

Summarize

continued

- Describe why and how we combined the two equations into one equation.
- Compare the work we did in this problem of making a new equation to the work in Problem 2.1 for making new equations.

ACE Assignment Guide for Problem 2.2



Core 6–8, 19–20

Other Applications 9, Connections 21–26; and unassigned choices from previous problems

Adapted For suggestions about adapting ACE exercises, see the CMP *Special Needs Handbook*.

Connecting to Prior Units 19–26: *Moving Straight Ahead*

Answers to Problem 2.2

- A. 1.** \$687.50; Substitute 0.25 for R in the equation $V = 600 - 500R$, solve for V , and then substitute that value of V into the equation $P = 2.50V - 500$ to find the profit P .

$$\begin{aligned} V &= 600 - 500(0.25) & P &= 2.50(475) - 500 \\ V &= 600 - 125 & P &= 1187.50 - 500 \\ V &= 475 & P &= 687.50 \end{aligned}$$

- 2.** 30%; Substitute 625 for P and solve for V in the equation $P = 2.50V - 500$, and then substitute that value of V into the equation $V = 600 - 500R$ to find the probability it will rain, R .

$$\begin{aligned} 625 &= 2.50V - 500 \\ 625 + 500 &= 2.50V - 500 + 500 \\ 1125 &= 2.50V \\ V &= 450 \\ 450 &= 600 - 500(R) \\ 450 - 600 &= 600 - 500(R) - 600 \\ -150 &= -500R \\ R &= 0.30 \text{ or } 30\% \end{aligned}$$

- B.1.** $P = 2.50(600 - 500R) - 500$ or any equivalent form.

- 2.** \$687.50; For 25% chance it will rain:

$$\begin{aligned} P &= 2.50[600 - 500(0.25)] - 500 \\ P &= 2.50[600 - 125] - 500 \\ P &= 2.50[475] - 500 \\ P &= 687.50 \end{aligned}$$

The answer is the same as the one in Question A, part (1).

- C. 1.** To find an equivalent expression for the profit, you can use the Distributive Property and multiply 2.50 times 600 and 2.50 times $-500R$. Then combine like terms.
- $$\begin{aligned} P &= 2.50(600 - 500R) - 500 \\ P &= 1,500 - 1,250R - 500 \\ P &= -1,250R + 1000 \end{aligned}$$

The two expressions are equivalent because to get from one to the other you can use the Distributive or Commutative properties. Students may also compare tables and graph or test two points in both (linear) equations to justify equivalence.

- 2.** 30%; Using the equation, $P = -1,250R + 1,000$ and solving for R when $P = 625$ gives:
- $$\begin{aligned} 625 &= -1,250R + 1,000 \\ 625 - 1,000 &= -1,250R + 1,000 - 1,000 \\ -375 &= -1,250R \end{aligned}$$

so $R = 0.30$ or 30%, which is the same as the answer for Question A2.

- 3–4.** Answers will vary. Students may use either the two equations or their one equation from Questions B1 or C1.

- 3.** 1,000 (this is the starting value or intercept in the equation $P = -1,250R + 1,000$) The answer makes sense since if the probability that it will rain is zero, more people should come to the park than if the probability is 100%, thus creating more profit.

- 4.** $-\$250$ or a loss of 250 dollars; Substitute 1 (i.e. 100%) for R in the equation, $P = -1,250R + 1,000$. If the probability of rain is 100%, there will be fewer visitors to the park, so it will probably lose money. So profit of $-\$250$ makes sense.

- D.** The relationships in Questions B and C are both linear. They both can be put into the form of $y = mx + b$, the equation of a line. Also they both have constant rates of change.