Exponential Functions and Their Graphs

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

INDEPENDENT

You do

A · Values and shape No calculator.

1 Copy and complete the table for $y = 3^x$. Click a cell to check it.

x	-2	-1	0	1	2
y					

2 Write each in the form a^{-x}, where $a > 1$.

(a) $(\frac{1}{6})^x$

(b) 0.25^x

(c) $(\frac{2}{3})^x$

3 Increasing or decreasing?

(a) 1.01^x

(b) 0.99^x

(c) 2^{-x}

(d) $(\frac{1}{3})^{-x}$

B · Transformations State the y-intercept and the equation of the asymptote, then sketch.

4 Sketch $y = 2^x + 3$.

5 Sketch $y = 5^x - 1$.

6 Sketch $y = 4 \times 3^x$.

7 Sketch $y = 3^{x-1}$.

8 Sketch $y = (\frac{1}{2})^x - 2$.

9 Sketch $y = 2^{-x} + 1$.

C · Reasoning No calculator.

10 Explain why the equation $2^x = -4$ has no solutions.

11 (a) Show that $3^{x+2} = 9 \times 3^x$.

(b) Describe the graph of $y = 3^{x+2}$ as a transformation of $y = 3^x$ in two different ways.

12 True or false? Justify each answer.

(a) For every $a > 0$, $y = a^x$ passes through $(1, a)$.

(b) When $x < 0$, $5^x < 2^x$.

(c) $y = 0.5^x$ is an increasing function.

D · Algebra

13 The curve $y = ka^x$ (with $k, a > 0$) passes through $(1, 12)$ and $(3, 3)$. Find k and a. Is the function increasing or decreasing?

14 The curve $y = ka^x$ (with $k, a > 0$) passes through $(-1, 2)$ and $(2, 54)$. Find k and a.

15 (a) Show that $8^x = 2^{3x}$.

(b) Hence find the coordinates of the point where $y = 8^x$ meets $y = 2^{x+6}$.

E · Exam-style question AQA-style. Use the mark scheme to self-assess.

16 The curve C has equation $y = ka^x$, where k and a are positive constants. C passes through the points $(2, 36)$ and $(5, 972)$.

(a) Find the values of a and k. [4 marks]

(b) Sketch C. State the coordinates of the point where C crosses the y-axis and the equation of its asymptote. [2 marks]

(c) Find the value of x for which $y = 324$. [2 marks]