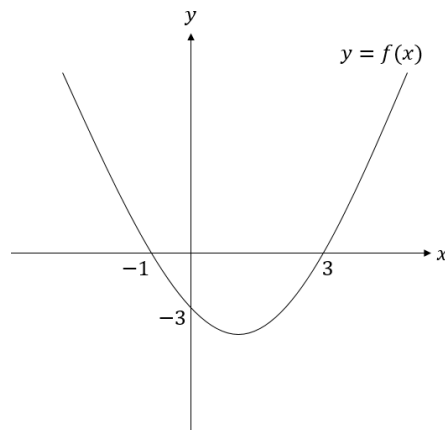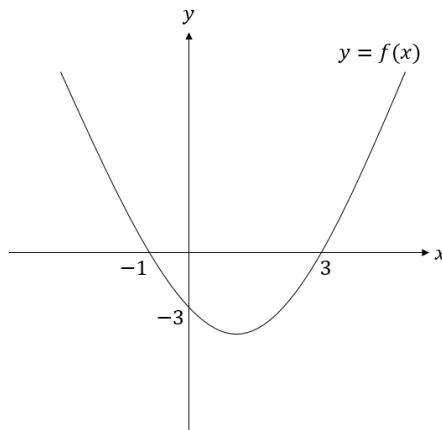## Sketching $y = |f(x)|$ and $y = f(|x|)$

It is important to understand the difference between $y = |f(x)|$ and $y = f(|x|)$ and to be able to graph each of these.

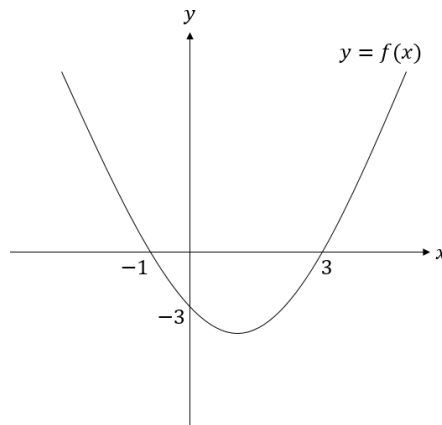The graph below shows $y = f(x)$ where $f(x) = (x - 3)(x + 1)$. Sketch $y = |f(x)|$ and $y = f(|x|)$

$y = f(x)$

$y = f(x)$

$y = |f(x)|$

$y = f(x)$

$y = f(|x|)$
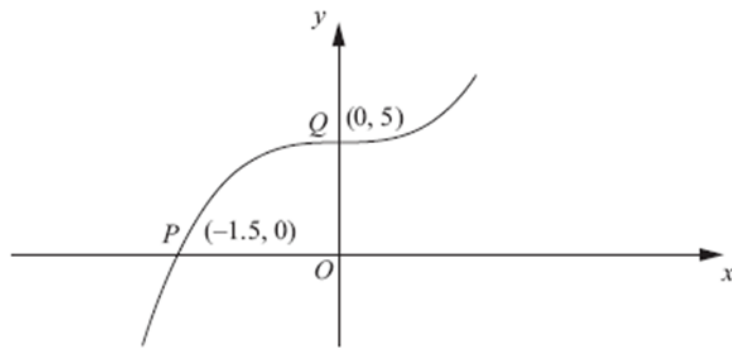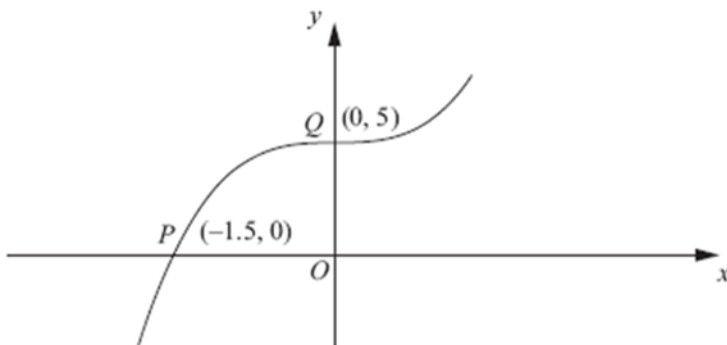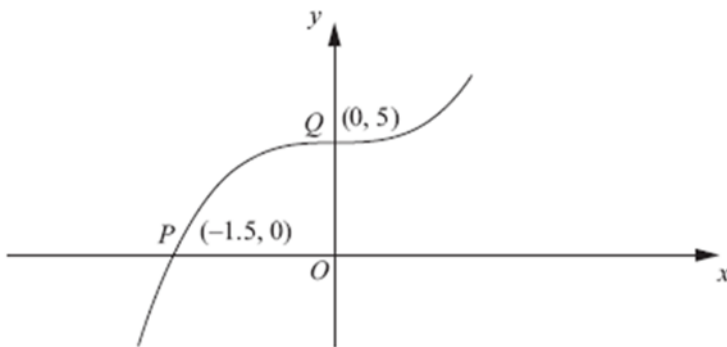
$y = f(x)$

Test your understanding

Figure 2 shows part of the curve with equation $y = f(x)$.
The curve passes through the points $P(-1.5, 0)$ and $Q(0, 5)$ as shown.

On separate diagrams, sketch the curve with equation

(a) $y = |f(x)|$

(2)

(b) $y = f(|x|)$

(2)

Indicate clearly on each sketch the coordinates of the points at which the curve crosses or meets the axes.

Test your understanding

Sketch for $-2\pi \leq x \leq 2\pi$:

a) $y = |\sin(x)|$
b) $y = \sin(|x|)$

Extension

[SMC 2008 Q25] What is the area of the polygon forms by all the points (x, y)
in the plane satisfying the inequality $||x| - 2| + ||y| - 2| \leq 4$?

A 24   B 32   C 64   D 96   E 112