1.   **Figure 1**
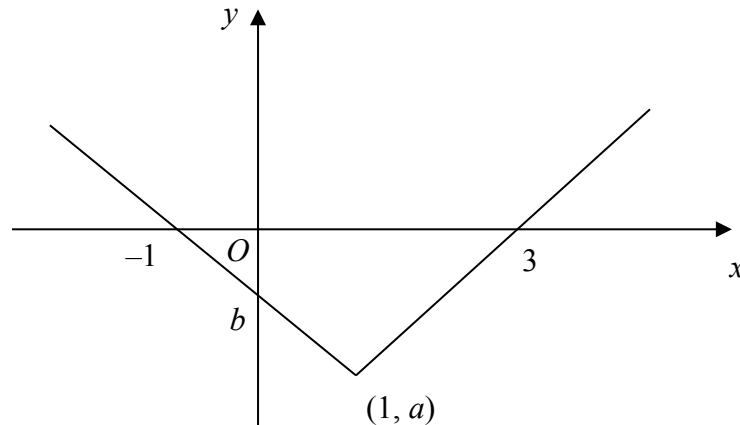

Figure 1 shows part of the graph of $y = f(x)$, $x \in \mathbb{R}$. The graph consists of two line segments that meet at the point $(1, a)$, $a < 0$. One line meets the x-axis at $(3, 0)$. The other line meets the x-axis at $(-1, 0)$ and the y-axis at $(0, b)$, $b < 0$.

In separate diagrams, sketch the graph with equation

(a) $y = f(x + 1)$,   **(2)**

(b) $y = f(|x|)$.   **(3)**

Indicate clearly on each sketch the coordinates of any points of intersection with the axes.

Given that $f(x) = |x - 1| - 2$, find

(c) the value of a and the value of b,   **(2)**

(d) the value of x for which $f(x) = 5x$.   **(4)**

                                                                                            June 05 Q6
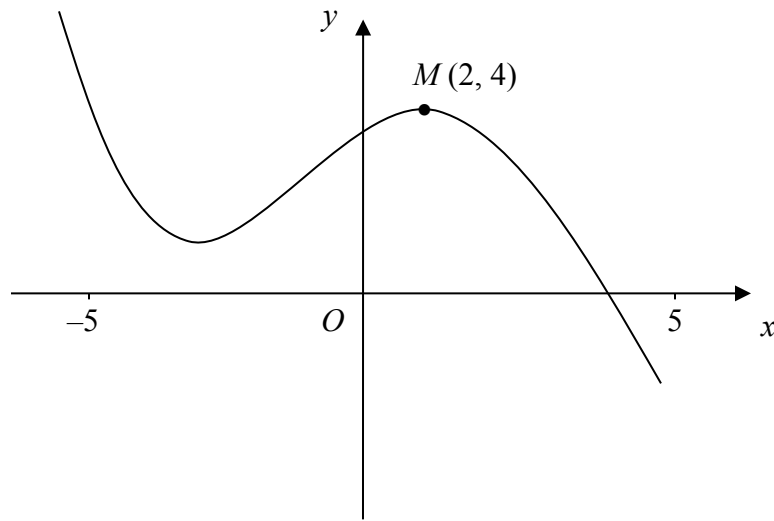
2.   **Figure 1**

Figure 1 shows the graph of $y = f(x)$, $-5 \le x \le 5$.

The point $M(2, 4)$ is the maximum turning point of the graph.

Sketch, on separate diagrams, the graphs of

(a) $y = f(x) + 3$,   **(2)**

(b) $y = |f(x)|$,   **(2)**

(c) $y = f(|x|)$.   **(3)**

Show on each graph the coordinates of any maximum turning points.

Jan 06 Q1
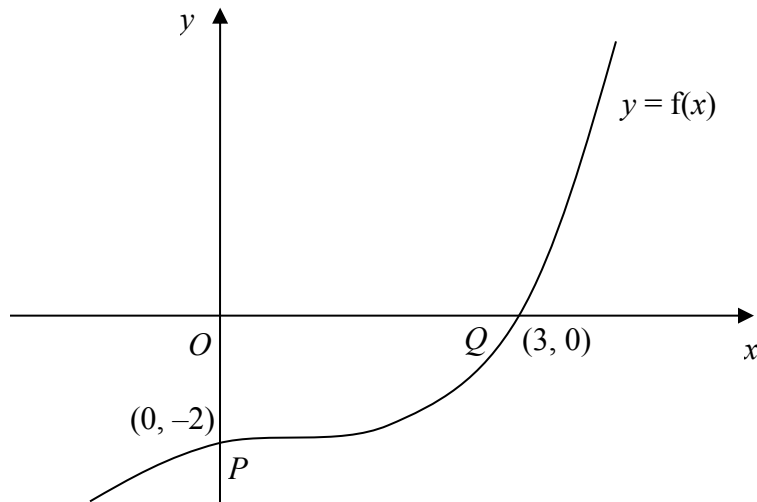
3.

Figure 1

Figure 1 shows part of the curve with equation $y = f(x)$, $x \in \mathbb{R}$, where f is an increasing function of x. The curve passes through the points $P(0, -2)$ and $Q(3, 0)$ as shown.

In separate diagrams, sketch the curve with equation

(a) $y = |f(x)|$, **(3)**

(b) $y = f^{-1}(x)$, **(3)**

(c) $y = \frac{1}{2} f(3x)$. **(3)**

Indicate clearly on each sketch the coordinates of the points at which the curve crosses or meets the axes.
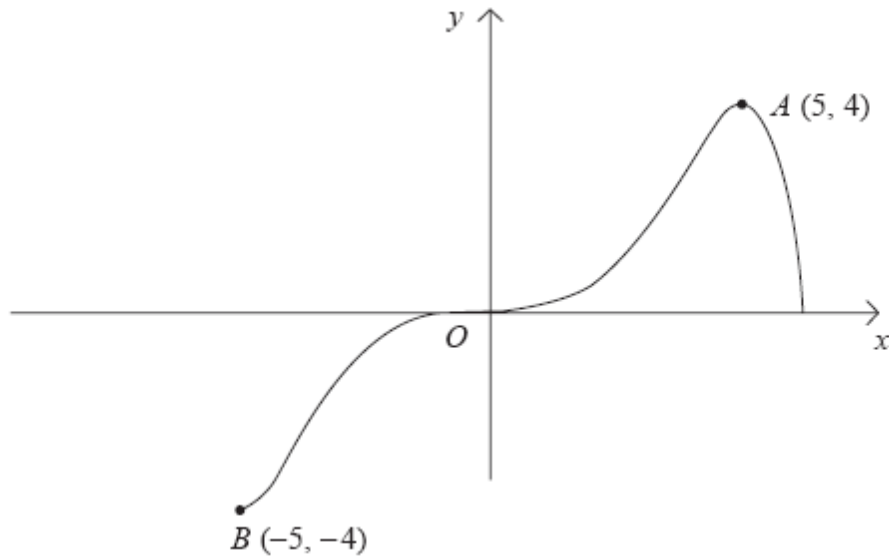
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4.

Figure 1

Figure 1 shows a sketch of the curve with equation $y = f(x)$.

The curve passes through the origin O and the points $A(5, 4)$ and $B(-5, -4)$.

In separate diagrams, sketch the graph with equation

(a) $y = |f(x)|$, **(3)**

(b) $y = f(|x|)$, **(3)**

(c) $y = 2f(x + 1)$. **(4)**

On each sketch, show the coordinates of the points corresponding to A and B.
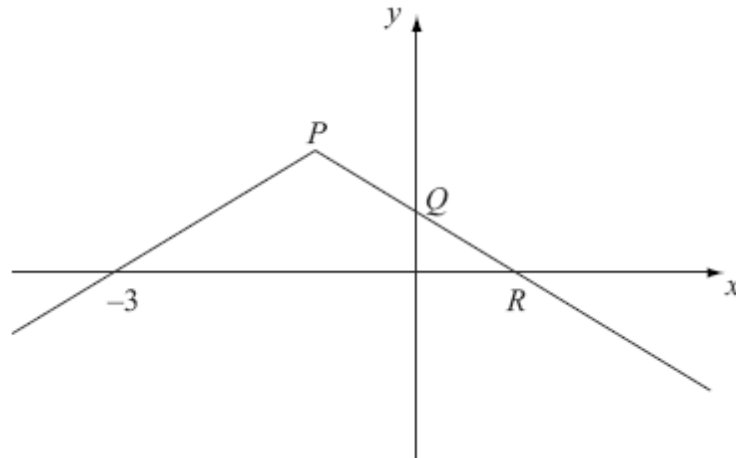
Jan 08 Q4

5.

Figure 1

Figure 1 shows the graph of $y = f(x)$, $x \in \mathbb{R}$,

The graph consists of two line segments that meet at the point P.

The graph cuts the y-axis at the point Q and the x-axis at the points $(-3, 0)$ and R.

Sketch, on separate diagrams, the graphs of

(a) $y = |f(x)|$, **(2)**

(b) $y = f(-x)$. **(2)**

Given that $f(x) = 2 - |x + 1|$,

(c) find the coordinates of the points P, Q and R, **(3)**

(d) solve $f(x) = \frac{1}{2}x$. **(5)**
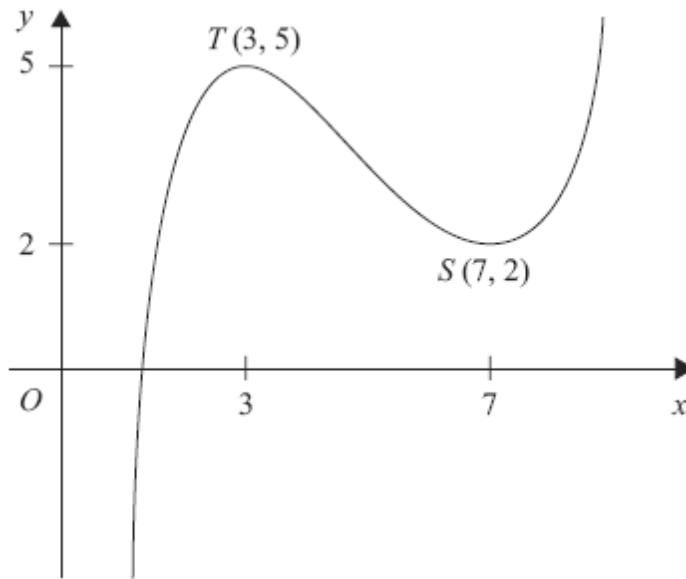
June 08 Q3

6.

Figure 1

Figure 1 shows the graph of $y = f(x)$, $1 < x < 9$.

The points $T(3, 5)$ and $S(7, 2)$ are turning points on the graph.

Sketch, on separate diagrams, the graphs of

(a) $y = 2f(x) - 4$, **(3)**

(b) $y = |f(x)|$. **(3)**

Indicate on each diagram the coordinates of any turning points on your sketch.
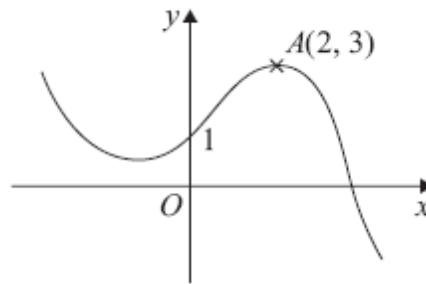
Jan 09 Q3

7.

Figure 1

Figure 1 shows a sketch of the graph of $y = f(x)$.

The graph intersects the y-axis at the point $(0, 1)$ and the point $A(2, 3)$ is the maximum turning point.

Sketch, on separate axes, the graphs of

(i) $y = f(-x) + 1$,

(ii) $y = f(x + 2) + 3$,

(iii) $y = 2f(2x)$.

On each sketch, show the coordinates of the point at which your graph intersects the y-axis and the coordinates of the point to which A is transformed.
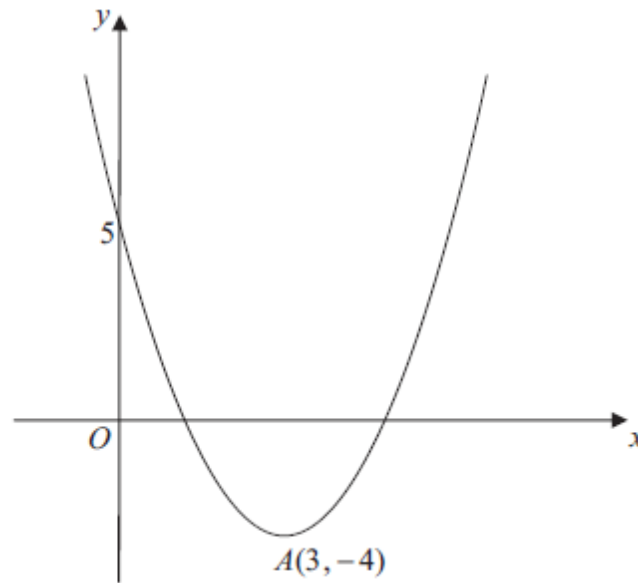
(9)

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8.

Figure 2

Figure 2 shows a sketch of the curve with the equation $y = f(x)$, $x \in \mathbb{R}$.

The curve has a turning point at $A(3, -4)$ and also passes through the point $(0, 5)$.

(*a*) Write down the coordinates of the point to which A is transformed on the curve with equation

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

    (ii) $y = 2f(\frac{1}{2}x)$.   **(4)**

(*b*) Sketch the curve with equation $y = f(|x|)$.

    On your sketch show the coordinates of all turning points and the coordinates of the point at which the curve cuts the y-axis.   **(3)**

The curve with equation $y = f(x)$ is a translation of the curve with equation $y = x^2$.

(*c*) Find f(x).   **(2)**

(*d*) Explain why the function f does not have an inverse.   **(1)**
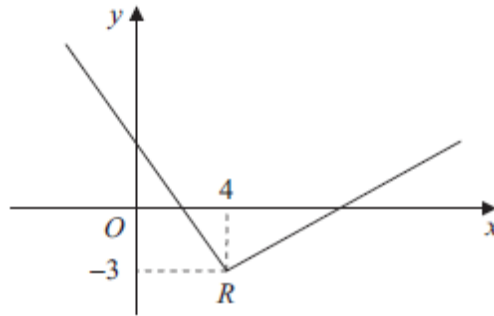
June 10 Q6

9.

Figure 1

Figure 1 shows part of the graph of $y = f(x)$, $x \in \mathbb{R}$.

The graph consists of two line segments that meet at the point $R\,(4, -3)$, as shown in Figure 1.

Sketch, on separate diagrams, the graphs of

(a) $y = 2f(x + 4)$,   **(3)**

(b) $y = |f(-x)|$.   **(3)**

On each diagram, show the coordinates of the point corresponding to R.

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