

Exercise walk-through

2.8

Inverse Functions

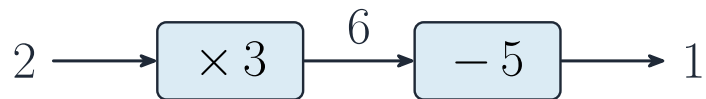
AP Precalculus

What we will cover

- 1 Arithmetic & geometric sequences
- 2 Linear vs exponential change
- 3 Exponential functions
- 4 Composition & inverses
- 5 Logarithms
- 6 Solving equations
- 7 Modelling & semi-log plots

Composition of functions, in detail

$f(x) = 3x - 5$: do $\times 3$, then -5



$f^{-1}(x) = \frac{x + 5}{3}$



reverse the order, undo each step

the inverse runs it backwards: $f(2) = 1$, so $f^{-1}(1) = 2$

The **composite**

$(f \circ g)(x) = f(g(x))$ feeds g 's output into f .

Exam tips

- Distinguish **arithmetic** (add a common difference) from **geometric** (multiply a common ratio) sequences and their linear/exponential function cousins.
- Exponential = repeated **multiplication**, so it eventually outgrows any linear or polynomial model.
- The **logarithm is the inverse** of the exponential ($\log_b c = a \Leftrightarrow b^a = c$); use it to solve $b^x = k$.
- Apply the log laws (product, quotient, power) and the change-of-base formula; the argument of a log must be **positive**.
- On a **semi-log plot** an exponential model becomes a straight line.

Exercises 2.1-2.3

2.1 State what an inverse function does.

[1]

2.2 State the line of reflection between f and f^{-1} .

[1]

2.3 Find the inverse of $f(x) = x + 5$.

[2]

Exercises 2.1-2.3

2.1 State what an inverse function does.

[1]

2.1

- it undoes f , returning the original input
-

2.2 State the line of reflection between f and f^{-1} .

[1]

2.2

- the line $y = x$
-

2.3 Find the inverse of $f(x) = x + 5$.

[2]

2.3

- swap: $x = y + 5$; solve: $y = x - 5$, so $f^{-1}(x) = x - 5$

Exercises 3.1-3.2

3.1 The graph of f^{-1} is the reflection of f across

[1]

☐

A the x -axis

B the y -axis

C the line $y = x$

D the origin

☐

3.2 A function has an inverse function only if it is

[1]

A increasing

B one-to-one

C linear

D positive

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- A the x -axis
- B the y -axis
- C the line $y = x$
- D the origin

3.1 C

- the line $y = x$.

3.2 A function has an inverse function only if it is

[1]

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- A increasing
- B one-to-one
- C linear
- D positive

3.2 B

- one-to-one.

Exercise 3.3 (a)

3.3 $f(x) = 3x - 6$.

(a) Swap x and y .

[1]

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(a) Swap x and y .

[1]

(a)

- $x = 3y - 6$

Exercise 3.3 (b)

3.3 $f(x) = 3x - 6$.

(b) Solve for y .

[1]

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(b) Solve for y .

[1]

(b)

- $y = \frac{x + 6}{3}$

Exercise 3.3 (c)

3.3 $f(x) = 3x - 6$.

(c) State $f^{-1}(x)$.

[1]

Exercise 3.3 (c)

3.3 $f(x) = 3x - 6$.

(c) State $f^{-1}(x)$.

[1]

(c)

- $f^{-1}(x) = \frac{x + 6}{3}$