LESSON MAKER PRO

Build the Rule

Turn a situation into an expression you can use.

HIGH SCHOOL · F-BF.1a

F-BF.1a "Determine an explicit expression or steps for calculation from a context."

NAME _____ DATE _____

FROM STORY TO EXPRESSION

Let x stand for a quantity that can change. Multiply a per-item amount by x, include any one-time amount once, and follow the order of actions in the situation.

WORKED EXAMPLE

A music site charges a $17 sign-up fee and $6 per song download. Let x be the number of downloads. Write an expression for the total cost, then find the cost of 4 downloads.

1. The downloads cost 6x dollars.
2. Add the sign-up fee: C(x) = 17 + 6x.
3. Substitute 4 for x: C(4) = 17 + 6(4) = 41.

Answer: C(x) = 17 + 6x; 4 downloads cost $41.

PRACTICE 6 problems

1 A bike rental costs $12 to start and $3 per hour. Let x be the number of hours. Write an expression for the total cost.

ANSWER _____

2 A tank holds 90 liters of water and loses 7 liters per hour. Let x be the number of hours. Write an expression for the water left in the tank.

ANSWER _____

3 A square mural panel has a side length of x + 2 inches. Write an expression for its area.

ANSWER _____

4 A seller receives $8 per notebook. Making the notebooks costs $35 to set up, plus $2 per notebook. Let x be the number sold. Write an expression for profit, then find the profit from selling 10 notebooks.

ANSWER _____

5 A group buys x tickets at $14 each and pays $20 for parking. The group splits the full cost equally among the x people. Write the cost per person, then find it when x = 5.

ANSWER _____

6 An event has x rows of 9 seats. Eleven seats are reserved. Write an expression for the seats still available, then find the number available when x = 3.

ANSWER _____

APPLY IT Show your work

1 A school club pays $48 for a hoodie design and $11 to make each hoodie. It sells each hoodie for $19. Let x be the number of hoodies sold. Write an expression for the club's profit, then find its profit if it sells 20 hoodies.

WORK SPACE

ANSWER _____

2 A gaming tournament awards a team $15 for each match it wins. The team pays a $25 entry fee out of its winnings, then splits what remains equally between two teammates. Let x be the number of wins. Write an expression for each teammate's net amount, then find the amount after 7 wins.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A ride service charges a $9 fee, plus $3 per mile for the first 10 miles and $2 per mile after that. Let x be the trip distance in miles. Write one cost expression for x at most 10 and another for x greater than 10. Find the cost of a 14-mile trip, and explain why the second expression uses x - 10.

WORK SPACE AND ANSWER

ANSWER KEY

Build the Rule

HIGH SCHOOL · F-BF.1a

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A bike rental costs $12 to start and $3 per hour. Let x be the number of hours. Write an expression for the total cost.	**12 + 3x dollars**
2	A tank holds 90 liters of water and loses 7 liters per hour. Let x be the number of hours. Write an expression for the water left in the tank.	**90 - 7x liters**
3	A square mural panel has a side length of x + 2 inches. Write an expression for its area.	**$(x + 2)^2$ square inches**
4	A seller receives $8 per notebook. Making the notebooks costs $35 to set up, plus $2 per notebook. Let x be the number sold. Write an expression for profit, then find the profit from selling 10 notebooks.	**P(x) = 8x - (35 + 2x) = 6x - 35; P(10) = $25.**
5	A group buys x tickets at $14 each and pays $20 for parking. The group splits the full cost equally among the x people. Write the cost per person, then find it when x = 5.	**C(x) = (14x + 20)/x = 14 + 20/x; C(5) = $18.**
6	An event has x rows of 9 seats. Eleven seats are reserved. Write an expression for the seats still available, then find the number available when x = 3.	**S(x) = 9x - 11; S(3) = 16 seats.**

PART 2 · APPLY IT

1. **P(x) = 19x - (48 + 11x) = 8x - 48; P(20) = $112.** Subtract the design and production costs from sales revenue. Then substitute 20 for x.
2. **N(x) = (15x - 25)/2; N(7) = $40 per teammate.** Subtract the entry fee from the team's winnings before dividing by 2. Seven wins bring in $105, leaving $80 to split.

CHALLENGE

For 0 ≤ x ≤ 10, C(x) = 9 + 3x. For x > 10, C(x) = 9 + 3(10) + 2(x - 10). C(14) = $47. The x - 10 counts only the miles beyond the first 10.

Accept equivalent simplified expressions. In the challenge, accept 2x + 19 for the cost when x > 10.