

Exercise walk-through

Function Model Construction and Application ■ 1.14

eXercise

You must be able to

- construct a **function model** 函数模型 from zeros, points, and transformations
- apply the model to make a prediction

Method — Constructing a model

Use the given conditions: **zeros** give factors, one extra **point** fixes the leading coefficient, and stated **transformations** set the shifts.

Method — Example

A parabola with zeros at $x = 1$ and $x = 5$ passing through $(3, -4)$: write $f(x) = a(x - 1)(x - 5)$. At $x = 3$: $a(2)(-2) = -4a = -4$, so $a = 1$ and $f(x) = (x - 1)(x - 5)$.

Practice 2.1 ■ 1 mark

Write the factored form of a quadratic with zeros at 2 and 6.

Solution 2.1

Method: Example

Worked steps

$$a(x - 2)(x - 6) \quad \text{B1}.$$

Practice 2.2 ■ 1 mark

State what extra information fixes the leading coefficient.

Solution 2.2

Method: Constructing a model

Worked steps

one additional point that the graph passes through **B1**.

Practice 2.3 ■ 1 mark

Evaluate $f(x) = (x - 1)(x - 5)$ at $x = 0$.

Solution 2.3

Worked steps

$$(0 - 1)(0 - 5) = (-1)(-5) = 5 \quad \text{B1}.$$

Exam-style 3.1 ■ 1 mark

A quadratic model with zeros at $x = r$ and $x = s$ has the form

A $a(x - r)(x - s)$

B $ax + b$

C a/x

D a^x

Solution 3.1

Method: Constructing a model

A $a(x - r)(x - s)$



B $ax + b$

C a/x

D a^x

Worked steps

A.

Exam-style 3.2 ■ 1 mark

To find the leading coefficient a , you need

- A** the degree
- B** one additional point on the graph
- C** the axis of symmetry
- D** nothing extra

Solution 3.2

Method: Constructing a model

- A the degree
- B one additional point on the graph
- C the axis of symmetry
- D nothing extra



Worked steps

B.

Exam-style 3.3 ■ 1 mark

A parabola has zeros at $x = 1$ and $x = 5$ and passes through $(3, -4)$.

(a) Write it as $f(x) = a(x - 1)(x - 5)$ and substitute $(3, -4)$.

(b) Solve for a .

(c) State $f(x)$.

Solution 3.3

Method: Example

Worked steps

(a) $a(3 - 1)(3 - 5) = -4$, i.e. $-4a = -4$ **B1**. (b) $a = 1$ **B1**. (c) $f(x) = (x - 1)(x - 5)$ **B1**.