



North Carolina
**Problem-Based
Tasks**

**for Mathematics II
Student Workbook**

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A–SSE.2; A–CED.1★; A–REI.4b • Algebra**Factoring****Common Core State Standards****A–SSE.2**

Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*

A–CED.1

Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*★

A–REI.4

Solve quadratic equations in one variable.

- 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 .

Problem-Based Task: On the Shelf

Kareem wants to put up a small corner shelf in his room. The shelf is in the shape of a right triangle. One leg of the triangle is 2 inches shorter than the other. The longest side of the shelf is 10 inches long. Kareem needs to find the area of the shelf so that he knows if he has enough paint to cover the top of the shelf. The area of a triangle is $A = \frac{1}{2}bh$.

A–SSE.2; A–CED.1★; A–REI.4a; A–REI.4b • Algebra**Completing the Square****Common Core State Standards****A–SSE.2**

Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*

A–CED.1

Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*★

A–REI.4

Solve quadratic equations in one variable.

- 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 .

Problem-Based Task: Curve Ball

The height of a baseball in feet x seconds after it is thrown is given by $-16x^2 + 32x + 5$. When will the ball be at a height of 7 feet?

A–SSE.2; A–CED.1★; A–REI.4b • Algebra**Solving Quadratic Inequalities****Common Core State Standards****A–SSE.2**

Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*

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Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*★

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- 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 .

Problem-Based Task: Dancing for Charity

A school is planning to host a dance with all profits going to charity. The amount of profit is found by subtracting the total costs from the total income. The income from ticket sales can be expressed as $200x - 10x^2$, where x is the cost of a ticket. The costs of putting on the dance can be expressed as $500 + 20x$. What are all the ticket prices that will result in a profit of \$200 or more?