

# Introducing Exponents

Before we start evaluating expressions, we need to talk about exponents.

$$\text{_____} \rightarrow 4^3 =$$

**Express the following using Exponents (Exponent Form).**

1.  $7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7$

2.  $3 \cdot 3 \cdot 3 \cdot 3$

3.  $5$

4.  $12 \cdot 12 \cdot 12 \cdot 12 \cdot 12 \cdot 12 \cdot 12 \cdot 12$

5.  $3 \cdot 3 \cdot 3 + 4 \cdot 4$

6.  $2 \cdot 2 \cdot 8 \cdot 8 \cdot 8 \cdot 8$

**Express the following as a product of factors (Expanded Form).**

1.  $15^4$

2.  $4^2$

3.  $3^9$

4.  $6^3 + 2^2 \cdot 5^2$

**Express the following in Expanded Form and then in Standard Form**

1.  $5^3$

2.  $2^5$

Let's tie this into our Order of Operations.

P

E

M  $\leftrightarrow$  D

A  $\leftrightarrow$  S

1. $3 \cdot 6^2 + 4$	2. $24 \div 2^3 + 6$
3. $5^2 + 8 \div 2$	4. $25 - 8 \cdot 2 + 3^3$
5. $6 \cdot (13 - 7) \div (8 - 5)^2$	6. $12 \div 4 + (4^3 - 6)$

# Introducing Exponents

Before we start evaluating expressions, we need to talk about exponents.

$$\text{base} \rightarrow 4^3 = 4 \cdot 4 \cdot 4 = 64$$
 The number 4 is labeled "base" and the number 3 is labeled "exponent".

Express the following using Exponents (Exponent Form).

1.  $7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7$   
 $7^6$

2.  $3 \cdot 3 \cdot 3 \cdot 3$   
 $3^4$

3.  $5$   
 $5^1$

4.  $12 \cdot 12 \cdot 12 \cdot 12 \cdot 12 \cdot 12 \cdot 12 \cdot 12$   
 $12^8$

5.  $3 \cdot 3 \cdot 3 + 4 \cdot 4$   
 $3^3 + 4^2$

6.  $2 \cdot 2 \cdot 8 \cdot 8 \cdot 8 \cdot 8$   
 $2^2 \cdot 8^4$

Express the following as a product of factors (Expanded Form).

1.  $15^4$   
 $15 \cdot 15 \cdot 15 \cdot 15$

2.  $4^2$   
 $4 \cdot 4$

3.  $3^9$   
 $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$

4.  $6^3 + 2^2 \cdot 5^2$   
 $6 \cdot 6 \cdot 6 + 2 \cdot 2 \cdot 5 \cdot 5$

Express the following in Expanded Form and then in Standard Form

1.  $5^3$   
 $5 \cdot 5 \cdot 5$   
 $25 \cdot 5$   
 $125$

2.  $2^5$   
 $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$   
 $4 \cdot 2 \cdot 2 \cdot 2$   
 $8 \cdot 2 \cdot 2$   
 $16 \cdot 2$   
 $32$

Let's tie this into our Order of Operations.

P

E

M  $\leftrightarrow$  DA  $\leftrightarrow$  S

<p>1. <math>3 \cdot 6^2 + 4</math></p> $\begin{array}{r} \underbrace{3 \cdot 6^2} \\ 3 \cdot 36 + 4 \\ \underbrace{\phantom{3 \cdot 36 + 4}} \\ 108 + 4 \\ \underbrace{\phantom{108 + 4}} \\ 112 \end{array}$ <p style="text-align: right;">P E MD AS</p>	<p>2. <math>24 \div 2^3 + 6</math></p> $\begin{array}{r} \underbrace{24 \div 2^3} \\ 24 \div 8 + 6 \\ \underbrace{\phantom{24 \div 8 + 6}} \\ 3 + 6 \\ \underbrace{\phantom{3 + 6}} \\ 9 \end{array}$ <p style="text-align: right;">P E MD AS</p>
<p>3. <math>5^2 + 8 \div 2</math></p> $\begin{array}{r} \underbrace{5^2} \\ 25 + 8 \div 2 \\ \underbrace{\phantom{25 + 8 \div 2}} \\ 25 + 4 \\ \underbrace{\phantom{25 + 4}} \\ 29 \end{array}$ <p style="text-align: right;">P E MD AS</p>	<p>4. <math>25 - 8 \cdot 2 + 3^3</math></p> $\begin{array}{r} \underbrace{25 - 8 \cdot 2} \\ 25 - 16 + 27 \\ \underbrace{\phantom{25 - 16 + 27}} \\ 9 + 27 \\ \underbrace{\phantom{9 + 27}} \\ 36 \end{array}$ <p style="text-align: right;">P E MD AS</p>
<p>5. <math>6 \cdot (13 - 7) \div (8 - 5)^2</math></p> $\begin{array}{r} \underbrace{6 \cdot (13 - 7)} \\ 6 \cdot 6 \div (8 - 5)^2 \\ \underbrace{\phantom{6 \cdot 6 \div (8 - 5)^2}} \\ 6 \cdot 6 \div 3^2 \\ \underbrace{\phantom{6 \cdot 6 \div 3^2}} \\ 6 \cdot 6 \div 9 \\ \underbrace{\phantom{6 \cdot 6 \div 9}} \\ 36 \div 9 \\ \underbrace{\phantom{36 \div 9}} \\ 4 \end{array}$ <p style="text-align: right;">P E MD AS</p>	<p>6. <math>12 \div 4 + (4^3 - 6)</math></p> $\begin{array}{r} \underbrace{12 \div 4} + (4^3 - 6) \\ 12 \div 4 + (64 - 6) \\ \underbrace{\phantom{12 \div 4 + (64 - 6)}} \\ 12 \div 4 + 58 \\ \underbrace{\phantom{12 \div 4 + 58}} \\ 3 + 58 \\ \underbrace{\phantom{3 + 58}} \\ 61 \end{array}$ <p style="text-align: right;">P E MD AS</p>

(4)