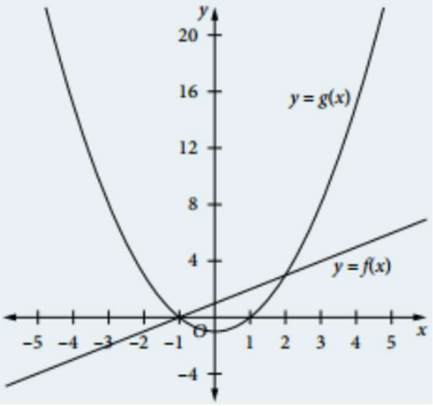
GRAPHING POLYNOMIALS BY ADDING ORDINATES

Given the graphs of two polynomial functions $y = f(x)$ and $y = g(x)$, the graph of a new function $y = f(x) + g(x)$ can be obtained by a process of adding the ordinates for each x value. This process is demonstrated in the following examples.

Example 10

The graphs of $y = f(x)$ and $y = g(x)$ are shown.

By drawing vertical lines and adding ordinates, draw the graph of $y = f(x) + g(x)$. Comment on the new curve.



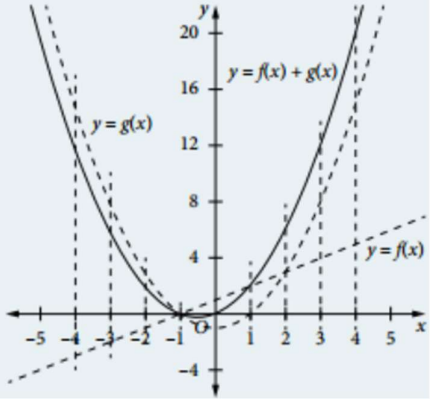
Solution

On the diagram, vertical lines are drawn through important points such as turning points, points where a curve cuts the axes, and points where the curves intersect.

On each vertical line, the intercepts of the two curves are added to find the position of a new point, which is marked on the line. These new points are then joined to obtain $y = f(x) + g(x)$.

The solid curve is the graph of $y = f(x) + g(x)$.

This curve is above $y = g(x)$ to the right of $x = -1$, and below $y = g(x)$ to the left of $x = -1$. They intersect at $x = -1$. $y = f(x) + g(x)$ cuts the x-axis at $(-1, 0)$ and $(0, 0)$.



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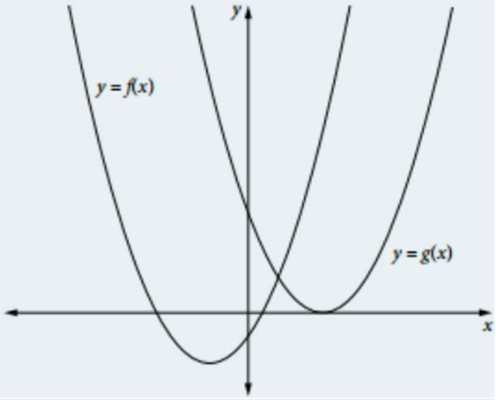
Example 11

The graphs of $y = f(x)$ and $y = g(x)$ are shown.
By drawing vertical lines and adding ordinates, draw the graph of $y = f(x) + g(x)$. Comment on the new curve.



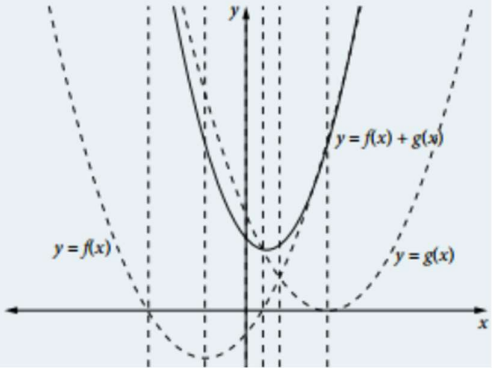
Solution

On the diagram, vertical lines are drawn through important points such as turning points, points where a curve cuts the axes and points where the curves intersect.

On each vertical line, the intercepts of the two curves are added to find the position of a new point, which is marked on the line. These new points are then joined to obtain $y = f(x) + g(x)$.

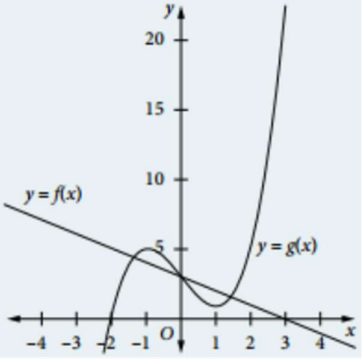
The solid curve is the graph of $y = f(x) + g(x)$.

This curve is above $y = f(x)$ to the right of its turning point, and below $y = g(x)$ to the left of its turning point.



Example 12

The graphs of $y = f(x)$ and $y = g(x)$ are shown.
By drawing vertical lines and adding ordinates, draw the graph of $y = f(x) + g(x)$. Comment on the new curve.



Solution

On the diagram, vertical lines are drawn through important points, such as turning points, points where a curve cuts the axes and points where the curves intersect.

On each vertical line, the intercepts of the two curves are added to find the position of a new point, which is marked on the line. These new points are then joined to obtain $y = f(x) + g(x)$.

The solid curve is the graph of $y = f(x) + g(x)$.

The new curve is above $y = g(x)$ for $x < 4$, passing through $(0, 6)$. They intersect at $x = 4$, and $y = f(x) + g(x)$ is just below $y = g(x)$ for $x > 4$.