Topic 2. Functions

Straight-lines

1) There are 3 different forms of for the equation of a straight line:

   a) Convert $y = 2x + 5$ to the general form, $ax + by + c = 0$: _________________

   b) Convert $18x + 6y + 12 = 0$ to the gradient-intercept form: $y =$_______________

   c) The third form is called the ________-gradient form. It is useful when having coordinates such as $(4, 6)$ given the gradient is 8. Copy and fill in the formula with this information:

2) Lines are sometimes _______________. This means the ____________ are exactly the same.

3) Lines can also be ___________________ to each other. To test if they are precisely at ______ degrees, you can ____________ the gradients and you should get a value of _____. This could be useful in proof. The word _____________ can also be used to describe a line that is at ______ degrees to another.

Other Functions

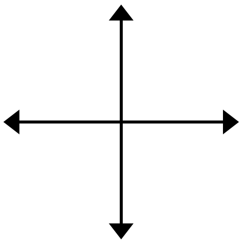
4) Functions can act as _______________. For example, $C(t)$ could be used to represent the change in cost over ________ for a company.

5) Inverse functions are found by switching the ___ and ___ coordinates. On a graph, this ends up being a reflection in the line ___=___. If a coordinate is defined as $f(2) = 5$, then the inverse would be written as f^{-1}____ $=$ ___.

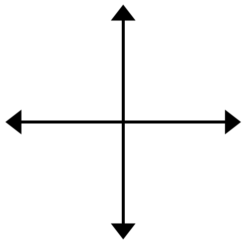
6) Finding the domain and range of inverse functions is easy. They simply ____________.

7) If inversing the function results in the ___________ function you started with, it is called a _______- inversing function. The simplest is $y = —$, also called the _____________ function. There is also something called an ____________ function. For these, if you make a composite function of the inverse and $f(x)$, your solution will be ____. This is important for proof. Try this here for $f(x) = 2x + 4$ by finding the inverse first:

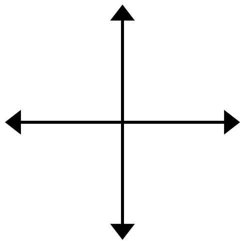
8) There are several functions you need to know the shape of. Sketch each, and state domain and range below. Also, add any asymptotes, stating their equations, and specify the coordinates of any zeros:



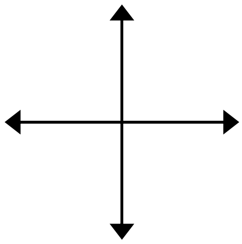
$y = \sqrt{x}$



$y \ = \frac{1}{x}$



$y = a^x$



$y = \ln x$

9) Transformations can be carried out on any type of function. To begin, $y = af(x)$ represents a _____________ _______________ of $f(x)$, scale factor ____. To carry out this transformation, simply __________ each ___- coordinate by ____. Leave the ___ - coordinate unchanged. Conversely, $y = f(ax)$ is a __________ _________ of scale factor ____. One must ____________ each ___ - coordinate by ___, leaving the __-coordinates.

10) Next, $y = f(x-4) + 5$ represents a ________________ by the ________ $\left(\ \right)$. To carry out this transformation, simply ___________ to each __ -coordinate and ____ to each __- coordinate. This is a _______________ transformation because you are doing ___ at once.

11) Also, $y = -f(x)$ is a ________________ in the __ -axis. Simply ____________ the _________ of each ____- coordinate, leaving each __ - coordinate unchanged.

12) For $y = f(-x)$, which is a _____________ in __ - axis, we simply change the ______ of each __- coordinate and leave the ____- ______________ as they were.

13) A quadratic graph can also be called a __________________. There are 3 forms for the equation of a quadratic.

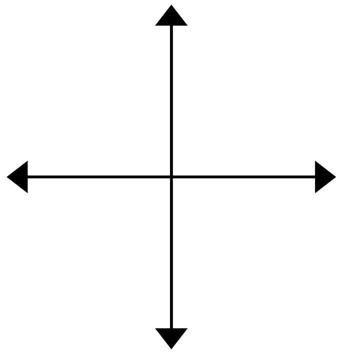
a) General form: $y \ =$ ______+______+_______

b) Root or x-intercept form: $y =$ ____________________

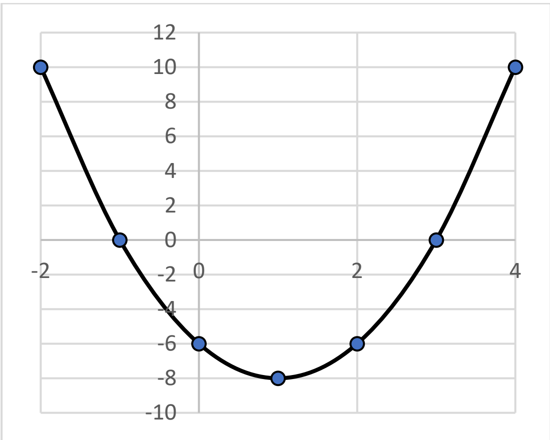
c) Vertex or completed square form: : $y =$ ____________________

14) Quadratic equations have symmetry.   The line of symmetry is called the ________ of symmetry.   There is also a ___________, which is the general term for a ________________ or _______________, depending if the function is _____________ (upward facing) or _____________ (downward facing).

a) Write the function $y = x^2 + 4x - 12$ in root form, and vertex form in space below. Sketch the function with the information these two forms provide. Also include the _____ of symmetry.



b) For this graph: Write the function in all three forms. Begin with root or vertex form.



15) For some quadratics, it is not simple to write them in the root/vertex forms. The _______ can be found by using the quadratic ______________ instead:

16) Part of this equation is called the discriminant. The formula is _ = ____________. The purpose of the discriminant is to determine how many ___________ a quadratic function has. There can be: (sketch each one next to it):

a) ___ solutions, where ____ 0

b) two _________ real solutions, where ____ 0

c) two ___________ real solutions, where ____ 0

17) Without the use of a calculator, sketch the following: $f(x) = \frac{12x+24}{6x-12}$, including:

a) The equations of the asymptotes
b) The coordinates of the x-intercepts.
c) The coordinates of the y-intercepts