**Foundations of Math 11**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Final Exam Review**

**Tips for Studying:**

1. **Answer each question in this review booklet**
2. **Rewrite your notes**
3. **Attend each lunch time tutorial your teacher holds (FOM11 is Wednesday lunch and Friday mornings)**
4. **Make cue cards and quiz yourself**
5. **Look at the learning goals that are worth the most marks and MASTER those sections**
6. **Find a study group that BRINGS OUT THE BEST IN YOUR LEARNING**
7. **Teach your parents, relatives, siblings, or pets this information**
8. **Go to my website (**[**www.beckersciences.weebly.com**](http://www.beckersciences.weebly.com)**) and review the videos and powerpoints**

**GOOD LUCK ☺**

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| **Learning Goals**  **Final Exam Review Booklet** | **Completed** | **Novice** | **Apprentice** | **Expert** |  |
| 1. I can use inductive and deductive reasoning, conjectures, and counterexamples |  |  |  |  |  |
| 1. I can determine, explain, verify, identify and correct a strategy to solve a puzzle. |  |  |  |  |  |
| 1. I can determine if an argument is valid and identify errors in a given proof |  |  |  |  |  |
| 1. I can find the missing side on a given similar shape |  |  |  |  |  |
| 1. I can use linear, area, and volume scale factors |  |  |  |  |  |
| 1. I can find missing angles using geometry |  |  |  |  |  |
| 1. I can use a protractor and a compass to find and draw angles |  |  |  |  |  |
| 1. I can calculate simple and complex interest |  |  |  |  |  |
| 1. I can explain an calculate loan payments and investments |  |  |  |  |  |
| 1. I can use technology to graph a parabola and find important data points |  |  |  |  |  |
| 1. I can graph a parabola using general, vertex, and factor forms |  |  |  |  |  |
| 1. I can find the intersection points of two non-linear graphs |  |  |  |  |  |
| 1. I can graph the solution to a system of linear inequalities |  |  |  |  |  |
| 1. I can use optimization to solve for different siutations |  |  |  |  |  |
| 1. I can solve systems of equations with linear inequalities |  |  |  |  |  |
| 1. I can calculate the measures of central tendency and standard deviation |  |  |  |  |  |
| 1. I can use confidence intervals, z-score, and distributions to explain data |  |  |  |  |  |
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**Learning Goals #1: I can use inductive and deductive reasoning, conjectures, and counter examples**

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| John claims that the sum of two prime numbers is an even number. Provide an example and a counter example. | Susie looks at the below data. What conjecture could she form?  **22 + 1 = 5**  **42 + 1 = 17**  **62 + 1 = 37**  **102 + 1 = 101**  **202 + 1 = 401**  **362 + 1 = 1297** |
| Using deductive reasoning, prove that the sum of 5 consecutive integers will always be odd. | Using deductive reasoning, prove that the difference between consecutive perfect squares is always an odd number. |
| What is the pattern below? How many total cubes are in the 12th pattern? Show your thinking in a DATA TABLE. | |
| Examine the pattern below. What is your conjecture? List two additional examples and one counter example.  **22 = 4 52 = 25 102 = 100 122 = 144**   |  |  |  | | --- | --- | --- | | Conjecture | Example (2) | Counter Examples (1) | |  |  |  | | |
| What is the 23rd diagram going to look like? How do you know? Organize your thinking. | |

**Learning Goals #2: I can determine if an argument is invalid and identify errors in proof**

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|  | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Create a fallacious proof showing 8 – 7. After completing the invalid proof, write down the error in the reasoning. | Jack says he can prove that 5 = 4. Here is his proof.   |  | | --- | | a + b = c | | 5a – 4a + 5b – 4b = 5c – 4c | | 5a + 5b – 5c = 4a + 4b – 4c | | 5(a + b + c\_ = 4(a + b – c) | | Divide both dies by a + b – c | | 5 = 4 |   Circle the step with the error. Why is this wrong? | | Liz claims that -3 = 3. Where is her error below?   |  |  | | --- | --- | | I assumed that -3 = 3 | -3 = 3 | | Then I squared both sides | (-3)2 = 32 | | I got a true statement | 9 = 9 | | This means that my assumption, -3 = 3 must be correct | | | | |
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**Learning Goal #3: I can determine, explain, verify, identify and correct a strategy to solve a puzzle.**

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| Which number should appear in the centre of Figure 4?   |  |  |  |  | | --- | --- | --- | --- | |  |  |  |  | | Figure 1 | Figure 2 | Figure 3 | Figure 4 | | |
| Complete the below KenKen. Use the numbers 1 – 4. There can not be any repeats along the rows and columns. | In a Kakuro puzzle, you fill in the empty squares with the numbers from 1 to 9.   * Each row of squares must add up to the circled number to the left of it. * Each column of squares must add up the circled number above it. * A number cannot appear more than once in the same sum. |

**Learning Goal #4: I can find missing side lengths on similar shapes**

***Novice***

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| What needs to occur between shapes in order for two shapes to be SIMILAR? | What is the missing side length between these similar shapes? |

***Apprentice***

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| What is the missing side length “x”? | What is the missing side length “x”? |

***Expert***

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| A rectangle has a length of 4 feet and a perimeter of 14 feet. What is the perimeter of a similar rectangle with a width of 9 feet? | A certain parallelogram has the dimensions shown. Which set of dimensions would produce a similar figure? A. 17.6 cm, 88 cm  B. 70.4 cm, 176 cm  C. 105.6 cm, 132 cm  D. 140.8 cm, 220 cm |

**Learning Goal #5: I can use linear, area, and volume scale factors**

***Novice***

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| A triangular object has a perimeter of 142 cm. What is the new perimeter is a linear scale factor of 5:1 is applied to it? | Complete the following table to show the relationship between linear scale factor, area scale factor, and volume scale factor:   |  |  |  | | --- | --- | --- | | **Linear Scale Factor** | **Area Scale Factor** | **Volume Scale Factor** | |  |  |  | |  | 16 |  | |  |  | 0.64 | |
| The scale of a map is 3 cm to 80 kilometers. If the distance on the map between Summerland and Calgary is 25 cm, what is the actual distance in kilometers? | A similar figure has a scale factor of 3:2. Is this an enlargement or a reduction? Explain how you know. |

***Apprentice***

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| Jack is designing a plan for renovating his kitchen. A scale drawing of the house is made using a scale of 1:45. Determine in metres, the actual dimensions of the kitchen if the scale drawing dimensions are 8cm by 19cm. | What is the perimeter and area of the enlargement shape if the scale factor from the below triangle is 1.2    Perimeter: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Area: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| A cylindrical oil tank is filled with 500 m3 of oil. A similar oil tank has dimensions that are reduced by a linear scale factor of . What volume of oil will fill the smaller tank? | Rectangular prism A is 6 cm high, 9 cm long, and 15 cm wide. Rectangular prism B is 14 cm high, 21 cm long, and 35 cm wide. These two prisms are similar.  By what factor is the surface area of rectangular prism B greater than the surface area of rectangular prism A? |

***Expert***

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| An architect is building a model of a tennis court for a new client. On the model, the court is 6 inches wide and 13 inches long. An official tennis court is 36 feet wide. What is the length of a tennis court? (! Foot = 12 inches) | Denise showed you the scale drawing of her room. If each 2 cm on the scale drawing equals 5 ft, what are the actual dimensions of Denise’s room?  (1 inch = 2.54 cm, 12 inches = 1 foot) |
| What is the scale factor of the below diagram?  C:\Users\sbecker\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\E050C809.tmp | What is the volume scale factor 2.744, written as a linear scale in the form a:b? |

**Learning Goal #6: I can find missing angles using geometry**

***Novice***

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| Complete the chart below:   |  |  |  | | --- | --- | --- | | Vocab Word | Diagram | Are the angles “equal” or “Add to 180º” | | Same Side Interior Angles |  |  | | Supplementary angles |  |  | | Complimentary Angles |  |  | | Alternate Interior Angles |  |  | | Corresponding Angles |  |  | |  |  |  | | |
| What is the missing angle x?  Image result for isosceles triangle | What is the sum of the interior angles in the below shape? |
| Are the below lines parallel? Explain how you know.    Explanation: | Are the below lines parallel? Explain how you know.    Explanation: |
| Complete the interior angles of the below polygon: | What is the value of the missing angle x? |
| Complete the below chart with labelling the vocab word for the KIND OF ANGLE and then adding a real world example of where you might see this type of angle:   |  |  |  | | --- | --- | --- | | Type of Angle | Diagram | Degree Range | |  |  | 181º - 360º | |  | Image result for right angle |  | |  |  | 0º - 89º | |  | Image result for obtuse angle |  | | |

***Apprentice***

|  |  |
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| What is the unknown angle?  Image result for missing angles 360 | Find the missing angle x: |
| Find angles a, b, c, and d. Place your justification into the table below:   |  |  |  | | --- | --- | --- | | Angle | Value | Reason | | a |  |  | | b |  |  | | c |  |  | | d |  |  |   Image result for missing angle parallel lines | |
| Find angles a, b, c, and d. Place your justification into the table below:   |  |  |  | | --- | --- | --- | | Angle | Value | Reason | | DEH |  |  | | KHL |  |  | | HDC |  |  | | x |  |  | | |
| Determine Find the sum of the measures of the interior angles of this polygon. | Determine Find the sum of the measures of the interior angles of this polygon. |

***Expert***

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| Determine the value of x | Determine all the interior angles (not just solving for x…solve for the angle). |
| Determine the measure of each angle  Image result for triangle angles variables | Determine the value of each variable:  *u = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*  *v = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*  *w = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*  *x = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*  *y = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*  Image result for parallel lines angles |
| Determine What is the value of each of the interior angles? | Determine the value of *angle b* |
| Determine What are the interior angles of a 10 sided regular polygon? | Each interi Each interior angle of a regular convex polygon measures 144°. How many sides does the polygon have? |

**Learning Goal #7: I can use tools such as a protractor and a compass to draw angles**

***Novice***

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| What is the below angle?  Image result for using a protractor | What is the below angle?  Image result for using a protractor |
| What is this angle classified as? What is the exact value of the angle?  Image result for using a protractor | What is this angle classified as? What is the exact value of the angle?  Image result for using a protractor |

***Apprentice***

|  |  |
| --- | --- |
| Use a protractor to draw an angle of 125º | Use a protractor to draw an angle of 230º |
| Use a protractor to find the below angle. | Use a protractor to find the below angle: |

***Expert***

|  |  |
| --- | --- |
| Using a compass, draw a 90º angle | Using a compass, draw a 60º angle |
| Using a compass, draw a 30º angle | Using a compass, draw a 120º angle |

**Learning Goal #8: I can calculate simple and compound interest**

***Novice***

1. You have saved $8000 from your summer job and are planning on putting it in your back account. You put it in your Royal Bank account, which is a simple interest account at 5.9% per year. You leave the funds in your account for a year and a half.
   1. Calculate the simple interest on your investment.
   2. In a year and a half time, how much do you have in your account? Do NOT use your TVM calculator (please show formula and use a regular calculator).
2. Brendan has invested $5000 in a 5 year bond, compounded semi-annually at a rate of 5.3% per annum. Determine the interest earned at the end of the 5 year period. Do NOT use your TVM calculator (please show formula and use a regular calculator).

***Apprentice***

1. You have invested $5900.00 from your summer earnings into a 20 year GIC investment, It is compounded quarterly at a rate of 4.2% per annum. Determine the value of the investment at the end of the term. Use your TVM Solver. Show what values you would add to the various parts below (not everything needs to be filled, only what is necessary for this scenario):

|  |  |
| --- | --- |
| Present Value |  |
| Payment |  |
| Future Value |  |
| Annual Rate % |  |
| Periods |  |
| Compounding |  |
| Mode |  |

***Expert***

1. Your grandma wants to invest some money into your college fund. She wants to put enough money in so that you will have at least $25,000 in eighteen years’ time. The bank offers an annual rate of 5.75% compounded monthly. How much, to the dearest dollar, should her initial investment be?

|  |  |
| --- | --- |
| Present Value |  |
| Payment |  |
| Future Value |  |
| Annual Rate % |  |
| Periods |  |
| Compounding |  |
| Mode |  |

**Learning Goal #9: I can calculate loan and leasing payments**

***Novice***

1. Jack borrows $8,500 to get his house a new roof. He can afford payments of $250 at the end of each month. The bank charge interest at 6.92% per annum compounded monthly.
   1. How much will he owe after 2 years?

|  |  |
| --- | --- |
| Present Value |  |
| Payment |  |
| Future Value |  |
| Annual Rate % |  |
| Periods |  |
| Compounding |  |
| Mode |  |

* 1. How many months will it take to pay off the loan?

***Apprentice***

1. A local dealership advertises the sale price of a pick-up truck as $27,899. You decide that you want to lease the truck with a down payment of $1000. The monthly payments, not including taxes, are $422.38 for 4 years with a final buyout of $10,950.
   1. Calculate the overall cost of the pick-up truck if you decide to buy the vehicle at the end of the lease.

|  |  |
| --- | --- |
| Present Value |  |
| Payment |  |
| Future Value |  |
| Annual Rate % |  |
| Periods |  |
| Compounding |  |
| Mode |  |

***Expert***

1. Jacob and Brendan decide to share the purchase of a new car. They find the perfect used jeep to purchase for the sale price of $21,500, They have saved $4,500 for a down payment. They are trying to decide if they take a loan from the bank for the remainder of the cost, or do a lease. See some additional information on the two options below.

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| --- | --- | --- |
|  | Option 1: Loan | Option 2: Lease |
| Details of the deal | * The down payment is $4500 * The loan is 7.95% per ann4um compounded monthly * Monthly payments are to be made for 5 years | * The down payment is $4500 * The interest on the lease is set at 8.75% per annum compounded monthly for 3 years * Residual value is $7,975.89 |
| Monthly payments |  |  |
| Total cost of the car to own |  |  |

Which one would you choose? Why? State at least 2 reasons to support your answer. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Learning Goal #10: I can use technology to graph parabolas and find important points on the graph**

***YOU ARE TO USE THE DESMOS APP FOR EACH QUESTION IN THIS LEARNING GOAL***

***Novice***

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| Graph the following equation into desmos. Use the graph to find the below data:  **f(x) = x2 - x - 12**  axis of symmetry: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  y-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  x-intercept(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Graph the following equation into desmos. Use the graph to find the below data:  **f(x) = 2(x - 6)(x + 10)**  axis of symmetry: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  y-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  x-intercept(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Graph the following equation into desmos. Use the graph to find the below data:  **f(x) = -x2 – x + 6**  axis of symmetry: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  y-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  x-intercept(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Graph the following equation into desmos. Use the graph to find the below data:  **f(x) = -3(x – 12)2 – 5**  axis of symmetry: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  y-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  x-intercept(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

***Apprentice***

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| You head to Mexico on a vacation and enjoy some lovely cliff jumping. Your brother took photos of your best jump. You use desmos to over lay a parabola on your photo and find the equation to your jump. ‘y’ represents the height in (m) and ‘x’ represents the time (sec):  y=-0.4x2+1x+12  Graph the function using desmos.   1. How tall was the cliff that you jumped from? 2. What was your highest point in your jump? 3. How many seconds were you in the air before you hit the water? |
| The Me to We club holds a yearly fundraiser for the students who go to Africa on a service trip. They usually sell tickets for $20. At this price, they typically sell 125 tickets. Looking at previous year’s sales they are aware that they will sell 10 fewer tickets for each price increase of $3. What function models the potential earnings, if *x* represents the number of price increases in dollars?   1. Using desmos, what is the maximum amount that the club will fundraise from this event? 2. If they are wanting to raise the maximum amount, how much should they sell the tickets for? 3. If they use this highest price ticket, how many tickets can they expect to sell? |
| Image result for bee motel  Susie starts a bee motel company to sell bee motels at the Summerland Farmers Market. She does some research and finds that other companies sell about 20 bee motels a week with a selling price of $30. She wants to sell hers for a bit more, and with some additional research, she find that for every $5 she increases her price, she will sell 1 less bee motel.     1. What is the maximum amount that Susie can make selling her bee motels? 2. What should Susie charge for her bee motels if she wants to earn the maximum amount of money? 3. If she charges the amount of money that she would need to earn the highest amount, how many bee motels would she sell in a week? |

**Learning Goal #11: I can communicate the characteristics of a quadratic function**

***You may NOT use Desmos for this learning goal. PUT YOUR PHONE AWAY!***

***Novice***

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| For the below graphs, identify the axis of symmetry and the co-ordinates of the vertex.    Equation in Factor Form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Equation in General Form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | For the below graphs, identify the axis of symmetry and the co-ordinates of the vertex.    Axis of symmetry: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Vertex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Value of a = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Equation in Vertex Form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Equation in General Form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| What are the three forms of a quadratic function? How do you represent these functions? What data can you get from each of these forms? | |
| Image result for cartesian planeUse a table of values to graph the below function:  **y = x2 - 4x + 3**   |  |  | | --- | --- | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | |

***Apprentice***

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| What is the equation of the below parabola in vertex form? | What is the equation of the below parabola in factor form? |
| Change the below equation into factor form and then graph the parabola: y = x2 - 4x - 5  Image result for cartesian plane | What is the y-intercept and x-intercept(s) of the below form? f(x) = 2x2 - 4x - 6  y-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  x-intercept(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Graph the below parabola  Image result for cartesian plane |

***Expert***

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| Graph the following equation (without using a table of values): f(x) = -2(x - 4)2 + 2  Image result for cartesian plane | A quadratic function has an equation that can be written in the form *f*(*x*) = *a*(*x* – *r*)(*x* – *s*)*.* The graph of the function has *x*-intercepts at (8, 0) and (-2, 0) and has the y-intercept of y = - 72. What is the equation of the parabola?  Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Learning Goal #12: I can graph the non-linear system of equality**

***Novice***

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| **Graph the following and state a solution to the system.**  x2 + 1 = y  -2x = y  Image result for cartesian plane | **Graph the following and state a solution to the system.**  x2 - 4 = y  y = -x - 2  Image result for cartesian plane |

***Apprentice***

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| **Graph the following and state a solution to the system.**  (x – 1)2 + 1 = y  y = x + 2  Image result for cartesian plane | **Graph the following and state a solution to the system.**  (x – 3)(x + 2) = y  y = 0  Image result for cartesian plane |

***Expert***

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| **Graph the following and state a solution to the system.**  x – y = - 1  y = x2 + 1  Image result for cartesian plane | **Graph the following and state a solution to the system.**  3x - y = - 2  2x2 - y = 0  Image result for cartesian plane |

**Learning Goal #13: I can graph the solution to a system of linear inequalities**

***Novice***

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| For which inequality is (-2, -4) a possible solution? Check all that apply.   * 1. 3x + 2 < y   2. x + 5 ≥ y   3. y > -x + 2   4. y ≤ -2x + 3 | Inequality equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Image result for linear inequalities |

***Apprentice***

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| Graph the following inequality:  y < x + 4  10 by 10 grid | Graph the following inequality:  -3y ≤ 9x + 12  10 by 10 grid |

***Expert***

|  |  |
| --- | --- |
| Graph the following systems of inequality:  x + y ≤ 3  y > 2  10 by 10 grid  ***What are two solutions that satisfy this system of inequality? \_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_*** | Graph the following inequality:  3y – 2x ≤ 6  2y – 3x ≤ 6  10 by 10 grid  ***What are two solutions that satisfy this system of inequality? \_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_*** |

1. A company makes two types of boats on different assembly lines: aluminum fishing boats and fiberglass bow riders. When both assembly lines are running at full capacity, a maximum of 20 boats can be made in a day. The demand for fiberglass boats is greater than the demand for aluminum boats, so the company makes at least 5 more fiberglass boats than aluminum boars each day. What combinations of boats should the company make each day?

State your variables and systems of inequalities. Graph the inequalities and state two possible solutions to the systems.

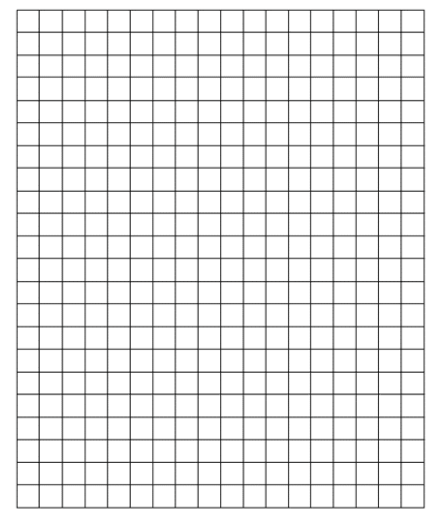
*Variables*

\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*System of inequalities*

*Graph the system*



*Two possible solutions*

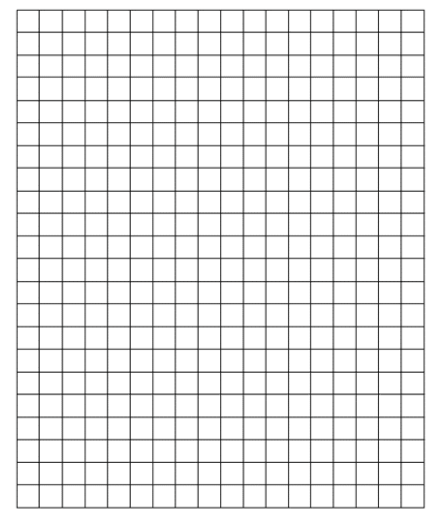
1. The staff in a cafeteria are making two kinds of sandwiches: egg salad, and ham and cheese. A maximum of 450 sandwiches are needed. Based on previous demand, there should be at least twice as many ham and cheese sandwiches as egg salad sandwiches. Define the variables and write a system of inequalities that models his solution.

*Variables*

\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*System of inequalities*



*Three possible solutions*

**Learning Goal #14: I can use optimization to solve for situations**

***Novice***

On a flight between Winnipeg and Vancouver, there are business class and economy seats. At capacity, the airplane can hold no more than 145 passengers. No fewer than 130 economy seats are sold, and no more than 8 business class seats are sold. The airline charges $615 for business class seats and $245 for economy class.

What combination of business class and economy seats will result in the maximum revenue? What is the maximum revenue?

1. Define your variables:
2. Complete the constraint and restriction chart

|  |  |
| --- | --- |
| Constraints | Restrictions |
|  |  |

1. What is your objective function?

|  |
| --- |
| Objective function: |

1. Graph using desmos. What are your test co-ordinates for your maximum and minimum?
2. Minimum and maximum test window.

|  |  |
| --- | --- |
|  |  |
|  |  |

1. What combination of business class and economy seats will result in the maximum revenue? What is the maximum revenue? (make a full sentence). \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Apprentice***

A jewelry store sells diamond earrings: small earrings (no more than 1 carat of diamonds) and large earrings (more than 1 carat of diamonds). They sell at least four pairs of small earrings for every pair of large earrings. They also sell no more than 120 pairs of earrings, in total per month. The small earrings sell for about $800 a pair, and the large earrings sell for about $1500 a pair.

What combinations of the two categories of earrings should they try to sell to maximize their revenue. What amount of sales can they expect?



***Expert***

A farmer planning spring planting has decided to plant up to a total of 120 acres in corn and soybeans. An estimate of the investment required and the expected return per acre for each appears in the below table.



Because corn is needed for feed purposes on the farm, the farmer needs at least 38 acres of corn, and the budget can cover at most $3000 for both corn and soybeans.

How many acres of corn and how many acres of soybeans should be planted to maximize the return from these two crops?

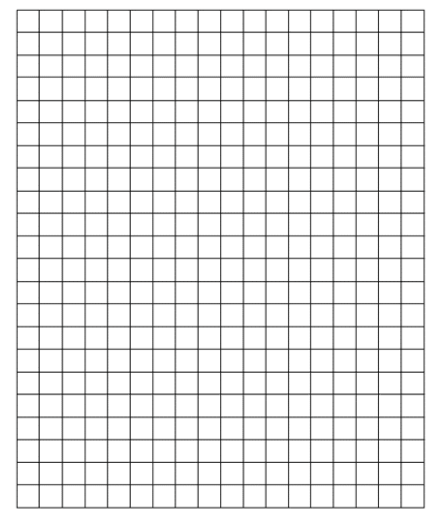
1. Nick is preparing a tomato and red pepper soup as the daily special for his restaurant. To allow the red pepper taste to dominate, he will include at least twice as many peppers as tomatoes, by mass. However, he wants no more than 25 kg of tomatoes and red peppers. Define the variables and write a system of inequalities to model.

Define the variables and write a system of inequalities to model this situation. Graph the system. Use your graph to suggest three possible combinations.

*Variables*

\_\_\_\_\_= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*System of inequalities*

*Three possible solutions*