Precalculus Name:

Function Fundamentals

1. Determine which of the following are functions and which are not. Be prepared to explain your answer.
   1. *y* = 2*x* – 1
   2. *y* 2 = *x* + 6
2. Evaluate the following given that:



* 1. *f*(2) =
  2. *g*(-1) =
  3. *h*(0) =
  4. *j*(.5) =

1. Solve the following using the functions above:
   1. *f*(*x*) = 0
   2. *h*(*x*) = 0
2. Review linear functions (using your book, online videos, your classmates or your own knowledge. I found this website this morning - <https://www.boundless.com/algebra/graphs-functions-and-models/functions-an-introduction/the-linear-function-f-x-mx-b-and-slope/>). Then, complete the following.
   1. Which of the following tables contains data that can best be modeled with a linear function? Why? Find an equation that fits the linear data. Find its slope, *y*-intercept and zero.

|  |  |
| --- | --- |
| *x* | *y* |
| 1 | 5 |
| 3 | 7 |
| 8 | 12 |
| 15 | 19 |

|  |  |
| --- | --- |
| *x* | *y* |
| 2 | 8 |
| 5 | 50 |
| 12 | 288 |
| 15 | 450 |

|  |  |
| --- | --- |
| *x* | *y* |
| 3 | -27 |
| 5 | -125 |
| 11 | -1331 |
| 20.5 | -8615.125 |

* 1. Find equations of lines through the following points. Give the slope, *y*-intercept and zero for each.
     1. (-2, 5) and (12, -20)
     2. (2, -3) and (-1, -15)
  2. Ms. Frenkil is training for a marathon. She starts at Robinson, stretches, and looks at her watch. It reads 6:00 am. She plugs in her headphones and begins to run around the town of Pomfret. After a while, she realizes she can't run anymore, and looks at her watch. It reads 7:30 am, and her iPhone tells her she is 7.5 miles from home. How fast was her average speed over the course of the run?
  3. The next day, she again begins running at 6:00 am. If she runs at exactly the same speed, when will she finish her run if she wants to run for 10 miles?
  4. The size of a shoe a person needs varies linearly with the length of his or her foot.

The smallest adult shoe size is Size 5, and fits a 9-inch long foot. An 11-inch long foot takes a Size 11 shoe.

* + 1. Write the particular equation expressing shoe size (s) in terms of foot length (l).
    2. If your foot is a foot long, what size do you need?
    3. Bob Lanier, who once played in the NBA wears Size 22. How long is his foot?
    4. Find the shoe-size-rate intercept. What does it tell you about the real world?
    5. Calculate the foot-length-intercept. What does this number represent in the real world?
    6. Calculate the slope and explain what it represents or what it tells you.
    7. Plot the graph of this linear function. Use a suitable domain and label the horizontal and vertical axes.
  1. Bridges on highways often have expansion joints, which are small gaps in the roadway between one bridge section and the next. The gaps are put there so the bridge will have room to expand when the weather gets hot. Suppose a bridge has a gap of 1.3 cm when the temperature is 22˚C, and that the gap narrows to 0.9 cm when the temperature warms to 30˚C. Assume the gap width varies linearly with the temperature.
     1. Write the particular equation for gap width (w) in terms of temperature (t)
     2. What is the slope? What does this number represent?
     3. How wide would the gap be at 35˚C? at 
     4. At what temperature would the gap close completely? What mathematical term describes this value?
     5. What is the width-intercept? What does this tell you in the real world?
     6. Plot the graph of this linear function. Use a suitable domain and label the horizontal and vertical axis.
  2. Given the line,, find the equation of a line parallel to this line and perpendicular to this line.
  3. What is the equation of a horizontal line through the point (2, 3)?
  4. What is the equation of a vertical line through the point (2, 3)?

1. Review quadratic functions (using your book, the internet, YouTube videos, your friends, your own memory, etc. This was fun to play with - <http://www.mathopenref.com/quadraticexplorer.html> - and this is useful nuts and bolts information - <http://math.about.com/od/algebra1help/a/Quadratic_Formula.htm>).
   1. Using a graphing calculator, sketch a graph of . Make a sketch of what you see below. Using all the tools at your disposal, find the *x* and *y* intercepts, the vertex and the axis of symmetry. Be prepared to explain your approach.
   2. The height *h* (in meters) of a BMX rider *t* seconds after leaving a jump can be modeled with the equation .
      1. Sketch a graph of this function, labeling all axes and noting the maximum, the *y*-intercept and the zero. Explain what each value represents.
      2. Where is the rider 1.5 seconds after leaving the jump?