2.3 Expressing a Number in Many Ways

YOU WILL NEED

- a calculator

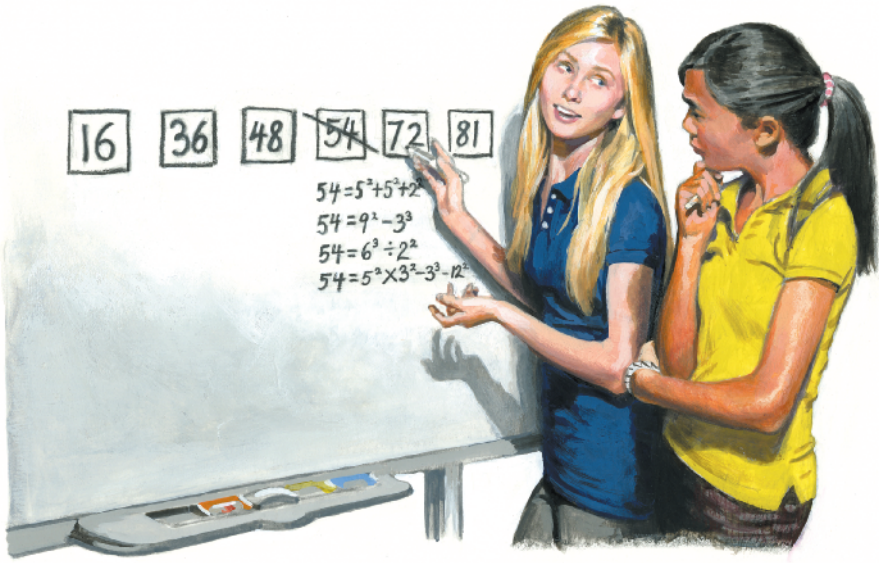
GOAL

Represent a number in many ways using powers.

EXPLORE the Math

Amanda and Yvonne are playing a game. They have five numbers and they want to see who can write a number the most ways using the sums, differences, products, or quotients of powers. The only rule is that they cannot use powers with an exponent of 0 or 1.

Amanda predicts you can write a greater number in more ways than a lesser number. Yvonne doesn't agree.



$$54 = 5^2 + 5^2 + 2^2$$
$$54 = 9^2 - 3^3$$
$$54 = 6^3 \div 2^2$$
$$54 = 5^2 \times 3^2 - 3^3 - 12^2$$

How could you decide whether Amanda is right or wrong?