How to find the Vertex

Factored Form

$(5-x)(x+3)$

What make parenthesis equal to zero

$(5,0)$ and $(-3,0)$

Add x-coordinates of x-intercepts (zeroes)

$5-3=2$

Divide that answer by 2 → x-coordinate of the vertex.

$\frac{2}{2}=1$

Plug that # in for x to get the y-coordinate of the Vertex

$(5-1)(1+3)$

Solve the equation

$(4)\cdot(4)=16$

You've found the Vertex!

$(1,16)$

Vertex Form

$(x-1)^2+16$

What makes parenthesis equal to zero

$(1,?)$

The constant outside of the parenthesis is the y-coordinate of the Vertex

$(1,16)$

You've found the Vertex!

Standard Form

$-x^2+2x+15$

Cannot find the vertex because there is a constant (y-intercept)

x^2+30x

Take the co-efficient of the non-squared term.

$(30,0)$ and $(0,0)$

Add x-coordinates of x-intercepts (zeroes)

$30+0=30$

Divide that answer by 2 → x-coordinate of the vertex.

$\frac{30}{2}=15$

Plug that # in for x to get the y-coordinate of the Vertex

$15^2+30(15)$

Solve the equation

$225+450=675$

You've found the Vertex!

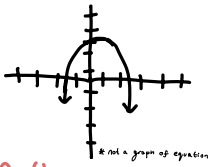
$(15,675)$

Is the Vertex the Maximum or the minimum?

Standard Form

$-x^2+2x+15$

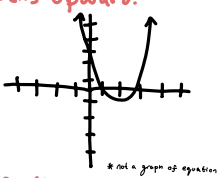
If the squared term is negative, the graph opens downward.



If the graph opens downward, the vertex is the maximum.

$x^2+2x+15$

If the squared term is positive, the graph opens upward.



If the graph opens upward, the vertex is the minimum.

Any Other Form

$(5-x)(x+3)$

Change equation to Standard form.

$-x^2+2x+15$

Follow the standard form steps above

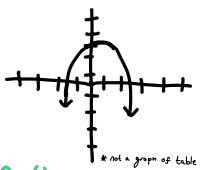
Is the Vertex the Maximum or the minimum?

Table Form

Vertex

x	-1	0	1	2	3
y	12	15	16	15	12

If the y-values next to the Vertex are less than the Vertex's y-value, the graph opens down.

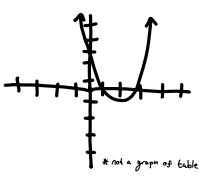


If the graph opens downward, the vertex is the maximum.

Vertex

x	-1	0	1	2	3
y	30	23	16	23	30

If the y-values next to the Vertex are more than the Vertex's y-value, the graph opens up.



If the graph opens upward, the vertex is the minimum.

How to find the y-intercept

Standard Form

$-x^2+2x+15$

The constant term in the equation is the y-intercept.

$(0,15)$

You've found the y-intercept!

Any Other Form

$(5-x)(x+3)$

Change equation to Standard form.

$-x^2+2x+15$

Follow the standard form steps above

Finding three points on a graph

Any form (not Standard)

$$(5-x)(x+3)$$

Find the Vertex of the equation.

What makes parenthesis equal to zero?

$(5,0)$ and $(-3,0)$

Add the x-coordinates of the zeroes, the divide by 2.

$$5-3=2 \qquad \frac{2}{2}=1$$

Plug that # in for x to get the y-coordinate of the Vertex

$$(5-1)(1+3)$$

$$(4)\cdot(4)=16$$

$$(1,16)$$

The Vertex is one of your three points.

There are three different ways to find two more points.

Find the x-intercepts

$$(5-x)(x+3)$$

What make parenthesis equal to zero?

$(5,0)$ and $(-3,0)$

These are your two other points on your graph!

Find the y-intercept

$$-x^2+2x+15$$

The constant is the y-intercept

$$(0,15)$$

This is your y-coordinate for both of your other two points.

$(0,15)$ and $(?,15)$

Take that x-value and subtract it from the x-coordinate of the Vertex.

$$0-1=-1$$

This # is your x-coordinate for your final point.

$(0,15)$ and $(-1,15)$

Find two random points

Plug in a random value for x.

$$(5-3)(3+3)$$

That # will be your x-coordinate for one of your points.

$(3,?)$

Solve for y with that x-value.

$$(5-3)(3+3)$$
$$(2)\cdot(9)$$
$$18$$

This is your y-coordinate for both of your other two points.

$(3,18)$ and $(?,18)$

Take that x-value and subtract it from the x-coordinate of the Vertex.

$$1-3=-2$$

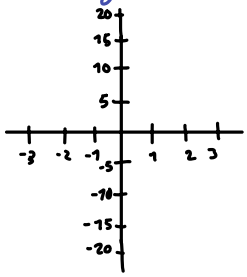
This # is your x-coordinate for your final point.

$(3,18)$ and $(-2,18)$

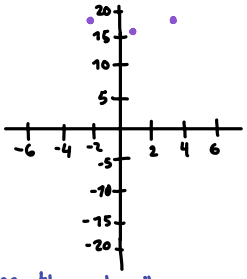
Graphing

* See 'finding three points on a graph'

Make your graph



Plot the three points you found on it.



Draw a line through all your points