Integrated Math II – Semester 1

Final Exam Review with Examples

**Vertex -**  Axis of Symmetry, Minimum & Maximum

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| Axis of Symmetry Example:  Determine the axis of symmetry if the *x*-intercepts of the parabola are and  *The axis of symmetry is the x-value at the midpoint of any two symmetrical points.* *To find it, add up the x-values and divide by 2.* | Minimum/Maximum Example:  What is the absolute minimum of the function ?  *The absolute min/max is part of the vertex. To find the x value of the vertex, use the formula.* | Vertex Example:  Name the vertex for the quadratic function .  . |

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| 1. Determine the axis of symmetry if the *x*-intercepts of the parabola are and. | 2. What is the absolute maximum of the function ? | 3. Name the vertex for the quadratic function |

**Features of a Quadratic Equation –** Direction, Translation, Y-intercept, Interval Solutions

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| Y-Intercept Example 1:  Is the *y*-intercept of the equation function ? How do you know?   |  | | --- | | If you plug in the point , then you cancheck if the point is the correct *y*-intercept (if it works, it has to be a *y*-intercept because *x* = 0).  The equation works with the given point. is the *y*-intercept. |   Y-Intercept Example 2:  Name the *y*-intercept for the quadratic function . | Direction & Transformation Example 1:  Does the function open upward or downward? How do you know?   |  | | --- | | Normally, the positive front is enough. However, both of the front terms are not positive, so I have to multiply them and check the sign. Multiplying makes .  Since the first term is negative, the parabola will open downward. |   Direction & Transformation Example 2:  How does this equation compare to the graph of  (the beginning) is positive, so it will . provides the translation left/right: since *x* lies, +5 means it moved . The at the end is the honest *y* translation up/down: is . | Interval Solutions Example:  What are the interval solutions to the quadratic inequality  ?  A.  B.  C.  D.  *I prefer to sketch it to see it better:*  makes it face down  , means that *y* is greater, so we shade up    & means it’s “or equal to,” so the answer will have [ ] where the numbers are.  Since the shading is on the outside, there are two shaded parts of *x*, which means the answer is: |

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| 4. Does the function  open upward or downward? How do you know? | 5. Is the *y*-intercept of the function ? Why or why not? | | 6. How does this equation compare to the graph of |
| 7. What are the interval solutions to the quadratic inequality ?  A. B.  C. D. | | 8. Name the *y*-interceptfor the quadratic function  . | |

**Features of a Quadratic Graph –** Domain, Range, Intervals of Increase/Decrease, Zeros, *Y*-intercept, Vertex, Axis of Symmetry

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| What is the range of the function represented by the graph?  The range is all values that *y* can be. The lowest *y* is at . The rest of the graph is above the vertex point, . So, the range is all values of *y* above or equal to . | What is the simplest polynomial that the graph can represent?    The zeros are at -5 & 1. The factors use their opposites: +5 & -1.  So, | The point identifies what feature of the graph below?    The vertex is the turning point: .  The axis of symmetry is the *x* of the vertex:  The zeros are where it crosses *x*:  The *y*-intercept is where it crosses *y*: .   |  | | --- | | It’s the *y*-intercept. | | The graph represents the function  . Identify the domain, range, zeros, interval of increase, and interval of decrease.    Domain is what *x* can be, and there is no limit, so it’s .  Range is what *y* can be, and the lowest point is at, so the range is .  Zeros are .  Interval of Increase is where *x* starts and ends when the *y* is moving up, so it’s: .  Interval of Decrease is where *x* starts and ends when the *y* is moving down, so it’s: . |

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| 9. What is the range of the function represented by the graph? | 10. What is the simplest polynomial that the graph can represent? | 11. The point identifies what feature of the graph below? | 12. The graph represents the function  . Identify the domain, range, zeros, interval of increase, and interval of decrease. |

**Zeros/X-intercepts/Roots/Quadratic Solutions** – Quadratic Formula, Completing the Square, Factoring, Plugging in Values

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| Quadratic Formula Example 1:  What are the zeros of the equation function  ?  Example 2:  How many real solutions does the quadratic function have?  The radical part tells us how many zeros a quadratic will have: means that we will add or subtract (2 answers) an *imaginary* number, so there are  The rules: | Completing the Square Example 1:  How do you correctly complete the square to solve the polynomial?  ***Step 1:*** *To complete the square, make it = 0, then move all the numbers to the other side of the equal sign (already happened in this case: )*  ***Step 2:*** *Complete the square by adding to both sides.*  ***Step 3:*** *Factor the left and simplify the right.*  ***Step 4:*** *Write as a square, square root both sides & solve for x.*  Example 2:  What would complete the square to solve the polynomial? |
| Factoring Example:  Determine the *x*-intercept for  ***Step 1:*** *Factor out any number that all terms have (take out a, if you can)*  ***Step 2:*** *What 2 numbers multiply to AC & add to B?*  multiply to & add to    ***Step 3:*** *Split the middle term, using the numbers from step 2.*  ***Step 4:*** *Factor out shared values to create 2 common groups.*  ***Step 5:*** *Factor out the common group.*  ***Step 6:*** *Set = 0 and solve.* | Plugging in Answer Choices Example:  What are the zeros of the quadratic function?  A.  B.  C.  D.  Test A.        It must be , so I will check D.  Test D. |

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| 13. Determine the *x*-intercept for . | 14. What correctly completes the square to solve the polynomial? | 15. What are the zeros of the quadratic function? |
| 16. How many real solutions does the quadratic function have? | 17. What are the zeros of the equation function  ? | 18. Name the zeros of the quadratic function  . |

**Polynomial Operations –** Multiplication, Checking Factors, Combining Like Terms

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| Combining Like Terms Example:  Simplify.  First, if one of the , change every sign inside to its opposite:  Then, combine terms that have matching *x* exponents: | | |
| Product Example 1:  Determine the product.   |  |  |  | | --- | --- | --- | |  |  |  | |  |  |  | |  |  |  | | Product Example 2:  Show by drawing an area model or multiplication table how to find the product of & . Also, find the product of & .   |  |  |  | | --- | --- | --- | |  |  |  | |  |  |  | |  |  |  | | Checking Factors Example:  Does correctly factor the polynomial? Show why or why not.  Check by multiplying:   |  |  |  | | --- | --- | --- | |  |  |  | |  |  |  | |  |  |  | |

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| 19. Determine the product. | 20. Simplify. | 21. Does correctly factor the polynomial? Show why or why not. | 22. Show by drawing an area model or multiplication table how to find the product of and . Also, find the product of and . |

**Systems of Equations –** Checking Points

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| Checking Points in a System Example:  Are solutions to this system of equations?  *Check both points in both equations to see if they work.*   |  |  |  |  | | --- | --- | --- | --- | |  |  |  |  | |  |  |  |  | | *CORRECT!* | *CORRECT!* | *WRONG!* | *CORRECT!* |   The second point doesn’t work in both equations,  so it is . | System of Equation Graph Example:  What are the solutions to the system of equations shown?    The solution is where the graphs intersect: |

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| 23. Are solutions to this system of equations? | 24. What are the solutions to the system of equations shown? |

**Radicals –** Approximating, Simplifying

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| Approximating Square Roots Example:  A park is in the shape of a square. The area of the park is 249 square meters. The exact length of a side of the park is between which two lengths?  If the park is a square, then the sides are . The two perfect squares that 249 is between are & . This means that is between & . | Simplifying a Square Root Example:  Which is equivalent to the radical expression?  *It’s not even, and it can’t be more than ½ the value, so that eliminates most choices:* |

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| 25. A ballroom is in the shape of a square. The area of the ballroom is 31 square meters. The exact length of a side of the ballroom is between which two lengths? | 26. Which is equivalent to the radical expression? |

**Inverse –** Inverse Equations, Points, and One-to-one Functions

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| Inverse Equation Example:  What is the inverse of ?  *Switch x & y, then solve to isolate y*. | Inverse Point Example:  What is the inverse of the point ?  *Switch x & y.* | One-to-One Function Example:  Is a one-to-one function?  *Draw a sketch. If it’s one-to one, then it will pass the vertical and the horizontal line test.*  Use your pen as a line. Hold it vertically and drag it across the graph. If it always goes through only 1 point, then it passes the 1st test. Try it horizontally. If it passes that too, it’s one-to-one.  a one-to-one function. |

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| 27. What is the inverse of  ? | 28. What is the inverse of the point ? | 29. Is a one-to-one function? |

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**Answers**

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|  |  |  | 1. It faces up because , so the term is positive. |
| 1. No. The constant term is not 2. If you plug in 0, the *y*-intercept will be -1. | 1. It opens downward and has been translated right 4 and down 2. |  |  |
|  |  | 1. Vertex | 1. Domain:   Range: or  Zeros:  Increase:  Decrease: |
|  |  |  | 1. 2 real solutions |
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| 1. If you multiply, you will get , which . So, no. They are not the factors. | |  |  |  | | --- | --- | --- | |  |  |  | |  |  |  | |  |  |  | | 1. Yes. |  |
| 1. Between 5 & 6 meters |  |  |  |
| 1. No. |  |  |  |