

Model Messages

Read what a linear model says about a situation.

HIGH SCHOOL • AI-S.ID.7

AI-S.ID.7 "Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data."

NAME _____

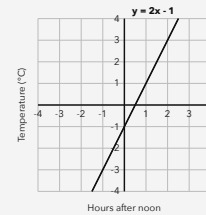
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SLOPE AND INTERCEPT

In $y = mx + b$, the slope m tells how much y changes when x increases by one unit. The intercept b tells the value of y when x is 0, or the starting amount.

WORKED EXAMPLE

The graph shows $y = 2x - 1$, where x is hours after noon and y is temperature in $^{\circ}\text{C}$. Interpret the slope and y -intercept.



1. Identify $m = 2$ and $b = -1$.
2. The temperature increases 2°C each hour.
3. At noon, $x = 0$ and the temperature is -1°C .

Answer: The temperature rises 2°C per hour. At noon, the temperature is -1°C .

PRACTICE 4 problems

- 1** For $y = 6x + 9$, x is the number of stickers sold and y is dollars earned. Interpret the slope and intercept.

ANSWER _____

- 2** For $y = -4x + 28$, x is hours after a laptop is unplugged and y is battery percent. Interpret the slope and intercept.

ANSWER _____

- 3** For $y = 7x$, x is miles walked in a charity event and y is dollars earned. Interpret the slope and intercept.

ANSWER _____

- 4** For $y = -8x + 56$, x is weeks and y is dollars left on a gift card. Interpret the slope and intercept.

ANSWER _____

APPLY IT Show your work

- 1** A school club earns money from concert tickets using $y = 3x + 45$, where x is tickets sold and y is dollars earned. Interpret the slope and intercept.

WORK SPACE

ANSWER _____

- 2** An online art contest pays a student an advance and earnings for digital designs sold. Use the table to write a linear model, then interpret its slope and intercept.

DIGITAL DESIGN EARNINGS

x, designs sold	y, earnings (\$)
0	18
4	30
8	42

ANSWER _____

CHALLENGE One step up

Two tutoring apps pay student creators for completed practice sets. App A uses $y = 5x + 20$. App B uses $y = 8x + 5$. Here, x is completed sets and y is dollars earned. At what value of x will the earnings match? Which app has the higher starting earnings, and which grows faster? Explain using slope and intercept.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	For $y = 6x + 9$, x is the number of stickers sold and y is dollars earned. Interpret the slope and intercept.	The earnings increase by \$6 per sticker sold. The starting earnings are \$9 when 0 stickers are sold.
2	For $y = -4x + 28$, x is hours after a laptop is unplugged and y is battery percent. Interpret the slope and intercept.	The battery level drops 4 percentage points per hour. The battery level is 28% when the laptop is unplugged.
3	For $y = 7x$, x is miles walked in a charity event and y is dollars earned. Interpret the slope and intercept.	The earnings increase by \$7 per mile walked. The starting earnings are \$0.
4	For $y = -8x + 56$, x is weeks and y is dollars left on a gift card. Interpret the slope and intercept.	The gift card balance drops by \$8 each week. The starting balance is \$56.

PART 2 • APPLY IT

- The club earns \$3 for each ticket sold. The club starts with \$45, such as a donation, before selling tickets.** The slope is 3, so earnings rise \$3 per ticket. The intercept is 45, so y is \$45 when x is 0.
- $y = 3x + 18$. Earnings increase by \$3 per design sold, and the student earns \$18 when 0 designs are sold.** Earnings rise \$12 when sales rise 4 designs, so the slope is 3. The table shows an intercept of 18.

CHALLENGE

The earnings match at $x = 5$ sets, when $y = \$45$. App A has the higher starting earnings because its intercept is \$20, compared with \$5 for App B. App B grows faster because its slope is \$8 per set, compared with \$5 per set for App A.

Accept equivalent wording for increase, decrease, rate, and starting amount. For the challenge, require both $x = 5$ and the matching earnings of \$45.