LESSON MAKER PRO

Line Up Relationships

Connect words, tables, graphs, and equations in y = mx + b form.

GRADE 7 · TEKS 7.7

7.7 "Expressions, equations, and relationships. The student applies mathematical process standards to represent linear relationships using multiple representations. The student is expected to represent linear relationships using verbal descriptions, tables, graphs, and equations that simplify to the form y = mx + b."

NAME _____ DATE _____

Connect the representations

In y = mx + b, m is the change in y for each unit of x, and b is the value at x = 0. A negative m gives a decreasing line. Simplify equivalent equations using the same operation on both sides.

Worked example

A tank starts with 2 liters and gains 3 liters per minute. Write a linear rule for the table.

The starting value is 2. The output increases 3 for every increase of 1 in x.

y = 3x + 2.

Minutes, x	Liters, y
0	2
1	5
2	8

Use the supplied tables and graphs. Show calculations and explain the relationships. Label plotted points as requested.

1. Simplify and fill a table

The equation 2y = 4x + 6 models a tank filling steadily. x is minutes and y is liters. Simplify to y = mx + b, complete the table, and explain m and b.

_____

_____

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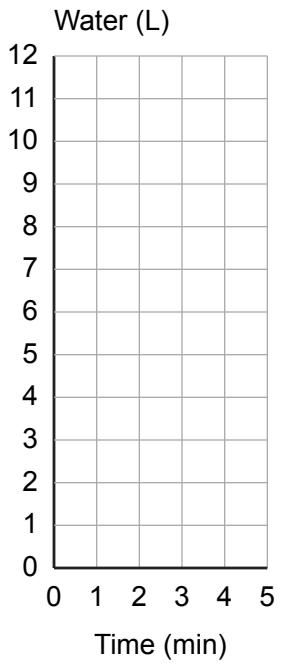
Minutes, x	Liters, y
0	
1	
3	
4	

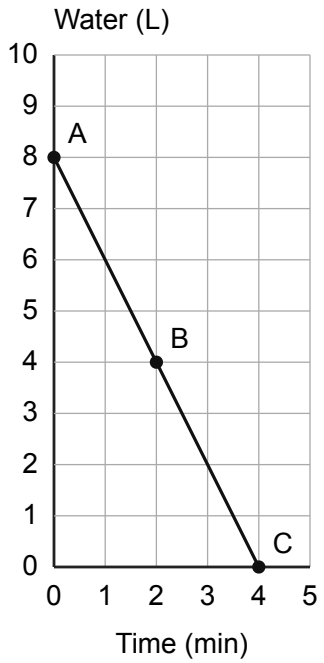
2. Construct and interpret

Use Task 1 to plot A, B, C, D in table order and connect them. Use the graph to find the water amount at 2 minutes.



3. Read a decreasing graph

The graph models water draining steadily from a tank. Read A and B, find the change per minute, and write the equation. Explain its starting value.



4. Match words and values

Use the draining graph in Task 3 to complete the table. Write a verbal rule that accounts for both the initial amount and the change.

Minutes, x	Liters, y
0	
1	
3	
4	

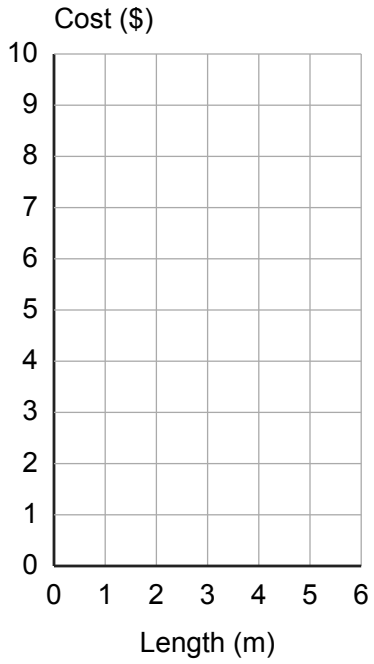
5. Build from words

A banner printer charges $2 setup and $1 per meter. Let x be meters and y total dollars. Write an equation and complete the table. Explain the charge when x = 0.

Meters, x	Cost ($), y
0	
2	
4	
6	

6. Graph the cost

Use Task 5 to plot A, B, C, D in table order and connect them. Read the cost of 3 meters and verify it with your equation.



7. Check equivalent representations

A student says the draining tank in Task 3 is represented by $2y + 4x = 16$. Simplify that equation to check the claim. Explain why the physical model stops at $x = 4$ even though the algebraic line can continue.

ANSWER KEY

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Each context is a continuous linear model on its physical domain. Match ordered pairs, graph, equation and verbal descriptions. Accept equivalent algebra; use the complete table values and key graphs to verify constructions.

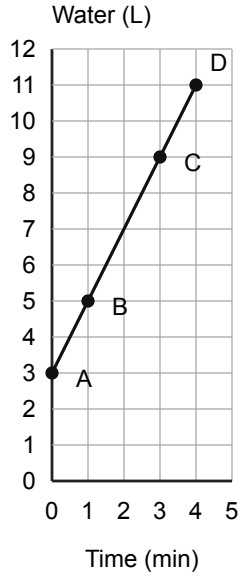
Task 1

y = 2x + 3. y-values: 3, 5, 9, 11. m = 2 L/min; b = 3 L initially.

Minutes, x	Liters, y
0	3
1	5
3	9
4	11

Task 2

A(0,3), B(1,5), C(3,9), D(4,11); at 2 minutes, 7 liters.



Task 3

A(0,8), B(2,4). Rate (4 - 8)/(2 - 0) = -2 L/min. y = -2x + 8; starts with 8 liters.

Task 4

y-values: 8, 6, 2, 0. Start with 8 liters and subtract 2 liters for each minute.

Minutes, x	Liters, y
0	8
1	6
3	2
4	0

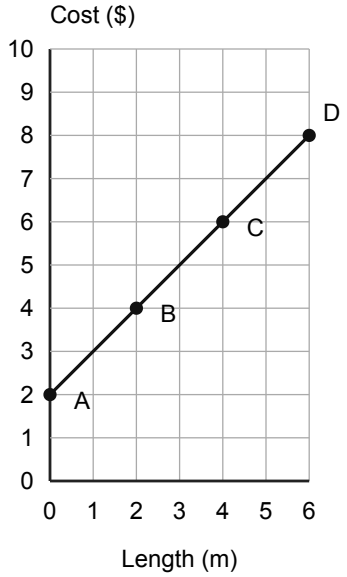
Task 5

y = x + 2; y-values: 2, 4, 6, 8. At x = 0 the model still includes the $2 setup fee. Check that the representation and explanation agree with the given quantities.

Meters, x	Cost ($), y
0	2
2	4
4	6
6	8

Task 6

A(0,2), B(2,4), C(4,6), D(6,8). 3 meters costs $5; y = 3 + 2 = 5. Check that the representation and explanation agree with the given quantities.



Task 7

2y = 16 - 4x, so y = -2x + 8: the claim is correct. At x = 4 the tank is empty; later negative water amounts are not physically possible.