

Modeling Real Situations With Linear Functions

Grade 8 math · Worksheet · Standards: 8.F.B.4, 8.F.B.5

Name: _____ Date: _____ Class: _____

These 20 problems follow Standards 8.F.B.4 and 8.F.B.5. They build linear functions from descriptions, tables, graphs and pairs of points, interpret the rate of change and initial value, and describe or sketch graphs of real situations.

Move from reading equations to modeling steady change, then to comparing models and sketching stories without numbers.

Standards: 8.F.B.4, 8.F.B.5 · **Level:** Grade 8

Problem 1 Read the equation (easy)

Name the rate of change and initial value of each function: (a) $y = 6x + 15$ (b) $c = 120 - 8t$

Problem 2 Table to function (easy)

The table shows a linear function. Find the rate, the initial value and the rule.

x	0	1	2	3
y	20	26	32	38

Problem 3 Two points (easy)

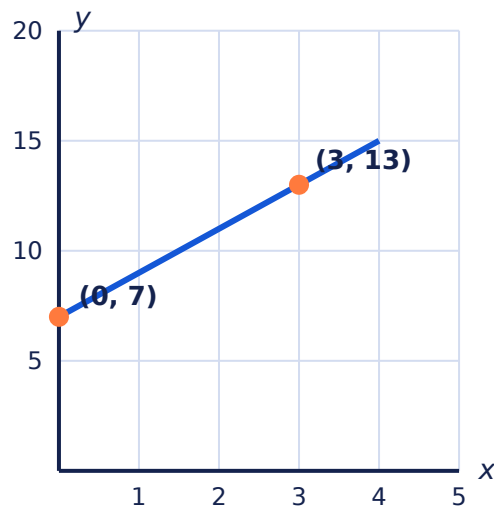
Find the equation of the line through (2, 9) and (5, 21).

Problem 4 Gym fees (easy)

A climbing gym charges a \$20 sign-up fee plus \$14 per month. Write a function for the total cost y after x months and find the cost after 6 months.

Problem 5 Equation from a graph (easy)

Use the graph to determine the rule of this linear function in the form $y = mx + b$.



A line on a grid.

Problem 6 Describe the function (easy)

Describe each as increasing, decreasing or constant, and as linear or nonlinear: (a) $y = -3x + 8$
 (b) $y = 2x^2$ for $x \geq 0$ (c) $y = 7$

Problem 7 Negative coordinates (medium)

Find the equation of the line through $(-2, 11)$ and $(4, -7)$.

Problem 8 Table with gaps (medium)

The table shows a linear function. Write its rule.

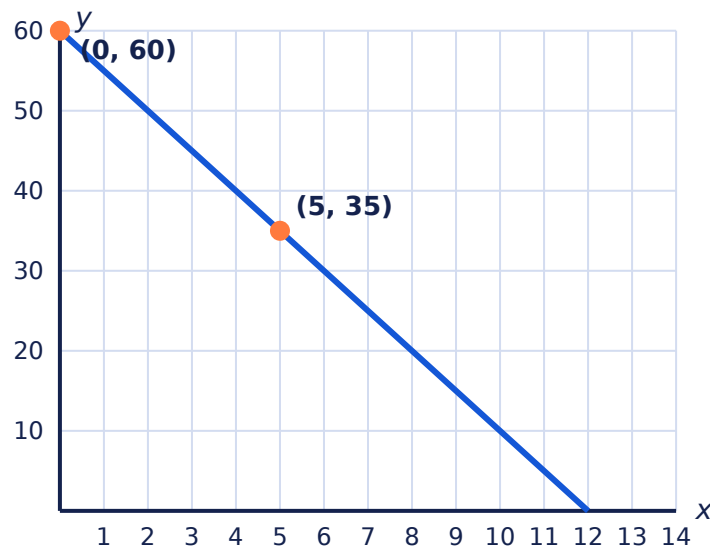
x	1	3	5	7
y	9	19	29	39

Problem 9 Van rental meaning (medium)

The cost of renting a van is $C = 0.45m + 28$ dollars for m miles. Explain what 0.45 and 28 mean and find the cost of a 120-mile trip.

Problem 10 Draining tank (medium)

The graph shows the gallons in a tank over time in minutes. Find the rate of change and initial value, write the function and say when the tank is empty.



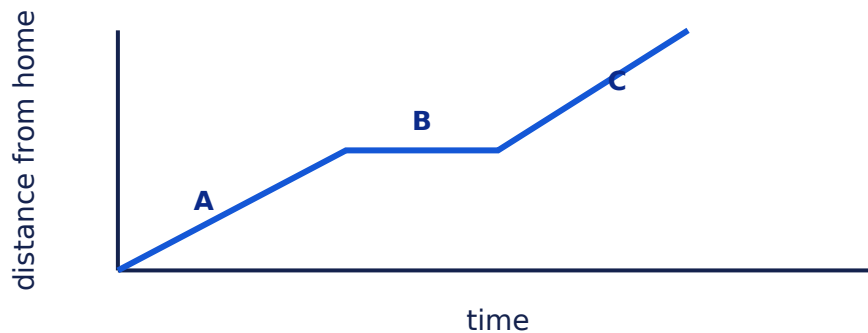
Gallons in a tank.

Problem 11 Drone climb (medium)

A drone is 30 feet high after 2 seconds and 54 feet high after 5 seconds, climbing at a steady rate. Write a function for its height and find the height after 10 seconds.

Problem 12 Cyclist's trip (medium)

The graph shows a cyclist's distance from home. Describe sections A, B and C in words and compare the speeds in A and C.



Distance from home over time.

Problem 13 Sketch a story (medium)

A candle burns down at a constant rate until nothing is left. Sketch a graph of its height against time and describe it.

Problem 14 Missing values (medium)

A line through (1, 7) has slope 4. Find y when $x = 6$, and find x when $y = 51$.

Problem 15 Ride-share fare (hard)

A ride-share costs \$11.50 for 3 miles and \$19.00 for 6 miles. Assume the cost is linear. Find the rate per mile, the starting fee and the cost of 14 miles.

Problem 16 Phone battery (hard)

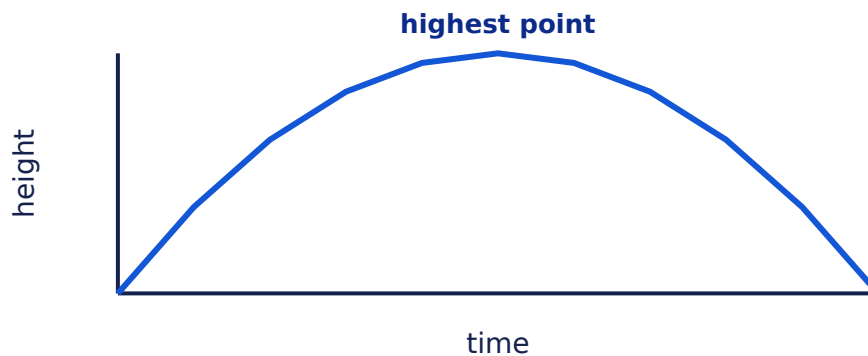
A phone battery is at 82% after 2 hours of video and 58% after 5 hours. Assume a steady drain. Write a function for the charge, find the charge after 10 hours and find when the battery reaches 0%.

Problem 17 Is a line a good model? (hard)

A table lists $x = 1, 2, 3, 4$ and $y = 3, 6, 12, 24$. Decide whether a linear function fits and describe the pattern.

Problem 18 A ball in the air (hard)

The graph shows the height of a ball thrown upward. Describe how the height changes over time, say whether the function is linear, and explain what happens at the highest point.



Height of a ball over time.

Problem 19 Savings race (hard)

Mia saves according to $y = 15x + 60$ dollars after x weeks. Noah has \$20 at week 0, \$100 at week 4 and \$180 at week 8, at a steady rate. In which week do they have equal savings, and how much is it?

Problem 20 Candle burn time (hard)

A candle is 18 inches tall at the start and 13.5 inches tall after 3 hours. Write a function for its height, find how long it lasts, and explain why the function is not meaningful at 15 hours.