

1. The graph of $y = f(x)$ undergoes in succession, the following three transformations
 - (a) A translation of 1 unit in the negative x direction
 - (b) A reflection about the y axis
 - (c) A stretch parallel to the x axis (with the y axis invariant) with a scale factor of 2

The equation of the resulting curve is $y = g(x)$ where $g(x) = \frac{x^2 - 2x - 3}{x + 2}$.

- (a) Express $f(x)$ in the form $g(ax + b)$, where a and b are constants to be found.
 - (b) Sketch the graph of $y = g(x)$, show clearly all the intersections with the axes, the asymptotes and the coordinates of turning points (if any).
2. Describe 2 different transformations that will map the graph of $y = 5^x$ onto the graph of $y = 5^{x+2}$.
3. The graph of $y = 5^{x+2}$ is reflected about the y axis followed by a translation of -4 units in the direction of the y axis. Find the equation of the final graph.
4. The curve of $y = x^2 + \frac{3}{x}$ undergoes a reflection about the line $y = m$ and the point $(2, 5.5)$ is mapped onto $(2, 2.5)$.
 - (a) State the value of m .
 - (b) Hence find the equation of the new curve.
5. A graph with equation $y = f(x)$ undergoes transformation A followed by transformation B.
 - (a) A: a translation of 2 units in the negative direction of the x axis
 - (b) B: a scaling parallel to the x axis by a factor of 12

The resulting equation is $g(x) = 8x + 8 + \frac{1}{(2x + 1)^2}$. Find the equation $y = f(x)$, showing your workings clearly.

6. The function $y = (q - r)x^2 + (3r - 2)x + 1$ is obtained by transforming the function $y = px^2 + qx + r$ through the following transformations:
 - (a) Translation of -1 units parallel to the x axis
 - (b) Scaling by a factor of 2 parallel to the y axis

Show that $4p + 2q - 3r = 2$. Hence, find the exact values of p, q and r by forming three equations involving p, q and r .