

Edexcel AS Mathematics Graphs and transformations

Section 2: Transformations of graphs

Exercise level 1

Do not use a calculator or graph-drawing package for this exercise.

- Sketch the following graphs.
In each case give the coordinates of the minimum point of the graph, and the coordinates of any points where the graph meets the coordinate axes.
 - $y = x^2$
 - $y = x^2 + 2$
 - $y = (x + 2)^2$
 - $y = x^2 - 1$
 - $y = (x - 1)^2$
 - $y = (x - 2)^2 + 1$
- For $f(x) = (x - 1)(x - 3)(x + 2)$, sketch the following graphs, showing the coordinates of the points where the graph cuts the coordinate axes.
 - $y = f(x)$
 - $y = 4f(x)$
 - $y = f(2x)$
 - $y = f\left(\frac{1}{2}x\right)$
 - $y = \frac{1}{3}f(x)$
 - $y = -f(x)$
- Starting with the graph of $y = x^2$, write down the equations of the curves obtained if the following transformations are applied to $y = x^2$.
 - translation by 2 units in the positive x direction
 - translation by 2 units in the negative y direction
 - stretch by a scale factor $\frac{1}{2}$ parallel to the y axis
 - stretch by a scale factor of 3 parallel to the x axis
 - translation by $\begin{pmatrix} 1 \\ 2 \end{pmatrix}$
- Starting with the graph of $y = \sin x$, state the transformation which can be used to sketch
 - $y = 3 \sin x$
 - $y = \sin(x + 90^\circ)$
 - $y = \sin \frac{1}{4}x$
 - $y = \sin x - 1$
 - $y = \sin(x - 180^\circ)$
 - $y = \sin(-x)$
- Starting with the graph of $y = \cos x$, state the transformation which can be used to sketch
 - $y = \frac{1}{2} \cos x$
 - $y = \cos(x - 90^\circ)$
 - $y = \cos 3x$
 - $y = \cos x - 2$
 - $y = \cos(x + 30^\circ)$
 - $y = -\cos x$
- Sketch the graphs of $y = \cos x$ and $y = \cos \frac{1}{2}x$ on the same set of axes for the range $0^\circ \leq x \leq 360^\circ$.
- Sketch the graph of $y = \tan x$ for the range $-90^\circ \leq x \leq 360^\circ$. On separate sets of axes sketch the graphs of
 - $y = \tan 2x$
 - $y = \tan x + 1$
 - $y = \tan(x - 90^\circ)$