

PART I GET STARTED

Today's Mathematics

We will build and use linear models of constant-rate situations.

Essential Question

How can a linear equation model and solve a real-life problem?

DO NOW

1. Write point-slope form with $m = -3$ through $(2, 8)$.
2. Convert it to slope-intercept form.
3. Interpret the slope and y -intercept in a possible context.

SEE IT

A tank starts with 150 gallons and drains 12 gallons each hour. Identify its rate, initial value, and meaningful domain.

QUICK WRITE | 2 MINUTES

Explain why a linear model may give answers that do not make sense in its context.

PART II INVESTIGATE**BUILD THE IDEA**

1. For the tank in See It, build a table at $x = 0, 5, 10, 12.5$ hours. Write the equation and graph it on graph paper.
2. Interpret its slope and both intercepts, including units.
3. A fundraiser pays \$240 for supplies and earns \$15 per sale. Write a profit equation. How many sales are needed to break even?
4. Can the tank model describe $x = 15$ hours? Can the fundraiser sell 15.5 items? Explain the restrictions.

COMPARE AND EXPLAIN

Compare solving a break-even question with a table, graph, and equation. Which method gives an exact result most efficiently?

APPLY

1. Model a \$75 initial fee plus \$20 per hour.
2. Find when the total reaches \$235.

PART III MAKE SENSE AND PRACTICE

WHAT WE CAN CONCLUDE

A linear model has a constant rate and an initial value. Define variables, include units, and interpret slope and intercepts within a meaningful domain.

WORKED MODEL

Profit is $P = 15x - 240$. At break-even, $P = 0$: $15x = 240$, so $x = 16$ sales.

FOCUSED PRACTICE

1. Model \$40 saved initially plus \$12 saved each week.
2. A 90-inch candle burns 2.5 inches per hour. When is it 55 inches tall?
3. A remaining budget is $y = 60 - 4x$. Interpret both intercepts and state a meaningful domain when x counts purchases.

MATH WRITE | 5 MINUTES

Explain how units, domain restrictions, and context help you reject unreasonable answers.

PART IV PUZZLE PRACTICE**Homework****What Is A Computer's Favorite Kind of Music?**

Write the letter of each answer in the box containing the exercise number.

1. The student government is selling T-shirts for a fundraiser. They spent \$280 on the shirts and will sell them for \$8 each. The profit y from selling x shirts is $y = 8x - 280$. How many shirts will the student government have to sell before breaking even?
R. 15 **S.** 35 **T.** 45
2. The number of feet y a jet ski will still have left to glide to a stop after x seconds is $y = -25x + 300$. How many seconds does it take for the jet ski to come to a complete stop?
I. 12 **J.** 15 **K.** 25
3. You are saving money to go on your class trip. You already have saved \$35 and you plan to add \$5 to that each week. Which equation represents the amount y you will have after x weeks?
M. $y = 5x - 35$ **N.** $y = 35x + 5$ **O.** $y = 5x + 35$
4. A swimmer is competing in the 50-meter butterfly. The number of meters y that she has left to swim after x seconds is $y = -\frac{5}{3}x + 50$. After how many seconds will the swimmer reach the halfway point in the race?
J. 30 **K.** 15 **L.** 25
5. A craft fair promises to donate \$100 plus 3% of every \$12 ticket sold to a charity. Which equation represents the amount y of money the craft fair will give to the charity if x tickets are sold?
B. $y = 0.03x + 100$ **C.** $y = 0.03x + 112$ **D.** $y = 0.36x + 100$

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