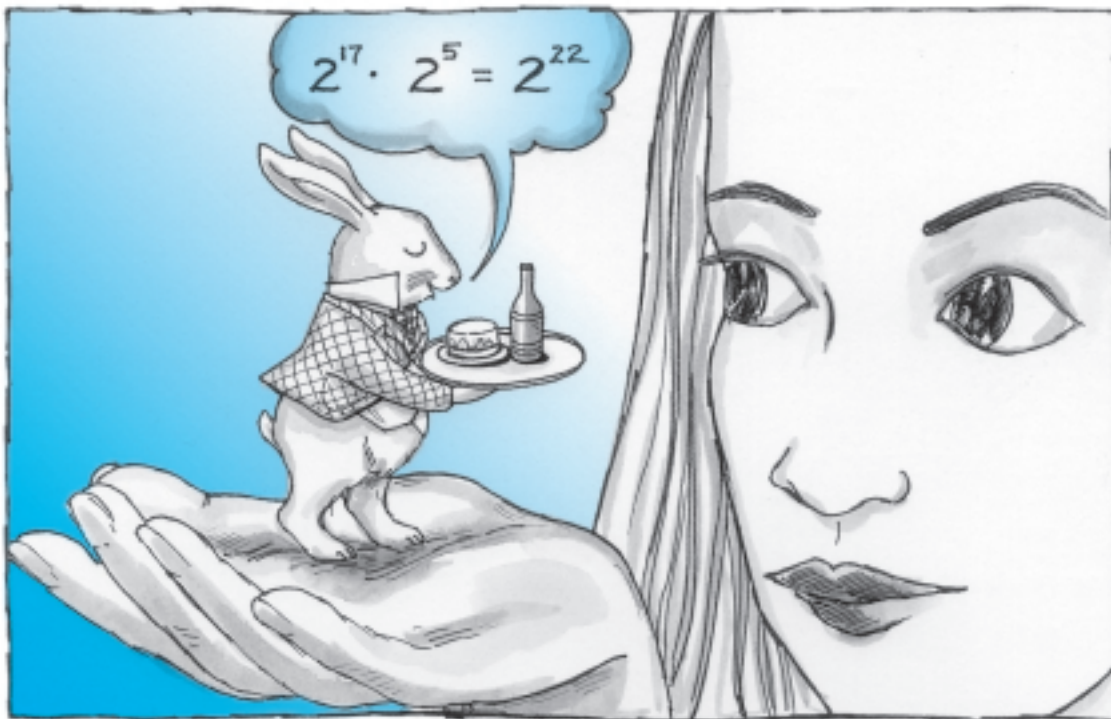


Having Your Cake and Drinking Too



You have found that the additive law of exponents gives an easy way to calculate what happens to Alice when she eats several pieces of cake. For example, the equation below shows how to combine the effect of a 17-ounce piece of base 2 cake with that of a 5-ounce piece of that cake.

$$2^{17} \cdot 2^5 = 2^{17+5} = 2^{22}$$

You also found out how to combine several servings of the beverage. For example, here is an equation that shows how to combine the effect of a 4-ounce serving of base 2 beverage with that of a 9-ounce serving of that beverage.

$$\left(\frac{1}{2}\right)^4 \cdot \left(\frac{1}{2}\right)^9 = \left(\frac{1}{2}\right)^{4+9} = \left(\frac{1}{2}\right)^{13}$$

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In this activity, your goal is to figure out how to determine the effect on Alice of combining base 2 cake and base 2 beverage.

1. What is Alice's height multiplied by if she consumes the same number of ounces of cake and beverage? Write an equation using exponential expressions that expresses your answer.
2. Write at least five ways to combine eating cake with drinking beverage that will result in Alice being 8 times her original height. That is, find combinations of amounts of cake and of beverage for which her original height will be multiplied by 2^3 .
3.
 - a. Find several combinations of amounts of cake and beverage that will result in Alice being 32 times her original height.
 - b. Find several combinations of amounts of cake and beverage that will result in Alice being 4 times her original height.
4. Look for a pattern in your answers to Questions 2 and 3. Write a general expression for the amount Alice's height is multiplied by if she eats C ounces of cake and drinks B ounces of beverage.
5. What happens to your rule in Question 4 if B is more than C ?