


<p>MAFS.912.A-REI.2.4</p>	<p>Solve quadratic equations in one variable.</p> <ol style="list-style-type: none"> 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. 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.
<p>Item Types</p>	<p>Editing Task Choice – May require choosing steps in a derivation of the quadratic formula.</p> <p>Equation Editor – May require creating a value or an expression.</p> <p>GRID – May require dragging and dropping text to complete the derivation of the quadratic formula, or to drag and drop text to complete steps for solving a quadratic equation.</p> <p>Hot Text – May require rearranging equations.</p> <p>Matching Item– May require matching quadratic equations with the type of solution (complex or real).</p> <p>Multiple Choice – May require selecting a value or an expression from a list.</p> <p>Multiselect – May require selecting multiple values.</p> <p>Open Response – May require writing an explanation of a step in a solution.</p>
<p>Clarifications</p>	<p>Students will rewrite a quadratic equation in vertex form by completing the square.</p> <p>Students will use the vertex form of a quadratic equation to complete steps in the derivation of the quadratic formula.</p> <p>Students will solve a simple quadratic equation by inspection or by taking square roots.</p> <p>Students will solve a quadratic equation by choosing an appropriate method (i.e., completing the square, the quadratic formula, or factoring).</p> <p>Students will validate why taking the square root of both sides when solving a quadratic equation will yield two solutions.</p> <p>Students will recognize that the quadratic formula can be used to find complex solutions.</p>

<p>Assessment Limits</p>	<p>In items that require the student to transform a quadratic equation to vertex form, the coefficient of the linear term must be an even factor of the coefficient of the quadratic term.</p> <p>In items that require the student to solve a simple quadratic equation by inspection or by taking square roots, equations should be in the form $ax^2 = c$ or $ax^2 + d = c$, where a, c, and d are rational numbers and where c is not an integer that is a perfect square and $c - d$ is not an integer that is a perfect square.</p> <p>In items that allow the student to choose the method for solving a quadratic equation, equations should be in the form $ax^2 + bx + c = d$, where a, b, c, and d are integers.</p> <p>Items may require the student to recognize that a solution is nonreal but should not require the student to find a nonreal solution.</p>
<p>Stimulus Attributes</p>	<p>The formula must be given in the item for items that can only be solved using the quadratic formula.</p> <p>Items should be set in a mathematical context.</p> <p>Items may use function notation.</p>
<p>Response Attributes</p>	<p>Items may require the student to complete a missing step in the derivation of the quadratic formula.</p> <p>Items may require the student to recognize equivalent solutions to the quadratic equation.</p> <p>Responses with square roots should require the student to rewrite the square root so that the radicand has no square factors.</p>
<p>Calculator</p>	<p>Neutral</p>

Sample Item	Item Type
<p>Matthew solved the quadratic equation shown.</p> $4x^2 - 24x + 7 = 3$ <p>One of the steps that Matthew used to solve the equation is shown.</p> <p>Drag values into the boxes to complete the step and the solution.</p>	<p>GRID – Drag and Drop</p> <div data-bbox="613 306 1417 957"><p>2 </p><p>3</p><p>5</p><p>6</p><p>24</p><p>32</p><p>36</p><p>148</p><p>154</p><p>Step: $4(x - \boxed{})^2 = \boxed{}$</p><p>Solution: $x = \boxed{} \pm \boxed{}\sqrt{\boxed{}}$</p></div>