
Exploring Quadratic Functions

Linear Functions

Recall that the standard form of a line is:

$$Ax + By = C$$

A, B and C must be integers.

A must be positive.

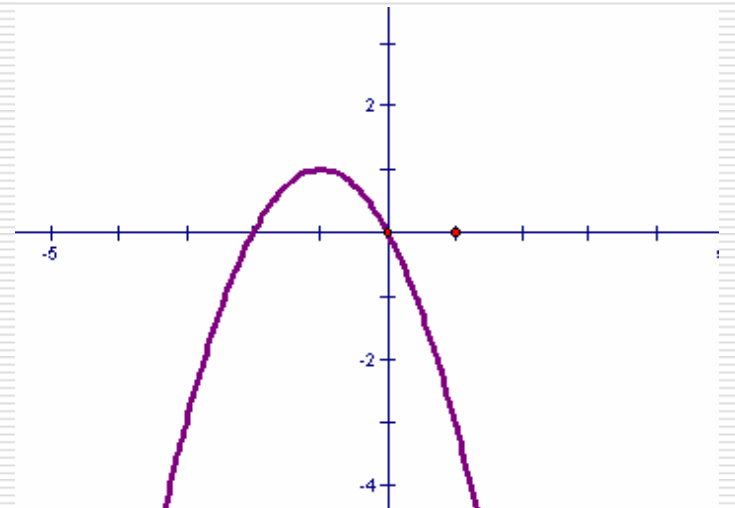
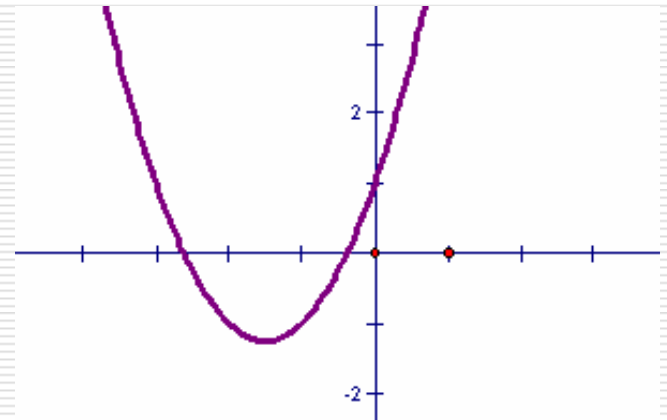
We are now going to look at another type of function ~
A [quadratic function](#).

Quadratic Functions

- The standard form of a quadratic function is:

$$y = ax^2 + bx + c$$

- The graph of a quadratic is always a parabola!



Quadratic Function

Find a, b and c for each quadratic.

1. $y = 2x^2 + 5x - 5$

2. $y = -5x^2 - 7x + 9$

3. $y = x^2 + 2x$

Quadratic Function

Find a , b and c for each quadratic.

1. $y = 2x^2 + 5x - 5$

$$a = 2, b = 5, c = -5$$

2. $y = -5x^2 - 7x + 9$

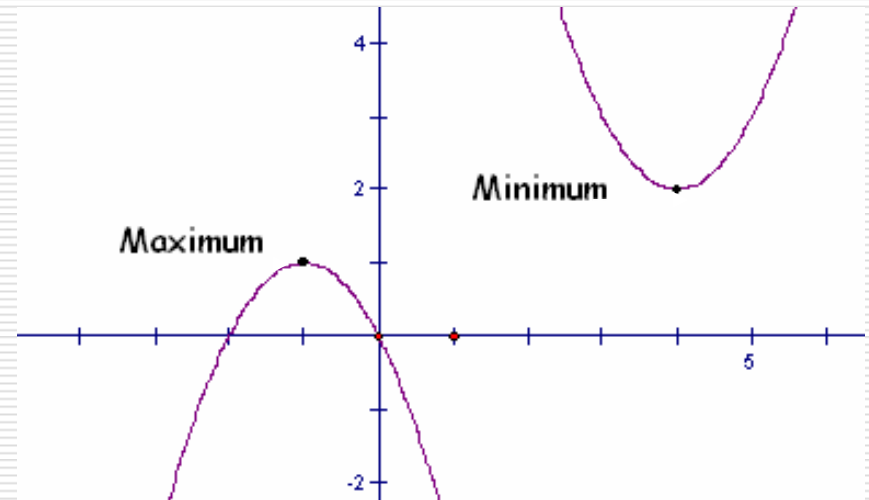
$$a = -5, b = -7, c = 9$$

3. $y = x^2 + 2x$

$$a = 1, b = 2, c = 0$$

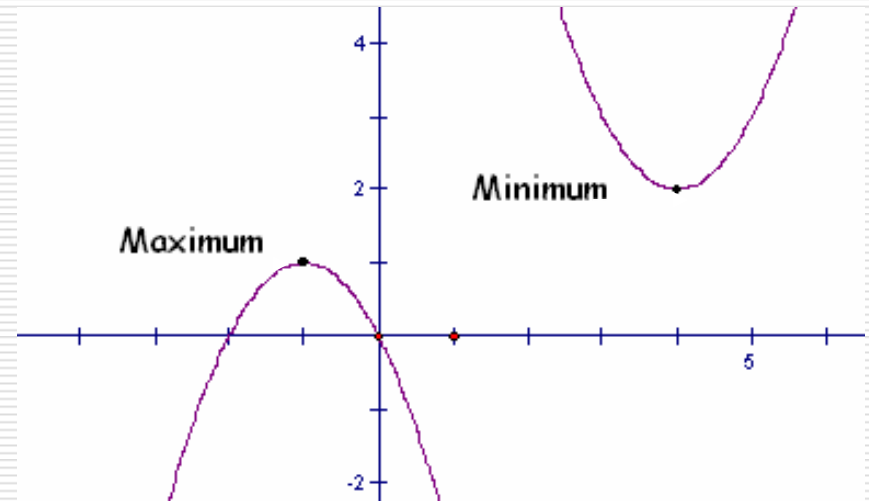
Minimums and Maximums

- Graphs of quadratic functions have either a minimum or a maximum.
- A maximum or a minimum point is called a vertex.
- [More practice online](#)



Minimums and Maximums (cont)

- When a parabola opens up it has a minimum, the lowest point on the graph.
- When a parabola opens down it has a maximum, the highest point on the graph.



Do These Open Up or Down?

1. $y = x^2$
2. $y = -x^2$
3. $y = 2x^2$
4. $y = -2x^2$
5. $y = 3x^2$
6. $y = -3x^2$

Hint? What happens when the a value is negative or positive?

Do These Open Up or Down? Answers

1. $y = x^2$
2. $y = -x^2$
3. $y = 2x^2$
4. $y = -2x^2$
5. $y = 3x^2$
6. $y = -3x^2$

You should notice that if a is positive your parabola opens up and that if a is negative your parabola opens down.

	Opens Up	Opens down
$y = x^2$	✓	
$y = -x^2$		✓
$y = 2x^2$	✓	
$y = -2x^2$		✓
$y = 3x^2$	✓	
$y = -3x^2$		✓

Order From Narrowest to Widest

1. $y = (1/2)x^2$
2. $y = (1/4)x^2$
3. $y = 2x^2$
4. $y = 5x^2$

Hint? What would make a parabola wider than a different one?

Order From Narrowest to Widest

Narrowest to Widest

1. $y = (1/2)x^2$

2. $y = (1/4)x^2$

3. $y = 2x^2$

4. $y = 5x^2$

$$Y = 5x^2$$

$$y = 2x^2$$

$$y = (1/2)x^2$$

$$y = (1/4)x^2$$

You should notice that the larger
a is the narrower the parabola is.

Exploring Quadratics Recap!

You should have discovered that:

Up or down!

- If a is positive a parabola will open up and its vertex will be a minimum
- If a is negative a parabola will open down and its vertex will be a maximum.

Wide or Narrow!

- The larger the absolute value of a , the narrower the parabola will be.

- A 's that are proper fractions are wider than whole numbered
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