Honors Pre-Calculus

Summer Assignment

WELCOME to PreCalculus Honors!!!. In preparation for this class, all students enrolled in Pre-Calculus Honors must complete this summer assignment. The assignment will provide you with a review of important skills and concepts that you are expected to know when taking Pre-Calculus. If there are any topics which do not look familiar (possibly logarithms), then ignore them for now.

It is strongly recommended that you work on this assignment **throughout the summer rather than waiting until the last minute.** The following problems on the **enclosed two packets are to be completed right in the packet itself and if necessary you can continue onto lined loose leaf paper.**

You **must bring this work with you to the first class in September**. It will be graded upon completion, neatness and accuracy and will be recorded as the first grade of the marking period. We will review this material during the first week of school and then move directly into the study of functions, which is the principal topic of Pre-Calculus.

If you have any questions, you can email me over the summer at jtrenelli@prsdnj.org and I will respond as soon as I can. In addition, the following websites are strongly recommended as they contain examples and tutorials that will prove very helpful.

www.khanacademy.org

www.mathisfun.com

www.purplemath.com

Have a safe, productive and enjoyable summer and I look forward to working with you in September.

Mr. Trenelli

PRE-CALCULUS
SUMMER REVIEW PACKET

Mr. Trenelli

Name: ____

1. Due on the first day of school
2. Show all work in the packet OR on separate paper attached to the packet
3. Completion of this packet will be counted toward your first MP grade

PART I

Summer Review Packet for Students Entering PreAP Precalculus

Radicals:

To simplify means that 1) no radicand has a perfect square factor and

2) there is no radical in the denominator (rationalize).

Recall – the **Product Property** $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$ and the **Quotient Property** $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

Examples: Simplify $\sqrt{24} = \sqrt{4} \cdot \sqrt{6}$ find a perfect square factor

$= 2\sqrt{6}$ simplify

Simplify $\sqrt{\frac{7}{2}} = \frac{\sqrt{7}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$ split apart, then multiply both the numerator and the denominator by $\sqrt{2}$

$= \frac{\sqrt{14}}{\sqrt{4}} = \frac{\sqrt{14}}{2}$ multiply straight across and simplify

If the denominator contains 2 terms –

multiply the numerator and the denominator by the ***conjugate*** of the denominator

The ***conjugate*** of $3+\sqrt{2}$ is $3-\sqrt{2}$ (the sign changes between the terms).

Simplify each of the following.

1. $\sqrt{32}$

2. $\sqrt{(2x)^8}$

3. $\sqrt[3]{-64}$

4. $\sqrt{49m^2n^8}$

5. $\sqrt{\frac{11}{9}}$

6. $\left(\sqrt{5}-\sqrt{6}\right)\left(\sqrt{5}+\sqrt{2}\right)$

Rationalize.

7. $\frac{1}{\sqrt{2}}$

8. $\frac{3}{2-\sqrt{5}}$

Complex Numbers:

Form of complex number - $a+bi$

Where a is the "real" is part and bi is the "imaginary" part

Always make these substitutions $\sqrt{-1}=i$ and $i^2=-1$

- To simplify: pull out the $\sqrt{-1}$ before performing any operation

Example: $\sqrt{-5}=\sqrt{-1}\cdot\sqrt{5}$ Pull out $\sqrt{-1}$

$= i\sqrt{5}$ Make substitution

Example: $(i\sqrt{5})^2 = i\sqrt{5}\cdot i\sqrt{5}$ List twice

$= i^2\sqrt{25}$ Simplify

$= (-1)(5) = -5$ Substitute

- Treat i like any other variable when +, -, ×, or ÷ (but always simplify $i^2=-1$)

Example: $2i(3+i) = 2(3i)+2i(i)$ Distribute

$= 6i+2i^2$ Simplify

$= 6i+2(-1)$ Make substitution

$= -2+6i$ Simplify and rewrite in complex form

- Since $i=\sqrt{-1}$, no answer can have an 'i' in the denominator **RATIONALIZE!!**

Simplify.

9. $\sqrt{-49}$

10. $6\sqrt{-12}$

11. $-6(2-8i)+3(5+7i)$

12. $(3-4i)^2$

13. $(6-4i)(6+4i)$

Rationalize.

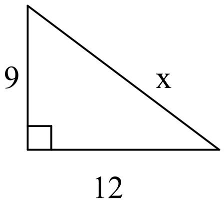
14. $\dfrac{1+6i}{5i}$

Geometry:

Pythagorean Theorem (right triangles): $a^2 + b^2 = c^2$

Find the value of x.

15.



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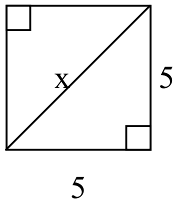

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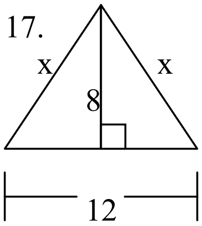
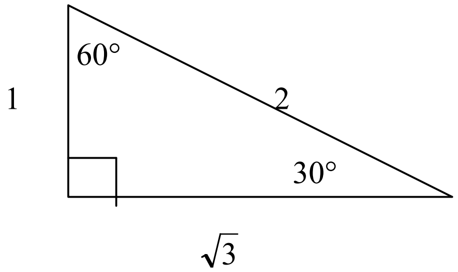
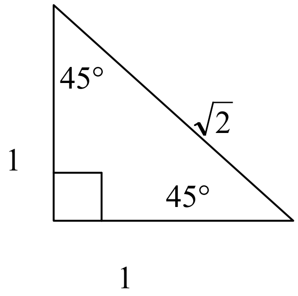


18. A square has perimeter 12 cm. Find the length of the diagonal.

* In $30° - 60° - 90°$ triangles,
sides are in proportion $1, \sqrt{3}, 2$.

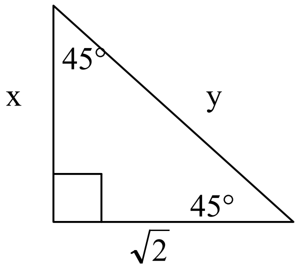


*In $45° - 45° - 90°$ triangles,
sides are in proportion $1, 1, \sqrt{2}$.



Solve for x and y.

19.



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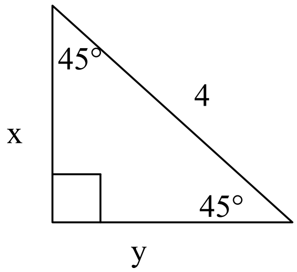

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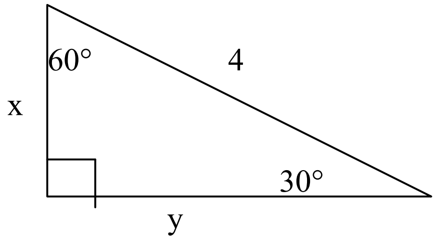

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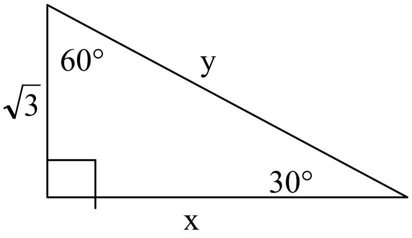


Equations of Lines:

Slope intercept form: $y = mx + b$

Vertical line: x = c (slope is undefined)

Point-slope form: $y - y_1 = m(x - x_1)$

Horizontal line: y = c (slope is 0)

Standard Form: $Ax + By = C$

Slope: $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

23. State the slope and y-intercept of the linear equation: 5x – 4y = 8.

24. Find the x-intercept and y-intercept of the equation: 2x – y = 5

25. Write the equation in standard form: y = 7x – 5

Write the equation of the line in slope-intercept form with the following conditions:

26. slope = -5 and passes through the point (-3, -8)

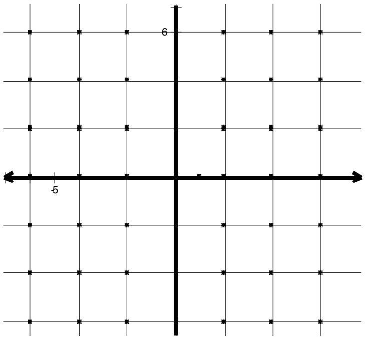
27. passes through the points (4, 3) and (7, -2)

28. x-intercept = 3 and y-intercept = 2

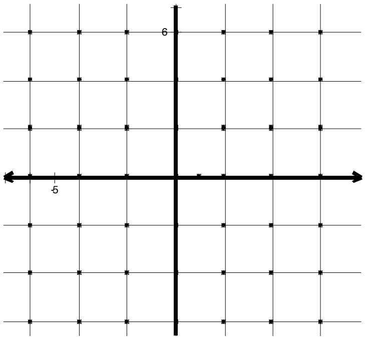
Graphing:

Graph each function, inequality, and / or system.

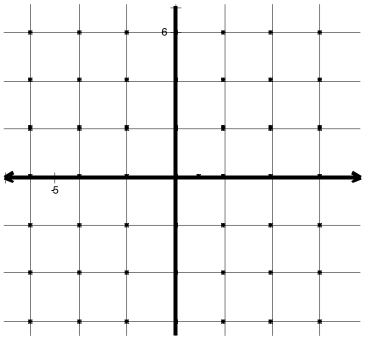
29. $3x-4y=12$



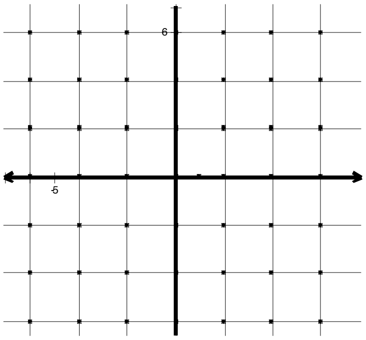
30. $\begin{cases} 2x+y=4 \\ x-y=2 \end{cases}$



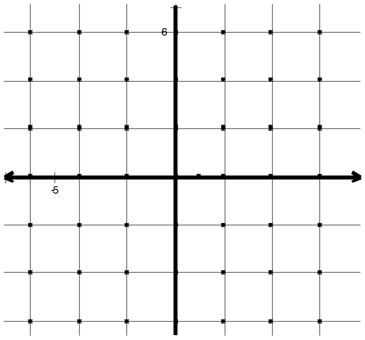
31. $y<-4x-2$



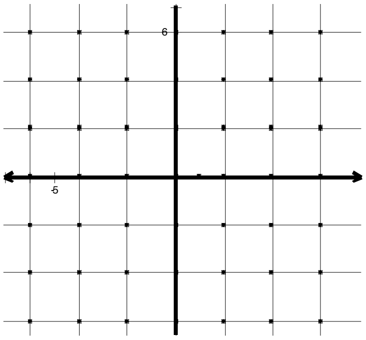
32. $y+2=|x+1|$



33. $y>|x|-1$



34. $y+4=(x-1)^2$



Vertex: ___________________

x-intercept(s): ___________________

y-intercept(s): ___________________

Systems of Equations:

$3x + y = 6$

$2x - 2y = 4$

Substitution:

Solve 1 equation for 1 variable.

Rearrange.

Plug into 2nd equation.

Solve for the other variable.

$y = 6 - 3x$ solve 1st equation for y

$2x - 2(6 - 3x) = 4$ plug into 2nd equation

$2x - 12 + 6x = 4$ distribute

$8x = 16$ simplify

$x = 2$

Elimination:

Find opposite coefficients for 1 variable.

Multiply equation(s) by constant(s).

Add equations together (lose 1 variable).

Solve for variable.

$6x + 2y = 12$ multiply 1st equation by 2

$\underline{2x - 2y = 4}$ coefficients of y are opposite

$8x = 16$ add

$x = 2$ simplify

Then plug answer back into an original equation to solve for the 2nd variable.

Plug $x = 2$ back into original

$3(2) + y = 6$

$6 + y = 6$

$y = 0$

Solve each system of equations. Use any method.

35. $\begin{cases} 2x + y = 4 \\ 3x + 2y = 1 \end{cases}$

36. $\begin{cases} 2x + y = 4 \\ 3x - y = 14 \end{cases}$

37. $\begin{cases} 2w - 5z = 13 \\ 6w + 3z = 10 \end{cases}$

Exponents:

TWO RULES OF ONE

1. $a^1 = a$

Any number raised to the power of one equals itself.

2. $1^a = 1$

One to any power is one.

ZERO RULE

3. $a^0 = 1$

Any nonzero number raised to the power of zero is one.

PRODUCT RULE

4. $a^m \cdot a^n = a^{m+n}$

When multiplying two powers that have the same base, add the exponents.

QUOTIENT RULE

5. $\frac{a^m}{a^n} = a^{m-n}$

When dividing two powers with the same base, subtract the exponents.

POWER RULE

6. $(a^m)^n = a^{m \cdot n}$

When a power is raised to another power, multiply the exponents.

NEGATIVE EXPONENTS

7. $a^{-n} = \frac{1}{a^n}$ and $\frac{1}{a^{-n}} = a^n$

Any nonzero number raised to a negative power equals its reciprocal raised to the opposite positive power.

Express each of the following in simplest form. Answers should not have any negative exponents.

38. $5a^0$

39. $\frac{3c}{c^{-1}}$

40. $\frac{2ef^{-1}}{e^{-1}}$

41. $\frac{(n^3p^{-1})^2}{(np)^{-2}}$

Simplify.

42. $3m^2 \bullet 2m$

43. $(a^3)^2$

44. $(-b^3c^4)^5$

45. $4m(3a^2m)$

Polynomials:

To add / subtract polynomials, combine like terms.

EX: $8x-3y+6-(6y+4x-9)$ *Distribute the negative through the parantheses.*

$=8x-3y+6-6y-4x+9$ *Combine terms with similar variables.*

$=8x-4x-3y-6y+6+9$

$=4x-9y+15$

Simplify.

46. $3x^3+9+7x^2-x^3$

47. $7m-6-(2m+5)$

To multiplying two binomials, use FOIL.

EX: $(3x-2)(x+4)$ *Multiply the first, outer, inner, then last terms.*

$=3x^2+12x-2x-8$ *Combine like terms.*

$=3x^2+10x-8$

Multiply.

48. $(3a + 1)(a – 2)$

49. $(s + 3)(s – 3)$

50. $(c – 5)^2$

51. $(5x + 7y)(5x – 7y)$

Factoring.

Follow these steps in order to factor polynomials.

STEP 1: Look for a GCF in ALL of the terms.

a.) If you have one (other than 1) factor it out front.

b.) If you don't have one, move on to STEP 2.

STEP 2: How many terms does the polynomial have?

2 Terms

a.) Is it difference of two squares? $a^2 - b^2 = (a+b)(a-b)$

EX: $x^2 - 25 = (x+5)(x-5)$

b.) Is it sum or difference of two cubes?

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$
$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

EX: $m^3 + 64 = (m+4)(m^2 - 4m + 16)$

$p^3 - 125 = (p-5)(p^2 + 5p + 25)$

3 Terms

$x^2 + bx + c = (x + \quad)(x + \quad)$ **Ex:** $x^2 + 7x + 12 = (x+3)(x+4)$

$x^2 - bx + c = (x - \quad)(x - \quad)$ $x^2 - 5x + 4 = (x-1)(x-4)$

$x^2 + bx - c = (x - \quad)(x + \quad)$ $x^2 + 6x - 16 = (x-2)(x+8)$

$x^2 - bx - c = (x - \quad)(x + \quad)$ $x^2 - 2x - 24 = (x-6)(x+4)$

4 Terms -- Factor by Grouping

a.) Pair up first two terms and last two terms

b.) Factor out GCF of each pair of numbers.

c.) Factor out front the parentheses that the terms have in common.

d.) Put leftover terms in parentheses.

Ex:
$$\begin{aligned} x^3 + 3x^2 + 9x + 27 &= \left(x^3 + 3x^2\right) + \left(9x + 27\right) \\ &= x^2\left(x+3\right) + 9\left(x+3\right) \\ &= \left(x+3\right)\left(x^2+9\right) \end{aligned}$$

Factor completely.

52. $z^2 + 4z - 12$

53. $6 - 5x - x^2$

54. $2k^2 + 2k - 60$

55. $-10b^4 - 15b^2$

56. $9c^2 + 30c + 25$

57. $9n^2 - 4$

58. $27z^3 - 8$

59. $2mn - 2mt + 2sn - 2st$

To solve quadratic equations, try to factor first and set each factor equal to zero. Solve for your variable. If the quadratic does NOT factor, use quadratic formula.

EX: $x^2 - 4x = 21$ *Set equal to zero FIRST.*

$x^2 - 4x - 21 = 0$ *Now factor.*

$(x+3)(x-7) = 0$ *Set each factor equal to zero.*

$x + 3 = 0 \quad x - 7 = 0$ *Solve each for x.*

$x = -3 \quad x = 7$

Solve each equation.

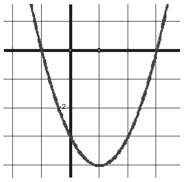
60. $x^2 - 4x - 12 = 0$

61. $x^2 + 25 = 10x$

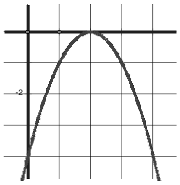
62. $x^2 - 14x + 40 = 0$

DISCRIMINANT: The number under the radical in the quadratic formula $(b^2 - 4ac)$ can tell you what kinds of roots you will have.

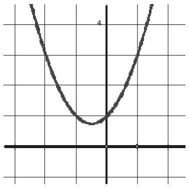
IF $b^2 - 4ac > 0$ **you will have TWO real roots.**
(touches x-axis twice)



IF $b^2 - 4ac = 0$ **you will have ONE real root**
(touches the x-axis once)



IF $b^2 - 4ac < 0$ **you will have TWO imaginary roots.**
(Graph does not cross the x-axis)



QUADRATIC FORMULA – allows you to solve any quadratic for all its real and imaginary roots. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

EX: Solve the equation: $x^2 + 2x + 3 = 0$

$$\begin{aligned} Solve: \quad x &= \frac{-2 \pm \sqrt{-8}}{2} \\ x &= \frac{-2 \pm 2i\sqrt{2}}{2} \\ x &= -1 \pm i\sqrt{2} \end{aligned}$$

Solve each quadratic.
Use EXACT values.

63. $x^2 - 9x + 14 = 0$

64. $5x^2 - 2x + 4 = 0$

Roots = ________________________

Roots = ________________________

Long Division – can be used when dividing any polynomials.
Synthetic Division – can ONLY be used when dividing a polynomial by a linear (degree one) polynomial.

EX: $\dfrac{2x^3+3x^2-6x+10}{x+3}$

Long Division

$$\frac{2x^3+3x^2-6x+10}{x+3}$$

$$\begin{array}{r}
2x^2-3x+3+\dfrac{1}{x+3} \\
= x+3\overline{)\quad 2x^3+3x^2-6x+10} \\
\underline{(-)\ (2x^3+6x^2)\qquad\qquad} \\
-3x^2-6x\qquad \\
\underline{(-)\quad(-3x^2-9x)\qquad} \\
3x+10 \\
\underline{(-)\ \ (3x+9)} \\
1
\end{array}$$

Synthetic Division

$$\frac{2x^3+3x^2-6x+10}{x+3}$$

$$\begin{array}{r|rrrr}
-3 & 2 & 3 & -6 & 10 \\
 & \downarrow & -6 & 9 & -9 \\
\hline
 & 2 & -3 & 3 & 1
\end{array}$$

$$= \ 2x-3x+3+\frac{1}{x+3}$$

Divide each polynomial using long division OR synthetic division.

65. $\dfrac{c^3-3c^2+18c-16}{c^2+3c-2}$

66. $\dfrac{x^4-2x^2-x+2}{x+2}$

To evaluate a function for a given value, simply plug the value into the function for x.

Evaluate each function for the given value.

67. $f(x)=x^2-6x+2$

$f(3)=$ ________

68. $g(x)=6x-7$

$g(x+h)=$ ________

69. $f(x)=3x^2-4$

$5\left[f(x+2)\right]=$ ________

Composition and Inverses of Functions:

Recall: $\left(f \circ g\right)(x) = f(g(x))$ *OR* $f[g(x)]$ read "***f*** of ***g*** of ***x***" Means to plug the inside function (in this case g(x)) in for x in the outside function (in this case, f(x)).

Example: Given $f(x) = 2x^2 + 1$ *and* $g(x) = x - 4$ find *f(g(x)).*

$$\begin{aligned} f(g(x)) &= f(x-4) \\ &= 2(x-4)^2 + 1 \\ &= 2(x^2 - 8x + 16) + 1 \\ &= 2x^2 - 16x + 32 + 1 \\ f(g(x)) &= 2x^2 - 16x + 33 \end{aligned}$$

Suppose $f(x) = 2x,\ g(x) = 3x - 2,$ *and* $h(x) = x^2 - 4$ **. Find the following:**

70. $f\left[g(2)\right] =$ ________

71. $f\left[g(x)\right] =$ ________

72. $f\left[h(3)\right] =$ ________

73. $g\left[f(x)\right] =$ ________

To find the inverse of a function, simply switch the x and the y and solve for the new "y" value.
Example:

$f(x) = \sqrt[3]{x+1}$	Rewrite f(x) as y
y = $\sqrt[3]{x+1}$	Switch x and y
x = $\sqrt[3]{y+1}$	Solve for your new y
$(x)^3 = \left(\sqrt[3]{y+1}\right)^3$	Cube both sides
$x^3 = y + 1$	Simplify
$y = x^3 - 1$	Solve for y
$f^{-1}(x) = x^3 - 1$	Rewrite in inverse notation

Find the inverse, $f^{-1}(x)$ **, if possible.**

74. $f(x) = 5x + 2$

75. $f(x) = \frac{1}{2}x - \frac{1}{3}$

Rational Algebraic Expressions:

Multiplying and Dividing.

Factor numerator and denominator completely. Cancel any common factors in the top and bottom. If dividing, change divide to multiply and flip the second fraction.

EX:

$$\frac{x^2+10x+21}{5-4x-x^2} \bullet \frac{x^2+2x-15}{x^3+4x^2-21x}$$ *Factor everything completely.*

$$=\frac{(x+7)(x+3)}{(5+x)(1-x)} \bullet \frac{(x+5)(x-3)}{x(x-3)(x+7)}$$ *Cancel out common factors* in *the top and bottom.*

$$=\frac{(x+3)}{x(1-x)}$$ *Simplify.*

Simplify.

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

77. $\frac{m^2-25}{m^2+5m}$

78. $\frac{10r^5}{21s^2} \bullet \frac{3s}{5r^3}$

79. $\frac{a^2-5a+6}{a+4} \bullet \frac{3a+12}{a-2}$

80. $\frac{6d-9}{5d+1} \div \frac{6-13d+6d^2}{15d^2-7d-2}$

Addition and Subtraction.

First, find the least common denominator.
Write each fraction with the LCD.
Add / subtract numerators as indicated and leave the denominators as they are.

EX: $\frac{3x+1}{x^2+2x}+\frac{5x-4}{2x+4}$ *Factor denominator completely.*

$=\frac{3x+1}{x(x+2)}+\frac{5x-4}{2(x+2)}$ *Find LCD* $(2x)(x+2)$

$=\frac{2(3x+1)}{2x(x+2)}+\frac{x(5x-4)}{2x(x+2)}$ *Rewrite each fraction with the LCD as the denominator.*

$=\frac{6x+2+5x^2-4x}{2x(x+2)}$ *Write as one fraction.*

$=\frac{5x^2+2x+2}{2x(x+2)}$ *Combine like terms.*

81. $\frac{2x}{5}-\frac{x}{3}$

82. $\frac{b-a}{a^2b}+\frac{a+b}{ab^2}$

83. $\frac{2-a^2}{a^2+a}+\frac{3a+4}{3a+3}$

Complex Fractions.

Eliminate complex fractions by multiplying the numerator and denominator by the LCD of each of the small fractions. Then simplify as you did above

EX:

$$\frac{1+\frac{1}{a}}{\frac{2}{a^2}-1} \qquad \textit{Find LCD}: a^2$$

$$=\frac{\left(1+\frac{1}{a}\right)\bullet a^2}{\left(\frac{2}{a^2}-1\right)\bullet a^2} \qquad \textit{Multiply top and bottom by LCD.}$$

$$=\frac{a^2+a}{2-a^2} \qquad \textit{Factor and simplify if possible.}$$

$$=\frac{a(a+1)}{2-a^2}$$

84. $\dfrac{1-\frac{1}{2}}{2+\frac{1}{4}}$

85. $\dfrac{1+\frac{1}{z}}{z+1}$

86. $\dfrac{5+\frac{1}{m}-\frac{6}{m^2}}{\frac{2}{m}-\frac{2}{m^2}}$

87. $\dfrac{2+\frac{1}{x}-\frac{1}{x^2}}{1+\frac{4}{x}+\frac{3}{x^2}}$

Solving Rational Equations:

Multiply each term by the LCD of all the fractions. This should eliminate all of your fractions. Then solve the equation as usual.

$$\frac{5}{x+2}+\frac{1}{x}=\frac{5}{x} \qquad \textit{Find LCD first.}\ \ x(x+2)$$

$$x(x+2)\left(\frac{5}{x+2}\right)+x(x+2)\left(\frac{1}{x}\right)=\left(\frac{5}{x}\right)x(x+2) \qquad \textit{Multiply each term by the LCD.}$$

$$5x+1(x+2)=5(x+2) \qquad \textit{Simplify and solve.}$$

$$5x+x+2=5x+10$$

$$6x+2=5x+10$$

EX: $x=8 \quad \Leftarrow \textit{Check your answer. Sometimes they do not check!}$

Check :

$$\frac{5}{8+2}+\frac{1}{8}=\frac{5}{8}$$

$$\frac{5}{10}+\frac{1}{8}=\frac{5}{8}$$

$$\frac{5}{8}=\frac{5}{8}$$

Solve each equation. Check your solutions.

88. $\frac{12}{x}+\frac{3}{4}=\frac{3}{2}$

89. $\frac{x+10}{x^2-2}=\frac{4}{x}$

90. $\frac{\mathbf{X}}{5}=\frac{x}{x-5}-1$

Logarithms

$y = \log_a x$ is equivalent to $x = a^y$

Product property: $\log_b mn = \log_b m + \log_b n$

Quotient property: $\log_b \frac{m}{n} = \log_b m - \log_b n$

Power property: $\log_b m^p = p \log_b m$

Property of equality: If $\log_b m = \log_b n$, then $m = n$

Change of base formula: $\log_a n = \frac{\log_b n}{\log_b a}$

Solve each equation. Check your solutions.

91. $2(3)^{2x} = 5$

92. $5\log(x-2) = 11$

93. $12 = 10^{x+5} - 7$

94. $\ln x + \ln(x-2) = 1$

95. $3 + \ln x = 8$

96. $3e^{-x} - 4 = 9$

PART II
Multiplying Polynomials
No Calculator!!!

1. $(x+7)^2$

2) $(x-11)^2$

3. $(x+4)^3$

4. $(x+h)^3$

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

6. $(x+h)(x^2+3xh+8)$

7. $(a+b)^2$

Factoring

No Calculator!!

Factor each polynomial ***completely***. If the polynomial cannot be factored write prime.

1) $2x^2 - 128$

2) $x^2 - 10x + 24$

3) $a^3 - 64b^3$

4) $5x^2 + 40x - 10$

5) $2x^2 - 11x + 12$

6) $x^3 + 16x^2 + 64x$

7) $x^3 + 3x^2 - 4x - 12$

8) $24x^2 - 54$

9) $6x^3 - 18x^2$

10) $5c^2 + 4cd - d^2$

11) $27y^3 + 125$

12) $20x^2 - 4x - 72$

13) $-x^2 + 100$

14) $4x^4 - 64$

15) $a^4 - 2a^2 + 1$

16) $9x^3 + 12x^2 - 45x$

17) $n^2 - 2n - np + 2p$

18) $24x^2 + 4x - 60$

Adding and Subtracting Fractions
No Calculator!!!

Simplify each expression.

1. $\frac{2}{3}+\frac{5}{7}$

2. $\frac{1}{6}-\frac{5}{18}$

3. $\frac{6}{x}+5$

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

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

6. $\frac{x}{x+5}+\frac{7x}{x^2-25}$

7. $\frac{6}{5x}+\frac{4}{9x}-\frac{1}{3x}$

8. $\frac{8}{x^2-4x+4}+\frac{2}{x-2}$

9. $\frac{x}{x^2-9}+\frac{5}{4x-12}$

10. $\frac{5x}{x-5}+\frac{x+5}{x+2}$

11. $\frac{3}{x+3}-\frac{4}{3x}$

Multiplying and Dividing Fractions
No Calculator!!!

Simplify each expression.

1. $\frac{4}{5}\cdot\frac{2}{3}$

2. $\frac{1}{9}\cdot-\frac{3}{7}$

3. $\dfrac{\frac{2}{7}}{\frac{4}{9}}$

4. $\dfrac{\frac{11}{7}}{-\frac{7}{18}}$

5. $\dfrac{-\frac{2}{3}}{5}$

6. $\dfrac{\frac{x}{5}}{3}$

7. $\frac{4}{13}\cdot\frac{x}{7}$

8. $\frac{x+2}{5x}\cdot\frac{-7}{4x}$

9. $\frac{11}{10}\cdot 9x$

10. $\dfrac{\frac{8}{3x}}{\frac{5x}{7}}$

11. $\dfrac{-\frac{7x+2}{5x-3}}{\frac{9x+4}{6x+7}}$

12. $\dfrac{x}{\frac{2}{5}}$

13. $\dfrac{\frac{y}{z}}{7}$

14. $\dfrac{2+\frac{3}{7}}{4-\frac{1}{7}}$

Remember you can***<u>not</u>*** cancel at the beginning!!!

15. $\dfrac{1+\frac{1}{x}}{1-\frac{1}{x}}$

16. $\dfrac{\frac{x}{3}-4}{\frac{x}{3}+7}$

Rationalize the denominator
No Calculator!!

1) $\frac{2}{3-\sqrt{2}}$

2) $\frac{\sqrt{7}}{\sqrt{3}+4}$

3) $\frac{4+\sqrt{3}}{2-\sqrt{3}}$

4) $\frac{2+\sqrt{2}}{6+\sqrt{2}}$

5) $\frac{3i-2}{5i-3}$

6) $\frac{6-i\sqrt{2}}{6+i\sqrt{2}}$

7) $\frac{3+7i}{7i}$

Solve Quadratic Equations
No Calculator!!

Find all real and imaginary solutions for all problems.

Solve the following by factoring.

1) $x^2 = 3x + 4$

2) $9x = 10x^2$

3) $8x^2 + 2x = 1$

4) $x(x-5) = 36$

5) $(x-6)(x-8) = 24$

Solve the following by using the square root property.

6) $3x^2 + 2 = 0$

7) $(x+5)^2 - 12 = 0$

8) $(2x-5)^2 = -11$

9) $5(4x-3)^2 = 30$

10) $\frac{(y+4)^2}{2} = 18$

Solve the following by completing the square.

11) $x^2 + 10 = 8x$

12) $x^2 - 5x + \frac{41}{4} = 0$

13) $2x^2 + 16x + 39 = 0$

Solve the following using the Quadratic Formula. You should have the Quadratic Formula memorized.

14) $3x^2 = 2 - 9x$

15) $5x^2 - 2x = -4$

16) $12x^2 = x + 6$

Find the domain of functions

No Calculator!!

State the domain of each function using interval notation.

1) $f(x)=\sqrt{2x-5}$

2) $f(x)=\dfrac{x}{5-x}$

3) $f(x)=4x+5$

4) $f(x)=3x^2-4x+9$

5) $f(x)=\dfrac{x}{x+4}$

6) $f(x)=\sqrt{-2x+5}$

7) $f(x)=\dfrac{1}{3x^2-27}$

8) $f(x)=\dfrac{1}{x^2-10x+24}$

Rational Equations
No Calculator!!!

Remember the quadratic formula!!!
Solve each rational equation.

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

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

3. $\frac{2}{x}+\frac{3x-1}{x+3}=4$

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

5. $\frac{2}{x+5}+\frac{6}{x^2-25}=\frac{3}{x-5}$

6. $\frac{13x+20}{x^2+13x+42}-\frac{4}{x+6}=\frac{6}{x+7}$

Logarithms
No Calculator!!!

Write each equation in logarithmic form.

1. $4^2 = 16$

2. $5^{-3} = \frac{1}{125}$

Write each equation in exponential form.

3. $\log_3 81 = 4$

4. $\log_{49} 7 = \frac{1}{2}$

Evaluate each expression.

5. $\log 100$

6. $\log_2 32$

7. $\log_3 \frac{1}{81}$

8. $\log_{64} 4$

9. $\log_5 5^8$

Solve each equation.

10. $\log_7 x = 3$

11. $\log_8 (5x - 11) = 2$

12. $\log_x 6 = \frac{1}{2}$

13. $\log_3 \frac{1}{27} = x$

14. $\log_4 x + 3 = \log_4 (5x^2)$

15. $\log 125 = 3\log x$

16. $2\log_9 3 - \log_9 5 = \log_9 x$

17. $\log_4 x + \log_4 2 = 3$

18. $\log_3(x+1) - \log_3(x-1) = 4$