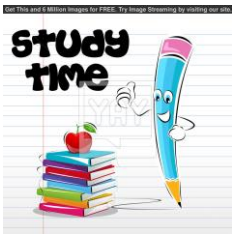
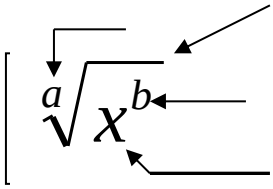


Unit #6 Radicals and Complex Numbers and *Unit #7 Transformations
Reflective Portfolio

Section #1: Vocabulary

Define each:

- **Redraw and label with the correct word (index, radicand, exponent, radical)**



- **Imaginary Number:**
- **Complex Number:**
- **Conjugate:**
- ***Even function:**
- ***Odd function:**

Section #2: Formulas/Equations/Rules

- **When two conjugates are multiplied together, you always get a positive _____ number.**
- **If the roots are imaginary, they will be _____ of each other.**
- **Powers of *i* repeat in a definite cycle:** i^0 = ____ i^1 = ___ i^2 = ____ i^3 = ____
- **Discriminant formula: _____**

Discriminant Rules: Complete the chart below!

If the discriminant is	The roots will be	# of x-intercepts	Sketch the graph
A negative number			
zero			
Positive perfect square			
Positive non-perfect square			

Example 1: Given the equation: $x^2 - 2x + 8 = 0$ Discriminant = _____

a) Describe the nature of the roots. b) Solve the equation. c) Sketch the graph.

***Transformation Rules:**

If $f(x)$ is the original function, **explain in words what each transformation below will do to** $f(x)$. Let *c* stand for a positive real number.

$f(x+c)$ _____

$f(x-c)$ _____

$f(x)+c$ _____

$f(x)-c$ _____

$-f(x)$ _____

$f(-x)$ _____

$c\,f(x)$ if $c > 1$ _____

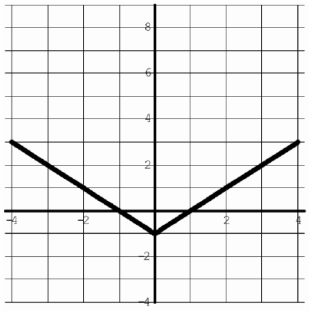
if $0 < c < 1$ _____

$f(cx)$ if $c > 1$ _____

if $0 < c < 1$ _____

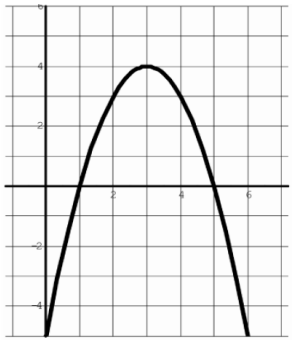
***Example 2:The function f(x) is graphed below. Graph g(x) and describe the transformation.**

a) $g(x) = 3f(x)$



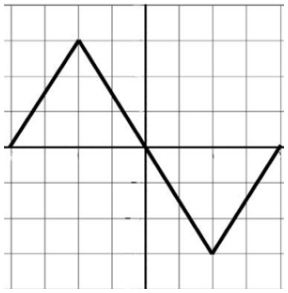
Transformation:

b) $h(x) = \frac{1}{2}f(x)$



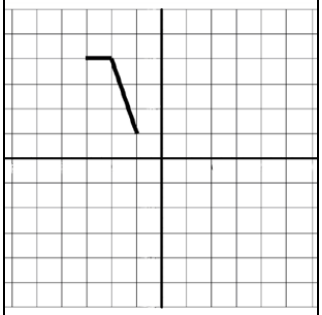
Transformation:

c) $j(x) = f(2x)$



Transformation:

d) $k(x) = f(\frac{1}{2}x)$



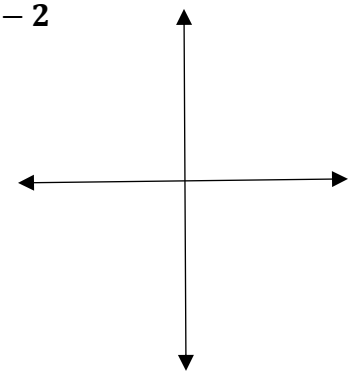
Transformation:

***Example 3: Evaluate Even and odd functions:**

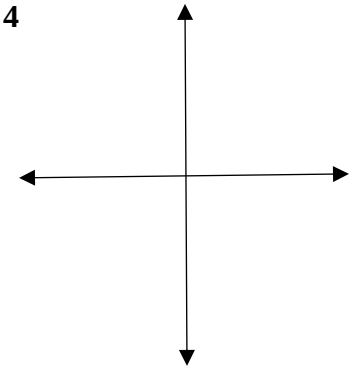
a) $f(x) = x^4$ **EVEN** $f(2) =$ _____ $f(-2) =$ _____ $f(x) =$ _____ $f(-x) =$ _____	b) $f(x) = x^5$ **ODD** $f(2) =$ _____ $f(-2) =$ _____ $f(x) =$ _____ $f(-x) =$ _____

***Example 4:Determine <u>algebraically</u> (test $f(-x)$) whether each of the following functions *is even, odd,* or *neither*. Then sketch each graph to verify. Justify graphically.**

A) $f(x) = x^3 - x - 2$



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



Section #3: Key methods and concepts –<u>Complete these specific examples!!!</u>

<u>Examples:</u>

- **<u>5) How to simplify radicals</u> (Write out the detailed steps for each example)**
  a) $\sqrt{48}$ **b)** $\sqrt[3]{48}$ **c)** $\sqrt[4]{48}$

- **6) How to add, subtract, multiply, divide radicals (rationalize denominator)**
  a) $2\sqrt[3]{x^4} \bullet \sqrt[3]{125x^7}$ b) $\sqrt[3]{9x^2} \bullet \sqrt[3]{6x^2}$ c) $\sqrt[3]{8x} + \sqrt[3]{16x} + \sqrt[3]{27x}$

- **<u>7) How do you rationalize a denominator using the conjugate</u>**
  $\dfrac{3-\sqrt{2}}{4+5\sqrt{2}}$

- **8) How to solve an equation containing a radical by isolating the radical**
  $\sqrt{4r - 4} + 4 = r$

- **How to simplify negative radicals**
  Always simplify negative radicals in terms of i
  Examples: 9) a) $\sqrt{-4}=$ b) $\sqrt{-18}=$

- **How to add, subtract, multiply, and divide(simplify) complex numbers**
  Treat i as a normal variable, but always simplify powers of i
  Example 10:

  a) $(3-4xi)-(6-3xi)$ **b)** $(3-4xi)(6-3xi)$

  c) $\dfrac{3-4i}{6-3i}$

- **How to simplify powers of i**
  If a whole number exponent is divided by 4, the remainder is 0, 1, 2, or 3.
  We can simplify powers of i by using the remainders after dividing by 4.
  Example 11: a) $i^{105}=$ b) $i^{64}=$

- **12) Multiplying conjugate pairs (5 + 3i)(5 - 3i)=**

Answers: 1) a) imaginary b) $1\pm\sqrt{7}i$ c) graph 2) a) v.s.by 3 b) v.c. by 2 c) h.c. by 2 d) h.s. by 2

3) a) 16, 16, x^4, x^4 b) 32, -32, x^5, $-x^5$ 4) a) neither b) even 5) a) $4\sqrt{3}$ b) $2\sqrt[3]{6}$ c) $2\sqrt[4]{3}$

6) a) $10x^3\sqrt[3]{x^2}$ b) $3x\sqrt[3]{2x}$ c) $5\sqrt[3]{x}+2\sqrt[3]{2x}$ 7) $\frac{22-19\sqrt{2}}{-34}$ 8) $r=10$ 9) a) $2i$ b) $3\sqrt{2}i$

10) a) $-3-xi$ b) $18-33xi-12x^2$ c) $\frac{2}{3}-\frac{1}{3}i$ 11) a) i b) 1 12) 34