

Name: _____

Directions: Use the resources on the PowerSchool Learning page to assist you with the following questions. Advanced students must complete questions 1 - 22. Honors students must complete the whole packet.

For problems 1 through 3, solve each equation algebraically.

1. $(x + 2)^2 = x^2 - 6x + 1$

2. $3|2x - 3| - 5 = 4$

3. $2\sqrt{x-2} = 6$

For problems 4-6, solve the equation by factoring. Check your solutions in the original equation.

4. $x^2 + 5x - 24 = 0$

5. $10x^2 + 7x - 12 = 0$

6. $(x + a)^2 - b^2 = 0$

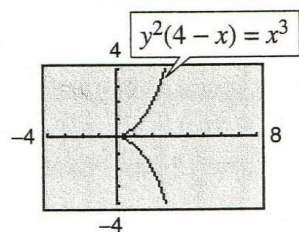
7. Solve the equation over the set of complex numbers.
 $(3x - 1)^2 + 6 = 0$

For problems 8 and 9, solve the quadratic equation by completing the square.

8. $x^2 + 4x - 32 = 0$

9. $9x^2 - 18x + 3 = 0$

10. Does the below graph represent y as a function of x ? Explain using at least one complete sentence.

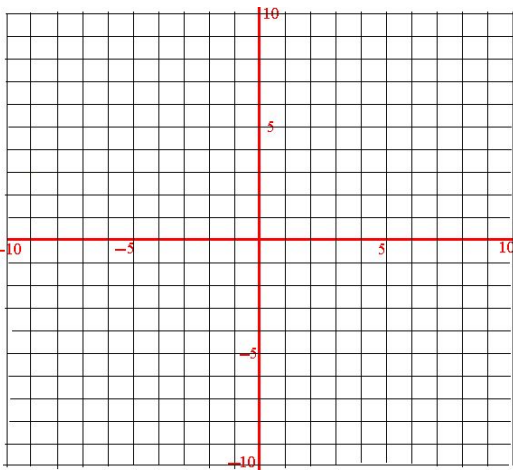


11. Evaluate $f(x) = |x + 2| - 15$ for $f(t - 6)$ and simplify.

12. An electronics company produces a car stereo for which the variable cost is \$5.60 and the fixed costs are \$24,000. The product sells for \$99.50. Write the total cost C as a function of the number of units produced and sold, x . Write the profit P as a function of the number of units produced and sold, x .

For problems 13-15, (a) identify the parent function f (e.g. $f(x) = |x|$), (b) describe the sequence of transformations from f to g , (c) sketch the graph of g , and (d) state the domain and range in interval notation.

13. $g(x) = -(x - 5)^2 + 3$



(a) Parent Function

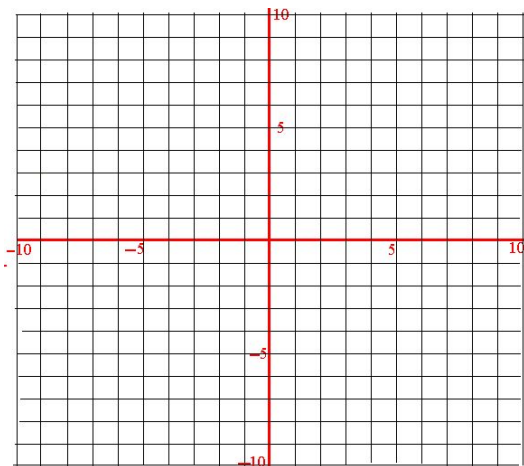
(b) Sequence of transformations:

(c) Sketch (*see graph*)

(d) Domain:

Range:

14. $g(x) = \sqrt{-x - 7}$



(a) Parent Function

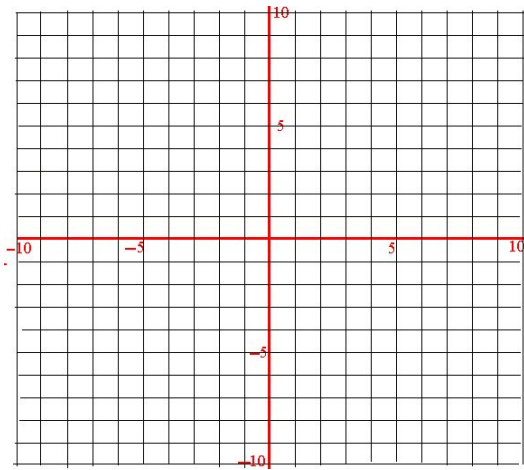
(b) Sequence of transformations:

(c) Sketch (*see graph*)

(d) Domain:

Range:

15. $g(x) = 4|x + 2| - 3$



(a) Parent Function

(b) Sequence of transformations:

(c) Sketch (*see graph*)

(d) Domain:

Range:

16. Use the functions $f(x) = x^2$ and $g(x) = \sqrt{2-x}$ to find the specified function and its domain.

(a) $(f - g)(x)$

(c) $(f \circ g)(x)$

(b) $(\frac{f}{g})(x)$

(d) $(g \circ f)(x)$

For problems 17 and 18, determine whether the function has an inverse that is also a function, and if so, find the inverse function. (Recall, for a function to have an inverse that is also a function, it must be one-to-one.)

17. $f(x) = x^3 + 8$

18. $f(x) = x^2 + 6$

19. Evaluate the function at each specified value of the independent variable, and simplify.

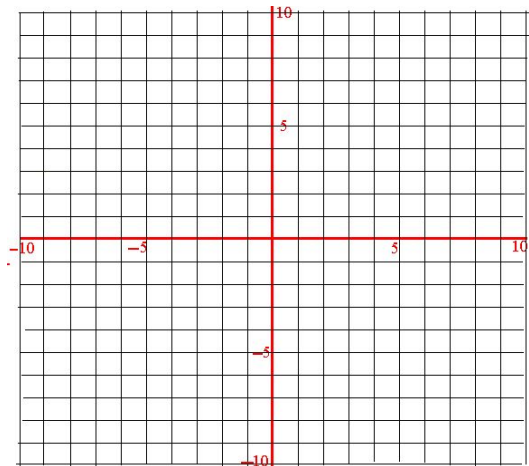
$$f(x) = -x^2 + 1$$

(a) $f(-1)$

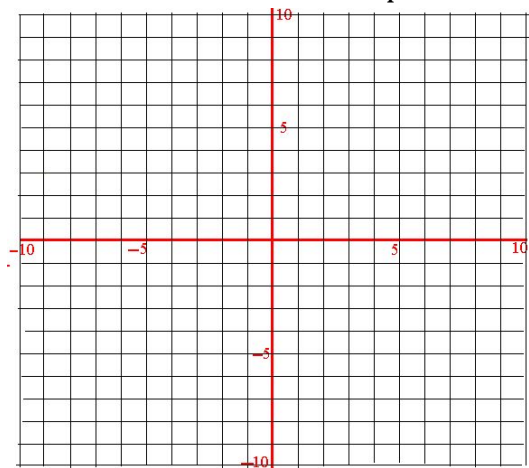
(b) $f(b^3)$

(c) $f(x - 1)$

20. Find the zeros of $f(x) = x^2 - x - 6$ by graphing. Indicate the zeros on the graph.



21. Sketch the graph of $f(x) = -(x - 2)^2(x + 5)$ without use of a graphing calculator. Clearly show the behavior at the x-intercepts as well as the end behavior.



22. Determine algebraically whether the function is even, odd, or neither.

$$f(x) = 2x^3 - 3x + 1$$

HONORS PRE-CALCULUS ONLY

23. Determine the intervals on which the polynomial is entirely negative and those on which it is entirely positive.

$$x^2 - 4x - 5$$

24. Divide using Long Division: $(2x^4 + 3x^3 + 5x - 1) \div (x^2 - 2x + 2)$

25. Divide using Synthetic Division: $(2x^4 + 5x^3 + 4x^2 + 5x + 2) \div (x + 2)$

26. Simplify the expression. Write your answer in the form $a + bi$

$$\frac{1-i}{4-5i}$$