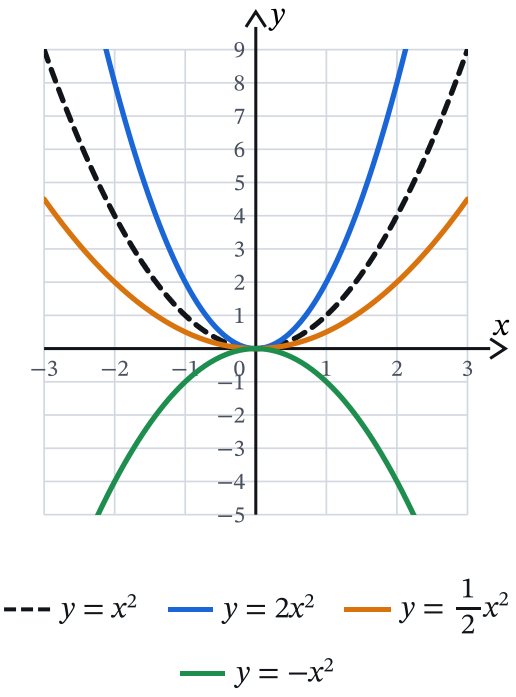
Name _____ Date _____

The Function $f(x) = ax^2$

Example



$y = x^2$ $y = 2x^2$ $y = \frac{1}{2}x^2$ $y = -x^2$

For the same x, the value of $2x^2$ is twice as big and the value of $\frac{1}{2}x^2$ half as big as that of x^2.

For $a < 0$ every value changes to its opposite, so the parabola opens downwards.

Remember

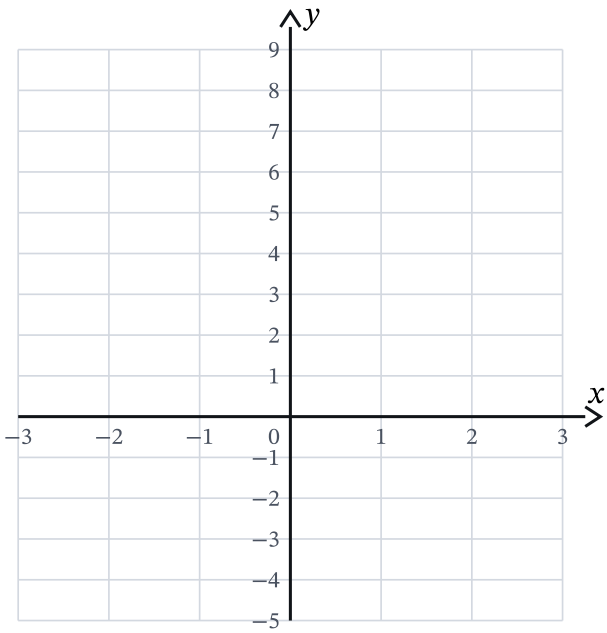
For $f(x) = ax^2$: if $a > 0$ the parabola opens **upwards**, and if $a < 0$ it opens **downwards**. The bigger $|a|$, the **narrower** the parabola; for $|a| < 1$ it is **wider** than $y = x^2$. The vertex is always $V(0, 0)$.

1 ON YOUR OWN Complete the table.

x	-2	-1	0	1	2
$2x^2$					
$\frac{1}{2}x^2$					
$-x^2$					

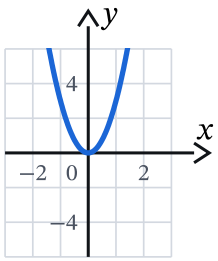
Names (pair) _____ Date _____

2 ON YOUR OWN Draw the graphs of the functions from task 1 in the same coordinate system. Use a different colour for each graph.

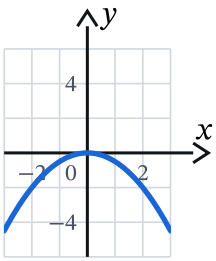


3 IN PAIRS **Match the formula and the graph.** One student chooses a graph, the other the formula, and explains why they belong together. Swap roles.

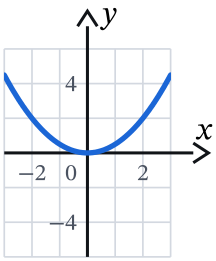
A



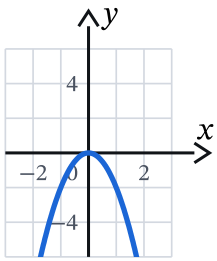
B



C



D



$y = -2x^2 \rightarrow$ ☐ $y = \frac{1}{2}x^2 \rightarrow$ ☐ $y = 3x^2 \rightarrow$ ☐ $y = -\frac{1}{2}x^2 \rightarrow$ ☐

4 ON YOUR OWN Find a so that the parabola $y = ax^2$ passes through the given point.

$(2, 8)$: $a =$ ☐ $(-1, -3)$: $a =$ ☐ $(4, 4)$: $a =$ ☐

★ ON YOUR OWN **Exit card.** The parabola $y = -3x^2$ opens **upwards** / **downwards**. Compared with $y = x^2$ it is **narrower** / **wider**.