Preparation Menu for Precalculus!

Directions: At minimum, you need to do enough of the problems on the menu to earn 50 points. You can accomplish this task in any manner you choose (i.e. do many of the problems worth fewer points, a mix of problems, or some of the problems worth more points). If you have questions, feel free to talk to a neighbor, but make sure you are staying on task. If you need additional help, please see one of the stations around that will give a brief explanation on how to solve each type of problem. If you need one on one help, see a teacher or friend, we will be circulating throughout. **NOTE: You must do at least one problem from each column.**

Deadline: You must complete the minimum by \_\_\_\_\_\_\_\_\_\_\_\_. If you finish the minimum required, please continue working on additional problems.

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|  | **Slopes and Lines** | **Writing Linear Equations** | **Functions & relations** | **Graphing** **functions**  Graph each function on graph paper, be sure to note any important information | **Domain and Range**  Identify the domain and range of each relation. |
| 1 pt | Find the slope between (3,7) & (-4, 6) | Write an equation for a line with a slope of 4, and a y-intercept of 2. | Is this relation a function? Explain. |  | {(3,-3), (-4, 7), (2, 5), (-3, -3), (0, 1)} |
| 2 pt | Find the slope between (2.5,6) & (-4,1/3) | Write an equation of a line parallel to , and passing through the origin. | Does the set of ordered pairs represent a function? (3,-3),  (-4, 7), (2, 5), (-3, -3), (0, 1) |  | {(3,8), (-4, 6), (2, 5), (3, -3), (3, 1)} |
| 4 pt | Find the slope of a line perpendicular to the line that passes through (3,4) and the origin. | Write an equation for a line perpendicular to the x-axis, and through the point (3,6) | Sketch both a function, and a relation that isn’t a function. |  |  |
| 8 pt | Determine the average rate of change per year if the number of fish in Boston Harbor in 1980 was 330,000 and the number of fish in 2010 was 520,000. Explain, in words, what this means. | Determine the equation of the line through  (-2, -5) & (3, 7). | Is it possible for a function to have neither a positive or negative slope? Explain why or why not, then give a real life example of this situation. |  |  |
| 10 pt | Find a value for k, such that the line passing through (1,6) and (k,4) is parallel to the line  y = 4/3x +1 | Write the equation of the line through the point (-3, -6) that intersects the line  when . | Sketch a picture of a function, that if reflected over the line y = x, would still be a function. |  |  |

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| **Slope/rate of change**  Finding the slope between two points requires you to find how much y-changes and divide it by how much x-changes. It is often thought of as . For example, to find the slope between  (-4, 6) and (5, -10), we first determine that the y-value changes by -16. We then see that the x-value changes by +9, so our slope must be .  Rate of change is the same idea as slope, you may need to read some context to the problem, then explain what it means. For example…  A red sea urchin grows its entire life, which can last 200 years. If at age 30 the sea urchin has a diameter of 11.9 cm and at age 110 it has a diameter of 15.5 cm, what is the average growth rate of this urchin over the given period and what does this mean?  The diameter changes 3.6 cm and the number of years is 80, so the slope is cm/yr or .045 cm/yr, which means that over the period of 80 years the sea urchin averages .045 centimeters of growth every year. | **Graphing Lines**  We could be given the equation in a variety of ways: y-intercept, standard form and point slope.  y-intercept:  The slope can be easily identified as 3 and the y-intercept is (0, -1).    standard:  We plug in 0 for x and 0 for y and can find the points (0, -4) and (3, 0).    Remember how to graph anything else? Parabolas, or circles maybe? |
| **Writing Linear Equations**  Hopefully, we remember how to write linear equations in slope-intercept (y=mx+b) form, where m is the slope, and b is the y-intercept.  EXAMPLE: Write an equation for a line with a slope of 6 and a y-intercept of -5. ANSWER: y = 6x – 5.  We might not remember how to write other forms of equations for lines, even though some of these are much easier to use in more situations. The big dog of linear equations is **point-slope form of a linear equation**.  We can use this form of a linear equation to write an equation quickly knowing the slope and ANY point on the line. Check it out:  EXAMPLE: slope = 1/3, point = (-1,8)  Point-slope looks like this: , where m is the slope, and (x1, y1) is the point we know.  ANSWER: y – 8 = 1/3(x + 1). Done. No rearranging necessary.  Parallel and Perpendicular lines.  Two lines that are *parallel*, have the **same slope**.  Two lines that are *perpendicular*, have slopes that multiply to -1. In other words, **negative reciprocal slopes.**  EXAMPLE: The slope of a line perpendicular to y = -3/2 x +1 is 2/3. We took the reciprocal of -3/2, and made it positive. BAM! | **Functions and Relations**  *Relations* are sets of ordered pairs. They look like this: {(2,1),(5,2),(1,5)}. Since ordered pairs represent points on a graph, we can also represent a relation as a graph, or as an equation.  *Functions* are a special kind of relation, where each x value (input), has a unique y-value (output). Using the same relation: {(2,1),(5,2),(1,5)}, we can see that if I input 2, I get 1 as an output. If I input 5, I get 2 as an output. If I input 1, I get 5 as an output. There’s no way to confuse them. This is a function.  Here’s a relation that isn’t a function. {(5,1),(5,2),(1,5)} If I input 1, I still get 5 as an output, but now if I input 5, I’m confused—I could get 1, or I could get 2 as an output. As soon as there are two potential y-values (outputs) for one x-value (input), our relation is not a function.  On a graph, we can use a shortcut called the **vertical line test** to see if a relation is a function. If there’s ever a time that we can draw a vertical line and it hits our graph in more than one place—it’s not a function. If vertical lines can only hit the graph once, it’s a function. Here are two graphs: the first one is a function, the second is not.  Function! Not a function!   |  |  | | --- | --- | |  |  | |
| **Domain and Range**  **Domain**: The domain is the set of all possible x-values (inputs) in a relation. This means, that any number that can be used as x, is included in the domain. We usually write the domain as an interval of numbers like: x ≤ 0, *or* -2≤x≤2, *or* x can be **all real numbers**.  EXAMPLE 1: The domain of the relation {(2,1),(5,2),(1,5)} is 2, 5, & 1.  EXAMPLE 2: The domain of this relation is -2 ≤ x ≤ 2, because the first x-coordinate appears at -2, the last x-coordinate appears at 2, and there are points everywhere in between. | We can also get the domain of a function from it’s equation, which you might recall from your study in Algebra 2, of radical functions.  EXAMPLE 3: For , the radicand (the stuff under the square root) has to be greater than zero, in order to show up on a normal graph. We can make an inequality to represent the domain, and solve for x:  EXAMPLE 4: For, there aren’t any real numbers that you can’t plug into this function and not get a value. Therefore, the domain is: **All Real Numbers**  **Range:** The range is the set of all possible y-values (outputs) in a relation. This means, that any number that can be used as y, is included in the range. We usually write the range as an interval of numbers like: y ≤ 0, or y can be all real numbers. For now, we can get the range by looking at a set of points, or looking at the graph of a relation and seeing where it exists in terms of y-values. |
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