

Exercise walk-through

Inverses of Exponential Functions ■ 2.10

eXercise

You must be able to

- use that the inverse of b^x is $\log_b(x)$
- solve an exponential equation by taking a logarithm

Method — Log inverts exponent

The inverse of $f(x) = b^x$ is $f^{-1}(x) = \log_b(x)$. To solve $b^x = y$, take $\log_b$ of both sides:
 $x = \log_b(y)$.

Method — Example

$$2^x = 16 \Rightarrow x = \log_2(16) = 4.$$

Practice 2.1 ■ 1 mark

State the inverse of $f(x) = 10^x$.

Solution 2.1

Worked steps

$$f^{-1}(x) = \log_{10}(x) \quad \text{B1}.$$

Practice 2.2 ■ 2 marks

Solve $3^x = 81$.

Solution 2.2

Worked steps

$$3^x = 81 = 3^4, \text{ so } x = 4 \quad \text{M1} \quad \text{A1}.$$

Practice 2.3 ■ 1 mark

State the inverse of e^x .

Solution 2.3

Worked steps

$\ln(x)$ (i.e. $\log_e(x)$) **B1**.

Exam-style 3.1 ■ 1 mark

The inverse of $f(x) = b^x$ is

A b^{-x}

B $\log_b(x)$

C $1/b^x$

D x^b

Solution 3.1

A b^{-x}

B $\log_b(x)$



C $1/b^x$

D x^b

Worked steps

B.

Exam-style 3.2 ■ 1 mark

To solve $5^x = 125$, take

A $\log_5$ of both sides

B the square root

C the reciprocal

D the derivative

Solution 3.2

Method: Log inverts exponent

A $\log_5$ of both sides



B the square root

C the reciprocal

D the derivative

Worked steps

A.

Exam-style 3.3 ■ 1 mark

Solve $2^x = 32$.

- (a) Rewrite 32 as a power of 2.
- (b) Equate the exponents.
- (c) State x .

Solution 3.3

Worked steps

(a) $32 = 2^5$ **B1**. (b) $x = 5$ **B1**. (c) 5 **B1**.