



MATH WITH MR DJ

GRADE 8 · FUNCTIONS

LINEAR AND NON-LINEAR

Today's goal: I can interpret the equation $y = mx + b$ as defining a linear function whose graph is a straight line and give examples of functions that are not linear.



Tan



Digit



Blaze



Pi



$y = mx + b$ is a line

- 1 A constant rate m , a starting value b .
- 2 Same climb for every step across.



BIG IDEA 2

The usual test

1 $x: 0, 1, 2, 3$ $y: 1, 3, 5, 7$

2 Up 2 each time. Linear.



WATCH OUT!

Careful – the test has a condition

1 $x: 1, 2, 4$ $y: 3, 5, 9$

2 Differences 2 then 4. Not linear?

DON'T FALL FOR IT

It IS linear. The x-steps were 1 then 2.



WATCH OUT!

So test the **RATE**, not the difference

1 $\frac{2}{1} = 2$ and $\frac{4}{2} = 2$. Constant rate.

2 Equal differences only work for equal steps.



WATCH OUT!

Genuinely not linear

1 $y = x^2$: 0, 1, 4, 9 — up 1, 3, 5.

2 $y = 2^x$: 1, 2, 4, 8 — up 1, 2, 4.

DON'T FALL FOR IT

Equal steps across, growing climbs. It bends.



BIG IDEA 6

Still functions, though

- 1 Each input has exactly one output.
- 2 Non-linear does not mean not a function.



SPOT THE SLIP!

Turn & talk

Something went wrong here...

THE PROBLEM

Is $y = -3x + 8$ linear?

WHAT A STUDENT DID

Said no because it decreases.

YOUR MISSION

What went wrong? What's the right answer?



Is $y = -3x + 8$ linear?

- 1 Form $y = mx + b$, $m = -3$.
- 2 A negative rate is still constant, so still a line — it just falls.

Answer: **yes**



Pick your pepper!



☛ MILD

$x: 0,1,2,3 \rightarrow y: 5,8,11,14.$
Linear?

#1 on your practice sheet



☛☛ MEDIUM

$x: 0,1,2,3 \rightarrow y: 1,2,4,8.$
Linear?

#2 on your practice sheet



☛☛☛ SPICY

Explain why “the y-values go up by the same amount” is not enough on its own.

#7 on your practice sheet

How's it going?



3 • Got it!

I could teach it



2 • Almost

One more example, please



1 • Not yet

I need some help



MATH WITH MR DJ

NOW YOU!

Practice sheet: everyone does Mild & Medium, then climb the peppers.

Stuck? Look back at Mr DJ's example at the top of the sheet.

Need it again? Step-by-step videos on YouTube @MathWithMrDJ

Brain break: 3 new daily puzzles at puzzles.mathwithmrdj.com

