Algebra 2 Name: Key Hour:_____

Review: Complex Numbers, Composite & Inverse Functions

Simplify the following:

1. $(-8i) - (6i)$

$\boxed{-14i}$

2. $(5i) + (5i)$

$\boxed{10i}$

3. $(-6 + 7i) + 2$

$\boxed{7i - 4}$

4. $(4 + 3i) + (3 + 4i)$

$\boxed{7i + 1}$

5. $(-2 - 7i) + (3 - 5i)$

$\boxed{-12i + 1}$

6. $(-8 + 5i) + (-1 - 7i)$

$\boxed{-2i - 9}$

7. $(3 + 6i) + (5 + 8i) + (+8 + -8i)$

$\boxed{6i + 16}$

8. $(-3 - i) + (7 - 3i) + (8 + 7i)$

$\boxed{3i + 12}$

$\boxed{i^2 = -1}$

9. $(3i)^3 = 3i \cdot 3i \cdot 3i$

$27 \cdot i^2 \cdot i$

$27 \cdot -1 \cdot i$

$\boxed{-27i}$

10. $(4i)(6 - 6i)$

$24i - 24i^2$

$24i - 24(-1)$

$\boxed{24i + 24}$

11. $(-6i)(-6i)$

$36i^2$

$36(-1)$

$\boxed{-36}$

12. $(-8 - 7i)(-4 + 6i)$

	-8	$-7i$
-4	32	$28i$
$6i$	$-48i$	$-42i^2$

$32 - 20i - 42i^2$

$32 - 20i + 42(+1)$

$\boxed{-20i + 74}$

13. $(8+2i)^2 = (8+2i)(8+2i)$

	8	2i
8	64	16i
2i	16i	$4i^2$

$64 + 32i + 4i^2$

$64 + 32i + 4(-1)$

$\boxed{32i + 60}$

14. $(-5-8i)(-5-7i)$

	-5	-8i
-5	25	40i
-7i	35i	$56i^2$

$25 + 75i + 56i^2$

$25 + 75i - 56$

$\boxed{75i - 31}$

15. $(4+6i)(-2+5i)(-2-6i)$

	4	6i
-2	-8	-12i
5i	20i	$30i^2$

$-8 + 8i - 30$

$(-38 + 8i)(-2 - 6i)$

	-2	-6i
-38	76	228i
8i	-16i	$-48i^2$

$76 + 48 + 212i$

$\boxed{212i + 124}$

16. $(4+8i)(1-6i)(1-8i)$

	4	-8i
-16i	-16i	$128i^2$
52	52	-416i

	1	-6i
4	4	-24i
8i	8i	$-48i^2$

$(-16i + 52)(1 - 8i)$

$\boxed{-432i - 76}$

Use the following functions for #16 – 21:

$f(x) = x^2 - 4x + 15$ $\quad g(x) = 2x^2$ $\quad h(x) = \sqrt{39 - x}$ $\quad k(x) = -3x + 2$

16. Find $(f - k)(x)$

$(x^2 - 4x + 15) + (+3x + 2)$

$\boxed{x^2 - x + 13}$

17. Evaluate $k(h(3))$

$-3x + 2$

$-3(\sqrt{39 - x}) + 2$

$-3\sqrt{39 - 3} + 2$

$-3\sqrt{36} + 2$

$-3(6) + 2$

$-18 + 2$

$\boxed{-16}$

18. Find $(fg)(x)$

$(x^2 - 4x + 15)(2x^2)$

$\boxed{2x^4 - 8x^3 + 30x^2}$

19. Evaluate $(g + k + f)(-1)$

$(2x^2) + (-3x + 2) + (x^2 - 4x + 15)$

$3x^2 - 7x + 17$

$3(-1)^2 - 7(-1) + 17 = \boxed{27}$

20. Find $\left(h/g\right)(x)$

$\boxed{\dfrac{\sqrt{39 - x}}{2x^2}}$

	-3x	2
-3x	$9x^2$	-6x
2	-6x	4

21. Find $(f \circ k)(x)$

$(-3x + 2)^2 - 4(-3x + 2) + 15$

$9x^2 - 12x + 4 + 12x - 8 + 15$

$\boxed{9x^2 + 11}$

Write the inverses of the given functions. Your answers should be in function notation. $f^{-1}(x) =$

22. $f(x) = 5x - 9$

$y = 5x - 9$

$x = 5y - 9$

$+9 \quad +9$

$\frac{x+9}{5} = \frac{5y}{5}$

$\boxed{f^{-1}(x) = \frac{x+9}{5}}$

23. $g(x) = 3(2x - 4)$

$y = 3(2x - 4)$

$\frac{x}{3} = \frac{3(2y-4)}{3}$

$\frac{x}{3} = 2y - 4$

$+4 \quad +4$

$\frac{\frac{x}{3}+4}{2} = \frac{2y}{2}$

$y = \frac{x}{6} + 2$

$\boxed{g^{-1}(x) = \frac{x}{6} + 2}$

24. $h(x) = 2x^2 + 7$ $\rightarrow$ $y = 2x^2 + 7$

$x = 2y^2 + 7$

$-7 \quad -7$

$\frac{x-7}{2} = \frac{2y^2}{2}$

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

$\boxed{h^{-1}(x) = \sqrt{\frac{x-7}{2}}}$

25. $f(x) = \frac{1}{3}x - 4$

$y = \frac{x}{3} - 4$

$x = \frac{y}{3} - 4$

$+4 \quad +4$

$3(x+4) = \frac{y}{3} \cdot 3$

$y = 3(x+4)$

$\boxed{f^{-1}(x) = 3x + 12}$

26. $g(x) = \sqrt{2x + 5}$

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

$x^2 = \sqrt{2y+5}^{\,2}$

$x^2 = 2y + 5$

$-5 \quad -5$

$\frac{x^2-5}{2} = \frac{2y}{2}$

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