $x^5 \cdot x^{\frac{5}{6}}$

Solve each of the following equations.

34) $x^{\frac{2}{3}} = 16$

35) $x^{\frac{5}{3}} = -32$

36) $2x^{\frac{2}{3}} = 72$

37) $4x^{\frac{2}{3}} - 4 = 60$

38) $-2(x - 1)^{\frac{5}{3}} + 4 = -60$

39) $3(2x - 3)^{\frac{5}{3}} - 3 = 381$

$$\mathbf{40)} \quad x^{-\frac{3}{5}} = 343^{-1}$$

$$\mathbf{41)} \quad (x - 1)^{-\frac{3}{2}} = \frac{1}{81}$$

Factoring and Solving Polynomial Equations

Find the product.

$$\mathbf{42)} \quad 2x(x + 3)(2x - 4)$$

$$\mathbf{43)} \quad (x - 1)(3 - 4x)(x^2 + 2)$$

$$\mathbf{44)} \quad (4x - 3)^2$$

$$\mathbf{45)} \quad (5x - 6)^3$$

Factor the polynomial completely.

46) $x^3 + 729$

47) $64x^3 - 125$

48) $2x^3 + 16$

49) $-5x - 40x^4$

50) $16x^4 - 81$

51) $3x^5 - 48x$

$$52) \quad x^3 + 2x^2 - 49x - 98$$

$$53) \quad 4x^3 - 24x^2 - x + 6$$

$$54) \quad -2x^4 - 10x^3 - 2x - 10$$

$$55) \quad x^6 + x^5 - x^4 - x^3$$

Solve each of the following equations for the real number solutions.

$$56) \quad x^4 - 6x^2 - 27 = 0$$

$$57) \quad x^8 + 8x^4 - 9 = 0$$

$$\mathbf{58)} \quad -20x^3 + 8x^5 - 30x = 8x^3 + 30x$$

$$\mathbf{59)} \quad 3x^6 + 10x^3 + 10 = 7$$

$$\mathbf{60)} \quad 2x^7 + 7x^4 + 3x = 0$$

$$\mathbf{61)} \quad (3x+2)^3((-2x^2+4)^3+8)^2 = 0$$

$$\mathbf{62)} \quad -x^2 + 16x - 64 = 0$$

$$\mathbf{63)} \quad -x(x-9)(x+3) + 6x^2 = 12x^2$$

Writing Equations of Lines in point-slope form

64) Write the equation of the line through the points $(-3,2)$ and $(-7,-3)$.

65) Write the equation of the line through the point $(-2,6)$ that is parallel to the line with equation $y + 4 = -2(x - 5)$.

66) Write the equation of the line through the point $(-3,-2)$ that is perpendicular to the line that goes through the points $(-4,6)$ and $(5,2)$.

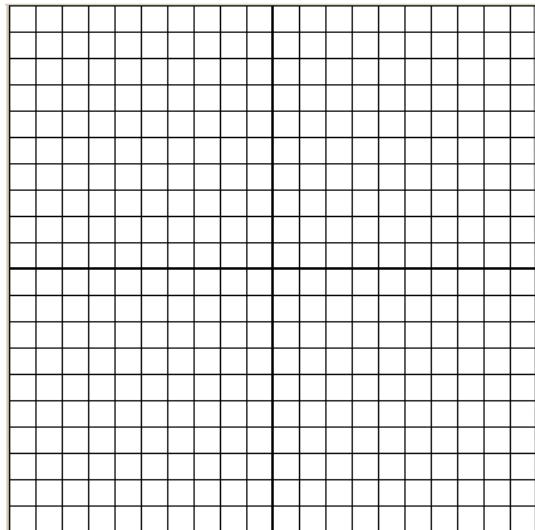
67) Write the equation of the line perpendicular to the line $y = 3$ that goes through the point $(-4,1)$.

68) Write the equation of the line parallel to the line $x = 5$ that goes through the points $(-2,9)$.

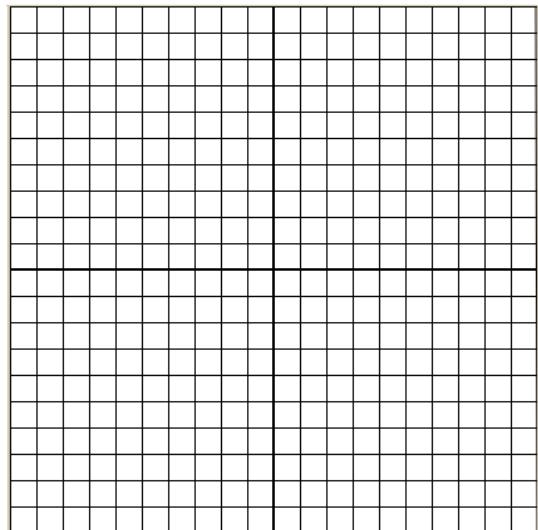
Graphing Piecewise Functions

Graph each function.

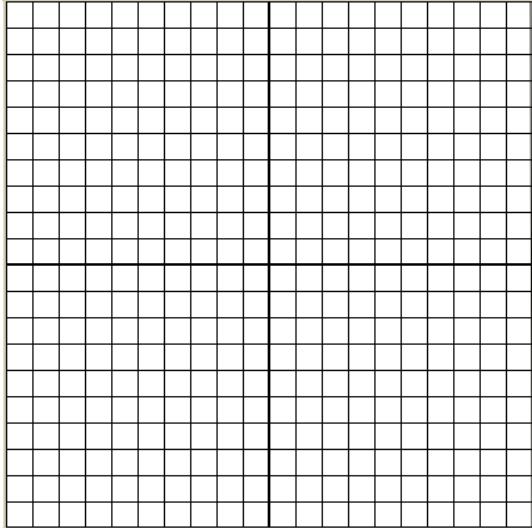
$$69) \quad f(x) = \begin{cases} -3x + 4, & x < 2 \\ 2x - 6, & x \geq 2 \end{cases}$$



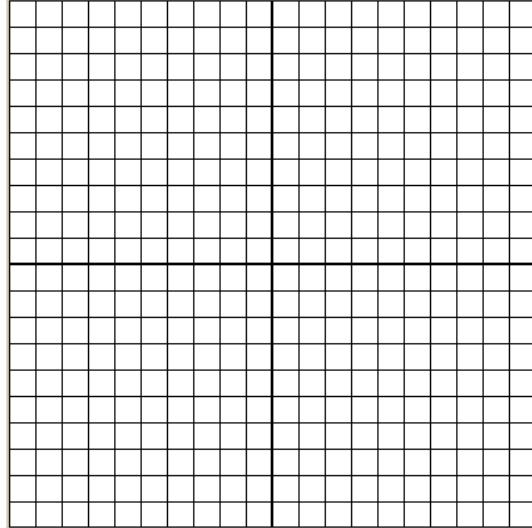
$$70) \quad f(x) = \begin{cases} \frac{1}{2}x, & x > -4 \\ -2x - 4, & x \leq -4 \end{cases}$$



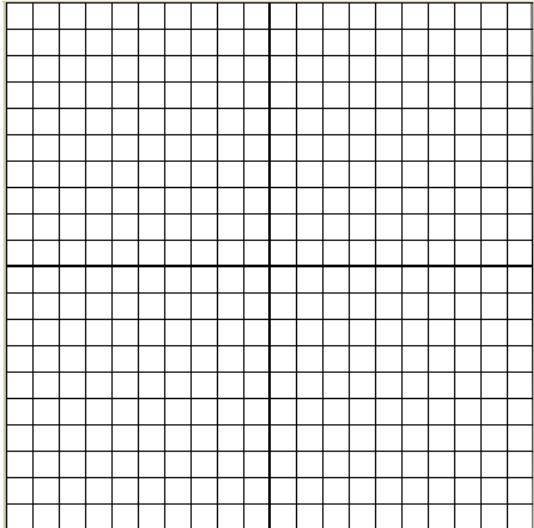
71) $f(x) = \begin{cases} x + 4, & x > 1 \\ x - 6, & x < 1 \end{cases}$



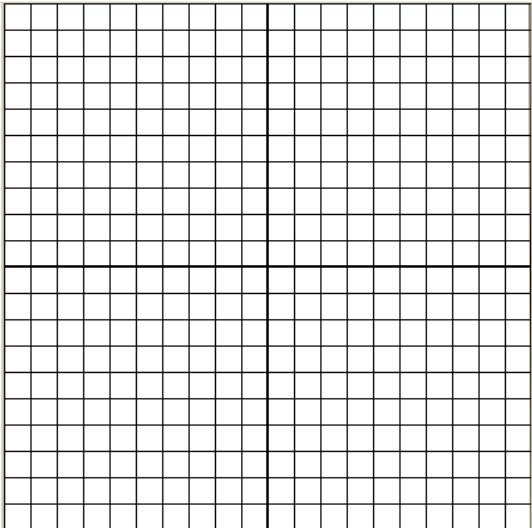
72) $f(x) = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$



73) $f(x) = \begin{cases} -4, & x < 2 \\ x - 3, & x \geq 2 \end{cases}$



74) $f(x) = \begin{cases} 2x - 4, & x \leq -2 \\ 3x + 1, & x > -2 \end{cases}$



Evaluating the Difference Quotient

Evaluate the difference quotient, $\frac{f(x+h) - f(x)}{h}$ for the given function.

75) $f(x) = x - 3$

76) $f(x) = x^2$

77) $f(x) = x^2 - 4x$

78) $f(x) = 2x^3 - 3x^2 + 5x$

Rationalizing Denominators

Rationalize the denominator.

$$79) \frac{4}{\sqrt{5}}$$

$$80) \frac{6}{\sqrt{2} - 3}$$

Unit Circle and Trigonometry

Evaluate each of the following without a calculator.

$$81) \sin\left(\frac{\pi}{3}\right)$$

$$82) \cos\left(\frac{5\pi}{6}\right)$$

$$83) \sin\left(-\frac{\pi}{4}\right)$$

$$84) \cos\left(\frac{\pi}{2}\right)$$

$$85) \sin^{-1}\left(\frac{1}{2}\right)$$

$$86) \cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$$

$$87) \cos^{-1}(-1)$$

$$88) \tan^{-1}(-1)$$

$$89) \sin^{-1}(0)$$

** You should also review what the basic graphs of absolute value, polynomial, sine and cosine functions look like.

Honors Calculus Summer Assignment Answer Sheet

Write your final answer for each problem on this sheet. You will not get credit for a correct answer if it is not written on this sheet.

1) _____ 13) _____ 25) _____

2) _____ 14) _____ 26) _____

3) _____ 15) _____ 27) _____

4) _____ 16) _____ 28) _____

5) _____ 17) _____ 29) _____

6) _____ 18) _____ 30) _____

7) _____ 19) _____ 31) _____

8) _____ 20) _____ 32) _____

9) _____ 21) _____ 33) _____

10) _____ 22) _____ 34) _____

11) _____ 23) _____ 35) _____

12) _____ 24) _____ 36) _____

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37) _____ 50) _____ 63) _____

38) _____ 51) _____ 64) _____

39) _____ 52) _____ 65) _____

40) _____ 53) _____ 66) _____

41) _____ 54) _____ 67) _____

42) _____ 55) _____ 68) _____

43) _____ 56) _____ 69) _____

44) _____ 57) _____ 70) _____

45) _____ 58) _____ 71) _____

46) _____ 59) _____ 72) _____

47) _____ 60) _____ 73) _____

48) _____ 61) _____ 74) _____

49) _____ 62) _____ 75) _____

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76) _____ 81) _____ 86) _____

77) _____ 82) _____ 87) _____

78) _____ 83) _____ 88) _____

79) _____ 84) _____ 89) _____

80) _____ 85) _____