Summer Math Packet

In preparation for Pre-Calculus, we have prepared a packet of concepts that students should know how to do. These concepts have been taught in previous math classes. This packet does not require you to use a calculator; in fact you should not use a calculator at all on any of these problems. Pre-Calculus builds on the concepts in this packet. We start teaching Pre-Calculus concepts on the first day of school. We expect you to know the concepts in the packet in order to help you be successful in Pre-Calculus.

If you are struggling with this packet, get help from a friend, parent, or tutor. If you can't find someone to help you, there are tutors available. A list of tutors can be found by calling Reagan High School. Keep in mind these tutors may charge a fee.

You will have a graded assignment within the first two weeks of school. The graded assignment will cover all the concepts in the packet, but will not be the exact same problems. The graded assignment will be without a calculator.

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

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

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

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

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

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

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

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

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

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***not*** 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) $\dfrac{2}{3-\sqrt{2}}$

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

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

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

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

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

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

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

Solve the following by completing the square.

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

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

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

ANSWER KEYS

Multiplying Polynomials
No Calculator!!!

1. $(x+7)^2$

$x^2+14x+49$

2) $(x-11)^2$

$x^2-22x+121$

3. $(x+4)^3$

$x^3+12x^2+48x+64$

4. $(x+h)^3$

$x^3+3x^2h+3xh^2+h^3$

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

x^3-2x^2-7x-4

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

$x^3+4x^2h+3xh^2+8x+8h$

7. $(a+b)^2$

$a^2+2ab+b^2$

Factoring--ANSWERS

No Calculator!!

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

1) $2x^2-128$

$2(x+8)(x-8)$

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

$(x-4)(x-6)$

3) a^3-64b^3

$(a-4b)(a^2+4ab+16b^2)$

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

$5(x^2+8x-2)$

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

$(2x-3)(x-4)$

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

x(x+8)(x+8)

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

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

8) $24x^2-54$

$6(2x+3)(2x-3)$

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

$6x^2(x-3)$

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

$(5c-d)(c+d)$

11) $27y^3+125$

$(3y+5)(9y^2-15y+25)$

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

$4(5x+9)(x-2)$

13) $-x^2+100$

$(10-x)(10+x)$

14) $4x^4-64$

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

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

$(a+1)(a-1)(a+1)(a-1)$

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

$3x(3x-5)(x+3)$

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

$(n-2)(n-p)$

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

$4(3x+5)(2x-3)$

Adding and Subtracting Fractions
No Calculator!!!

Simplify each expression.

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

$\frac{29}{21}$

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

$-\frac{1}{9}$

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

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

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

$\frac{3x-28y}{4y}$

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

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

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

$\frac{x^2+2x}{x^2-25}$

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

$\frac{59}{45x}$

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

$\frac{2}{x-2}$

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

$\frac{9x+15}{4x^2-36}$

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

$\frac{6x^2+10x-25}{x^2-3x-10}$

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

$\frac{5x-12}{3x^2+9x}$

Multiplying and Dividing Fractions
No Calculator!!!

Simplify each expression.

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

$\frac{8}{15}$

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

$-\frac{1}{21}$

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

$\frac{9}{14}$

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

$-\frac{198}{49}$

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

$-\frac{2}{15}$

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

$\frac{x}{15}$

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

$\frac{4x}{91}$

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

$\frac{-7x-14}{20x^2}$

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

$\frac{99x}{10}$

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

$\frac{56}{15x^2}$

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

$\frac{-42x^2-61x-14}{45x^2-7x-12}$

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

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

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

$\frac{5x}{2}$ $\frac{y}{7z}$ $\frac{17}{27}$

Remember you can ***not*** cancel at the beginning!!!

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

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

$\frac{x+1}{x-1}$ $\frac{x-12}{x+21}$

Rationalize the denominator--ANSWERS
No Calculator!!

1) $\frac{2}{3-\sqrt{2}}$ $\frac{6+2\sqrt{2}}{7}$

2) $\frac{\sqrt{7}}{\sqrt{3}+4}$ $\frac{-\sqrt{21}+4\sqrt{7}}{13}$

3) $\frac{4+\sqrt{3}}{2-\sqrt{3}}$ $11+6\sqrt{3}$

4) $\frac{2+\sqrt{2}}{6+\sqrt{2}}$ $\frac{5+2\sqrt{2}}{17}$

5) $\frac{3i-2}{5i-3}$ $\frac{21+i}{34}$

6) $\frac{6-i\sqrt{2}}{6+i\sqrt{2}}$ $\frac{17}{19}-\frac{6\sqrt{2}}{19}i$ could write the answer all over 19 as one fraction

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

Solve Quadratic Equations--ANSWERS
No Calculator!!

Find all real and imaginary solutions for all problems.

Solve the following by factoring.

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

X= $-1, 4$

2) $9x = 10x^2$

x= $0, \frac{9}{10}$

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

x= $-\frac{1}{2}, \frac{1}{4}$

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

X= $9, -4$

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

x=2, 12

Solve the following by using the square root property.

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

X= $\pm\frac{i\sqrt{6}}{3}$

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

x= $-5 \pm 2\sqrt{3}$

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

x= $\frac{5 \pm i\sqrt{11}}{2}$

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

X= $\frac{3 \pm \sqrt{6}}{4}$

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

x=10, -2

Solve the following by completing the square.

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

X= $4 \pm \sqrt{6}$

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

x= $\frac{5}{2} \pm 2i$ or $\frac{5 \pm 4i}{2}$

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

x= $-4 \pm \frac{i\sqrt{14}}{2}$ *or* $\frac{-8 \pm i\sqrt{14}}{2}$

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

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

$x = \frac{-9 \pm \sqrt{105}}{6}$

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

$x = \frac{1 + i\sqrt{19}}{5}$

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

$x = \frac{3}{4}, -\frac{2}{3}$

Find the domain of functions--ANSWERS

No Calculator!!

State the domain of each function using interval notation.

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

$\left[\frac{5}{2},\infty\right)$

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

$(-\infty,5)\cup(5,\infty)$

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

$(-\infty,\infty)$

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

$(-\infty,\infty)$

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

$(-\infty,-4)\cup(-4,\infty)$

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

$\left(-\infty,\frac{5}{2}\right]$

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

$(-\infty,-3)\cup(-3,3)\cup(3,\infty)$

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

$(-\infty,4)\cup(4,6)\cup(6,\infty)$

Rational Equations
No Calculator!!!

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

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

-2

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

$\frac{3}{2}$

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

$\frac{-11\pm\sqrt{145}}{2}$

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

$\frac{9\pm\sqrt{105}}{2}$

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

-19

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

$\frac{44}{3}$

Logarithms
No Calculator!!!

Write each equation in logarithmic form.

1. $4^2 = 16$

$\log_4 16 = 2$

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

$\log_5 \frac{1}{125} = -3$

Write each equation in exponential form.

3. $\log_3 81 = 4$

$3^4 = 81$

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

$49^{\frac{1}{2}} = 7$

Evaluate each expression.

5. $\log 100$

2

6. $\log_2 32$

5

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

-4

8. $\log_{64} 4$

$\frac{1}{3}$

9. $\log_5 5^8$

8

Solve each equation.

10. $\log_7 x = 3$

343

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

15

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

36

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

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

-3

$\frac{64}{5}$

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

5

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

$\frac{9}{5}$

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

32

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

$\frac{41}{40}$