

Input Output Detectives

Model changing quantities with equations and tables.

GRADE 6 • 6.EE.C

CCSS.Math.Content.6.EE.C "Represent and analyze quantitative relationships between dependent and independent variables."

NAME _____

DATE _____

THE BIG IDEA

Use x for the independent quantity, the quantity you choose or control. Use y for the dependent quantity, whose value changes when x changes. An equation such as $y = mx + b$ shows the relationship, where m is the change for each 1 unit of x and b is the starting amount.

WORKED EXAMPLE

At a craft booth, y is the total number of beads after x packs. There are 13 beads to start, and each pack has 6 beads. Write an equation and find y when $x = 4$.

1. Start with 13 beads: $y = 13 + 6x$.
2. Substitute $x = 4$: $y = 13 + 6(4)$.
3. Multiply and add: $y = 13 + 24 = 37$.

Answer: $y = 6x + 13$; when $x = 4$, $y = 37$.

PRACTICE 6 problems

- 1** A music app downloads 5 songs each minute. Let x be the number of minutes and y be the number of songs downloaded. Write an equation for y .

ANSWER _____

- 2** In the equation $y = 3x + 2$, find y when $x = 7$.

ANSWER _____

- 3** For $y = 7x$, complete the table. x : 1, 2, 3. y :
____, ____, ____.

ANSWER _____

- 4** This table shows a relationship. x : 1, 2, 3. y : 8, 16, 24. Write an equation that relates y to x .

ANSWER _____

- 5** For $y = 10x + 1$, name the independent variable and the dependent variable.

ANSWER _____

- 6** The equation $y = 9x$ relates two quantities. If $y = 45$, what is x ?

ANSWER _____

APPLY IT Show your work

- 1** Your game profile starts with 2 bonus gems. You earn 11 gems for each quest. Let x be the number of quests and y be the total number of gems. Write an equation. Then find y after 5 quests.

WORK SPACE

ANSWER _____

- 2** A student podcast has 9 listeners before new episodes are posted. It gains 7 listeners per episode. Let x be the number of episodes and y be the number of listeners. Which variable is independent? Write an equation and find y after 3 episodes.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Channel A begins with 8 followers and gains 5 followers each day. Channel B begins with 17 followers and gains 2 followers each day. After how many days will the channels have the same number of followers? How many followers will each have? Show equations or a table.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A music app downloads 5 songs each minute. Let x be the number of minutes and y be the number of songs downloaded. Write an equation for y .	$y = 5x$
2	In the equation $y = 3x + 2$, find y when $x = 7$.	$y = 23$
3	For $y = 7x$, complete the table. x : 1, 2, 3. y : __, __, __.	7, 14, 21
4	This table shows a relationship. x : 1, 2, 3. y : 8, 16, 24. Write an equation that relates y to x .	$y = 8x$
5	For $y = 10x + 1$, name the independent variable and the dependent variable.	x is the independent variable; y is the dependent variable.
6	The equation $y = 9x$ relates two quantities. If $y = 45$, what is x ?	$x=5$

PART 2 • APPLY IT

- $y = 11x + 2$; $y = 57$ The starting amount is 2, and each quest adds 11 gems. Substitute 5 for x to get $11(5) + 2 = 57$.
- x is the independent variable; $y = 7x + 9$; $y = 30$ The number of episodes is the input, so x is independent. Substitute 3 for x to get $7(3) + 9 = 30$.

CHALLENGE

After 3 days, both channels have 23 followers. Equations: $y = 5x + 8$ and $y = 2x + 17$.

Accept equivalent equation forms, such as $5x = y$ instead of $y = 5x$. For the challenge, accept a correct table or equation-based method that shows both totals are 23 when $x = 3$.