Name Answer Key Date _____ Period _____

Accelerated Geometry
End of Year Algebra Review #5

Relations and Functions

Complete.

1. Given $f(x)=2x-1$ and $g(x)=x^2-x+3$, find $g[f(-2)]$. 33

$2(-2)-1$ $(-5)^2-(-5)+3$ $g[-5]$
$-4-1$ $25+5+3$
-5 33

Find the range of each function.

2. $F(t)=2t-2$, D = {-1, 0, 2}

ex values!
$2(-1)-2$ $2(2)-2$
$-2-2=-4$ $4-2=2$
$2(0)-2$
$0-2=-2$
$R=\{-4,-2,2\}$

3. $g(x)=x^2-1$, D = {-1, 0, 1}

$(-1)^2-1$
$1-1=0$
$(0)^2-1=$
$0-1=-1$
$(1)^2-1$
$1-1=0$
$R=\{-1,0\}$

Writing Equations of Lines

$Ax+By=C$

Write an equation in standard form for each line described.

4. through (6, 0); slope 4

$y-0=4(x-6)$
$y=4x-24$
$-4x+y=-24$
$4x-y=24$

5. slope $\frac{2}{3}$; y-intercept -5

$y=\frac{2}{3}x-5$
$-3\ \ 3\ \ -3$
$-\frac{2}{3}x+y=-5$
$2x-3y=15$

6. $(-4, 6), (-2, 5)$

$m=\frac{5-6}{-2-4}=\frac{-1}{2}$
$y-6=-\frac{1}{2}(x+4)$
$y-6=-\frac{1}{2}x-2$
$\frac{1}{2}x+y=4$ $\cdot 2$
$x+2y=8$

7. Has y-intercept 7 and is parallel to the graph of $y=5x-3$.

same slope! $m=5$ ∴ $\parallel m=5$

$y=5x+7$
$-5x+y=7$
$5x-y=-7$

8. Passes through the point (5, -3) and perpendicular to $y=\frac{1}{2}x-6$.

$m=\frac{1}{2}$ ∴ $\perp m=-2$

opposite reciprocals
$y+3=-2(x-5)$
$y+3=-2x+10$
$2x+y=7$

Properties of Exponents

Zero Product Property	$a^0 = 1, a \neq 0$	Any number raised to the power of zero is 1
Power of a Product Property	$(ab)^m = a^m b^m$	Multiply exponents of each term within parentheses
Power of a Power Property	$(a^m)^n = a^{mn}$	Multiply exponents
Product of Powers Property	$a^m \bullet a^n = a^{m+n}$	When multiplying terms with common bases, add exponents
Negative Exponent Property	$a^{-m} = \frac{1}{a^m}, a \neq 0$	When you have a negative exponent in the numerator, move the term to the denominator to make positive.
Quotient of Powers Property	$\frac{a^m}{a^n} = a^{m-n}, a \neq 0$	When dividing, if there are common bases, subtract exponents.
Power of a Quotient Property	$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$	Raise both the numerator and the denominator to the power of the exponent.

Simplify.

9. $(4x^2)^0$

1

10. $(-6xy)^3$

$-6^3 x^3 y^3$

$-216 x^3 y^3$

11. $4x(3x^2)^2$

$4x \cdot 3^2 x^4$

$4x \cdot 9x^4$

$36x^5$

12. $x^6y \bullet y^9z$

$x^6 y^{10} z$

13. $-14a^{-3}$

$\frac{-14}{a^3}$

14. $\frac{8a^5}{2a^2} = 4a^3$

15. $\frac{(12x^2y^6)^2}{8x^7y^7} = \frac{12^2 x^4 y^{12}}{8x^7y^7}$

$\frac{144 y^5}{8 x^3}$

$\frac{18y^5}{x^3}$

16. $(p^2q)^{-2}$

$p^{-4} q^{-2} = \frac{1}{p^4 q^2}$

17. $\left(\frac{3x^{-2}y^6z^{-5}}{6x^6y^{-6}z^4}\right)^{-2}$

$\frac{3^{-2} x^4 y^{-12} z^{10}}{6^{-2} x^{-12} y^{12} z^{-8}}$

$= \frac{36 x^4 x^{12} z^{10} z^8}{9 y^{12} y^{12}}$

$= \frac{4x^{16} z^{18}}{y^{24}}$

Inverse of a Relation

- To find the inverse of a relation expressed as an equation, interchange x and y in the given equation and isolate y.

Find the inverse of the function.

18. $f(x) = 2x - 3$

$y = 2x - 3$

$x = 2y - 3$

$+3 \quad +3$

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

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

$f^{-1}(x) = \frac{x+3}{2}$

19. $f(x) = (x+1)^2$

$y = (x+1)^2$

$\sqrt{x} = \sqrt{(y+1)^2}$

$\pm\sqrt{x} = y + 1$

$-1 \quad -1$

$\pm\sqrt{x} - 1 = y$

$f^{-1}(x) = \pm\sqrt{x} - 1$

How to find the discriminant:

1. Use $b^2 - 4ac$
2. positive number = 2 solutions, zero = 1 solution, negative number = 0 solutions

★ Quadratic must be in standard form!

Find the discriminant and determine the number of solutions.

20. $3x^2 = 8x - 3$

$3x^2 - 8x + 3 = 0$

$a = 3$

$b = -8$

$c = 3$

$(-8)^2 - 4(3)(3)$

$64 - 36$

Discriminant 28

# of solutions 2

21. $2x^2 + 8x = -8$

$2x^2 + 8x + 8 = 0$

$a = 2$

$b = 8$

$c = 8$

$(8)^2 - 4(2)(8)$

$64 - 64$

Discriminant 0

# of solutions 1

22. $-x = 7x^2 + 4$

$0 = 7x^2 + x + 4$

$a = 7$

$b = 1$

$c = 4$

$(1)^2 - 4(7)(4)$

$1 - 112$

Discriminant -111

# of solutions 0

23. $2x = x^2 - x$

$0 = x^2 - 3x$

$a = 1$

$b = -3$

$c = 0$

$(-3)^2 - 4(1)(0)$

$9 - 0$

Discriminant 9

# of solutions 2

Graphing Quadratic Functions

- Standard Form: $y = ax^2 + bx + c$
- To find the x of the vertex and axis of symmetry use: $x = \frac{-b}{2a}$
- To find the y of the vertex, plug in x value to the original equation and simplify
- The y-intercept is the c value of the standard form equation
- If the a value is positive, the parabola opens upward (vertex is minimum)
- If the a value is negative, the parabola opens downward (vertex is maximum)
- Domain: x values of function
- Range: y values of function

* Create a table of values for 2 pairs of points * reflect over axis of symmetry

Give the specified information and Graph the parabola on the coordinate plane provided.

24. $y = -2x^2 + 8x + 2$

$x = \frac{-8}{2(-2)} = \frac{-8}{-4} = 2$

$-2(2)^2 + 8(2) + 2 = -2(4) + 16 + 2 = -8 + 18$

Vertex: (2, 10)

Axis of Symmetry: $x = 2$

y-intercept: (0, 2)

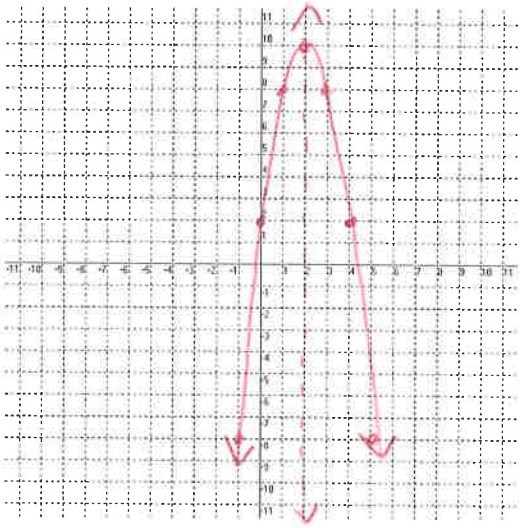
Opens up/down? down

Max/Min value? max 10

Domain: all $\mathbb{R}$

Range: $y \leq 10$

x	y
1	8
3	8
-1	-8
5	-8



25. $y = x^2 - 2x - 3$

$x = \frac{-(-2)}{2(1)} = \frac{2}{2} = 1$

$(1)^2 - 2(1) - 3$

$1 - 2 - 3 = -4$

Vertex: (1, -4)

Axis of Symmetry: $x = 1$

y-intercept: (0, -3)

Opens up/down? up

Max/Min value? min -4

Domain: all $\mathbb{R}$

Range: $y \geq -4$

x	y
-1	0
3	0
-2	5
4	5