Name: _____ Per: _____

Mid-Semester 1 Final Review

Unit 1

1.	Add. $-2\sqrt{7} + \sqrt{175}$	3.	If x is a real number, which best describes the values of x for which the inequality $x^2 > 0$ is true? **A.** all $x < 0$ **C.** all $x > 0$ **B.** $x \neq 0$ **D.** all real values of x
2.	Given the equation $y = xn$, where $y > 0$ and $n < 0$, which statement is valid for the real values of x? **A.** $x \leq 0$ **B.** $x > 0$ **C.** $y < x$ **D.** $x \neq 0$	4.	Simplify the expression $(4)^{-3}\ (2)^5\ (12)^0$.

Units 2 & 3

5.	Graph the system of equations. $\begin{cases} 5x - 3y = 15 \\ 2x + 4y = 12 \end{cases}$	9.	Solve the system. $\begin{cases} 4x + 2y = 12 \\ -4x - 3y = -16 \end{cases}$
6.	Graph the solution to the following inequality. $\lvert -2 - 4x \rvert \leq 18$	10.	Determine the number of solutions for the system. $\begin{cases} 6x + 4y = 2 \\ -24y + 36x = 12 \end{cases}$
7.	Graph the inequality. $y < \frac{5}{3}x - 2$	11.	Solve the system. $\begin{cases} x = 5y - 3 \\ 3x + 2y = 8 \end{cases}$
8.	Solve the system of equations. $\begin{cases} 2x + 4y - 3z = -8 \\ 7x + 9y - 2z = 4 \\ -2x - 5y + 3z = 11 \end{cases}$ **A.** (4, -4, 0) **C.** (5, 3, 2) **B.** (-4, 4, 0) **D.** (5, -3, 2)	12.	Given the equation $y = x - n$, where $x < 0$ and $-1 < n < 0$, which statement is valid for the real values of y? **A.** $y < x$ **C.** $y > x$ **B.** $y = x$ **D.** $y > 0$

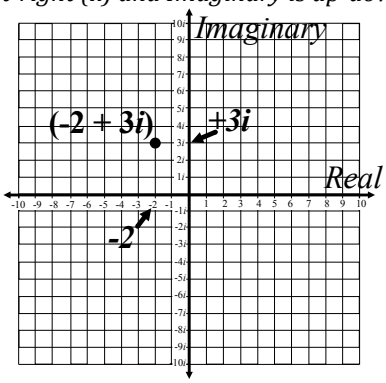
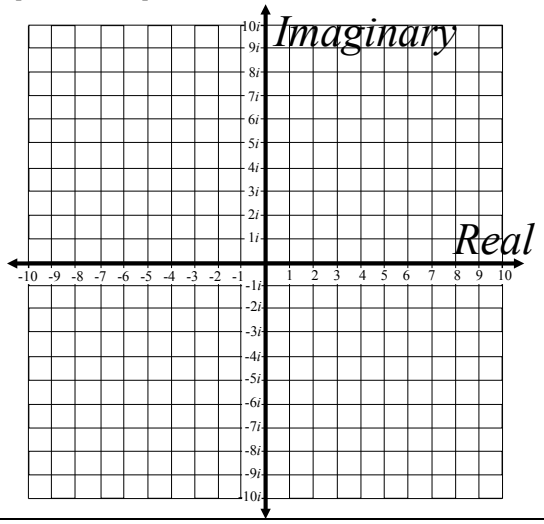
Unit 5

13.	Graph $f(x) = x^2 - 10x + 22$	17.	Find the complex conjugate of $7 - 4i$.
14.	Identify the axis of symmetry for the graph of $f(x) = 9x^2 - 36x + 4$	18.	Subtract. Write the result in the form $a + bi$. $(-7 + 16i) - (2 - 25i)$
15.	State whether the function has a maximum or minimum value and find it. $f(x) = -3x^2 + 6x - 4$	19.	Multiply. Write the result in the form $a + bi$. $-5i(2 - 7i)$
16.	Express $5\sqrt{-252}$ in terms of i.	20.	Simplify. $\frac{3 - 5i}{2 + 2i}$

Extension of Unit 5 skills you've already learned:

21.	Solve the equation $x^2 + 4x - 12 = 63$ *This is the same as saying:* $x^2 + 4x - 75 = 0$ *Factor/complete the square/use quadratic formula*	23.	Solve the equation $x^2 = -4 - 6x$ *This is the same as saying:* $x^2 + 6x + 4 = 0$ *Factor/complete the square/use quadratic formula*
22.	Find the roots of the equation $-2x^2 = 8x - 192$ by factoring. *This is the same as saying:* $-2x^2 - 8x + 192 = 0$ *Factor/complete the square/use quadratic formula*	24.	Graph $y > x^2 + 4x - 3$ *Graph* $y = x^2 + 4x - 3$ *Then, test (0, 0)—it'll either be inside the U or outside …If it works, shade the area where it is (inside or out). If it doesn't work, shade the area where it ISN'T .*

New Unit 5 skills:

<table>
<tr>
<td>EX</td>
<td>Write a quadratic function in standard form with zeros -2 and 3.
They've given you the solutions to the quadratic. Do the problem backwards to find the function.
If the zeros are -2 & 3, then the factors are the opposite…
If $x = -2$, then $x + 2 = 0$. If $x = 3$, then $x - 3 = 0$.
So… $(x + 2)(x - 3) = 0$
Multiply it out…
<table>
<tr><td></td><td>x</td><td>$+2$</td></tr>
<tr><td>x</td><td>x^2</td><td>$+2x$</td></tr>
<tr><td>-3</td><td>$-3x$</td><td>-6</td></tr>
</table>
$x^2 + 2x - 3x - 6 = 0$
$x^2 - x - 6 = 0$
$\boxed{f(x) = x^2 - x - 6}$</td>
<td>25.</td>
<td>Write a quadratic function in standard form with zeros 5 and 7.</td>
</tr>
<tr>
<td>EX</td>
<td>Graph the complex number $-2 + 3i$
It's just like graphing (x, y), only it's $(-2 + 3i)$
Instead of an <u>x-axis</u> and a <u>y-axis</u>,
it's a <u>real</u> and an <u>imaginary</u> axis.
Real is left-right (x) and Imaginary is up-down (y)
 
</td>
<td>26.</td>
<td>Graph the complex number $4 - 5i$
 
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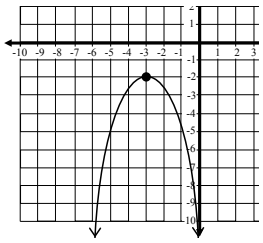
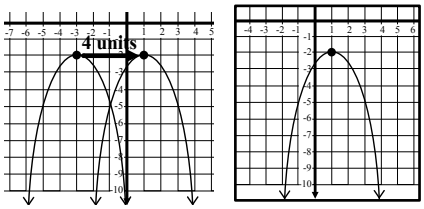
<tr>
<td>EX</td>
<td>A toy rocket is launched from the ground level with an initial vertical velocity of 32 ft/s. The position of the rocket can be tracked using the following equation $f(t) = -16t^2 + 32t$, where t is the time in seconds. After how many seconds will the rocket hit the ground?
You're looking for when it hits the ground—has a height of 0…
Determine the <u>zeros</u> of $f(t) = -16t^2 + 32t$
Or… $f(x) = -16x^2 + 32x$
$0 = -16x^2 + 32x$ divide by -16!
$0 = x^2 - 2x = x(x - 2)$
$x = 0, or\ x - 2 = 0$
$x = 0\ or\ 2$
At 0 seconds it lifted off. At 2 seconds it hit the ground again. So, the answer is $\boxed{2\ seconds}$.</td>
<td>27.</td>
<td>A toy rocket is launched from the ground level with an initial vertical velocity of 160 ft/s. The position of the rocket can be tracked using the following equation $f(t) = -16t^2 + 160t$, where t is the time in seconds. After how many seconds will the rocket hit the ground?</td>
</tr>
</table>

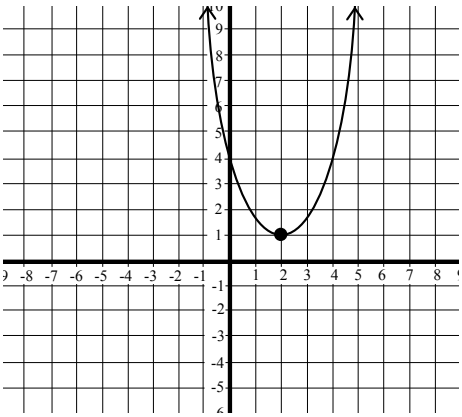
EX Use a table to translate the graph 4 units right.



You don't need a table—just move the whole parabola to the right 4 units.



28. Use a table to translate the graph 3 units down.



EX The parent function $f(x) = x^2$ is reflected over the y-axis, horizontally stretched by a factor of 5, translated right 4 units and down 3 units to create g. Use the description to write the quadratic function in vertex form.

In this word problem, they've given you RST and rst, and want you to write the equation in this format:

$$g(x) = RS(rs + t)^2 + T$$

RST are the VERTICAL pieces –
R (±): "reflect over x" (because that flips it up/down),
S (multiply by a number): "vertical stretch"
T (add a number): "translate up/down"

rst are the HORIZONTAL pieces
r (±): "reflect over y" (because that flips it left/right),
s (multiply by a number): "horizontal stretch"
s is a lie! If it says multiply by 5, divide by it!
t (add a number): "translate right/left"
t is a lie! If it says add (right) 4, subtract it!

VERTICAL		***HORIZONTAL***	
R	*(none)* $+$	r	*("over y")* $-$
S	*(none)* 1	s	*("H. stretch by 5")* $Lie \to 5 \quad Truth \to \frac{1}{5}$
T	*("down 3 units)* -3	t	*("right 4 units")* $Lie \to +4 \quad Truth \to -4$

$$g(x) = RS(rsx + t) + T$$

$$g(x) = +1\left(-\frac{1}{5}x + -4\right)^2 + -3$$

$$\boxed{g(x) = \left(-\frac{1}{5}x - 4\right)^2 - 3}$$

EX The parent function $f(x) = x^2$ is reflected over the x-axis, vert. stretched by a factor of 2, horizontally stretched by a factor of $\frac{4}{3}$, and translated left 7 units to create g. Use the description to write the quadratic function in vertex form.

VERTICAL		***HORIZONTAL***	
R	*(says "over x")* $-$	r	*(none)* $+$
S	*("V. stretch by 2")* 2	s	*("H. stretch by $\frac{4}{3}$")* $Lie \to \frac{4}{3} \quad Truth \to \frac{3}{4}$
T	*(none)* $+0$	t	*(says "left 7 units")* $Lie \to -7\ Truth \to +7$

$$g(x) = RS(rsx + t) + T$$

$$g(x) = -2\left(+\frac{4}{3}x + 7\right)^2 + 0$$

$$\boxed{g(x) = -2\left(\frac{4}{3}x + 7\right)^2}$$

29. The parent function $f(x) = x^2$ is reflected over the y-axis, horizontally stretched by a factor of 6, translated left 2 units, and up 8 units to create g. Use the description to write the quadratic function in vertex form.