

Summer Assignment for Students Going Into Elementary Functions

Directions:

- ☐ Complete this packet following the directions below:
 - ☐ Complete all problems in the space provided, showing all of your work. If there is no work to show, write a sentence or two explaining your answer. **Only questions with work and/or explanations will be counted as complete.**
 - ☐ Write your final answer/solution on the chart on the next page
 - ☐ Check your answers using the answer key on the last page of this packet.
 - ☐ If a question is wrong, that's okay! Check your work for any mistakes and try again :)
 - ☐ If multiple questions are wrong or you don't understand how to arrive at the correct answer, it's probably time to get extra help (see below)
- ☐ Bring this packet with you on the first day of school
 - ☐ While we will be looking at the chart to see trends across the class, your grade will be based on **completion** not correct answers.
 - ☐ Please draw a ☆ next to any topic you would like your teacher to review with you or the whole class.

Name: _____

Solution/Reflection Chart

Question	My Answer	Correct?
1		
2		
3		
4	Table & Graph	
5	Table & Graph	
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24	Graph	

25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36	Graph	
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		
51		

Given the points $A(-2, 6)$ and $B(4, -3)$, compute:

1. The slope of \overline{AB} :

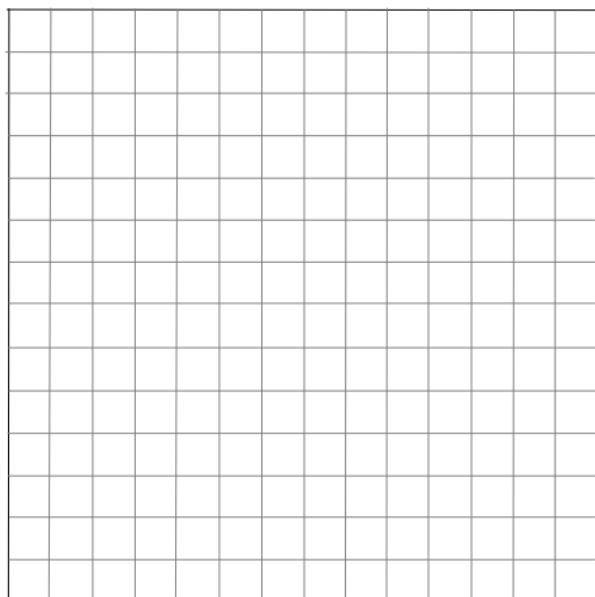
2. The y-intercept of \overline{AB} :

3. The x-intercept of \overline{AB} :

Make a table of values and sketch the graph for:

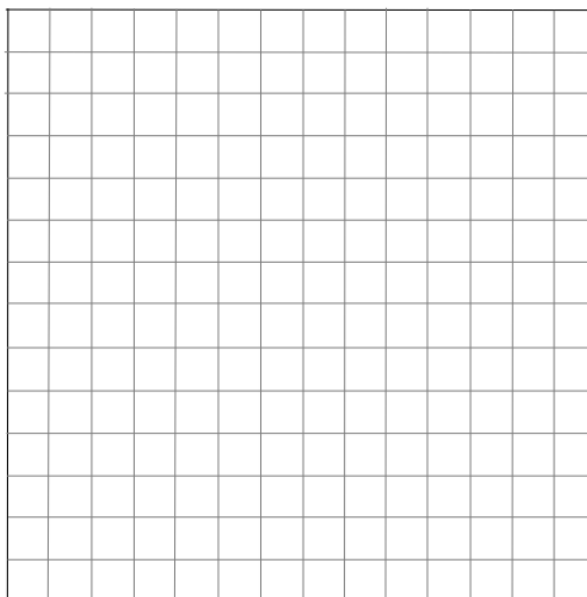
4. $y = 2x^2 - x - 9$

x							
y							



5. $y = \sqrt{x - 5} + 2$

x							
y							



Find the x- and y-intercepts of the graph of:

6. $y = |x + 1| - 3$

7. $y = x\sqrt{4 - x^2}$

8. Write an equation for the line passing through the points A (-1, 8) and B (6, 5) in slope - intercept form.
9. Write an equation for the line through (3, -2) that is *parallel* to the graph of $5x - 4y = 60$ in standard form.
10. Write an equation for the line through (-4, 9) that is *perpendicular* to the graph of $2x + 3y = 25$ in point-slope form.

Given the function defined by the piecewise as indicated below, find the requested values:

$$f(x) = \begin{cases} 2x + 1 & \text{for } x \leq -1 \\ x^2 + 2 & \text{for } x > -1 \end{cases}$$

11. $f(-2)$

13. $f(0)$

15. $f(2)$

12. $f(-1)$

14. $f(1)$

16. Find the domain of the function defined by $f(x) = \frac{x}{x^2 - x - 6}$

Use algebra (not your calculator!) to determine the zeros of the function

17. $f(x) = 3x^2 - 16x + 21$

18. $g(x) = x^3 - x^2 - 25x + 25$

Consider the functions defined by $f(x) = \frac{1}{x-5}$, $g(x) = x^2 - 4$, and $h(x) = \sqrt{x}$. Write and simplify the formula for AND identify any restrictions on the domain of each of the composite functions.

19. $f(g(x))$

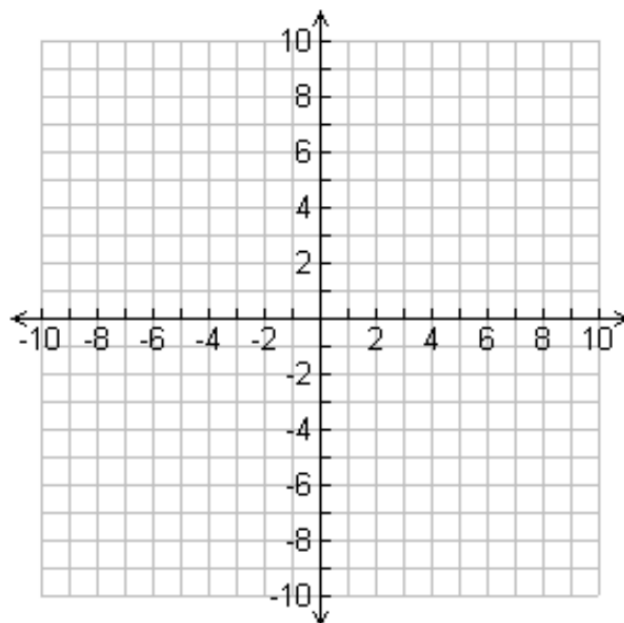
20. $(h \circ f)(x)$

21. $g(h(x))$

22. $(h \circ g)(x)$

23. Given the function $f(x) = 3x + 7$ find a formula for $f^{-1}(x)$, the inverse of f . Then verify algebraically that $f(f^{-1}(x)) = f^{-1}(f(x))$.

24. Sketch the graph of the quadratic function $y = -2x^2 + 4x + 1$. Label with coordinates all points of interest (e.g. vertex, axis of symmetry, intercepts)



25. Describe the end behavior of the polynomial function $g(x) = x^2 - x^3 + 2$

26. Use polynomial long division to divide: $(24x^2 - x - 8) \div (3x - 2)$

27. Use synthetic division to divide: $\frac{6x^4 - 4x^3 - 27x^2 + 18x}{x - 2}$

Using synthetic division, determine whether or not the given values of x are zeros of the function defined by $f(x) = 3x^3 - 8x^2 - 20x + 16$

28. $x = 4$

29. $x = -4$

30. $x = \frac{2}{3}$

31. $x = -1$

32. Given the function $h(x) = x^3 + 4x^2 - 25x - 28$, confirm that $x = 4$ is a zero. Then find all other zeros and write the complete factorization of $x^3 + 4x^2 - 25x - 28$.

Perform the indicated operations and write the result in standard $a + bi$ form.

33. $5i(13 - 8i)$

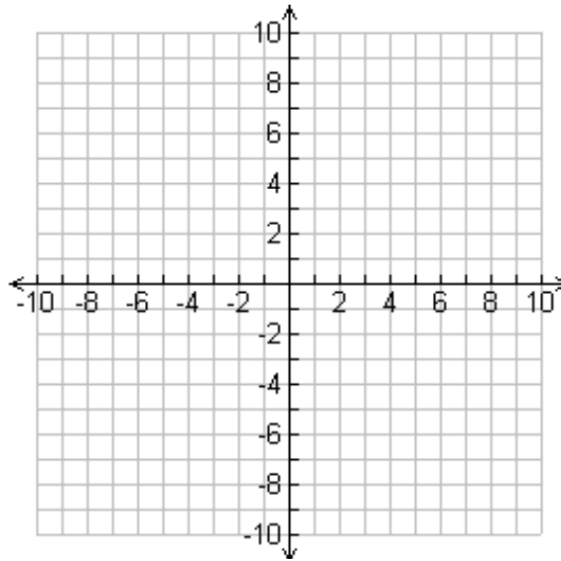
34. $(1 + 6i)(5 - 2i)$

35. $\frac{15}{1 + 2i}$

36. Sketch and label a graph of the system of inequalities. Shade the solution set.

$$2x + 3y < 24$$

$$y \geq x - 2$$



37. List all of the possible rational roots of the equation $3x^3 - 20x^2 + 7x + 30 = 0$

38. Mrs. Gottfried invests \$12,000 in an account that earns 5% annual interest compounded quarterly. Determine the cash value of her investment after 10 years' time.

39. The number of bacteria in a culture grows continuously at a rate of 6.5% per day. If there are 1000 bacteria initially, approximately how many will be present after 7 days' time?

Simplify the following rational expressions

$$40. \frac{4a+5}{3} + \frac{7a-9}{2}$$

$$41. \frac{2b}{b-3} - \frac{5b}{b+3}$$

$$42. \left(\frac{c^2-9}{c^2+3c+2} \right) \left(\frac{c^2+7c+10}{c^2+2c-15} \right)$$

$$43. \left(\frac{2d^2-32}{d^2-3d-4} \right) \div \left(\frac{2d^2+9d+4}{d^2+1} \right)$$

Solve each equation:

$$44. \sqrt{1-2a} = a + 17$$

$$45. \frac{2b+1}{3} - \frac{7b-5}{2} = 13$$

$$46. 27^{(3c+8)} = 9$$

$$47. \log_6(3d+14) = 2$$

Evaluate and/or simplify each expression:

48. $64^{1/2}$

49. $\left(\frac{25}{49}\right)^{\frac{1}{2}}$

50. $\left(\frac{27}{8}\right)^{-\frac{2}{3}}$

51. $\sqrt[3]{24x^{12}y^{16}}$

SOLUTIONS

1 $-\frac{3}{2}$	18 $x = 1, \pm 5$
2 $(0, 3)$	19 $\frac{1}{x^2 - 9}, x \neq \pm 3$
3 $(2, 0)$	20 $\sqrt{\frac{1}{x-5}}, x > 5$
4 <<see table/graph below>>	21 $ x - 4, x > 0$
5 <<see table/graph below>>	22 $\sqrt{x^2 - 4}, (-\infty, -2] \cup [2, \infty)$

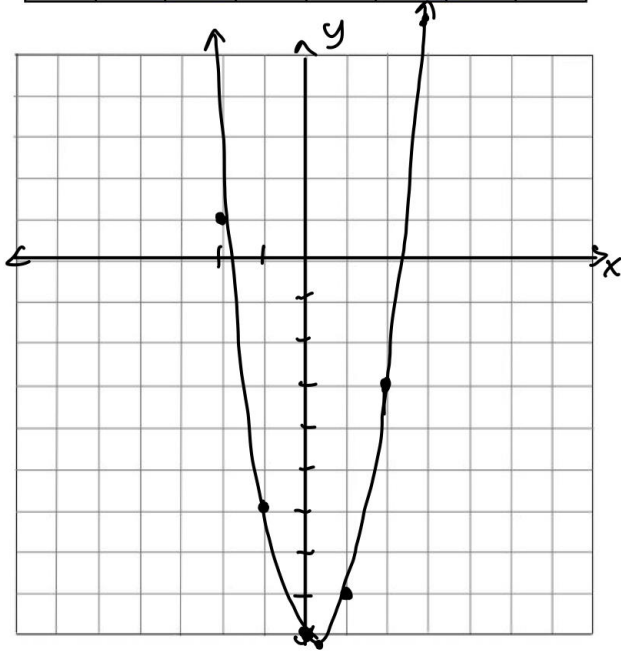
6	x-intercepts: (2,0), (-4,0) y-intercept: (0,-2)	23	$f^{-1}(x) = \frac{x-7}{3}$
7	x-intercepts: (0,0), (2,0), (-2,0) y-intercept: (0,0)	24	<<see graph below>>
8	$y = -\frac{3}{7}x + \frac{53}{7}$	25	As x approaches $+\infty$, y approaches $-\infty$ As x approaches $-\infty$, y approaches $+\infty$
9	$5x - 4y = 23$	26	$8x + 5 + \frac{2}{3x-2}$
10	$y - 9 = \frac{3}{2}(x + 4)$	27	$6x^3 + 8x^2 - 11x - 4 - \frac{8}{x-2}$
11	-3	28	yes
12	-1	29	no
13	2	30	yes
14	3	31	no
15	6	32	$h(x) = (x-4)(x+7)(x+1)$
16	$(-\infty, -2) \cup (-2, 3) \cup (3, \infty)$	33	$40+65i$
17	$x = \frac{7}{3}, 3$	34	$17+28i$

35	$3-6i$
36	<<see graph below>>
37	$\pm \left(1, \frac{1}{3}, 2, \frac{2}{3}, 3, 5, \frac{5}{3}, 6, 10, \frac{10}{3}, 15, 30\right)$
38	\$19,723.43
39	1576.173 bacteria
40	$\frac{29a-17}{6}$
41	$\frac{-3b^2+21b}{(b-3)(b+3)}$

42	$\frac{c+3}{c+1}$
43	$\frac{2(d^2+1)}{(d+1)(2d+1)}$
44	$a = -12$
45	$b = -\frac{61}{17}$
46	$c = -\frac{22}{9}$
47	$d = \frac{22}{3}$
48	8
49	$\frac{5}{7}$
50	$\frac{4}{9}$
51	$2x^4y^5 \sqrt[3]{3y}$

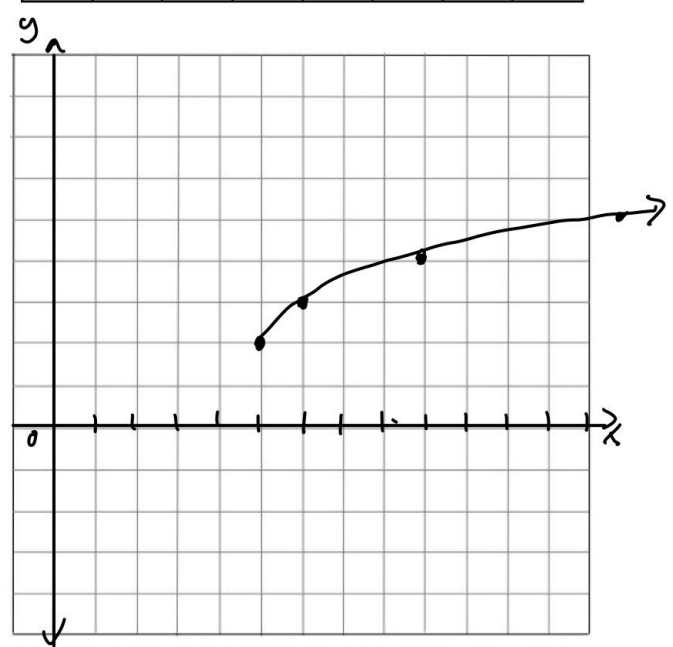
4. $y = 2x^2 - x - 9$

x	-2	-1	0	$\frac{1}{4}$	1	2	3
y	1	-6	-9	-9.125	-8	-3	6



5. $y = \sqrt{x - 5} + 2$

x	5	6	9	14	21	30	41
y	2	3	4	5	6	7	8



24.

