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Algebra, Part 2 (Quick Study)

ALGEBRA - Part 2

GRAPHING

REAL NUMBER LINE
 Chart of the graph of the real number line, of solutions to inequalities in one variable.

SYMBOL & GRAPHIC NOTATION

Ex. $x = 2$	
$x > 2$	
$x < 2$	
$x \leq 2$	
$x \geq 2$	
$x \neq 2$	

* Direction of ray is determined by picking (at random) a value on each side of the object. Ray goes in direction of the point which makes the inequality true.

ABSOLUTE VALUE STATEMENTS

- EQUATIONS:** To solve $|ax| = b$, where $a > 0$, solve both equations $ax = b$ and $ax = -b$, and graph the union of the two solutions.
- Inequalities:**
 - To solve $|ax| < b$, where $a > 0$, solve $ax < b$ and $ax > -b$; these two inequalities may be written as $-b < ax < b$. If $a < 0$, graph the intersection of the two solutions.
 - To solve $|ax| \geq b$, where $a > 0$, solve $ax \geq b$ or $ax \leq -b$; if $a < 0$, graph the union of the two solutions.

RECTANGULAR (OR CARTESIAN) COORDINATE SYSTEM

Method: using two perpendicular lines (forming an 90° degree angle) for locating and naming points of a plane. The vertical line is the **Y-axis**. The horizontal line is the **X-axis**. The point where the lines intersect is called the **origin**.

LOCATING POINTS (ORDERED PAIRS)

Each point on coordinate plane is located or labeled by using an ordered pair of numbers separated by a comma and enclosed in a set of parenthesis; first number is **x-coordinate** or **abscissa**; second number is **y-coordinate** or **ordinate**; that is, an ordered pair is of the form (x,y) . The origin is $(0,0)$.

QUADRANTS

The x-axis and the y-axis separate the plane into fourths. Each fourth is called a **quadrant**. The quadrants are labeled using Roman numerals, starting in the upper right section, and continuing counter-clockwise through quadrants I, II, III, and IV which is located in the lower right section.

DISTANCE FORMULA: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Find distance between two points, (x_1, y_1) and (x_2, y_2) , is derived from the application of the Pythagorean Theorem and always results in a non-negative number.

MIDPOINT FORMULA: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

Determine the coordinates of the midpoint of a line segment with end points of (x_1, y_1) and (x_2, y_2) .

LINES

SLOPE OF A LINE
 The slope of a line can usually be described in the form of the line. If the line starts up on the right end of the line then the slope will be a positive number. If the line starts up on the left end of the line then the slope will be a negative number. If the line is horizontal then the slope is zero. If the line is vertical, then the slope is undefined.

FORMULA: If a line is not vertical then the slope, indicated by m , can be found using two distinct points $A = (x_1, y_1)$ and $B = (x_2, y_2)$ of the line using two coordinates and point-slope form in the formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{where } x_1 \neq x_2 \quad \text{and } x_2 \neq x_1$$

PARALLEL: The slopes of parallel lines are equal.

PERPENDICULAR: The slopes of perpendicular lines are negative reciprocals. If the slope of L_1 is m_1 and the slope of L_2 is m_2 , and the lines are perpendicular then $m_1 \cdot m_2 = -1$, or $m_2 = -\frac{1}{m_1}$. If the slope of L is -2 , then the slope of the line which is perpendicular to it is $\frac{1}{2}$.

LINEAR EQUATIONS (EQUATIONS OF LINES)

- Since the coordinate system has two axes, there are two types of lines which intersect the **x-axis**: one the **x-intercept** is the **x** in the linear equation, and lines which intersect the **y-axis**: one the **y-intercept** is the **y** in the linear equation, and lines which intersect both the **x-axis** and the **y-axis** have both **x** and **y** in the linear equation.
- Slope-Intercept Form:** Equation of a line is $y = mx + b$ where m is the slope of the line and b is the **y-intercept** (**y**-value of the point where the line intersects **y**-axis).
- Standard Form:** The equation of a line is $ax + by = c$ where the **x** and **y** terms have no **coefficients** and **c** is a **constant** note that the **b** does not represent the **y-intercept** in this form.

GRAPHING

When graphing a line, there are 3 types:

- Horizontal lines have equations which simplify to the form $y = b$ where b is the **y-intercept**. The slope of these lines is zero.
- Vertical lines have equations which simplify to form $x = a$, where a is the **x-intercept**. They have no slope.
- Find at least two points** which make the equation true and are there on the line. Finding a third point is one method of checking for errors. Note: If you can't find two points to form a line then there is an error in at least one of the points. To find these points:
 - Choose **x** or **y** and solve.
 - Substitute the number into the linear equation for either the **x** or the **y** variable in the equation.
 - Solve the resulting equation for the other variable.
 - The randomly selected number (say x) and solution (say y) which in one point. (x, y) .
 - Repeat this step as though it were as indicated until the desired number of points are located.
 - Plot points and connect them; resulting graph should be a line.
- Plot the x-intercept and the y-intercept.**
 - Substitute zero for the **y** variable in the equation and solve for **x** to find the **x-intercept**.
 - Substitute zero for the **x** variable in the equation and solve for **y** to find the **y-intercept**.
 - Plot the two points and draw the graph of the line which contains them.
- NOTE:** Line may start at the origin ($0,0$), since there is at least one other point located in order to draw the graph of the line.
- Write the equation in the slope-intercept form:** plot the point where the line crosses the **y**-axis (the **b** value) use the slope to plot additional points on the line (one more point). Connect the points to draw the graph of the line.
- Find the slope of the line and one point on the line.** Plot the point that has the slope to plot additional points on the line. That is, repeat the **NOTE** for the **y**-intercept at the point which was just plotted.



Synopsis

Algebra 2 is the advanced QuickStudy guide specially designed for students who are already familiar with Algebra 1.

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Customer Reviews

Cant wait for my daughter to se it this semester, very well constructed.

High quality and delivered on time.

I love it!!!!!!

I wish they would package it so it didn't get bent being stuffed in my mailbox, but good reference, concise source for formulas. Glad I bought it.

perfect for my kids they are in middle and high school and after the summer need a refresher before school starts this gives them the basic information they need before class starts then if they still need to refer to it while in school it is perfect

My son loves these quick study/class aids. I like that they are pre-punched and have a coating for them. My son likes them because they are very handy and he can usually find items he is looking

for without having to flip through a text book.

I forgot to mention that the second page has dark greasy smudge marks and dust..I guess this was not in New condition like it said.

Yet another handy reference guide. I own several and they are a great way to look up information without needing the internet or thumbing through a book.

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