Exponential Functions and Their Graphs

Specification: AQA 7357: F1, B1, B9 · Edexcel 9MA0: 6.1, 2.1, 2.9

HOMEWORK Consolidation

1 Without a calculator, state the y-intercept and the equation of the asymptote of $y = 3 \times 2^x - 5$.
AQA F1, B9 · Edexcel 6.1, 2.9

2 (a) Describe the single transformation that maps $y = 2^x$ onto $y = 2^{3x}$.
(b) Write $y = 2^{3x}$ in the form $y = a^x$.
AQA F1, B9 · Edexcel 6.1, 2.9

3 Sketch $y = -3^x$. State the y-intercept and the equation of the asymptote.
AQA F1, B9 · Edexcel 6.1, 2.9

4 The curve $y = ka^x$ crosses the y-axis at $(0, 5)$ and passes through $(2, 45)$. Find k and a, where $a > 0$.
AQA F1, F7 · Edexcel 6.1, 6.7

5 Sketch $y = 4 - 2^x$. Give the coordinates of the points where it crosses the axes and the equation of the asymptote.
AQA F1, B9 · Edexcel 6.1, 2.9

6 Show that $y = 9^{x/2}$ is the same curve as $y = 3^x$.
AQA B1 · Edexcel 2.1

7 The curve $y = ka^x$ (with $k, a > 0$) passes through $(-2, 48)$ and $(1, 0.75)$.
(a) Find k and a.
(b) Is the function increasing or decreasing?
AQA F1, F7 · Edexcel 6.1, 6.7

8 Find the coordinates of the point where $y = 2^x$ meets $y = 4^{x-3}$.
AQA B1 · Edexcel 2.1

9 The graph of $y = 2^x$ is translated by $\begin{pmatrix} -3 \\ 0 \end{pmatrix}$. Write the equation of the new graph in the form $y = k \times 2^x$.
AQA F1, B9 · Edexcel 6.1, 2.9

10 Two different numbers a and b are positive and not equal to 1. Prove that the curves $y = a^x$ and $y = b^x$ meet at exactly one point.
AQA F1 · Edexcel 6.1

11 *Edexcel-style.* $f(x) = 3^x$.
(a) Sketch the curve with equation $y = f(x) - 9$. Show the coordinates of any points where it meets the axes and state the equation of the asymptote. [4 marks]
(b) Find the coordinates of the point where $y = f(x) - 9$ meets $y = f(-x) - 9$. [2 marks]
AQA F1, B9 · Edexcel 6.1, 2.9 · Edexcel-style

12 *AQA-style.* A curve C has equation $y = pq^x$, where p and q are positive constants. C crosses the y-axis at $(0, 6)$ and passes through $(3, 48)$.
(a) Find p and q. [3 marks]
(b) C is translated by $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$ to give the curve D. Find the equation of D in the form $y = rq^x$. [2 marks]
(c) State the equation of the asymptote to D. [1 mark]
AQA F1, F7 · Edexcel 6.1, 6.7 · AQA-style