



BLUE KNIGHTS

Southington High School

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Dear Students,

Enclosed you will find a comprehensive set of problems which reflect critical math skills that must be mastered prior to entering your Pre-Calculus class at Southington High School. You are encouraged to develop a wide range of ways for finding the correct answer, including techniques both with and without the aid of a calculator*. Working with a friend, sibling, or parent might be a helpful way to complete this assignment!

On the second day of school, your teachers will check your packets for completion and count it as your first three homework grades. In order to receive full credit for the assignment, you must attempt each problem and show all work used to complete it. The answers are provided as a means to assess your own work. During the first few days of school, your teachers will provide you with an opportunity to review your work from this packet. Soon thereafter, you will be given your first quiz that addresses these skills.

Our goal is for you to have a successful and enjoyable transition into your Pre-Calculus class at Southington High School. This packet is meant to facilitate this process. Try your best and remember your teachers will help you upon your return.

Sincerely,

David Kowalchuk
Mathematics Department Chair

Southington High School

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Frank Pepe

Principal

*Reminder: A graphing calculator is an important tool used within this course. Students are strongly encouraged to obtain one for their personal use. Copies of this packet may be found on the Southington High School Website. Go to www.southingtonschools.org and click on the link to Parent Resources



Part I: Use the exponent rules to simplify each expression.

1) $(3x^4 \cdot 6x^5) =$

2) $(8x)^0 =$

3) $(3xy)^3 =$

4) $5^{-3} =$

5) $(-4x^2 y^4)^3 =$

6) $(3m^2 n)(6m^3 n^2)^{-2} =$

7) $\frac{x^{12}}{x^4} =$

8) $\left(\frac{y^4}{x^8}\right)^3 =$

9) $\frac{a^5 \cdot a^8}{a^6} =$

Part II: Multiply the following binomials:

10) $(x + 8)(x + 7) =$

11) $(x - 8)(3x - 2) =$

12) $(7x + 12)(x - 5) =$

13) $(4x - 15)(x + 9) =$

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

15) $(2x + 11)^2 =$

Part III: Factor the following expressions.

16) $x^2 + 12x + 35 =$

17) $x^2 - 8x - 48 =$

18) $3x^2 + 15x - 72 =$

19) $2x^2 - 26x + 72 =$

20) $5x^2 - 13x - 28 =$

21) $64x^2 - 121 =$

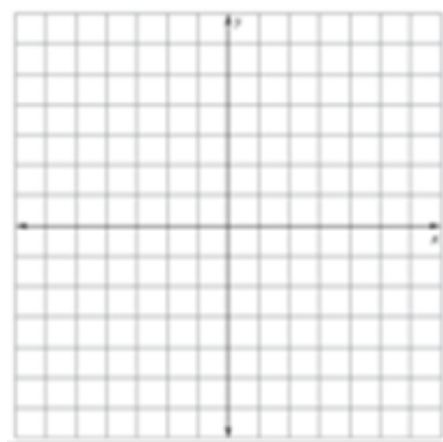
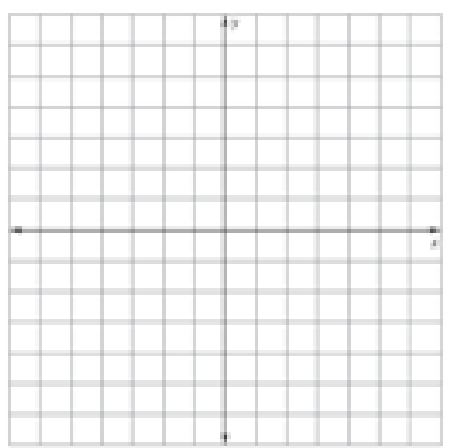
22) $64x^3 - 125 =$

23) $16x^4 + 54x =$

Part IV: Graph the following functions without the aid of a graphing calculator. (Show roots and turning points)

24) $f(x) = (x + 1)^2 - 9$

25) $y = x^3 - 2x^2 - 5x + 6$



Part V: Solve each quadratic by the indicated method.

26) $2x^2 - 11x + 12 = 0$ by factoring.

27) $3x^2 - 6x - 24 = 0$ by quadratic formula

28) $6x^2 = 150$ by any method.

Part VI: Simplify each expression.

29) $\sqrt{18} + \sqrt{32} =$

30) $27^{\frac{2}{3}} =$

31) $\sqrt[3]{54} - \sqrt[3]{250} =$

32) $\sqrt{4x^3 y^4} \cdot \sqrt{5x^3 y} =$

Part VII : Evaluate each expression.

33) $\log_5 125 =$

34) $e^{-2} \bullet e^7 =$

35) $\sqrt{16e^8} =$

36) $\log_3 \frac{1}{27} =$

37) $\log_3 81^x =$

38) $6^{\log_6 4} =$

Part IX : Simplify each rational expression.

39) $\frac{x-3}{2x-8} \bullet \frac{6x^2-96}{x^2-9} =$

40) $\frac{x^2-13x+40}{x^2-2x-15} \div (x^2-5x-24) =$

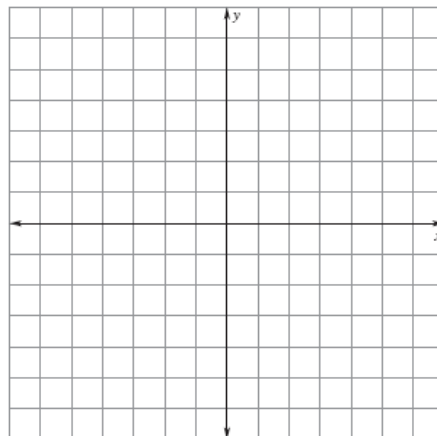
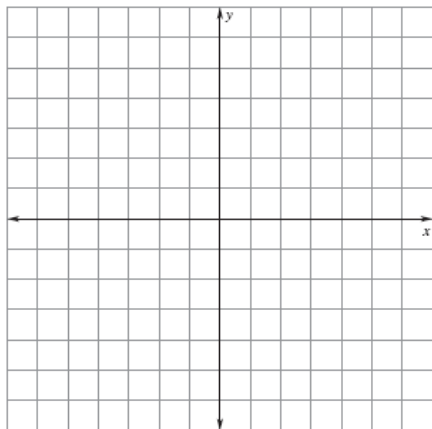
41) $\frac{5x}{x+8} + \frac{4x-9}{x^2+5x-24} =$

42) $\frac{x^2-5}{x^2+5x-14} - \frac{x+3}{x+7} =$

Part X : Graph each function. Be sure to indicate any asymptotes used to create the graph.

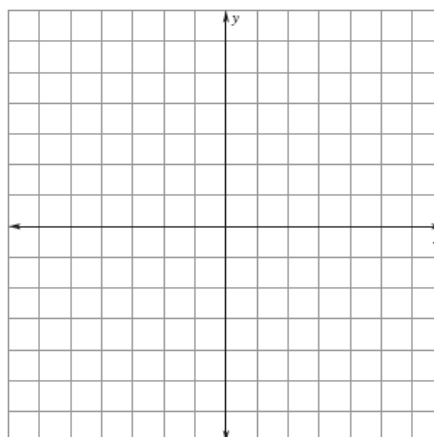
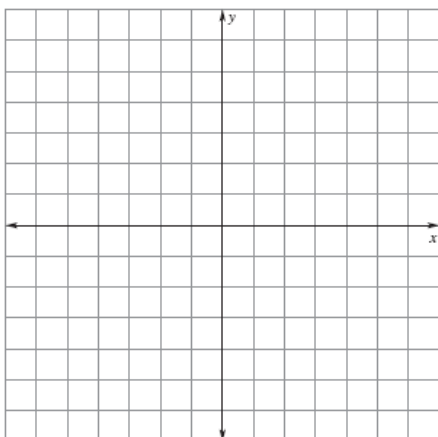
43) $y = \frac{x+3}{x-3}$

44) $y = \frac{2x^2}{x^2-9}$



45) $y = 3^{x-2}$

46) $y = \log_2(x) + 1$



Use the function $f(x) = x^2 + 2x$ for questions 47 – 49.

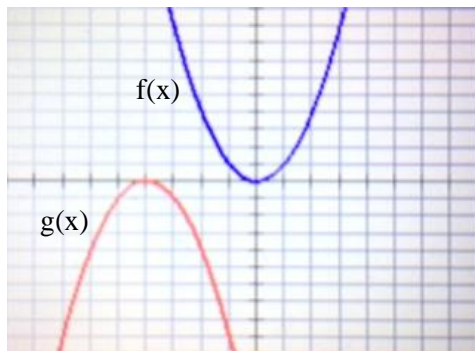
47. Evaluate $f(-3) =$

48. Evaluate $f(4) =$

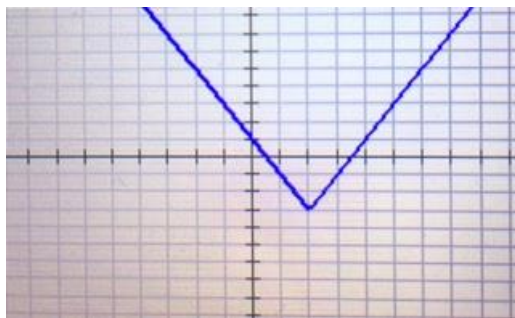
49. If $f(x) = 15$, then the value(s) of $x =$

50. Given the function $f(x) = |x|$, describe the transformations of $g(x) = 3|x - 1| + 2$

51. Compare the graph of $f(x)$ to $g(x)$.



52. What is the domain and range of the following function?



Domain: _____

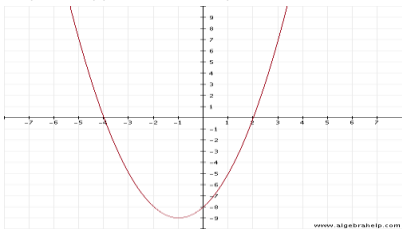
Range: _____

Answer Key

1. $18x^9$
2. 1
3. $27x^3y^3$
4. $1/125$
5. $-64x^6y^{12}$
6. $\frac{1}{12m^4n^3}$
7. x^8

8. y^{12}/x^{24}
9. a^7
10. $x^2 + 15x + 56$
11. $3x^2 - 26x + 16$
12. $7x^2 - 23x - 60$
13. $4x^2 + 21x - 135$
14. $x^2 - 18x + 81$
15. $4x^2 + 44x + 121$

16. $(x + 7)(x + 5)$
17. $(x - 12)(x + 4)$
18. $3(x + 8)(x - 3)$
19. $2(x - 9)(x - 4)$
20. $(5x + 7)(x - 4)$
21. $(8x + 11)(8x - 11)$
22. $(4x - 5)(16x^2 + 20x + 25)$
23. $2x(2x + 3)(4x^2 - 6x + 9)$



24.

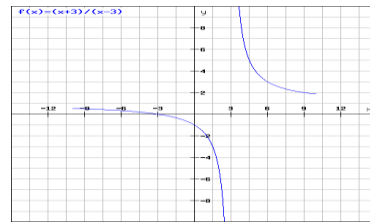


- 25.
26. $x = 1/5, -2/3$
27. $x = 4, -2$
28. $x = 5, -5$
29. $7\sqrt{2}$

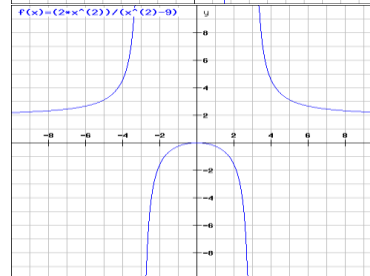
30. 9
31. $-2\sqrt[3]{2}$
32. $2x^3y^2\sqrt{5y}$
33. 3
34. e^5
35. $4e^4$
36. -3
37. $4x$

38. 4
39. $3(x + 4)/(x + 3)$
40. $1/(x + 3)^2$
41. $(5x^2 - 11x - 9)/[(x + 8)(x - 3)]$
42. $(-x + 1)/[(x + 7)(x - 2)]$

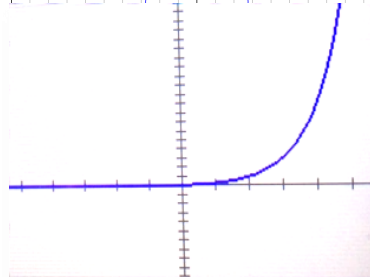
43.



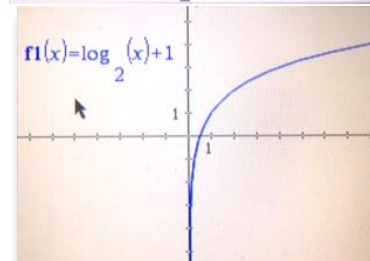
44.



45.



46.



47. $f(-3) = 3$
48. $f(4) = 2$
49. $x = -5$ or $x = 3$
50. Vertical stretch, shift right 1 unit, shift up 2 units
51. Shift left 4 units, reflection in x-axis
52. Domain $(-\infty, \infty)$ Range $[-3, \infty)$