

Grade 8 · Linear Functions and Modeling · Worksheet

Common Core 8.F.B.4, 8.F.B.5 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

These 23 problems practice Common Core standards 8.F.B.4 and 8.F.B.5. Find the rate of change and initial value, write linear functions from tables, graphs, points and stories, and describe or sketch graphs.

The last six are word problems that ask for a model, an interpretation and a prediction. Work from easiest to hardest.

Grade 8 Common Core: 8.F.B.4 · 8.F.B.5

Problem 1: Rate from a table

The table shows a linear function. Find the rate of change.

x	0	1	2	3
y	4	7	10	13

Problem 2: Read the equation

The equation $y = 5x + 8$ is linear. Identify (a) the rate of change and (b) the initial value.

Problem 3: Slope between two points

Find the rate of change of the line through (1,3) and (4,12).

Problem 4: A negative rate

Find the rate of change of the line through (2,9) and (6,1). Is the function increasing or decreasing?

Problem 5: Linear or nonlinear?

Decide whether each table shows a linear function. Give a reason.

Table A:

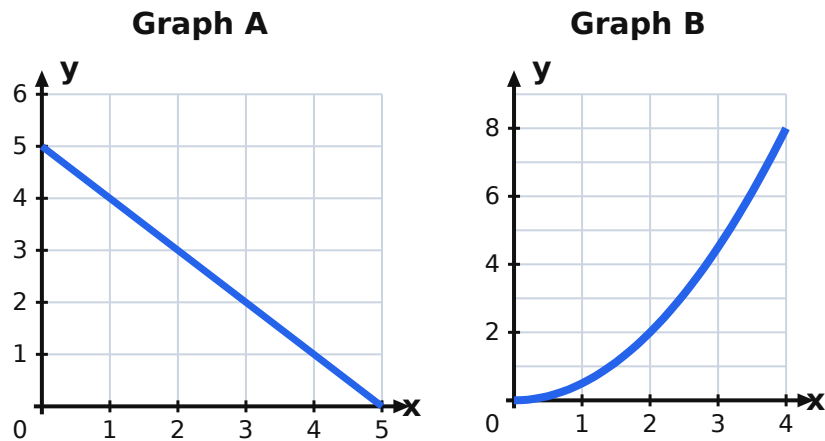
x	1	2	3	4
y	2	4	8	16

Table B:

x	1	2	3	4
y	3	7	11	15

Problem 6: Increasing or decreasing

For each graph, state whether the function is increasing or decreasing, and whether it is linear or nonlinear.



Two graphs for the exercise.

Problem 7: Equation from a table

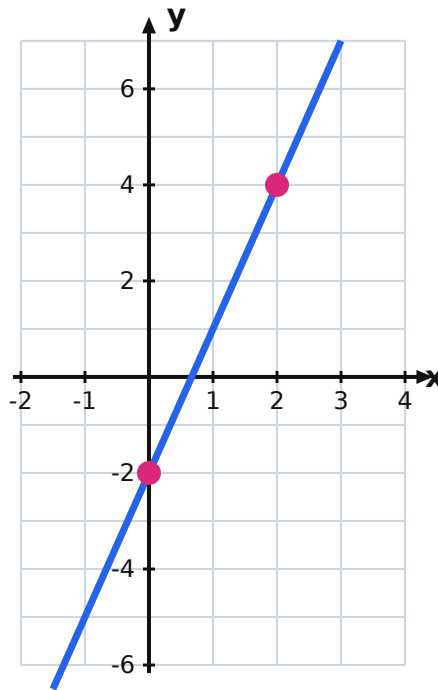
The table shows a linear function. Write an equation in the form $y = mx + b$.

x	0	2	4	6
y	5	11	17	23
change in y		+6	+6	+6

A linear function in table form.

Problem 8: Equation from a graph

Write the equation of the line shown in the form $y = mx + b$.



The line passes through $(0, -2)$ and $(2, 4)$.

Problem 9: Two points to equation

Write the equation of the line through $(1, 5)$ and $(3, 11)$.

Problem 10: A fractional rate

Write the equation of the line through $(3, 4)$ and $(9, 8)$.

Problem 11: A point and a rate

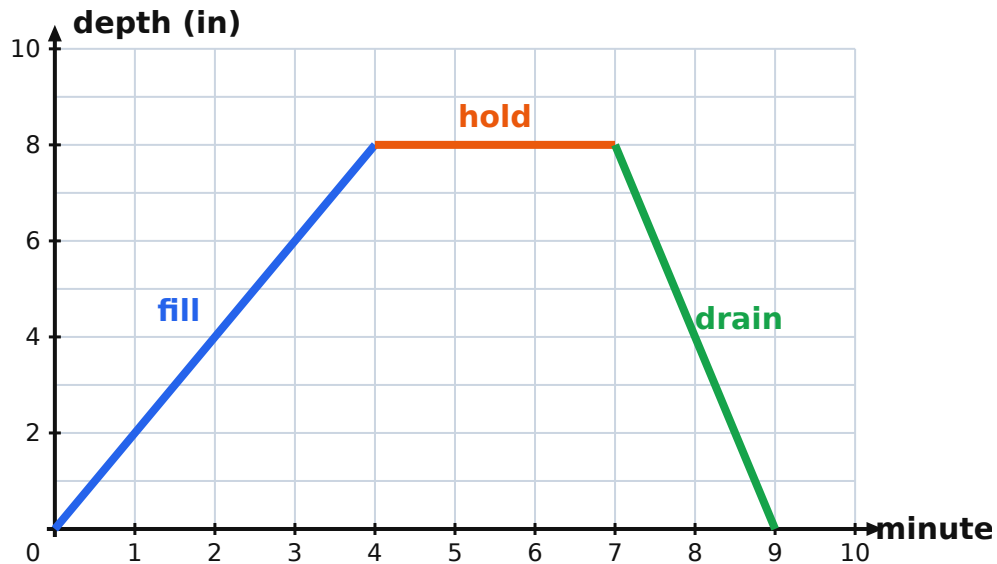
A line has rate of change -2 and passes through $(4, 10)$. Write its equation.

Problem 12: The burning candle

A candle is 12 inches tall when lit and burns down 1.5 inches each hour. Write a function for the height h (in inches) after t hours, then find the height after 4 hours.

Problem 13: Read a story graph

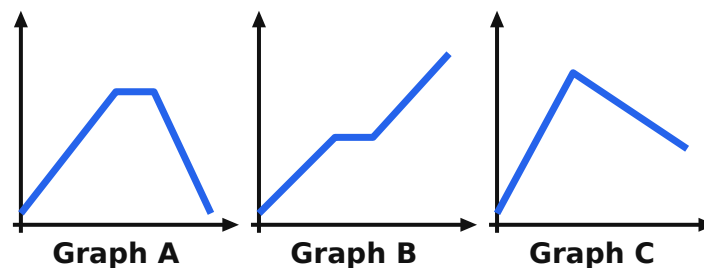
The graph shows the depth of water in a bathtub. Describe what happens in each part and find the rate of change of the depth during the first 4 minutes and during the last 2 minutes of drainage.



Water depth in inches over time in minutes.

Problem 14: Match the graph to the story

Mei walks away from home at a steady pace, stops to rest, and then walks straight home. She walks home faster than she walked away. Which graph shows her trip? Explain.



Distance from home (vertical) against time (horizontal).

Problem 15: Sketch a trip

Priya walks 0.5 mile from home to the library in 10 minutes at a steady pace, stays 20 minutes, and walks home in 10 minutes. Sketch a graph of her distance from home against time.

Problem 16: Sketch a cooling curve

A bowl of soup cools quickly at first and then more and more slowly until it reaches room temperature. Sketch a graph of temperature against time and tell whether the function is linear.

Problem 17: Taxi fare

A taxi charges a flat fee of \$3.50 plus \$2 per mile. (a) Write a function for the cost C of a ride of m miles. (b) Identify the rate and initial value. (c) Find the cost of a 9-mile ride.

Problem 18: Ethan's savings

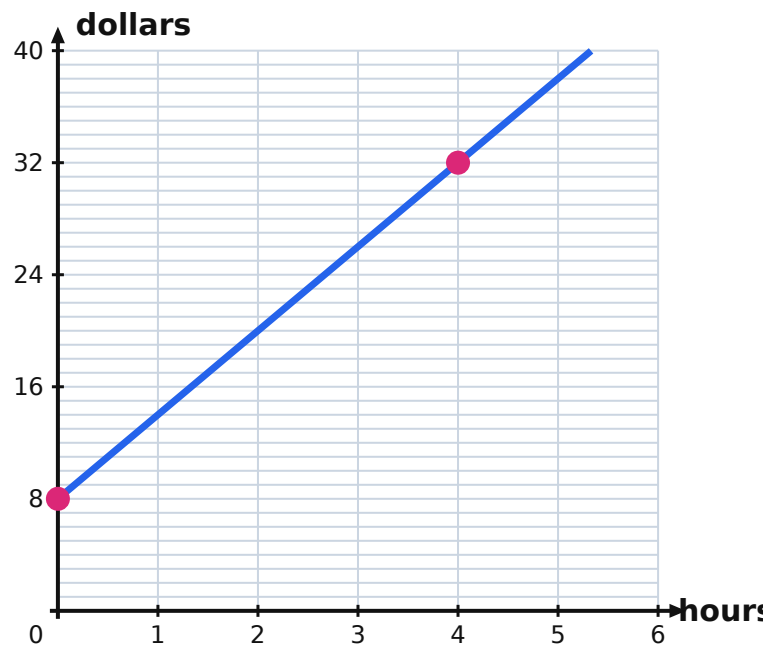
Ethan saves the same amount every week. After 3 weeks he has \$120, and after 6 weeks he has \$165. (a) Write a function for his savings y after x weeks. (b) What do the rate and initial value mean? (c) After how many weeks will he have \$300?

Problem 19: A draining tank

A tank drains at a constant rate. After 3 hours it holds 240 gallons, and after 7 hours it holds 160 gallons. (a) Write a function for the gallons y after x hours. (b) How much water was in the tank at the start? (c) When will the tank be empty?

Problem 20: Kayak rental graph

The graph shows the cost of renting a kayak. (a) Find the rate of change and the initial value. (b) Write the function. (c) Find the cost of renting for 7 hours.



Rental cost in dollars against hours.

Problem 21: Filling a pool

The table shows the gallons g in a small pool after t minutes of filling.

t	2	4	6	8
g	50	80	110	140

(a) Show that the function is linear. (b) Write the function. (c) Predict the gallons after 25 minutes.

Problem 22: Two dog walkers

Sofia earns $S = 9h + 12$ dollars for h hours of dog walking. Noah's earnings N are shown below.

h	1	2	3
N	\$17	\$24	\$31

Write a function for Noah, then find who earns more for 10 hours and by how much.

Problem 23: Area or perimeter?

A square has side length s inches.

s	1	2	3	4
Perimeter P	4	8	12	16
Area A	1	4	9	16

Which relationship is linear? Write the linear function and name its rate of change and initial value. Explain why the other is nonlinear.