MINISTRY OF EDUCATION

CHRISTMAS TERM

SEPTEMBER 2020

GRADE 11
SUBJECT: MATHEMATICS

WEEK 5 LESSON 1

TOPIC: RELATIONS FUNCTIONS AND GRAPHS

SUB-TOPIC: quadratic functions Axes of symmetry and roots of functions

1. Determine the axis of symmetry, maximum or minimum value of a quadratic function expressed in the form $a(x+h)^2+k$
2. Expressed in the form $a(x+h)^2+k$ and determine the roots.
3. Draw and interpret the graphs of non- linear functions.

OBJECTIVES:

Content:

Axis of symmetry

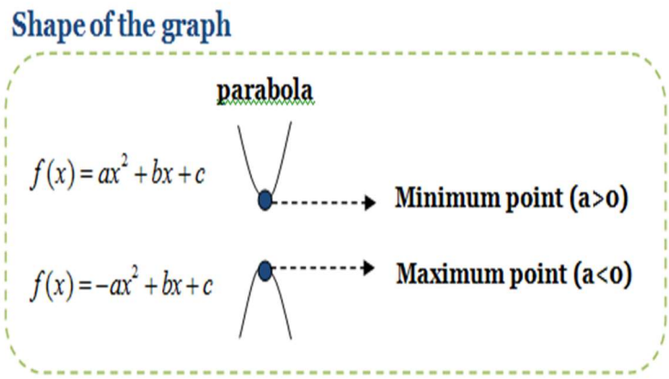
A line through a shape so that each side is a mirror image.

When the shape is folded in half along the axis of symmetry, then the two halves match up.

In this photo the white line down the center is a vertical axis of symmetry. Also called the Line of Symmetry.

Minimum and maximum value

The **minimum value** of a function is the lowest **point** of a vertex, and the maximum value of a function is the highest point of the vertex.



Maximum and Minimum $a(x - h)^2 + k$, o this format gives us the information about the parabola (quadratic function).

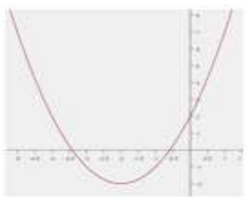
If $a > 0$, the parabola will have a minimum value.

If $a < 0$, the parabola will have a maximum value (p;q) represents the turning point.

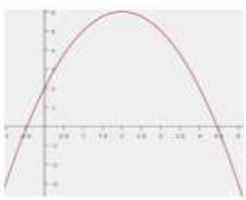
The y-value of the turning point (q) gives us the maximum or minimum value of the function.

The graph of a quadratic function is called a parabola.

For $f(x) = ax^2 + bx + c$



Opens up if $a > 0$



Opens down if $a < 0$

x-intercept: Set $f(x) = 0$, solve for x.

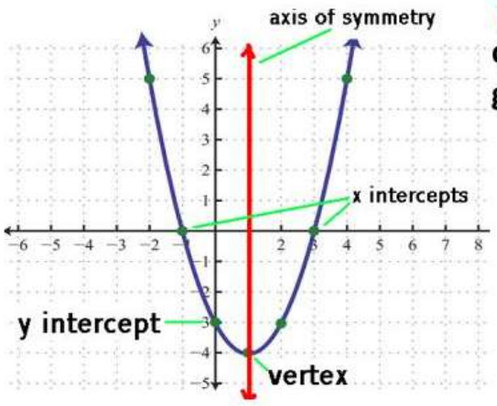
y-intercept: c

Equation of axis: $x = -\frac{b}{2a}$

Roots of a quadratic equation

Roots are also called x-intercepts or zeros. ... The **roots** of a function are the x-intercepts. By **definition**, the y-coordinate of points lying on the x-axis is zero. Therefore, to find the **roots of a quadratic** function, we set f (x) = 0, and solve the equation, $ax^2 + bx + c = 0$.

Define and graph quadratic functions



Any function that can be written in the form:

$y = ax^2 + bx + c$ is called a quadratic function. It's graph is called a parabola.

Consider the graphs of the quadratic functions:

$y = x^2$

$y = 2x^2$

$y = -2x^2$

$y = x^2 - x - 6$

1. GRAPH OF A QUADRATIC FUNCTION

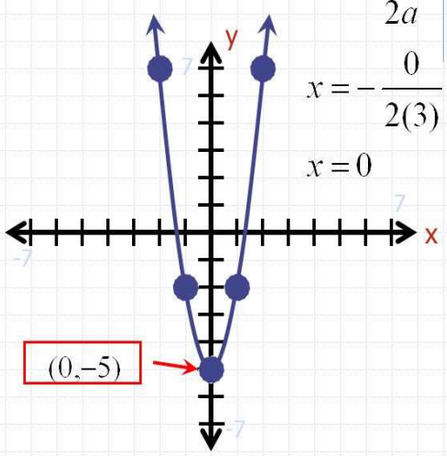
$f(x) = 3x^2 - 5$

x	y
-2	7
-1	-2
0	-5
1	-2
2	7

$x = -\frac{b}{2a}$

$x = -\frac{0}{2(3)}$

$x = 0$



Graphs of Quadratic Functions

Using these 4 attributes of a quadratic function we can sketch the graph.

For example:

$y = x^2 + 10x + 9$

1. Roots:

$(x+9)(x+1) = 0$

$x = -9 \quad x = -1$

$(-9, 0) \quad (-1, 0)$

2. Intercept:

$+9 \qquad (0, 9)$

3. Turning Point:

$y = (x+5)^2 - 16$

$(-5, -16)$

4. Max/Min:

Minimum

Reference: https://www.google.com/search?q=constructing+a+quadratic+graph-+showing+all+working&tbm=isch&ved=2ahUKEwiqjv_r2-3rAhWNoFMKHZSoD2QQ2-cCegQIABAA&oq=constructing+a+quadratic+graph-+showing+all+working&gs_lcp=CgNpbWcQA1Cn6gRYmJoFYK2eBWgAcAB4AIABrAKIAegZkgEIMC4xOC4yLjGYAQCgAQGqAQtnd3Mtd2l6LWltZ8ABAQ&sclient=img&ei=jQpiX-qTB43BzgKU0b6gBg&bih=657&biw=1366&rlz=1C1YQLS_enGY769GY76