



FREE Pre-Calculus Formula Sheet

Your Quick & Complete Guide to Pre-Calculus Success (Grades 11–12)

Unlock Your Potential With Expert Tutoring

MINIMAL GEOMETRY

Factoring Rules

COMMON FACTOR (GCF)

$$ab + ac = a (b + c)$$

*Always look for a GCF first!

PERFECT SQUARE TRINOMIAL

$$a^2 + 2ab + b^2 = (a + b)^2$$

$$a^2 - 2ab + b^2 = (a - b)^2$$

DIFFERENCE OF SQUARES

$$a^2 - b^2 = (a - b) (a + b)$$

*Two perfect squares separated by subtraction.

GENERAL TRINOMIAL ($AX^2 + BX + C$)

Find two numbers that multiply to **ac** and add to **b**.

*Use decomposition or box method.

Quadratic Functions

THE QUADRATIC FORMULA

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

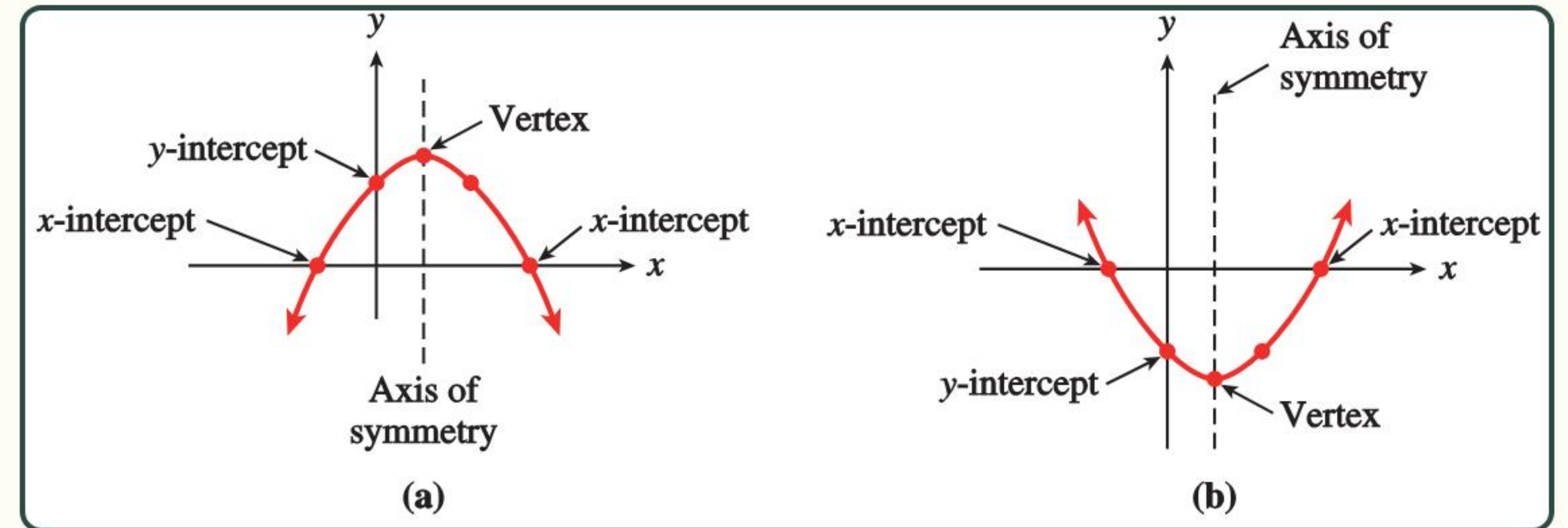
THE DISCRIMINANT ($b^2 - 4ac$)

- > 0 : Two distinct real roots
- $= 0$: One real root (perfect square)
- < 0 : No real roots (imaginary)

VERTEX FORM

$$y = a(x - p)^2 + q$$

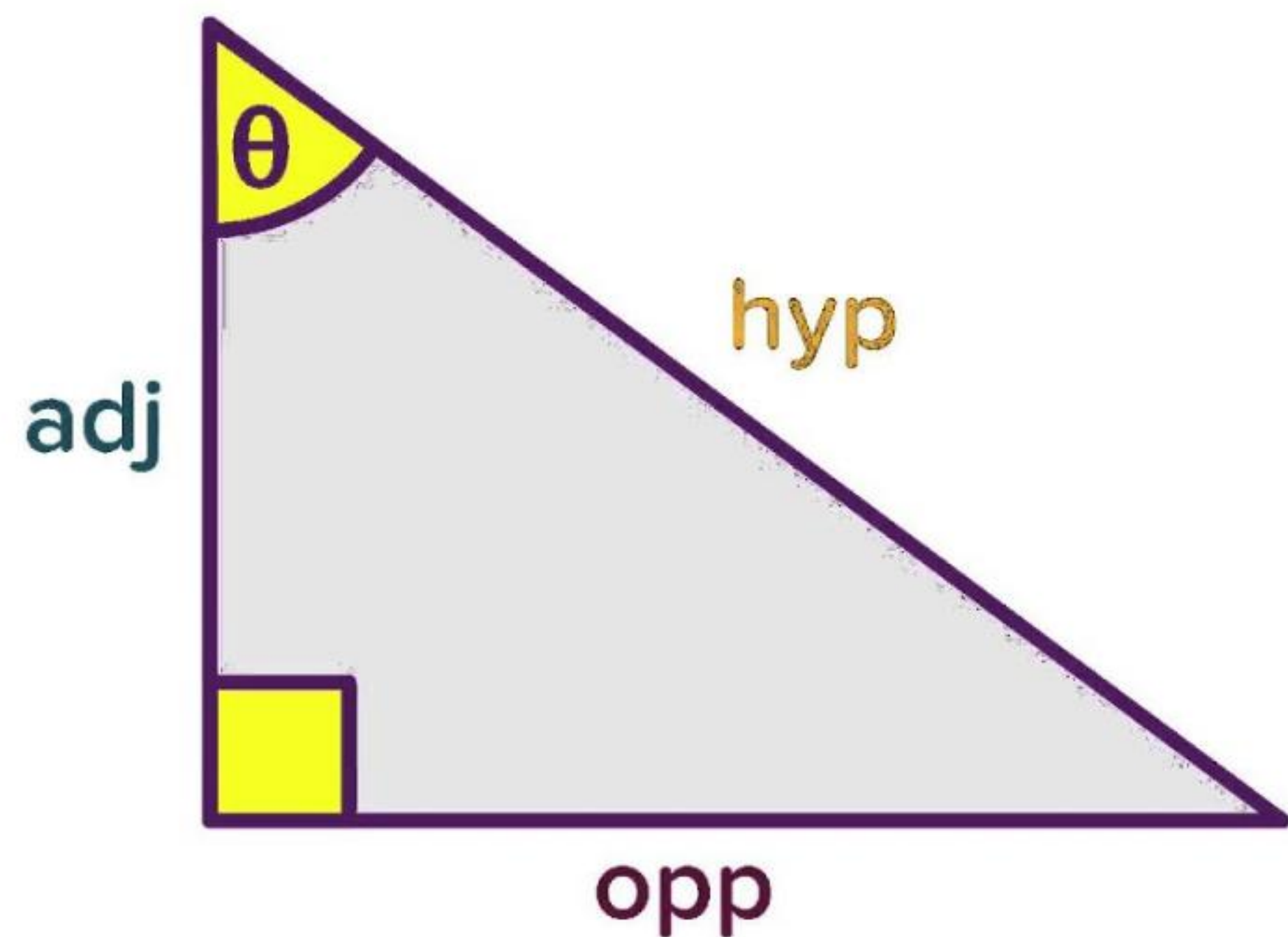
Vertex is (p, q) . Axis of Symmetry: $x = p$



Trigonometry Identities

Trigonometry in Right-angled Triangles

Video Tutorial: 'Labelling Sides'



SOH - CAH - TOA

$$\sin = \text{Opp/Hyp}$$

$$\cos = \text{Adj/Hyp}$$

$$\tan = \text{Opp/Adj}$$

RECIPROCAL IDENTITIES

$$\csc\theta = \frac{1}{\sin\theta}$$

$$\sec\theta = \frac{1}{\cos\theta}$$

$$\cot\theta = \frac{1}{\tan\theta}$$

PYTHAGOREAN IDENTITY

$$\sin^2\theta + \cos^2\theta = 1$$

QUOTIENT IDENTITIES

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

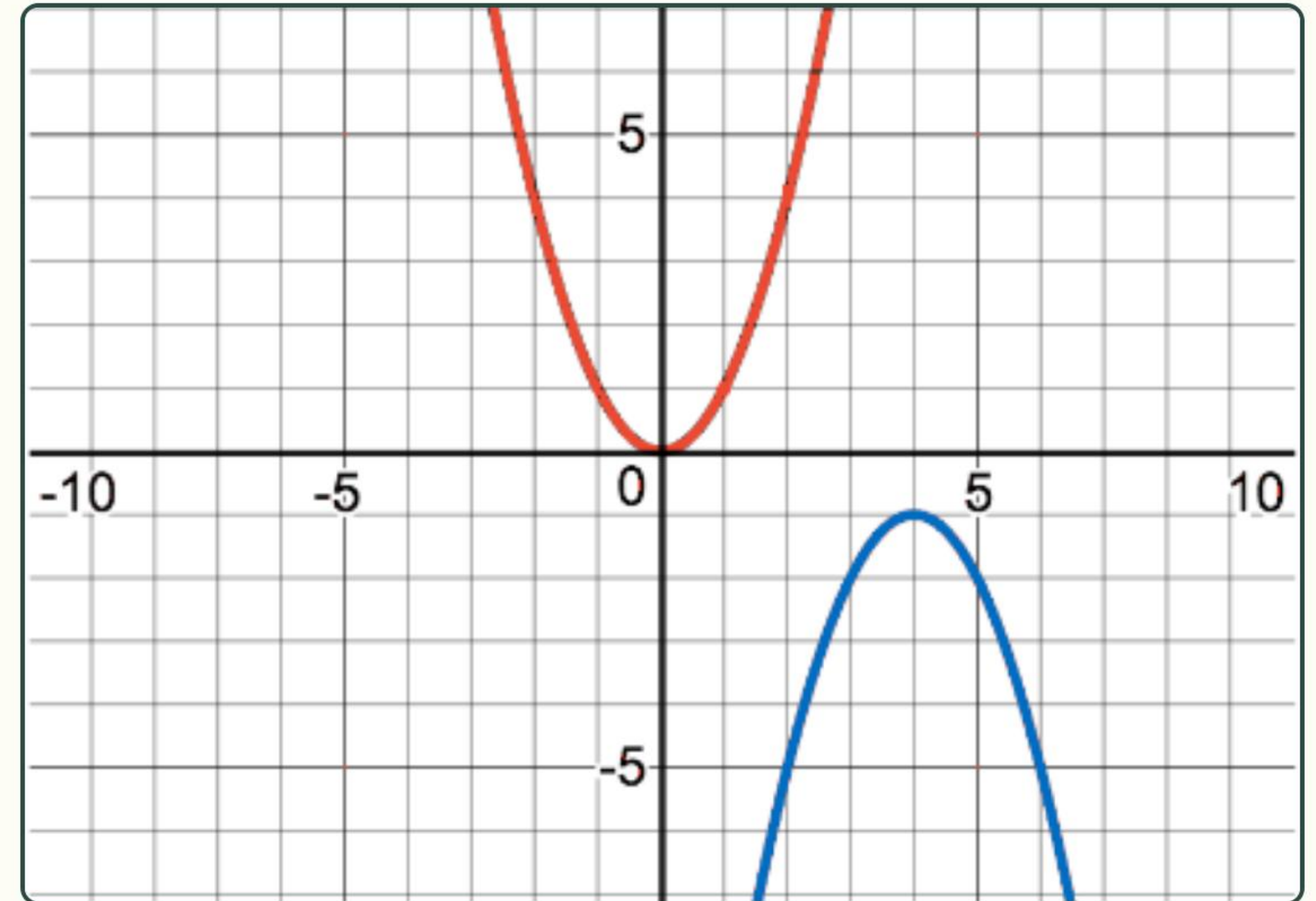
Function Transformations

TRANSFORMATION FORMULA

$$y = a \cdot f(x - h) + k$$

PARAMETER BREAKDOWN

- **a (Vertical Stretch):**
 $|a| > 1$: Stretch
 $0 < |a| < 1$: Compression
 $a < 0$: Reflection in x-axis
- **h (Horizontal Shift):**
 $x - h$: Shift Right ($h > 0$)
 $x + h$: Shift Left
- **k (Vertical Shift):**
 $+k$: Shift Up
 $-k$: Shift Down



Observe how 'h' shifts left/right and 'k' shifts up/down.

Common Mistakes & Solutions

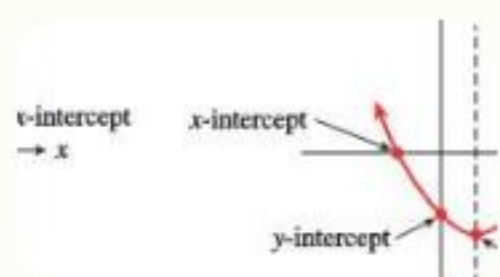
Common Mistake ⚠	How to Fix It ✓
✗ Distributing exponents incorrectly: $(x + y)^2 = x^2 + y^2$	✓ Expand properly: $(x + y)(x + y) = x^2 + 2xy + y^2$
✗ Wrong sign in transformations: $y = f(x - 3)$ means shift LEFT 3.	✓ Remember: Inside brackets is opposite. $(x - 3)$ moves RIGHT 3.
✗ Canceling terms in fractions: $\frac{x+2}{x} \text{ becomes } 1 + 2$	✓ You can only cancel factors: Terms separated by + or - cannot be cancelled individually.
✗ Forgetting +/- in roots: $x^2 = 9 \text{ becomes } x = 3$	✓ Include both roots: $x = \pm 3$

Image Sources



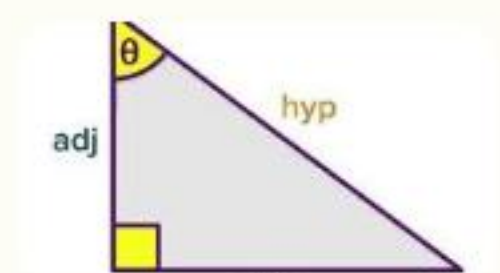
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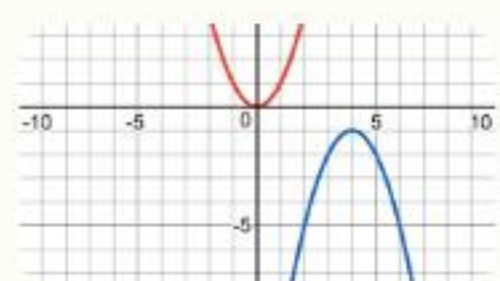
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Source: www.youtube.com



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