

Place Value

The Face Value of a digit multiplied by its position in a number.



Place Value Sidewalk

Imagine that each square has a Place Value.

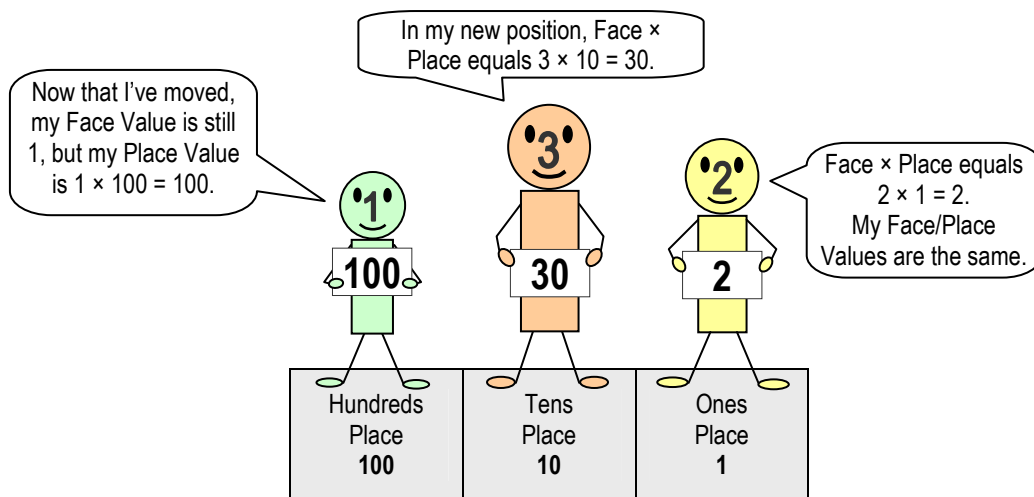
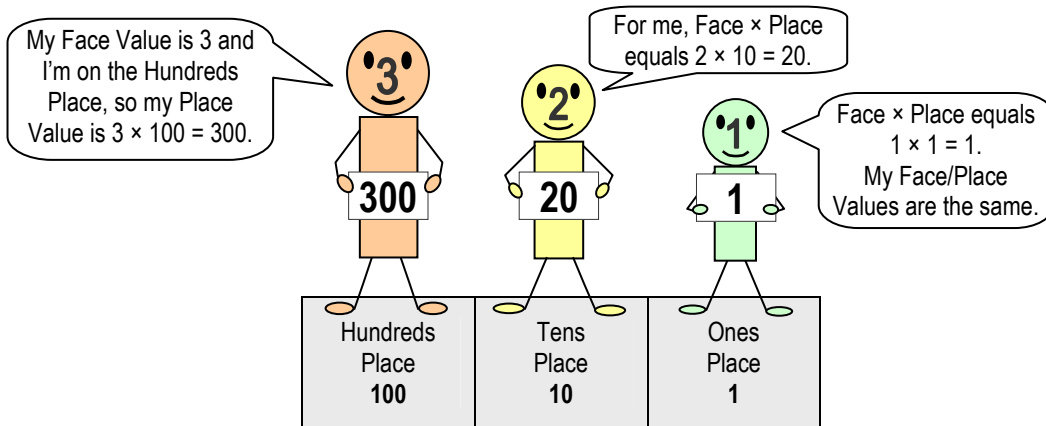
Hundreds Place 100	Tens Place 10	Ones Place 1	.	Tenths Place .1	Hundredths Place .01
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Decimal Point



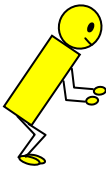
Imagine Mathbots with permanent Face Values moving around on the Sidewalk calculating and displaying their changing Place Values.

$$\text{Face Value} \times \text{Place} = \text{Place Value}$$



Expanded Notation

Expanded Notation extracts then adds the Place Values of each digit.



1	1	1
Hundreds Place × 100	Tens Place × 10	Ones Place × 1

- Toss a number onto the Place Value Sidewalk.
- Multiply each digit times its place.

$$\underbrace{100 + 10 + 1}_{\text{Expanded Notation}} = 111 \quad \leftarrow \text{Expanded Notation adds to the original number.}$$

9	8	7	.	6	5
Hundreds Place × 100	Tens Place × 10	Ones Place × 1	•	Tenths Place × .1	Hundredths Place × .01

$$\underbrace{900 + 80 + 7 + .6 + .05}_{\text{Expanded Notation}} = 987.65$$

The Importance of Zero

Zero is a “place” holder for a position in a number that has no value.

Some early number systems had no concept of or symbol for zero, so a place without value would be left blank.

5	4
Hundreds Place 100	Tens Place 10 Ones Place 1

For example, “Five hundred four” would be written as 5 4 with a gap between the digits.

But this could be mistaken for two separate digits or 54.

The use of zero as a placeholder eliminated the possibility of confusion.

5	0	4
Hundreds Place 100	Tens Place 10	Ones Place 1



Your Turn!

Draw an arrow from each item to the best matching example.

Face Value	Digit value times position in number
Place Value	Numerical symbol
Digit	Composed of a digit or digits
Number	Placeholder for no place value
Zero	Extracts and adds place values
Expanded Notation	Permits large numbers with few symbols
Positional Notation	Digit value which never changes

Fill in the Place Value Sidewalk up to the Ten-Thousands Place.

				Ones Place 1
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For each number, write the Place Value of the digit 3 in words.

3	_____
30	_____
300	_____
3,000	_____
30,000	_____

Rewrite the following numbers in Expanded Notation.

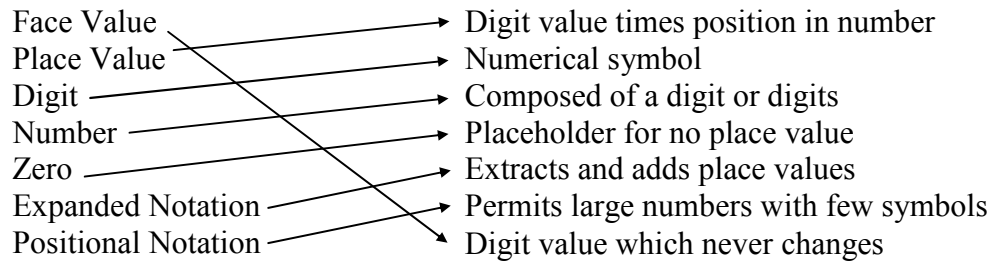
145 =	_____
9,191 =	_____
54,026 =	_____

Convert the Expanded Notations back into numbers.

$$300 + 70 + 2 = \boxed{}$$
$$2,000 + 800 + 0 + 1 = \boxed{}$$
$$90,000 + 7,000 + 800 + 50 + 6 = \boxed{}$$

Answers follow on next page.

Answers



Ten- Thousands Place 10,000	Thousands Place 1,000	Hundreds Place 100	Tens Place 10	Ones Place 1
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3	<i>Three</i>
30	<i>Thirty</i>
300	<i>Three hundred</i>
3,000	<i>Three thousand</i>
30,000	<i>Thirty thousand</i>

$$145 = \underline{100 + 40 + 5}$$

$$9,191 = \underline{9,000 + 100 + 90 + 1}$$

$$54,026 = \underline{50,000 + 4,000 + 0 + 20 + 6}$$

Including a placeholding 0 in Expanded Notation is optional but advisable so you don't overlook a place.

$300 + 70 + 2 =$	372
$2,000 + 800 + 0 + 1 =$	2,801
$90,000 + 7,000 + 800 + 50 + 6 =$	97,856