### 2.2 Coefficients and Exponents

## Difference Between Exponents and Coefficients

A coefficient is a number that is multiplied to a variable. Remember, when expanding an expression that contains multiplication we use addition. Look at the following examples:

| Example 1-two numbers | Example 2-coefficient and variable <br> $3 \times 5=5+5+5$ |
| :--- | :--- |
| $3 x=3 \times x=x+x+x$ |  |

Expand the expressions so that it does not contain a coefficient.

| LP\#1 <br> $6 x$ | $4 y$ | $5 x^{2}$ |
| :--- | :--- | :--- |

An exponent is a number that is represented by using a superscript at the end of a term or expression. Remember, when expanding an expression that contains an exponent we use multiplication. Look at the following examples:

| Example 3 | Example 4 |
| :--- | :--- |
| $3^{5}=3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$ | $x^{4}=x \cdot x \cdot x \cdot x$ |

Expand each expression so that it does not contain an exponent.

| LP\#2 <br> $x^{4}$ | $y^{7}$ | $7 x^{3}$ |
| :--- | :--- | :--- |

State some differences between a coefficient and an exponent based on the criteria given.
By the looks

By the operation

Class Notes - State the coefficient and exponent to the variable to the following expressions.

| LP\#3 <br> $5 x^{4}$ <br> coefficient $=$ <br> exponent $=$ | $20 y^{2}$ |
| :--- | :--- | :--- |
| coefficient $=$ |  |
| exponent $=$ |  |$\quad$| $-\frac{1}{2} x^{4}$ |
| :--- |
| coefficient $=$ |
| LP\#4 |
| $w^{6}$ |
| coefficient $=$ |
| exponent $=$ |$\quad$| coefficient $=$ |
| :--- |
| exponent $=$ |$\quad$| $0.2 g$ |
| :--- |
| coefficient $=$ |
| exponent $=$ |

Class Notes - Evaluate the following expressions. Let $a=5, b=-6$, and $c=4$.

| LP\#5 <br> $3 a$ | $a^{3}$ | $2 b$ | $b^{2}$ |
| :--- | :--- | :--- | :--- |
| LP\#6 <br> $5 c$ | $c^{5}$ | $2(a+b)$ | $(a+b)^{2}$ |

Review - State the coefficient and exponent to the variable to the following expressions.

| R\#1 <br> $5 y^{8}$ <br> coefficient $=$ <br> exponent $=$ | $\begin{aligned} & \frac{4}{5} x^{3} \\ & \text { coefficient = } \\ & \text { exponent = } \end{aligned}$ | $11 x^{7}$ <br> coefficient $=$ <br> exponent $=$ | $m^{3}$ <br> coefficient $=$ <br> exponent $=$ |
| :---: | :---: | :---: | :---: |
| R\#2 <br> $0.25 x^{4}$ <br> coefficient $=$ <br> exponent $=$ | $-7 y^{14}$ <br> coefficient $=$ <br> exponent $=$ | $\begin{aligned} & -\frac{3}{4} x^{6} \\ & \text { coefficient }= \\ & \text { exponent }= \end{aligned}$ | $\begin{aligned} & 10 y^{9} \\ & \text { coefficient = } \\ & \text { exponent = } \end{aligned}$ |
| R\#3 <br> $-12 y^{8}$ <br> coefficient $=$ <br> exponent $=$ | $y$ <br> coefficient $=$ <br> exponent $=$ | $3 n^{10}$ <br> coefficient $=$ <br> exponent $=$ | $16 y^{2}$ <br> coefficient $=$ <br> exponent $=$ |

## Homework

State the coefficient and exponent to the variable to the following expressions.

1) $2 y^{5}$
2) $\frac{3}{4} x^{2}$
3) $7 x^{3}$
4) $m^{10}$
5) $-\frac{1}{5} x^{8}$
6) $0.5 x$
7) $-y^{7}$
8) $-\frac{5}{6} x^{11}$
9) $18 y^{9}$
10) $29 g^{4}$
11) $-9 y^{10}$
12) $x$
13) $6 n^{13}$
14) $8 y^{4}$
15) $-\frac{1}{10} p^{2}$

Evaluate the following expressions. Let $a=8, b=-3$, and $c=9$.
16) $a^{2}$
17) $4 b$
18) $5(a+c)$
19) $(c+b)^{3}$
20) $3(a+b)$
21) $(a+b)^{3}$
22) $c^{3}$
23) $5 c+a^{2}$
24) $b^{2}$
25) $(a+3 b)^{2}$
26) $(a+b+c)^{2}$
27) $3 a^{2}$
28) $10 b^{2}$
29) $2 c^{2}$
30) $2(a+b)^{2}$
31) $4 c^{2}$

## Synthesis

Condense each expression using exponents and/or coefficients.
32) $m+m+m+m+m$
33) $k \cdot k \cdot k \cdot k$
34) $w \cdot w \cdot w \cdot w \cdot w \cdot w \cdot w$
35) $c+c+c+c$
36) $b^{4}+b^{4}+b^{4}$
37) $h^{10}+h^{10}$
38) $x \cdot x \cdot+x \cdot x+x \cdot x$
39) $y \cdot y \cdot y \cdot y+y \cdot y \cdot y \cdot y$

