# Explicitness and Thoroughness in the Presentation of the Content

MQI Lite

National Center for Teacher Effectiveness

Center for Education Policy Research
HARVARD UNIVERSITY

# Explicitness and Thoroughness in the Presentation of the Content

- *Definition*: This code captures characteristics of presentation of mathematical procedures, definitions, and properties.
- By "explicit and thorough" we mean the teacher (or student) emphasizes:
  - key pieces of a procedure, definition, or property
  - notes key decision points in a procedure
  - and/or comments on the meta-features of the procedure.

# Examples of common activities captured

- *Outlining or Describing the Steps of a Mathematical Procedure*:
  - E.g., How to factor trinomials with a leading coefficient; How to graph a line given two points; how to solve systems of linear equations. Procedures are generally "steppy" – that is, steps follow in a logical sequence or flow.
- *Providing Mathematical Definitions*:
  - E.g., Defining zeroes of a function
- *Describing Mathematical Properties*:
  - E.g., The rules of exponents; The zero product property

# Notes

- Applies to both the presentation of *new* algebra content as well as solving problems using known procedures:
  - Presenting new content by outlining new procedures or presenting a definition or property
  - Describing procedures used when presenting solutions or solving example problems
  - Reviewing previously learned material
- Content can be presented by either teachers or students
- Can also occur when teacher is working with an individual student or a group if content of the interaction can be heard
- We score this code on quality, meaning that a teacher can receive a high score, even if the activity occurs for only a portion of the segment

# Guiding Questions

- Does the teacher (or students) engage in one of the three activities?
- If so, how clear, detailed, explicit, and/or thorough is the presentation of the procedure/definition/property?
- To answer these questions, you can look for certain types of evidence, including:
  - Whether the presentation of steps is clear
  - Whether the presentation is highly organized and systematic
  - Whether the teacher (or students) generalize the steps of a procedure beyond a specific problem or task
  - Whether the teacher (or students) comment on the meta-features of the procedure
  - Whether the teacher (or students) emphasize key mathematical aspects of mathematical terms and properties or key decision points in the procedure

# Scoring E&T

- **Low (1):** Presentation of the content is not particularly explicit or thorough because:
  - Teacher (or students) do not engage in any of the activities defined in this code
  - Teacher omits critical steps/pieces when presenting the content
  - Teacher's presentation of the content is incomplete, confusing, or wrong
  - Teacher defines mathematical terms/properties incorrectly
  - Incorrect student presentations are not addressed by the teacher

- **Mid (2):**
  - Presentation of the content is acceptable and clear, but not exceptionally explicit or thorough as described under high.
  - Presentation of the content has some features of high but also includes some sloppiness.

# Scoring E&T

- **High (3)**: Presentation of the content is not only clear, but is *explicit, detailed, and thorough* as suggested by some combination of:
  - Careful recording of mathematical work
  - Emphasis on key mathematical aspects of terms and properties and their applicability
  - Highly organized and systematic presentation of the content
  - Emphasis on key pieces of the procedure/definition/property and key decision points.
  - Comments on meta-features of the procedure
  - Generalization beyond the specific problem/task

# An Example of Mid vs. High

- **Consider the problem:**

$$x + 2y = -16$$
$$-2x - y = 20$$

- **A clear presentation – Mid (2):**
  - "Multiply the top equation by 2 on both sides so that the coefficients of x are additive opposites of each other."
  - "Then add these two equations together."
  - "Next, solve this equation for y to get y = -4."
  - "Now we substitute y = -4 back into our top equation..."
- **Additional features that bring the instruction to a High (3):**
  - "You can start by eliminating either x or y."
  - "If the equations are in slope-intercept form, you'll need to start by converting them."
  - "No matter what the coefficients are, you can always find a number to multiply both sides of the equation by that will let you eliminate x…."

# Additional Notes

- Calculator use:
  - If a calculator is in use, score the presentation of content as you would otherwise
  - ***However***, instruction that focuses ONLY on how to manipulate the calculator does not by itself count as a procedure
    - E.g., “Press y=, then press NUM, then arrow right, then choose abs for absolute value…”

# Additional Notes

- Instruction featuring only a brief sub-procedure (e.g., the last step or most difficult step in a procedure) should be scored as low for not present
  - Long sub-procedures can receive a 2 (mid) or 3 (high)
- When a procedure crosses segment boundaries, score each segment as if the procedure were complete and apply other criteria

# Explicitness and Thoroughness in the Presentation of the Content

- *Distinguish from*:
  - The mathematical richness of the presentation of the content (Overall Richness)
    - Being "explicit, detailed, and thorough" does not necessarily include any conceptual explanation of the meaning behind the steps of a procedure.

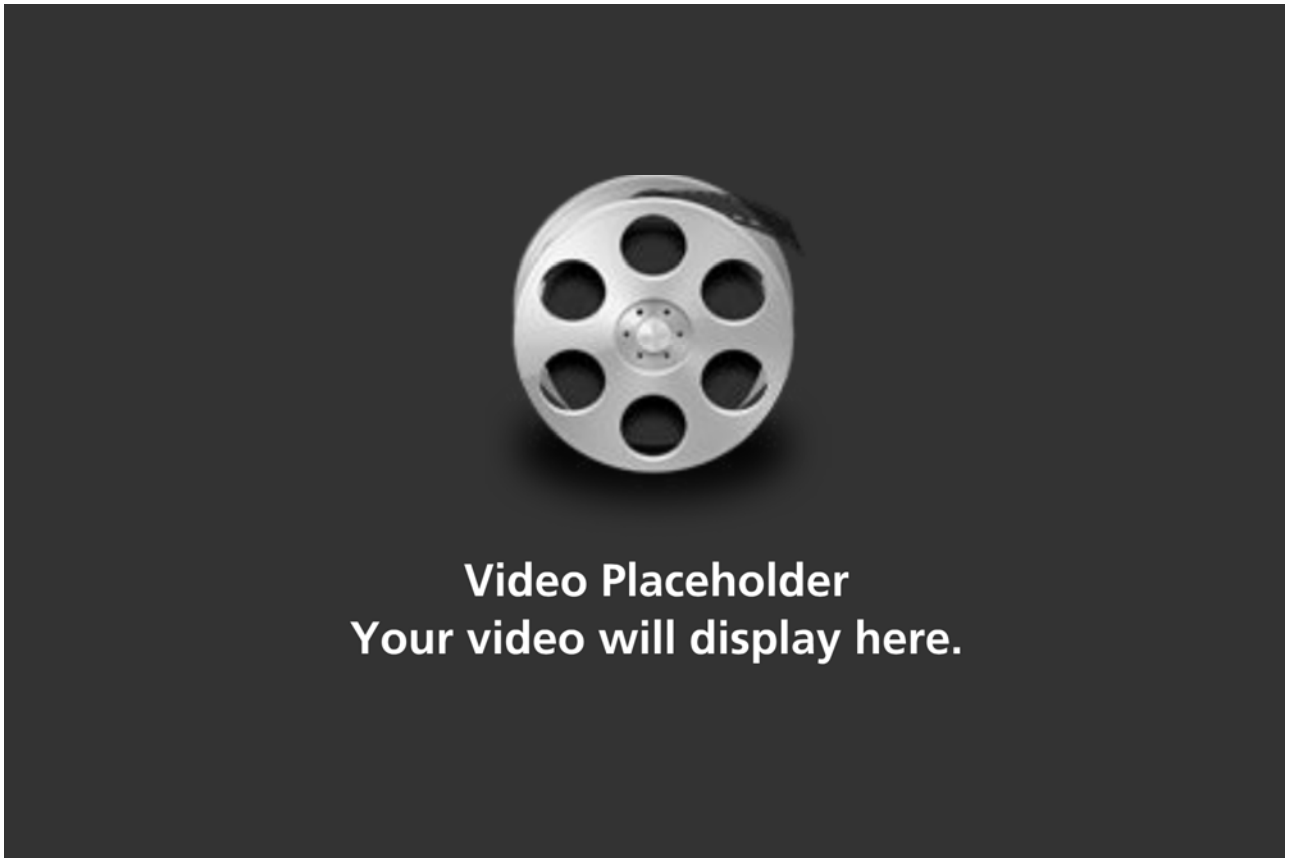
# Examples

- Natasha A: Factoring
- Naomi: Simplifying Rational Expressions
- Nora: Finding the Equation of a Line
- Neil: Slope Between Two Points
- Nikki: Zero Product Property
- Natasha B: Factoring
- Natalie: Solving Systems of Equations

# Natasha A: Factoring

- In this lesson, the teacher is showing students how they would go about factoring a cubic polynomial expression by grouping.

# Natasha A: Factoring: Video

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- *Take a moment to write down your score before moving on to our answer…*

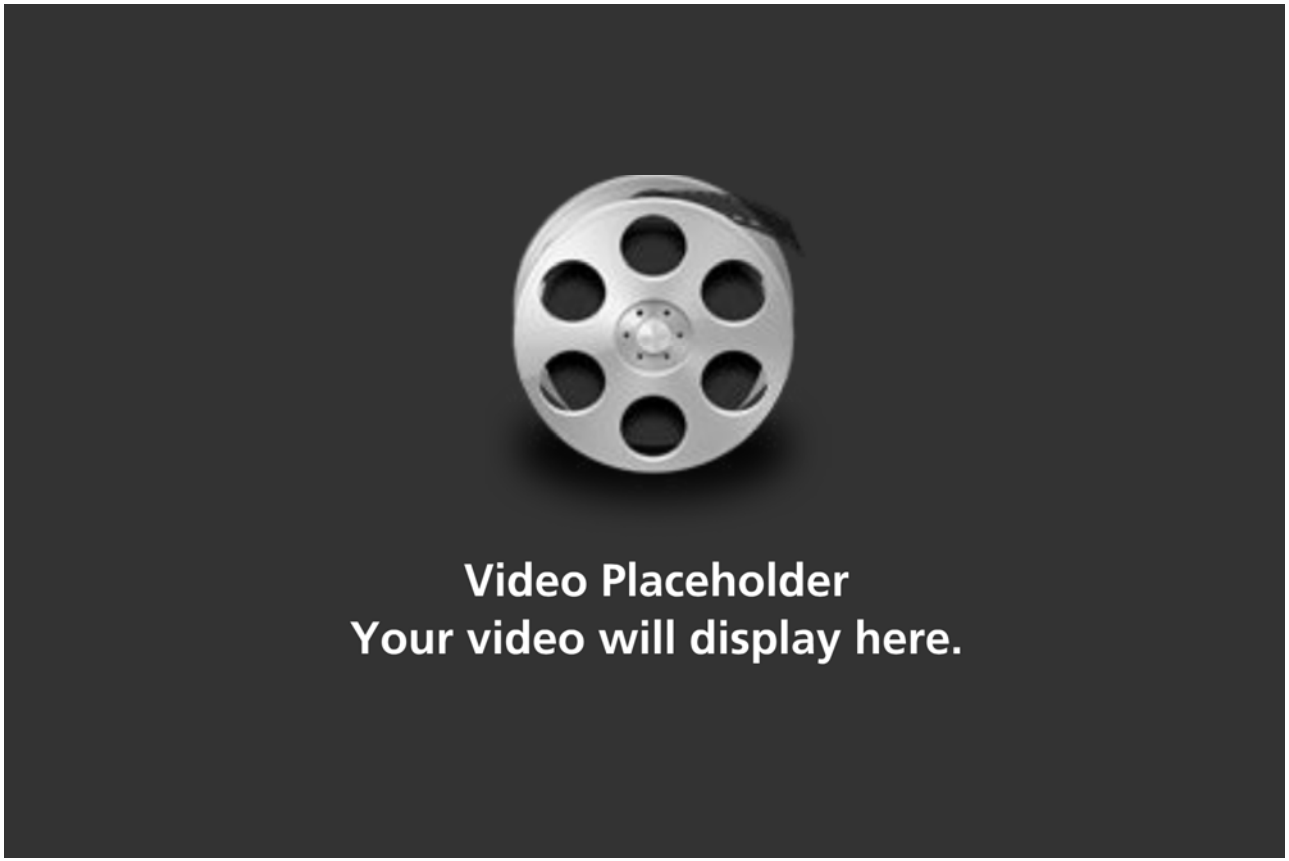
# Natasha A: Factoring: Answers

- Explicitness and Thoroughness in the Presentation of the Content: **1**
  - The teacher's presentation of the content is confusing.

# Naomi: Simplifying Rational Expressions

- Class has been working on simplifying rational expressions by factoring

# Naomi: Simplifying Rational Expressions: Video

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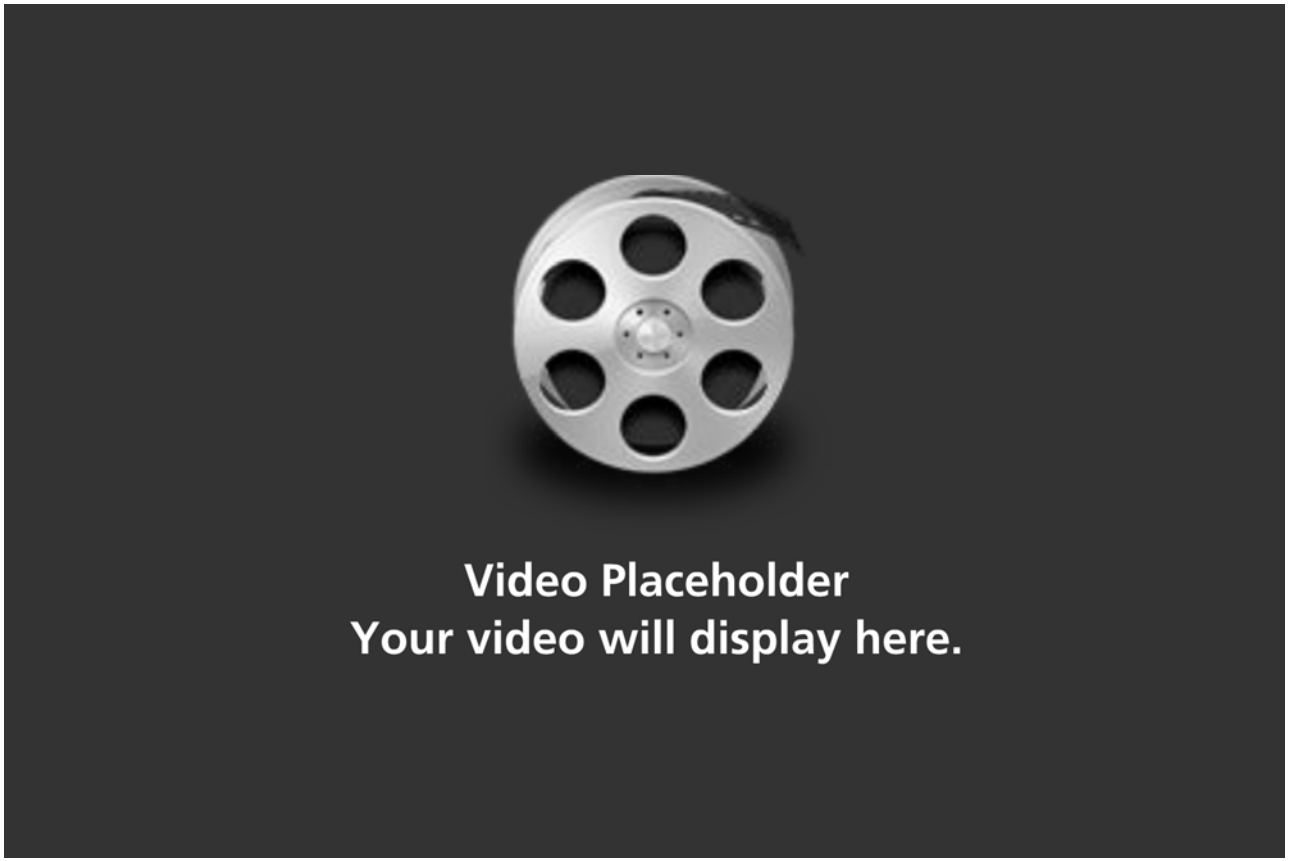
# Naomi: Simplifying Rational Expressions: Answers

- Explicitness and Thoroughness in the Presentation of the Content: **1**
  - Not Present: The teacher is not engaged in any of the behaviors in the code.

# Nora: Finding the Equation of a Line

- Teacher is presenting how to find the equation of a line given a point and the slope.

# Nora: Finding the Equation of a Line: Video

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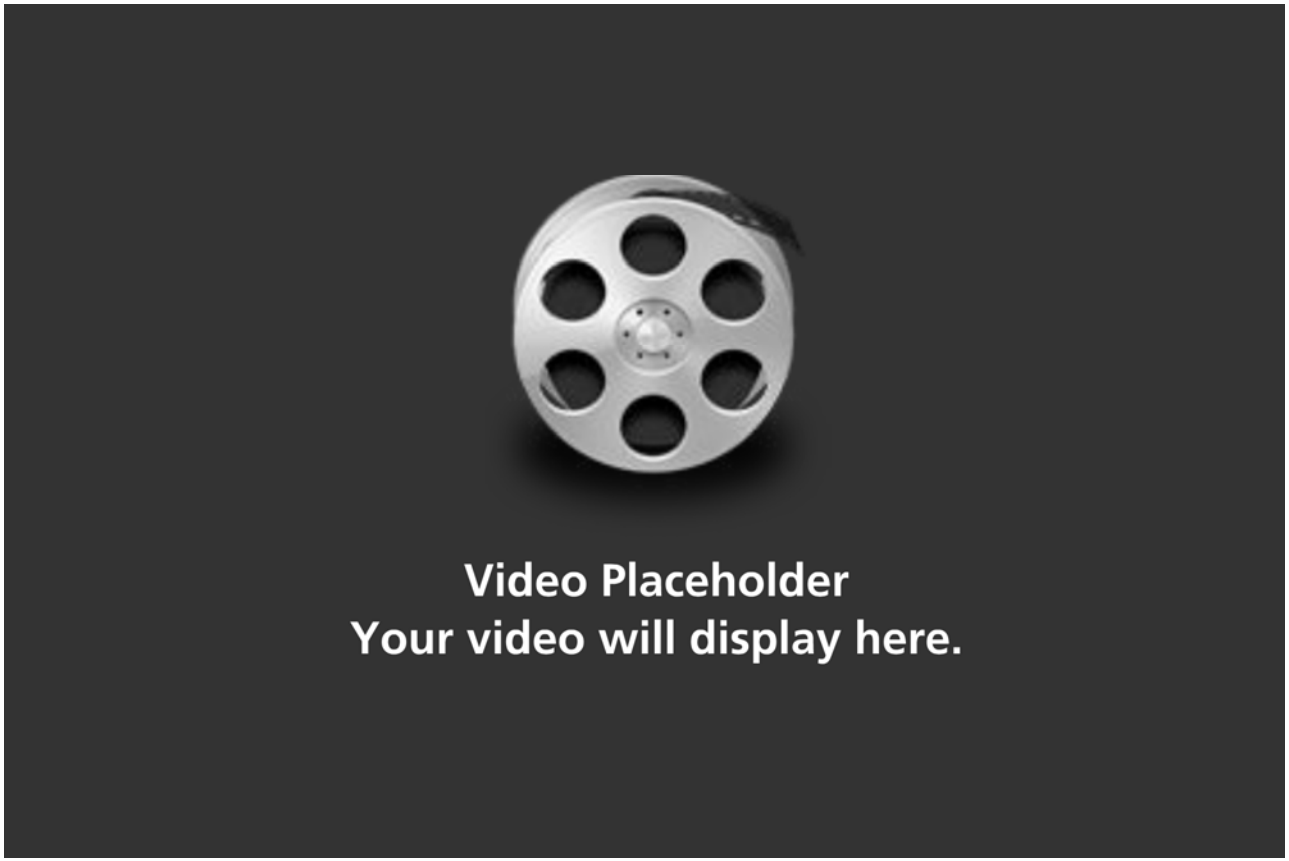
# Nora: Finding the Equation of a Line: Answers

- Explicitness and Thoroughness in the Presentation of the Content: **3**
  - Presentation of the content is exceptionally clear, explicit, and thorough:
    - Mathematical work is recorded carefully and in detail
    - Teacher identifies and emphasizes key aspects and decision points of the procedure
    - Teacher generalizes the steps of the procedure beyond the specific problem

# Neil: Slope Between Two Points

- The class has posted solutions to the homework problems on the board and students are explaining how they found the answer to a particular problem in which they were asked to find the slope between two points.

# Neil: Slope Between Two Points: Video

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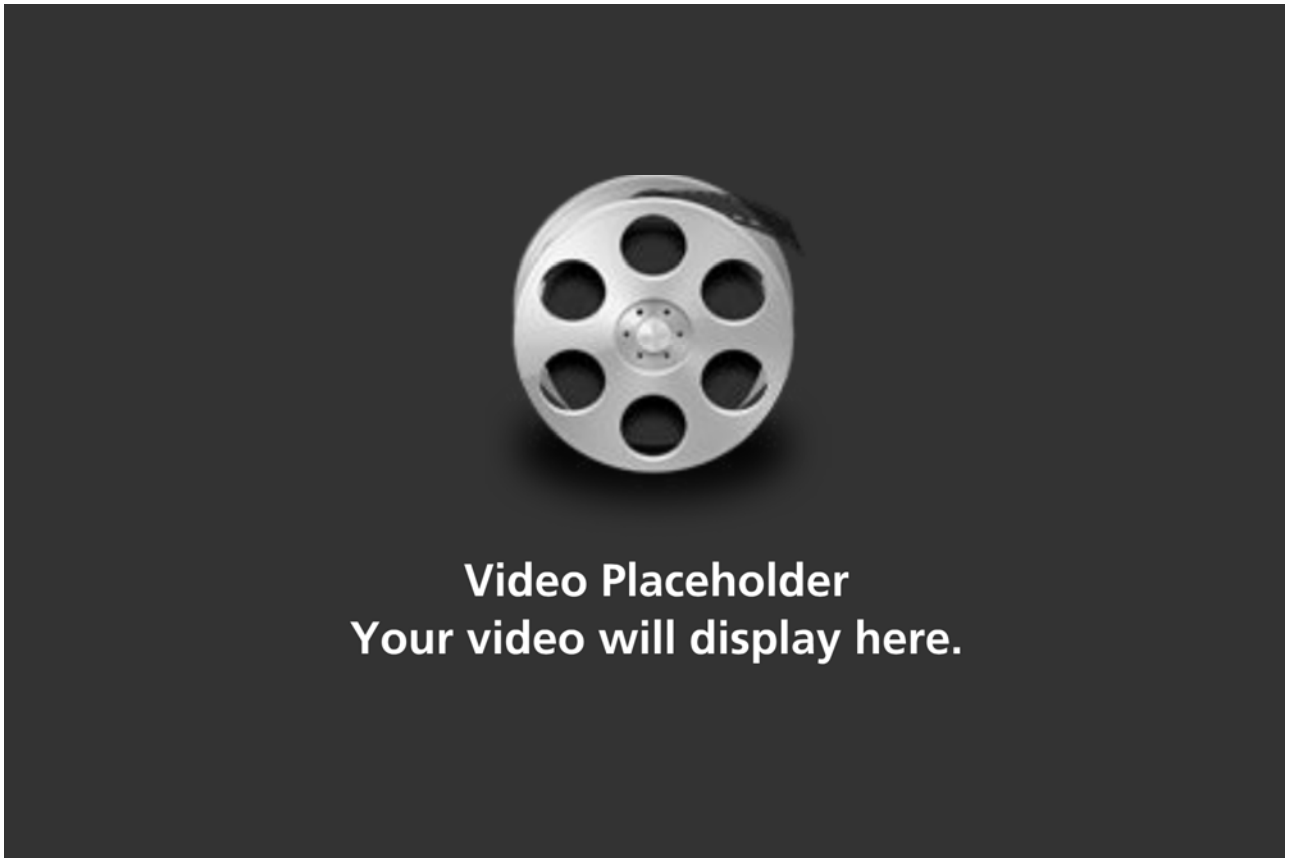
# Neil: Slope Between Two Points: Answers

- Explicitness and Thoroughness in the Presentation of the Content: **2**
  - Student presentation of content is unclear, but the teacher's intervention clarifies the procedure
  - Overall, the procedure is described clearly, but not in an exceptionally explicit, detailed, or thorough way
  - Some elements of high, but also some sloppiness

# Nikki: Zero Product Property

- In this lesson, the teacher presents the zero product property to the students and continues to show examples of its application.

# Nikki: Zero Product Property: Video

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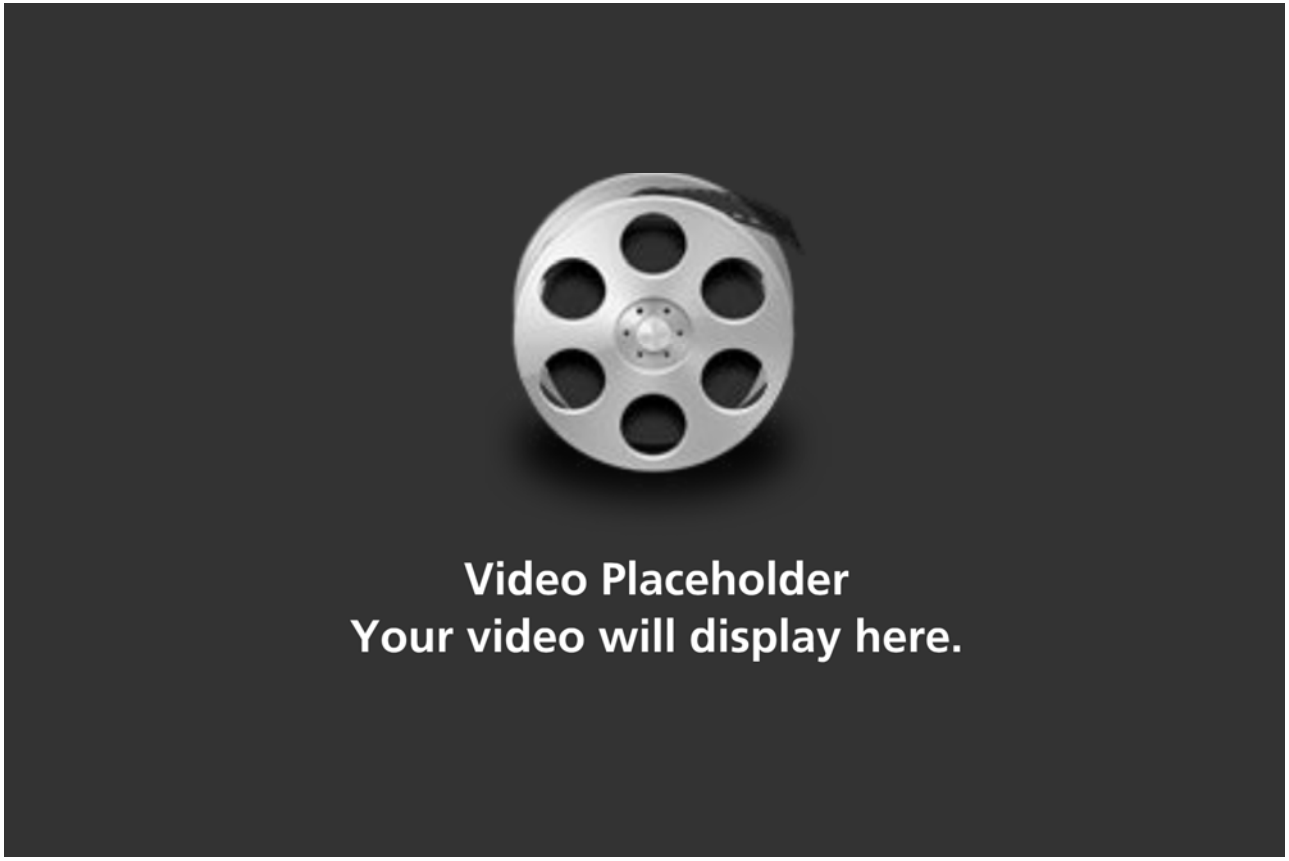
# Nikki: Zero Product Property: Answers

- Explicitness and Thoroughness in the Presentation of the Content: **2**
  - This is an example of a situation where a teacher is presenting a property (the zero product property). She then goes on to present the procedure for solving an equation using the zero product property.
  - Her explanation of the zero product property is reasonably clear and explicit, but not in depth or thorough enough to warrant a 3.

# Natasha B: Factoring

- In this lesson, the teacher shows students how to factor a cubic expression by factoring out the greatest common factor and then factoring the remaining quadratic trinomial in order to “factor completely.”

# Natasha B: Factoring: Video

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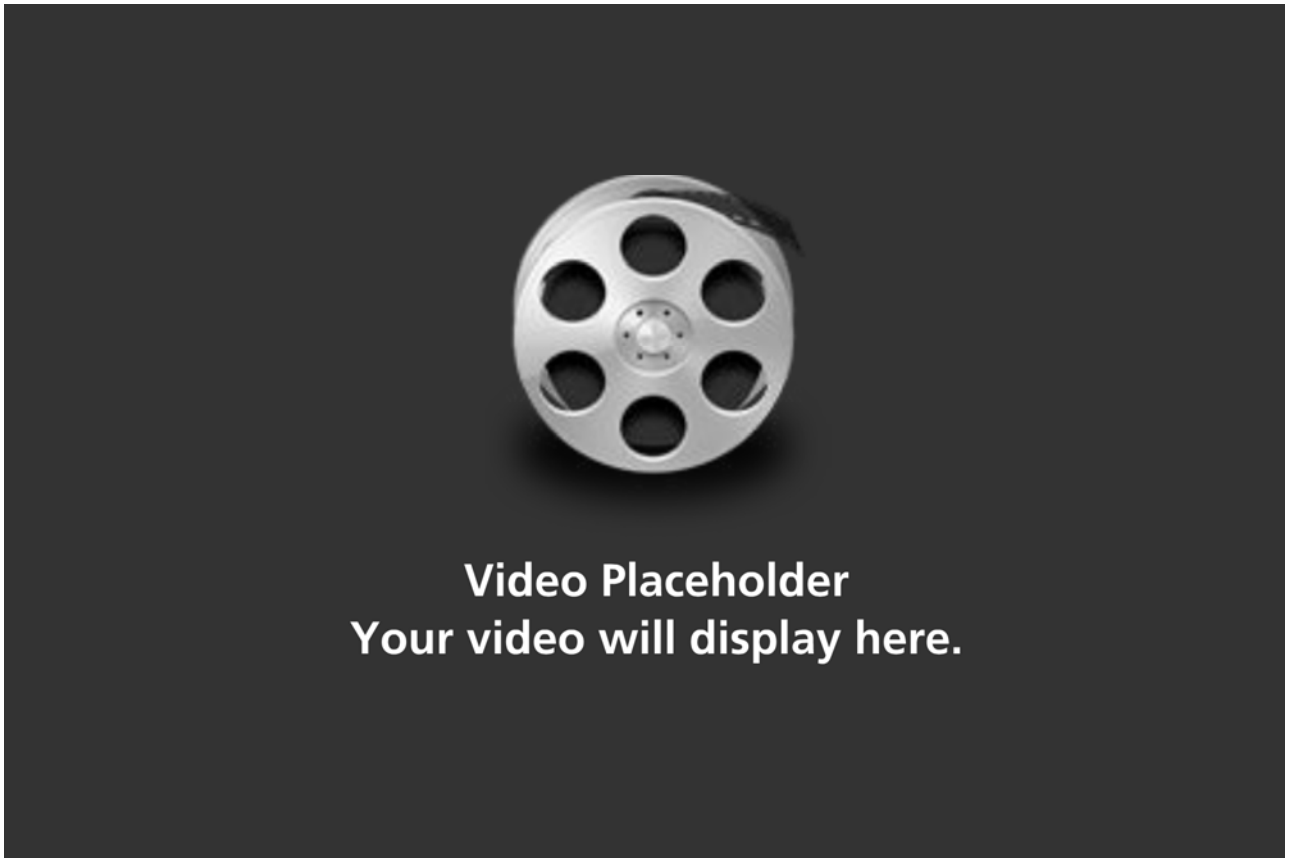
# Natasha B: Factoring

- Explicitness and Thoroughness in the Presentation of the Content: **2**
  - The teacher conveys some aspects of the procedure in a manner we would code as high,  but the presentation also includes some sloppiness.

# Natalie: Solving Systems of Equations by Substitution

- Earlier in the lesson, students have learned how to solve a system of equations using the equal value method.
- In this clip, the teacher shows students how to solve the same system of equations using the substitution method and that this method will generate the same solution.

# Natalie: Solving Systems of Equations by Substitution: Video

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# Natalie: Solving Systems of Equations by Substitution: Answer

- Explicitness and Thoroughness in the Presentation of the Content: **3**
  - Presentation of the content is exceptionally clear, explicit, and thorough:
    - Comments on meta-features of the procedure
    - Points out key aspects of the procedure

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