

# C2.10 Graphs of functions

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

**Total: 20 marks****KEY WORDS** axis 坐标轴 • function 函数 • roots 根 • linear 一次 • quadratic 二次

## Objective

Use graphs of functions to solve Core IGCSE Mathematics problems.

**You must be able to:**

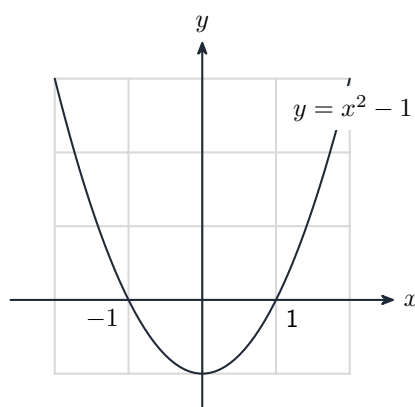
- Complete value tables and plot smooth function graphs
- Keep reciprocal branches separate across zero
- Read equations from intersections of plotted curves or lines

## 1 Key knowledge and worked examples

### ■ Key knowledge: Graphs of functions

Make a table by substituting each  $x$  into the function. Plot  $(x, y)$  pairs on labelled axes. Join a linear function with a ruler; draw a quadratic or reciprocal as a smooth curve. For  $a/x$ , omit  $x = 0$  and keep the two branches separate. A root is an  $x$ -axis crossing. Intersections give solutions where two graphs have the same  $y$  value.

### ■ Worked example: Graphs of functions



For  $y = x^2 - 1$ , values at  $x = -2, -1, 0, 1, 2$  are  $3, 0, -1, 0, 3$ ; plot them and draw a smooth U-shaped curve.

- Roots are  $x = -1, 1$ , where  $y = 0$ .
- For  $y = 4/x$ , points include  $(1, 4), (2, 2), (4, 1)$  and  $(-1, -4), (-2, -2), (-4, -1)$ ; no point exists at  $x = 0$ .

- Intersections of  $y = x^2 - 1$  and  $y = 3$  give  $x = -2, 2$ .

■ **Method check**

A reciprocal function is undefined at zero. A line joining points on opposite sides of zero would falsely suggest values the function does not have.

## 2 Practice

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**2.1** For  $y = 2x - 3$ , find  $y$  when  $x = -1, 0, 2$ . [2]

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**2.2** For  $y = -x^2 + 4$ , find  $y$  when  $x = -2, -1, 0, 1, 2$ . [2]

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**2.3** For  $y = 6/x$ , give the points for  $x = -3, -2, 2, 3$ . State the excluded  $x$  value. [2]

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**2.4** On graph paper, draw  $y = x^2 - 4$  for  $-3 \leq x \leq 3$  and read its roots. [2]

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### 3 Exam-style questions

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**3.1** Apply the graphs of functions methods below. Show working and include units where appropriate.

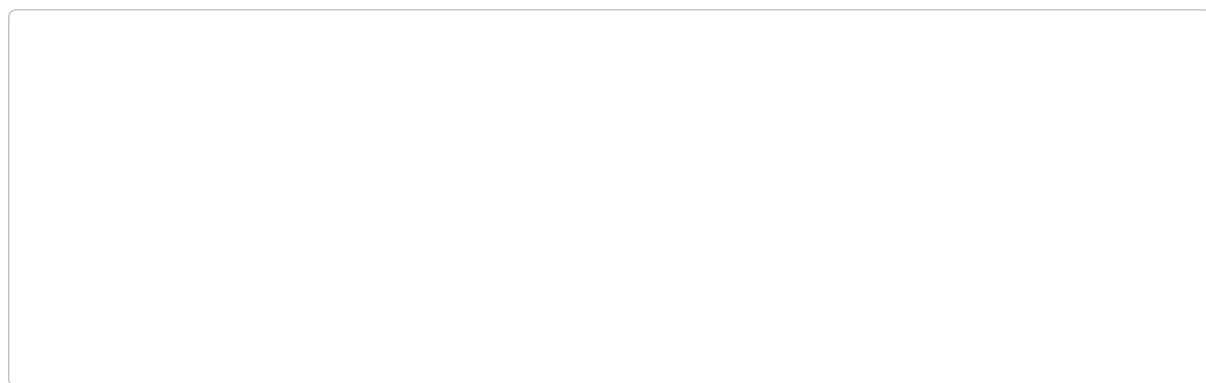
- (a) Complete a table for  $y = x^2 - 2$  at integer  $x$  from  $-2$  to  $2$ . [2]

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- (b) Draw the curve and the horizontal line  $y = 2$  on graph paper. [2]



- (c) Read the two solutions of  $x^2 - 2 = 2$  from the intersections. [2]

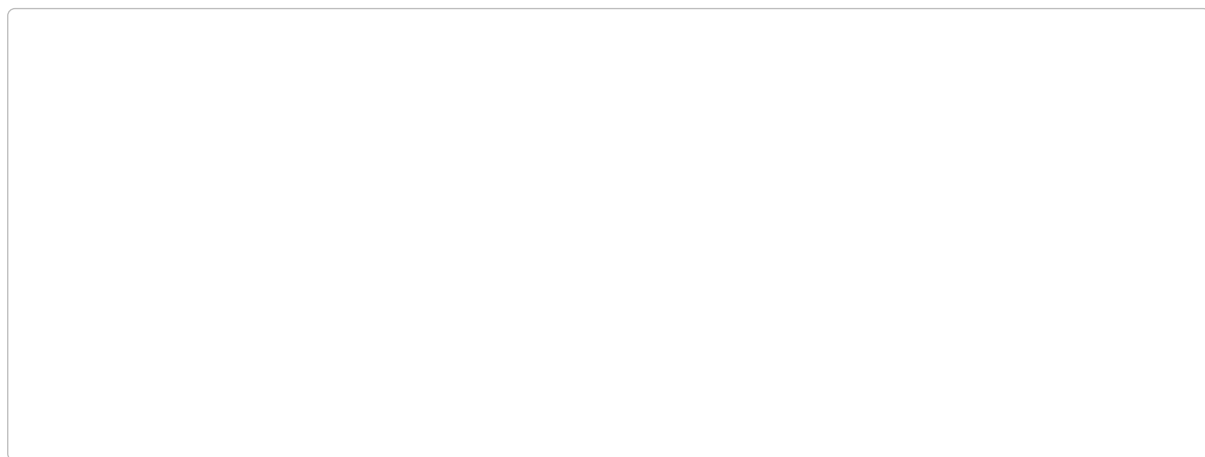
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**3.2** Use the function  $y = 12/x$ .

(a) Calculate  $y$  for  $x = -6, -3, -2, 2, 3, 6$ . Plot the points and draw the two smooth branches on graph paper. [3]



(b) Draw  $y = 4$  on the same axes and read the solution of  $12/x = 4$ . Explain why the curve has no point with  $x = 0$ . [3]

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