DynaNotes™ Review Guide

# A2 Algebra II End-of-Course

DYNA NOTES

DYNANOTES™ TOOLS FOR EXPLOSIVE LEARNING

## Category 1 – Properties and Attributes of Functions

### DOMAIN AND RANGE

**function:** relation such that each $x$-value has just one $y$-value; no $x$-coordinate is repeated; a vertical line drawn on a function's graph only crosses at one point

**domain:** $x$-values; "input" values

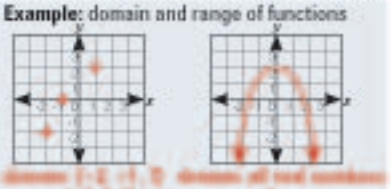
**range:** $y$-values; "output" values

**closed point:** point is included

**open point:** point is not included

**Examples:** {(2, 2), (2, 3)} is not a function ($x$-value is repeated); {(1, 2), (5, 2), (3, 4)} is a function. domain: {1, 5, 3}, range: {2, 2, 4}

**Example:** domain and range of functions



### DATA ANALYSIS AND INTERPRETATION

Organize data (tables, graphs, or equations) to make predictions or judgments.

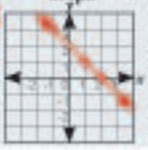
**Example:** Show that (3, −1) is part of this function.

**Equation Notation** $y = -x + 2$

**Function Notation** $f(x) = -x + 2$

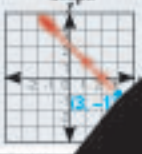
| Table | |
|---|---|
| −1 | 3 |
| 1 | 1 |
| 2 | 0 |

Graph



**Answer:** (3, −1) lies on function's graph and satisfies the equation $y = -x + 2$, where $y = -3 + 2 = -1$

Graph



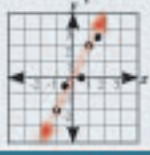
**scatterplot:** graph of ordered pairs on a coordinate plane; use points on the best-fit line to approximate linear equations and to interpret correlations

| Correlation | positive | negative |
|---|---|---|
| Trend Direction | upward | downward |
| Sketch | | |

**Example:** Plot the data and find a linear equation to approximate the correlation.

| Data Table | |
|---|---|
| −1 | −2 |
| −0.5 | −0.5 |
| 0.5 | 0 |
| 1 | 2 |
| 1.5 | 2.5 |

Scatterplot



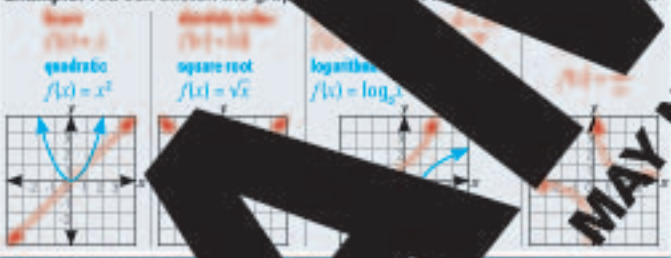
**Answer:** positive correlation, $y = 2x$

### PARENT FUNCTIONS

**parent function:** simplest form of a func

**Example:** $f(x) = x$ is the parent funct

**Example:** You can sketch the gra




### CHANGES IN FUNCT

**parameter:** variable, often changes the pa function's graph

**Example 2:** As th olute value of he parameter creases in the linear nction $f(x) = + b$, the function's pe bec steeper. Changing the ramet moves the -intercept from (0, 0) for the paren (0, moving the gra

### A FUNC

nction, $f^{-1}(x)$ on $f(x)$ and y-coordinates are that the dom of its inverse; the two reflections reflect $y = x$; if no horizontal line through int on ction, then its inverse is als

**Example 1:** the inverse of {(1, 2), (6, 3)}?

**Answer 1:** {(2, 1), (3, 6)}

**Example 2:** To find the inverse of $y = x$ and then solve for $y$.

**Answer 2:** Reversing $x$ and $y \rightarrow x = y$

**Example 1:** Is the inverse of $f(x) = 2x - 4$?

$g(f(x)) = g(2x - 4) = \frac{1}{2}(2x - 4) + 2 = x - 2 + 2 = x$

**Answer 1:** Yes, $g(x)$ is the inverse of $f(x)$, because $g(f(x)) = x$

**Example 2:** Show that $f(x)$ is also the inverse of $g(x)$.

**Answer 2:** $f(g(x)) = f(\frac{1}{2}x + 2) = 2(\frac{1}{2}x + 2) - 4 = x + 4 - 4 = x$

*Note: $f(g(x))$ can also be shown using notation $f \circ g(x)$*


## Category 2 – Representation Tools to Solve Problems

### FACTORING, EXPONENTS, AND X NUMBERS

**factor:** to show a polynomial as a p simpler polynomial(s) or monomial(s)

| Polynomial | Factoring Descri | Example |
|---|---|---|
| $a^2 - b^2$ | $= (a + b)(a - b)$ s of squ | $x^2 - 9 = (x + 3)(x - 3)$ |
| $a^2 + 2ab + b^2$ | $= (a + b)^2$, per e trinor | $x^2 + 8x$ $= (x + 4)^2$ |
| $a^2 - 2ab + b^2$ | $= (a - b)^2$, e trin | $x^2 -$ $- 3)^2$ |
| $x^2 + bx + c$ | 1 positive | $x^2 +$ $b$ $x^2 +$ $(x + 3)$ |
| $x^2 - bx + c$ | 2 negative nu | $n = -b$ $(x - 2)(x - 3)$ |
| $x^2 + bx - c$ | 1 negative numbe | $m = b$ $= (x - 7)$ |
| $ax^2 + bx + c$ | can factor by groupi | $x + 9 =$ |

in form $ax^2 + mx + nx + c$, and $m + n = b$; group into tw terms; factor out the greatest factors; factor out the

$2x +$ $+ 12x)$ $+ 9) =$ $+ 3) =$ $3)$

$a^3 - b^3$ $(a - b)(a^2 + ab + b^2)$, difference of cu $x^3 -$ $2)(x^2 + 2x + 4)$

$a^3 +$ $b)(a^2 - ab + b^2)$, sum $+ 1)(x^2 - x + 1)$

Exam inomials $(x +$ $8 = x^2 + 2x - 8$

FOIL: First

ubtrac Example: $5x^3 + 4x^2 + x = 9x^3 + x$

/divisio add c act exponents

mple 2: $\frac{a^5}{a^2} = a^{5-2} = a^3$

negati ent: equal to rec ocal of ter sitive exponent Example 1: $\frac{1}{x^3} = x^{-3}$ $x^{-3} = \frac{1}{x^3}$ Example 2: $\frac{1}{x^{-3}} = x^3$ $\frac{1}{x^{-3}} = x^3$

ra wer: raise both variable nd constant (coefficient) and then y exponents as in $(xy)^3 = x^3y^3$ and $(x^3)^3 = x^{3 \cdot 3}$

le 1: $(xy^2)^3 = x^3y^{2 \cdot 3}$ $= x^3y^6$ Example 2: $x^4 = 1$, for $x \neq 0$ $16^0 = 1$ $(-5)^0 = 1$ Example 3: $\sqrt{x} = x^{\frac{1}{2}}$ $\sqrt{16a^8} = 4a^{8 \cdot \frac{1}{2}} = 4a^4$

tions: work m in the following order: (1) groupings (brackets o (2) ex (3) m e, (4) subtract

**Example:** Solve $x^2 - 4x + 13 = 0$ with quadratic formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, $a = 1$, $b = -4$, $c = 13$

complex mber: a in standard rm where $a$ is rt and $bi$ is ary part $i = \sqrt{-1}$, then $i^2 = -1$, $i^3 = i = \sqrt{-1}$, ...

$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(13)}}{2(1)} = \frac{4 \pm \sqrt{16 - 52}}{2} = \frac{4 \pm \sqrt{-36}}{2}$

$x = \frac{4 \pm 6i}{2} = 2 \pm 3i$ (two complex numbers)

### STEMS OF EQUATIONS OR INEQUALITIES

equat escribes 2 equal expressions; uses = sign; graph with solid line (——)

| Symbol | < | > | ≤ | ≥ |
|---|---|---|---|---|
| Line | dashed | dashed | solid | solid |
| Shading | below | above | below | above |

ity: describes 2 unequal expressions

ms: 2 or more equations or inequalities with 2 or more (same number) variables

mulate systems of equations or inequalities using expressions and variables.

**Example:** Reggie has a total of 15 rock and country CDs, and he has 3 fewer rock CDs than country CDs. The number of rock CDs is shown by the variable $r$ and the number of country CDs with $c$. Show this system of equations.

Equation 1: $r + c = 15$ *+describes total number of CDs*

Equation 2: $r = c - 3$ *+shows there are 3 fewer rock CDs than country CDs*

Graphs, tables, matrices, or algebraic methods can be used to solve systems. Solve two equations or inequalities with two unknowns using substitution:

1. Simplify one equation in terms of a single variable.
2. Substitute this variable into the second equation.
3. Simplify the second equation so the remaining variable is alone on one side and solve for this variable.
4. Substitute this variable's solution into the original equation and solve for the remaining variable.

**Example:** Find $r$ and $c$, if $r = c - 3$ and $r + c = 15$.

Step 1. $r = c - 3$

Step 2. $(c - 3) + c = 15$

Step 3. $2c = 18$, so $c = 9$

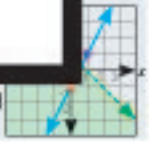
Step 4. $r = 9 - 3 = 6$

get -2) on se, $x$). ons; ite

des by r $y$

that are impossible (like negative area or time).

is not, because it is not in the shaded area below the green dashed line.







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