

High School: Algebra » Reasoning with Equations & Inequalities

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Standards in this domain:

CCSS.MATH.CONTENT.HSA.REI.A.1	CCSS.MATH.CONTENT.HSA.REI.A.2	CCSS.MATH.CONTENT.HSA.REI.B.3
CCSS.MATH.CONTENT.HSA.REI.B.4	CCSS.MATH.CONTENT.HSA.REI.C.5	CCSS.MATH.CONTENT.HSA.REI.C.6
CCSS.MATH.CONTENT.HSA.REI.C.7	CCSS.MATH.CONTENT.HSA.REI.C.8	CCSS.MATH.CONTENT.HSA.REI.C.9
CCSS.MATH.CONTENT.HSA.REI.D.10	CCSS.MATH.CONTENT.HSA.REI.D.11	CCSS.MATH.CONTENT.HSA.REI.D.12

Understand solving equations as a process of reasoning and explain the reasoning.

[CCSS.MATH.CONTENT.HSA.REI.A.1 \(HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/HSA/REI/A/1/\)](#)

Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

[CCSS.MATH.CONTENT.HSA.REI.A.2 \(HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/HSA/REI/A/2/\)](#)

Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

Solve equations and inequalities in one variable.

[CCSS.MATH.CONTENT.HSA.REI.B.3 \(HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/HSA/REI/B/3/\)](#)

Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

[CCSS.MATH.CONTENT.HSA.REI.B.4 \(HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/HSA/REI/B/4/\)](#)

Solve quadratic equations in one variable.

[CCSS.MATH.CONTENT.HSA.REI.B.4.A \(HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/HSA/REI/B/4/A/\)](#)

Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the

same solutions. Derive the quadratic formula from this form.

[CCSS.MATH.CONTENT.HSA.REI.B.4.B](http://www.corestandards.org/math/content/HSA/REI/B/4/B/) ([HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/HSA/REI/B/4/B/](http://www.corestandards.org/math/content/HSA/REI/B/4/B/)).

Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .

Solve systems of equations.

[CCSS.MATH.CONTENT.HSA.REI.C.5](http://www.corestandards.org/math/content/HSA/REI/C/5/) ([HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/HSA/REI/C/5/](http://www.corestandards.org/math/content/HSA/REI/C/5/)).

Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

[CCSS.MATH.CONTENT.HSA.REI.C.6](http://www.corestandards.org/math/content/HSA/REI/C/6/) ([HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/HSA/REI/C/6/](http://www.corestandards.org/math/content/HSA/REI/C/6/)).

Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

[CCSS.MATH.CONTENT.HSA.REI.C.7](http://www.corestandards.org/math/content/HSA/REI/C/7/) ([HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/HSA/REI/C/7/](http://www.corestandards.org/math/content/HSA/REI/C/7/)).

Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.

[CCSS.MATH.CONTENT.HSA.REI.C.8](http://www.corestandards.org/math/content/HSA/REI/C/8/) ([HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/HSA/REI/C/8/](http://www.corestandards.org/math/content/HSA/REI/C/8/)).

(+) Represent a system of linear equations as a single matrix equation in a vector variable.

[CCSS.MATH.CONTENT.HSA.REI.C.9](http://www.corestandards.org/math/content/HSA/REI/C/9/) ([HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/HSA/REI/C/9/](http://www.corestandards.org/math/content/HSA/REI/C/9/)).

(+) Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3×3 or greater).

Represent and solve equations and inequalities graphically.

[CCSS.MATH.CONTENT.HSA.REI.D.10](http://www.corestandards.org/math/content/HSA/REI/D/10/) ([HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/HSA/REI/D/10/](http://www.corestandards.org/math/content/HSA/REI/D/10/)).

Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

[CCSS.MATH.CONTENT.HSA.REI.D.11](http://www.corestandards.org/math/content/HSA/REI/D/11/) ([HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/HSA/REI/D/11/](http://www.corestandards.org/math/content/HSA/REI/D/11/)).

Explain why the x -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the

equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. *

[CCSS.MATH.CONTENT.HSA.REI.D.12 \(HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/HSA/REI/D/12/\)](http://www.corestandards.org/math/content/HSA/REI/D/12/).

Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.