Unit 2 Test 2 Review Name KEY Block_____

Expand the binomials using Pascal's Triangle.

1. $(x+3)^2$ $= \boxed{x^2+6x+9}$

$1 \quad (x)^2 \quad (3)^0 = 1\cdot x^2 \cdot 1 = x^2$
$2 \quad (x)^1 \quad (3)^1 = 2\cdot x\cdot 3 = 6x$
$1 \quad (x)^0 \quad (3)^2 = 1\cdot 1\cdot 9 = 9$

2. $(a-b)^3$ $= \boxed{a^3-3a^2b+3ab^2-b}$

$1 \quad (a)^3 \quad (-b)^0 = 1\cdot a^3\cdot 1 = a^3$
$3 \quad (a)^2 \quad (-b)^1 = 3\cdot a^2\cdot -b = -3a^2b$
$3 \quad (a)^1 \quad (-b)^2 = 3a\cdot b^2 = 3ab^2$
$1 \quad (a)^0 \quad (-b)^3 = 1\cdot 1\cdot -b = -b$

3. $(x-3)^5$ $= \boxed{x^5-15x^4+90x^3-270x^2+405x-243}$

$1 \quad (x)^5 \quad (-3)^0 = 1\cdot x^5\cdot 1 = x^5$
$5 \quad (x)^4 \quad (-3)^1 = 5\cdot x^4\cdot -3 = -15x^4$
$10 \quad (x)^3 \quad (-3)^2 = 10\cdot x^3\cdot 9 = 90x^3$
$10 \quad (x)^2 \quad (-3)^3 = 10\cdot x^2\cdot -27 = -270x^2$
$5 \quad (x)^1 \quad (-3)^4 = 5\cdot x\cdot 81 = 405x$
$1 \quad (x)^0 \quad (-3)^5 = 1\cdot 1\cdot -243 = -243$

4. $(4x+3)^3$

$1 \quad (4x)^3 \quad (3)^0 = 1\cdot 64x^3\cdot 1 = 64x^3$
$3 \quad (4x)^2 \quad (3)^1 = 3\cdot 16x^2\cdot 3 = 144x^2$
$3 \quad (4x)^1 \quad (3)^2 = 3\cdot 4x\cdot 9 = 108x$
$1 \quad (4x)^0 \quad (3)^3 = 1\cdot 1\cdot 27 = 27$

$= \boxed{64x^3+144x^2+108x+27}$

Use the four-step process to find the inverse of the following functions.

5. $f(x) = 2x - 5$

$y = 2x-5$
$x = 2y - \cancel{5}$
$+5 \qquad +\cancel{5}$
$\frac{x+5}{2} = \frac{2y}{2}$

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

6. $f(x) = \frac{1}{2}x + 3$

$y = \frac{1}{2}x+3$
$x = \frac{1}{2}y+3$
$(2)(x-3) = \frac{x}{2}y\left(\frac{2}{1}\right)$
$2x-6 = y$

$\boxed{f^{-1}(x) = 2x-6}$

7. $y = \sqrt{x+4}$

$(x)^2 = \left(\sqrt{y+4}\right)^2$
$x^2 = y+4$
$-4 \qquad -4$
$x^2-4 = y$

$\boxed{f^{-1}(x) = x^2-4}$

8. $y = \sqrt{x} - 3$

$x = \sqrt{y} - 3$
$+3 \qquad +3$
$(x+3)^2 = (\sqrt{y})^2$
$(x+3)^2 = y$

$\boxed{f^{-1}(x) = (x+3)^2 \text{ or } f^{-1}(x) = x^2+6x+9}$

9. $y = x^3 + 4$

$x = y^3+4$
$\sqrt[3]{x-4} = \sqrt[3]{y^3}$
$\sqrt[3]{x-4} = y$

$\boxed{f^{-1}(x) = \sqrt[3]{x-4}}$

10. $f(x) = \frac{x-3}{8}$

$y = \frac{x-3}{8}$
$8\cdot x = \frac{y-3}{\cancel{8}}\cdot \cancel{8}$
$8x = y-3$
$+3 \qquad +3$
$8x+3 = y$

$\boxed{f^{-1}(x) = 8x+3}$

Using **composition of functions,** prove (verify) that the following functions are inverses of each other. Don't forget to include a statement written as a complete sentence.

11. $f(x) = 2x - 6$, $g(x) = \frac{1}{2}x + 3$

① $f(g(x))$
$= 2x - 6$
$= 2(\frac{1}{2}x+3) - 6$
$= x + \cancel{6} - \cancel{6} = x$ ✓

② $g(f(x))$
$= \frac{1}{2}x + 3$
$= \frac{1}{2}(2x-6)+3$
$= x - 3 + 3 = x$ ✓

$\boxed{\star\ f(x) \text{ \& } g(x) \text{ are inverses}}$

12. $f(x) = x - 2$, $g(x) = x + 2$

① $f(g(x)) =$
$= x - 2$
$= (x+2) - 2$
$= x + \cancel{2} - \cancel{2}$
$= x$ ✓

② $g(f(x))$
$= x + 2$
$= (x-2)+2$
$= x - 2 + 2$
$= x$ ✓

$\boxed{\star\ f(x) \text{ \& } g(x) \text{ are inverses}}$

Given the relation, find the inverse relation. Write your answer in the blank provided.

13. (2, -3)

(-3, 2)

14. (4, 7)

(7, 4)

15. (0, 11)

(11, 0)

16. (-2, -15)

(-15, -2)

17. Find the inverse (algebraically) of the following function using the space below. Graph both functions and complete the table of values.

Original Function: $f(x) = 4x - 1$

Inverse Function: $f^{-1}(x) = \frac{x+1}{4}$

$y = 4x - 1$
$x = 4y - 1$
$x + 1 = 4y$
$\frac{x+1}{4} = \frac{4y}{4}$
$f^{-1}(x) = \frac{x+1}{4}$

Original	
X	Y
-2	-9
-1	-5
0	-1
1	3
2	7

Inverse	
X	Y
-9	-2
-5	-1
-1	0
3	1
7	2