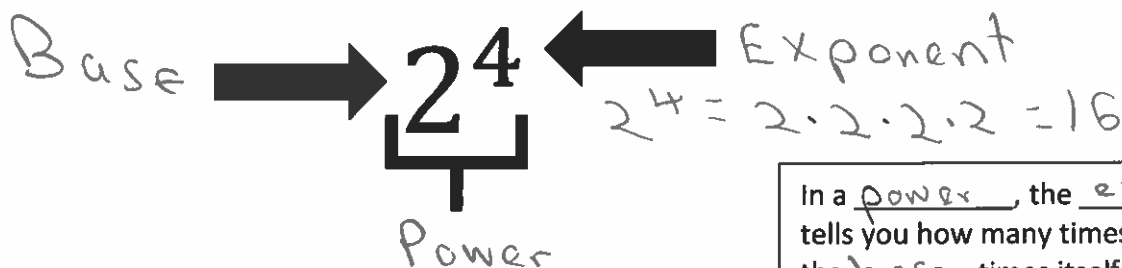


## 1.2 POWERS AND EXPONENTS

Essential Question: How can you use repeated factors in real-life situations?



In a power, the exponent tells you how many times to multiply the base times itself.

Power	Words
$3^2$	Three <i>squared</i> , or three to the second
$3^3$	Three <i>cubed</i> , or three to the third
$3^4$	Three to the fourth

### EXAMPLE 1

Write each product as a power.

1)  $7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7$   $7^7$

2)  $15 \times 15 \times 15 \times 15$   $15^4$

3)  $4 \cdot 4 \cdot 4 \cdot 4$   $4^4$

4)  $12 \times 12 \times 12$   $12^3$

### EXAMPLE 2

Find the value of each power.

1)  $7^2 = 7 \cdot 7 = 49$

2)  $5^3 = 5 \cdot 5 \cdot 5 = 125$

3)  $6^3 = 6 \cdot 6 \cdot 6 = 216$

4)  $9^2 = 9 \cdot 9 = 81$

5)  $3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81$

6)  $12^2$

$1^2 = 1$

$2^2 = 4$

$3^2 = 9$

$4^2 = 16$

$5^2 = 25$

$6^2 = 36$

$7^2 = 49$

$8^2 = 64$

$9^2 = 81$

$10^2 = 100$

$11^2 = 121$

$12^2 = 144$

The answers to the above powers are called Perfect Squares.

Perfect Square  $\rightarrow$  The square of a whole number.

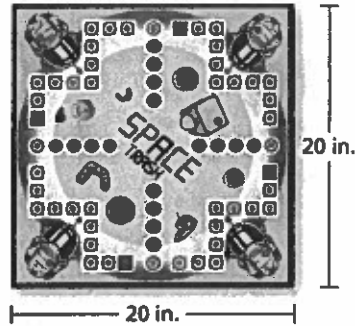
EXAMPLE 3

Determine whether each number is a perfect square.

- 1) 64 yes    2) 20 no    3) 25 yes    4) 2 no    5) 99 no    6) 100 yes

EXAMPLE 4

1) A game board is a square with a side length of 20 inches. What is the area of the game board?



Area of square = side x side

$$A = 20^2$$

$$A = 400 \text{ in}^2$$

The area of the game board is  $400 \text{ in}^2$ .

2) What is the area of the square traffic sign in square inches?  
In square feet?



$$A = 2 \times 2$$

$$A = 4 \text{ ft.}^2$$

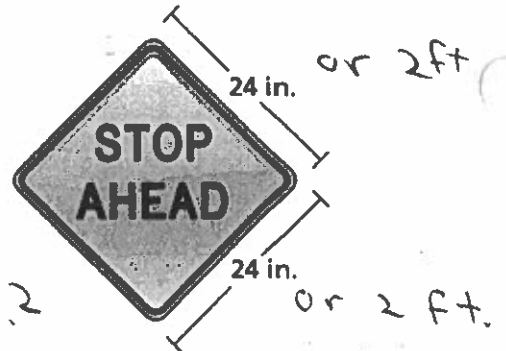
The area of the traffic sign in square feet is  $4 \text{ ft.}^2$ .



$$A = 24 \times 24$$

$$A = 576 \text{ in}^2$$

The area of the traffic sign in square inches is  $576 \text{ in}^2$ .



$$\begin{array}{r} 24 \\ \times 24 \\ \hline 196 \\ 480 \\ \hline 576 \end{array}$$