7.3 / Sketching Slope Fields

Watch the lesson ➤

A short segment at each point: slope, not height; rows or columns alike

Learning goal

Sketch a slope field from a differential equation and match a slope field to its equation, using rows, columns, flat segments, and signs.

Key ideas

01 A **slope field** draws, at each point, a short segment with the slope $\frac{dy}{dx}$ given at that point.

02 A segment shows the **slope** of the solution through that point, not its height. The y in the equation is the height of the point.

03 Only x in the equation → **columns** alike. Only y → rows alike. Where the expression is 0, the segments are flat.

04 To sketch: rows first. Put y in, then read each x.

05 Where the expression gives no number (a bottom of 0), no segment is drawn.

Remember

slope field
Short segments showing the slope $\frac{dy}{dx}$ at many points.

flat
Slope 0: a horizontal segment.

match
Use rows or columns, a flat row, and one sign to pick the equation.

Class notes

7.3 / Write it clearly

What earns the point on the AP Exam, and the mistakes that lose it.

Writing checklist

Notation to use and to avoid

WRITE	AVOID
Draw each segment short and centered on its point, with the right steepness and sign.	Do not make a segment's length or height show the value: only its slope matters.
Draw flat segments where the expression is 0.	Do not draw a segment where the equation gives no number.

Common mistakes

The mistake code is used in the answers and in My Mistakes

01 Slope, not height

Code DE4

✗ $\frac{dy}{dx} = y$ at $(1, 2)$: draw a point at height 2.

✓ At $(1, 2)$ draw a short segment with slope 2, through $(1, 2)$.

02 Columns, not rows

Code DE4

✗ $\frac{dy}{dx} = x$: the segments are alike along each row.

✓ Only x appears, so each column (same x) has parallel segments.

Real AP questions on this topic Free on AP Central. Try them after the practice.

Slope fields appear inside differential-equation questions; 2023 AB Q3 (a) gives one and asks for a solution curve (Lesson 7.4).

7.3 / Guided examples

Watch, pause, and write the reasoning. Full solutions are in the video.

Problem types

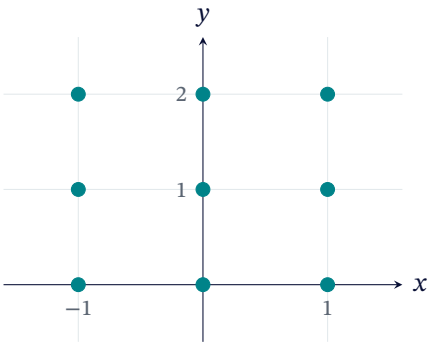
Read the problem, name the type, then use its method

Type	Method	Problems
Sketch a slope field	Rows first: put y in, then each x; a short segment with that slope at each point.	E01 · Practice 1, 4
Read a slope field	Rows or columns alike? Where flat? One sign at one point. No number, no segment.	E02 · Practice 2, 3, 5, 6

Example 01

Video · E01

The differential equation $\frac{dy}{dx} = x(y-1)$.
Sketch the slope field at the nine points $x = -1, 0, 1$ and $y = 0, 1, 2$.

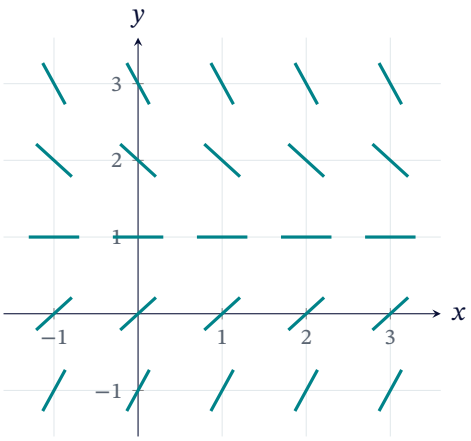


> Rows first: put y in, then read each x.

Example 02

Video · E02

Which differential equation has this slope field?



A. $\frac{dy}{dx} = y - 1$

B. $\frac{dy}{dx} = 1 - y$

C. $\frac{dy}{dx} = 1 - x$

D. $\frac{dy}{dx} = x - 1$

> Rows or columns alike? Then one flat row and one sign.

VIDEO COMPLETE Check your example answers at the end of this booklet.

7.3 / Example answers

Sketching Slope Fields

E01 $y = 1$: $0, 0, 0$; $y = 0$: $1, 0, -1$; $y = 2$: $-1, 0, 1$

E02 (B)