Name:

Activity 4: Rationalizing the Denominator of an Expression

# Content: Rationalization of the denominator of an expression.

# Objective: Be able to rationalize a denominator, and to simplify expressions by using multiplication of conjugate forms.

**Part I: Calculator and paper & pencil activity**

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| a-i) Enter the expression  into your calculator. What do you notice?  The CAS displays as a result: . |

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| a-ii) What paper and pencil calculation will produce the same result as the calculator’s (in Part I a-i above)? |

**Classroom discussion of questions a-i & a-ii**

Part I. b) The following activity continues the work on rationalizing denominators of expressions. **Fill in the table one complete row at a time**, proceeding from the top to the bottom:

|  |  |  |
| --- | --- | --- |
| Expression | Enter each expression into your calculator and write the result it displays | Paper & pencil work that transforms the original expression into the form produced by the calculator |
|  |  |  |
|  |  | x =  = |
|  |  | = x =  = |
|  |  | = x =  = |
|  |  | = x =  =  =  =  = |

**Classroom discussion of Question Part I b**

Part I c) On the basis of the strategies you used to rationalize the denominators of the previous expressions, fill in the empty cells of the table below, using paper and pencil.

|  |  |
| --- | --- |
| Expression  ***(c ≥ 0 & d ≥ 0)*** | Manipulation that rationalizes the denominator of the given expressions |
|  | = x = |
|  | =  x  =  = |

Explain why the restrictions *c ≥ 0 & d ≥ 0* are necessary when considering the given expressions above. What other restrictions, if any, apply?

The square root of a negative number is not defined under the real numbers. Thus, both *c* and *d* cannot be negative. Both *c* and *d* cannot be 1, because of the denominators *c*-1 and *d*-1.

, otherwise  would have denominator equal to zero. Similarly, .

**Classroom discussion of Question Ic**

**Part II: (Calculator and paper & pencil activity)**

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| II a) What paper & pencil manipulations will rationalize the denominator of the expression  ?  x =  =  =  =  II b) What restrictions are necessary when considering the expression in (a)? Explain why.  and  because the square root of a negative number is not defined over the real numbers.  , otherwise the value of the denominator would be zero. |
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| II c) Enter the expression  into your calculator and write down the result it displays. |

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| II d) If the calculator displays a result that differs from the one you obtained in Part II (a), what can you do to reconcile the two?  , by the rules for radicals |
|  |

**Classroom discussion of Part II and a return to Part I for purposes of consolidation**

**Part III: A challenge (paper & pencil)**

We wish to use a strategy similar to the one used thus far to rationalize the denominator of the expression 

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| III a) Enter the expression  into the calculator and write down the result it displays. What do you notice?  The CAS displays the same expression, except for commuting the two terms under the radical sign in the denominator |

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| III b) What paper & pencil calculation can you use to rationalize the denominator of the expression ?  =  =  =  =  =  = |

**Classroom discussion of Part III**