

Exercise walk-through

Exponential and Logarithmic Equations and Inequalities ■ 2.13

eXercise

You must be able to

- solve $b^x = c$ by taking a **logarithm** 对数
- solve $\log_b(x) = c$ by rewriting in exponential form, and check the **domain** 定义域

Method — Solving

- $b^x = c \Rightarrow x = \log_b c$;
- $\log_b(x) = c \Rightarrow x = b^c$.

Always check a log solution lies in the domain (the argument must be > 0).

Method — Example

$$\log_2(x) = 5 \Rightarrow x = 2^5 = 32 \text{ (and } 32 > 0, \text{ so it is valid).}$$

Practice 2.1 ■ 1 mark

Solve $10^x = 1000$.

Solution 2.1

Worked steps

$$x = 3 \text{ (B1).}$$

Practice 2.2 ■ 2 marks

Solve $\log_2(x) = 5$.

Solution 2.2

Worked steps

$$x = 2^5 = 32 \quad \text{M1} \quad \text{A1}.$$

Practice 2.3 ■ 1 mark

State the domain restriction to check for a log equation.

Solution 2.3

Method: Solving

Worked steps

the argument of the log must be positive ($x > 0$) **B1**.

Exam-style 3.1 ■ 1 mark

To solve $2^x = 20$, you take

A log base 2 of both sides

B the square root

C the reciprocal

D nothing

Solution 3.1

A log base 2 of both sides



B the square root

C the reciprocal

D nothing

Worked steps

A.

Exam-style 3.2 ■ 1 mark

The solution of $\log_3(x) = 2$ is

A 6

B 8

C 9

D 5

Solution 3.2

A 6

B 8

C 9



D 5

Worked steps

C.

Exam-style 3.3 ■ 1 mark

Solve $\log_5(x) = 3$.

- (a) Rewrite in exponential form.
- (b) Evaluate.
- (c) Confirm the domain is satisfied.

Solution 3.3

Worked steps

(a) $x = 5^3$ **B1**. (b) 125 **B1**. (c) $125 > 0$, so it is valid **B1**.